LASSEN PARK ROAD
Lassen Volcanic National Park
Mineral Vicinity
Tehama County
California

HAER NO. CA-270

HAER
CA-270

PHOTOGRAPHS

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WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Department of the Interior
1849 C Street, NW
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HISTORIC AMERICAN ENGINEERING RECORD

LASSEN PARK ROAD

HAER No. CA-270

LOCATION:	Lassen Volcanic National Park Tehama County, Mineral vicinity, California Shasta County, Viola vicinity, California
DATES OF CONSTRUCTION:	1925-1934
DESIGN:	National Park Service, Bureau of Public Roads
CONTRACTORS:	Various
STRUCTURE TYPE:	Park road system
OWNER:	National Park Service, Lassen Volcanic National Park
SIGNIFICANCE:	The Lassen Park Road—a thirty mile stretch of scenic mountain road through Lassen Volcanic National Park—is a classic example of early twentieth century park road design. The road, which is the sole means of automobile access to the greater part of Lassen Volcanic National Park, was carefully designed and located to maximize scenic opportunities for automobile tourists while preserving the majority of the park as wilderness. Built between 1925 and 1934, the Lassen Park Road is an example of an early collaboration between the National Park Service and Bureau of Public Roads in the design and construction of national park roads. It represents an important example of national park planning, development, and scenic road design in the early decades of the twentieth century.
HISTORIAN:	Leonard Warner, summer 2000
PROJECT INFORMATION:	Documentation of Lassen Park Road was undertaken during the summer of 2000 and 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. HAER (Eric DeLony, Chief) is administered by the Historic American Buildings Survey/Historic American Engineering Record (E. Blaine Cliver, Chief), a division of the National Park Service, U.S. Department of the Interior.

The historical report and photography were completed under the direction of Tim Davis, Program Historian, and Todd Croteau, Program Manager. Leonard Warner wrote the historical report, which was edited by Justine Christianson, HAER Historian, NCSHPO. Large format photography was produced by Brian Grogan.

Lassen Park Road

The Lassen Park Road carries motorists to the base of Lassen Peak, one of the largest plug dome volcanoes on earth. The park road traverses a wide variety of volcanic landscapes throughout its thirty-mile length, taking visitors through terrain that includes boiling fumeroles, ancient lava flows, fields of dwarf trees and massive granitic boulders. Motorists are presented with constantly changing views as the road traverses the variety of landscape types within Lassen Volcanic National Park (LAVO). The scenic mountain road was carefully located and designed to provide motorists with access to this unusual landscape. It passes through sub-alpine meadows and pine and hemlock forests, and offers superlative panoramic views of the surrounding countryside: the Sierra Nevada mountain range on the eastern horizon, the broad expanse of California's Central Valley, and the coastal Trinity Alps on the western horizon.

Congress established Lassen Volcanic National Park in 1916 to protect the unique natural features of Lassen Peak and its surrounding volcanic terrain. Lassen Peak, located at the southernmost end of the Cascade Mountain chain, was thought at the time of the park's establishment to be the only active volcano in the continental United States. Beginning in 1914, Lassen Peak entered into a six-year cycle of dramatic eruptions, laying a swath of destruction across a wide area. Shortly after the eruptions began, a movement to establish the park gained momentum in Congress, as its significant scenic qualities were recognized to be worthy of federal protection.[1]

As the principal road in the park, it is the primary means by which visitors experience Lassen Volcanic National Park. The road was built between 1925 and 1934. Although drainage and paving construction projects continued in the ensuing decades, it continues to fulfill the dual function for which it was originally designed: to provide visitor access to the volcanic landscape while retaining the majority of the park's acreage as wilderness.

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[1] John Ise, *Our National Park Policy: A Critical History* (Baltimore: Johns Hopkins University Press, 1961), 222-230.

The National Park Service (NPS) began construction of the road in 1925. In 1926, the NPS and the Bureau of Public Roads (BPR) entered into an interbureau agreement to design and build roads in the national parks. This collaborative undertaking between the two federal agencies ensured that park roads were built to the highest engineering standards while also protecting the natural landscape and scenic values. NPS landscape architects had the right to review and change contract specifications to assure that construction met strict NPS standards for landscape preservation. Construction of the road followed many of the classic road building policies that were used in national parks throughout the nation. Borrow pits were located out of sight of the road, construction was carried out within a narrow right-of-way to preserve existing vegetation, and shoulders were sloped to prevent erosion and to present a more naturalistic appearance.[2]

Some of the most prominent names in NPS park development and road construction were involved in the Lassen Park Road's design. NPS chief engineer George Goodwin conducted surveys and assisted in road location decisions in the early 1920s. Frank Kittredge, who became NPS chief engineer in 1927 carried on the work initiated by Goodwin. NPS chief landscape architect Thomas Vint consulted on landscape development, and landscape architect Merel Sager supervised construction projects, ensuring road-building projects did not impair the park's scenic resources.

Upon establishment of the national park, the NPS and local park promoters began to seek ways to open the area to the motoring public. While a number of alternative routes and park road systems were considered during early park development planning, the decision to provide a single scenic road through the park followed the principles of park road building pursued by NPS Director Stephen Mather.[3] The Lassen Volcanic National Park

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[2] Linda McClelland, *Building the National Parks: Historic Landscape Design and Construction* (Baltimore: Johns Hopkins University Press, 1998), Chapter III.
[3] Horace Albright as told to Robert Cahn, *The Birth of the National Park Service: The Founding Years 1913-38* (Chicago: Howe Brothers/Institute of the American West Book, 1985), 195-196.

road represents a classic example of scenic mountain road design developed by the National Park Service in the 1920s and 1930s.

Description

The Lassen Volcanic National Park road extends 29.86 miles to connect the southwest and northwest entrances to LAVO, and also serves as a connecting highway between California State Route 44 along the park's northern boundary and State Route 36, which travels along the park's southern border. The park road connects on each end with State Route 89, which extends in a northwest/southeast direction between the town of Mount Shasta in Siskiyou County to its junction with U.S. Route 395 in southeastern Plumas County. It includes territory in Tehama and Lassen County. Its elevation ranges between 6646' at the southwest entrance of the park near the Sulphur Works, climbs to an elevation of 8511' near the summit of Lassen Peak, and descends to an elevation of 5808' at its northwest terminus near Manzanita Lake.

If starting from the south on California State Highway 36, visitors approach the park from the town of Mineral in Tehama County. Approximately five miles east of Mineral, at Morgan Springs, Highway 36 intersects with Highway 89, the southwest approach road to the park. From this junction, Highway 89 travels for approximately four miles through the Lassen National Forest where the surrounding pine forest foreshortens views. Upon reaching the Raker Memorial Gateway at the park's southwestern boundary, a monumental lava rock masonry pylon, 15 1/2' in height, and originally constructed in 1931, displays a painted wooden sign announcing the entrance to Lassen Volcanic National Park. Opposite the large lava rock pier, a smaller pylon, built to a height of 7'-9", is constructed of the same material as its larger counterpart across the road.

Approximately one mile past the Raker Memorial Gateway at the southwest entrance to the park, views expand beyond the forest and the unique landscape of LAVO comes into view. Two side-by-side checking stations (erected in 1963) and a parking area accommodate visitors. Just beyond the checking kiosks motorists reach the parking area

for the Chalet, which operated in conjunction with a downhill ski area between 1966 and 1993. A kiosk, staffed by park personnel, offers visitor information, and brochures, booklets and trail maps are available. The Chalet, constructed in 1964, once served patrons of the Lassen Ski Area, which was closed in 1993. The Chalet is now open in summer only, and a snack bar, gift shop and outdoor observation deck serve visitors. Adjacent to the Chalet is the parking lot for the Southwest Walk-In Campground, where hiking trails lead to the Mill Creek Falls.

Approximately one mile past the checking station, the road crosses over the west fork of Sulphur Creek on a continuous deck, steel stringer bridge, 214'-3" abutment-to-abutment. Construction for the bridge began in 1964 and was completed in 1966. A parking area on the north (west) side of the road provides parking for visitors to the Sulfur Works and a trailhead leads to the Ridge Lakes area. The parking area is edged with a continuous, low rising (approximately 18") lava rock masonry wall. The wall continues to the bridge parapet wall along the west side of the road. A boardwalk with interpretive signs leads visitors on a self-guided tour through this interesting, active and dangerous geothermal area adjacent to the park road. Gaseous emissions from the steam vents at the Sulfur Works fill the air with hydrogen sulfide (H_2S) and sulfur dioxide (SO_2). Steam and carbon dioxide emitting from vents in the earth wafts over the road, carried on the wind. LAVO is sometimes called "little Yellowstone" for its geothermal features, and this analogy is nowhere more fitting than in the southwest entrance area, in the vicinity of the Little Hot Springs Valley. The road passes through a landscape of light colored bedrock, bleached a pale shade of yellow by underground volcanic gases and steaming water. Vegetation includes stands of western white pine and red fir trees, as well as a variety of groundcover and a profusion of wildflowers, especially lupine and mountain mule ear. In late summer, yellow rabbitbrush blooms in low bushes along the road shoulders.

As the road passes the Sulfur Works it begins its ascent along the flank of Diamond Peak on a steady grade and on a long tangent before curving around the eastern face of Diamond Peak. Benched into the mountainside, the road provides a panoramic view of

Brokeoff Mountain, Mount Diller and Pilot Pinnacle on the eastern horizon. An historic, rustic-styled wooden horizontal log sign with saw-toothed edges and painted brown with white lettering indicates Brokeoff Mountain (elevation 9235', the second highest peak in the park) and is visible to the southwest.

Having climbed from an elevation of approximately 6500' at the Sulfur Works to Diamond Point, the road begins a series of switchbacks as it negotiates the head of the Little Hot Springs Valley, and offers a variety of views toward Lassen Peak. Numerous culverts with rustic stonemasonry (lava rock) headwalls provide drainage and are visible from the road in this location. Roadside slopes are banked to achieve a rounded appearance, however, the talus is exceptionally loose, and vegetation is sparse. Small rockslides are common in this location and a warning sign alerts motorists to the danger of falling rocks. At switchbacks and at tight curves in the road, small boulders and large rocks edge the road, discouraging drivers from pulling off at undesignated spots. Pull-out parking areas are provided in several locations to take in the view to the Little Hot Springs Valley. Interpretive signs at one wayside describe the geological and volcanic processes that created the strange and colorful landscape of the Little Hot Springs Valley, where manganese, iron and sulfur deposits have tinted the earth shades of blue, red and yellow.

The road reaches an elevation of approximately 8000' at Emerald Lake, and parking areas are provided on either side of the road. Sunlit algae on the bottom of the shallow lake give the water its vibrant blue-green color. At this elevation, red pine trees are replaced by mountain hemlock. Approximately one mile past Emerald Lake, a large parking area on the east side of the road is located to serve visitors to the largest and one of the more active areas of geothermal activity, Bumpass Hell. A trailhead leads to the Bumpass Hell area, a remarkably diverse geothermal landscape that includes boiling springs, mudpots and steam vents. Comfort stations, interpretive signs and trail markers serve visitors stopping to enjoy the eastern view from the parking area. This panorama encompasses the Caribou Wilderness (adjacent to the park's eastern boundary) of the

Lassen National Forest and offers perspectives of Lake Almanor and the Plumas National Forest. The northern extremity of the Sierra Nevada range defines the eastern horizon. Approximately one mile past Bumpass Hell, the road snakes around the shore of Lake Helen, elevation 8164'. The landscape opens up and the view from the road provides vistas of snow-capped Lassen Peak, reflected in the still waters of Lake Helen.

The road reaches its highest elevation—8512'—at the base of Lassen Peak (10,475'). The trailhead to the summit is located adjacent to the parking area on the west side of the road. Year-round snowfields make this a popular stopping spot, even for those visitors not intending an ascent of Lassen Peak. Often, hikers on the Lassen Peak trail can be seen from the park road as they climb the mountain's steep, exposed and barren southern flank. From its high point near the Lassen Peak trailhead, the road begins a slow and gentle descent, while a series of switchbacks and hairpin turns following natural topographic contours negotiate the mountainous, forested terrain. Occasional pullout parking areas provide opportunities to stop and enjoy the views to the east, which include Harkness Mountain and the head of the Warner Valley in the southeast corner of the park.

The road continues to descend on a maximum 6 percent grade as it traverses the southwest flank of Redding Peak. A hairpin turn switches back and views to Lassen Peak loom ahead. The road turns again, and continues on a gently winding descent toward Kings Creek through a forest of red fir trees and pinemat manzanita bush. As the road levels at Kings Creek Meadow, the lush valley, fed by Kings Creek as it meanders through the meadow, frames a distant view of Lassen Peak. Wildflowers—including paintbrush, bog kalmia, larkspur and monkeyflowers—and grasses blanket the meadow in a dense vegetative cover. The road crosses over Kings Creek on a 4' x 4' arch concrete culvert bridge. The culvert is finished with lava rock stone masonry, and headwall architectural details include a lintel and ringstones. An unpaved parallel parking area on either side of the road provides access to the trailhead for Kings Creek trail, a popular two-mile hike to Kings Creek Falls.

From Kings Creek the road follows a gently winding course on a level grade through a forested landscape. Jeffrey and lodgepole pine, red fir and northern white pine contribute to the diversity of the conifer forest. Drivers enjoy occasional distant views through the forest toward Mount Harkness and the head of Warner Valley in the southwestern section of the park. Beyond, views to the Plumas National Forest and the peaks of the northern Sierra Nevada are intermittently available. As the road continues through the pine forest, it reaches the campground at Summit Lake, approximately two miles past Kings Creek. The lake is partially visible to the east of the road through a screen of trees. Another campground, North Summit Lake, serves as an overflow camping area and offers additional camping facilities near Summit Lake. A ranger station is located at the parking area for the North Summit Lake campground. Hikers may park at the North Summit Lake parking area for access to the central and eastern sections of the park, along wilderness trails to Twin Lakes, Horseshoe Lake, and Butte Lake near the park's northeastern border and to Juniper Lake near the park's southeastern border.

Past Summit Lake, the road passes through a section of Dersch Meadows on a long tangent and provides intermittent, direct views of Lassen Peak through a mixed aspen and pine forest. Approximately three miles past Summit Lake the road reaches the Hat Creek parking area where a short trail leads to Hat Lake. The parking area is a popular stopping point for motorists, as it provides a direct view of Lassen Peak beyond the Hat Lake area. A dark-brown painted wooden post sign with white lettering announces Hat Lake near the trailhead. A box-culvert bridge carries Hat Creek under the park road. Rustic stonemasonry headwalls extend above the surface of the road to form a low-rising stone curb at the road's edge.

Approximately one-half mile beyond the Hat Lake parking area, another parking area is located to take advantage of the views to Lassen Peak and the Devastated Area. The paved parking area, with space for approximately thirty cars, is edged with a square, lava rock masonry curb. Interpretive panels describe basic geological processes and the volcanic phenomena that created the Devastated Area. This locale was the site of wide-

scale destruction associated with the last major eruption of Lassen Peak in 1917; today the forest has regenerated and the view from the parking area takes in a heavy pine forest with Lassen Peak visible beyond the treetops. Several large groves of aspen trees on either side of the road west of the Devastated Area, emerging as part of the cycle of forest succession, offer a contrast to the evergreen forests that characterize much of the park road's associated landscape.

As the road continues on a relatively straight northwesterly course past the Devastated Area and through intermittent aspen and conifer forests, it crisscrosses a section of the Nobles Immigrant Trail near the park's northern boundary, and roughly parallels the route of Lost Creek. The Nobles Immigrant Trail crosses the road in two locations between Hat Creek and Sunflower Flat. Vegetation is regularly cut back in these spots to create discrete vistas and to preserve the trace of the historic immigrant trail.

The road passes over Lost Creek on a dual-span concrete box culvert bridge. Consistent with the culvert bridges at Kings Creek and Hat Creek, the Lost Creek culvert headwalls are constructed of concrete with rustic-cut lava rock stonemasonry veneers. Past Lost Creek, the road makes a sharp turn in a south-southwesterly direction. Roadside groves of manzanita bush and ponderosa and Jeffrey pine trees frame direct views of Lassen Peak, offering yet another perspective on the mountain as the road swings around to the northwest corner of the park.

Approximately two miles past the crossing of Lost Creek, the most dramatic evidence of recent volcanic activity confronts the motorist at the roadside areas known as Chaos Crags and Chaos Jumbles. This is an area strewn with massive volcanic boulders that spilled from an earlier, eighteenth-century eruption of Lassen Peak. The road is at its furthest point from the peak in this location, but the destructive force of the volcano is perhaps the most striking here. The trail of lava flow and rock avalanches is clearly visible from the summit of Lassen Peak to within yards of the shoulder of the road. A

parallel parking area on both sides of the road offers drivers a chance to stop and contemplate the view.

As the road passes the Chaos Jumbles it begins a slow and gentle descent to the Manzanita Lake developed area. The Manzanita Lake campground road joins the main park road at a wye intersection, and leads motorists to a series of four loop roads that define and provide access to the campsite areas. Manzanita Lake campground is the largest campground in the park and amenities include a camp store as well as an amphitheater where park interpretive staff offer natural and cultural history lectures.

West of the Manzanita Lake campground entrance, the road passes the Loomis Museum and seismograph station. A parking area, ranger station and restrooms are located across a pedestrian plaza. In addition to its educational displays and small bookshop, the museum currently functions as the main visitor center for LAVO. The museum complex is located near the northern shore of Manzanita Lake and across the road from the southern shore of Reflection Lake. On the north side of the road, across from the museum, a naturalist's residence, erected in 1934, is nestled in a grove of pine trees. It is partially visible from the road and is a classic example of the kind of rustic architecture developed for the national parks in the 1920s and 1930s. Its foundation is clad in roughly cut lava rock boulders, a pair of shed dormer windows punctuates a steeply gabled roof, and its rough-hewn wood siding is stained a dark shade of brown.

The road passes between Reflection and Manzanita Lakes just beyond the museum area. The lakes are visible on either side of the road through a thin screen of pine trees. The view of Lassen Peak from the shores of Manzanita Lake is one of the more scenic vistas in the park: a heavy pine forest encircles the shoreline and frames views to the snow-capped mountain, which is mirrored in the water of Manzanita Lake.

The road approaches the northwest entrance to the park near the northern shore of Manzanita Lake. A single central checking station designed and built in 1931 is clad in

dark-stained wood siding, has a steep gable roof, and includes such details as mullioned windows, copper lanterns and a seasoned, peeled wood flagpole. The Manzanita Lake ranger station is located opposite the checking station. It is a gabled frame structure, with a pair of dormer windows, also clad in wood siding painted a dark brown (tobacco) color. Wood shake roof shingles are painted a dark shade of green. A lava rock masonry chimney adds to its picturesque and rustic appearance. The park road extends for approximately one-half mile past the northwest entrance station to the park's western boundary and the road's junction with State Route 44.

Road Characteristics/Alignment:

The park road is a two-lane asphalt roadway, 26' wide, shoulder-to-shoulder. It was originally constructed as a 16' wide compacted gravel road, with gravel gutters, conforming to contemporary park road building standards. A 2.5" gravel subgrade underlay a 3" crushed rock surface, which was treated with hot-spread bituminous material. In 1952, the eight-mile section between the southwest entrance and the summit was re-surfaced with bituminous concrete or "asphalt." In 1959, the section between the summit and Hot Rock (13.7 miles) was paved with asphalt. By 1971, the entire road was surfaced with asphalt. Yellow centerlines and white fog lines define the boundaries of the driving lanes. The minimum length of curvature is 200', with the exception of the curve around Diamond Point, where topography prevented wider curves. Vertical grades do not exceed 6 percent throughout the length of the road.

Retaining Walls:

A concrete crib retaining wall erected in the early 1970s, and rebuilt/rehabilitated in 1993, shores up the heavy cut at the western front of Diamond Peak. Known as the Diamond Sidehill, this retaining wall replaced an earlier hand laid rubble wall dating from the period of original construction in the mid-1930s. An additional retaining wall, originally installed downslope near the Raker Gateway in 1934 during reconstruction of the southwest approach road, has also been reconstructed as a concrete crib system.

Several gabion retaining walls help to stabilize slopes, including a large gabion structure at the Emerald Sidehill, which was constructed in 1983.

Curbs and Shoulders:

For most of its length, the park road is without curbs or asphalt shoulders. Adjacent to parking areas (at Sulphur Works, Bumpass Hell, the Devastated Area, and Hat Creek), curbs mark the transition from the road to the parking lots. In addition, an asphalt curb was added near the Hat Creek culvert, helping to channel rainwater and snowmelt off the road into underground drainage pipes. In modern reconstruction projects curbs have been added in some locations to assist in drainage and to control spring runoff.

Drainage System:

Most of the drainage on the park road is accomplished through gravel gutters at the road's edge, carrying snowmelt and rainwater to paved run-offs and corrugated metal, vitrified concrete, and plastic culvert drainpipes. Headwalls as well as rustic stone veneered box culvert bridges—at Lost Creek and at Hat Creek—were constructed along the road to blend into the landscape, using native stone and lava rock. A culvert bridge at Kings Creek features a 4' x 4' masonry arch, which channels the perennial waters of Kings Creek under the road.

Parking Areas and Pullouts:

Paved parking areas are provided along the length of the road—at scenic lookouts, at trailheads, and near areas exhibiting the effects of volcanic activity. Parking lots are also provided at Emerald, Helen, Hat and Summit Lakes, and the Devastated Area. Interpretive markers at the Sulphur Works boardwalk, at Little Hot Springs Valley, Bumpass Hell, Hot Rock and the Devastated Area provide basic geological information. Comfort stations are located at the larger parking areas, including the Lassen Peak Trail parking area, Bumpass Hell and the Devastated Area parking lots.

In addition to formal, paved parking areas, informal pullouts have developed along the length of the road. In places, barrier rocks have been installed to discourage cars from stopping at undesignated locations, at potentially dangerous, narrow or winding stretches of road. Barrier rocks are located along the switchbacks between the summit and the southwest entrance, serving to enhance driver safety and to protect and preserve the adjacent landscape. The barrier rocks also edge pullout parking areas at the Lake Almanor lookout, located between the summit and Kings Creek Meadows.

Signs:

Five signs along the road, dating from the early to mid-1930s, point out landscape features to automobile tourists. The signs are uniformly painted a dark brown color with raised, Art Deco-styled white lettering on saw-toothed planks; however, their shapes and methods of construction vary. The Hat Lake and Manzanita Lake signs are rectangular signs mounted on posts, while the Diamond Peak, Raker Peak, and Brokeoff Mountain signs are mounted on horizontal log bases. The Hat Lake sign is mounted on a heavy timber post, where tree rings exposed on the top of the post are outlined in white paint. In addition to these rustic-style signs, contemporary regulatory signs indicate speed limits, which range from a minimum of 25 mph at tight curves to 45 mph between the Devastated Area and Lost Creek; most of the road is posted for 35 mph travel. Other metal signs occasionally warn of areas of potential rockslides and alert drivers to hairpin turns.

The Lassen Area

In the early nineteenth century, the Lassen area was a province of Mexico, but by 1848, when California was ceded to the United States, land grants issued by the Mexican government to settlers had encouraged the establishment of ranches, farming and prospecting operations. One of these land grants was issued to Danish immigrant Peter Lassen, who established "Rancho Bosquejo" in the northern Sacramento Valley in 1844.[4]

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[4] Ruby Johnson Swartzlow, *Lassen: His Life & Legacy* (Mineral: Loomis Museum Association, 1964), 6-19.

Lassen and other pioneers developed wagon trails, including the Applegate Trail, the Nobles Trail and the Lassen Trail through Northern California and the Cascade Mountains of southern Oregon. Following discovery of gold in California, passage on these trails increased as settlement extended into the northernmost reaches of the Sacramento Valley.

In 1857, the United States Army commissioned a survey of the region in order to establish a railroad route into northern California. Though the transcontinental railroad was constructed further south through the Sierra Nevada at Donner Pass, in the early 1860s the state legislature authorized the Tehama County Board of Supervisors to issue a bond for road construction using the Army's survey as basis for establishing an east-west cross-county transportation corridor. The Tehama Wagon Road opened in 1862 and was maintained as a toll road between Susanville in Lassen County and the town of Mineral in Tehama County. A wagon road extended westward from Mineral to the Tehama County seat of Red Bluff, a riverside town located along the northernmost navigable section of the Sacramento River. By 1870 a rail line was completed between Red Bluff and Oakland, increasing the pace of permanent settlement in the region, and establishing means of communication and transportation with the growing metropolitan San Francisco Bay area. Homesteaders continued to settle in the Lassen area throughout the mid- to late-nineteenth century, though not in great numbers. At the turn of the century the territory remained largely a wilderness area, with large areas of forests being actively logged. And while the area that now defines the park's boundaries remained a remote district more than fifty miles from transportation systems, a number of homesteaders settled in the southern sections of the park, operating as prospectors and cattle and sheep ranchers.[5]

By the early decades of the twentieth century, the railroads had extended well into the Lassen area. The Western Pacific Railroad established a station at Westwood, a logging

[5] *Farris & Smith's Illustrated History of Plumas, Lassen and Sierra Counties and Biographical Sketches of Their Prominent Men and Pioneers* (Berkeley: Howell-North Books, 1971), 342.

town owned by the Red River Lumber Company and a major distribution point for area logging operations. A branch of the Central Pacific reached Susanville and a spur connection was built to the town of Keddie in Plumas County. The main line of the Southern Pacific served Red Bluff and Redding.

In 1902, the Department of the Interior proposed setting aside 750,000 acres in the Lassen area as the "Lassen Peak Forest Preserve," and by 1905 more than 3 million acres were under federal protection. In 1905, Congress transferred the jurisdiction of "forest reserves" from the Department of the Interior to the Department of Agriculture. In 1907, encouraged by petitions from local citizens and led by local Congressman John E. Raker, President Theodore Roosevelt declared Lassen Peak and Cinder Cone national monuments, federal sanctuaries in which development of the land was forbidden. Seeking to expand the protected area, Raker first introduced a bill in the 62nd Congress in 1912 to establish "Peter Lassen National Park." Though he initially lacked congressional support, Raker continued to pursue the park idea in the 63rd and 64th Congresses.[6]

As Raker continued to lobby in Congress to establish the national park, nature interceded. In 1914, Lassen Peak began a six-year cycle of eruptions. A local photographer, Benjamin Loomis, captured dramatic images of the volcanic event, and his pictures were widely published in local, state and national newspapers, as well as in scientific journals.[7] Lassen was believed at the time to be the only active volcano in the continental United States. On May 14, 1915, the most spectacular eruption occurred. Great torrents of melting snow, gasses and volcanic ash tore through more than eighteen miles of surrounding countryside, leveling trees, strewing massive boulders and causing destructive mud flows across a large area.

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[6] Ise, 222-230

[7] In addition to newspaper accounts in the *San Francisco Examiner* and the *Seattle Star*, the journal *Science* covered the Lassen story in its issue of 26 May 1916. Douglas H. Strong, *Footprints in Time: A History of Lassen Volcanic National Park*, 5th ed. (Red Bluff, CA: Loomis Museum Association, 1998), 39.

Raker capitalized on the popular and scientific excitement caused by the active volcano and reintroduced his bill in Congress to establish the national park, which was passed on December 6, 1915. As a political expedient, and to ensure its passage, Raker's bill defined the new park as a sort of hybrid, a composite of a national forest and a national park. The bill effected a compromise with local industry: logging and ranching interests were provided for as the bill permitted the sale of downed and dead timber and allowed grazing permits to be sold.[8] On August 9, 1916, President Wilson signed the legislation into law, creating Lassen Volcanic National Park. The establishing legislation was signed just days before creation of the National Park Service, making it the fourteenth park in the newly established agency of the Department of the Interior.[9] In addition to compromises with logging, ranching and water reclamation interests, Congress imposed a strict budget cap on the newly established park. Like the establishing acts for Rocky Mountain and Hawaii Volcanoes National Parks enacted the same year, annual appropriations were limited to $5000, however, appropriations never rose above $3000 until 1925.[10]

Forest Service Cooperation and Early Roads in LAVO

Due to the congressional mandate restricting the park's annual budget, the NPS turned to the Forest Service for administration and protection of the park's resources. Limited funding prevented the NPS from appointing a ranger to guard the park and its visitors, and Forest Service fire lookouts and boundary patrols guaranteed a minimum of protective oversight. The park remained a distant and inaccessible locale, however, as visitors had to make their way over rough wagon roads to reach the park's borders. From the various stub roads leading into the park, the scenic attractions and volcanic landscapes could only be accessed via horseback or on foot.

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[8] These compromises that undermined preservation of the park's natural resources were removed in 1931. See Ise, 222-224; also Robert Shankland, *Steve Mather of the National Parks*, 3rd ed. (New York: Alfred A. Knopf, 1970), 170-71.
[9] 39 Statute, 442.
[10] Ise, 224.

Existing roads entering the park were of a very low standard, and could hardly be called "roads." When the park boundaries were drawn, they encompassed several areas of private property, particularly in the park's southeastern section, in the Warner Valley. A rough road constructed in the late nineteenth century led from the Plumas County town of Chester to several ranches in the Warner Valley, including the Lee and Sifford properties. These ranches provided pack animals and overnight tent lodging for adventurous tourists intending to explore the new national park.

On the park's northern front, a truck trail led through the national forest to Butte Lake, a spot popular with local fisherman. This rough truck trail also served as a means to reach the nearby Cinder Cone, just east of Butte Lake. On the park's western front, a spur from a forest road extended into the park as far east as the Devastated Area, past Hat Creek. Laborers hired by Benjamin Loomis built this rough road from Manzanita Lake to the Devastated Area, in the early 1920s, following the eruptions of Lassen Peak.[11]

Finally, on the park's southern front, a rough wagon road led from the county road (the old Tehama Wagon Road) to the Little Hot Springs Valley. Mathias Supan, an Austrian immigrant who began a sulfur extraction and refinery operation in the 1860s, had developed a small-scale sulfur mine here. In order to gain easier access to his sulfur mine, Supan carved out a wagon trail from the Tehama County Road to his claim stake. His entrepreneurial endeavors included making dyes out of salts extracted from the active fumerole and hot springs area. During the winters when heavy snows made the area inaccessible, Supan worked as a pharmacist in Red Bluff, selling various concoctions of sulfur and alum he called "mine medicines," including "Supan's sour powder," "Supan's baby colic," and "Supan's rheumatic remedy."[12] The road to Supan's property crossed through approximately ten miles of the Lassen National Forest, and extended into the park approximately one mile beyond its southern boundary. In sum, four different rough roads, or wagon trails, had carved paths into the park. With the exception of the Butte

[11] Douglas H. Strong, *These Happy Grounds: A History of the Lassen Region*, 4th ed. (Red Bluff, CA: Loomis Museum Association, 1989), 55.
[12] Strong, *Footprints in Time*, 26-27.

Lake road, each traversed, and led to, private property. These properties, and the roads to them, later became focal points in park development plans.

While roads led into the park from the north, south, east and west, none were adequate to serve automobile tourists. In addition, before any park development projects could begin, a serviceable approach would have to be constructed to accommodate construction equipment. The highest quality highway closest to the park boundary in the early 1920s was the old Tehama Wagon Road, now State Route 36, along the southern boundary of the park, which extended between Red Bluff and Susanville. The rough wagon road leading to the Supan property took off from this road near the town of Mineral. Despite the higher elevation at the southwest boundary, where greater amounts of snow fell than at the northwest corner of the park, the Supan Wagon road was otherwise preferable to the existing Butte Lake, Warner Valley or Manzanita Lake entrance roads. Appropriately, the southwestern approach brought visitors to the park's active volcanic landscape in the Little Hot Springs Valley, and private property holdings were less extensive here than in the northwest or southeast section of the park. The park's limited budget, however, meant that creative solutions would have to be found to initiate development and to make the park accessible to the motoring public.

While Raker continued to lobby Congress for increased park appropriations, Stephen Mather, Director of the National Park Service turned to the Forest Service for assistance. In the summer of 1920, Mather brokered an arrangement to develop roads for LAVO with Paul Redington, the San Francisco-based District Supervisor of the U.S. Forest Service. The agreement between the two agencies stipulated that the park's annual budget would be turned over to the Forest Service for Redington's road crews to "undertake and supervise necessary road and trail construction work in the park."[13] Due to the priority given to road building, the park's modest annual budget left no funds to hire a park ranger. Administrative supervision of the park fell to Washington B.

[13] Arno Cammerer, Mather's assistant in Washington, formalized the agreement with the Forest Service in a letter to E.A. Sherman, the Chief Forester of the U.S. Forest Service. Cammerer to Sherman, 31 July 1920, LAVO central administrative files, LAVO.

("Dusty") Lewis, superintendent of Yosemite, who served as the park's nominal superintendent until a permanent ranger was hired in 1923. Prior to the appointment of a full-time ranger, Forest Service fire lookouts and boundary patrols did their best to protect the park's resources.[14]

These ad hoc arrangements for park supervision and road development reflected the fact that, in the late 1910s and early 1920s, the NPS was establishing its role as custodian of the nation's scenic resources. The Forest Service viewed natural resource management as a means to maximize the economic potential of public lands—through reclamation projects, mining leases and logging programs—while the NPS distinguished itself as the nation's chief agency for conservation of resources to protect scenic values.[15] LAVO had been created within the boundaries of the Lassen National Forest, and compromises had been written into the park's establishing act allowing certain commercial activities—grazing leases and limited timber harvests—to continue. Economic interests, including cattle and sheep ranching, timber harvesting and water reclamation projects represented powerful political forces challenging the new service's goals of scenic and wilderness preservation.[16] The deal struck between Mather and Redington was a practical, if impermanent, solution to open the area up to tourism.

At Mather's direction, Lewis traveled to LAVO to report on the status of the park and the Forest Service road building program. He observed that the road, "is not a boulevard, being only wide enough to drive over." Lewis expected that "later on [it] can easily be widened and improved into a very good automobile road at a reasonable expense."[17]

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[14] Strong, *Footprints in Time*, 54-55.
[15] See Ronald A. Foresta, *America's National Parks and Their Keepers* (Washington, D.C.: Resources for the Future, Inc. 1984), 16-38, for a discussion of the potential for political and philosophical conflict between the U.S. Forest Service and the NPS. For an analysis of the prevailing philosophy guiding federal natural resources management policy in the early decades of the twentieth century, see Samuel P. Hayes, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920* (Cambridge: Harvard University Press, [1959]; reprint New York: Athenaeum, 1979).
[16] Alfred Runte, *National Parks: The American Experience*, 2nd ed. (Lincoln: University of Nebraska Press, 1987), 106-138.
[17] Lewis to Mather, 24 June 1921, LAVO.

Near the end of the construction season, Lewis returned to the park in order to make a final report to Mather on the park approach road under construction. He noted that nearly eight miles of road between the park's southern boundary and the Red Bluff-Susanville Highway had been completed for "a little less than $5000." Lewis claimed that "considering the character of the country the road goes through" this price was an "exceptional value." [18]

The Forest Service had brought a serviceable, though low-standard road to within one quarter of a mile of the park boundary but Lewis noted, "we have nothing in the way of a road within the park." Lewis "hope[d] that funds would be available from somewhere to continue it up to the foot of Mt. Lassen." The Forest Service had kept a "careful watch …on the expenditure of every dollar," and Lewis indicated there was "little, if any, opportunity to secure money from the Forest Service" to continue the road at least to the park boundary. Lewis raised the possibility of exploiting local interest to assist in developing a road system for the park. Lassen National Forest Supervisor, C.E. Dunston, had already approached the Tehama County Board of Supervisors who seemed, according to Lewis, "favorably inclined" towards assuming responsibility for maintenance of the newly improved approach road to the southwest park boundary. Lewis thought that the county's interest in establishing Red Bluff as a park gateway could be leveraged, and suggested that the county could be "induced to expend at least as much on a road inside of the park as we have expended on the one outside."[19]

While Tehama County officials had been approached to consider funding road construction in the park, Shasta County interests, centered in Redding, had taken a decisive step toward asserting its claim on park development planning. In 1921, the Redding Chamber of Commerce allotted $500 to fund a park road survey.[20] Lewis suggested that it might be possible to get the two counties to work together to develop a park road system. He outlined a plan to continue the road just completed by the Forest

[18] Lewis to Mather, 1 November 1921, LAVO
[19] Lewis to Mather, 1 November 1921, LAVO
[20] Strong, *Footprints In Time*, 58.

Service into the park where it would traverse the east shoulder of Lassen Peak, continue to Manzanita Lake, and connect with the state road to Redding (the "Redding-Alturas Highway," now, State Route 299). Lewis characterized this plan as providing a "loop," which would benefit both Red Bluff and Redding. Lewis claimed it would "offer far more attraction to motorists" than would a single, dead-end road into the park which would make it necessary to traverse the same road in both directions. Lewis' strategy to solicit cooperation from area communities was based on his perception that LAVO would be "more or less a local proposition for some time to come."[21]

Park Promotion and Local Interest

Lewis had implied that the principal obstacle to the park's development was its remote locale. Its location in far northern California, more than two hundred miles from the major population center of the San Francisco Bay Area, where the majority of the park's potential patrons resided, made it an unlikely destination for the urban tourist. An editorial in the *San Francisco Chronicle* reproached northern Californians for providing so little in the way of road construction to make the park accessible to the motoring public, and asserted that if the park had been located in southern California it would have been developed and made world famous.[22] Yosemite, General Grant (now King's Canyon) and Sequoia were more well known, popular, and more easily accessed park destinations in the state, due to an improved network of state and county highways, as well as improved roads within these older parks.[23] Without adequate access roads, the park would remain isolated from the majority of its prospective clientele. Consequently, roads became the key to the park's future.

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[21] Lewis to Mather, 1 November 1921, LAVO.
[22] "A Neglected Scenic Region," *San Francisco Chronicle*, 2 March 1921, quoted in letter from Raker to Mather, 15 March 1921, LAVO.
[23] Larry M. Dilsaver and Douglas Strong, "Sequoia and Kings Canyon National Parks: One Hundred Years of Resource Management," *California History* vol. 69: 98-117, 219-21; Ise, Chapters II-III.

National Park-to-Park Highway

When Stephen Mather was appointed the first Director of the NPS in 1916, he embarked on a tour of the parks to assess local situations. At Rocky Mountain, he met a group of automobilists based in Denver who advanced the idea of connecting the disparate parks with a highway, forming a 3500-mile automobile touring route beginning and ending in Denver. Mather quickly began promoting the National Park-to-Park Highway, using his contacts in the newspaper business to ensure coverage in the national media. In 1918, he personally traveled much of the Park-to-Park highway. The *Brooklyn Eagle* newspaper sponsored a national park tour in 1919, and the following year the route was officially dedicated.[24] Turning to local chambers of commerce, state highway building authorities and park booster organizations, Mather presented a sort of "package deal" in which park promotion at the local level could be tied into a system-wide tourist route throughout the western states. Improved roads within and to the parks were necessary from both a public relations and an economic perspective. Better roads to and within the parks would create a favorable impression on the traveling public, and increased visitation made possible by improved transportation networks would demonstrate the public's demand for scenic recreational travel in the national parks.

Originating in Denver, the Park-to-Park Highway entered California from Arizona. The Pacific Highway (now Interstate 5, which extends from California to Washington State) provided the link in the National Park-to-Park Highway between California's four parks--General Grant, Sequoia, Yosemite and Lassen Volcanic. Improved county lateral roads connected each of these parks to the Pacific Highway. Lassen's location in central northern California, between Yosemite to the south and Crater Lake to the north, put it squarely on the route of the Park-to-Park Highway tour.[25]

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[24] Shankland, Chapters 7 and 8.
[25] A map of the National Park-to-Park Highway published in Mather's 1920 annual report is reprinted in Ethan Carr, *Wilderness By Design: Landscape Architecture in the National Parks* (Lincoln: University of Nebraska Press, 1998), 147.

California's representative to the National Park-to-Park Highway Association, Arthur L. Conard of Red Bluff, was a northern California ranch owner and operator of several area hotels. Having served as a member of the Tehama County Central Democratic Committee, Conard was a political associate of the park's congressional sponsor, John E. Raker.[26] Conard had been a champion of the movement to create the park, and his representation on the National Park-to-Park Highway Association promised expanded publicity—and visitation—for the new park. Rather than remaining a little known park in the remote region of northern California, Lassen would become an integral component in a system of western national parks.

Lassen Volcanic National Park Association

While Conard worked to promote the new park, both locally and as a member of the National Park-to-Park Highway Association, Michael Dittmar, a journalist based in Redding, became the most persistent independent voice for development of LAVO. Prior to the establishment of the park, Dittmar wrote to Raker urging its creation, proposing an area encompassing four hundred square miles.[27] The local communities recognized Dittmar's commitment to developing the area's tourist economy when he was appointed Manager/Secretary of the Lassen National Park Committee of the Shasta County Promotion and Development Association in March 1922. By the end of the year, the Lassen Volcanic National Park Association had branched off as its own booster organization, focusing specifically on the new national park as a potential boon to the Shasta County and northern California regional tourist economy.[28] The park association's goals extended beyond publicizing the park to participate in regional transportation planning. It worked to "urge the completion of the present State Highways under construction leading to, from, and adjacent to" LAVO.[29] The park association began a subscription campaign to fund its promotion efforts. It solicited support from

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[26] Strong, *Footprints in Time*, 51.
[27] Strong, *Footprints in Time*, 50.
[28] Association minutes and correspondence for the years 1922-1925 are located in NARA RG 79, File 12-17 LAVO Misc.
[29] Lassen Volcanic National Park Association, "Articles of Incorporation." Northern California Automobile Association (NCAA) Corporate Archives, Lassen Park file, San Francisco.

town and county chambers of commerce, as well as prominent businesses and individuals throughout the local region and as far south as San Francisco.[30]

In addition to legislative lobbying efforts at the state and national level, the park association initiated a statewide publicity campaign directed at the general public to promote awareness of the park's scenic and recreational opportunities. In March 1922, in conjunction with the Northern California Automobile Association, the San Francisco Chamber of Commerce, and the Sierra Club, the park association and the California Development Association sponsored a luncheon with a Lassen Park theme at a San Francisco hotel. The invitation for this event claimed, "the call of scenic California and our National Parks brings many thousands of worthwhile visitors each year." Yosemite, General Grant and Sequoia parks, the association claimed, "are recognized factors in the intensive development of the San Joaquin Valley. Lassen Volcanic National Park will bring like benefits to all Upper California."[31] The following year, the park association sponsored another public event in its continuing effort to drum up publicity and attract an urban audience to the park. Called "An Evening in the Wonderland of the Lassen Country," the program featured speakers praising the geological and natural wonders of the park area, offering lectures with such romantic titles as "California's Volcanic Benefactions," "The Lure of the Woods," and "An Imaginary Overflow of Lassen Peak." In addition, attendees could purchase *The Kingship of Mount Lassen*, heralded by its San Francisco publisher as "the first and only book ever written about California's newest playground and the State's greatest scenic asset." The publisher claimed the book was "as necessary to one intending to visit Mount Lassen as a road map."[32]

While the park association concentrated most of its publicity and park promotion efforts within California, Raker pursued increased park funding in Washington. The budget

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[30] Park Association Letters of Subscription were sent to businesses throughout the state, but focused on Bay Area businesses. Select copies of this correspondence are located in the NCAA Archives, Lassen Park file, San Francisco.

[31] California Development Association and the Lassen Volcanic National Park Committee, "Lassen Volcanic National Park Luncheon Invitation," 2 March 1922, LAVO.

limit imposed on LAVO was repealed in April of 1922; however, funding remained below $3000 per year until 1925.[33]

As Raker persisted in his efforts to repeal LAVO's congressionally mandated annual budget limit in the winter of 1922 the park association approached the California state legislature to support a road and park development program at Lassen. In perhaps its most significant contribution to the park's development planning, the park association secured state support from the California legislature, which voted to appropriate $8000 in the state's 1923 budget for a road and park development program at the park.[34] The state funds would be used for a detailed road survey. This appropriation, made possible by the organized lobbying efforts of the park association, represented a milestone in the history of the development of the national parks. While local park booster organizations had often spurred park development, according to Horace Albright the state appropriation facilitated by the park association was historic. In a letter to Michael Dittmar, Albright claimed "This was the first time cooperation of this character ha[s] ever been tendered to our bureau."[35]

Dittmar's Survey and Proposed Scenic Boulevard

The park association had been successful in securing funds from the California legislature, and had maintained an aggressive promotional campaign, but actual development of the park was restricted to improvements to approach roads through the Lassen National Forest carried on by the Forest Service. Dittmar had conducted his own survey of the park area in 1921, however, and had devised a plan for a "Scenic Boulevard" and comprehensive park road system.[36]

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[32] "An Evening in the Wonderland of the Lassen Country," Lassen Volcanic National Park Association and The Mount Lassen Geographical Research Society of California, 26 February 1923, LAVO.
[33] Ise, 224.
[34] California Assembly Bill No. 1014, 1923; Dittmar to Lewis, 9 July 1923; Strong, *These Happy Grounds*, 63.
[35] Albright to Dittmar, 19 April 1924, LAVO.
[36] Letters from Dittmar to Mather 25 March and 24 May 1922, LAVO.

In 1922, California Division of Highways Engineer C.T. Dozier, mapped Dittmar's proposed "scenic boulevard" in a reconnaissance project funded by the Redding Chamber of Commerce. Dozier's map indicated the major geographic and volcanic features of the park, showed a proposed system of hiking trails, and noted existing approach roads. Dittmar proposed a scenic boulevard linking the southwest and northwest park entrances using the existing Forest Service roads surrounding the park and part of the Nobles Immigrant Trail along the northern boundary. More than a single scenic route traversing the flanks of Lassen Peak, Dittmar's map delineated a network of lateral roads, a grand circuit reaching to the four corners of the park.[37]

As Dittmar was advancing his development plan for the park in the early 1920s, an improved highway infrastructure, developing in response to the increase in automobile ownership nationally, was under construction throughout the Lassen region in Northern California. County highway authorities were adapting forest roads oriented and designed to support the area logging industry for use as private passenger automobile routes. Tehama County was constructing the Red Bluff-Susanville Highway (now State Route 36), which skirted the park's southern boundary as far west as Mineral. Just past Mineral, at Morgan Summit, the Red Bluff-Susanville Highway entered Plumas County. Along the park's northern boundary, Shasta County was constructing the Redding-Reno Highway (now State Route 44), which had been designated as part of the National Park-to-Park Highway. While these two major east-west routes would in time become the principal approach roads to the park, additional county roads as well as Forest Service roads promised improved connections from points north and south.[38] Shasta County planned to provide improved access to the recreational area north of the park boundary, to the popular fishing grounds along Hat Creek and to Burney Falls State Park.[39] Butte County, south of the park, was improving the existing road (now State Route 32) through

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[37] C.T. Dozier and Lassen Park Volcanic National Park Association, "Proposed Scenic Boulevard and Approach Roads," 1922, LAVO. See Appendix A for map.
[38] Dittmar to Lewis, 26 December 1924, LAVO.
[39] Burney Falls State Park in Shasta County is one of California's oldest state parks, established in the early 1920s. The fishing grounds in Shasta County, including the Hat Creek area, were well known by outdoors

the national forest between the towns of Chico and Mineral. Highways under construction in Shasta and Tehama County would serve to connect the Pacific Highway (now Interstate 5) with the Victory Highway (now Interstate 80), both major components of the National Park-to-Park Highway linking the Central Valley towns with major east-west and north-south transportation routes. These lateral roads would skirt the northern and southern boundaries of the park. In letters to NPS officials, Dittmar described the growing network of state and county highways as "a great outer circle highway.... 140 miles in length and . . . in itself a scenic drive." Dittmar touted his road development plan as a means to make the park "the scenic crossroads of Northern California."[40]

Dittmar's park and road development plan intended to make all four corners of the park accessible from the main road around the east and west fronts of Lassen Peak. No less than four formal park entrances would accommodate visitors arriving from any direction. Dittmar's proposed system connected each of the corners of the park with each other, but the survey, funded by the Redding Chamber of Commerce, reflected its interests. The majority of development, including campgrounds, lodging facilities, and hiking trails would be most easily accessed via the northwest corner of the park, near Manzanita Lake, to take advantage of traffic arriving on State Route 44 from Redding.

In Dittmar's proposed development plan, the scenic boulevard would split past Manzanita and Reflection lakes to begin its circumnavigation of the park. Taking the northern route, the road would pass to the north of Chaos Jumbles, traverse the northern boundary of Chaos Crags, continue through the Devastated Area, and swing to the east of Summit Lake. It would pass to the south of Hat Mountain, pass between Echo Lake and Crater Butte, and continue easterly to the shore of Snag Lake. From Snag Lake the road would turn north along the edge of the Fantastic Lava Beds, continuing to Cinder Cone and to Butte Lake. This road would circle Butte Lake, turn south, and traverse the eastern boundary of the Fantastic Lava Beds. Skirting the eastern shore of Snag Lake along the

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enthusiasts, including Theodore Roosevelt who visited the falls during his presidency. http://parks.ca.gov/north/nobuttes/mbfsp125.htm

[40] Dittmar to T.C. Vint, 12 September 1925, LAVO.

western flank of Mount Hoffman, the road would cut through Cameron Meadows and continue to Horseshoe Lake. From Horseshoe Lake it would turn east and south to loop around Juniper Lake, and pass through Kings Creek Canyon before turning south toward the Warner Valley. From the Warner Valley it would turn west to travel through the Devil's Kitchen, toward Crumb Lake and then along the southern boundary of Bumpas Hell (then known as "the Inferno"). Climbing out of Bumpass Hell, the road would continue westerly to pass the Sulphur Works, turn to the north of Diamond Peak, and continue toward Mount Diller. Turning north to the east of Pilot Pinnacle and Vulcan's Castle, the road would continue in a northwesterly direction past Crescent Cliffs and on to its terminus at Manzanita Lake. The proposal left virtually no scenic or volcanic feature in the park untouched by roads.[41]

Dittmar's ambitious development plan reflected the role the new national park would assume in recreational travel in northern California and, while park promotion, planning and development were overarching interests, Dittmar also lobbied heavily for provisions in the NPS budget to provide administration and protection of the park.[42] From the date of the park's creation in 1916 to the summer of 1923, the park was patrolled and protected by the Forest Service. It was not until June 1923, when a seasonal ranger, Lynn Walker Collins, was hired as the park's first employee.[43]

In 1922, no high-level NPS official had visited LAVO. Nothing had been done by the NPS itself in the way of articulating a park development plan, beyond improvements made by the Forest Service to the road leading to the southwest entrance near the Sulphur

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[41] Dozier and Lassen Volcanic National Park Association, "Proposed Scenic Boulevard and Approach Roads."

[42] Dittmar maintained an active letter writing campaign, regularly updating NPS leadership in Washington of local developments, pursuing congressional support, and encouraging publicity for the park. Writing to the Chairman of the House Committee on Ways and Means, Louis C. Cramton, Dittmar claimed park "administration and protection [are] a crying need." Dittmar to Cramton, 26 October 1923, LAVO.

[43] Two area residents were hired to patrol the park in the summer of 1922. These itinerant employees appointed by the Forest Service were paid modest salaries of $80 per month out of the LAVO budget. Dittmar's persistent appeals to Mather to provide patrols pointed out that not only were fire patrols needed, the active volcanism of Bumpass Hell and the Devil's Kitchen were dangerous areas for tourists to explore without guides. Dittmar to Mather, 4 May 1922, LAVO.

Works. The Scenic Boulevard proposal, fostered by Dittmar and the park association, forced the issue, and required an official response. Albright realized that "in view of the great activity out here in behalf of Lassen Park, the NPS should take a hand in the work." Albright instructed Washington Lewis, superintendent of Yosemite and nominal superintendent of LAVO to report on the merits of Dittmar's plan in order to "establish a satisfactory road system in Lassen Volcanic National Park."[44]

Lewis traveled to the park in the spring of 1922, and prepared a report to Albright outlining his findings. Lewis' report did little more than summarize Dittmar's proposal by outlining a four-stage plan for road construction that essentially concurred with Dittmar's plan, with one main exception: Lewis determined that the major entrance point should be along the southern front. Lewis's evaluation of Dittmar's plan reflected an admittedly hurried two-day trip to the park in which he saw the actual locations of the proposed roads "only at a distance." In addition to the roads proposed within the park, Lewis also reported on the status of roads outside the park being constructed by state and county road building authorities. The State Highway Commission was improving the Red Bluff-Susanville Highway (State Route 36) which, when completed, Lewis reported, "will be a first class paved highway." For this reason, Lewis asserted, "the two most important entrances will be in the southwest and southeast" sections of the park, near Warner Valley and the Sulphur Works, respectively. Lewis submitted his estimate for construction expenses, but he admitted that the estimates were "entirely my own and given with the idea that there would be built only plain, ordinary, dirt roads sixteen foot in width."[45] Since the NPS lacked any staff assigned to the park, Lewis' recommendations essentially ratified, for the time being, the basic park development plan advanced by Dittmar and the park association. Lewis' report was only a preliminary reconnaissance, and more in the nature of a report on park management needs. A complete study of the possible road systems contemplated for the park fell to the chief engineer of the NPS, George Goodwin. Indeed, before dispatching Lewis to report on

[44] Albright to Lewis, 11 April 1922, LAVO.
[45] Lewis to Albright, 24 May 1922, LAVO.

conditions, Albright recommended that Goodwin and Landscape Engineer Daniel Hull travel to the park "to make a study of its possible future road and trail development."[46] The $8000 provided by the State of California would provide the necessary survey funds.

The Goodwin Survey

Stephen Mather met George Goodwin in 1915 while Mather was on a tour of Crater Lake National Park and Goodwin was working for the U.S. Army Corps of Engineers, constructing the park's road system. A civil engineer with railroad and mountain road building experience, Mather hired Goodwin in the capacity of Chief Engineer of the NPS, a position he held from 1917 to 1925. Working out of offices in Portland, Oregon, Goodwin was responsible for overseeing park road development in all the national parks.[47]

Following the director's instruction to make a visit to the park "at the first opportunity," Goodwin traveled to the park in September 1922 from Glacier National Park where he was assigned to work on the Going-to-the-Sun-Highway.[48] Dittmar and Conard (secretary and president, respectively, of the Lassen Volcanic National Park Association) accompanied Goodwin on his reconnaissance trip. In an eighteen-page report to Mather Goodwin described his impressions of the area and his plans for park road development. He marveled at the scenery, noting that "(its) characteristics make a most interesting, instructive, beautiful and alluring playground." Goodwin was particularly impressed with the "special interest and . . . distinctly unusual nature" of the volcanic landscape, noting that "the peak and the Area of Devastation are unquestionably the most interesting and possess the greatest value of national park attraction." The Devastated Area, Goodwin noted, "leaves on the mind of the person that views it a profound and even appalling impression."[49]

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[46] Albright to Mather, 7 March 1922, LAVO.
[47] Albright, *Birth*, 103-4.
[48] Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, "Going-To-The-Sun-Road," HAER No. MT-67, 1988; Carr, 139-181.
[49] George E. Goodwin, "Report and Recommendations Regarding Lassen Volcanic National Park," January 1923, LAVO.

Goodwin noted that while Dittmar's plan was "excellent," he stated that "experienced mountain highway engineers would probably differ somewhat as to location and the general scheme of road development for this park." In particular, Goodwin urged construction of a "higher and more scenic highway . . . susceptible to stage development." According to Goodwin, this plan conformed to "the general fundamental which we follow in road location and construction in our national parks. . . that roads should be so built that they will connect the principal attractions by the most scenic route possible."[50]

Like the Dittmar scheme, Goodwin recommended a system of lateral roads branching off from a main scenic road. The areas of volcanic activity in the park were widely dispersed, but his road system was designed to make most of the park's volcanic landscapes accessible from a main road. In addition to Lassen Peak and the Devastated Area, Cinder Cone, Bumpass Hell, Devil's Kitchen, and Hot Springs Valley displayed interesting volcanic features and phenomena and were included as scenic destinations in his proposed comprehensive park road system.

Goodwin identified Summit Lake rather than Manzanita Lake as the park's major circulation point. He outlined a four-year stage development plan in which road construction would begin at the four corners of the park and proceed to connect with each other near Summit Lake. The first year's construction would extend the existing Forest Service road to the park's southern boundary—the "Mineral approach road"—to the east of Brokeoff Mountain, around Diamond Peak and to Sapphire Lake (now Lake Helen). In the southwest section of the park, the existing road into the Warner Valley would pass Lee's Camp, and continue northwest along Kings Creek east of Flatiron Ridge. Passing to the south of Saddle Mountain, the road would continue past the western flank of Mount Harkness, continuing toward the eastern shore of Juniper Lake. In the northern section of the park, construction would begin on extending a road along Lost Creek on the Old Nobles Immigrant Trail to reach the Devastated Area. Finally, in the

[50] Goodwin, "Report and Recommendations," 7.

northeastern section, the existing road to Butte Lake would extend past the Cinder Cone to reach the base of Prospect Peak. The second, third, and fourth year of construction would essentially complete the extension of these roads to intersect with the main park road near Summit Lake. Eventually, a road would be built along the southern face of Prospect Peak on the park's northern boundary, past Soap Lake and continue to Badger Flat, where it would turn south along the route of Hat Creek to connect with the main road near Lost Creek along the Devastated Area.

In June 1923, Goodwin directed NPS Assistant Engineer Frank C. Hewitt to conduct final surveys on the routes Goodwin had located the previous year. Hewitt was authorized to hire "such men as may be needed to carry on these surveys . . . including transitmen, a levelman, a superior rodman able to compute sections, plat and do general work, ordinary rodmen, chainmen, axemen, and cooks." Funds for this final survey work would be provided out of the $8000 park development appropriation approved by the California legislature.[51]

While Hewitt was conducting his road location survey in the summer of 1923, Superintendent Lewis of Yosemite returned to the park to prepare a report to Mather on Goodwin's road development plans. Spending several days hiking and on horseback tours of the region, Lewis realized that Goodwin's recommended road system would "give this small area a veritable network of roads." Noting that the territory traversed through the center of the park "has nothing of particularly scenic interest but is merely attractive timber country," Lewis charged that Goodwin's plan "would make practically everything in the park accessible by automobile and leave nothing for the explorer and camper."[52]

Though Goodwin's planned main road promised to provide a unique motoring experience as it conducted tourists through diverse scenery which displayed the effects of volcanic

[51] Goodwin to Hewitt, 12 June 1923, LAVO.
[52] Lewis to Mather, 9 August 1923, LAVO.

activity on the shaping of the landscape, Lewis challenged Goodwin's proposed network of lateral roads leading to the lakes in the park's eastern section. Dittmar's plan also recommended lateral roads connecting the east and west sides of the park at several points along the main scenic boulevard, however his proposed road system was less extensive than the plan devised by Goodwin. Lewis recommended that road construction and park development should follow the Dittmar plan which also included a road connecting the eastern and western sections of the park. A well-located connection between the east and west sections of the park had both practical and scenic value. It would enable patrol and administration of the park to be more efficiently carried out, would allow quick access to remote districts in the forested eastern section should a fire break out, and would be popular with motorists as it would allow tourists to travel the length of the main road and exit the park without retracing their route.

Proposed Roads, Legislation and Construction Schedule

By 1924, the state of California had spent more public funds on road development at the park than had the federal government. From a system-wide perspective, other parks also suffered from inadequate road construction budgets. Congress allocated only $180,000 in the 1924 federal budget for road construction in all the national parks.[53] Considering that 1924 was the year the ten millionth car rolled off Ford's assembly line, congressional funding was clearly insufficient to meet the public demand for automobile access. Recreational automobile touring was becoming a popular pastime of the middle classes. Without adequate roads within the parks, large sections of the public would never see them.[54]

Preparing to make the case before Congress for increased funding to support NPS road construction, Mather called for detailed construction cost estimates, as well as

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[53] Carr, 151

[54] For a discussion of the gaining popularity of auto camping and recreational motoring in the early decades of the century, see Warren Belasco, *Americans on the Road: From Auto Camping to Motel* (Cambridge: MIT Press, 1979); Hans Huth, *Nature and the American: Three Centuries of Changing Attitudes* (Berkeley: University of California Press, 1957); John Rae, *The Road and the Car in American Life* (Cambridge: MIT Press, 1971).

justifications for each proposed road project in all of the parks. In response, Goodwin prepared a road construction schedule for each of the parks. His report observed that "two or three short, sharply built wagon roads leading into private holdings" represented the extent of existing roads at the park. As the "many wonders [are] widely distributed," Goodwin wrote, "proper development of the park requires a connected road system which will make it possible for automobile travelers to visit these various attractions and go from one scenic area to another without having to leave the park."[55]

Goodwin's proposed three-year road construction program for the park outlined a construction schedule with a total estimated expenditure of $340,000 between 1925 and 1928. His three-year plan, however, was presented as the basis of a more extensive road system he considered desirable. Goodwin noted that his proposed three-year program was "part of a general road system, which contemplates the opening of each corner of the park with connecting roads within the park," and anticipated an ultimate expenditure of $622,000 for his entire road system.[56]

Goodwin's plan called for the construction of approximately eight miles of road between the southwest entrance and Lake Helen near the summit of Lassen Peak during the first construction season. As the Forest Service had been receiving funds from the park's annual appropriations for several years to improve the approach road from State Route 36 to the southwest entrance, Goodwin proposed that this approach road should be widened to "double width" and continued to Lake Helen. The following year's project would extend from the northwest entrance for approximately seven and a half miles to reach Summit Lake. The third year's project would extend approximately four and a half miles from the northwest entrance along the northern boundary of the park to the Cinder Cone area near Butte Lake. Finally, the "very scenic crossing of the haunch of Mt. Lassen within a mile and a half of the summit of the peak," extending approximately eight miles

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[55] "Justification of Road Projects, Lassen Volcanic National Park," Goodwin to Mather, 5 January 1924.
[56] George E. Goodwin, "Three Year Road Program for the National Parks and Monuments, Justification First Year's Program," n.d., LAVO.

to connect the road from Lake Helen to Summit Lake would complete the loop route around the volcano. [57]

The "most needed and most important road development project" for the park, Goodwin asserted, was to construct a road from the southwest entrance to Lake Helen, near the summit of Lassen Peak, a distance of approximately eight miles. The Forest Service had improved the road through the National Forest and had brought the road about one mile within park boundaries.[58] Though Goodwin conceded that this park approach road taking off from Route 36 east of Mineral was a "narrow, cheaply constructed" road, it could easily be widened and improved. Goodwin argued that this project was of prime importance to the larger park development plans because "Helen Lake is probably where the principal hotel in the park will be situated."[59]

Goodwin suggested that, due to Shasta County's construction of a forest road from the Redding-Alturas highway (State Route 299) to Manzanita Lake, a road (approximately seven miles in length) should be built in the northwest section of the park to connect Manzanita Lake to Summit Lake along the Hat Creek Valley. Following completion of this second project, rather than connecting the two roads from the northwest and southwest entrances, Goodwin urged construction of connecting roads to the eastern section of the park, toward the Warner Valley, Juniper Lake and the Cinder Cone and lava fields in the northeastern section of the park. In all, Goodwin's proposal contemplated constructing fifty-one miles of roads within the park.[60]

Comparing the situation at Lassen Volcanic to Crater Lake National Park, Goodwin noted that Crater Lake National Park was "much less favorably situated" than Lassen. Goodwin recognized the park was "located in about the right position in the chain of

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[57] Goodwin, "Three Year Road Program," LAVO.
[58] C.E. Dunston to Lewis, 28 May 1921; Lewis to Mather, 24 June 1921; Paul G. Redington to Mather, 16 August 1921; Camerer to Lewis, 31 May 1922; Regional Forester J.E. Elliot to Lewis, 28 March 1923, LAVO.
[59] Goodwin, "Three Year Road Program," LAVO.
[60] Goodwin, "Three Year Road Program," LAVO.

national parks and [was] served by the Pacific Highway." Goodwin claimed that visitation at Crater Lake increased nearly ten-fold following completion of the Crater Lake Road, so it followed, he reasoned, that "a large and constantly increasing [amount of] travel to Lassen is assured."[61] Goodwin's three-year plan served as a rough outline for a construction schedule, however, it was modified in order to complete the connection between the northwest and southwest entrances before commencing construction on the eastern link to the Cinder Cone area.

In February 1924, Mather and Assistant Director Albright testified for three days before the House Committee on Public Lands, appealing for federal support for a system-wide program of road construction in the national parks. Armed with detailed engineering surveys and reasoned justifications for road building programs in each of the parks, Mather and Albright turned to the economic benefits of improving automobile access to the parks. Roads promised to bring both visitors and revenues to the parks, and park road construction could pay dividends. In their testimony to Congress, Mather and Albright reported that automobile entrance fees at the national parks amounted to $385,000 in 1923 alone.[62]

High standard roads were essential to transport the public to the parks but within the parks road construction would be strictly proscribed by wilderness preservation goals. As necessary as improved roads in the parks were, the principal planning and design challenge was to respond to the demand for access to the parks while maintaining scenic and wilderness areas in as pristine a natural state as possible. In his 1922 annual *Report to the Secretary of the Interior*, Mather had warned, "there is danger to our parks through injurious road building." Park roads, Mather wrote, would be located only insofar as they would, "contribute solely toward accessibility of the major scenic areas by motor without disturbing the solitude and the quiet of the other sections."[63]

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[61] Goodwin, "Three Year Road Program," LAVO.
[62] Carr, 151.
[63] Stephen Mather, Department of Interior, National Park Service, *Report to the Secretary of the Interior*, 1922, 21, quoted in Carr, 155.

In light of Mather's policy guiding appropriate road development in the national parks, Goodwin's park road system appeared unnecessarily elaborate. His ambitious development plan faced several significant obstacles. Mather had indicated his desire to conserve the wilderness areas in the parks, to protect them from "injurious road building." Further, the extent of private property located in the Warner Valley and at Juniper Lake, the value of which would be increased by improving access and connections to them, was another reason to scale back plans.[64] Mather wired instructions to Goodwin, directing that, "[it is] essential principle points of interest be made accessible [but] care must be taken that road situation not overdone. Think your road through center of park should be eliminated. Make outer road surveys at this time only."[65]

This brief telegram effectively settled the ongoing debates surrounding the extent of roads proposed for the park. Mather had combined the best aspects of the Dittmar and Goodwin proposals. Using Dittmar's plan to appropriate the existing forest service roads as a "Grand Circuit Tour" encircling the park, and Goodwin's recommendation for the Scenic Boulevard traversing the eastern flank of Lassen Peak, the two plans were combined to connect the north and south boundary forest roads.

Mather's response to Goodwin, to limit the scope of road construction within the park, was echoed in his published policy for all park road construction projects. Writing in his 1924 annual *Report to the Secretary of the Interior*, he reiterated his position on appropriate park road planning:

> 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

[64] Mather's aide, Arno B. Cammerer informed Dittmar, who had been agitating for hotel development in the park, that Director Mather was "strongly opposed to the government doing any development work in Lassen Park that will be of benefit to private property owners." Cammerer to Dittmar, 26 June 1924, LAVO.

> will be kept in a natural wilderness state without piercing feeder roads and will be accessible only by trails by the horseback rider and the hiker. Particular attention will also be given to laying out the roads themselves so that they will disturb as little as possible the vegetation, forests, and rocky hillsides through which they are built.[66]

Park Inholdings, Road Development and Wilderness Preservation

Private property within the boundaries of the park complicated road location and park development decisions. Despite the fact that these properties included undesirable development, existing access roads, while of a low standard, were generally located along natural alignments that offered opportunities for improvement.

While private inholdings were widely distributed within the park, including property along Hat Creek, at Manzanita Lake, and at the Sulphur Works, private property in the southeastern section of the park presented the greatest obstacle to road development. In Mather's 1924 annual *Report to the Secretary of the Interior*, he noted that "Our tentative development plans include work on the west side of the park only, where the road can be built entirely on public lands."[67] In the southeastern section of the park, Lee's Camp, the Kelly Resort and the Drakesbad Ranch were located in the scenic Warner Valley, accessible via a rough dirt road from the Plumas County town of Chester. By the mid-1920s, these camps were well-established tourist facilities offering tent accommodations and meals for overnight visitors.[68] Guides were available to lead tourists on horseback and hiking trips into the park. In addition to the scenic splendor of the area, where a lush meadow fed by Hot Springs Creek framed distant views of Lassen Peak, some of the most interesting areas of active volcanism were adjacent to the Warner Valley, including Boiling Springs Lake and the Devil's Kitchen.

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[65] Telegram from Mather to Goodwin, 5 October 1923, LAVO.
[66] Stephen Mather, *Annual Report of the Director of the National Park Service to the Secretary of the Interior for Fiscal Year Ended June 30, 1924*, 14.
[67] *Annual Report*, 1924, 14.

The largest lake in the park, Juniper Lake northeast of the Warner Valley, was also reached via a privately maintained dirt road from the town of Chester and was the focus of park development plans. Views of Lassen Peak from the east side of the tree-lined lakeshore made this a particularly scenic locale with obvious potential for tourist facility development. More than four hundred acres of shoreline property at Juniper Lake, however, were privately owned. The property's owner, C.P. Snell, maintained his prerogative to enhance the value of his investment, and undertook a scheme to divide the property into individual parcels.[69] This private real estate enterprise put park development plans for the eastern section of the park in jeopardy. When discussions of the potential for the development of tourist facilities at Juniper Lake began, Mather re-stated his guiding philosophy of park development. Writing to W.B. Lewis, he expressed his "desire to keep large sections of the national parks free from commercial developments" and advised that development at the park be limited, for the time being, to "improvement of existing roads by widening, reducing grades, and surfacing."[70]

In January 1925, an official of the Western Pacific Railroad wrote to Mather regarding park development plans. The railroad was building an extension to the town of Westwood, a logging community dominated by the Red River Lumber Company, Though Westwood was located approximately ten miles east of the park's boundary, it was more than an hour's drive from the southwest park entrance. Winfield Scott, the railroad's promotion agent, objected to Mather's policy of restricting development to the east side of the park. Railroad interests focused on encouraging improvements to the eastern approaches. Scott characterized the territory traversed by the proposed park road as "the high, broken up country on the west side of the park," incompatible with resort development. Neglecting the scenic opportunities of the southeastern section of the park, Scott wrote, "is neither good policy nor good business." Scott argued that "sooner or later this central portion will have to be reached. It is the key to the whole park."[71]

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[68] Strong, *These Happy Grounds*, 22-30.
[69] C.P. Snell to L. Walker Collins, 12 August 1925; Collins to Lewis, 14 August 1925, LAVO.
[70] Mather to W.B. Lewis, 3 February 1925, LAVO.
[71] Winfield Scott to Mather, 31 March 1925, LAVO.

Despite an express policy to concentrate on road construction and facilities development in the western section of the park, the heavily timbered eastern section continued to be the focus of potential development. An arrangement was made with the Western Pacific Railroad to operate as the park's sole concessionaire, and in the fall of 1930, the president of the Western Pacific Railroad, H.H. Adams, his chief engineer, and San Francisco architect Charles Underwood toured the park in company with Albright and NPS chief landscape architect Thomas Vint. An early snowstorm prevented the party from completing their tour, and in early October the group returned, with Vint's assistant, landscape architect Merel Sager representing the NPS. Sager reported to Vint that "everyone was pleased with the prospects for a development at Juniper Lake," however, no final decisions were made. Adams and Underwood concurred with Albright that "nothing should be done until the National Park Service takes definite action in regard to the private holdings at Juniper Lake and Drakesbad."[72]

While planning for the development of tourist accommodations in the eastern section of the park was deferred, plans to extend an east-west road taking off from the park road were pursued throughout the 1930s. Based on the Dittmar and Goodwin surveys, a connection from the main park road near Summit Lake to the Drakesbad area in the Warner Valley was included in the park's 1935 master plan, based on a reconnaissance survey conducted by Bureau of Public Roads engineer J.L. Mathias in 1930. The establishment in 1934 of the Caribou Wilderness, a 20,000 tract of Forest Service land adjacent to the park's eastern boundary complicated the matter of providing an eastern approach road to the park as Forest Service regulations prohibited construction of roads through primitive areas. The establishment of the Caribou Wilderness ensured protection of the numerous lakes in the national forest from commercial development, but it represented "a liability" to some members of the local communities. The Susanville Chamber of Commerce claimed that the Caribou Wilderness area "stands between us and

[72] Merel S. Sager, Assistant Landscape Architect to T.C. Vint, 22 October 1930, LAVO.

any entrance to the park which would be of benefit to Lassen County."[73] Susanville residents flocked to a popular public campground at Silver Lake in the Lassen National Forest and it was the chamber of commerce's goal to extend the road to Silver Lake westward into the park. It urged construction of a road to connect Silver Lake to the Juniper Lake Road, which would then continue to Grassy Lake in the park's central section before joining the main park road near Summit Lake.

Continuing pressure from communities in Lassen County to construct a park road to provide access from the east culminated in a request from area Congressman Harry Englebright to explain why planning for an eastern approach had abated. Arno Cammerer, who had succeeded Albright as NPS Director, noted that the majority of construction funds were allocated in the park's budget for improvement of the Mineral-Southwest approach road, and the remainder would be committed to "other physical improvements, including buildings, water, sewer, and electric systems."[74]

Frank A. Kittredge, who succeeded George Goodwin as NPS chief engineer in 1925, was less dispassionate in his reaction to Englebright's request. In a letter to the Director, Kittredge claimed that the attempt by local communities to exert political pressure to develop the eastern section of the park was "a body blow to our ambitions" to retain the wilderness area in the park's central and eastern sections. Kittredge noted that "it has long been the Director's policy and hope to build an entrance into the south or southeastern portion of Lassen Park via Warner Valley just as soon as the private holdings situation could be solved." Kittredge concluded by asserting his opinion that

> there is no great need for an entrance at this time via the southeast. I would like to see the entire east side of the park left as a wilderness area, and free from the influences of a great public highway. I would like to see an end made to the

[73] U.J. Tranis, President, Susanville Chamber of Commerce to U.S. Representative Harry L. Englebright, 18 April 1934, LAVO.
[74] Cammerer to Englebright, 3 May 1934, LAVO.

> building of new public highways through wilderness and virgin areas, in all areas except where there is a dire and urgent need.[75]

Kittredge's statements echoed Mather's established policy: road construction in national parks should be limited to providing access to the main scenic features while avoiding, and thereby preserving, wilderness areas. This was the prevailing philosophy of road development in the national parks. The park's superintendent, however, argued that "it would defeat our purpose by assuming too arbitrary a stand in this matter." Walker Collins asserted that "we shall be adding fuel to the flames" if "the entire eastern half of the park is kept free of all motor travel." He claimed that the road proposed from Juniper Lake to Summit Lake would only "fringe" on the wilderness area of the park's central and northern section, and would therefore pose no threat to its wilderness designation. He claimed that "Lassen has, does, and will continue to suffer public apathy due to incomplete highway access."[76]

Despite Collins' plea and the proposed connection between Summit Lake and the Warner Valley that remained on the park's 1935 Master Plan, inholdings at Warner Valley and at Juniper Lake precluded any future park road construction. In the spring of 1935, Cammerer met with Congressman Engelbright to explain that a road between Warner Valley and Summit Lake would be "contrary to our ideals" of keeping the eastern section of the park a wilderness area. Cammerer kept open the possibility of improving the existing road that entered the park and terminated at Juniper Lake, assuming that the government could acquire the Snell property.[77]

Local communities continued to appeal to Englebright, however, and a meeting was held in July 1935 to hear the concerns of the area residents who felt disenfranchised in the park development decision-making process. Kittredge attended the public meeting to represent the NPS position in the controversy. He reminded those in attendance that the

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[75] Kittredge to Cammerer, 6 August 1934, LAVO.
[76] Walker Collins to Cammerer, 7 November 1934, LAVO.
[77] Cammerer to Collins, 11 April 1935, LAVO.

park's development had indeed been guided by the desires of area residents; it was the local community (through the Lassen Volcanic National Park Association) that had succeeded in sponsoring construction of the main park road. This road, Kittredge pointed out, "cuts through the heart of the park and opens to the tourist some of the finest and most beautiful scenery in the whole park." Any other road, Kittredge claimed, "would be just another road and another entrance, and would not be as fine or as grand" as the main park road. In conclusion, Kittredge asked, "If the NPS cannot keep wilderness areas as such, what organization can?"[78]

Surveys to connect the park road to the forested eastern section near Drakesbad in the Warner Valley were conducted throughout the 1930s, but inholdings at Juniper Lake as well as at Drakesbad remained obstacles to improved road connections. In the park's 1950 Master Plan, an eastern connection was finally abandoned. The truck trail between Hat Creek and Badger Flat was graded, however, to enable park patrols and fire suppression equipment to more easily access the central section of the park.

Park Road Construction: 1925-26

In 1924, following Mather and Albright's testimony before the House Committee on Public Lands, Congress passed the Roads and Trails Act, representing its commitment to construct and improve roads, trails and bridges in the national parks. Over a three-year period between 1925 and 1928, it appropriated $7.5 million in park construction funds. In 1931, the Leavitt Approach Road Act authorized the NPS to oversee and fund construction of roads outside the park that were necessary to provide access to the parks.[79] These two pieces of legislation enabled construction to begin on the Lassen Peak Highway, and to connect the park road to the larger transportation network in northern California.

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[78] Kittredge to Cammerer, 26 July 1935, LAVO.
[79] Linda Flint McClelland, *Presenting Nature: The Historic Landscape Design of the National Park Service 1916-42* (Washington, D.C.: Interagency Resources Division, National Register of Historic Places, National Park Service, U.S. Department of the Interior, 1993), 108.

In the summer of 1925 the congressional appropriation to the NPS provided $110,000 for the first year's construction of a road system in the park. Plans were prepared to execute the best components of the Dittmar and Goodwin proposals. Dittmar's scenic boulevard, rather than fully encircling Lassen Peak, would be brought around the east side of the mountain, and would continue northerly toward Kings Meadow and the Devastated Area before reaching the northwest entrance near Hat Creek. Engineers in the Portland Field Office, based on Hewitt's more detailed surveys of Goodwin's preliminary reconnaissance, prepared road plans and profiles for what would become known as the "Loop Highway." Contract specifications and invitations to bid, also prepared by the engineering staff in the Portland office, were approved by the Director in June 1925.[80]

Specifications addressed two contract sections approved for the 1925-26 construction seasons. The southwest project involved reconstruction and construction of approximately three miles of the entrance road that had been improved between 1922-24 by the Forest Service, and new construction between the southwest entrance and Lake Helen. The other section extended approximately six miles from the northwest entrance near Hat Creek to Summit Lake. These two sections would ultimately be extended to complete the scenic boulevard, or loop highway, traversing the eastern flank of Lassen Peak.[81]

The contract specifications included thirty-eight pages of textual information and ten pages of drawings, with precise information outlining approved construction practices. Detailed instructions addressed methods of excavation, including limits to blasting, disposition of merchantable timber encountered in clearing operations, desired finished slope characteristics, and side ditches as well as drainage channel construction. Examples of desirable designs for structures including culvert headwalls, log trestle

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[80] George S. Goodwin, "Proposals and Specifications for Road Work in Lassen Volcanic National Park," June 1925, NARA San Bruno, RG 79, "Records Pertaining to Roads Within the National Parks" (hereafter cited as NARA San Bruno, RG 79). Box 12, 3002 F-G.

[81] George C. White, Associate Highway Engineer, Report of Preliminary Investigation Covering Proposed Highway System Within the Lassen Volcanic National Park and Study of Approach Roads to Park, 1926, LAVO.

bridges and guardrails were illustrated in measured drawings. Reflecting the rush to get the work started, quantities were indicated as rough estimates, and were "only given as an approximate guide as to what might be encountered as judged from surface indications." A condition of bidding required contractors to visit the site of the work to "determine the location of the various construction materials and other local conditions effecting the work, and the price at which it can be done."[82]

Of the two projects, the southwest section was the more expensive and difficult to build. As the road passed around the head of the Mill Creek Valley, and climbed up the side and around the east face of Diamond Peak it was benched into a steep cliff. Stump blasting and clearing began in August using day laborers working with teams of horses. In September, the contractor, T.E. Connelly Construction Company of San Francisco, brought an Erie steam shovel on site to begin rough grading.[83]

Contract specifications indicated three classes of excavation, with restrictions on methods of removal, ensuring minimal disruption to, and protection of, the landscape adjacent to the construction site. Sections of earth, clay, loam, gravel and all other material measuring less than one-half cubic yard were plowed by teams of horses attached to a railroad plow. Larger materials, rocks and boulders, including shale, slate, laminated rock, cemented gravel, and hard pan more than 1' in diameter that could not be picked, mattocked or plowed loose were blasted through with dynamite. The use of "coyote holes," a particularly destructive method of excavating with explosives, was prohibited to ensure protection of adjacent natural features. Overcasting of excavated material was allowed, provided it did not mar the adjacent landscape, was hidden from view, and was approved by the engineer. [84] A power shovel assisted in excavation, but the crossing of

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[82] Goodwin, "Proposals and Specifications for Road Work," June 1925, LAVO; "General Conditions, Paragraph 88, "Quantities and Conditions," 37, NARA San Bruno, RG 79. Box 19, 3002 F-G.
[83] J.L. Mathias, Associate Highway Engineer, "Final Construction Report (1925-26) Southwest Entrance Project 1-A," U.S. Department of Agriculture, Bureau of Public Roads, District Two, LAVO.
[84] U.S. Department of the Interior, National Park Service, "Proposals and Specifications for Reconstruction and Construction of About Three Miles of the Southwest Entrance Road and the Construction of About Six Miles of the Northwest Entrance Road in Lassen Volcanic National Park, California," NARA San Bruno, RG 79. Box 19, 3002 F-G.

Mill Creek was worked out entirely by hand as the small hot springs and fumeroles prevented the use of the large shovel. Once the fill was in place over the Mill Creek crossing, the shovel advanced toward the curve around Diamond Peak, the end of the contract section. Here, excavation was accomplished using picks, axes, and blasting. More than 22,000 pounds of explosives were used. Between twenty-five and thirty laborers worked the rock out by hand, and a team of sixteen horses dragging blades shaped up the rough grading prior to finishing.[85]

In contrast to the steep open terrain characterized by volcanic soils and solid rock on the southwest contract, the northwest project site traversed a very different landscape type. The eight-mile section between Hat Creek and Summit Lake promised easier construction as it traversed relatively level elevation with heavy stands of timber sparsely grouped in the open subalpine terrain. With a generally level elevation (transverse slopes did not exceed 20°), light and medium timbered forests interspersed with open areas made construction on the northwest project much less expensive, difficult and dangerous than the work underway on the southwest contract. The Nat Lovelace Construction Company of Berkeley submitted the low bid of $46,377.76 and was awarded the contract on the northwest section. Rough grading began in August 1925. In addition to drainage culverts and tile underdrains along this section of the road, a log trestle bridge was constructed at Hat Creek.[86] Precise instructions were included in the contract to "leave the timber and logs and stumps … undisturbed except where they occur in the actual roadway prism," and required clearing the right-of-way to a width of no more than 40'.[87]

While the character of the topography differed, both sections were located to display the effects of recent volcanic activity on the shaping of the landscape. The southwest section traversed the active geothermal region of the Sulphur Works area, Mill Creek and Little Hot Springs Valleys; the northwest contract carried the road past the Devastated Area.

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[85] Mathias, "Final Construction Report (1925-26) Southwest Entrance Project 1-A," LAVO.
[86] J. L. Mathias, Associate Highway Engineer, "Final Construction Report (1925-26) Northwest Entrance Project, 1-B," U.S. Department of Agriculture, Bureau of Public Roads, District Two, LAVO.
[87] Goodwin, "Proposals and Specifications."

The destruction wrought by the catastrophic eruptions between 1914 and 1917 was most visible in the landscape of the Devastated Area, a vast area denuded of vegetation, where soils consisted of mixture of volcanic sand and gravel, as well as large and small fixed and loose boulders. The remainder of the northwest contract section passed through light loam, clay and sandy loam, with several stretches of outcropping rock.

The onset of winter weather in the middle of October delayed completion of both contracts and work picked up again the following June. Due to the late start—construction seasons at Lassen were extremely short, as winter conditions could extend into early July and resume in September—less than half of the work was completed before the work was halted. Before the spring construction season began in 1926, a programmatic agreement between the NPS and the Bureau of Public Roads (BPR) transferred road building authority in the national parks to the BPR, the nation's chief technical agent of highway construction. The agreement allowed the NPS to retain aesthetic control over the character of park roads, to locate and design them in such a way that limited disturbance to the natural landscape. BPR technical expertise ensured the roads would be built to the highest standards, using the latest construction technology.[88]

With the assumption of BPR technical oversight, more exacting design standards were instituted, including extending the length of horizontal curves. The southwest contract, which traversed Mill Creek and ascended toward the face of Diamond Peak, included several curves under 100' in length on the road plans prepared by NPS engineer C.E. Randels in 1925. When work resumed on this contract section in June of 1926, BPR associate highway engineer J.L. Mathias was in charge of surveys and construction. The BPR flattened the shortest curves, and maintained a minimum radius of 200' for blind curves, with two exceptions. At stations 118 and 130, as the road rounded Diamond Peak, 130' and 100' curves were used. While the original contract specifications indicated a log trestle bridge to cross Mill Creek, 36" reinforced concrete pipe culverts

[88] A history of the establishment of the Bureau of Public Roads, its development of technical expertise and its assumption of authority as the nation's road building experts is told in Bruce Seely, *Building the American Highway System: Engineers as Policy Makers* (Philadelphia: Temple University Press, 1987).

with cement rubble headwalls were substituted.[89] Though the location of the road was slightly altered in several places to conform to BPR standards, the alignment remained essentially the same as that drawn by NPS engineer Randels, based on the 1922 Goodwin survey.

Boundary Expansion & Park Road Extension

Four contract sections were originally identified and approved by Mather in Goodwin's proposed three-year road construction program. These four sections extended from the southwest entrance (including a portion of the approach road outside the park boundary) to the northwest park boundary near Hat Creek. A fifth section was added in 1929, when the park boundary was extended to encompass Chaos Jumbles and Manzanita Lake.[90] When the park was originally established in 1916, boundaries were drawn to include the two national monuments: Lassen Peak and the Cinder Cone. Productive forestlands surrounding these boundaries remained the province of the Forest Service. George Goodwin had recommended an extension of the northwest boundary as a result of his 1922 survey and, in 1925, when the park received its first allotment for road construction and plans were prepared for the road, the park association proposed a similar, though more extensive, boundary expansion.[91] Taking in several miles to the north, southwest and east, the proposed expansion would include Manzanita Lake, Brokeoff Mountain and the Warner Valley.

Manzanita Lake, a scenic, tree-ringed expanse of water in the shadow of Lassen Peak was privately owned by the Pacific Gas and Electric Company, which had purchased the property in 1919 from the Northern California Power Company.[92] Benjamin Loomis owned some 40 acres of property near Manzanita Lake, including a portion of nearby Reflection Lake. Loomis, whose photographs of Lassen Peak in eruption had been so influential in promoting the area as a national park, promised to donate his property to the

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[89] BPR Final Construction Report, Section 1-A, 1926, LAVO.
[90] L. Walker Collins. Superintendent's Monthly Report, 6 July 1929, LAVO
[91] Conard to Raker, 7 November 1925, and Lewis to Conard, 2 November 1925, LAVO.
[92] Strong, *Footprints in Time*, 101.

NPS if the park boundary was expanded to include Manzanita Lake.[93] In addition to these private tracts of land surrounding Manzanita Lake, the Forest Service controlled the intervening property between Hat Creek and Manzanita Lake. While the Forest Service had cooperated with the park development plan by improving the southwest approach road, a proposed boundary expansion taking in forested areas along the north-northwest boundary raised the issue of the best use of public land, a controversy that had largely been avoided when the original park boundary lines were drawn and compromises had been written into the park's establishing act.

Mather dispatched Vint to make a field examination of the proposed boundary expansion. Vint toured the proposed expansion area in August 1927, and reported that the expanded boundaries were "necessary to properly show the volcano as an intrusion into older formations."[94] Congressman Englebright introduced a bill in Congress to enlarge the park in accordance with Vint's recommendations. Englebright's bill was passed, with minor revisions, and became law January 19, 1929.[95] The expansion added some 25,000 acres to the park, including a large portion of the Warner Valley, and shifted the proposed northwest entrance from Hat Creek to Manzanita Lake. The legislation also extended the boundary line along the southwest to encompass approximately one and a half miles of the Mineral approach road. Upon passage of Englebright's bill, a fifth contract section was added to the park road construction program, extending approximately seven and a half miles between Hat Lake and Manzanita Lake. [96]

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[93] The Loomis offer to transfer ownership of his property at Manzanita Lake to provide for an expanded western boundary exacerbated the continuing competition between Redding and Red Bluff to be designated park gateway communities. The Board of Directors of the Redding Chamber of Commerce submitted a lengthy argument to the Director in favor of establishing the main park entrance at Manzanita Lake. Their argument turned on two main points: ease of access from the Sacramento Valley and the superior scenic qualities at Manzanita Lake. According to the Chamber, Redding had been the "clearing house for travel in this region for fifty years," and Manzanita Lake was "the most inspiring setting that can be found in the park." J.A. Baker and W.B. Menzel to the Director, 25 May 1928, LAVO.

[94] Vint to Mather, 10 January 1928, LAVO.

[95] While the Forest Service agreed to include Mount Raker, north of the Devastated Area in the new park boundaries, expansion along the timbered west front of the park was rejected. Strong, *These Happy Grounds*, 97. See William C. Everhart, *The National Park Service* (New York: Praeger Publishers, 1972), especially Chapters 4, 5 and 11 for a discussion of the different approaches to land management pursued by the NPS and the Forest Service in the 1920s.

[96] Superintendent's Monthly Report, 6 July 1929, LAVO.

Bureau of Public Roads Construction: 1926-31

With the assumption of BPR technical oversight, BPR District Engineer C.W. Sweetser was assigned to supervise construction of the park road. Another personnel change introduced engineer Bert Burrell, following Goodwin's departure as NPS Chief Engineer in 1925. In March 1926, the Lovelace grading and structures contract was completed. While the BPR accepted the project and turned it over to the NPS for continued maintenance, its surface required finishing. Reporting that the combination of using the "natural materials at hand" for construction and the extremely dry summer weather made the surface "loose," BPR resident engineer O.G. Taylor reasoned that "after the winter snow the road can be put in much better condition than could possibly done now."[97]

The 1927 construction season began with the letting of two rough grading and structures contracts. These sections extended north from the end of the Connelly section and south from the Lovelace contract, stretching toward the summit of the road near Lassen Peak. The southern section, covering a distance of 2.180 miles from Diamond Point to Pilot Pinnacle, was awarded to Young Brothers Contractors from Berkeley, with a low bid of $84,134. The second contract let in 1927 covered 5.650 miles from the Devastated Area to Upper Kings Creek Meadows and was awarded to Nat Lovelace.[98]

The southern contract section had originally been surveyed (by Goodwin and Randels for the NPS) in 1924, and included several short-radii curves and ascended toward Pilot Pinnacle on a 6 percent grade. The BPR made a location survey of the contract section in 1926 and ran a preliminary line to maintain a grade "to as near 5% as possible."[99] Designed to 1926 Forest Highway standards, the BPR flattened curves on the 16' wide roadway to a minimum of 100' on open curves and 200' on blind curves. Young Brothers began rough grading July 11. The topography was rocky, open and steep, and required extensive blasting during excavation. Sections through solid rock were

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[97] BPR Final Construction Report, Lovelace Contract, Section 1-C-2, 1927, LAVO.
[98] Superintendent's Monthly Report, 5 June 1927, LAVO.

subgraded to a depth of 6" and backfilled with crushed rock. A series of switchbacks along the contract section where the soils consisted of blue mud and humus were excavated to a depth varying from 15" to 3'. Drainage structures consisted of 18" and 24" corrugated metal culvert pipes and 24" vitrified clay pipes. Cement rubble masonry headwalls were placed at the inlet ends of all pipe culverts.[100]

It took Young Brothers more than a week of drilling and shooting at Diamond Point before a power shovel could backhaul or overcast the excavated rock. Material for the subgrade was quarried from an approved pit located north of the Diamond Point curve. Young Brothers subcontracted the rock crushing work to Cuffe and White Contractors of San Rafael, California, who erected a crusher plant about 35' above the roadway. Two crushers—a #10 Telsmith gyratory crusher and a #2 Telsmith secondary crusher driven by a seventy-five-horsepower motor—produced material for the subgrade. The process involved hoisting quarried material in a dragline bucket to the primary crusher. Once the rock was crushed in the primary crusher, it passed through a revolving screen. Oversized rock was then re-crushed and sent a second time through the screen before it was placed into a bunker at the base of the cliff and then spread on the graded roadbed. The Young Brothers contract extended over two construction seasons, beginning in July of 1927 and completed in October of 1928.[101]

BPR Engineer Mathias attributed the contractor's slow progress to inexperience, mismanagement and poor equipment, and a second subcontractor was hired to replace Cuffe and White. Hemstreet and Bell Contractors from Marysville, California reconditioned the crusher plant, adding an additional Holt seventy-five-horsepower engine to run the secondary crusher, screens and bucket line. Hemstreet and Bell made sufficient progress to complete the surfacing item on the contract by October 30, just ahead of a heavy snowfall. Near the northern extremity of the contract section, a series of high fills and cut slopes carried the road through the rocky, alpine terrain. In order to

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[99] BPR Final Construction Report, Young Brothers Contract, Section 1-C-1, 1928, LAVO.
[100] BPR Final Construction Report, Young Brothers Contract, 7.
[101] BPR Final Construction Report, Young Brothers Contract, 10.

allow the fills to settle during the winter season, the surfacing component of the contact was omitted, deferred until the following summer.[102]

Work began on the second Lovelace contract, the section between the Devastated Area and Upper Kings Creek Meadows, in July 1927. An approved borrow pit, located well off the roadway and out of sight, provided the rock required for the fill section over the seasonal wetlands along Kings Creek Meadows.[103] As the subgrade was being prepared, a deep trench, dug parallel to the center line of the roadway, drained excess groundwater where the road passed through the wet meadow. According to Mathias, this was "very effective and produced a stable roadbed."[104] Corrugated metal pipe culverts with rubble masonry headwalls were constructed along the length of the contract to assist in drainage. In addition to these smaller culverts, a large culvert featuring a 4' x 4' concrete arch with rubble headwalls was installed where the road crossed over Kings Creek. It was a substantial structure, necessary to channel the perennial creek under the road. Architectural details on the lava rock masonry headwalls included ringstones and lintels. Through cut sections along Kings Creek, the subgrade was extended an extra foot in width to accommodate drainage ditches. Reflecting the mountainous terrain, bank slopes were staked 1:1. The slopes tended to ravel, however, as they were largely composed of unstable material, principally volcanic ash and sand. In an attempt to stabilize the raveling volcanic sand slopes, laborers flattened the bank slopes and set them back from the edge of the road. Like the Young contract between Diamond Point and Pilot Pinnacle, work on this section extended over several construction seasons, and was completed in the fall of 1930.[105]

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[102] BPR Final Construction Report, Young Brothers Contract, 11.
[103] The location of borrow pits was carefully monitored by NPS landscape architects to protect landscape features adjacent to, and within sight of, the park road. NPS landscape architects John Wosky and Merel Sager made regular trips to inspect BPR-supervised construction operations. Superintendent's Monthly Report, July 1928; Wosky to Vint, 28 July 1929; Sager to Vint, 12 June 1930; Sager to Vint, 15 September 1930, LAVO.
[104] BPR Final Construction Report, Lovelace Contract, 1-C-2, 1927, LAVO.
[105] BPR Final Construction Report, Lovelace Contract, 1-C-3, 1930, LAVO.

As the Young and Lovelace contact sections were under construction, the rough grading and structures contract for the stretch of road between Pilot Pinnacle and the summit, elevation 8511' was awarded to Arthur Jones Contractors of Montague, California. Jones' low bid of $48,838.80 for the 2.715 miles of road was accepted in June 1928; spanning two construction seasons, the Jones contract was completed in September 1929. The mountainous, rocky terrain made excavation difficult and extensive blasting of sound rock was required. Sections in solid rock and boulders were subgraded to an average depth of 6" and backfilled with borrow material from a pit established near Lake Helen. A parking area was constructed for the Bumpass Hell trail, using sand from the slope at the base of Lassen Peak. In an unusual instance of disposal of excavated material, which was often used for subgrade foundations, the rock excavated in the heavy cut past Pilot Pinnacle, between Stations 272 and 278, was overcast out of sight of the road. The topography permitted such disposal, as the steep drop on the downslope was an area of boulders spilled from rockslides. Dumping the excavated rock in this location would not mar the landscape. Culvert drains were installed using corrugated metal pipes, between 24" and 36" in diameter; however, an analysis of the ground water disclosed a high level of sulfur and mineral deposits in several places. In these locations, vitrified clay pipe was substituted for the metal pipes.[106]

In 1929 and 1930, the final two construction contracts were let, extending the park road from the southwest entrance near the Sulphur Works to the northwest entrance near Manzanita Lake. One section extended for 4.556 miles from the end of the Jones contract at the summit to Upper Kings Creek Meadows. This contract was awarded in July 1929 to The Fairbanks Brothers Contractors of South San Francisco, with a low bid of $68,273.40. In 1930, the section between Hat Creek and Manzanita Lake, a distance of 7.706 miles was awarded to the Mathews Construction Company of San Francisco, with a low bid of $63,841.90. These two sections were constructed to revised Forest Highway Standards of 1929. While the width of the road remained at 16', radial curves connected to tangent sections allowed the road to stretch out on its relatively level course

[106] BPR Final Construction Report, Jones Contract, 1-C-4, 1930, LAVO.

between Hat Creek and Manzanita Lake. The section between the summit and Upper Kings Creek Meadows descended on a series of curves, with a minimum length of 100' and at a maximum grade of 6 percent. [107]

The Fairbanks contract traversed high altitude (between 6325' and 8511') topography, featuring bare, rocky, steep slopes with very little topsoil. The excavation was difficult and time consuming and caused the contractor, who had established a camp at Kings Creek Meadows, to run twenty-four hour operations during the summer of 1929.[108] In addition to the solid rock and massive boulders encountered in excavation, the territory covered by the Fairbanks contract featured attractive hemlock forests, and offered expansive views to the north and south, encompassing the Plumas and Lassen National Forests. This stretch of road northeast of the summit provided the most distant views along the road. It was a scenic vantage point for the entire region, offering views of the Trinity Alps and the broad expanse of the Sacramento Valley to the west, as well as eastern views toward the northern extremity of the Sierra Nevadas, with the park's eastern wilderness area in the middle distance.

Due to the special scenic qualities and mature vegetation adjacent to the road, Fairbanks was required to take extra steps to protect the adjacent landscape from damage. A special class of excavation, known as "Type B excavation," was ordered by NPS landscape architects for approximately 30,000 cubic yards of material to be moved in this section, in order to guarantee a minimum of disturbance to landscape features during construction operations.[109] Type B excavation relied on relatively low-impact techniques such as "plastering" and "mudcapping" for cutting through sound rock. NPS chief landscape architect Thomas Vint developed these special specifications "to advance the goals of landscape protection and stewardship" on all national park road construction projects.[110]

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[107] BPR Final Construction Reports, Fairbanks Contract, 1-B-1, 1930; Mathews Contract 1-E, 1930, LAVO.
[108] Superintendent's Monthly Report, July 1929, LAVO.
[109] BPR Final Construction Report, Fairbanks Contract, 1-B-1, 1930, LAVO.
[110] McClelland, 202-203.

In June 1929, Director Albright approved Vint's recommendations establishing "Type B" excavation standards.[111]

On the Fairbanks contract near the summit of the road, light shooting of the rock, using one-quarter to three-eighths pound of 40 percent dynamite protected adjacent trees and ensured blasted rock would not be strewn outside of the right-of-way. Despite double shifting of the shovel, Fairbanks had to shut down operations in late October due to snow. On July 10, 1930 work resumed, and rough grading was completed on October 1.[112]

The grading and structures contract for the section between Hat Creek and the northwest entrance was let in June 1930 to the Mathews Brothers Construction Company. Using two 1-1/4 yard Northwest gasoline shovels, one Ingersoll-Rand compressor, two thirty-horsepower Caterpillar tractors, a 12' grader and a scarifier, Mathews began work in early July. The push was on to complete the road and dedicate it, and the stretch of road covered by the Mathews contract was the last remaining section of the road to be constructed. Both the shovels were double-shifted from the start of operations, and no shut downs were allowed for Sundays or holidays. This contract section, added when the park boundary was expanded following passage of Engelbright's bill in 1929, passed through the Chaos Jumbles, an area of large boulders and dwarf trees created by an earlier, eighteenth-century eruption of Lassen Peak. The terrain caused difficulty in excavating and required extensive amounts of borrow material to build up the finished surface. Rock was hauled from borrow pits located along the road—near Lake Helen, near the Jones cut and near the summit. In addition, some borrow material was provided by daylighting cuts. Fortunately, there was an abundance of surfacing material on-site, volcanic ash and cinders, which would assist in obtaining a well-compacted rock surface.[113]

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[111] BPR Final Construction Report, Fairbanks Contract, 1-B-1, 1930, LAVO.
[112] BPR Final Construction Report, Fairbanks Contract, 1-B-1, 1930.
[113] BPR Final Construction Report, Mathews Contract, 1-E, 1930, LAVO.

The Mathews contract was completed and turned over to the park on November 1930, marking the completion of the grading and surfacing work over the entire length of the road, with the exception of the short, approximately one-mile northwest entrance road, which had been designated as Lassen Route 6. Extending from Manzanita Lake, this connector stretch brought the park road to the park's western boundary and its junction with Forest Highway 71 (now State Route 44), which, once it was completed by the Forest Service in 1929, was turned over to the State Division of Highways.[114]

Finish work on the Mathews contract, including clean up of slopes, stabilizing the toes of fills, and removing scarred trees, was deferred until the following summer. In addition, a culvert crossing of Lost Creek, originally contained in the contract, was also postponed to the 1931 construction season. The crossing of Lost Creek had originally been planned as a timber trestle, similar to that spanning Hat Creek. An inspection of the location revealed a more substantial, concrete structure was necessary.[115] Plans were prepared in the Branch of Plans and Design in San Francisco for a double 8' x 8' reinforced concrete box culvert with cement rubble masonry wingwalls.[116] Work on the excavation for the Lost Creek culvert began late in May 1931. A temporary flume and ditch was constructed extending approximately 250' to carry the creek around the culvert construction site. Lumber for the forms was obtained from a local mill and reinforcing steel and cement were shipped from San Francisco. Coarse aggregate was manufactured at the surfacing quarry from selected rock. Fine aggregate was obtained from a contractor in Redding. A Jaeger concrete mixer was used and the concrete was placed by means of buggies. The first concrete was poured on June 28 and the final pour was made July 20. Work began on the masonry wingwalls on August 1. The rock was obtained from the west side of a rock cut near Diamond Point. The drawings for the wingwall masonry indicated approximate dimensions for the rock veneer, with instructions that the

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[114] "Highway Transportation Survey of 1934, Appendix A" (Sacramento: State of California, Department of Public Works, 1935).
[115] BPR Final Construction Report, Mathews Contract.
[116] A.W. Burney to Albright, 2 April 1931, LAVO.

rocks should have a "weathered surface."[117] Merle Sager reported that "experienced stone masons" constructed the rock veneer walls, which, when completed, "presented an excellent appearance."[118]

With the completion of the Mathews grading contract, plans were prepared to surface the stretch of road between the Devastated Area and Manzanita Lake. Due to the boundary expansion enacted by the legislature in 1929, the short spur connection to Route 44 was included in construction plans in 1931. As the entire road lacked a surface seal, bids were let in April to surface the spur connection, as well as to lay down a seal coat along the length of the entire park road. Irving Ryder Company of San Jose, who submitted a bid of $121,161.50, which was 71.5 percent of the engineer's estimated expense, was awarded the contract to construct this short connector spur, known as Lassen Volcanic National Park Project 6.[119]

The northwest entrance road was constructed by spreading two courses, a 4" base of crushed rock and a 3" top course of compacted gravel. While Ryder spread approximately 55 gallons of water per cubic yard to the base course to aid in compaction, no water was applied to the gravel surface. This step was omitted due to Ryder's plans to seal coat the surface during the same construction season and the surface would have to be completely dry to allow the bituminous oil to bond successfully to the rock. Rock was obtained from approved borrow pits, including one near the Devastated Area which provided fines for binder material. The binder, hauled to the construction site in five-cubic-yard dump trucks, was spread over the crushed rock surface using a thirty-horsepower tractor and blade grader. The surface was then raked by hand to remove roots and oversize material, which were disposed out of sight of the road.[120]

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[117] Hat Creek Culvert, Drawing L-312-A, 1930, LAVO.
[118] Sager to Vint, 28 July 1931, LAVO.
[119] BPR Final Construction Report, Project 6, Grading and Surfacing, 1931, LAVO.
[120] BPR Final Construction Report, Project 6, 6.

Upon completion of the surface construction, Ryder commenced oiling operations. Prior to spreading the bitumen, the surface was scarified and bladed, using a Russell Super-Mogul grader with a 12' blade and heavy-duty scarifier drawn by a sixty-horsepower Best tractor. The roadway was scarified to a depth of 3" and to the required width, which ranged from a standard of 16' to 19.5' on shorter radius curves. Once the surface was prepared to accept the oil, tests were conducted on the surfacing material to determine the appropriate quantity of oil to spread. The California Division of Highways Testing and Research Laboratory ran the surface material through a series of tests in order to establish the "apparent density" of the rock and to devise an index so that the contractor could combine the crushed rock and oil in the proper proportions. In addition to tests conducted on the surface rock, careful monitoring of the oil ensured it was heated to the right temperature before it was applied to the rock to obtain a thorough saturation of the surface.[121]

Asphaltic fuel oil was shipped from the Union Oil Company's plant to Red Bluff, the nearest rail point. Before transporting the oil to the park, it was heated in a retort to between 220° and 240°. Once heated, it was transferred to 1600- to 2500-gallon trucks and trailers and hauled the fifty-mile distance to the construction site. The oil was placed on the road surface using a 1050-gallon distributor. A double disk and spring-tooth harrow, drawn by a thirty-horsepower Caterpillar tractor followed the distributor, partially mixing the oil with the aggregate. Contract specifications directed that the harrow pass at least three times after each application of the oil, to ensure a thorough mix. Following the oiling and disking, two Caterpillar Super-Special graders with 10' blades drawn by a thirty-horsepower Caterpillar tractor re-mixed the oil and aggregate. The mixing process involved an average of twenty-two turns of the material before it was fine graded.[122]

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[121] BPR Final Construction Report, Project 6, 15.
[122] BPR Final Construction Report, Project 6, 16.

With plans to dedicate the park to the public in July, Ryder accelerated the pace of his oil surface contract in order to complete the work in time for the anticipated traffic. After approximately one-fifth of the road had been oil treated, Ryder adjusted the quantity of oil to 3/4 gallon per cubic yard, spreading the oil in two applications. The decision was made, according to BPR Engineer Mathias, "to cause less interference with traffic." Noting that the lesser amount of oil required a greater amount of harrowing, Ryder nonetheless continued working seven days a week through the 1931 construction season, stopping only for the three-day pubic dedication ceremonies.[123]

While the majority of the road was spread with approximately one and one half gallon of oil per square yard, the stretch through the Chaos Jumbles, between Hat Lake and Manzanita Lake, only recently completed, was spread with more oil, 1.95 gallons per cubic yard. This adjustment was made due to the "extremely porous" quality of the surface rock, which was, according to Mathias, "extremely angular and had a higher percentage of fines" than other surfaced sections. [124]

Because most of the road had been surfaced several years earlier, Ryder encountered damage to the existing crushed rock surface in numerous locations. Traffic, as well as weather conditions—extreme cold and heavy wet snowfalls followed by dry and hot summer weather—had undermined the untreated road surface. Repairs to these failed sections required re-spreading crushed rock and, in some cases, excavating and reconstructing the subgrade to install additional culvert drains. Additional drainage was provided by 6" vitrified tile underdrains and 8" perforated corrugated metal culvert pipes.[125]

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[123] Superintendent's Monthly Report, 5 August 1931; BPR Final Construction Report, Project 6.
[124] BPR Final Construction Report, Project 1 Oiling and 6 Surfacing, 1932, LAVO.
[125] BPR Final Construction Report, Project 1 and 6, 12

The limitations of the road's drainage system design became apparent in the spring of 1932.[126] Along the Kings Creek Meadow, additional springs had developed following a heavy rainfall in September 1931. The action of the springs caused a failure of more than 300' of roadbed. To drain the excess moisture, 350' of 6" vitrified tile drains were placed in a gutter ditch at a depth of 3.5'.[127] Pressed for time due to the impending winter snows, Ryder finished the surface with a double thickness application of asphaltic seal coat, rather than attempting to windrow, mix and re-spread the crushed rock surface before the winter weather set in.[128]

Ironically, Ryder's effort to finish the surfacing contract during the 1931 construction season only served to delay completion of the work. A recurrent problem existed where surface mixing and seal coat surfaced sections met. In these areas of overlap, the grader, turning around to pass repeatedly over the mixed surface, would leave depressions on the newly sealed surface. The weight of the grader machinery compacted the crushed rock surface, causing corrugations to the road. Further, when Ryder began the oiling contract in the 1930 construction season, some sections of the road had been surfaced for several years and the mixing process tended to pick up subgrade foundation rock intermixed with surface fines.[129]

Ryder's rush to complete the seal coat surfacing, however, was only part of the problem. Upon inspecting the contractor's work, BPR engineer J.L. Mathias suggested that the road mix method of oil surfacing, as well as the method of shoulder construction, was unsuitable for the extreme weather conditions around Lassen Peak to which the road was exposed. Winter storms, dropping tens of feet of heavy wet snow, followed by spring run-offs and increased groundwater activity regularly exposed the surface and the subgrade to excessive amounts of water. During the blading process in surface

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[126] Writing to the Director in June of 1932, Superintendent Collins noted "it has been brought to light that the seal coat did not apparently make a proper bond with the road mix treatment." Collins to Albright, 5 June 1932.
[127] BPR Final Construction Report, Project 1 and 6.
[128] BPR Final Construction Report, Project 1 and 6, 3
[129] BPR Final Construction Report, Project 1 and 6, 4

construction, the crushed rock shoulders became incorporated into the pavement. The rock from the shoulders made an inappropriate surfacing material, as it lacked the proper quantity of fines and binder. Mathias proposed that in reconstructed sections subgrades should be constructed to a depth of 6", rather than the standard depth of 4", with a 3" top course.[130]

Park Dedication Ceremonies

The slow progress of the Ryder surfacing contract threatened to undermine the success of park dedication ceremonies scheduled for the weekend of July 24-26, 1931. Less than half the road had been surface sealed and the dry, compacted rock surface was in an unsatisfactory condition to provide a smooth, dust-free ride. In anticipation of the crowds arriving for the dedication ceremonies, Albright directed that a special contract be let to spread a light coat of surface oil as a dust palliative, an essentially cosmetic and impermanent solution. In addition, the State of Division of Highways agreed to spread oil on both park approach roads especially for the weekend crowds.[131]

Several park development projects were undertaken in preparation of the dedication weekend. Rustic split log checking stations with lava rock foundations had been completed at both the Sulphur Works and Manzanita Lake entrances. Parking lots along the road at Bumpass Hell and at the Lassen Peak trailhead were oiled and rolled. Expanded visitor services were also guaranteed by the employment of a full-time ranger, in addition to a seasonal ranger. A dozen rangers from Yosemite and Crater Lake, assigned to the park for the weekend ceremonies, complemented the park's own ranger force. A naturalist, hired in June, established an educational program in the park to supplement the "School of Lassen" that Superintendent Collins had been conducting in the valley towns over the past year.[132]

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[130] BPR Final Construction Report, Project 1 and 6, 9
[131] BPR, "Final Construction Report on Road Oiling, Acct. #522"; Ward P. Webber to F. A. Kittredge, 17 December 1931; Superintendent's Monthly Report, 5 August 1931, LAVO.
[132] Superintendent's Monthly Report, 5 August 1931.

The California Chamber of Commerce organized the dedication ceremonies, establishing a special "Lassen Park Dedication Committee" headed by A.J. Conard. Unfortunately, in 1931 there was only one developed campground in the park, along the south shore of the Manzanita Lake in the vicinity of the Loomis Museum. The chamber paid for temporary camping facilities, including raising canvas tents on wood platforms and setting out seventy-five picnic tables in areas of congregation at Summit Lake, and at Kings Creek Meadows. For those intending an ascent of Lassen Peak on the Summit Trail, the Sierra Club erected a visitor's register at the summit, a cast aluminum box featuring the Sierra Club emblem, the name of the park and the altitude of Lassen Peak, in raised letters.[133]

To commemorate Raker's contribution to the establishment of the park, the Chamber provided funds to design and construct an entrance marker as a memorial to the park's congressional sponsor. A 15'-6" tall lava rock masonry pillar designed by Sager in 1931 was matched on the opposite side of the road by a smaller pier of the same materials and construction. The Raker Gateway featured a copper sign, forged in San Francisco, which hung from wrought iron chains on a projecting peeled timber post. A brass plaque embedded on the inside of the pier honored Congressman Raker as the guiding force behind the establishment of the park.[134] Along the road, park laborers built several lava rock masonry fountains with funds provided by the chamber: low-rising, square wells with catch basins behind invited motorists to stop for a drink, fill canteens, or to collect water to cool overheated radiators. Shortly after their installation, however, these drinking fountains were removed. They were discovered to be the source of water damage to the road as water impounded in the catch basins froze in cold weather and created frost heaves and surface and subgrade damage.[135]

Governors Rolph of California and Balzar of Nevada, Congressman Englebright and Secretary of the Interior Ray Lyman Wilbur were in attendance for the dedication weekend, and more than 21,000 members of the public enjoyed the wide range of

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[133] Superintendent's Monthly Report, 5 August 1931.
[134] Sager to Vint, 28 July 1931, LAVO.
[135] Superintendent's Monthly Report, 7 July 1933, LAVO.

scheduled activities intended to showcase the newly-accessible park. Natural history lectures, including Dittmar's "Story of Mount Lassen" told of the volcanic history of the region. Capping off the events was a Saturday night dance followed by a fireworks show from Lassen Peak, making, in the words of Superintendent Collins, "the world's largest firecracker."[136] By the end of the 1931 travel season, more than 56,000 people had visited the park, and 18,273 vehicles were recorded entering the park at the southwest checking station.[137]

Park Road Reconstruction

With the completion of the surfacing contract and the final construction accomplished on the crossing of Lost Creek in October 1931, the road extended the length of the route originally surveyed in 1922 and 1923 by NPS engineers Goodwin and Hewitt. It traversed a variety of landscape types, including areas of volcanic activity, and provided a sequence of intimate and distant views of Lassen Peak as it passed within two miles of the summit of the volcano. Approach roads from both the southwest and northwest entrances allowed motorists to traverse the park in a 30-mile scenic loop. The rush to celebrate completion of the road and to dedicate the park to the public was somewhat premature, however, as road surfacing contracts and the installation of additional drainage structures were ongoing projects for several construction seasons. A change order was added to the Ryder surfacing contract, calling for rolling the sealed surface with an 8-ton tandem gasoline roller.[138] Road widening, including daylighting cuts and slope banking was also an ongoing project in the early 1930s. [139]

In the spring of 1932, when the winter snows receded from the road, Superintendent Collins reported that the seal coat surfacing applied in the fall of 1931 had failed. The seal coat, Collins reported, did not make a proper seal with the road mix treatment.

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[136] Superintendent's Monthly Report, 5 August 1931, LAVO.
[137] National Park Service, U.S. Department of the Interior, "Press Release," 1 November 1931, LAVO.
[138] Ward P. Webber, "Final Construction Report on Road Oiling, Acct. #522," 17 December 1931, LAVO.
[139] For calendar years 1933 and 1934, $10,000 was allotted for "post construction, spring slide removal, daylighting cuts, widening and dressing shoulders and roadside cleanup" on the Lassen Park road. F. A. Kittredge to L.W. Collins, 20 January 1933, LAVO.

Large sections of the road were covered in nothing but "bare oil." Traffic passing over the road caused further damage, as tires picked up the oil and bits of the surface rock. He immediately reported this problem to BPR Engineer Mathias who inspected the road but "was at a loss" to account for the condition.[140] Pending an analysis of the oil treatment, Collins and his crew attempted to protect the road, spreading sand to pick up the loose oil.[141] Collins requested NPS Chief Engineer Frank Kittredge to dispatch a member of his staff to conduct a field inspection of the road, to determine the cause of the oiling failure, and to support his request for funds to continue the sanding work. Unfortunately, Kittredge's assistant, A.W. Burney, responded that Kittredge was busy with work in Yosemite, and none of his staff was presently available to make the trip to Lassen. Burney also asked Collins to clarify under whose responsibility maintenance of the road fell—the Bureau of Public Roads or the NPS.[142]

As soon as engineering personnel were available, Kittredge ordered engineer Ward P. Webber to inspect the road and to report on its condition. Webber essentially agreed with Mathias' assessment of the root cause of the problem. Asserting that the seal coat was applied too late in the season, Webber claimed that "the low temperature of the road surface and air caused the hot seal coat to congeal before having a chance to spread or penetrate, forming a surface film which is entirely too thick." In addition, little traffic had traveled the road subsequent to the seal coat application and, therefore, it had not received sufficient compaction. Further, Webber realized that not only cold weather, but wet conditions were to blame, writing that "considerable moisture" was present in the oil mix surfacing at the time the seal coat was applied. Apparently, in Ryder's rush to complete the surfacing job the surface material had not dried out sufficiently to form a bond with the seal coat. Webber proposed that nothing less than an entirely new seal coat would need to be applied on the whole road, and estimated that it would cost approximately $30,000 for repairs.[143]

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[140] Collins to the Director, 5 June 1932, LAVO.
[141] Collins to Kittredge, 30 June 1932, LAVO.
[142] A.W. Burney to Collins, 7 July 1932, LAVO.
[143] Webber to Kittredge, 6 August 1932, LAVO.

Unfortunately, a $30,000 expenditure on repairing the entire road would have used up most of the construction funds for the year. The park's proposed maintenance and road construction budget for the 1933 construction season was intended to improve the alignment of a short, one-half mile of the road from the boundary to the Sulphur Works area, and to daylight cuts and perform general post-construction clean-up.[144] Originally constructed in 1925, this section of road was designed with shorter curves and narrow shoulders. Plans had been prepared to flatten the tight curves and expand the shoulders in order to bring this one section up to the same standards as the rest of the road.[145]

Kittredge directed NPS "road oiling expert" T.R. Goodwin of the San Francisco Branch of Plans and Design, to prepare a full description of the work required, and its anticipated cost. He outlined the method of construction and, while in agreement with Webber on the root causes of the problem, Goodwin originally anticipated that approximately $18,000 would take care of the job, but his estimate was eventually adjusted upward, to $30,000.[146] In addition to repairs to the drainage structures and the faulty surface, Goodwin proposed that the realignment of the half mile section between the southwest entrance and the Sulphur Works should be completed as soon as possible. The tight curves of the old section of road made it the most dangerous part of the entire road, Goodwin reported, making it "impossible for one car to pass another safely at ordinary driving speeds, but people continue to make the attempt." In addition to the $30,000 estimated to resurface the entire road, an improved alignment on the short half-mile section near the Sulphur Works would cost an estimated $10,000.[147]

Before such a large allotment could be released, however, the question raised earlier by Burney would need to be determined: whether the NPS or the BPR was responsible for post construction and maintenance work on the Lassen road. Writing to the Director,

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[144] Kittredge to L.W. Collins, 20 January 1933, LAVO.
[145] W.P. Webber, "Report on Southwest Entrance Road," 22 December 1932, LAVO.
[146] T.R. Goodwin, "Post Construction of Lassen Peak Loop Highway, Seal Coat to Provide Durable All-Weather Armour Coat Surface," n.d., LAVO.
[147] T.R. Goodwin, "Post Construction of the Lassen Peak Loop Highway to Widen and Straighten Alignment of Approximately One-Half Mile of Road, Estimate and Justification," n.d., LAVO.

Kittredge used the Lassen example as an instance of the policy "adopted nearly five years ago and reaffirmed at the Hot Springs conference" that the NPS would handle post construction and maintenance of roads by its own forces. He urged approval of a $30,000 allotment to the park for a "rush contract and to push the work to completion this season." The coming winter snow, Kittredge warned, would subject the road to "further penetration of water and disintegration."[148]

Before funds for the resurfacing project were released, winter weather arrived, causing further damage to the road surface. The following fall, when the road was being plowed out after an early snowfall, Collins reported the snowplow (a sixty-horsepower Caterpillar tractor with a blade attachment) "actually picked up the seal coat with a small portion of the underbase hanging thereto."[149] Without a protective seal coat properly adhered to the oil mixed surface, the road would only continue to deteriorate. As park maintenance crews continued spreading sand to absorb excess oil, another problem was revealed. In places, Goodwin noted, the road "started to roll. That is, it gave the appearance of a rubber-like composition; in places rather spongy in its characteristics, in others very rough." Damage to the sub-base was only one part of his concern, however, as "driving became dangerous on corners" and "drivers frequently lost control of [their] cars due to the bouncing of its wheels." Goodwin concluded his analysis of the problem by stating that the funds for resurfacing were "imperative" since "the present coat is practically worthless."[150]

He outlined a three-stage construction process, with careful instructions to allow for proper drying and compaction of the material. First, the entire surface would be scarified and turned with the blade into windrows. Once the surface mix had dried sufficiently and traffic compaction had taken place emulsified asphalt would be spread at a rate of 1/4 gallon per square yard. He described a method that would allow traffic to continue to use

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[148] Kittredge to the Director, 8 August 1932, LAVO.
[149] Collins to Kittredge, 8 November 1932, LAVO.
[150] T.R. Goodwin, "Post Construction of the Lassen Peak Loop Highway to Widen and Straighten Alignment of Approximately One-Half Mile of Road, Estimate and Justification," n.d., LAVO.

the road; as one side of the road was under repair, the other side would remain open to traffic.[151]

The park received its funds for the reconstructed seal coat, and work was carried on during 1933, however, only the worst sections were rebuilt—between the southwest entrance and the summit. The $30,000 was insufficient to complete the entire surfacing job, as more drainage structures were discovered to be necessary. Culverts and perforated tile drains were installed in places where groundwater and snowmelt collected. In places where total failure of the surface occurred, an entirely new subgrade was constructed. The reconstruction work was supervised during the 1933 construction season by NPS associate engineer E.J. Currigan; in 1934 the BPR assumed management of the continuing improvement work. Currigan made a full report of work in a June 1934 report to Kittredge. Not only was the seal coat applied too thickly and at too low a temperature, Currigan asserted, subgrade drainage was inadequate. He noted that the combination of "very unstable" soil forming the subgrade, heavy seepage of groundwater and snowmelt from the slope on the inside of road, and inadequate drainage system design had caused such extensive damage.[152]

As the scope of the repair work escalated, a new source of funds and labor arrived to assist in road repair projects. In 1933, with the establishment of the Civilian Conservation Corps (CCC), trail construction, campground development and road maintenance benefited from hundreds of laborers, who accelerated the pace of park development. The first CCC camp was set up at Old Boundary Spring (near the Devastated Area) in 1933. On May 16, Captain Erickson of Fort Baker arrived, bringing Lt. Walter Stone, a sergeant, a private and forty-eight CCC enrolled men, twenty-five of whom were locals.[153] By June, eighty-nine enrollees were working on truck trails,

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[151] T.R. Goodwin, "Post Construction of Lassen Peak Loop Highway, Seal Coat to Provide Durable All-Weather Armour Coat Surface," n.d., LAVO.
[152] "Seasonal Report On Project No. F.P. 45.6—Lassen Peak Loop Highway Seal Coat Surfacing For Period August 23 1933 to February 20, 1934," LAVO.
[153] P.J. Holloway, Report to the Chief Architect Through the Superintendent of Lassen Volcanic National Park," 1 November 1933, 2, LAVO.

erosion control, roadside cleanup and campground improvement. In their first full year at the park, the CCC concentrated on roadside cleanup projects.[154] The width of cleanup sites was variable, depending on the adjacent landscape's visibility from the road. In some cases it extended for several hundred feet, while in others it was necessary to go back only about 50'.[155] Roadside cleanup had aesthetic as well as practical value. It improved the appearance of the landscape adjacent to the construction zone, and it also reduced fire danger, by clearing downed wood, brush, and other combustibles.

CCC labor was used for routine maintenance of bank sloping, for spring cleanup and clearing the right-of-way, while Emergency Conservation Work appropriations provided the funding. CCC labor removed rocks and dirt from gutterlines to the shoulders. The work was "particularly adapted to [CCC forces] since it involve[d] a large amount of hand work."[156] In addition to roadside cleanup and road maintenance projects, the construction of structures, including log bridges on hiking trails, as well as park road signs were constructed by CCC labor. Eventually, a camp was established across the road from park headquarters, in addition to camps at Lost Creek and Old Boundary Springs, within the park.

For the 1933 construction season, road work was carried on by NPS day laborers, augmented by CCC forces. In addition to assisting with post-construction clean up, these laborers were put to work on the reconstruction of sections of the road where water damage had occurred. Reconstruction of the subgrade started with the removal of existing drainage tiles to clean them out, and drains that were badly damaged were replaced. The subgrade then sat exposed to the air to dry before a 6" to 8" thick telford base of crushed rock was spread. Next, filler material of smaller stones and fines was spread and rolled until "all movement in the rock had stopped and an unyielding base

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[154] Noble Hoggson, "Landscape Report, Lassen Park," 15 August 1934, LAVO.
[155] Superintendent's Monthly Report, October 1933, LAVO.
[156] "Quarterly Narrative Report, Old Boundary Springs Camp, NP-1, Lassen Volcanic National Park," July-September, 1933, LAVO.

obtained."[157] On the outside shoulder of the road, the base course was extended 18" wider than the final surfacing and on the inside shoulder the base was extended to the slope or the drainage ditch line.[158]

On the section of road between Diamond Point and the switchback at Pilot Pinnacle, more than 1000 cubic yards of rock foundation course was constructed along a length of approximately 1800 lineal feet. In addition to reconstruction of the subgrade in the sections of the worst failure, drainage systems were introduced in order to channel groundwater, rain and snowmelt away from the surface of the road. Investigations of the existing drainage structures revealed that many drain tiles were completely filled with sediment. Drainage ditches were excavated to an approximate depth of 3'-6". Once the tiles were cleaned and relaid, the ditches were backfilled with crushed rock. Fine crusher run rock was then spread on the surface of these drainage trenches. Culverts with either 10" or 18" corrugated metal drain pipes were installed in several locations, and were dressed with cement rubble masonry headwalls. This work focused on the areas of the worst subgrade failure, between the summit and the southwest entrance station, where the road ranged in elevation from 6565' to 8512'.[159]

In the summer of 1934, Kittredge reported to the BPR District Engineer Captain C.H. Sweetser on the surface and drainage construction of the preceding season as the BPR prepared to carry on the work for the 1934 construction season. Kittredge outlined the process that Currigan's crews had followed, with particular attention to the details of drainage construction, since "the correction of drainage features proved to be a very material one." He reported that trenches were excavated and, where possible, the existing tile was cleaned out. In places where the drainage tiles were damaged beyond repair, "bell and spigot tile" was used. He also noted that the rock foundation was extended "clear across the ditch and tied into the hillside in an effort to further prevent the

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[157] NPS Branch of Engineering, "Seasonal Report on Seal Coat, Surfacing Lassen Peak Loop Highway, for period August 23 1933 to February 20 1934," LAVO.
[158] NPS Branch of Engineering, "Seasonal Report on Seal Coat."
[159] NPS Branch of Engineering, "Seasonal Report on Seal Coat."

softening of the subgrade." Kittredge noted that this method of repair was expensive but "it seem[ed] about the only way to prevent a repetition of the failures" of the past.[160]

Excess moisture, both in the subgrade and in the oiled surface, had caused areas of slumping and subgrade deterioration. In addition to the slumping roadbed, a slide of approximately 1000 cubic yards of the fill section along the front of Diamond Peak required total reconstruction. This work, begun in June 1936, under the direction of the Bureau of Public Roads, started with excavating an 8' trench along the uphill gutter line in an attempt to redirect underground springs away from the fill section. This approach proved to be unsuccessful. In order to repair the fill, the entire section was excavated, perforated, corrugated metal culvert pipes were installed at the apparent source of the water, and regular corrugated metal pipes directed the captured water and carried it to outlets beyond the toe of the fill. The fill section was then replaced with rock material salvaged from roadside cleanup operations. Over the next several construction seasons, a hand-placed rock retaining wall was erected at the Diamond Peak curve to shore up the fill.[161]

While sliding slopes, seasonal springs and heavy spring runoff had caused considerable damage to the section of the road between the southwest entrance and the summit, along Kings Creek Meadows excessive groundwater under the road undermined the stability of the subgrade. Reconstruction of failed sections of this stretch of the road began with tearing up the existing surface, excavating to a depth of 18", and replacing the excavated material with "rock ballast and pervious material." The surface was laid in a 6" course of crushed gravel, followed by a 3" course of road-mixed asphaltic material and then sealed with a seal coat of asphaltic oil.[162]

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[160] Kittredge to Sweetser, 10 August 1934, LAVO.
[161] BPR Final Construction Report of Post-Construction Repairs of the Lassen Loop Highway, Seasons of 1934, 1935, 1936, LAVO, 11-14.
[162] BPR Final Construction Report, Seasons of 1934, 1935, 1936, 11-14.

Winter storms had exacted repeated damage to a road that was inadequately designed to accommodate rapid drainage during periods of sudden rain or rapid snowmelt. Torrents of water would flood the gutter lines, cutting deep trenches and causing damage to the shoulders. Slope raveling also posed a threat to the surface of the road. Maintaining a naturally appearing slope, a standard design policy on all national park roads, proved difficult along many sections of the road and slope repairs were a constant maintenance problem. In his report to Vint for the summer of 1936, NPS resident landscape architect Theodore G. Meier realized that "the loose rocky nature of the banks" were resistant to stabilization. He anticipated that "repeated sewing of the banks with seed of the plants forming the ground cover in the area should be undertaken to help hold them from constant sloughing off."[163]

Highway Protection Program: Sulphur Works Fumerole

In addition to weather-related drainage problems, the unusual geological conditions characteristic of the certain sections of the road also posed challenges to constructing a long-wearing road surface and stable subgrade. The sulfuric soil and active fumeroles in the vicinity of the Sulphur Works were a special problem, persistently undermining the banks and eventually eating away at the edge of the road. The steam vents and boiling mud pots in this area were one of the more interesting tourist attractions in the park and the road passed nearby these active geothermal features on a large fill. As early as 1935, NPS landscape architect Thomas Carpenter had suggested that a concrete slab (stained the same color as the adjoining oiled surface) be constructed to carry the road over the West Fork of Sulphur Creek, in vicinity of the Sulphur Works.[164] The combination of a particularly severe winter and increased activity of the steam vents and fumeroles caused a complete failure of the fill section over the west branch of Sulphur Creek in the winter of 1937. It proved a particularly difficult challenge to engineers to devise an appropriate method of construction that would protect the road from the corrosive effects of active sulfur springs. Brief construction seasons, inconsistent appropriations and private

[163] Meier to Vint, 28 August 1936, LAVO.
[164] Thomas Carpenter to W.G. Carnes, 29 October 1935, 3, LAVO.

property adjoining the road by the Sulphur Works complicated plans for adequate repairs; the BPR began work on repairing the fill over Sulfur Creek in 1938, but ran out of funds and favorable weather before the work could be completed. In May 1940, a "disastrous" slide occurred near the Sulphur Works, forcing the road to remain open to one-way travel. The destructive force of the boiling sulfuric springs gradually ate away at the steep banks, finally engulfing a large tree on a knoll between the road and the fumerole.[165]

NPS associate engineer George Reed was put in charge of a special "highway protection program" and considered several alternative solutions to reconstruct the section of road near the Sulphur Works. Proposals included erecting a bridge to carry the road over the steam vents on the same alignment, changing the alignment and moving the road away from the destructive fumeroles, and building a reinforced concrete wall between the fumerole and the road. Reed recommended the latter alternative, a retaining wall, "as being the most desirable, for the time being at least."[166]

While a "long high bridge" over a new alignment crossing the West Fork of the Sulphur Creek, would have cost, in Reed's estimation, $100,000 (nearly one sixth of the expense of the entire road), this would be only one part of a greater expense. Unfortunately, the Supan family still maintained private property near Sulphur Creek, as well as several hundred acres to the east of the road, where cattle grazed in the Little Hot Springs Valley. A new alignment would mean acquiring the right-of-way over the private property, an unlikely success due to the fact that the Supans had resisted any attempts by the government to purchase their property within the park. Making matters worse, the owners operated a tourist facility on their Sulphur Works property, a primitive, unplanned, crudely built collection of wood frame buildings including a curio shop, a bathhouse and, eventually, a gas station and roadside diner. All attempts by the government to acquire the property from the Supans were met with excessive demands

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[165] NPS Final Construction Report on Lassen Peak Highway Improvements at Sulphur Works, 5 December 1941, LAVO.
[166] NPS Final Construction Report on Lassen Peak Highway Improvements at Sulphur Works.

for payment, and their commercial enterprise remained a blight on the landscape until the property was finally condemned by court order in 1952.[167]

Though Reed had recommended a retaining wall to protect the road, on an inspection of the location with NPS Assistant Regional Engineer Homer C. Crowley, Crowley suggested instead that pilings rather than a retaining wall should be erected to stabilize the road banks. Varying in length from 20' to 40.7' a total of twenty-two red fir pilings spaced on 4' centers were driven to depths between 16.5' and 20' below grade. The pilings were secured by 3/4" galvanized steel cables tied to cedar deadmen on the opposite side of the road and attached to the pilings with clamps. A 16' clearance was maintained for road traffic to pass under the cable ties. The cedar deadmen were then leveled off and the cut sections were used as horizontal rails on the top of the pilings, forming a post and beam handrail system adjacent to the road. The pilings, wales, and guardrail were treated with creosote. The handrail was built on a 6' graveled sidewalk that was constructed on the inner side of the road. A 10" timber guardrail served as a safety barrier between the road and the sidewalk.[168]

The mechanical unit for the pile driving was a 19-ton speeder gas shovel, but its weight prevented it from safely passing over the weakened section of road. A section of the road was excavated and a 4' thick mat of log sills and stringers were laid to form a temporary protective surface for the shovel to pass over[169].

In order to protect the banks in which the pilings were driven, a system of 6" x 8" walers (vertical timbers supporting the walls of the trench) and 3" x 18" sheeting was placed in the excavated trench. Walers were installed in two parallel rows, one at the bottom of the excavation and the other near the top of the piling, and bolted to the piling. The sheeting was spiked to the inner side of the piling. The individual lengths of walers were

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[167]Memorandum from Johnson, attorney, to Director, 23 September 1941, NA RG 79, File 610, Private Holdings-Supan; Strong, *These Happy Grounds*, 72.
[168] NPS Final Construction Report on Lassen Peak Highway Improvements at Sulphur Works.
[169] NPS Final Construction Report on Lassen Peak Highway Improvements at Sulphur Works, 5.

overlapped, while the sheeting was butt-ended. The unstable ground posed a dangerous threat to both the workers and the road stabilization system that they were building. The vibrations caused by the 1000-pound hammer driving the piles could cause the sides of the banks to slough and fill in the excavated area, so the excavation for the walers was worked out by hand. The engineer made special note of the unusual character of the ground in the project area; the "bluish colored clay" was so warm that workers could not withstand more than five or six minutes standing in it while shoveling out the waler trench. The heat, he reported, "went completely through their boots."[170]

In addition to the road stabilization project, an attempt was made to contain the deteriorating banks surrounding the fumeroles adjacent to the road. Wire fences were placed along the extremities of the active fumerole area. Reed expected that the fences would have to be replaced annually, as the banks of the fumerole were constantly receding. A large knoll near the southeastern limit of the fumerole area was located on the Supan property and it was not removed, as Reed desired. The knoll collected snowdrifts that would hang over the edge and as the snow melted the edge of the knoll would ravel and fall into the steaming vents, accelerating their activity.[171] As construction proceeded during the 1941 season, the Supans erected a sign on the knoll, indicating their ownership. A crudely painted sign announcing "Supan's Sulphur Works," a wire fence, more than 600' of cable ties over the roadway, and a forest of pilings made this section of the road particularly unsightly. Nonetheless, the sidewalk, handrail, and protective guardrail provided a sufficiently safe environment for park visitors and invited motorists to stop, get out of their cars, and observe the hot spring activity at close range.

While its aesthetics were undesirable, the piling system, Reed predicted, would last indefinitely. Rather than destroying the pilings, the "white film or oxide accumulating

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[170] NPS Final Construction Report on Lassen Park Highway Improvements at Sulphur Works, 8.
[171] NPS Final Construction Report on Lassen Park Highway Improvements at Sulphur Works, 4.

upon the wood and metal exposed to the vapor and fumes," Reed anticipated, would "prove more of a protective agent than a destructive [agent]."[172]

The second component of the "Highway Protection Program" called for completion of the fill and drainage system, which had been started by the BPR in 1938, over the west fork of the Sulphur Creek. A pair of 36" vitrified clay pipe culverts installed by the BPR were dressed with wet masonry head and wingwalls. An additional culvert, with a 12" vitrified clay pipe installed at the eastern end of the fill was added to assist in drainage along the foot of the sloughing bank. Wet masonry headwalls and wingwalls were constructed on the two 36" pipe culverts, and headwalls were placed on the 12" pipe culvert. The repair work on the West Sulphur Creek fill was completed in October, but a heavy storm in December raised questions as to the efficacy of a culvert system in this location. Brush washed downstream during a heavy rainstorm plugged one of the two 36' inch vitrified clay culvert pipes. Quick action by park maintenance workers prevented the flow of water from backing up and destroying the fill, but when the water subsided a hole in the bottom of the clay drainage pipe was discovered.[173]

The park's chief of maintenance wrote, "it is not known whether there was a flaw [in the vitrified clay pipe] at the time of installation or if there was a settling of the sub-base beneath the culvert."[174] Further, when the pipe was cleared of debris, a small stream of hot water flowed out of it, though the water at its inlet was not hot. The constantly shifting springs apparently had worked their way under the culvert pipe, raising doubts about the clay pipe's ability to withstand the corrosive action of sulfuric springs. The maintenance chief urged replacement of the pipe culvert at Sulphur Creek with a 4' x 6' x 80' box culvert. "Contact with the chemist at the Portland Cement Company," the chief of construction reported, revealed that "sulphate-resisting concrete would resist water with sulphate content."[175] The chief of maintenance proposed the same solution—a

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[172] NPS Final Construction Report on Lassen Park Highway Improvements at Sulphur Works, 15.
[173] Monthly Report of the Chief of Maintenance, 19 December 1941, LAVO.
[174] Monthly Report, 19 December 1941.
[175] Monthly Report, 19 December 1941.

concrete box culvert—for another pair of pipe culverts installed at Upper Dersch Meadows following the disastrous storm of 1937 which had washed out this section of road. The twin 30" corrugated metal pipe culvert pipes became entirely clogged with debris in the 1941 storm, washing out a section of the road embankment at Dersch Meadows. Neither of these proposed box-culvert drainage structures was installed.

Maintenance crews attempted to stay ahead of any culvert back-ups, clearing and dredging out blocked culvert pipes during spring clean up and after summer storms. Of course, nothing could be done to clear out the culverts in the winter season, as snow depths on the road near the summit routinely reached more than 20' of heavy pack. The park's snow removal equipment, the Sno-Go, could cut through deep snow, but when the height of the snow pack exceeded the height of the machine itself, it was impossible to throw the snow over the side of the steep snow banks. In these cases, the power shovel led the Snogo to clear a route for its passage. Bulldozers and dump trucks assisted the Snogo, as crews worked around the clock to open the road to the public. In an effort to expedite snow removal in the spring of 1940, the maintenance crew spread a thin layer of coal dust on the deepest drifts along the road to enhance the melting action of the sun. This method had been used with some success in roads at Yosemite, but was only occasionally employed at Lassen; it was effective at reducing the depth of snow at the end of the season, but failed to be effective if the dust were spread between storms.[176] The severe storms, dropping heavy, wet snow often followed each other in succession and could extend into late spring. A telling indicator of the unusually heavy snow at Lassen is the popularity of the Fourth of July Ski Meet, held on the hillside near the southwest entrance station where a rope tow and a poma lift and warming station were built in the mid-1930s. The ski meet was only rarely cancelled due to lack of snow and attracted skiers from all over the state for the premier late season conditions.[177]

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[176] Monthly Report of the Chief of Maintenance, 16 June 1940, LAVO.
[177] Strong, *These Happy Grounds*, 82.

The "100-year storm" of 1937 had wrought destruction to the road surface as well as many of the drainage systems. The winter of 1941 was nearly as destructive. It became a matter of routine spring clean up to discover areas of excess moisture threatening to undermine the stability of the road. Pipe culverts were added in places where they could assist in carrying water away from the road. In addition to the damage groundwater and snowmelt posed to the subgrade, heavy rain and the weight of the unusually wet snow wrought havoc on the road's surface. Though the park had repaired the entire seal coat along the length of the road in the years following its dedication to the public, it became apparent that regular, repeated oilings were necessary to protect the surface.

Post-War Construction

After the 1941 construction season, CCC labor was no longer available to assist in the clean-up details. By 1941, only one camp remained at the park, at the Old Boundary Springs near the Devastated Area. The CCC was abolished the following year, and many of the "boys" accepted the call to service in World War II. Their contribution had been considerable at the park. In addition to providing most of the labor on spring clean up and road maintenance projects, including gutter line cleaning and slope stabilization, CCC labor built facilities at the park's developed campgrounds, as well as many of the park's 150 miles of hiking trails. By the mid-1940s, the park's chief of maintenance, Theodore Rex, lamented "About all that can be done on the highway this year is gutter work for drainage, and then we may not get the best job done."[178]

In 1947, under the direction of NPS engineer H.S. Shilko, a job-training program was instituted in the maintenance department in order to impart to new workers the skills the CCC crews had acquired in road maintenance techniques. Under Shilko's guidance, workers were instructed in the "accepted practices" of road maintenance on the park road, including patching, repairing slopes, and road oiling.[179]

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[178] Theodore Rex, Park Foreman, "Report of the work done in the field for the month of August 1944," LAVO.
[179] H.S. Shilko, " Report on Maintenance of Roads," 6 August 1947, LAVO.

The crushed gravel surface completely re-oiled and extensively patched every year was an expensive, labor-intensive project using a large portion of annual maintenance budgets. The road, plagued by excess moisture especially between the southwest entrance and the summit and along the seasonal wetlands of Kings Meadows and Dersch Meadows, would inevitably reveal damage once the snow was removed. The exact extent and specific location of water damage, however, could never be accurately predicted. The twin tasks of plowing the road and repairing damage from the plow and the winter snow and ice amounted to the majority of maintenance expenditures. Following particularly severe winters, the budget for road maintenance was quickly depleted and work orders for repair jobs would routinely escalate.[180] By the end of the 1940s, the Bureau of Public Roads (now called the Public Roads Administration [PRA]) recommended a survey to "permit more accurate work control and cost estimates."[181]

Maintenance of the park road, including snow removal, was not the only road project for which the park was responsible. Its jurisdiction expanded in 1946, when the park's approach roads through the National Forest, leading to Butte Lake and Juniper Lake were recognized as integral components of park access. In addition, the Viola Road, which was used by park personnel to travel between the Mineral headquarters area to the northwest entrance at Manzanita Lake, was included in the park's maintenance domain.[182]

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[180] Monthly maintenance reports to the superintendent throughout the 1940s record estimated expenses associated with snow removal and road repair projects. During this time, the park's snow removal equipment included bulldozers, 5-ton dump trucks, pickup trucks with blade attachments, and a "Snogo" plower. Cleaning out gutters, shooting and removing large boulders and surface patching were routine projects.. Due to the necessity of re-oiling the road every summer, the park purchased equipment to construct its own road oiler, mounting a 500-gallon tank on the back of a truck. By the late 1940s, the park's needs for additional snow removal equipment was granted with a $11,3000 allotment out of Roads and Trails funds, in addition to a "substantial allocation for road maintenance." Chief of Maintenance Monthly Reports to the Superintendent, 28 May 1941; 31 July 1941; September 1944; July 1945; August 1948; Memorandum, Acting Regional Director Herbert Maier to Superintendent, 25 February 1947, LAVO.

[181] Charles C. Morris, PRA Division Engineer to Tobin, 2 November 1948, LAVO.

[182] By Act of August 7, 1946: (Public Law 633) provided appropriations for the NPS, and authorized expenditures for "maintenance of approach roads through the Lassen National Forest leading to LAVO.

A meeting in the fall of 1948 between PRA engineers, park superintendent Daniel Tobin, the park's chief of maintenance Theodore Rex and park landscape architect Thomas Carpenter resulted in a plan to place a "final surface" on the road. Bituminous concrete, or asphalt, would minimize the routine maintenance expenses required of an oiled gravel road. Before plans were prepared for a new asphalt surface, however, the PRA required a survey indicating soil conditions and road width data. The PRA recommended a width of 20', plus 2' or 3' shoulders.[183] Tobin responded to the PRA's recommendation, stating that "we definitely agree on a minimum width of twenty feet plus the shoulders. A more established pavement line is needed on both the inside and outside edges (and is) desirable for both appearance and maintenance."[184]

The PRA crews established a camp at the former Old Boundary Springs CCC camp and construction began in the fall of 1948 to expand the width of the entire road to the full 20', plus shoulders.[185] With the short construction seasons at the park, first priority was given to the troublesome eight-mile section between the southwest entrance and the summit. By the end of the 1950 construction season, the road had been widened between the southwest entrance and the summit; the alignment remained essentially unchanged, with the exception of the tightest curves, which were widened the recommended minimum 2' width. In October 1950, bids were let for the paving contract for this section and the low bid (only two were received) of $223,917 was accepted. This eight-mile section was surfaced with asphalt in 1953.[186]

Typical sections were constructed to a width of 26', shoulder-to-shoulder. The pavement contract called for scarifying the existing oiled rock surface, then blading and rolling the full 26' width. Trench shoulders were excavated to an average depth of 6" below the top

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From: General Development Plan, 1953, Fred Johnson, Superintendent, approved by T.C. Vint Chief of Design & Construction, LAVO.

[183] PRA Division Engineer Charles C. Morris to Daniel J. Tobin, Superintendent, LAVO, 2 November 1948, LAVO.

[184] Tobin to Morris, 23 November 1948, LAVO.

[185] "Chief of Maintenance Field Report for the Month of August 1948," LAVO.

[186] Tobin to the Director, 13 November 1950; Rex to Tobin, September Maintenance Report, 5 October 1953, LAVO.

of the existing surface. The outside shoulders were constructed to a 2.5' width, while the width of the inside shoulder was variable, constructed between 2' and 3' wide. A base course of crushed gravel or stone was built up to a depth of 3.5"and a width of 21', which was then spread with a prime coat of bitumen. The surface course of Class C-1 dense graded road-mix was spread in two layers, to a depth of 3" over the improved and primed base course before a seal coat was spread. Superelevation was designed at a maximum rate of 0.08 per foot width of the roadbed.[187]

BPR and NPS crews continued during the next several seasons to finish the widening between the summit and the northwest entrance, using gravel quarried from the borrow pits near Lost Creek and in the Devastated Area, and completing the widening project in the fall of 1953. Once the pavement job was completed between the southwest entrance and the summit, the BPR recommended bituminous concrete (asphalt) surfacing for the remaining mileage, at an estimated expense of approximately $500,000.[188]

Vint approved the BPR's recommendation. Noting that the road had been top surfaced (with oiled, crushed rock) more than twenty years earlier, Vint stated "in order to protect our investment, reduce maintenance costs and provide a safe and comfortable traveling surface for the heavy traffic now using this road, this section should be surfaced."[189]

The park was seeing a steady increase in visitation in the years following the war. Between 1949 and 1950, for example, the number of cars entering the park increased from 45,177 to 47,774, with more than 152,000 visitors.[190] Despite this increase in visitation, important maintenance work was deferred during the most of the 1940s. In 1947, the park's maintenance chief, Theodore Rex was happy to report that "for the first time in many years the gutters have been cleaned from one end of the highway to the

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[187] BPR Division 7, San Francisco, "Typical Cross Section, Lassen Project 1-A, C-2, C-3, D-Bituminous Surfacing, 6 September 1950, LAVO.
[188] BPR Division Engineer Charles C. Morris to Fred Johnston, Superintendent LAVO, 6 February 1953, LAVO.
[189] Vint to Regional Director, NPS, Region 4, 14 April 1953, LAVO.
[190] Superintendent's Monthly Report, 12 September 1950, LAVO.

other."[191] The section north of the summit was the most neglected; the gutters had not been cleaned, in Rex's estimation, for more than eight years.

Vint's recommendation to surface the remainder of the road—from the summit to the northwest entrance—was planned to supplement BPR day labor work currently underway. These projects included repairs to the Diamond Point retaining wall, building up the outside shoulder between the ski area and the Sulphur Works, extending a 24" corrugated metal culvert pipe under the road at the summit, as well as reconstructing the southwest entrance pylon (Raker Memorial Gateway). From the summit north, improvement projects during the early 1950s included placing guard rocks at the Lake Almanor viewpoint, shoulder and slope dressing and general cleanup, and a slight grade change at the approach to the Lost Creek culvert crossing to improve sight distances.[192] In addition, the BPR proposed that the old Hat Creek truck trail intersecting with the park road should be scarified, obliterated and camouflaged from view.[193] Despite Vint's recommendation to surface the entire road, the 1958-59 paving project extended only as far as the Hot Rock parking lot in 1959.[194]

Mission 66 at LAVO

The improvements contemplated for the park road in the late 1940s initially anticipated—and ultimately coincided with—a service-wide initiative known as Mission 66 instituted by NPS Director Conrad Wirth. Planned as a system-wide program of park improvement and restoration projects, the ten-year program was targeted for completion in 1966, the fiftieth anniversary of the NPS. The neglect suffered by the parks during the war years and the increase in travel to the parks following the war called for a new way of thinking about park development. While "protection and preservation of park values" was of

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[191] Field Report for the Month of July, 1947, LAVO.
[192] Superintendent's Monthly Report, 3 September 1951; BPR Memorandum, Day Labor Improvement Work 17 March 1952; BPR Memorandum, Day Labor Improvement Work, 18 February 1953, LAVO.
[193] "NPS. As Constructed Plans for Project Lassen Volcanic NPH 1-B8.C12 Bituminous Plant-Mix Surfacing," Sheets 1-8, LAVO.
[194] NPS, "As Constructed Plans for Project Lassen Volcanic NPH 1-B8.C12 Bituminous Plant-Mix Surfacing," Sheets 1-8.

paramount importance, Wirth also noted "substantial and appropriate use of the NPS is the best means by which its basic purpose is realized and is the best guarantee of perpetuating the System."[195] The program attempted to manage development, including expanding visitor services, with preservation of natural and scenic resources, thereby continuing the original mission articulated by Mather in the formative years of the NPS.

In 1951, the title to the Supan property at the Sulphur Works (and some 200 acres the Supans owned across the road in the Little Hot Springs Valley) was transferred to the government in a final court decision.[196] The private roadside property had been a blight on the park landscape for many years as the Supans continuously expanded their commercial enterprises, degrading the natural environment with a haphazard collection of shoddily built wood-frame buildings adjacent to the park road. Further, when expansions to their business were undertaken, careless excavation marred the landscape. The damage to the landscape was such that that the park's first published road guide, issued in 1950, explained that "the natural landscape (near the Sulphur Works) was severely disturbed by excavations in 1949 for the building of a roadhouse and lodgings." The guide continued, asserting "it will take considerable expense and scores of years for this area to resume any semblance of its original contour, soil, plants, and animals." The Sulphur Works lodge was an object lesson to park visitors, the road guide warned, of "the problems which threaten parts of national parks containing privately owned lands. Buildings and hotdog stands of any description or architecture, the cutting of the forest, the erection of large advertising signs . . . and other nuisance and harm may result from the rightful activities of owners of such areas."[197]

In anticipation of the court decision to condemn the Supan property, planning accelerated for the improvement of the southwest entrance area. Several of the buildings from the

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[195] Conrad Wirth, *Parks, Politics, and People* (Norman, Oklahoma: University of Oklahoma Press, 1980), 257-58.

[196] Legal title to the Supan property was acquired on July 6, 1951. A jury trial in 1952 awarded the Supan family $39,950 for the Sulphur Works and $9000 for their property in the Little Hot Springs Valley. Lassen Volcanic National Park Press Release, nd, LAVO; Strong, *Footprints in Time*, 81.

Supan development were removed in the fall of 1952, and were recycled for park use.[198] One was moved to the Warner Valley area to be used as a guard station and one was moved to Manzanita Lake to be used for a storage shed. In addition to repair of the Supan property, plans for the southwest entrance area concentrated on developing a "winter use area."[199] The park had always plowed out the first mile of the road, in order to allow winter visitors access to the ski area. A new ski chalet was planned to replace the existing warming hut and an expanded parking area was designed to serve both the southwest campground and the winter use area. In addition, two modern checking stations for the southwest entrance were included in the development plans.

Plans for the improved winter use area were expanded to encompass improvements to the Sulphur Works area, and to totally reconstruct the park road over the West Fork of the Sulphur Creek. The widening and surfacing project of the late 1940s and early 1950s had improved the alignment of the road by removing the tightest curves, however, the road still crossed the creek on fill, and a pair of culverts carried the creek under the road. The BPR prepared plans for a 214'-3" abutment-to-abutment continuous deck steel stringer bridge for the creek crossing. The design was based on the prevailing (1961) American Association of State Highway Officials (AASHO) standards for highway bridges. The concrete used for the footings and pier was classed as Type V Portland cement, a sulphate-resistant cementing material. Construction began in 1964, and the bridge was completed and opened to traffic during the 1966 season.[200]

Unfortunately, another heavy winter season hit the park in the winter of 1966-67, causing damage to the new bridge. An accumulated snow pack of 16' feet with a weight of 40 pounds per cubic foot exceeded the bridge's design standards.[201] A buckling failure of

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[197] Paul E. Schultz (Park Naturalist), *Guide To Lassen Peak Highway*, Loomis Museum Association (San Francisco: Henri Strand Publisher, 1950).
[198] July Maintenance Report, 5 August 1952, LAVO.
[199] In a report to Assistant Regional Director Hill in San Francisco, NPS landscape architect Edward Nash outlined a proposed development plan for the Supan property, providing for "all-season use" including a parking area able to accommodate up to 200 cars. Nash to Hill, 15 November 1951, LAVO.
[200] FHWA BPR Final Construction Report, Structural Steel Superstructure Repair, April 1967, LAVO.
[201] U.S. Department of Transportation, Region 7, San Francisco, Final Construction Report, Structural Steel Repair, West Fork Sulphur Creek Bridge, 1968, LAVO.

several girders, due to heavy wet snow loads, required the bridge to be closed to traffic until it could be repaired. In the meantime, a detour was constructed for one-way travel around the bridge re-construction site. In October 1968, following inspections by the BPR (now the U.S. Dept. of Transportation, Federal Highway Administration), the contractor, San Jose Steel Company, began repairs and was completed by the end of the month. Analysis of snowfall records over the decades revealed that the repairs would extend the "serviceable" life of the bridge to the next "50-year recurrence interval snowpack, which would be 1.48 times as much moisture as the 1966-67 season."[202]

The extreme winter conditions required special solutions to enhance the safety and efficiency of snow plowing operations. In 1969, an electronic road edge locator system was introduced at the park during a total road re-surfacing project. Modeled on the same principle as metal detectors, the system relied on a wire cable to transmit electromagnetic signals. A single, stranded, insulated copper wire was installed beneath the surface of the road along the outside shoulder, at a minimum depth of 8". Transmitters were placed on trees adjacent to the road shoulder, at two or three mile intervals.[203] It allegedly was able to locate the road under more than 60' of snow. The system proved to be quite successful, and was certainly an improvement over the old metal pole rodding method used for years.[204]

By the early 1970s the effects of winter storms were causing a "steady deterioration" of the road, according to park superintendent Dick Boyer. Writing to the Director of the NPS Western Region in San Francisco, Boyer urged that a proposed road improvement project at Sequoia Park be deferred, in favor of "urgently needed" protective measures on the Lassen park road. "When visitor safety and/or a loss of our major capital investment is involved," Boyer wrote, "unusual steps must be taken to insure a prompt remedy."[205] Boyer's plea did not go unheeded, as a contract was let in June 1972 for repaving the

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[202] U.S. Department of Transportation, Final Construction Report, West Fork Sulphur Creek Bridge.
[203] Project Lassen Volcanic National Park Road 1-(23), Sheet 2 of 23, LAVO.
[204] Dennis Haig, former roads and trails maintenance, interview by author, 14 August 2000, San Francisco.
[205] Boyer to Director, Western Region, 29 February 1972, LAVO.

section of road between the southwest entrance and the summit. In addition, the parking area for Bumpass Hell was expanded and the road was relocated to the east of the Lassen Peak Trailhead parking area so that hikers would not have to cross traffic to access the trails. Boyer also requested a slight expansion of the parking area at the "Jones cut," a heavy cut and fill at Diamond Point, where a view of the Little Hot Springs Valley and the forest to the east of the park attracted many cars.[206]

Current Conditions

As the road entered its sixth decade in the 1980s, a culvert replacement and surfacing contract between the southwest entrance and the summit improved drainage and protected the road from snow and water damage, involving gabion retaining walls to stabilize slopes and culvert construction. Pipe culverts were replaced and headwalls were dressed with cement mortared masonry.[207] In 1984-85, a new boardwalk path was constructed at the Sulphur Works. Storm damage in the winter of 1986 called for the construction of a concrete crib wall at Diamond Sidehill to repair slope failure. In 1997-98, repairs were conducted where washouts had occurred along the road at Dersch Meadows and at Diamond Sidehill. In addition to the culvert replacement and concrete crib retaining wall construction, paving and centerline and fogline striping was completed.[208] In an attempt to minimize the intrusion of newer drainage structures in the road landscape, the newly installed or repaired culverts were dressed with rustic stone cobble headwalls, though some newer culvert inlets were installed without stone veneers, and feature exposed poured concrete headwalls.[209]

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[206] Project Lassen Volcanic National Park Road 1-(23) Rev. 18 September 1971, Sheet 6 of 28, LAVO.
[207] National Park Service, Denver Service Center, "Slope Stabilization, Retaining Wall and Culvert Replacement, IFB LAVO-263, Drawing No. 41,019B," March 1983, LAVO.
[208] Headwall and Culvert Replacement, Highway No. 89, Lassen Volcanic National Park Road, March 1993, Sheets 2 of 21 and 12 of 21, LAVO.
[209] Headwall and Culvert Replacement, Highway No. 89, March 1993, Sheet 18 of 21.

In 1998, a GPS-enabled snowplow was added to the park's snow removal equipment inventory. A computer screen in the cab guides the operator on a precise course (accurate to within centimeters of the road's edge) along the mapped route of the road.[210] Its arrival at the park marked the first time this technology was used for snow removal in the national parks, and has improved safety and efficiency on the arduous process of clearing out the road from winter storms.

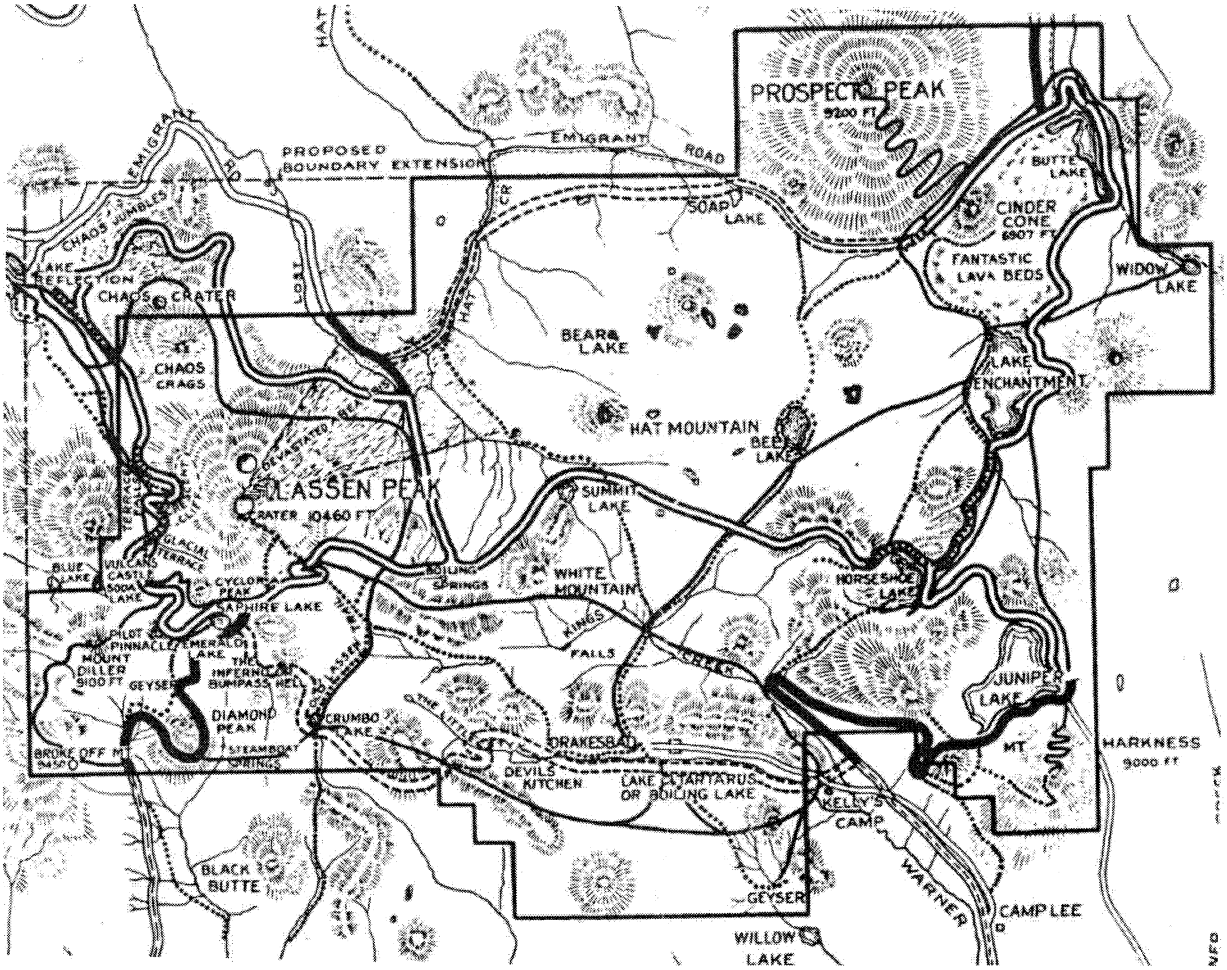
A repaving project, scheduled for completion in 2001, is presently under construction by the Federal Highways Administration (FHWA). The project encompasses three areas of construction, and has a projected budget of nearly $6.5 million. Focusing on the stretch of road between the southwest entrance and the parking lot for Bumpass Hell, the project includes rehabilitating all pavement, curbs and drainage structures, as well as "spot repairs" to the Diamond Sidehill. Two other sections, from the junction with State Route 44 to the Manzanita Lake campground road, approximately 1.2 miles in length, and approximately one-half mile of the Manzanita Lake Campground road, are included in the present FHWA road improvement project.[211]

Despite these modern reconstruction projects, the road retains its integrity of design and reflects its historic purpose to provide unsurpassed views while conducting recreational travelers through the diverse landscapes of Lassen Volcanic National Park.

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[210] Dan Jones, Chief of Maintenance, interview by author, August 2000, LAVO.
[211] Lassen Volcanic National Park Federal Lands Highway Program Rehabilitation (3R), Project CA PRP-LAVO 10(1) & 204(1), 11 February 2000. Pacific Great Basin Support Office, Cultural Resources Division, LAVO files.

APPENDIX A
PROPOSED SCENIC BOULEVARD AND APPROACH HIGHWAYS



Lassen Volcanic National Park
Showing Proposed Scenic Boulevard
And Approach Highways
Interior Development
National Park Service
Compliments of Lassen Volcanic National Park Association, 1922

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Brian Grogan / Photography + Preservation Associates, October 2000

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Brian Grogan / Photography + Preservation Associates, October 2000

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CA-270-43 (CT) VIEW OF LASSEN PEAK FROM ROAD BELOW DIAMOND PEAK. LOOKING OVER LITTLE HOT SPRINGS AREA. NOTE ROAD TRAVERSING RIDGE AT CENTER REAR. LOOKING NNW.

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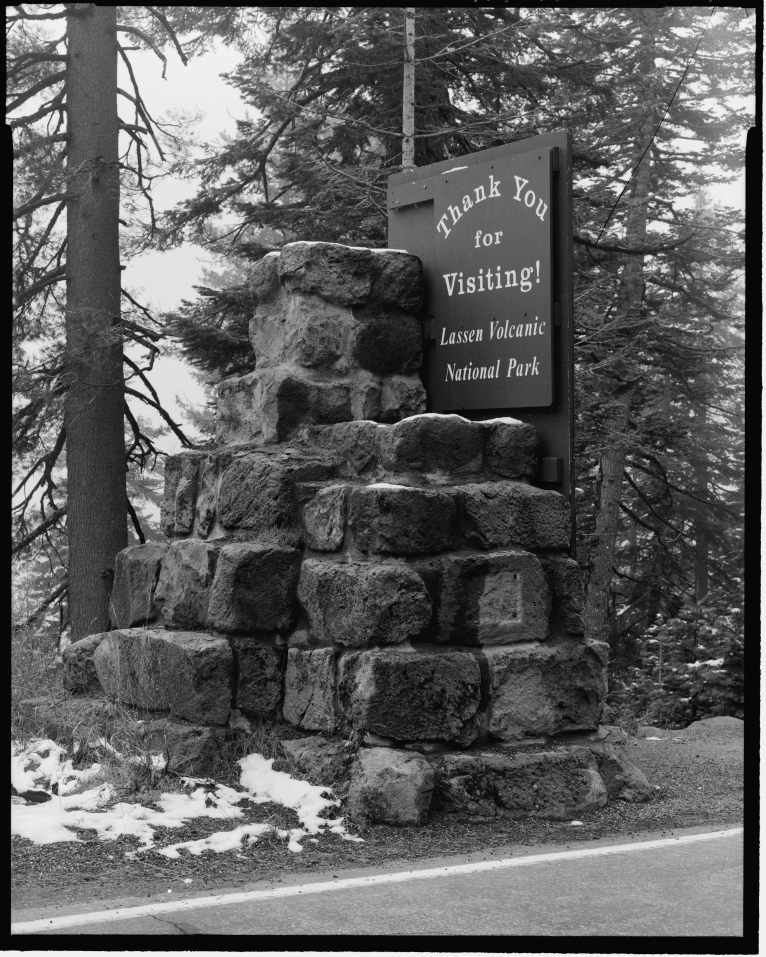
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Lassen Volcanic
National Park



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HISTORIC AMERICAN BUILDINGS SURVEY
NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR
WASHINGTON, D.C. 20240

SEISMOGRAPH
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MANZANITA
LAKE
ELEV. 5845


STOP



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ENTERING
LASSEN VOLCANIC
NATIONAL PARK
MANZANITA LAKE
NATIONAL PARK SERVICE
Department of the Interior

HAER NO. CA-270-28

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HAER No. CA-270-29

2-29-

HAER NO.CA-270-30



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HASA NO CH-2710-31

HAER NO. CA-237-32



HELEN AND HIGHWAY
FROM
M PEAK



136

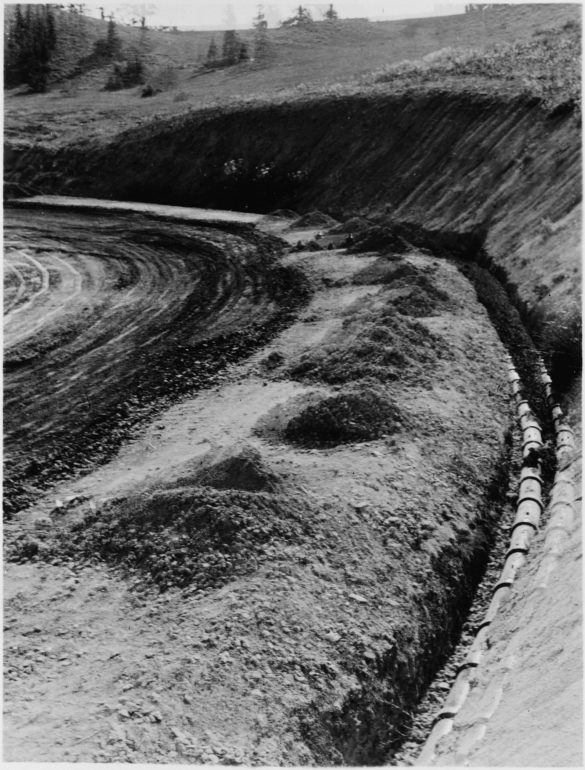
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HAER NO CA-270-24



CREDIT

MEMORANDUM



HAER NO CA-210-35



143

HABS NO NM-22-OTE-36



170 F

HAER NOCA-2-107-81

204 F



HAER NO CA-270-23

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HAER No CA-270-39



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HAGLUND CH270 - 40



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