

NORTH ENTRANCE ROAD
(Grand Canyon Route #4)
Between Little Park and Bright Angel Point
Grand Canyon National Park
Coconino County
Arizona

HAER No. AZ-43

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
P.O. Box 37127
Washington, D.C. 20013-7127

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HISTORIC AMERICAN ENGINEERING RECORD

NORTH ENTRANCE ROAD
(Grand Canyon Route #4)
HAER No. AZ-43

Location: The approximate 13-mile park entrance road begins at the north park boundary in Little Park and runs generally south and southwest 9.98 miles to its intersection with Cape Royal Road, thence south along a former segment of Cape Royal Road to Grand Canyon Lodge at Bright Angel Point.

UTM A: 12 4021780 399850 / park boundary
UTM B: 12 4006145 405405 / G.C. Lodge
Little Park Lake USGS Quadrangle, 1988

Date of Construction: 1930-31

Type of Structure: Park entrance road

Use: Park entrance road

Designer/Engineer: U.S. Department of Agriculture, Bureau of Public Roads (BPR).
U.S. Department of Interior, National Park Service (NPS).

Builders: Hodgman & McVicar, Pasadena, California.
O.A. Lindberg, Stockton, California.

Owner: NPS, Grand Canyon National Park (GCNP).

Significance: North Entrance Road is significant as an early example of the cooperative agreement between the NPS and BPR to build quality automotive roads within national parks. Although most road-related structures reflect utilitarian reconstruction of the 1980s, it retains its 1928 rustic log entrance station, original 1931 alignment, and 1939 entrance sign.

Project Information: Documentation of North Entrance Road is part of the NPS Roads & Bridges Recording Project, conducted in summer 1994 under the co-sponsorship of GCNP and GABS/HAER. This report was researched and written by Michael F. Anderson, HAER historian, September 1994.

INTRODUCTION

The approximate 13-mile North Entrance Road begins at the 1939 GCNP entrance sign just north of the divide between DeMotte and Little parks and runs generally south and southeast through Little Park and Thompson Canyon, then up to Bright Angel Point and south to Grand Canyon Lodge. As constructed in 1930-31, it replaced a rough wagon road which had evolved into a primitive automotive road during the early 1920s along a nearby but different alignment. The NPS partially reconstructed North Entrance Road in 1982-84, but it retains its original alignment and a few of its historic associated structures.

HISTORICAL CONTEXT

When the National Park Service assumed management of Grand Canyon National Park in 1919, it inherited an insufficient network of ungraded dirt roads. All roads leading to Grand Canyon from the south, east, and north had been built or worn in the years 1883 through 1915 by tourist operators who were concerned only with the passage of horse-drawn stages and wagons. Roads within the park, other than the macadam-paved Hermit Rim Road at south rim, resembled these early approaches. Summarily, the typical park road in 1919 was an 8'- to 12'-wide sinuous set of wagon tracks through terrain spotted with dense ponderosa pine forest, shallow but steep gullies, and frequent Kaibab Limestone outcroppings. All proved dusty in summer and impassable in winter or following any measurable rain.¹

Roads approaching Grand Canyon at its north rim were if anything worse than those on the south, for several reasons. Elevations at north rim average 1,000 feet higher than south rim, a fact that created all manner of problems for early ungraded and otherwise unmaintained dirt roads. Rain, snow, frost, and thaw, though present on the south rim, are far more severe on the north side of the chasm. Snow accumulation alone (and the federal government's choice not to plow) keeps even today's paved highways closed seven months of the year. More plentiful rain falling in frequent storms brought many more days when roadways turned to quagmires, becoming entirely impassable. Although early morning frosts tended to solidify early dirt roads thus making them passable, thaw which followed by mid-morning often stranded unwary motorists in the middle of nowhere.²

Severe weather combined with local terrain to make early north rim roads still worse. Unlike the south rim where moisture drains away from the chasm leaving reasonably flat surfaces near the Canyon edge, moisture on the north rim drains into the Canyon, causing a more "ragged" edge laced with side canyons. Even today

this topography requires roads of steeper grades, curves, and embankments which are susceptible to slides. During the dirt-road era the problem proved more severe as rutted wagon tracks served alternately as roads and stream beds.

Despite these adverse conditions, wagon and early automobile roads made their appearance at north rim at the same time as south rim, relative to their reason for being--pioneer tourist facilities. Although David Rust of Kanab, Utah, established a tourist camp at the later site of Phantom Ranch as early as 1906 (and presumably reached the head of his trail down Bright Angel Creek by way of a wagon road), tourism atop the north rim lagged more than thirty years behind that at the south. In 1917, Thomas and Elizabeth Wylie McKee set up the first north rim concession, a Wylie Way tent camp at the approximate site of today's Grand Canyon Lodge. Before that year, only two automobile parties are known to have reached the general area of Bright Angel Point: that of Gordon Wooley in 1909, which required passengers to build much of the road along the way; and a trip made by Joseph and Anna Brown about 1916, which Mrs. Brown in her understated manner has described as "difficult."³

Details of north rim history are less researched than south rim history, and consistent with this statement, the exact paths followed by the earliest roads to north rim are not as easy to trace as those to the south. It is clear, however, that the earliest roads and trails did not approach Bright Angel Point, just as the earliest roads and trails to south rim did not approach Grand Canyon Village. The first European Americans to the north rim arrived from the Mormon communities at Fredonia, Arizona, and Kanab, Utah, for one of three reasons: to graze cattle, cut timber, or hunt deer and cougar. For all, the rim of Grand Canyon was least amenable to their ends, thus roads and trails led to points such as Indian Hollow near the head of Thunder River Trail before the turn of the century (grazing cattle on the esplanade below the rim); Big Springs by 1872 (timber); V.T. Park, called DeMotte Park today, by the 1880s (cattle); the Walhalla Plateau before the turn of the century (cattle); and the edge of Marble Canyon near the base of the Kaibab Plateau about 1906 (buffalo).

By the early years of the twentieth century, two roads began to take shape which did approach the area of Bright Angel Point, although they had not been developed to access that point. The first may well have been the "road" followed and partially built by the Gordon Wooley party of 1909. A wagon road from Fredonia to Big Spring, which had been worn by Mormon bishop Levi Stewart as early as the 1870s to access his ranch and sawmill at that site, likely served as the first leg. It is not too difficult to imagine a route continuing from that point up the Kaibab Plateau

and on over to DeMotte Park (along the lines of today's Forest Road 422) where cattle belonging to the Mormon church grazed and where cattlemen later established headquarters buildings. Sources do not reveal exactly where Wooley, family, and friends arrived at the rim, but they likely travelled as far as V.T. Park where people might be found, then struck south. A 1927 regional map depicts this developed route as a (comparatively) major approach road as far as V.T. Park.⁴

The second road to approach Bright Angel Point developed from Fredonia east to the base of the Kaibab Plateau then to the east of today's U.S. Highway 89A up LeFevre Canyon generally along Forest Roads 248D, 248A, or 279, crossing the line of U.S. 89 and continuing to the 1910 forest ranger station at Jacob Lake.⁵ The road then continued south to V.T. Park. This approach would evolve into today's alignment of U.S. 89A and Arizona Highway 67 by the late 1920s and 1930s.

Research for this history did not reveal who was the first to visit Bright Angel Point or to develop a road from V.T. Park south to the point, but it is likely a wagon road approached within a few miles soon after the turn of the century with the arrival of James Owens in 1906. "Uncle Jimmy" was one of the more colorful characters to inhabit the Kaibab Plateau from that year until the middle 1920s, and the part time game warden (full time cougar killer) kept one of several cabins near Bright Angel Spring at Thompson Canyon. Cattlemen, too, passed this way as they drove herds up to the Walhalla Plateau at the turn of the century. When Anna Brown described her 1916 automobile trip to north rim with husband Joe, her clearest recollection was driving up to Owens' cabin and staying the night before continuing to Bright Angel Point. When Arizona Governor Hunt's party visited north rim in 1923, they too visited with Owens at his cabin along the way. A 1919 forest map depicts the old road from the north terminating at Bright Angel Spring, though by that year it must have continued as far as the McKee's camp.⁶

A partial alignment of this early road is depicted on late 1920s plans to construct the new entrance road. It passed from V.T. Park directly into Little Park along today's alignment (these two meadows are contiguous except for the negligible intervening saddle). It then followed along today's line as far as Lindberg Hill where it veered to the west along a ridge west of Thompson Canyon before rejoining today's line in the vicinity of Bright Angel Spring. It is likely that the McKees themselves developed the remainder of the road after they established their camp in 1917. It is certain that they, the U.S. Forest Service, and the National Park Service after 1919 maintained it as best they could with limited funds for the following ten years.⁷

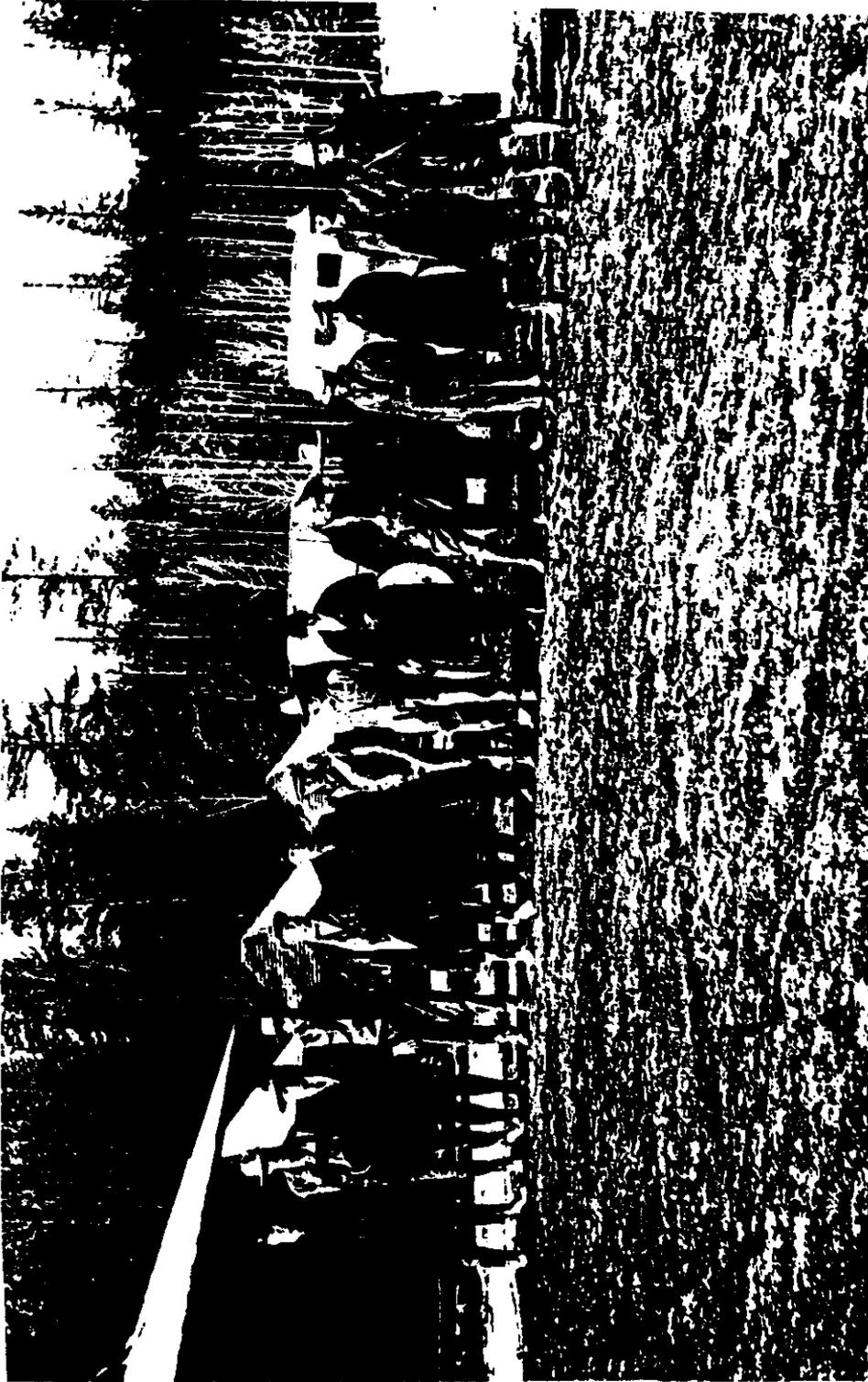


Figure 1. Arizona Governor Hunt's automotive party in front of Uncle Jimmy Owens' cabin in Harvey Meadow, October 1923. (GCSC)



Figure 2. Thomas and Elizabeth McKee's tent camp at Bright Angel Point, 1926. (Photo by Dudley H. Scott, GRCA Image #6822, GCSC)

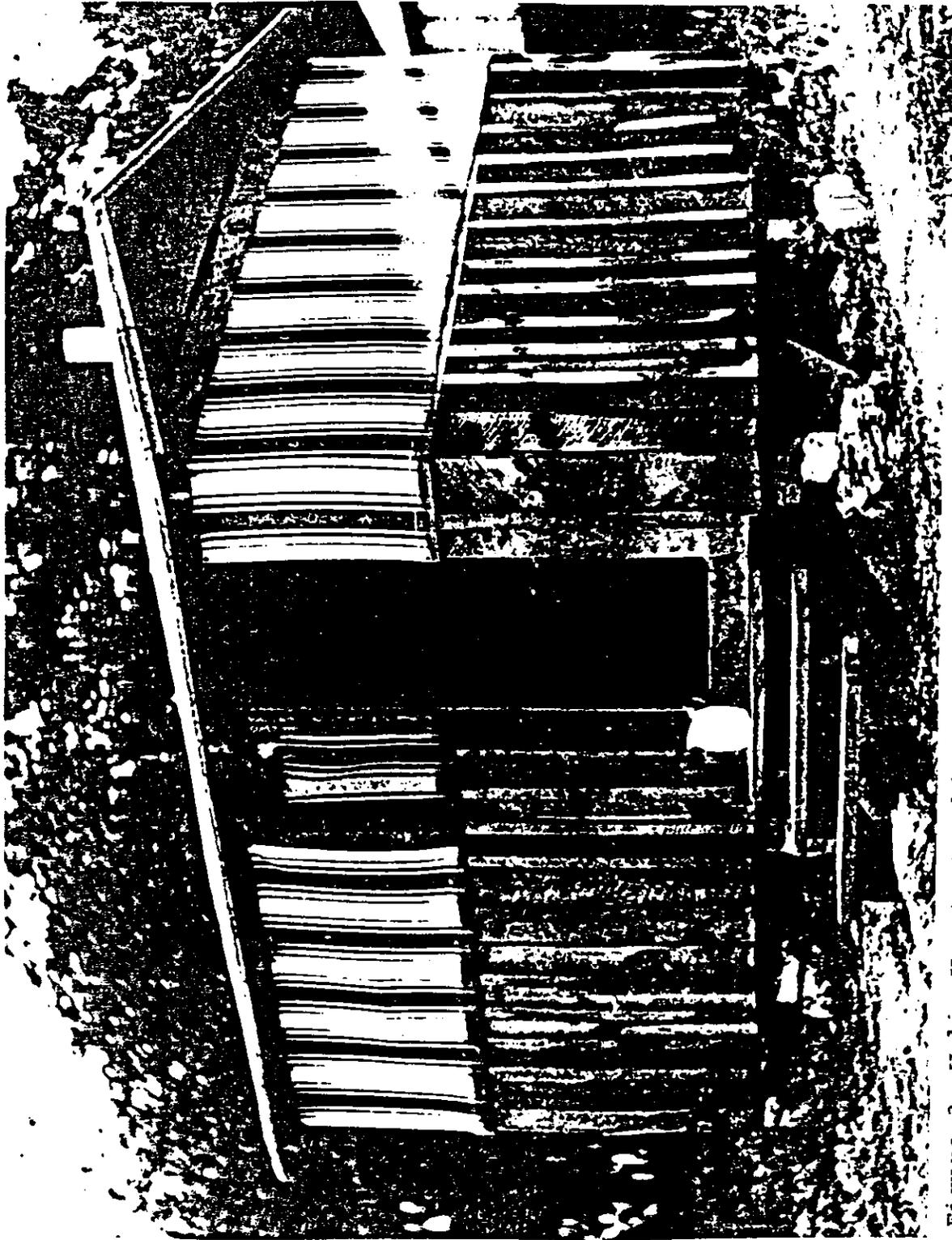


Figure 3. Wylie Way tent cabin at McKee's camp, 1926. This form of national park tourist camp was developed by Elizabeth McKee's father, W.W. Wylie, at Yellowstone and Zion national parks. (Photo by Dudley H. Scott, GRCA Image #6821, GCSC)

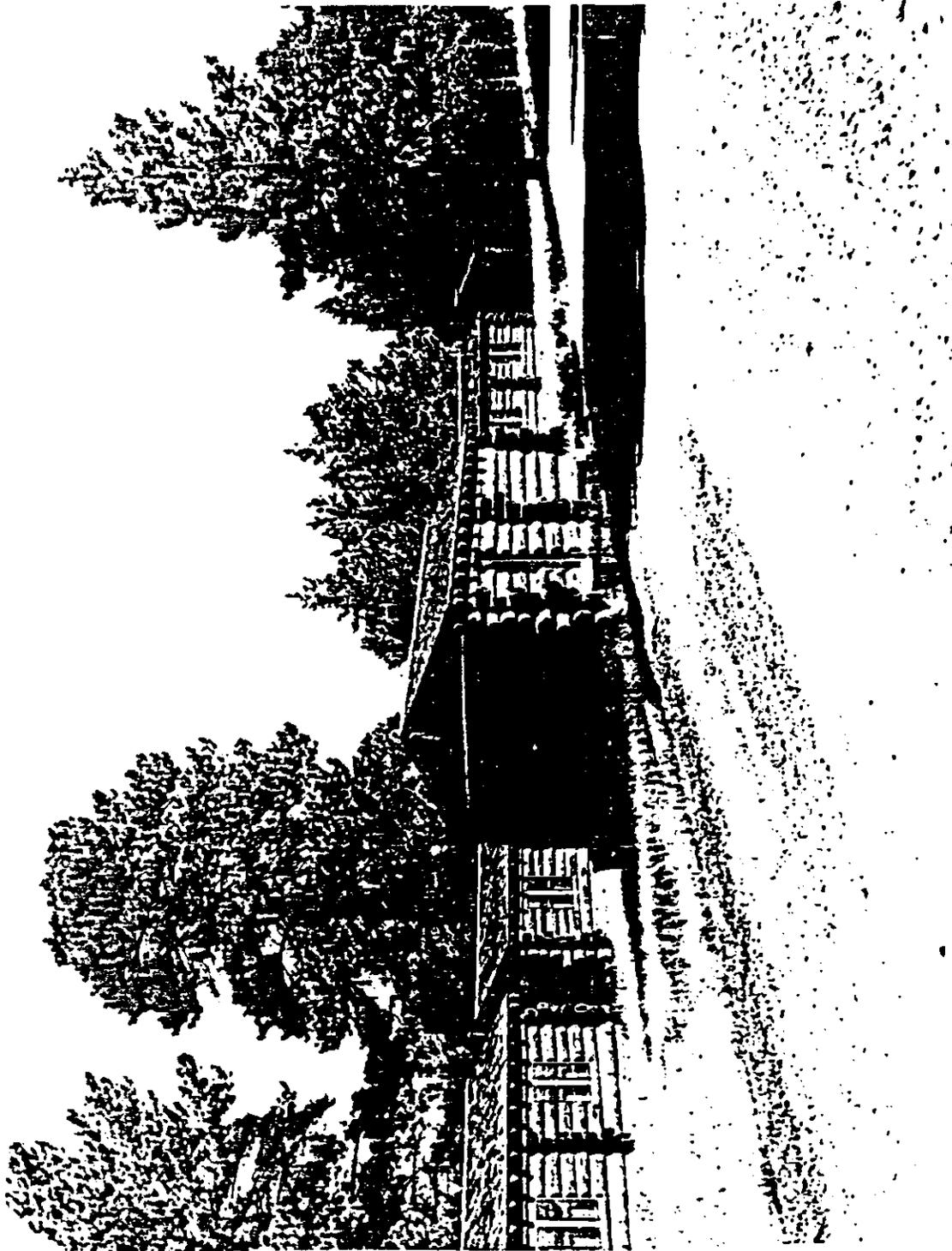


Figure 4. Cabins of the Utah Parks Company which replaced the McKee's camp in 1927-28. Photo taken in August 1932 beside the oil-mixed gravel surfaced entrance road. (GRCA Image #648, GCSC)

Beginning in 1917, Thomas and Elizabeth McKee offered wagon trips and by 1924, automobile trips, from their camp at Bright Angel Point to Point Sublime and Cape Royal. In the latter year they drove their few customers to these scenic points in a Dodge and two seven-passenger Buicks. Also by 1924, the Parry Brothers of Cedar City, Utah, began to offer automotive bus trips to these points in cooperation with the Union Pacific Railroad and Utah Parks Company. At this same time, motorists in their private vehicles began to visit north rim. As the number of automobiles entering the park from the north increased approximately 1,000 per year through the middle and late 1920s, the NPS determined to build two new roads at north rim: a new scenic highway from Bright Angel Point to Cape Royal, and a new entrance highway from the park boundary at Little Park to intersect with the Cape Royal road within Thompson Canyon. After grading Cape Royal Road in 1927-29, they immediately made plans for North Entrance Road.

HISTORY OF THE STRUCTURE

Design and Construction

BPR engineers completed reconnaissance, survey, plans and specifications for a new north entrance road in 1929. Aside from construction to modern standards, the significant difference between the old and new roads would be the alignment which, after climbing Lindberg Hill several miles south of the park boundary, would deviate from the old by descending on a moderate grade to the Thompson Canyon drainage. It would then follow the canyon's serpentine path, generally on the east side and slightly above the drainage bottom, to its intersection with Cape Royal Road. For a few years, administrators would consider this intersection at the confluence of Thompson and Fuller canyons to be the end of North Entrance Road. Inevitably, since tourists always drove directly to Grand Canyon Lodge upon arrival in the park, administrators began to consider the first three miles of the Cape Royal Road from Bright Angel Point to be the terminal portion of the entrance road.

The BPR solicited bids for grading the new road in December 1929, coincident with bids for a separate project to surface the new Cape Royal Road. USDI awarded the contract to Hodgman & McVicar of Pasadena, California, who began work in late spring 1930 as soon as winter thaw permitted equipment to be moved on-site. Under the direction of BPR resident engineer Rudolph Thirion, who had also directed construction of the Cape Royal Road, the contractors completed grading of the 9.979-mile-long, 18'-wide, 1926 forest standard highway (Station 0+00 at the north boundary

to Station 520+38 at the Cape Royal Road intersection) on 3 October 1930. Project costs totalled \$92,192.24.⁸

In March 1931, the BPR in San Francisco opened bids for subgrade reinforcement and bituminous-treated surfacing of the 9.98-mile entrance highway. USDI awarded the contract to O.A. Lindberg of Stockton, California for the low bid of \$81,380.40, which was \$14,630.80 below engineers' estimates. The contractor began operations in June and apparently completed surfacing to a width of twenty feet by the end of the 1931 season, although one source indicates that the contract was not fulfilled until the following season, on 3 August 1932. Project costs totalled \$93,161.98.⁹

In July 1932, the BPR completed specifications for a seal coat to overlay the oil-mixed, crushed-rock surface applied the year before to a width of twenty feet. This contract included bituminous surface treatment and a seal coat to the new 25.84-mile-long Cape Royal Road, the first portion of which (Station - 10+00 to 146+60) would be sealed to a width of twenty feet to conform with the entrance road, while the remainder of Cape Royal Road and Point Imperial spur would be surfaced to a width of eighteen feet. USDI awarded this contract to O.A. Lindberg in July for the low bid of \$59,460. Lindberg completed the project 8 November 1932.¹⁰

No construction report was found for this project, but it appears to have been performed according to specifications, thus, we have some information on early seal coat projects at north rim. The government supplied required fuel oil and asphaltic oil free of charge, but the contractor had to retrieve the oil at the railroad station in Cedar City, Utah, nearly 200 miles away, and transport it to the construction site at his own expense. The oil had to contain at least 94 percent asphalt with a penetration of 80 at a temperature of 77 degrees. Fuel oil had to be a 50-60 oil with a specific viscosity (Engler) at 122 degrees of between 10 and 25. The NPS designated quarries for obtaining aggregate screenings 300 feet north of the entrance road at Station 220+00, and left of Stations 528+00 and 1120+00 and right of Station 1138+00 along Cape Royal Road.

Within the seal coat process, Lindberg had to work on one half of the roadway width at a time, using whatever flagmen and warning signs required to allow traffic to pass on the other lane. The first task consisted of reworking any road segments which showed signs of cracking or moisture damage to the subgrade. This process consisted of scarifying the top layer and blading with a windrow all loosened material to the center of the road. After allowing moisture to evaporate from the pile, it was bladed over the full width of the roadway and again allowed to dry. This process was repeated until the engineer determined that all

moisture had been removed down to the level of the base course. The surface was then continuously bladed and allowed to compact under traffic.

After compaction, workmen swept the roadway free of all dirt and other materials with power and hand brooms, then applied a fuel oil prime coat. Fuel oil was heated to at least 140 degrees in a retort or by steam coils and spread with a mechanical spreader at a rate of 1/8 gallon per square yard. Immediately upon application, workmen broomed the surface to accelerate oil penetration, after which traffic was kept off the primed surface until the oil was completely absorbed. The supervising engineer did not allow the contractor to apply the prime coat when the weather was cloudy or foggy, or when the surface was wet.

The contractor also had to follow specific requirements for fine screened aggregate to be used in the seal coat. Working within designated quarries, the material first had to pass a 3/4" square mesh screen; be of "sound, tough, durable rock or gravel, free from adobe, vegetable matter, loam, or other deleterious matter"; and wasted within the quarry, if rejected. This material was then crushed and passed through a 3/8" mesh, with 85 percent of the resultant screenings consisting of material which would not pass a number ten mesh screen. The contract required Lindberg to use up all promising material within a quarry then slope the sides and otherwise cleanup the site before moving to another. The government paid for the cost of moving the quarry site under these conditions.

The seal coat could be applied only when temperatures exceeded 65 degrees (a condition which would prevent application at north rim in early mornings and late evenings, even during summer months). Asphaltic oil was heated to between 300 and 400 degrees, then laid down with a spraying machine at that temperature at a rate of 1/6 gallon per square yard. Screenings were immediately spread atop the oil at a rate of 12-18 pounds per square yard, using trucks with spreaders operating in reverse such that truck wheels would pass over the laid material. The treated surface was then broomed and rolled and the oil/screenings applied a second time. After traffic was allowed over the sealed surface for a period, Lindberg again covered any excess oil with screenings, then reshaped gutters and shoulders and dumped excess material over adjacent fill slopes."

Major Repairs and Alterations

As with construction of Cape Royal Road, few road-associated structures were built during these initial grading, surfacing, and seal coat projects. Drainage, of course, would have been

provided ahead of grading during the first project, and it is clear that initial culverts were of corrugated metal pipe (CMP), probably with dry rubble masonry headwalls (one such headwall survives) as along Cape Royal Road. Several years later, the BPR supervised a project, somewhat unusual among early GCNP roads, to install approximately 2000 feet of perforated 8" CMP along portions of the roadway which exhibited poor drainage. These drains failed (clogged) within a few years, and in October 1938, Civilian Conservation Corps (CCC) crews invested 1,700 man hours to excavate, clean, and replace them within a bed of crushed rock to prevent further clogging.¹²

Other early road-related structures not associated with initial road projects include the North Entrance Station, which was constructed in summer 1928.¹³ In that year, the pioneer wagon road was the only entrance to the park and the new automotive road had not yet been surveyed. Nonetheless, Congress had revised the park's north boundary in February 1927 to include the saddle between V.T. (DeMotte) Park and Little Park where the station was built the following year. The NPS built the station at the new boundary along the path of the old road, and the 1929 road survey simply followed the old road beside the station (and as far south as Lindberg Hill).¹⁴

As constructed in 1928, the entrance station reflected the "trapper variation" (much favored by Stephen Mather) of rustic style architecture with rough-hewn whole logs of variable lengths overlapping at each of its four corners. Carports over both the entrance and exit sides of the structure formed a continuous line with the original shake shingle roof and were supported by massive peeled logs at each corner. The earliest photograph found during research for this project depicts Ranger Ed Laws standing in front of this remarkable structure two years after construction.¹⁵ Its covered entrance concept remained unique at Grand Canyon until construction of the new South Entrance Station in the late 1980s.

The 66-year-old entrance station has evolved over the years--undergoing major internal changes, losing aesthetically pleasing parts of itself, and gaining more modern, undesirable elements--but it retains its core structural integrity. By 1935, it had acquired whole peeled-log curbing around a traffic channelization island which extended to the north and south the full width of the log cabin, as well as the automotive road which now passed beneath its carports. Either CCC or park crews planted pine seedlings beside the cabin within the island, and a small white sign with dark lettering reading "keep to right" sufficed to remind motorists that the correct lane lay to their right. A flag poll had also sprouted from the south side traffic island by 1935. No curbing delineated the nearby parking area. In fact,

the all-wood station basically stood alone in what in 1935 could be called a near wilderness, free of distracting structures. With CCC crews keeping the site swept and clear of debris, the station and its rustic-appearing, oil-mixed gravel road surface made for an appealing north entrance portal.¹⁶

By 1949, the pine seedlings beside the cabin had reached the eaves of the roof and the site had acquired a few more signs (35 mph speed limit), but otherwise appeared the same as in the 1930s. The first major alterations to the building took place in 1954. The original fireplace which had stood in the structure's center was replaced by an oil stove and the masonry chimney replaced with a standard metal stove-type chimney. The old wooden floor and center partitions were torn out and a concrete floor poured. The ceiling was lowered by installing new rafters and placing a wall board ceiling. New sectional doors, electrical wiring, windows, and outlets were installed, and the whole structure "painted" (apparently stained, at least on the outside) inside and out. The station's exterior remained basically untouched, other than the new chimney arrangement and stain.¹⁷

Between 1954 and 1964 the station lost its carports and had begun to acquire more traffic and information signs as well as the ugly day-glow orange "dunce caps" which to this day are used to funnel traffic alongside the station. Between 1964 and 1983, the shake shingle roof was replaced or overlaid with corrugated metal, and light fixtures, signs, and other odd entrance paraphernalia attached themselves to the structure. The traffic channelization island was reconfigured (shortened and tapered toward the ends) and log curbing was replaced (perhaps years earlier) by concrete curbing. This is basically how the entrance station appears today: the cabin, an anachronism rather than an adjunct of the forest and the site itself an unappealing portal for park visitors.¹⁸

Another early addition to the North Entrance Road environment is the North Entrance Sign, designed with an elaborate construction drawing in 1938 and constructed by CCC crews in October 1939 at a cost of 46 man days and \$31.67. The sign seen today is no doubt original, but varies somewhat from its design. The massive peeled whole log posts, horizontal beam, heavy metal straps, masonry base of weathered stone (now buried slightly), sign, and wording are identical to 1938 drawings, but a few features such as a third, shorter massive log fronting the west post are missing.¹⁹ The appeal of this unusual rustic entrance sign is untarnished by its brown painted surface today; it may, in fact, have been painted immediately upon construction.

From the moment they arrived at the north rim and setup camp at Neal Spring in May 1933, CCC forces were employed each summer

season through 1941 in maintenance of North Entrance Road and construction and repair of road-related structures such as the entrance sign. Park administrators appreciated the combination of nearly unlimited manpower and ample recovery act funds at north rim, where roads follow along the base of steep canyon slopes and require attention after each winter season to clear slides, clean out ditches, and repair shoulders and surfacing. In some cases CCC crews completed projects with perennial effects such as slope rounding and revegetation to help prevent slides and building guardrails along dangerous segments of roadway.

An early project completed over a five-year period and of lasting effect entailed construction of the north rim parking lot adjacent to North Entrance Road near Grand Canyon Lodge. In 1935, CCC crews began grading the parking area and installing interior log guardrails to protect islands of trees and sparse shrubbery. In 1936, they added the cement rubble masonry walls and stair steps seen today along the northern-most segment of the parking area. In 1939, they built a 100-car, crushed-rock surface addition to the lot because visitors had been parking along the roadside near the lodge which required a full time ranger to keep traffic moving. CCC men invested 4,783 man days on this project, but the NPS spent only \$833.90 for materials. Some of the parking lot's CCC features, including the masonry wall and steps, survive today.²⁰

Other projects finished by the CCC in the later years (1937-39) of their Grand Canyon tenure included a trailside shelter, built in October 1937 of logs salvaged from other projects, and adjacent minor structures east of the parking lot, all about 150 yards northeast of Grand Canyon Lodge. In connection with the shelter construction and the overall parking lot project of which it was a part, CCC crews built a masonry bubbler fountain, a number of hewn-log seats beneath the shelter and along the rim, and two naturalist signs. Farther away but still within the long-term project, men installed an 18" CMP culvert under the road to drain the north end of the parking lot. In the entire area encompassing the last several thousand feet of roadway, CCC forces hauled in tons of forest topsoil and planted native species of trees, shrubs, grass, and wildflowers. One of their last accomplishments in the parking lot area was to build a walkway along the east side of the lot, a spur walk to connect with the existing rim walk, and a flagstone pavement under the trailside shelter.²¹

With the United States' entry into World War II, Grand Canyon National Park--like all national parks--went on "standby" for the duration. With young men of the CCC reassigned to wartime duty, experienced NPS personnel too off to fight the war, a cessation of public works monies, and draconian cuts in operational funds,

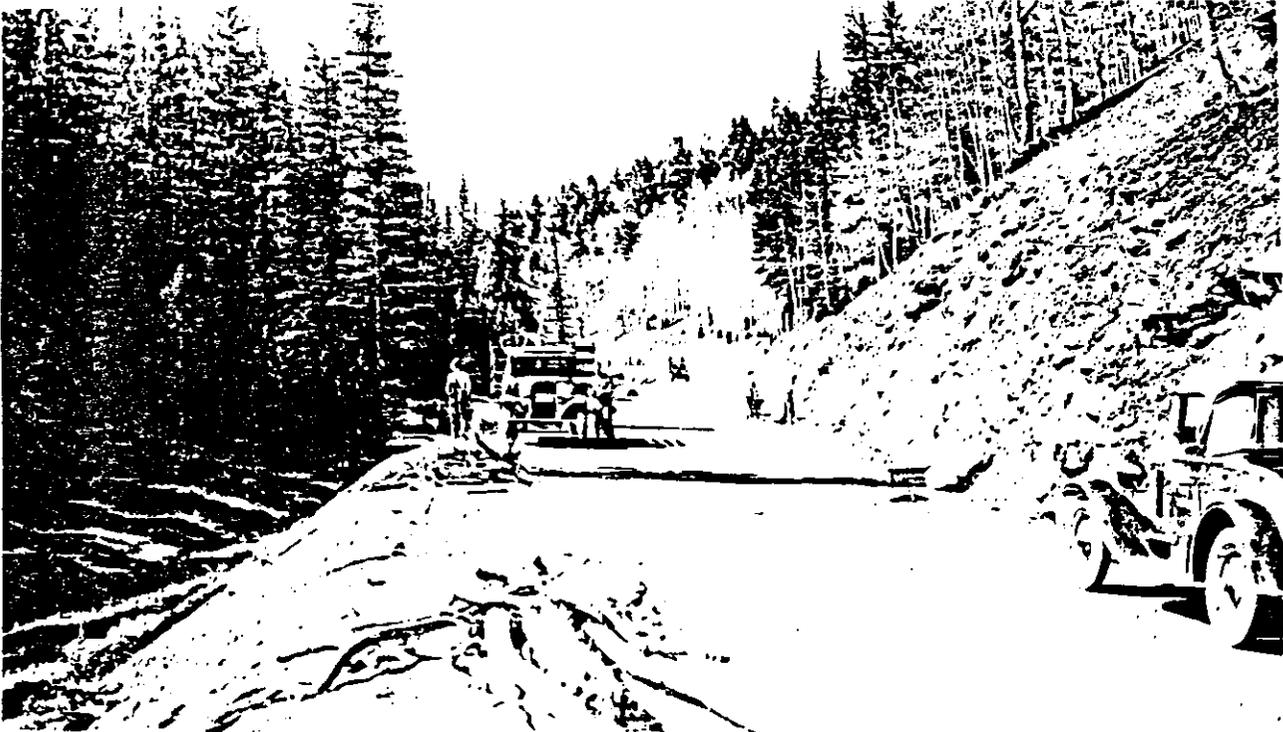


Figure 6. Maintenance along North Entrance Road, September 1934.
(GRCA Image #2950, GCSC)

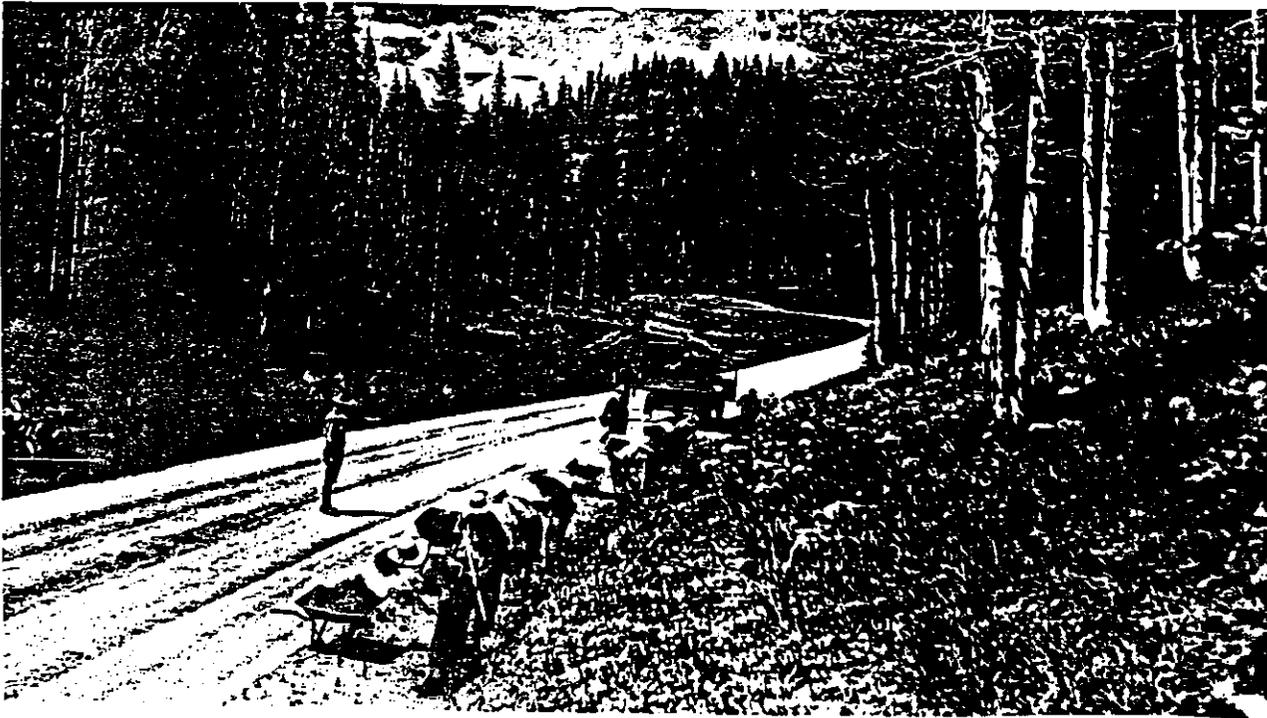


Figure 7. CCC ditch clearing along North Entrance Road, 1935.
(GRCA Image #2940C, GCSC)



Figure 8-9. CCC Bright Angel Point parking lot project ca. 1935.
(Construction report, GCSC)



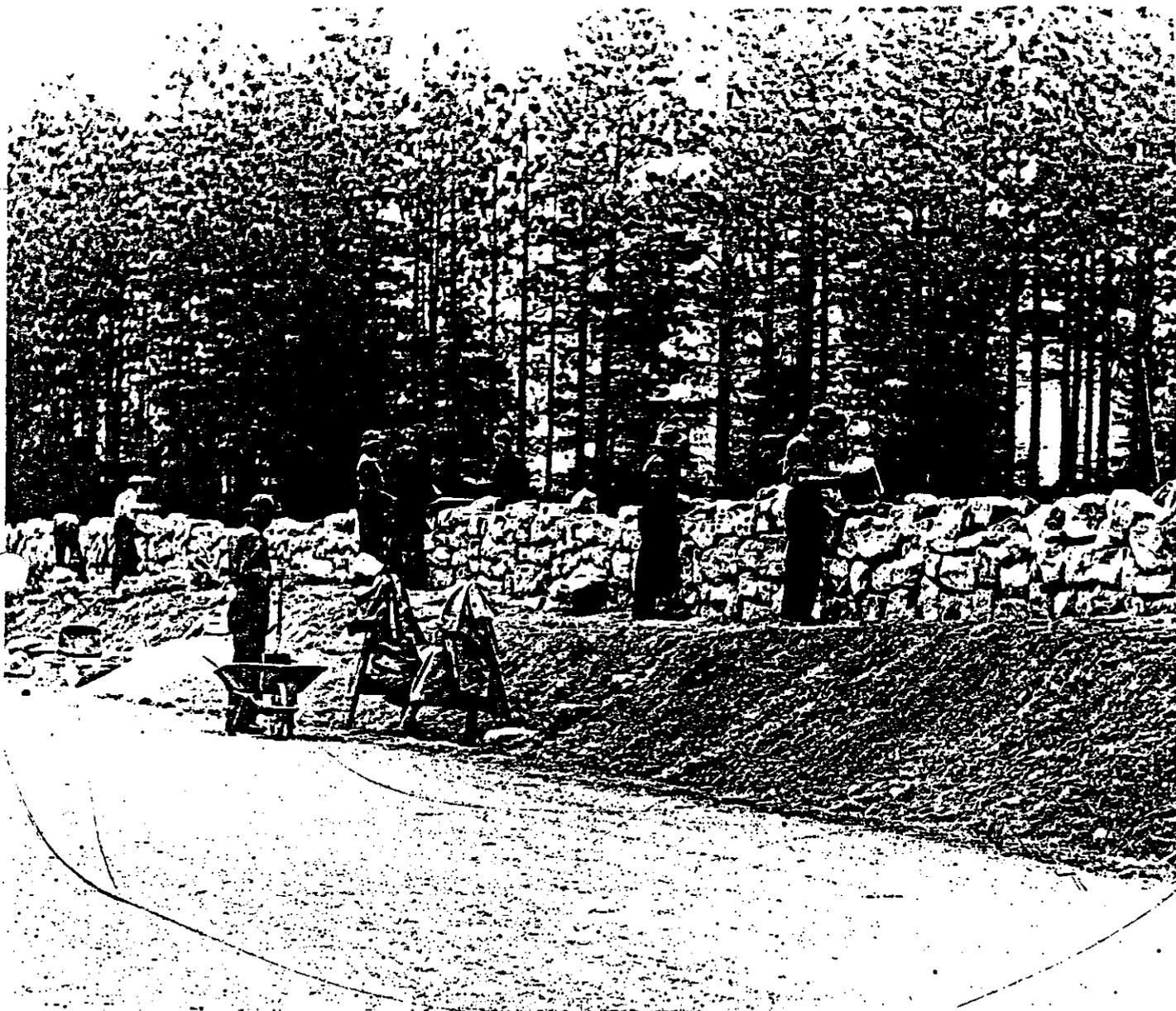


Figure 10. CCC building the Bright Angel Point parking lot wall
in 1936. (GRCA Image #14044, GCSC)

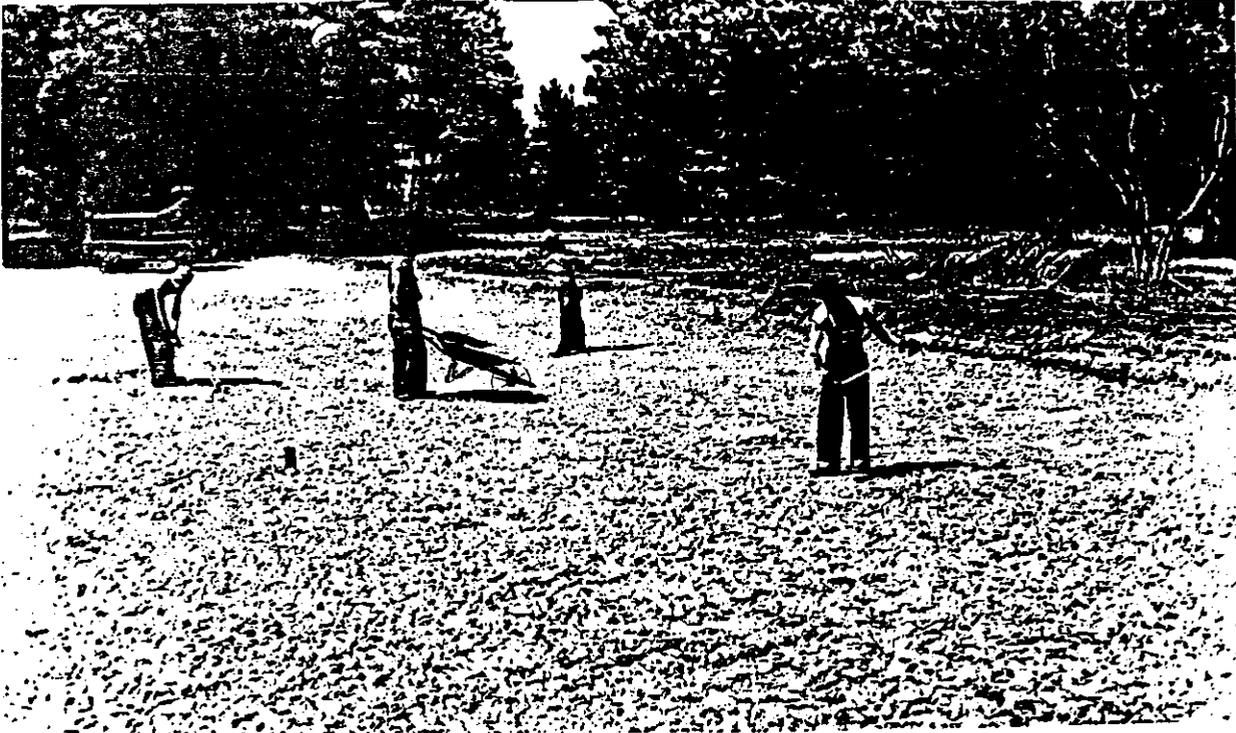


Figure 11. CCC Bright Angel Point parking lot project, July 1935.
(GRCA Image #2921, GCSC)



Figure 12. NPS park forces guard rail project for North Entrance
and Cape Royal roads, 1937. (Construction report, GCSC)

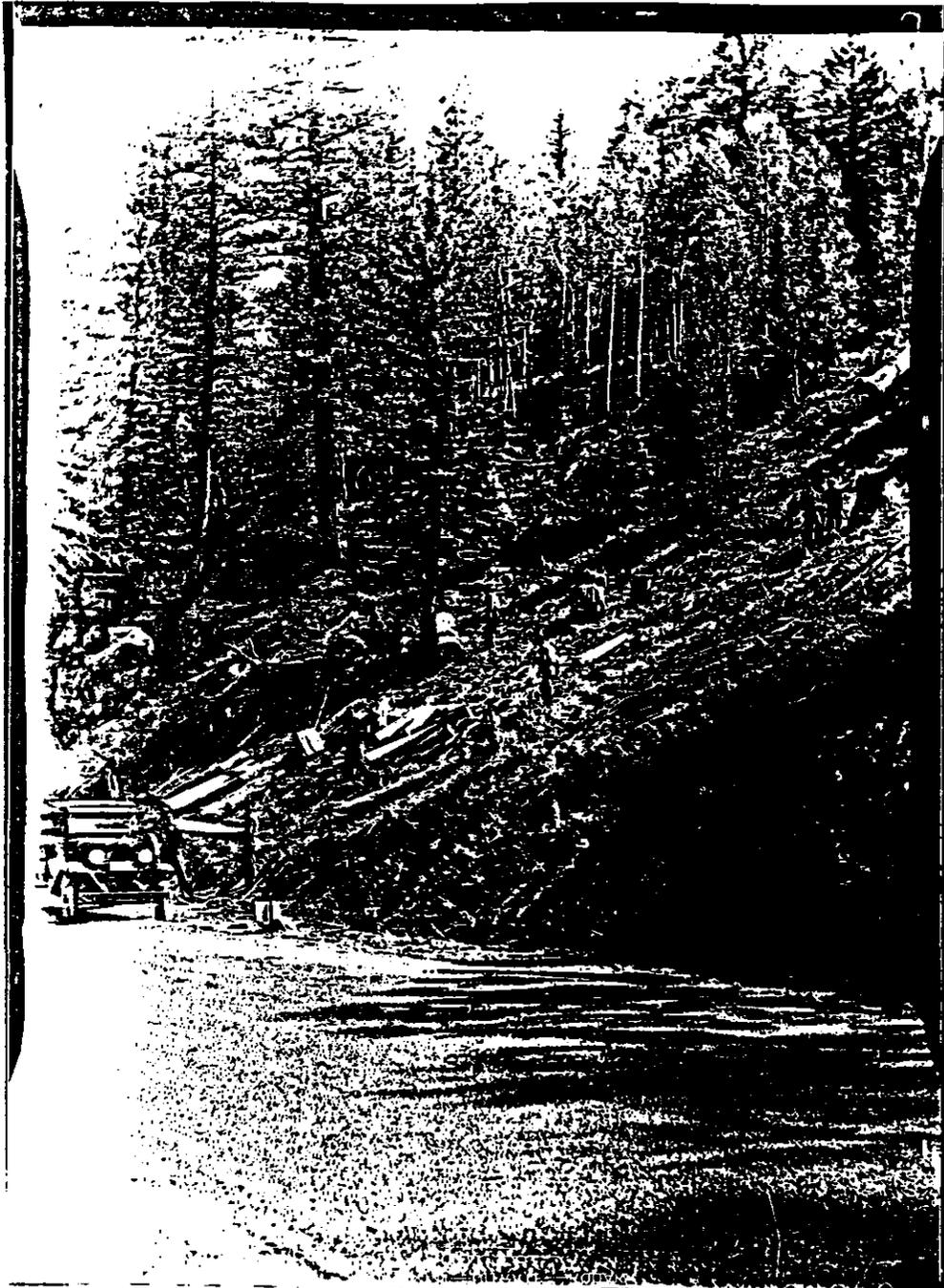


Figure 13. CCC landscaping and clearing for fire protection along North Entrance Road, ca. 1935. (GRCA Image #7986, GCSC)



Figure 14. GCNP Building #122, formerly the north rim entrance station toll collector's residence, later used by miscellaneous park forces. This photo taken in June 1949. (GRCA Image #1768, GCSC)



Figure 15. The 1928 north entrance station. This photo taken 14 July 1930 with NPS ranger Ed Laws on the left. (GRCA Image #3824, GCSC)

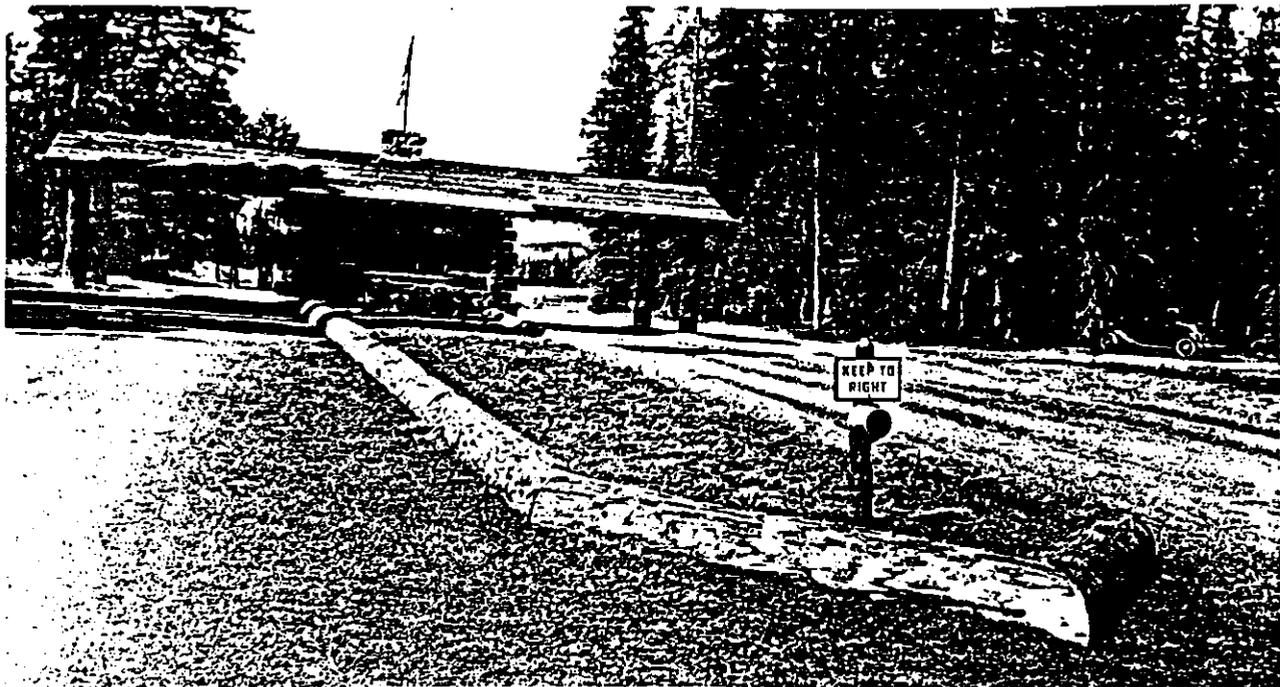


Figure 16. Entrance station in 1935. (GRCA Image #13052, GCSC)



Figure 17. Entrance station, June 1949. (GRCA Image #1767, GCSC)



Figure 18. Entrance station in 1950s or 1960s, but date unknown.
(GRCA Image #10018, GCSC)

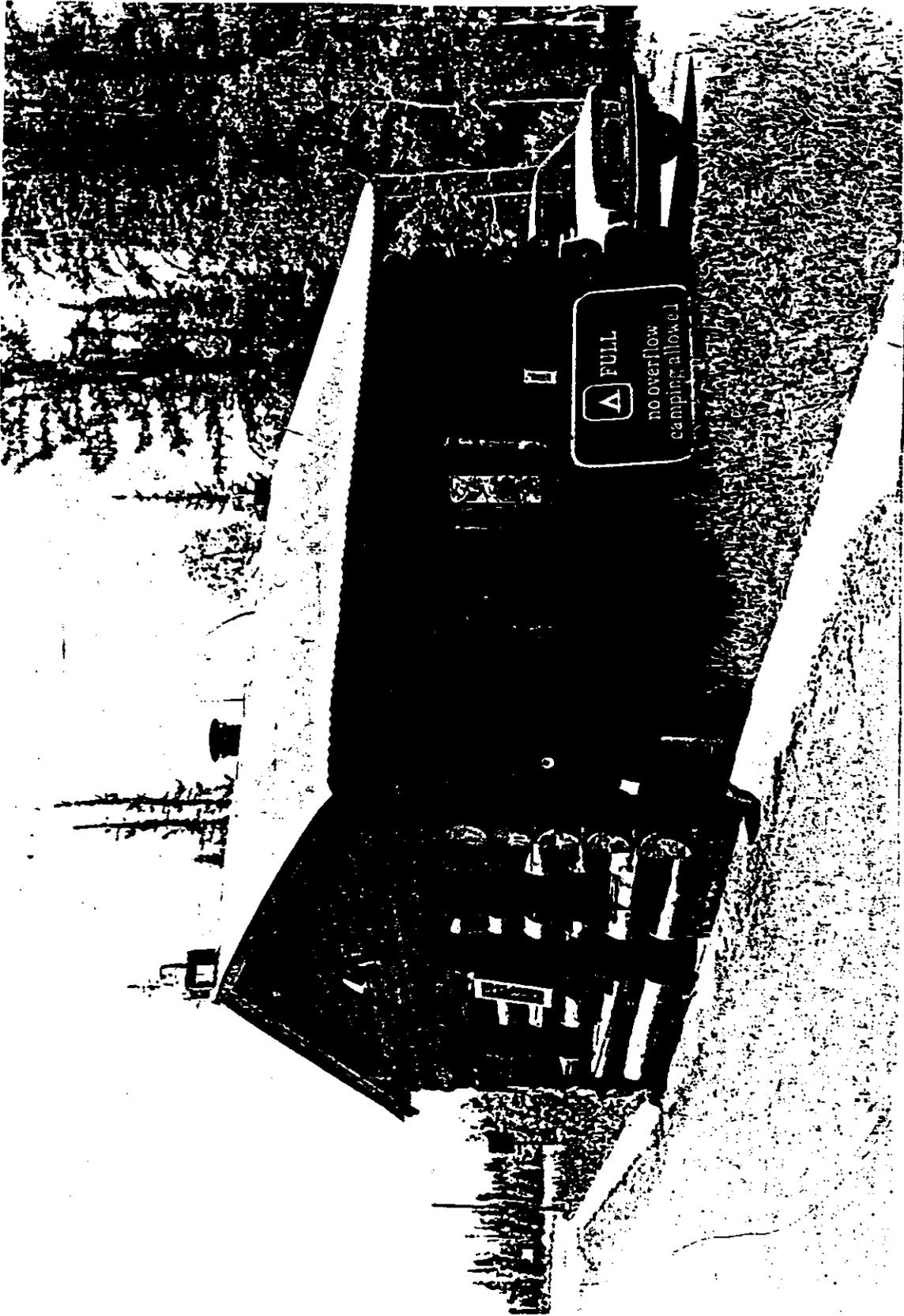


Figure 19. Entrance Station, July 1983. (GRCA Image #16745, GCSC)

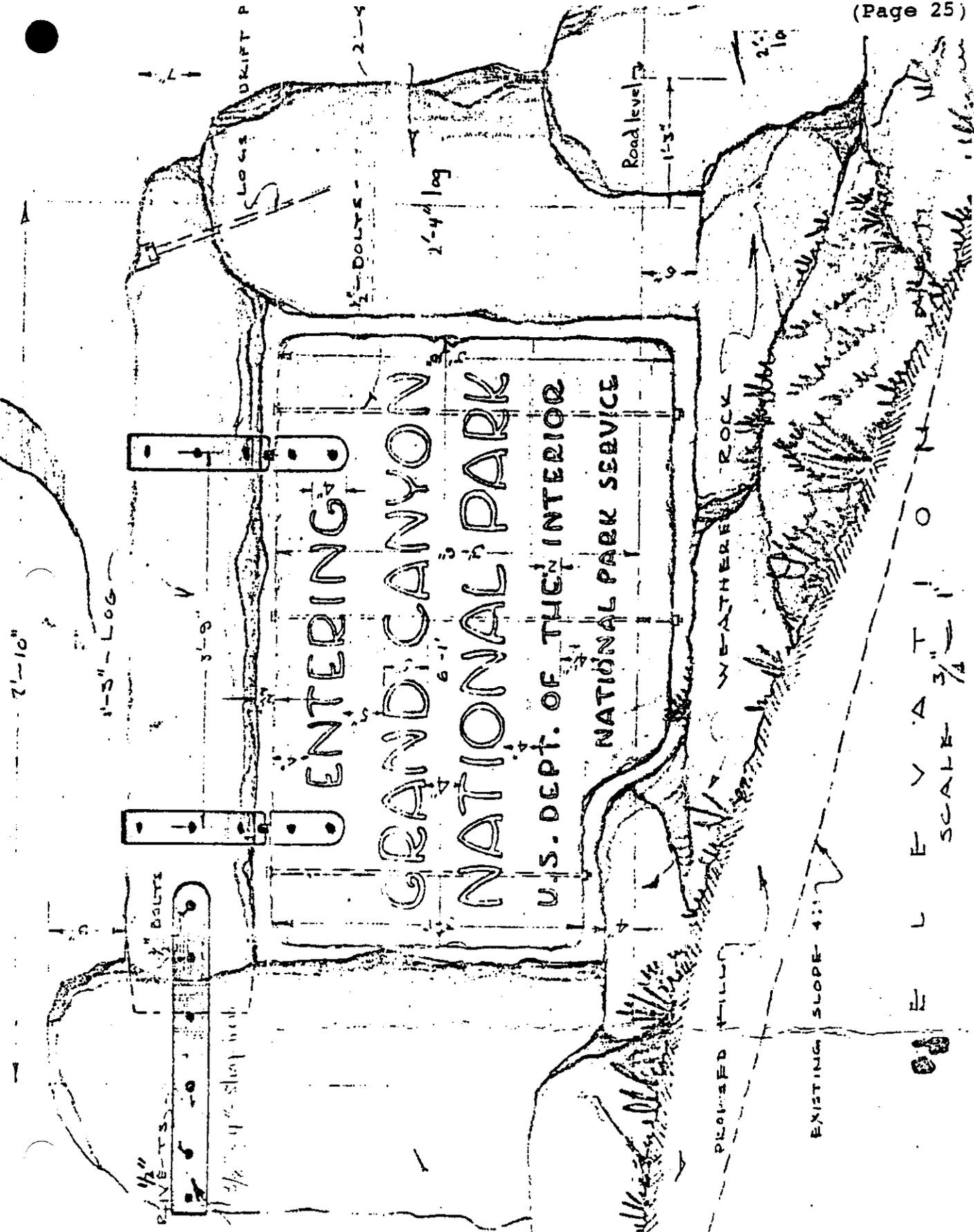


Figure 20. 1938 architect's drawing for north entrance sign, built in 1939. (NPGC-2041)

park administration had little choice. Road construction ceased and maintenance was reduced to essential repairs, but deleterious effects were mitigated by a number of factors. While funding dropped to early 1920s levels, so did visitation numbers as the wartime Office of Defense Transportation called a halt to all scenic bus tours as well as civilian operations of the Grand Canyon Railway. Rubber and gasoline rationing further diminished the number of vehicles travelling (thus wearing) the park's roads. Roadway's require maintenance whether used or not, but GCNP and regional roads were all fairly new (1928-39) at the outbreak of the war and they would not fall apart immediately.

The situation at the north rim more or less mirrored that at south rim. Through the war years, park road crews still arrived in late spring, cleared North Entrance Road to Grand Canyon Lodge, and performed demand maintenance on the roadway through the summer months. Grand Canyon Lodge closed during the war as did Jack & Mardene Church's mule trip concession, but the deluxe cottages and cafeteria remained open for a diminished number of visitors. Although nothing is written about North Entrance Road in Superintendent H.C. Bryant's annual reports in these years, it is reasonable to assume that park road crews spent most of their time just keeping the road clear, and little time on routine but not annually essential maintenance activities such as crack sealing, patching, seal coating, shoulder and embankment sloping, and ditch and culvert clearing.²²

Grand Canyon's roads (and entire infrastructure) really took a turn for the worse after the war when the worst possible set of circumstances for park improvements combined in the years 1946-1953. Superintendent Bryant noted that everyone and their brothers returned to the national parks after the war, spurred by the release of wartime tensions, termination of rationing and travel restraints, and general prosperity. Visitation, which more than tripled in the few years following the war and kept on rising, fueled all other problems. Roads which were entering middle age (as roads go) immediately showed the wear of heavier and more vehicles, yet operational funding did not immediately increase after the war. More funds as well as war surplus road equipment began to turn the situation around by 1950, but immediate attention had to be given to south rim roads as they still carried 90 percent of park visitors.²³

Road funds began to loosen up in the early 1950s and the NPS Mission 66 program carried the pace of road reconstructions into the 1960s, but again, south rim received the lion's share of attention. Although Cape Royal Road was reconstructed in the late 1950s and early 1960s, North Entrance Road continued to function solely with routine spring clearance, patching, and an

occasional seal coat. By 1964, the North Rim District Ranger reported that

As usual, much of the maintenance crews time was spent repairing the winter damage to the north entrance road; patching, oiling, and chipping where necessary. This road is in such a bad state of repair that even this work is not enough to hold it for next season.²⁴

In the following year the park forester highlighted the vagaries of north rim road maintenance when he reported that crews had plowed through 4'-6' of snow to open the entrance road by 12 May, but storms of 13 May and 24 May dropped another 23". Snow drifts persisted into July and fire roads remained closed until the end of June. On the back side of the season, an early storm on 18 September caused more than 500 aspen trees to fall across the roads, requiring a second seasonal road clearance project. This followed immediately after a project to chip seal the entire entrance road in July and August 1965.²⁵

The year 1966 proved even worse. In December, torrential rains and flooding caused heavy road damage such as eroded shoulders, buried ditches and culverts, pavement settlement, and mud and debris atop the entrance and Cape Royal roads. The park applied for emergency federal funds and was turned down because repairs were classified as "heavy maintenance," and had to go after the damage with operating funds in summer 1967. Continuing heavy rains hampered this effort and the Point Imperial spur remained closed for the entire 1967 season. On paved roads alone (Cape Royal Road, Point Imperial spur, North Entrance Road), NPS road crews spent 267 man days removing mud slides and repairing flood damage, another 132 man days on standard maintenance, and twelve additional days on roadside repair. Further, the park contracted with Concrete Construction Company of Phoenix, Arizona, and with Robert E. McLaren of Mentone, California, to assist with the repairs, spending an additional \$46,000.00 for this help.²⁶

The years 1966 and 1967 were unusual only for their severity, and after forty years serving without reconstruction, North Entrance Road was one tired roadway. After all other park roads of the 1928-35 era except West Rim Drive had been reconstructed, and after the North Approach Road from Jacob Lake to the entrance station had been rebuilt twice (in the 1930s and late 1960s), an NPS committee began finally to consider reconstruction of North Entrance Road in 1970. While these men recognized that the road followed steep slopes with corresponding steep grades and curves, they recommended a project which would protect the adjacent landscape and follow the original alignment other than slight curve improvements and a wider surface course.²⁷

Ideas for reconstruction languished in a "consideration" stage until the NPS and Federal Highway Administration (FHWA, the modern name for the BPR) started at ground zero in 1977 with an assessment of the roadway's needs. All noted that the original (existing) road with its 18'-wide wearing course, inadequate drainage, and little or no base was insufficient for modern vehicle widths, weight, and numbers and would require complete reconstruction. All reconfirmed that a new roadway should follow the original alignment to avoid landscape scarring and that the segment from the entrance station to Cape Royal Road intersection should be completed first, but opinions differed as to design. NPS landscape architects and environmental specialists favored 28 feet of pavement (11' lanes and 3' paved shoulders) while the NPS regional director oddly enough suggested a narrower 24' paved surface (10' lanes and 2' paved shoulders). Ultimately, the parties compromised by doing nothing for another five years.²⁸

A greatly reduced project to renovate, but not reconstruct, the 50-year-old North Entrance Road emerged in the early 1980s and was followed through to completion in 1984. This began as a project to install new drainage culverts and underdrains, repair unstable areas of roadway, and apply a Type 3 Seal coat from the North Entrance Station to Bright Angel Point. In July 1982, Hurricane Sand and Gravel of Hurricane, Utah, won the contract for the bid price of \$654,383.64. They began work on 29 July 1982 and apparently had completed all aspects of the contract other than seal coating (which was in progress) by September 1983 when the NPS/FHWA terminated the contract because they had decided instead to proceed with bituminous surfacing.²⁹

The FHWA negotiated Change Order No. 5 to the initial contract to allow Hurricane Sand and Gravel to apply bituminous surfacing, but reneged on the agreement when the federal agency claimed that the contractor had defaulted on a separate aggregate supply contract. The aborted agreement brought an end to the project, but not to the dispute, which centered on the contractor's claim that unusual rainfall in summer 1983 had disrupted his operations at the Cedar Knolls pit, 15 miles south of Fredonia, Arizona, and resulted in late deliveries of aggregate. He had mobilized a hot plant to handle the bituminous surfacing when the FHWA called a halt to the project, and claimed \$143,500 in damages as a result. In April 1987, federal counsel determined that the contractor was right and the FHWA settled the claim.³⁰

In May 1984, W.R. Skousen Contracting of Mesa, Arizona, won a surfacing contract for the bid price of \$1,150,775.00. It called for a 0'-2" overlay of Asphalt Cement AC-10 and a Type 2 seal coat, 24' wide and 12.62 miles long, from the entrance station to a point atop Bright Angel Point a short distance north of Grand Canyon Lodge. The NPS, which had not had much luck of late with

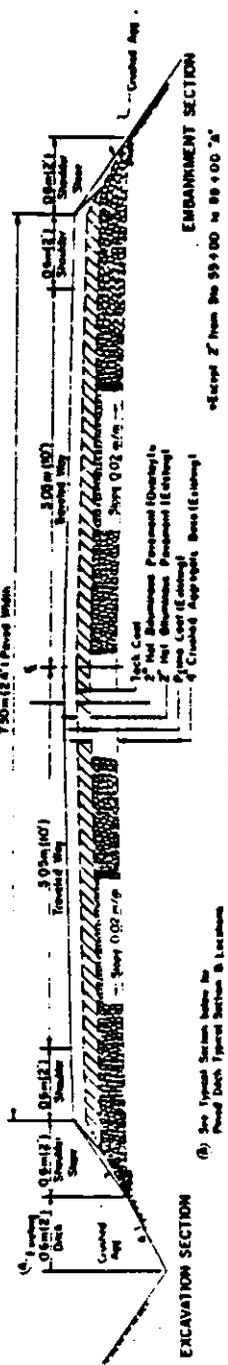
STRIPING SUMMARY

STATION TO STATION	LINE NO.	MARKS
1+00 to 1+100	1	100
1+100 to 1+200	1	100
1+200 to 1+300	1	100
1+300 to 1+400	1	100
1+400 to 1+500	1	100
1+500 to 1+600	1	100
1+600 to 1+700	1	100
1+700 to 1+800	1	100
1+800 to 1+900	1	100
1+900 to 2+000	1	100
2+000 to 2+100	1	100
2+100 to 2+200	1	100
2+200 to 2+300	1	100
2+300 to 2+400	1	100
2+400 to 2+500	1	100
2+500 to 2+600	1	100
2+600 to 2+700	1	100
2+700 to 2+800	1	100
2+800 to 2+900	1	100
2+900 to 3+000	1	100
3+000 to 3+100	1	100
3+100 to 3+200	1	100
3+200 to 3+300	1	100
3+300 to 3+400	1	100
3+400 to 3+500	1	100
3+500 to 3+600	1	100
3+600 to 3+700	1	100
3+700 to 3+800	1	100
3+800 to 3+900	1	100
3+900 to 4+000	1	100
4+000 to 4+100	1	100
4+100 to 4+200	1	100
4+200 to 4+300	1	100
4+300 to 4+400	1	100
4+400 to 4+500	1	100
4+500 to 4+600	1	100
4+600 to 4+700	1	100
4+700 to 4+800	1	100
4+800 to 4+900	1	100
4+900 to 5+000	1	100
5+000 to 5+100	1	100
5+100 to 5+200	1	100
5+200 to 5+300	1	100
5+300 to 5+400	1	100
5+400 to 5+500	1	100
5+500 to 5+600	1	100
5+600 to 5+700	1	100
5+700 to 5+800	1	100
5+800 to 5+900	1	100
5+900 to 6+000	1	100
6+000 to 6+100	1	100
6+100 to 6+200	1	100
6+200 to 6+300	1	100
6+300 to 6+400	1	100
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6+700 to 6+800	1	100
6+800 to 6+900	1	100
6+900 to 7+000	1	100
7+000 to 7+100	1	100
7+100 to 7+200	1	100
7+200 to 7+300	1	100
7+300 to 7+400	1	100
7+400 to 7+500	1	100
7+500 to 7+600	1	100
7+600 to 7+700	1	100
7+700 to 7+800	1	100
7+800 to 7+900	1	100
7+900 to 8+000	1	100
8+000 to 8+100	1	100
8+100 to 8+200	1	100
8+200 to 8+300	1	100
8+300 to 8+400	1	100
8+400 to 8+500	1	100
8+500 to 8+600	1	100
8+600 to 8+700	1	100
8+700 to 8+800	1	100
8+800 to 8+900	1	100
8+900 to 9+000	1	100
9+000 to 9+100	1	100
9+100 to 9+200	1	100
9+200 to 9+300	1	100
9+300 to 9+400	1	100
9+400 to 9+500	1	100
9+500 to 9+600	1	100
9+600 to 9+700	1	100
9+700 to 9+800	1	100
9+800 to 9+900	1	100
9+900 to 10+000	1	100

Total Length = 37,052 + 6,290 (A) + 35,061 + 74,385 50m = 244,788 x 0.71 = 173,798 ft. (approx. 92700)

Application 80 ft. / station. Includes Stop Bars.

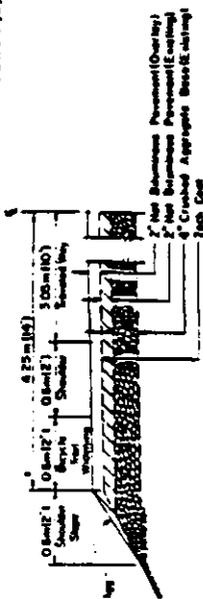
NORTH ENTRANCE ROAD
HAER No. AZ-43
(Page 31)



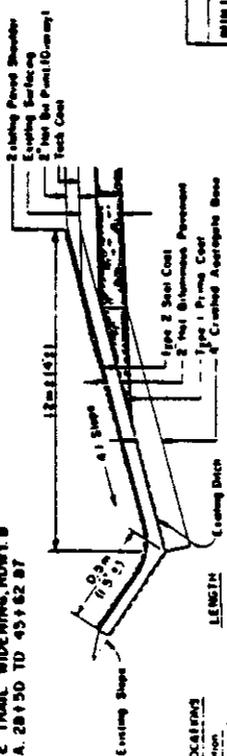
LENGTH OF PROJECT

STATION TO STATION	METERS
ROWY A 817000 to 821147.07	4377.07
ROWY B 118285 to 86542.07	4370.02
ROWY C 010485 to 118690	1081.05
TOTAL	9838.14

TYPICAL SECTION
ROWY A, B, (EXCEPT FOR BICYCLE TRAIL,
AND E



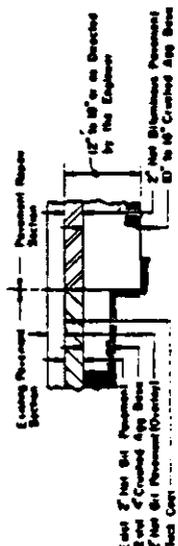
TYPICAL HALF SECTION
BICYCLE TRAIL WIDENING, ROWY B
STA. 28150 TO 45162.07



ROWY B TRAIL WIDENING LOCATIONS

Station to Station	LENGTH
55100 to 40100 x LPH	500m
51185 to 53185 x LPH	200m
57181 to 51181 x LPH	300m
72150 to 75150 x LPH	600m
4120 to 5160 x LPH	1040m
TOTAL	1570m

TYPICAL SECTION
FOR PAVED BRICKS



TYPICAL ROADWAY
REPAIR SECTION
Various Locations As Directed By The Engineer



SECTION	LENGTH (M)	AREA (SQ M)	VOLUME (CU M)	UNIT PRICE	TOTAL
ROWY A	4377.07	1,044,000	1,044,000	0.25	261,000
ROWY B	4370.02	1,044,000	1,044,000	0.25	261,000
ROWY C	1081.05	260,263	260,263	0.25	65,066
TOTAL	9838.14	2,348,263	2,348,263	0.25	587,066

NOTES: SEE FOR AVAILABILITY, QUANTITIES.
 1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS.
 2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS.
 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITIES.
 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING STRUCTURES.
 5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING VEGETATION.
 6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING LANDSCAPE.
 7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING HISTORIC STRUCTURES.
 8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING CULTURAL RESOURCES.
 9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING MONUMENTS AND MEMORIALS.
 10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING ARCHITECTURAL FEATURES.

Figure 23. Specifications for 1984 surfacing project, from project plans. (Professional Services, GCNP)

contractors supplying the required aggregate (another contractor had recently defaulted), furnished Grade D aggregate for the bituminous mix from the House Rock Pit and filler material from the Fredonia area free of charge. The contractor started work on 9 May and finished 11 July 1984. Final contract amounts totalled \$1,217,942.24 due to change orders to pave adjacent parking lots and pullouts and to furnish and install grates on downdrains."

DESCRIPTION

North Entrance Road and most of its visible associated features today bear the imprint of the early 1980s projects, but a few of the more important historic elements remain, beginning with the North Entrance sign. As noted earlier, the sign displays significant elements identified in the 1938 architect's drawings, especially massive posts, heavy iron straps, substantial wooden sign, and masonry base. Modern aspects of this rustic-style sign which detract from the historic feel are several, including the glossy brown paint over all, burial of the masonry base beneath a gravel shoulder, the sloppily-poured asphalt pullout immediately north which appears as a construction afterthought, and the small post and larger 45 mph speed limit sign beside and immediately behind the structure. The sign is placed at the park boundary, approximately 500 feet north of the entrance station."

As with other entrance roads at Grand Canyon, there is a roadway transition from the state-maintained approach highway to the NPS-maintained entrance road. Here the lanes of both roads remain the same width with a seamless blend of yellow center stripes and white shoulder stripes, but the state road (Arizona Highway 67) has far broader paved shoulders.

The latter feature is the result of more recent work on the approach highway, but it also points out a fundamental NPS road building philosophy. Since the late 1910s, the NPS has preferred narrow graveled shoulders with added topsoil and seeding to create an impression of roadways emerging from the surrounding landscape, almost as if they are natural features. The desired effect is sometimes, but not often achieved at Grand Canyon since infrequent but at times violent rains wash away the topsoil, and intense sunlight in some locations produces a semiarid climate which does not favor luxuriant growth. North Entrance Road exhibits success and failure in this effort along its thirteen miles of roadway. Where it succeeds (usually along north facing slopes or in shaded areas), native grasses snuggle along narrow paved shoulders which never exceed two feet in width; where it fails (usually beside south facing slopes and areas of full sun), sparse clumps of grass fail to hide well-sloped gravel shoulders and embankments beside the pavement.

After transitioning to narrow paved shoulders and lighter asphaltic pavement (another feature of Grand Canyon roads), the road approaches the much-modified, 1928 north entrance station. This 15' (east to west) x 21' building is intentionally placed atop the slight, heavily-wooded saddle which separates DeMotte Park from Little Park and achieves its aesthetic intent as a wooded portal to the park. Aesthetic difficulties as illustrated earlier lie with modern accouterments which detract from the building and the site. The original masonry pad, log exterior, and roof line as well as sympathetic 1950s doors and windows preserve much of the historic feel of the rustic-style structure. The corrugated metal roof replacement (or sheathing) of the original shake shingle roof is understandable, and in fact, representative of an evolution in roof materials in northern Arizona where heavy snows threaten structural collapse and forest fires promise incineration. Although the roof's pitch is only average or less for northern buildings, corrugated metal encourages snow to melt faster and slide off the roof and is, of course, a nonflammable material. GCNP maintenance crews have painted the metal brown, which helps mitigate the modern affect.

Other modern additions, though superficial, are aesthetically irksome or perhaps better said, distracting. Nearing the station from the north, the eye is not engaged by one of few (perhaps the only?) true historic log cabins within Grand Canyon National Park. Rather, one is distracted by shiny metallic objects hanging off the structure, or by the orange directional cones in the roadway, or informational and speed limit signs, or the swinging metallic (open) gate, or the concrete curbing (once log) surrounding the traffic channelization island and adjacent parking lot. The difficulty is not so much that the station and its environs are rustic or modern, though the preferable rustic could easily be recaptured by stripping the site of its doo-dads. The real problem is that they are neither rustic nor modern, but confusing at first glance and ugly upon analysis.

The roadway surrounding the entrance station dates to the 1980s projects which began at this point. There are two lanes on the east (exit) side totalling 22 feet in width between the station and concrete curbing. This curbing surrounds a grassy island which separates the roadway from a small, perhaps 7-8 vehicle, parking lot. The roadway to the west (entrance) side of the station is 25 feet in width allowing two lanes of traffic to pass, although the ranger who operates out of the west side double door can only handle one line of vehicles.

Immediately to the west of the small parking lot is a short service road which leads east about 100 yards to a larger rustic-style cabin. This cabin and small developed site used to serve the ranger assigned to the north entrance station, but is today

apparently used by park personnel as required. A sign above the door reads "trail crew entrance cabin." The history of this structure was not investigated but it appears to date to the late 1920s or 1930s.

South of the entrance station the roadway immediately narrows to a two lane entrance highway, approximately 25 feet in width with a little wider than 10' lanes and 2' paved shoulders. The first 1.2 mile tangent passes in a straight line slightly east of south through Little Park, after which, the roadway is consistently curvilinear. Two paved pullouts resulting from the 1980s projects are reached a few tenths of a mile south of the entrance station. The first is on the west side of the roadway and contains an interpretive sign which summarizes the ecology of meadows (in the West, "parks") such as Little Park. The second is immediately south of the first on the east side of the roadway and is devoid of structures other than the pavement and asphaltic curbing.

The absence of features such as masonry walls at these pullouts, and for the most part, along the entire entrance road, is typical of modern utilitarian construction, but also is appropriate to the landscape. North side landscapes except along the rim are typically dominated by grassy meadows or canyons heavily forested in ponderosa pine, fir, spruce, and aspen. Although the north entrance road does pass through a few areas where rock is exposed (usually by road cuts), cement masonry structures do not seem appropriate, and certainly not within meadows where they would appear incongruous affectations. The only road-related building materials which seems appropriate here are whole peeled logs or unobtrusive dry rubble masonry, both of which along with an oil-mixed gravel surface are what were used during and immediately after original construction. If these materials are not going to be used, the landscape is better served by a naked ribbon of faded asphalt devoid of all but essential structures. Today's North Entrance Road leans close to the latter description.

After the initial tangent, the entrance road takes on a twisting but generally southeasterly direction, climbing out of Little Park and remaining for the most part near the base of drainages on the east side of low canyons. An example of modern drainage structures--a feature of the 1982-83 repair project--is seen within the first curve where a double CMP culvert passes beneath the roadway. These and almost all culverts along the entrance road contain ARMCO metal end aprons rather than headwalls. As the road curves back to the right and begins to climb along the first canyon base, a small segment of log rip rap is noted along the downslope embankment. Some downslope shoring is necessary along major segments of this road, but what rip rap exists is seldom seen by motorists.

As the roadway continues along the base of the canyon and climbs toward Lindberg Hill, an asphaltic gutter with a narrow (several inches wide) drop inlet and asphaltic curbing are noted on the right. These drainage features are typical of the roadway where grades measure greater than 2-3 percent. Asphaltic gutters are common along Grand Canyon roads, but asphaltic curbs--which crumble easily--are less common. The narrow drop inlets seem unique to North Entrance Road and appear worthless, as the few the author inspected were hopelessly clogged with debris. Near most of these structures one will find a ragged break in the asphaltic curbing, a feature probably not found on construction drawings but necessary to allow storm water to drain from the roadway.

As the roadway nears the top of Lindberg Hill, approximately 3.8 miles south of the entrance station, there is a parking area on the east side separated from the roadway by a landscaped island--the only such pullout along the entrance road. This, too, is devoid of structures other than curbing and an interpretive sign. Just two tenths of a mile beyond near the crest of the hill, a dirt road leads off to the right (south) which follows along the pre-1930 alignment of the old pioneer wagon road. This old alignment, which today is used as a utility corridor, can still be followed by its "treeless line" through the forest. The treeless line does not seem consistent with pioneer roads which typically wound their way around trees rather than cutting a swath through the forest, but use as an auto road for about six years and later use as a utility corridor may explain the anomaly. Today's dirt road runs parallel to and west of the old alignment and comes back to today's alignment via the Windforss Trailhead road.

After topping Lindberg Hill, the entrance road descends in a series of curves to Thompson Canyon, remaining generally on the east side of the small canyons just above the drainage bottoms. Paved gutters are to be seen on both sides of the roadway through this segment. Once at the bottom of Thompson Canyon, the road passes through several narrow ribbons of beautiful meadow lands then approaches the intersection with Cape Royal Road, about 9.9 miles south of the entrance station. This intersection, which used to be a wye rather than today's "T," represented the end of the entrance road as completed in 1931. The intersection is made where Fuller and Thompson canyons meet. During the 1970s, it was debated whether the main road should proceed up Fuller Canyon and on to Point Royal, in other words, whether a right turn from the main roadway should be required to reach Grand Canyon Lodge. Why NPS administrator would propose that the main roadway continue to a point with no services is a mystery, however, the suggestion was not followed and the intersection was reconfigured such that a left turn is required to take the Cape Royal Road.

Three tenths of a mile beyond the Cape Royal intersection, the entrance road begins its long and twisting climb out of Thompson Canyon toward Bright Angel Point. Just as the road heads out of the canyon, a road to the right (west) continues down the canyon then on to the Windforss Point trailhead. Just a few hundred feet down this graded gravel road, one intersects the pre-1930 entrance alignment which is readily seen on the left, blocked by an earthen berm, as today's gravel road swings sharply to the right. After the trailhead is reached, this same gravel road quickly narrows and deteriorates into a fire road which can be followed to Point Sublime, to points west, or to the dirt road which follows the pre-1930 alignment back toward Lindberg Hill. This is not the original route to Point Sublime, which once left the entrance road at Little Park, and there are no signs at the entrance road intersection nor along the first couple miles of road which tell the park visitor that this is a backcountry road to a scenic viewpoint.

The approximate 3-mile road which leaves Thompson Canyon to approach Bright Angel Point was constructed as part of the Cape Royal Road project of the late 1920s. At the first curve out of the canyon there is a "guardrail" of treated wooden posts and a chain "rail" on the outside of the roadway which replaced a whole log guardrail built at this location by CCC crews. At the bottom of a deep fill two-tenths of a mile beyond this guardrail is a dry rubble masonry culvert headwall, typical of those seen along the Cape Royal Road and probably typical of North Entrance Road prior to 1980s culvert replacements. Another two tenths of a mile up the hill, the turnoff to the Kaibab Trail parking lot is reached on the left. At this intersection one can see examples of stone guardrail left of the road up ahead, asphaltic gutter and curb on the right with another narrow (and clogged) drop inlet, and simple concrete curbs lining the parking area. The only masonry structure in the vicinity is the small staircase and wall within the parking lot leading up to the mule corral. A trail begins at this lot which leads 1.1 miles up to Grand Canyon Lodge.

The Kaibab parking lot is accessed from along the tangent of an ascending, blind, broken back curve, which seems one of the more hazardous segments of the entrance road. This entire segment from Thompson Canyon until the relatively level point is reached is, in fact, the steepest segment, requiring sharp curves through thickly forested terrain. About one mile past the Kaibab parking lot after a series of tight curves the road begins to straighten and level off atop the point.

The last 1.4 miles of road passes in a fairly straight line through the developed area which for the most part retains its historical configuration. Service roads which run to the right

(west) to access the campground, service station, NPS buildings, and tourist facilities have been in place since 1928-31, although additions have been made and buildings altered over time. The 0.2-mile-long parking lot to the left (east) which begins with the masonry staircase and wall dates to CCC construction of the 1930s. The road continues until dead ending in a small loop in front of Grand Canyon Lodge. This tiny terminal loop is original and witnessed completion of the lodge in 1928, its destruction by fire in 1932, and reconstruction at the same point in 1936-37.

SIGNIFICANCE/CONCLUSIONS

North Entrance Road is significant as an early example of the cooperative agreement between the National Park Service and Bureau of Public Roads to build quality automotive roads within the national parks. It is the last of five Grand Canyon roads surveyed, designed, and supervised by BPR engineers and NPS landscape architects in the years 1924-31. Although associated structures built within the original 1930-31 projects were few, early features such as the 1928 entrance station, 1930-31 alignment with one (and perhaps more) dry rubble masonry culvert headwall, 1935-39 parking lot, and 1939 entrance sign remain as reminders of rustic style road architecture.

ENDNOTES

1. W.R. Mattoon, Forest Examiner, "A Working Plan for Grand Canyon National Monument," 105-page report with illustrations, 23 June 1909, copy in Professional Services, GCNP, 5, 38-39, 42-48.

2. Conversations with Mardene Church of Kanab, Utah, who used to run Big Saddle Hunting Camp near the north rim with husband Jack, and others whom the author has interviewed in Fredonia and Kanab, reveal that locals did their necessary driving early on cold autumn and spring mornings to take advantage of frosted-hard dirt roads.

3. See HAER No. UT-72, pages 22-23, for a summary of the Wooley trip, and the report in general for a background history of regional roads.

The author spoke with Anna Brown at her home in Kanab in early 1994 and discussed the early road to north rim. Mrs. Brown, who worked for many years at Grand Canyon Lodge (and was present when it burned in 1932) remembered the old pioneer entrance road in a very general way as early as 1916 when she and her husband made the trip and spent the first night at Uncle Jimmy Owens cabin.

4. "Road Map to Points of Interest from Flagstaff, Arizona," March 1927, copy in Reference File--Roads, GCNP Library (GCNPL).

5. The author has not travelled this route, but it was described to him by Mr. Cecil Cram of Fredonia, Arizona, who has lived in this area since his birth in 1915. Cecil is a geographical expert on the Kaibab Plateau and eastern Arizona Strip.

6. USDA, USFS, "Tusayan National Forest, Arizona," 1919, GRCA 28716, Grand Canyon Study Collection (GCSC). This map was compiled in 1918, published in 1919, and concerned with the forest south of Grand Canyon, thus, it probably had not been revised to depict the Wylie's road.

The author has not determined for certain that Owens had his cabin near Bright Angel Spring. It could have been near upper or lower Thompson Spring or an unnamed spring in the near area, but then the Browns would not have approached the cabin on their way to Bright Angel Point along the old road alignment.

More research is needed!

7. USDI, NPS, "Plans for Proposed Project 4, Surfacing, Route No. 4--Bright Angel Spring-North Entrance, Grand Canyon National Park Highway System," [1930], copy in Professional Services, GCNPL.

8. C. H. Sweetser, BPR District Engineer, to M.R. Tillotson, park superintendent, letter, 30 November 1929; Tillotson to Webster,

Leigh & Walker, letter, 10 January 1930; Sweetser to Tillotson, letter, 19 June 1930; all in Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL. See also "Grand Canyon National Park Completed Projects," 1933, Misc Construction D30--Desert View-Cameron Approach Road Jun 1934-Feb 1935, GCNPL.

No construction reports, completion reports, nor specifications were found for this grading project; information is pieced together from miscellaneous sources.

9. H. Bishop, Acting Chief of BPR, to H.M. Albright, NPS Director, letter, 12 March 1931; Sweetser to O.A. Lindberg, letter, 27 March 1931; Lindberg to Sweetser, letter, 25 May 1931; all in Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL. See also Superintendent's Annual Report, 1930-31 and USDI, NPS "Plans for Proposed Project 4, Surfacing, Route No. 4--Bright Angel Spring-North Entrance," cover sheet, 1931. These sources all state or imply completion in 1931.

The one-page summary sheet entitled "Grand Canyon National Park Completed Projects," 1933, gives the completion date as 3 August 1932.

10. USDI, NPS, "Bid, Contract, and Bond for National Park Road Construction, Bright Angel Point-Cape Royal Seal Coat and Bituminous Surface Treatment, Bright Angel Springs-North Entrance Seal Coat," project specifications with attached contract, 6 July 1932, Misc Construction D30--B.A. Cape Royal Road July 1925-June 1932, GCNPL; Superintendent's Annual Report, 1932-33.

11. USDI, NPS, "Bid, Contract, and Bond, 6 July 1932."

12. USDI, NPS, "Job Application and Completion Record, Culvert Reconstruction, No. 406-728, North Rim," summary record of CCC activities, 25 April 1939, GRCA 61773, Box 4, GCSC; Superintendent's Annual Report, 1938-39.

13. Superintendent's Annual Report, 1927-28.

14. Superintendent's Annual Report, 1926-27.

15. GRCA Image #3884, 14 July 1930, GCSC.

16. GRCA Image #13052, 1935, GCSC.

17. GRCA Image #1767, June 1949, GCSC; Superintendent's Monthly Report, June 1954.

18. GRCA Image #10018, no date, and #16745, July 1983, GCSC; North Rim District Ranger to Chief Park Ranger, memorandum, 24 November 1964, Gen. Admin--General N. Rim Operations and Annual Reports, GCNPL.

19. USDI, NPS, "Job Completion Record, No. 153-748, North Entrance Sign," 16 September 1940, GRCA 61773, Box 4, GCSC; USDI, NPS, construction drawing, NPGC-2041, 1938, copy in Professional Services, GCNP.

20. GRCA Image #2921, July 1935, #14044, 1936, GCSC; USDI, NPS, "Job Completion Record, No. 710-670, Parking Area (Construction)," 24 April 1940, GRCA 61773, Box 4, GCSC.

21. USDI, NPS, "Job Completion Record, 24 April 1940." Month and year for each segment of this project are identified within this source.

22. Superintendent's Annual Reports, 1941-46.

23. Superintendents' Annual Reports, 1946-53.

24. North Rim District Ranger memorandum, 24 November 1964.

These standard tasks are amply reported in district ranger and superintendent monthly reports found in the Grand Canyon Study Collection. Routine maintenance activities at north rim have really not changed since the 1920s.

25. Park Forester to Chief Park Ranger, memorandum, 17 December 1965, Gen. Admin--Gen. N. Rim Operations & Annual Reports, GCNPL.

26. W.H. Baugh, Division Engineer, to George W. Miller, Acting Regional Director, letter, 23 June 1967; Stanley T. Albright, North Rim Area Manager, to Superintendent, memorandum, 15 December 1967, Gen Admin--Gen. N. Rim Operations & Annual Reports, GCNPL.

27. Joint committee letter to the Director, memorandum, 9 September 1970.

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30. U.S. Department of Transportation, "Final Construction Report, 20 August 1987."

31. U.S. Department of Transportation, FHWA, Region 9, "Final Construction Report on Grand Canyon National Park Project NP4-A11, B9, North Rim Entrance Road, Hot Bituminous Pavement Overlay and Repair," 11 May 1987, Denver Service Center-Technical Information Center Document D-119, Denver, Colorado.

32. This paragraph and the following are based on the author's field photographs and observations made during two field trips to north rim in June and July 1994. Historical references are referenced within the text of this report, or hereafter.

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Minor reports, letters, memoranda, contract information, and work orders identified in the notes were taken from the following files at Grand Canyon Library:

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Misc Construction D30--B.A. Cape Royal Road July 1925-

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Misc North Rim Roads--Final Reports 1932, 1938, 1940

Reference File--Roads

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