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CAPE ROYAL ROAD
(Grand Canyon Route #3)
(Point Imperial-Cape Royal Road)
Between North Entrance Road and Cape Royal
Grand Canyon National Park
Coconino County
Arizona

HAER No. AZ-40

BLACK & WHITE PHOTOGRAPHS

~~REDUCED COPIES OF MEASURED DRAWINGS~~

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Department of the Interior
P.O. Box 37127
Washington, DC 20013-7127

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HISTORIC AMERICAN ENGINEERING RECORD

CAPE ROYAL ROAD
(Grand Canyon Route #3)
(Pt. Imperial-Cape Royal Road)
HAER No. AZ-40

Location: Cape Royal Road begins at its intersection with North Entrance Road and continues to Cape Royal at the north rim of GCNP. Point Imperial spur begins at its intersection with Cape Royal Road, and ends at Point Imperial. Coconino County, Arizona.

UTM A: 12 4009585 404865 /N. Entrance Int.
UTM B: 12 3997755 414650 /Cape Royal Park.
UTM C: 12 4012845 409925 /Pt. Imperial Int.
UTM D: 12 4015160 412035 /Pt. Imperial Park
Point Imperial USGS Quadrangle, 1988
Bright Angel Point USGS Quadrangle, 1988
Cape Royal USGS Quadrangle, 1988

Date of Construction: 1927-31

Type of Structure: Scenic highway

Use: Scenic highway

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

Builders: Lang Transportation Co., Los Angeles, CA
Butler B. Boyd, San Diego, CA
Lord and Bishop, Sacramento, CA

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

Significance: The scenic drive is an early example of the cooperative agreement between the NPS and BPR to build modern automotive roads within the national parks. Extant features of Cape Royal Road and Point Imperial spur include original alignment; pullouts and parking areas with scenic views; minimal landscape scarring; and some of the oldest dry rubble masonry structures within the park.

Project Information: Documentation of Cape Royal Road is part of the NPS Roads & Bridges Recording Project, co-sponsored in summer 1994 by GCNP and HABS/HAER. This report was researched and written by Michael F. Anderson, HAER historian, September 1994.

INTRODUCTION

The approximate 21-mile Cape Royal Road begins at its intersection with the North Entrance Road, 3.4 miles north of Grand Canyon Lodge, and runs generally northeast up Fuller Canyon to its intersection with Point Imperial spur road, then southeast and south, generally near the east rim of the Walhalla Plateau, to its terminus near Cape Royal. The approximate 2.9-mile Point Imperial spur road begins at its intersection with Cape Royal Road at Neal Spring, about 5.4 miles from North Entrance Road, and runs uphill generally north through Neal Canyon and east to Point Imperial, the highest scenic point within Grand Canyon National Park. Although the Point Imperial road is the longest surfaced spur within the park, it has always been considered a portion (Portion 3-D) of the longer Cape Royal Road, Grand Canyon Route #3.

As constructed in 1927-31, Cape Royal Road and Point Imperial spur replaced a rough wagon road worn principally by the north rim's first concessioners, Thomas and Elizabeth Wylie McKee, and used as a primitive automobile road for a few years. As North Rim transitioned from its pioneer tourism period to modern services offered by the Union Pacific Railroad's Utah Parks Company in 1927-28, the NPS determined to build an automotive road to these points which would afford better and more scenic viewpoints. To this end, the NPS and BPR designed and built a roadway similar in purpose to East Rim Drive, under construction in these same years along the south rim.

Although Cape Royal Road and East Rim Drive had similar purposes when first constructed, they were by no means the same kind of road nor did they evolve the same in succeeding years. East Rim Drive enjoys more level terrain and frequent encounters with the Canyon's south rim. For these reasons (and others), it evolved into a popular park entrance road during and after the 1930s and the NPS felt compelled to streamline its alignment by the late 1950s. Cape Royal Road (and its sole scenic spur) encounters difficult terrain at its long beginning and short end, has a long way to go before reaching a Canyon overlook then touches the rim in only a few places, and dead ends at the Canyon's brink. Topography, purpose, and use determined that it remain a long, narrow, and sinuous road of steep grades, sharp curves, and few tangents. Although reconstructed in 1959-63, the road and its spur retain their essential alignment and these characteristics.

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, 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 and within the park at its north rim were if anything worse than those on the south, for several reasons. Elevations at the north rim of Grand Canyon average 1,000 feet higher than on the south, a fact which created all manner of problems for early ungraded and unmaintained dirt roads. Rain, snow, frost, and thaw, though present on the south rim, are far more severe on the north rim. Snow accumulation alone (and the federal government's choice not to plow) keeps even today's paved roads closed seven months of the year. More plentiful rainfall falling in frequent storms brought many more days when roadways turned to quagmires, becoming entirely impassable. Although early morning frost 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 interacted 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 was 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 the 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 on 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 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]

Although cattlemen had made their way out to the Walhalla Plateau since before the turn of the century and may well have worn a wagon road to carry in supplies, there is no evidence of such a road out toward Cape Royal or Point Imperial before the McKees' arrival at Bright Angel Point. Elizabeth McKee recalled in 1926 that her husband had been taking their guests to Cape Royal since their arrival in 1917, and he may in fact have "built" the first road out onto the plateau. Whichever the case, it is clear that Thomas McKee ran his concession service using horse-drawn wagons and that the road, which ended several miles short of the cape itself, was particularly nasty. Elizabeth in the summer of 1924 wrote that "there is no car in here that can well make the trips except ours and no one else who knows the roads but Mr. McKee."[4]

Calls for a new road to Cape Royal were not heard until 1924 when forces similar to those at work at the south rim converged to set road building cogs in motion. The McKees began to offer automotive trips to Cape Royal and Point Sublime in 1924, and by 1926, they maintained a Dodge and two seven-passenger Buicks to make these excursions. Following the McKees' lead, the Parry Brothers of Cedar City, Utah, who ran an automobile livery to the southwestern Utah national parks and monuments in concert with the Utah Parks Company, began to offer trips to the Wylie Camp and to Point Sublime and Cape Royal. The McKees had little influence with the NPS and were not complaining types (except concerning the Parrys and their other competitor at V.T. Park, Will Rust), but the Parrys had some influence through their association with Utah Parks and the Union Pacific Railroad and used it to nudge the NPS toward a better road. At this same time, a few private motorists began to make the scenic excursion and like most early tourists, probably let the NPS know what they thought of their roads.[5]

NPS and GCNP administrators, who had trouble receiving funds from Congress in their first few years, spent nothing to develop the remote north rim until the year 1923. Open to tourists only a few snow-free months per year, Director Stephen Mather, J.R. Eakin, and other early superintendents were content to place a ranger (who really had no place to stay for awhile) at the rim and let the McKees run the fledgling tourist business under NPS policies. The early 1920s were, in fact, a "holding" period at north rim. Everyone--including Mather, his assistant Horace Albright, superintendents, and the McKees themselves--understood perfectly that the Union Pacific and their concession arm, the Utah Parks Company, would take over the tourist concession and develop the area when the time was right, just as the Santa Fe

and Fred Harvey Company had done on the south rim more than twenty years earlier.[6]

That time approached in 1925, as the Utah highway commission and BPR began to build better regional roads in southern Utah and the "Arizona Strip" (Arizona, north of Grand Canyon) while the Union Pacific, by agreement with Stephen Mather, developed facilities at Zion and Bryce national parks. Railroad planners had envisioned Grand Canyon's north rim as the southernmost stop on their "Grand Circle" tourism route as early as 1922, and only awaited further road improvements at and near the park to move in and build the tourism infrastructure. For this reason, when the NPS and BPR came to their decision to build roads together and sent BPR highway engineer Donald Evans to survey five new roads within GCNP in 1924-25, it was understandable that a new north entrance road and scenic drive to Cape Royal would be two among the five.[7]

HISTORY OF THE STRUCTURE

Location and Survey

In spring 1924, Superintendent Eakin wrote Elizabeth McKee to inform her that the NPS planned to build a ranger cabin, store house, barn, machinery sheds, and snowshoe cabins at the north rim in 1925. He added that the park's road budget over the next few years included development of a road to Cape Royal.[8] True to his word in the next year, Eakin and BPR engineer Evans visited the north rim in early summer 1925 and completed a location survey which began at Little Park, a point just south of today's north entrance station. Although Little Park in 1925 was outside the park boundary by a long shot, Eakin hoped that a new scenic drive to Point Sublime would also leave the entrance road at this point, creating an intersection where the north approach road from Jacob Lake would branch into three roads: to Cape Royal, Point Sublime, and Bright Angel Point. Here he hoped to build an entrance station which would control entry to all three, and to extend the park boundary such that all would be within Grand Canyon National Park.[9]

The NPS discarded this plan by spring 1926, apparently because plans for boundary revisions had temporarily changed, and asked the BPR to perform a new reconnaissance and location survey originating at Bright Angel Point.[10] Engineer Evans completed the required work in summer 1926, which laid out the alignment (with minor variations) seen today. His 1927 report is worth considering as it reflects the compromises often struck between the BPR and NPS concerning optimal road alignments and landscape

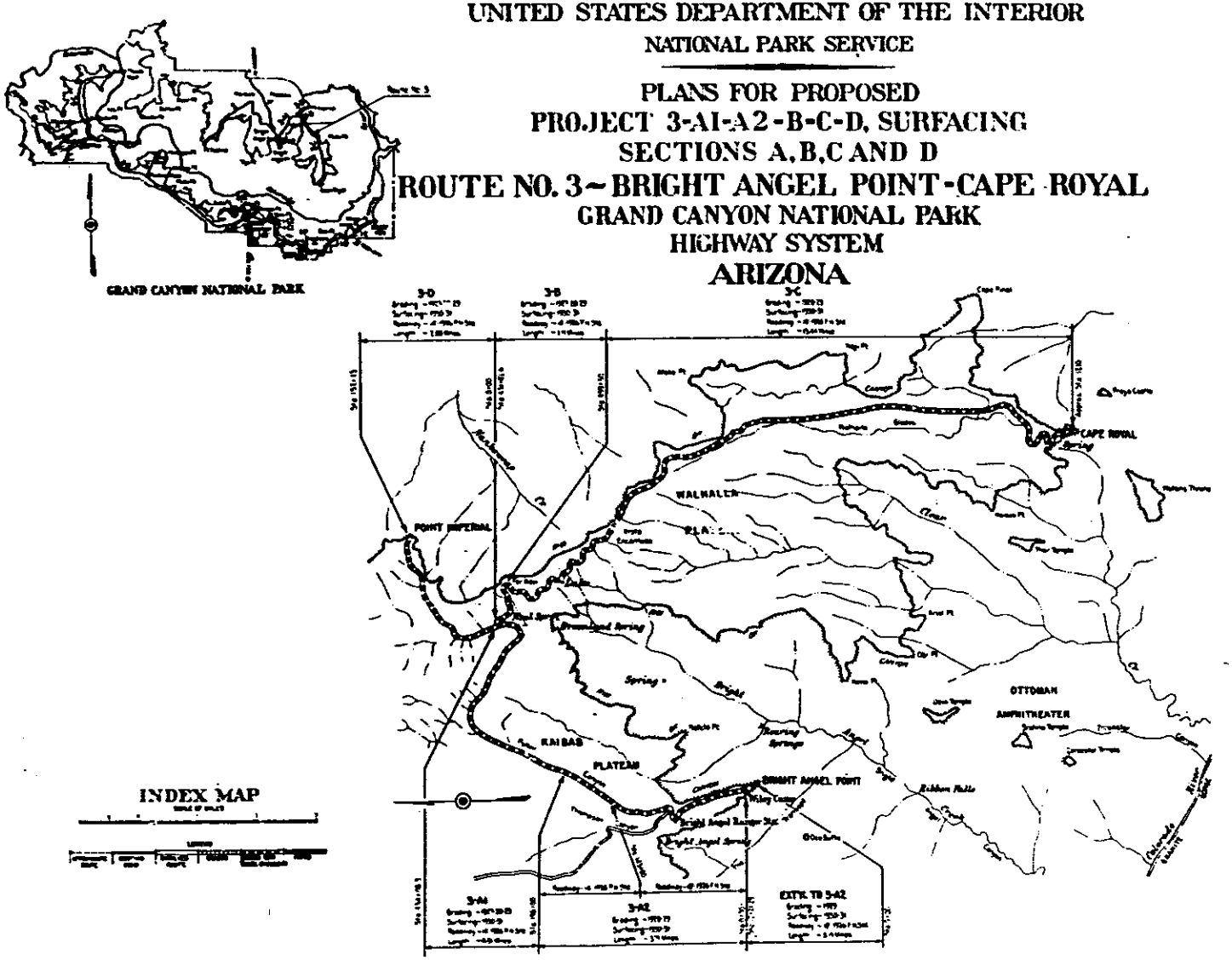


Figure 1. Cape Imperial Road and Point Imperial Spur as constructed in 1927-29 immediately preceding surfacing in 1931.

accommodations, even within difficult terrain where options are few. In Evans own words,

> Standards were not definitely set on the job but the entire line was located with the idea of receiving the best alignment and grade the country afforded, and at the same time keeping the landscape features in mind. As the entire project is a sight-seeing road, the development of canyon views of unusual merit was considered the major object, so many opportunities exist for shortening the line if the project is reviewed from a strictly engineering viewpoint.[11]

Evans survey began at Station 0+00 approximately 1,000 feet north of the later site of Grand Canyon Lodge (1927-28). He wrote that the line proceeding north along the Bright Angel plateau was restricted by Roaring Springs Canyon to the east, which the NPS insisted he follow with minimal grading to take advantage of the eastern view. Evans preferred to locate to the west at Station 16+00 to scale a hill on a 5 percent grade, but here the NPS planned to build their barn, corrals, and warehouse and insisted the road not penetrate the service area. With these restrictions, the engineer found it necessary to use two 150'-radius open curves, one 200'-radius open curve, and one 300'-radius blind curve to maintain a 5 percent grade down to Thompson Canyon and the mouth of Fuller Canyon. At Station 130+32, a connection to the old north entrance road was envisioned using a small radius curve.[12]

The line Evans plotted up Fuller Canyon was fairly straight forward, and probably followed the McKees' old road for much of the distance, at least until the new line encountered the ascent to the divide between Fuller and Neal canyons. Here, the BPR planned extensive excavation to ascend the dividing saddle with a satisfactory grade, top the divide at Station 346+00, and descend to Neal Spring. At the bottom of Neal Canyon, Evans staked a lower standard spur road to Point Imperial. Throughout this vicinity, the engineer noted that NPS restrictions on borrow pits would force an uneconomical design, since the roadbed through Fuller Canyon (and at Cape Royal) could best be made of nearby borrowed material.

From Farview, which was a Canyon viewpoint at Station 499+50 (the first along the road) no longer in use today, to Vista Encantada, the road would require heavy excavation because side canyons prevented a road along the rugged Canyon rim. Between Stations 755+00 and 792+00,

> a loop was made to develop a series of canyon views. This point has numerous fine trees and the various

> compound curves [which road engineers disliked] were computed to save as many trees as possible. The alignment could be bettered, but at a sacrifice of trees which the Park Service desired saved.

From Station 1080+00 to the road's terminus at Station 1210+00, short radius curves and steep grades were chosen specifically to "develop the only true rim drive possible."

Evans reported that drainage could be handled by standard CMP, that headwalls should be of dry rubble masonry, and rim side guard walls built of cement rubble. He was concerned about the availability of materials, as surface topography consisted of soft sandstone; very little gravel and no sites for a gravel pit were available along the route (he was wrong in this belief); and there was almost no water. Evans was equally pessimistic about hauling in material and supplies. The nearest railroad was (and still is) 200 miles away, and feed for stock--still used for road projects in these years--would have to come from Fredonia or Kanab, about 75 miles away. He ended his report with the caution that the construction season at north rim lasted only 4-1/2 months, from about 1 June to 15 October.[13]

Subsequent to Evans location survey of Cape Royal Road, the BPR developed plans and specifications which contained seven pages of special provisions (aside from standard specifications), many of which were designed to protect the landscape, make efficient use of scarce building materials, and protect workers on what could prove to be a hazardous piece of road construction. Landscape came first, and bidders were warned that

> special attention must be given to the landscape features of the work and special care taken to protect these features and adjacent camp grounds. Any timber or other landscape feature scarred or damaged by the contractor's operations shall... be removed, trimmed up or restored as nearly as possible to its original condition at the contractor's expense.[14]

Clearing and grubbing could be done only five feet wider than the actual roadway, and all materials cleared had to be lined along the roadway to protect vegetation from blasting operations. Blasting could not be done by means of "coyote" or "gopher" holes which might damage the landscape, unless authorized by the on-site engineer, and wherever possible, Pyrotol--a smokeless powder equalling 40 percent dynamite which would not cause "headaches or other ill effects and will not stain the hands or clothing"--was to be used. Contractors would make use of every available grain of material excavated in cuts for fills and to otherwise prepare the roadbed. If the engineer allowed contractors to waste some

of the material, he would designate where it might be dumped over the Canyon rim. In the case of the roadway along the Bright Angel plateau, special care had to be taken to ensure that the wasted material did not land on the heads of tourists hiking along the recently-completed North Kaibab Trail.

Structures associated with the initial grading of Cape Royal Road were few. They consisted only of galvanized CMP for culverts, supplied by the government free of charge, but F.O.B. at either Cedar City or Marysvale, Utah, 200 miles away; guard rails of stone at least 0'-15" in diameter, placed 0'-8" to 0'-12" deep and 3' to 5' apart with the longest axis parallel to the roadbed; dry rubble masonry culvert headwalls, assembled as directed by the engineer (these were built only on the intake sides of culverts); and unlined ditches along the roadway as directed by the engineer.

As with most road projects at Grand Canyon, the NPS did not have funds to complete the entire road with one contract, thus, they had to determine which sections of the old road required first replacement, and separate the overall project into sections. By spring 1927, the NPS and BPR had split the projected roadway into five sections: from Bright Angel Point to Station 196+00 within Fuller Canyon (3-A2); from Station 196+00 to the intersection with the Point Imperial spur at Station 434+06 (3-A1); the entire Point Imperial spur, Stations 0+00 to 152+43 (3-D); from Point Imperial intersection to Farview, Stations 431+82 to 499+50 (3-B); and from Farview to the parking lot just short of Cape Royal, Stations 499+50 to 1210+00 (3-C). Grading, subgrading, and surfacing over the next four years would include combinations of these segments as money allowed.[15]

Construction

The BPR and NPS decided to go after the worst road segment first. After completing plans and specifications in 1926-27, the BPR advertised for bids to grade Sections 3-A1, 3-B, and 3-D--the middle segment of the road from within Fuller Canyon as far as the neck of the Walhalla Plateau at Farview, Stations 196+00 through 499+50, as well as the Point Imperial spur. Of the five bidders, USDI awarded the contract to B.B. Boyd of San Diego, California, on 21 July 1927 for the low bid of $162,571.50, which was 85 percent of engineers' estimates. Between the start of the project 25 July 1927 and completion 11 September 1929, Boyd finished the clearing, drainage, grading, and finishing (but not surfacing) of 8.53 miles of roadway. He completed the project according to specifications, but a change from rock to earth classification increased costs by 25 percent. The contractor also had to make numerous minor line shifts and grade changes to

avoid the drainages of Fuller and Neal canyons and increase head room for culverts.[16]

B.B. Boyd completed the project to 14' 1926 forest highway standards with minimum curvature of 150'-radius open curves and 200'-radius blind curves. The sole exception was the 125'-radius open curve constructed at the intersection of Cape Royal Road and Point Imperial spur where even a slight increase in radius would require a disproportionate increase in excavation quantities (this intersection was rebuilt to today's configuration in 1932). Rolling grades up Fuller Canyon to Neal Saddle at Station 347+00 were considered light, but from that point to Farview required 5-6 percent grades and heavy excavation, descending first to Neal Spring then immediately up to the neck of Walhalla Plateau at Farview.

Engineers attributed Boyd's completion of only 8.53 miles of roadway within three full construction seasons (338 working days) to heavy excavation, a late start in the 1927 season, worn out equipment, and poor supervision. The contractor brought on-site one one-cubic-yard Koehring gas shovel (shipped to Marysvale unassembled), four one-cubic-yard Fordson tractor wagons, two one-ton Ford trucks, two five-ton Mack trucks, two 220 cu. ft./min. compressors, one 30 HP tractor, and one eight-foot blade along with an average fifty local men and thirty head of stock. Although the Koehring shovel proved "very efficient," Fordson tractors were good only for earth excavation and short hauls, and had worn out by project end. Ford trucks proved too light for grading and were used only when other equipment broke down. Mack trucks arrived in poor condition and operated only 50 percent of the time. The multi-talented B.B. Boyd served as contractor as well as job superintendent, and on occasion as timekeeper, foreman, driller, and blacksmith. BPR Engineer Rudolph Thirion described Boyd's personal work ethic as a problem since he neglected overall management and allowed inexperienced men to work without supervision.

Boyd was not only a jack-of-all-trades, but a shrewd businessman. Thirion wrote that he had submitted excellent bid prices on individual construction items, and with liberal time allotted managed to turn a profit on the overall project despite the problems. Although equipment and supplies had to be hauled from the nearest railways at Cedar City, Utah, and Marysvale, Utah, Boyd was able to contract hauling at 1-1/4 cents per pound and thus saved the expense of using his own men and vehicles. Boyd also chose Neal Spring for his camps and stock, a source very convenient to his operations and one of the few good water holes in the general area. When Lang Transportation Company arrived to construct the second segment of the road in 1928, Boyd already had this spring "claimed" and Lang had to transport water to his

distant job sites from Bright Angel Point. Weather also favored the contractor as the first two seasons proved dry while the third, though visited with frequent showers, witnessed only four lost working days.

The principal engineering aspect of this project was unclassified excavation which accounted for fully 90 percent of costs (141,000 cubic yards at $1.32 per yard). Here, too, Boyd was fortunate because he had bid the contract based on rock excavation. As grading progressed it became evident that surface indications of solid rock were only "float boulders" embedded in earth and very soft sandstone. This allowed the contractor to avoid much of the anticipated blasting and to excavate with his power shovel and men with teams. For example, between Stations 361+00 and 433+00 (from Neal Saddle down to the Point Imperial intersection) solid rock had been expected, but Boyd's gas shovel managed 80 percent of the excavation without blasting. Men and teams excavated the Point Imperial spur from Stations 0+00 to 25+00 and the power shovel completed the rest to Station 152+00, with blasting required only in the cuts between Stations 105+00 - 109+00, 113+00 - 115+00, and 117+00 - 122+00.

The change in classification from rock to earth required flattening slopes from the specified 1/2:1 on sandy loam segments to 1:1. In segments of solid rock, slope specifications were changed from 1/4:1 to 1/2:1. The classification change also required an increase in the "shrinkage factor" in order to balance cuts and fills. These modifications, and slight shifts in alignment required within drainages, kept Engineer Thirion and his crew (a draftsman, transitman, two chainmen, and stakeman) busy during each of the construction seasons.

Boyd built few structures within this project other than the roadway. He had to address drainage, of course, and installed 1,536 linear feet of 18", 1,052 linear feet of 24", and 278 linear feet of 30" CMP culverts with 159 cubic yards of dry rubble masonry headwalls. He also dug 8,265 linear feet of drainage ditches and used the borrow thus obtained for roadbed construction. Cement rubble masonry structures had been a part of the original contract, but the BPR/NPS eliminated them along the way. The contract specified no guard rails nor walls.

After three years of construction, project costs totalled $229,752.90. Of this amount, $204,556.64 went to B.B. Boyd, while engineering and overhead costs totalled $21,122.65 and NPS materials costs (mostly CMP for culverts) totalled $4,073.61. The project officially ended 11 September 1929, and was accepted within a few days by NPS Landscape Architect Harry Langley who commented only that the completed sections "present a good appearance." GCNP Superintendent Minor Tillotson walked the

project with park engineer C.M. Carrel and Engineer Thirion in October and also forwarded his approval to the BPR.[17]

While B.B. Boyd initiated construction on Sections 3-A1, B, and D, the BPR and NPS completed plans and specifications for the remainder of the road in 1927-28. The BPR advertised for bids to grade Sections 3-A2 and C, in May 1928. USDI awarded the contract to the sole bidder, Lang Transportation Company of Los Angeles, California, for the bid of $184,000.00, which was considerably below the engineers' estimate of $208,000.00. Between the start of the project in July 1928 to acceptance in October 1929, Lang completed the clearing, drainage, grading, and finishing (but not surfacing) of 17.11 miles of roadway, which included an additional 1,021 feet from Station 0+00 south to Grand Canyon Lodge (Station -10+21). Lang completed the project as specified in project drawings, except Stations 705+00 - 731+10, 858+00 - 961+00, and 1004+00 - 1021+00, which he built as cut and fill segments rather than turnpike segments (per change order).[18]

Lang completed the project to 18' 1926 forest highway standard between Stations -10+21 and 150+00 (nearly all of Section 3-A2) and a 14' forest highway standard for the remainder. Minimum curvature equalled 150'-radius open curves and 200'-radius blind curves. Grades were rolled as much as possible and an average maximum rate of 6 percent obtained, although rolling grades of 7 percent and greater were required to achieve scenic views near the end between Stations 1100+00 and 1196+00.

Completion of more than 17 miles of roadway within two short construction seasons may be attributed to the efficiency of Lang Transportation Company, which also completed an excellent stretch of roadway in Zion National Park during this period (HAER No. UT-39). Lang brought an average of 135 men to the project in 1928 along with two one-cubic-yard Northwest gas shovels, seven 5-ton dump trucks, four 320 cu. ft./min. compressors, two 60 HP tractors, two 12' blades, two scarifiers, and an unknown number of stock to pull blades across more level segments. The BPR halted the project on 15 October 1928 due to early snows, and when called back on 1 June 1929, Lang delayed nearly six weeks due to commitments at Zion National Park. Nevertheless, he brought men, animals, and equipment back by 15 July and employed an average 125 men and 65 head of stock through completion at the end of October 1929. The contractor completed the job 37 days late, but before winter 1929 set in.

Lang approached the project from both ends at once. During the first season he finished clearing, grubbing, grading, and some of the finishing of Section 3-A2, using gas shovels to excavate and grade nearly the entire section. On Section C, he completed

clearing and grubbing to Station 1170+00, burning to Station 830+00, and rough grading to Station 618+00. This work took place during an unusually dry and dusty summer, which elicited many complaints from the motoring public.

Between 1 June and 15 July 1929, Lang reestablished his three grading camps and moved some men and equipment from Zion to burn, slope, gather rocks, and finish Section 3-A2. By 15 July he had 70 men, two shovels, eight 5-ton trucks, and 40 head of stock at the site and went to work completing Section C. Gas shovels excavated Stations 499+50 - 673+00, 688+00 - 705+00, 731+00 - 749+00, 832+00 - 855+00, 1037+00 - 1055+00, 1082+00 - 1112+00, 1140+00 - 1198+00, and all other hard rock sections. Sixty HP Caterpillar tractors pulled two-cubic-yard scrapers to grade Stations 673+00 - 688+00, 749+00 - 782+00, 1020+00 - 1031+00, and 1067+00 - 1082+00. Men with teams did the remainder. After 30 September, Lang had only one shovel to continue the work as the other "rolled over the bank" at Station 1175+00 and was wrecked.

BPR Engineer Rudolph Thirion complemented the contractor's powder men as they used 24,000 pounds of Pyrotol and 49,250 pounds of 40 percent dynamite to clear, grub, and excavate without accident or marring of the adjacent landscape. He described the workmen as "skillful," as jackhammer men drilled vertical holes to a depth two feet below grade and five feet apart, then powder men using just enough charge to shatter the rock without scattering it into surrounding shrubs and trees.

Lang laid stone guard rails as specified on Canyon side embankments at Stations 774+25 - 775+25, 1181+00 - 1183+00, and 1194+50 - 1196+80. He installed approximately 2,885 linear feet of 18", 964 linear feet of 24", and 182 linear feet of 30" CMP culverts and constructed 102 cubic yards of dry rubble masonry headwalls. Borrow material obtained from digging drainage channels at Stations 131+00 - 153+00 and 162+50 - 170+85 was used to reinforce and shape embankments, which were generally designed to 1/2:1 through solid rock and 1:1 on loose material slopes. Finishing tasks did not include surfacing; only leveling the surface to grade with teams and scrapers, then scarifying and blading the roadway into usable condition.

The contractor encountered a few minor problems and difficult conditions. The 320 cu. ft./min. compressors at sea level could power four jackhammers; at the 8000' elevation of this project they could power only two on shallow holes and one on deeper holes. Lang had to employ two 3-ton trucks to carry supplies between the Union Pacific railhead at Cedar City, Utah, and the job site, a distance of 200 miles on roads which were not bad but not altogether up to modern automotive standards in 1928-29. He had to obtain water from the Utah Parks Company, which had their

own construction camp going in these years as they kept their end of the Union Pacific-NPS bargain to build Grand Canyon Lodge, cabins, and other tourist facilities in exchange for better roads. This was a 20-mile haul at worst, however, presumably from the UPC camp at Station 40+00 of the new roadway to Lang's farthest grading camp along the new road. A wet summer 1929 caused ten lost working days and some mucky conditions, while an unanticipated "scab rock and boulders" segment between Stations 705+00 - 731+00 required hand labor, additional expense, and further delays.

Project costs to the NPS totalled $207,732.21. The contractor earned $182,107.81 after having nearly $3,000 withheld for late completion. Engineering costs totalled $20,691.76 and materials totalled $4,932.64. The engineering team on-site in 1928-29 included BPR Assistant Highway Engineer Rudolph Thirion, an office assistant, transitman, levelman, two chainmen, and a stakeman. They maintained their camp near the Utah Parks camp and kept themselves busy retracing, leveling, cross-sectioning, and adjusting the grade line to balance cuts and fills. Changes they made to plans included shifting the line between Stations 16+00 and 46+00 to reduce the grade to 6 percent, removing the Canyon side shoulder at Station 31+00 to afford a better scenic view, and shifting the line away from the Canyon edge between Stations 682+00 and 689+00 to "avoid the removal of trees of value to the appearance of the road."[19]

As Lang progressed on Section C during summer 1929, the BPR and NPS completed plans and specifications for the parking area to be constructed at the end near Cape Royal. The NPS extended Lang's contract to complete this work, which consisted of grading Section C to Station 1196+65 to a 14' width, then clearing and blading a 1.88 acre parking area, then constructing 2,300 linear feet of log guard rails around the area and along two of the five parking lanes. Construction drawings and narrative descriptions reveal the parking area very much like it is seen today, except that stone guard rails surround the parking area.[20] This stone was substituted in original construction, probably to cut costs, as the NPS had trouble near the end of the project coming up with enough money to pay the contractor.[21]

Construction reports and correspondence during the period 1927-29 reflect nothing of working and social conditions of Boyd's and Lang's workmen. Certainly they lived at the project site among several tent camps, and in this remote location probably had little to do other than admire the scenery when not on shift. Likely all of the unskilled and some of the skilled workers came from the Mormon communities of Fredonia, Arizona, and Kanab, Utah, the closest towns to the work site but still fifty or more miles away. These men may well have foregone "pleasures" of camp

life and saved their entire salaries (other than meals, which workmen had to buy).

Lang paid his workmen more than Boyd and also employed nearly twice as many. His superintendent earned $750.00 per month plus expenses; accountant, $200.00 per month; timekeeper, $150.00 per month; foremen, $250.00 and $200.00 per month plus meals; shovel operators, $1.50 to $1.75 per hour; tractor operators, $1.00 per hour; powder men, 87-1/2 cents per hour; blademen, 95 cents per hour; truck drivers, 75 cents per hour; drillers, 62-1/2 cents per hour; and unskilled laborers, 50 cents per hour. Boyd saved considerable money by acting as superintendent, accountant, and timekeeper himself, earning his money through project profits. He paid his foremen, when not doing the work himself, $150.00 per month; shovel operators, $1.50 per hour; drillers and other skilled workmen, 62-1/2 cents per hour; and unskilled workmen, 50 cents per hour.[22] Road workers on the south rim of Grand Canyon in these same years earned comparable salaries.

Construction reports and correspondence also do not mention grading of scenic pullouts along the completed sections of new road, but it is likely that contractors at least roughed out parking areas at Farview and Point Imperial. Touring motorists visiting north rim had been increasing at a rate of an additional 1,000 automobiles and 3,000 passengers per year since 1925, and it is unlikely the NPS would build the scenic drives without providing parking at a few viewpoints. With the completion of the North Kaibab Trail, the Grand Canyon Lodge, and 122 tourist cabins at Bright Angel Point in 1928, this traffic did nothing but escalate in succeeding years. During the 1929 season as Lang and Boyd neared completion of Cape Royal Road, 6,000 vehicles carrying 20,000 passengers visited north rim.[23]

Although traffic was allowed onto the new Cape Royal Road and Point Imperial spur even as the contractors pursued their work, the new road contained no surfacing other than graded and rolled fine aggregate. While these two contracts neared completion, the BPR prepared plans and specifications for surfacing of the entire 26.38-mile roadway. They advertised for bids in November and USDI awarded the contract to Lord and Bishop of Sacramento, California, in December 1929 for the low bid of $251,552.50, which was 99.9 percent of engineers' estimates. The contract called for a start date of 3 June 1930.[24]

Specifications identified an 18'-wide, crushed-rock base course varying by specific stations from 0'-3" to 0'-4" deep and topped with an oil-treated, crushed-rock surface varying by specific stations from 0'-3" to 0'-4" deep. Aggregate had to be obtained from approved quarries, and 100 percent pass a 1" screen, 50-70 percent pass a 3-mesh sieve, 35-60 percent pass a 10-mesh sieve

(sand was acceptable), and 5-10 percent pass a 200-mesh sieve (earth or dust acceptable). All asphaltic base crude oil had to be 60 to 70 percent asphaltic residue with penetration of 100 or greater at a temperature of 77 degrees, with a flash point no lower than 175 degrees, specific viscosity of 25 - 45 at 122 degrees, and no more than 2 percent water and sediment.[25]

The BPR also specified how base and surface courses must be laid. The base course would be applied atop the subgrade left by Boyd and Lang, compacted, and bladed to true grade and cross section. The top course crushed rock would be mixed with 3-5 percent (by weight) fuel oil at contractor's central mixing plant (rotary drum or pug mill type allowed), such that the resulting color appeared brown rather than black. It would then be spread atop the base course from vehicles equipped with spreading devices (not piled by the roadbed then shovelled), followed by a blade grader with a wheelbase of not less than 16'. The contractor had to keep the blade grader operating five days after application, following behind vehicular traffic (which would accomplish most of the surface compaction) to smooth out ruts. If traffic did not accomplish proper compaction, contractor would use a roller until achieving the desired effect. The contractor would then shape and finish the roadbed with a center crown, shape shoulders and gutters, and clean out all excess materials.[26]

Lord and Bishop arrived at the north rim 27 May 1930, began to move equipment to the site, and hunted for a suitable quarry. The list of equipment eventually brought into use is impressive:

(1) P & H 3/4-cubic-yard gasoline power shovel
(1) Atlas 200 horsepower diesel engine
(1) Atlas 120 horsepower diesel engine
(1) 15" x 38" roller bearing primary crusher
(1) 3" x 36" Cedar Rapids secondary crusher
(1) Meese-Gottfried belt conveyor system
(1) Sullivan 370 cu. ft. stationary air compressor
(1) 4' x 8' Cedar Rapids shaker screen
(1) 60 horsepower Caterpillar tractor
(1) 30 horsepower Caterpillar tractor
(1) 12' Russell Super-Mogul blade grader
(1) two-cubic-yard revolving Jumbo scraper
(1) 20 horsepower Caterpillar motor grader
(1) 1500 kilowatt welding and lighting plant
(1) Madsen mixing plant and drier
(8) five-ton White dump trucks with pneumatic tires
(2) 3-1/2-ton Reo dump trucks with pneumatic tires
(4) seven-ton Fageol 6-wheel dump trucks w/ pneumatic tires
(1) complete blacksmith shop
(1) complete machine repair shop
(1) cook house and camp outfit, complete for 60 men

The quarry chosen by the contractor and approved by resident engineer Thirion, was located at a point near Station 522+00, about 1/2 mile south of Farview (a dirt road still leads to this area). Contractor began to setup his camp and crushing plant here on 22 June while crews prepared the subgrade with the 60 HP tractor pulling a 12' grader and a 30 HP tractor pulling a Fresno scraper.[27]

During the 1930 season, the contractor got off to a poor start as he did not setup his crushing plant until 20 July, its initial production did not exceed 175 tons per shift, and it broke down continuously. Thirion blamed low production on poor management and use of a dragline to feed material to the primary crusher. The dragline was unsuitable for working boulder and conglomerate rock in ledge formations. Contractor replaced the drag with a 3/4-ton P & H shovel and two trucks on 7 September and production increased to 400 cu. yds. per shift. Using double shifts, quarry crews managed to produce enough rock to keep eight 5-ton dump trucks busy hauling rock to construction sites and road crews finished the base course by 29 October. Workmen bladed the base course and left it in good condition to stand over the winter while the contractor broke camp in early November.

As the 1931 season approached, W.J. Nelson replaced Rudolph Thirion as resident engineer and reestablished the engineering camp at the contractor's quarry site camp. He was assisted by H.K. Church then D.J. Steele and a crew consisting of a road inspector, plant inspector, scaleman, and quarry inspector. Lord and Bishop returned with equipment and crews on 23 May 1931 and went to work clearing ditches, cleaning winter slides from the roadway, overhauling the crushing plant, and installing a Madsen oil-mixing plant and drier powered by a 120 HP diesel engine. After applying small amounts of additional base course, crews went to work preparing and laying the oil-mixed top course on 17 June.

Workmen mixed oil and screenings in a pug mill with a batch capacity of 3,000 pounds. As a 60 HP tractor and 12' grader went ahead to prepare the base, four to eight 5-ton dump trucks hauled the mix to the site. Spreader boxes supplemented by a 20 HP Caterpillar motor grader laid the material. The contractor made good progress, laying down six miles of surfacing, until the resident engineer on 6 July began to investigate why the surface was raveling under heavy traffic. He experimented with four more miles of surface material, using the same rock and oil in varied proportions, then shut down operations to run laboratory tests. Altogether ten miles from Stations 18+75 to 536+00 were effected. Analysis showed that the specified low viscosity oil (25-45) combined with highly absorbent aggregate resulted in deficient asphalt after the surface had been in place for several weeks.

The BPR resumed operations on 10 August, first using up the lighter oil at a 6-6.5 percent (by weight) mix, then substituting heavier asphaltic oil with a 55-85 viscosity and 65-75 asphaltic content, applied in a 5.00-5.30 percent (by weight) mix. These percentages worked well for the rest of the oil-mix surfacing, completed on 10 October. Meanwhile, the contractor went after the poorly-laid, 10-mile segment by blading off raveled material from Stations 144+00 - 229+00 and placing an additional 0'-1-1/2" of oil-treated, crushed-rock material. He laid a flush coat of asphaltic oil on the remainder at Stations 18+00 - 144+00 and 229+00 - 536+00 using 1/7 gallon per square yard in order to seal the surface over the winter. The engineer knew, however, that these last segments would not hold up under seasonal traffic and severe winter conditions, and suggested repairs as well as a seal coat of heavy asphalt and screenings over the entire section in the 1932 season. He also stated that a heavy seal or armor coat which makes the surface impervious to water would always be necessary for the north rim roadway.

Soon after surfacing resumed, quality aggregate ran out at the old quarry site and on 21 August the contractor moved to a new site near Station 1137+00. Rock at this quarry consisted of a sedimentary conglomerate composed principally of hard chert with streaks of sandstone and limestone. An overburden of dirt and sandstone from one to eight feet in depth had to be stripped, and segments of decomposed chert had to be wasted, but with careful selection a fair grade of aggregate was obtained which served the remainder of the project. This new aggregate required a 5 percent (by weight) asphaltic mix to obtain satisfactory results.[28]

The only structures associated with this project consisted of 2,170 linear feet of stone guard rails placed at the Cape Royal parking lot. These guard rails were of individual stones at least 1'-3" thick, 2'-6" to 5'-0" long, and 0'-9" to 1'-6" high, placed along the perimeter and within the parking lanes of the lot from three to four feet apart and one foot from the roadway. The stones were laid to an average depth of 0'-8" to 1'-0" and backfilled. The contractor also completed surfacing of the new spur road built to access the campground, cafeteria, and cabins at Bright Angel Point, as well as the 1,021'-long roadway and loop (Stations 0+00 to -10+21) leading to Grand Canyon Lodge by an additional work order.[29] The entire project was completed and contractor moved off site by 22 October 1931. Superintendent Tillotson and Chief Landscape Architect Thomas Vint forwarded their approvals within two weeks.

Assessing the conduct of this project, Engineer Nelson wrote that the contractor's "attitude left much to be desired," that they slighted their responsibilities and required "rigid and close inspection" at all times, and that they were unreliable and very

inefficient in [their] methods."[30] These words sound very much like the BPR shifting blame where it did not belong, as the principal problem--ten miles of poorly surfaced road--was due to BPR specifications which called for the low viscosity oil, the mix, and for engineers' regular inspections. Lord and Bishop were, in fact, reputable contractors who had done other surfacing projects for the NPS with no reported problems. They completed this project on schedule with no specific complaints noted, other than dust raised during their mixing operations.

GCNP Superintendent Tillotson, a trained and practicing engineer before he became an administrator, agreed that the BPR was trying to shift blame to the contractor when Lord & Bishop had followed specifications to the letter. In a rather scathing letter to BPR District Engineer C.H. Sweetser, Tillotson wondered why 55-85 viscosity oil had been specified for four other road projects within the park in the past few years, but 25-45 specified for the Cape Royal Road. He wondered how the engineer could complain that aggregate was the problem, when the same aggregate was used with higher viscosity oil and obtained excellent results. Lastly, he wondered why he (the NPS) was paying the BPR $23,000.00 for this job when

> Frankly it does not seem to me that we have been getting $23,000 worth of engineering inspection and supervision and I feel I have the same right to raise a protest as if we should spend $23,000 for machinery and equipment and not get value received.[31]

Tillotson was clearly furious at the BPR for, among other things, accusing the contractor of cheating on the oil mixture by tampering with the on-site scales (a check found the scales to be accurate). In a letter to Horace Albright, Tillotson said that he was convinced

> that the difficulty lies in faulty specifications and in improper inspection of rock going into the crusher. If the bureau is at fault in this case it seems to me that the best thing for them to do would be to acknowledge it like a man without trying to pass the buck to the contractor...[32]

Tillotson was not through lambasting the bureau, who made plans for rectifying the mistakes without telling him. Ultimately he asked that future BPR/NPS projects at Grand Canyon be supervised out of the BPR Phoenix office, rather than the San Francisco office as was the case with the Cape Royal Road. His problem was with the specific engineers and engineering office, not the bureau, which he acknowledged had always done excellent work before this incident. His concern then turned to rectification

of the problem. He agreed with remedial measures outlined above which were effected in the 1931 season, and also understood that further work likely totalling $60,000.00 would be required during the 1932 season. Park forces kept after the required surfacing work into 1933 under park minor projects, and reconfigured the Cape Royal-Point Imperial intersection while they were at it.[33]

Major Repairs and Alterations

When the park service returned to north rim in early summer 1932 to open for the new season and inspect their brand new road, they discovered just how difficult it was going to be to maintain a north rim automotive highway in years to come. Despite engineers' assurances that the new road would not be seriously impacted by landslides, Tillotson found that winter slides had in fact blocked the road and torn up the surfacing. The park road crew estimated an initial $3,000.00 simply to remove slides, clean out ditches, build up shoulders, and repair the surfacing. They went to work on these tasks and had the road open by 15 June.[34]

Coincident with repairs to Cape Royal Road by park forces, the BPR advertised for bids to seal coat the entire road as well as the recently-completed North Entrance Road. USDI awarded a contract to seal coat and bituminous treat the 35.819 miles of roadway early in spring 1932 to O.A. Lindberg of Stockton, California, for $59,460.00. Lindberg got a good jump on the project in early summer and successfully completed the treatment on 8 November 1932. This contract's purpose was to seal the roadway's surface and thus protect the subgrade from moisture, frost, and thaw which were (and are) particularly damaging on the north rim. Seal coating could not resolve the problem of annual clearing and repairs, however.[35]

Fortunately for the park, the Civilian Conservation Corps arrived at Grand Canyon the following spring (1933). Superintendent Tillotson met the first contingent at Cedar City, Utah, on 29 May 1933 and led them directly to the north rim where CCC Company 818 under the command of Captain W.O. Poindexter established Camp NP-1A at Neal Spring. For the next eight years they would summer at various points near Bright Angel Point and winter at Phantom Ranch or Desert View. The 200 men of this company (later, Company 2833) would assist NPS forces with myriad constructions and maintenance tasks, and be especially useful for the types of problems described above: slide clearing, ditch cleaning, shoulder shaping, embankment rounding, and surface repairs. PWA workers and federal works project funds would also help the CCC make road-related improvements such as building guardrails and walls and landscaping.[36]



Figure 2. Teams finishing the roadway at Station 32+00 along Bright Angel Point, ca. 1929. (construction reports GCSC)



Figure 3. Completed roadway at Station 518+00, ca. 1929. (construction reports, GCSC)

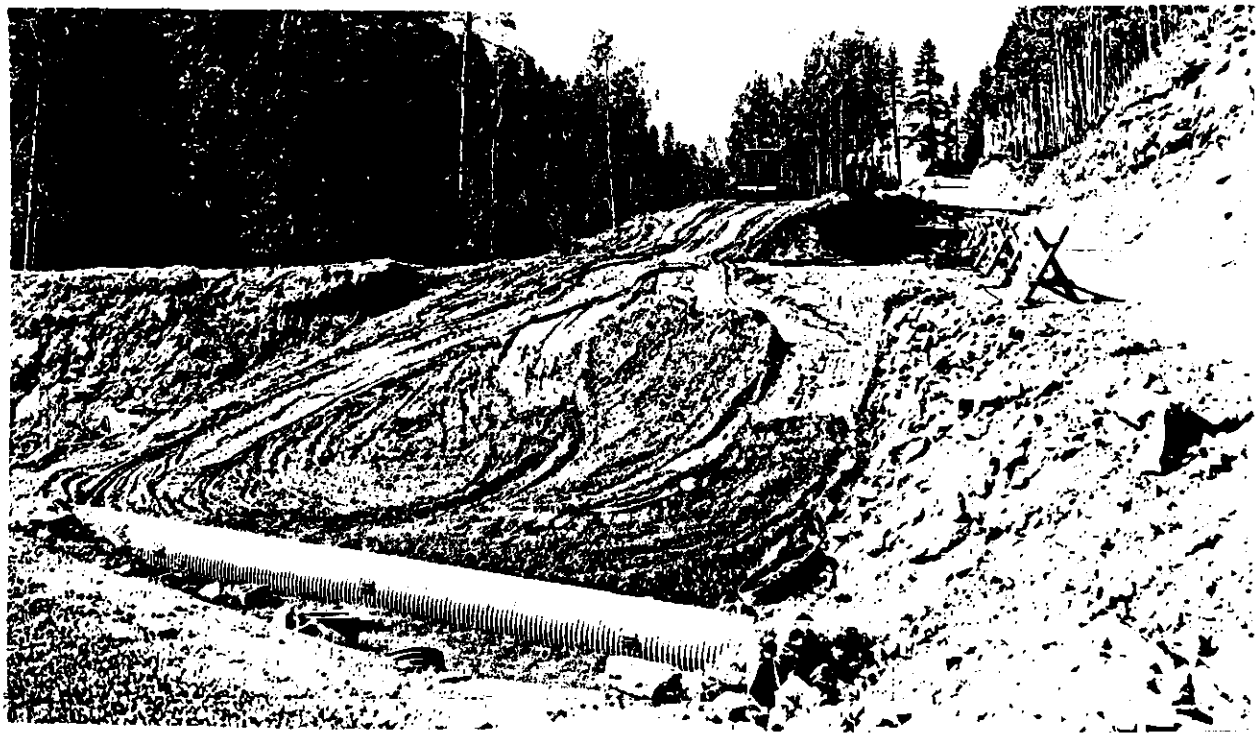


Figure 4. Fitting in the wye intersection at the Point Imperial spur road, July 1932. (GRCA Image #2894, GCSC)



Figure 5. Completed intersection. (GRCA Image #3946, GCSC)

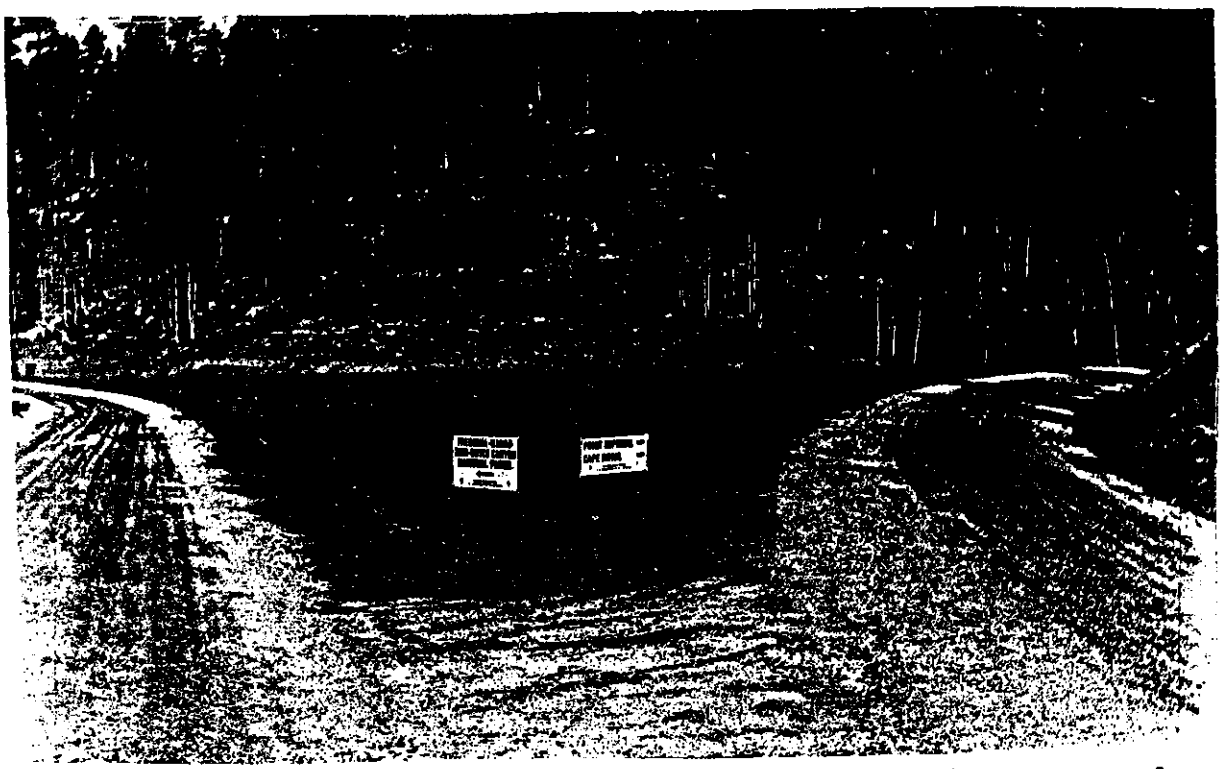


Figure 6. Wye intersection of North Entrance and Cape Royal roads, ca. 1932. (GRCA Image #2978, GCSC)



Figure 7. Park forces guardrail project along Cape Royal Road, 15 July 1937. (GRCA Image #4002, GCSC)

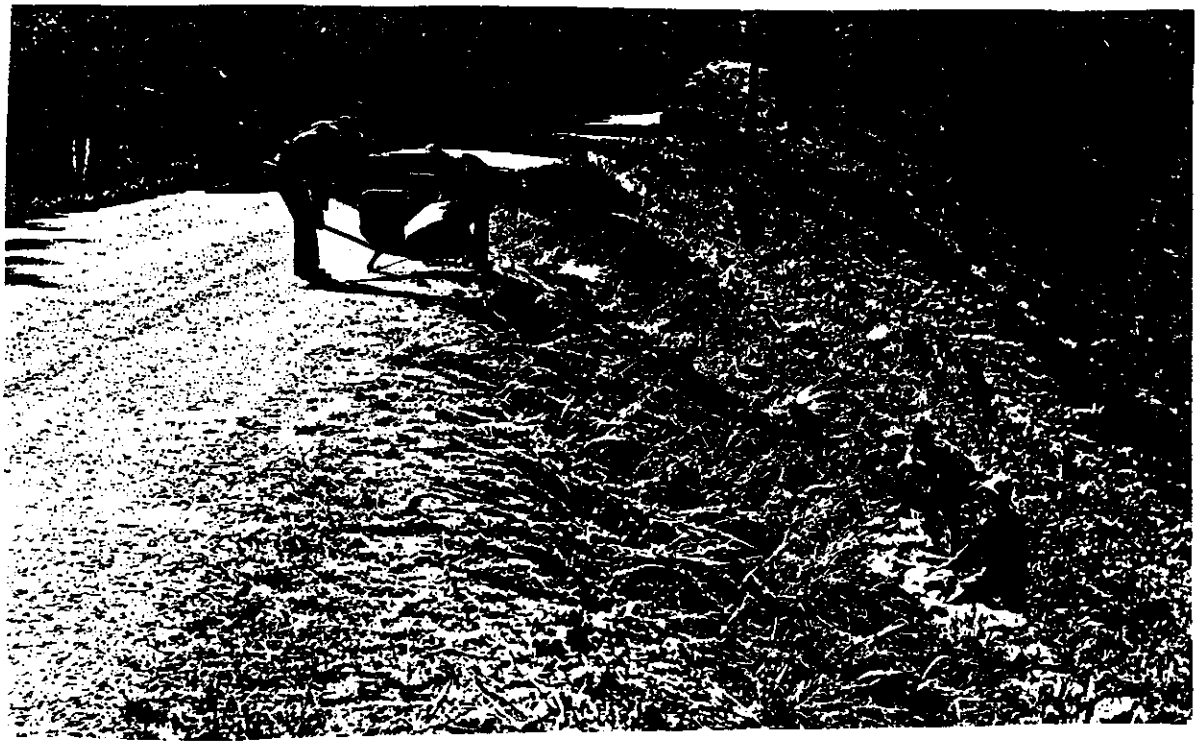


Figure 8. CCC at work shoring embankments along Cape Royal Road, August 1938. (GRCA Image #2911, GCSC)



Figure 9. Automobile caravan with touring bus parked along Cape Royal Road scenic viewpoint, 1937. (GRCA Image #15351, GCSC)

There were no major alterations to Cape Royal Road until the late 1950s, but CCC and park forces did build road-related structures during the 1930s and kept after each year's winter wear. In 1936-37, park crews constructed the first guard rails along the roadway, other than the stone guards placed by early contractors. In the 1930s, concerns were much like today's in that speeders--and those passing motorists who believe that park roads double as parking lots--had a tendency to fly off the road at short radius curves. Automobiles of the 1930s were also more prone to brake failure, and as anyone who has driven the steep curvilinear Cape Royal Road and Point Imperial spur knows, you do not want to travel either without brakes.

Under the supervision of park engineer C. M. Carrel, park crews obtained 1'-8" to 2'-4" post logs and 1'-0" to 1'-4" rail logs from designated areas within six miles of the project, peeled and bucked them at the cutting site, then used trucks to haul them to one of four sites where they built and creosote treated the whole-log post and rail guards. Reports do not specify exactly where these were erected, but construction drawings prepared in July 1936 identify nine locations. Photographs indicate that one length of guardrail was installed along the curve where the road climbs out of Thompson Canyon toward the Kaibab Trail parking lot--the identical position that the post and chain "guardrail" occupies today. The remaining eight, totalling 3,000 linear feet, were to be placed between the first curve leading up to Neal Saddle and the last curve approaching Vista Encantada. One 1,200' segment flanked the grade from Neal Saddle down to the Point Imperial intersection. Another length edged a curve near Vista Encantada. None of these rustic-style structures survive today.[37]

All through the 1930s, one of the most popular activities for Grand Canyon motoring tourists was the daily, naturalist-led automobile caravan along East Rim Drive and Cape Royal Road. These caravans stopped at various scenic pullouts along the way, and with as many as 65 autos in a single caravan--perhaps 200 people--and the ranger prepared to talk for who knew how long, some kind of seating was desirable. In 1938, the CCC built from 47 to 56 hewn-log benches at Vista Encantada and Cape Royal, many of which still exist off the pathway near the cape. The cost of this project totalled $0.00, while the products after sixty years service still welcome many thousands of weary visitors annually. The cost to build log guard rails the year before totalled $4,189.34 and have long since disappeared.[38] It is easy to see why the NPS loved the Civilian Conservation Corps.

The World War II years were hard on Grand Canyon National Park roads, not only because it meant the end of the CCC (1942) but also because park allocations dwindled to early 1920s levels as

the war dragged on. Road work reverted to demand maintenance only. At north rim, Grand Canyon Lodge closed for the duration and operations at the cafeteria and housekeeping cabins were curtailed while tourist numbers also dwindled to early 1920s levels. The North Entrance Road to Bright Angel Point remained open for summer seasons during the war years, but considering gasoline and rubber rationing, the closure of all commercial bus operations, public attitudes toward wartime waste, and the remote nature of the dead-end Cape Royal Road, one might speculate that no one bothered to plow it and the road may in fact have closed. No mention is made of the road during these years.[39]

Tourists returned to Grand Canyon National Park in hordes after the war, but appropriations for any purpose lagged for the first few years. The park benefitted from war surplus road equipment in 1946-47, but attention focused on the south rim's infrastructure which serviced 90 percent of park visitors. In 1948, H.C. Bryant groaned that because of inadequate funding and the enforced 40-hour work week, "our physical plant continues to deteriorate faster than we are able to repair it." The beleaguered superintendent had trouble keeping up with employee housing and visitor accommodations in the late 1940s, and in contrast to annual reports of the 1920s and 1930s, had little to say about park roads other than to mention insufficient parking, traffic snarls, and a new phenomena: roadside littering.

Road maintenance began to improve in the early 1950s as park forces made better use of mechanized equipment and allocations took a turn for the better. Routine patching satisfied north rim roads in 1951. The park purchased a new snow plow in 1952, and likely brought it along with other equipment to the north rim in the spring for the standard early season tasks of snow and slide removal. Despite improvements, however, Bryant in 1953 lamented that "more and more, the lack of accommodations, service, and outmoded roads becomes apparent." When money did appear for road reconstruction within Mission 66 programs, early projects focused on the south rim, especially reconstruction and realignment of the South Entrance Road (HAER No. AZ-45) and East Rim Drive (HAER No. AZ-44). Cape Royal Road simply had to wait its turn.[40]

Cape Royal's turn for Mission 66 funds came in summer 1959 when the BPR completed plans & specifications for reconstruction of Stations 621+99 (between Greenland Lake and Vista Encantada) to 1196+79 at the approach to the Cape Royal parking lot. USDI awarded the contract to Thayn Construction Company of Salt Lake City, Utah, for the low bid of $415,014.80, which was 11 percent above engineers' estimates. The project began 27 October 1959 and upon completion on 25 July 1961 contract costs totalled $518,461.19, of which $100,953.39 was charged to planning, specifications, and engineering.[41]

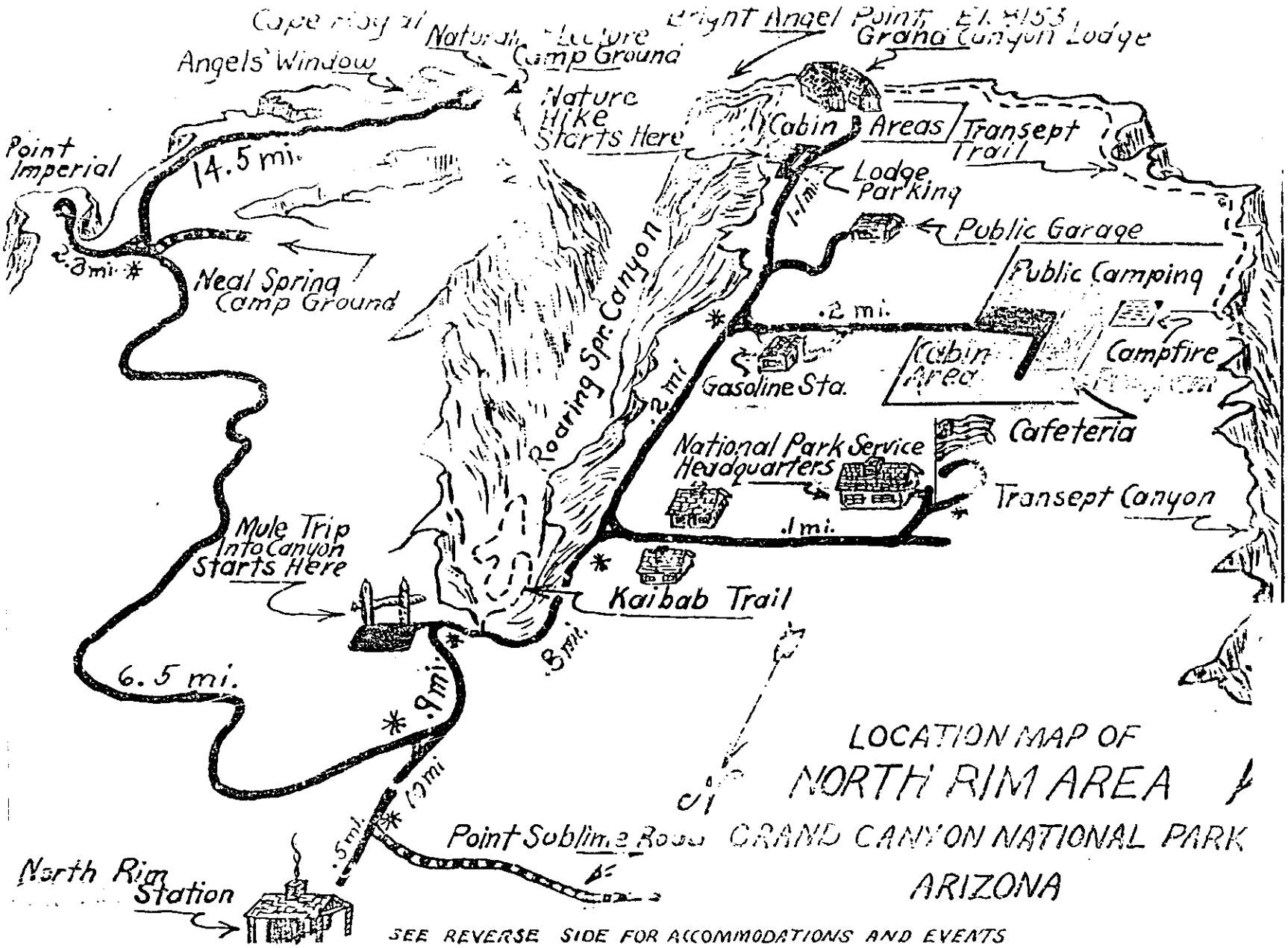


Figure 10. 1955 Visitor Guide map (not to scale!) with services and NPS facilities along Cape Royal Road.

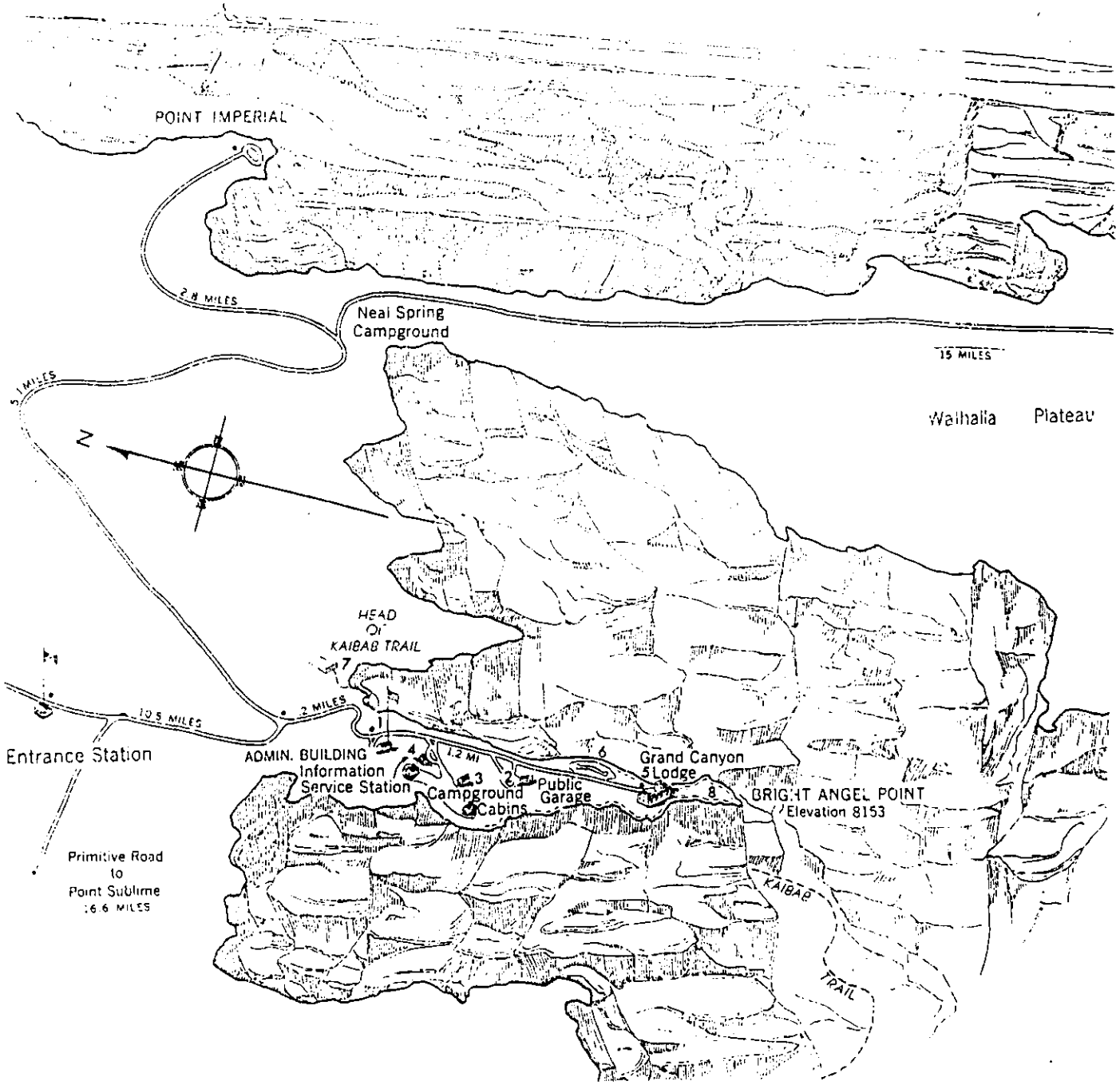


Figure 11. 1955 Visitor Guide map with slightly better scale illustrating the overall Canyon topography near Cape Royal Road.

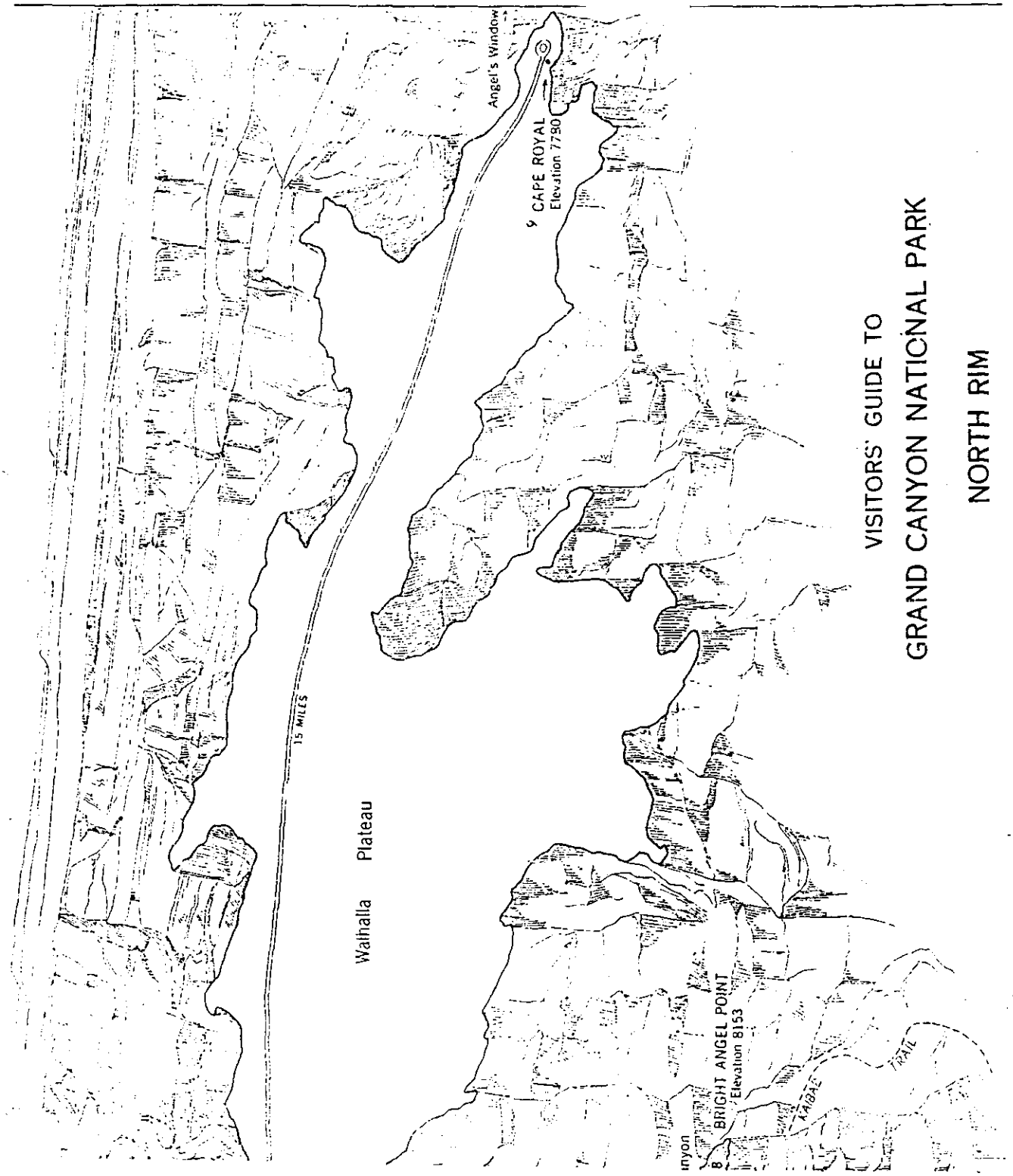
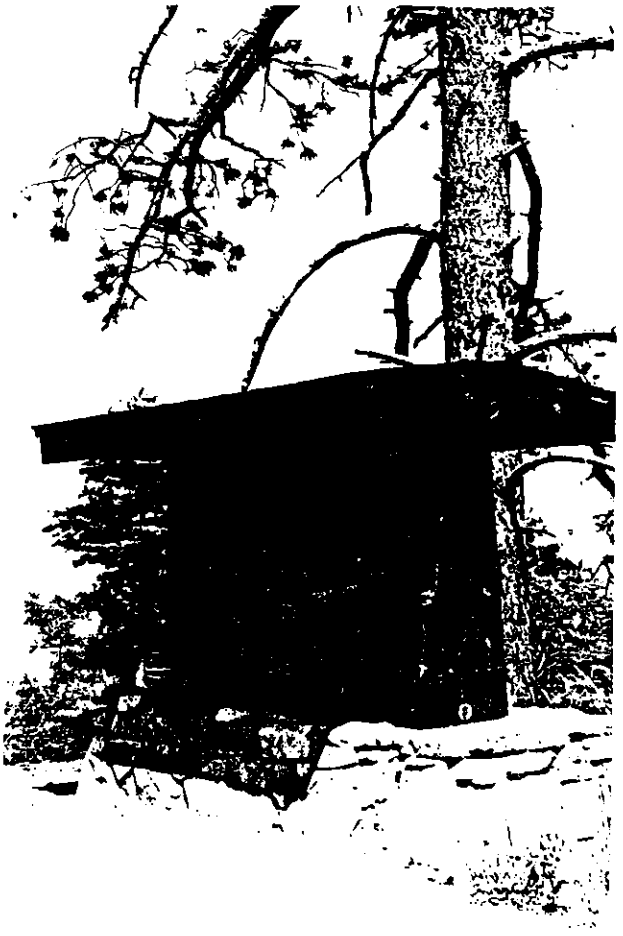


Figure 12. Continuation of 1955 Visitor Guide map to Cape Royal.





Figures 13-14. Masonry and wood interpretive monuments and glass-enclosed signs along Cape Royal Road, July 1962.

The 1959-61 project represented only the first of two programmed to reconstruct the entire road and Point Imperial spur. In 1959-61, Thayn completed grading, drainage, base course, bituminous surface, and seal coat; two minor line changes; and construction of five parking areas along the 10.832-mile project portion of the roadway.[42]

Alignment changes were slight, and apparently made solely to move the roadway away from the rim to allow space for new parking areas. At Station 769+86 to 781+97, contractor shifted the line slightly to the west, which flattened the curve somewhat, but more importantly allowed construction of the 8-10 car Two Rivers Junction (today, Painted Desert) Parking Area at Station 776+00. From Stations 1114+87 to 1129+63, Thayn again shifted the line away from the Canyon rim to allow room for the 28-car River View (today, Walhalla Overlook) Parking Area. Three additional parking areas were constructed at Stations 686+00 left (Vista Encantada), 890+00 right (Transition Zone Pullout), and 1168+00 left (Angel's Window Pullout).

Although reports of the 1927-31 original road construction projects do not indicate that the road contractors built parking areas and pullouts, it is likely that informal pullouts along the roadway existed at some of these points and others. Early drawings identify Farview and Vista Encantada, and it is unlikely a scenic overlook would be named without expecting motorists to stop and look. Construction drawings prepared in 1959, however, indicate that improvements seen today at these points date to this later project. For example, 1959 specifications for Vista Encantada reveal a layout basically the same as today, including the picnic area. The work done here in 1959 included 300 cubic yards of excavation, 1,850 square yards of plant-mix surfacing, 650 linear feet of bituminous curbs, 480 square yards of bituminous side walks, and 250 linear feet of metal railing. All but the absent metal railing and the closed south end of the lot (it was designed to have an outlet here) seem to match what one sees today.

Specifications for the other four parking areas within this project included the same basic arrangement of surfaced parking, bituminous curbs and sidewalks, and metal railings. Five hundred and eleven of 670 linear feet of railings were eliminated from the project, as at Vista Encantada, because the resident engineer considered them unnecessary. Thayn placed the sole 59' of metal railing which survived within the project at the River View Parking Area at the end of its protruding walkway. The unique monolithic rock retaining wall at this parking area is also owed the 1959 contractor, who used a derrick to place the stones.

Slight realignments and construction and reconstruction of parking areas were important elements of this project to improve a scenic drive, but most of the work consisted of rebuilding the highway. Thayn did not widen the roadway, which explains why original dry rubble masonry culvert headwalls still exist, but he did rebuild portions and resurfaced as well as seal coated the entire roadway. The fact that the original road was built to a 14' 1926 forest highway standard while reconstruction within this project resulted in an 18' roadway (plus two more feet of paved shoulders) is difficult to reconcile, unless the 1927-29 project included a wider roadbed than initially required. That may well be the case since project drawings, final quantities, and report narratives for the 1959-61 project do not mention widening nor include drainage structures. New CMP culverts would have been required if the roadbed had been widened because original structures were headwalled, not cantilevered.

The contractor did widen exceptionally narrow shoulders to bring them up to subgrade elevation, with the object of paving 20' of roadway (9' lanes plus 1' paved shoulders). To accomplish this objective, he shifted the centerline as necessary to remain exactly along the original alignment. He then removed existing surfacing and base from several sections totalling about 5,700 linear feet, and applied a special subbase in two courses 0'-9" to 1'-0" thick (mostly 1'-0") at these sections. He then placed an aggregate base in two courses, 0'-6" to 0'-8" thick, the full width of the roadway over existing surface at selected stations totalling about 4.1 miles. To prepare the roadway for surfacing, Thayn spread an emulsified asphalt grade SS-1 tack coat over existing surface, and RC-5 bituminous blotter material as a prime coat over the new base course.

Surfacing consisted of spreading 0'-3" bituminous plant-mix the full 20' roadway width, set down in two layers: a 0'-1-1/2" grader-spread levelling course topped by a 0'-1-1/2" finishing course. The entire road then received a Type 3 seal coat which included shoulders and paved gutters. The finished wearing course consisted of two 9' lanes, sloping two percent from the crown, flanked where required by Type 2 seal bituminous gutters with "machine formed and compacted bituminous dykes" (curbs). All parking areas other than that at Cape Royal (which was not touched in this project) received the same 0'-3" surfacing, as did sidewalks to a depth of two inches.[43]

As Thayn Construction Company completed the first project to reconstruct Cape Royal Road, USDI awarded the second to Carl G. Nelson Construction Company of Logan, Utah, for the low bid of $410,350.00. This project called for grading, base course, and bituminous surfacing of Cape Royal Road from its intersection with North Entrance Road at Station 143+00 to the beginning of

the previous project at Station 621+99, plus the entire 2.97-mile (with parking lot) Point Imperial spur road. The entire project measured 11.869 miles and was completed between June 1961 and October 1963 at a cost of $559,752.03, including $104,669.08 in planning, specifications, and engineering costs.[44]

No completion report was found for this project, but "as constructed" drawings reveal details of roadway reconstruction nearly identical to the 1959-61 project. Narrow shoulders were widened, special subbase 0'-9" to 1'-0" thick applied at selected stations totalling 555 linear feet, and a 0'-6" cement-stabilized base course spread over existing surface at all parking areas and selected stations of roadway, totalling about one mile along Cape Royal Road and about 3,500 feet along Point Imperial spur. Nelson then applied an emulsified-asphalt curing seal atop the base course, and Grade SS-1 emulsified asphalt over the curing seal and existing surfacing as a tack coat. Surfacing consisted of a 0'-1-1/2" grader-spread levelling course and a 0'-1-1/2" finish course, followed by Type 3 bituminous seal coat for the full 20' roadway width (9' lanes, 1' paved shoulders) and paved ditches. The entire roadway was sloped from the center crown at a 2 percent grade.[45]

Working drawings prepared in 1959 and 1960 exist for pullouts and parking areas within this project, including one within the meadow in Fuller Canyon at Station 227+00 (Meadow Pullout); atop Neal Saddle at Station 348+00 (Neal Springs Parking Area); along the descent to the Point Imperial intersection at Station 420+00 (Neal Springs Overlook); above Greenland Lake at Station 579+00 (Greenland Lake Pullout); and at the end of the Point Imperial Spur (Point Imperial Parking Area and Loop). Construction plans prepared in 1961 include these drawings, but all save the pullout for Greenland Lake were removed from later "as constructed" drawings, making it problematic whether they were constructed at this time. Pullouts and parking areas do exist approximately at these points today, but their configurations do not exactly match those depicted in the drawings, thus, the best that can be said is that they were built in 1960-63 or thereafter.[46]

Park forces completed center lane striping and preparation and placement of interpretive signs soon after the contractors finished these reconstruction projects. Between February 1961 and July 1962, crews striped the eleven miles of roadway completed by Thayn Construction. Between October 1962 and October 1963 they completed the same task for the Nelson segment. Park crews also placed traffic and informational roadway signs during these projects.[47]

Within the earlier project, park naturalists with financing from the Grand Canyon Natural History Association prepared plans and

texts and furnished illustrative materials for seven interpretive panels. Illustrator Bill Chapman of Gardiner, Montana, prepared the panels while park crews built three exhibit structures, one each at Vista Encantada, Two River Overlook (Painted Desert Overlook), and Colorado River Overlook (Walhalla Overlook). These structures with masonry bases and heavy timber and glass-enclosed cases resembled those installed along East Rim and West Rim drives during these same years, all of which still exist. Panels entitled "Forest of the North" and "Indian Country" were installed at Vista Encantada; one panel entitled "The Painted Desert" at Two River Overlook; and panels entitled "Indian Farmers of the Walhalla Glades" and "Canyon Impressions--Past and Present" at Colorado River Overlook.[48]

These two major Mission 66 projects upgraded the Cape Royal Road and Point Imperial spur road in two ways. Subgrade reinforcement with a heavier base course along with a new surface widened to 9' lanes better prepared the roadway for more, wider, and heavier vehicles of the 1960s. More pullouts and expanded parking areas with interpretive signs also addressed the needs of increasing numbers of visitors. In 1931, BPR engineers had boasted that their new road could handle annual traffic at north rim which had reached 6,000 vehicles carrying 20,000 passengers. In 1961, as reconstruction neared completion, north rim annual visitation had jumped to 175,000 visitors while 250 automobiles per day travelled the length of Cape Royal Road. Today, another thirty years later, annual visitation is creeping toward the half million mark. Despite continually increasing numbers of vehicles, Cape Royal Road, Point Imperial spur, and associated pullouts, parking areas, and interpretive structures remain basically as configured and constructed in the 1960s.[49]

Maintenance since the 1960s has consisted of spring clearance and normal upkeep through the summer season, which typically lasts from mid-May to mid-October. Each spring the GCNP road crew faces the task of first plowing whatever snow remains along North Entrance Road and Cape Royal Road, then moving equipment over from the south rim to clear roadway and ditches of debris left from winter bank slippage, rock slides, tree falls, and drainage. As at the south rim, north rim roads are patched as required and seal coated on an approximate 7-10 year cycle. In past years, the park has contracted with the Arizona Department of Transportation to do the initial snow plowing, but have recently acquired a "snow blaster" and are going to take on this task themselves.[50]

DESCRIPTION

Cape Royal Road

The 1927-31 project to construct Cape Royal Road began at Station -10+21 at the loop in front of Grand Canyon Lodge and continued north atop Bright Angel Point until descending to Thompson Canyon. This initial segment has since the early 1930s been considered the terminal portion of North Entrance Road (HAER No. AZ-43), and is described in the report associated with that road. Today, Cape Royal Road begins at the confluence of Thompson and Fuller canyons where the builders of North Entrance Road ended their work in 1930-31, forming a wye intersection. As configured in 1930-31, this intersection with center island presented motorists from the north with a fork and equal opportunity to continue to Cape Royal or Bright Angel Point. Later, this was moved several tenths of a mile to the north and reconfigured to a "T" intersection (seen today) with the main road continuing to Bright Angel Point and a 90 degree left turn required to access Cape Royal Road.

Cape Royal Road enters the portal of Fuller Canyon and rises northeasterly in gentle grades along the left side of the Fuller drainage just above the flood plain. It passes through several narrow parks (meadows) until veering to the east southeast in steep grades to ascend the divide (saddle) separating Fuller and Neal canyons, remaining to the left (north) of the divide drainage. From Neal Saddle, the roadway descends to Neal Spring, at first along a gentle easterly grade then in steep grades as it curves sharply to the north and follows the west side of Neal Canyon to the bottom at the Point Imperial spur intersection. The road then ascends the broken east slope of Neal Canyon in continuous curves and deep cuts to the neck of Walhalla Plateau. From Vista Encantada south to Cape Royal, the road penetrates more level terrain with longer tangents, first along the Canyon rim and then through Walhalla Glades, until climbing steeply the last half mile to Cape Royal parking lot. Speed limits along the entire road are 35 mph, except along many curves where the limit drops to 25 mph and the terminal switchback which is 15 mph. These are realistic speeds for this narrow and largely curvilinear road.[51]

Within the first few hundred feet from North Entrance Road, the roadway surface course is 21' wide with 10-1/2' lanes and no paved shoulders as the road passes through an open swinging gate (hinged on both sides) which is closed in winter. The asphaltic surface remains approximately 21' wide beyond the initial segment (it has been broadened informally since 1959-63 to provide a little more surface course), but lanes after a few hundred feet narrow to 9' wide with narrow paved shoulders. An interesting feature of Cape Royal Road is the rough texture of this surface course. The texture is not intentional, but the result of chip sealing where the asphaltic oil has worn away more than on most Grand Canyon roads, leaving the aggregate a bit more exposed.[52]

The rough texture not only causes more tire to surface friction, thus better traction, but viewed on a sunny day at the right angle sparkles with varied aggregate hues. The overall impact is of a bleached asphaltic surface, which is more aesthetically in tune with surrounding Kaibab Limestone formations than black bituminous roadway surfaces.

Approximately 0.3 (odometer) miles from the entrance road a bare CMP culvert without headwalls passes under the roadway. This is atypical of culvert arrangements along Cape Royal Road and a more representative culvert with a dry rubble masonry headwall is found at 0.9 miles. Here the headwall on the inflow side is very small, as many are along the road, because the roadway base is elevated very little from surrounding terrain. There is no headwall on the outlet side, just a bare CMP end section. This too is typical of all culverts along Cape Royal Road, and the reason is unknown as drainage practice (even in the 1920s) calls for some form of headwall on the outlet side of culverts unless the pipe cantilevers from the roadway. Among the dozen or more culverts studied for this report, all have dry rubble masonry headwalls on the inflow side and no walls on the outflow sides. Along fill sections, headwalls are also of dry rubble masonry and found only on the inflow side, but are larger simply because the CMP is wider and there is more room to accommodate a wall. These dry rubble masonry walls date to 1927-29 and are the oldest culvert headwalls found within the park.

At 1.3 miles from the entrance road, a small segment of stone guardrail lines the right side of the road at the onset of a narrow park. Speculatively, this rail may have been placed to prevent motorists from driving out into the meadow, perhaps along the alignment of the pioneer road to Cape Royal. Two tenths of a mile farther along, the Fuller Canyon Meadow Pullout lies on the right side amid a small stand of aspen. This pullout as mentioned earlier dates to the early 1960s or thereafter. It is surfaced in asphalt, lined with asphaltic curbing, and allows perhaps five or six automobiles to parallel park. There are no other structures at this site other than two metal trash cans, but the pullout offers wonderful views of the meadow and timbered canyon slopes.

The road leaves the Fuller Canyon drainage and ascends more steeply to the divide, on top of which to the right is the Neal Springs Parking Area. Drawings discussed earlier date this parking area to the 1960s or later. It is comparatively small, with an asphalt surface and adjacent asphalt walkway, the purpose for which is unknown since it leads nowhere and there is no scenic view. There are also no developments at this point, and during summer 1994 the pullout itself is blocked off with large boulders.

As the roadway descends from Neal Saddle along a more or less east facing slope, roadside vegetation creeps right up to the asphaltic wearing course. This is an effect desired of early national park roads but not always achieved. Along Cape Royal Road, vegetated shoulders do well where the road follows east or north facing slopes or where the roadway is shaded by canyon slopes or thick stands of trees. These shoulders continue as the road descends steeply then turns sharply to the north, plummeting along the west slope of Neal Canyon to the Point Imperial intersection. Although contractor B.B. Boyd graded 80 percent of this slope without the aid of dynamite, the motorist certainly understands he is following a grade cut out of the mountainside. The speed limit reads 25 mph and the steep downslope and deep canyon are clearly visible.

Park forces placed peeled-log guardrails along this down grade and up the other side as far as Vista Encantada in 1937, but today there is only a segment of wooden posts with reflectors lining the outside of the first curve--a visible warning but no protection. Park personnel have commented that log rip rap lines portions of the downslope through this segment, but the author did not look for these structures. When studying the descent (a tourist would not notice), one does get the feeling that the roadway is somehow insecure along this downgrade, as if it would have been better had Boyd excavated to solid rock. The embankment along the left side is high, steep, and... what holds it up there if it is not solid rock?

At 5.2 miles from the entrance road, a small asphalt-surfaced pullout with asphaltic curbing is noted on the right, perhaps the Neal Springs Overlook pullout designed ca. 1960 and installed some time thereafter. The speed limit accelerates to 35 mph at this point, but the wye intersection with Point Imperial spur is reached only 0.2 mile farther along. The intersection takes up the entire width of Neal Canyon with a wye configuration and central island of native grasses. The current appearance is owed park forces of 1932 who used heavy equipment to excavate and grade a relatively flat confluence of the two roads. The extant wye intersection is rare for modern Grand Canyon National Park roads.

As the road begins to ascend the east side of Neal Canyon, one notes immediately a small segment of stacked-stone retaining wall on the right which reveals an old road heading down the canyon to a small tank (pond) near Neal Spring. At one time, the pioneer road from Bright Angel Point passed along this line and on toward Point Imperial. In the late 1920s, contractor B.B. Boyd set up his construction camp near the spring. In May 1933, the first company of the Civilian Conservation Corps to arrive at north rim established their camp here. Later, the NPS developed a tourist

campground at this point. All of these camps may have occupied the same space near this uncommon, easily-accessible surface water source, but the author did not investigate the possibility. Today, nothing visible from Cape Royal Road remains at this historic spot save the fragment of wall and tank.

From the Point Imperial intersection, Cape Royal Road ascends the eastern slope of Neal Canyon in a continuous curvilinear line as it wends its way up to the neck of Walhalla Plateau. The asphaltic surface remains approximately 21' wide with 9' lanes, while vegetation (mostly grass and ferns) creeps up to the very lip of its raveled edges. Steep, thickly-vegetated upslopes are generally on the left, but the roadway sometimes exhibits deep cuts through the sedimentary rock exposing cliffs on both sides. This is the steepest segment of Cape Royal Road (other than the terminal segment) and the most dangerous with its numerous sharp blind curves and relatively narrow lanes. Painted white shoulder lines and yellow center line have 0'-2" reflective rubber pads to warn motorists from straying out of bounds, but are of little note to motorhomes and automobiles whizzing around curves above posted 25 mph speed limits. Several segments of wooden posts with reflectors line the outside of the road in especially sinuous segments, but these too are simply warnings.

Cape Royal Road finally approaches its purpose as a Canyon rim drive at Farview (Station 499+50) about 1.1 miles beyond Point Imperial intersection, but there is no longer a parking loop or pullout at this point. The general location of this former scenic viewpoint is given away by a small pullout on the right with a trailhead sign (Ken Patrick Trail). Here the road has achieved the Walhalla Plateau's elevation, and the roadway on to Vista Encantada, although still curvaceous and hilly, maintains a relatively even grade. Half a mile from the trail sign, a dirt road leads off to the left a short distance to a site apparently used by today's road crews. From narrative reports, it appears certain this was also the site of the 1930-31 Lord & Bishop construction camp and quarry.

The road continues through sharp curves and a few high narrow cuts along the neck of the plateau to the small Greenland Lake pullout about 2.7 miles from the Point Imperial intersection. Park naturalists in the 1950s and 1960s envisioned a prominent interpretive pullout here. Downslope about fifty yards there is a small sinkhole in the Kaibab Limestone known as Greenland Lake, which was used by cattlemen before the turn of the century. A small cabin once stood nearby (perhaps still does, the author did not see it) which cattlemen used for salt storage and overnight shelter. Today, the small pullout accommodates only three or four vehicles, but there is an adjacent interpretive sign describing the Karst topography of the Kaibab Plateau.

The first developed Canyon rim scenic viewpoint and parking area along Cape Royal Road is reached at Vista Encantada, about 4.7 miles beyond the Point Imperial spur. This viewpoint is developed much as the others from this point to Angel's Window pullout with asphaltic surface, curbing, and walkway. There are no railings, retaining walls, nor parapets except for a very low dry rubble masonry retaining wall near the base of the cement masonry and wood interpretive sign (built in the early 1960s). The splendid near view of the Canyon and distant eastern view as far as Navajo Mountain are welcome relief from the miles of twisting roadway just travelled. The parking lot extends to a small picnic area on the southeast, but does not allow egress back to the roadway here as one would expect of a loop parking configuration. As noted earlier, an exit was specified in construction drawings, but apparently never built or has since been closed and landscaped.

From Vista Encantada southeast for several miles the road remains close to the Canyon rim, although there appears to have been no historic nor recent attempts to clear the vegetation to obtain scenic vistas. Opportunities to glimpse the Canyon are in fact fewer than along south rim's East Rim Drive. The roadway surface remains 20'-21' wide with 9' lanes as the alignment achieves a few long tangents through slightly more open and level terrain. Paved gutters with asphaltic curbs are noted along the roadway as are a few additional low dry rubble masonry culvert headwalls. Paved gutters contiguous with the roadway are, in fact, common along the entire Cape Royal Road where grades exceed a few percent, and all exhibit asphaltic (not masonry nor concrete) curbing.

Painted Desert Overlook is reached 1.8 miles beyond Vista Encantada. This is a true loop parking area with a landscaped island separating parking from the main roadway and entrances/ exits at both ends. This too exhibits the standard reconstruction of the early 1960s with asphaltic surface, curbing, and walkway (5' wide); masonry and wood interpretive monument and glass-encased sign; no railings, retaining walls, nor parapets. It is a small pullout on the left (Canyon) side of the road with room for perhaps five or six vehicles to parallel park.

A couple miles beyond Painted Desert Overlook, Cape Royal Road pulls away from the Canyon rim and follows a line more directly south along the east side of Walhalla Glades. Although still forested through this segment, underbrush diminishes, plateau terrain is relatively level, and a series of long tangents are obtained. A small pullout (right side) with asphalt surface and curbing is passed 2.1 miles beyond Painted Desert Overlook at the beginning of another series of tangents broken by slight curves. At a fill section 5.8 miles beyond the last overlook, one of the

larger dry rubble masonry culvert headwalls found along the road, measuring 7' long x 4' high x 2' thick, protects a 30" CMP culvert at the bottom of a shallow drainage. The road's surface course through Walhalla Glades narrows a little to 20' wide with 8-1/2' lanes.

At a point approximately six miles beyond Painted Desert Overlook, the road leaves the glades as it again approaches within 30'-40' of the Canyon rim. Here the road curves sharply to the right without affording scenic views and rises steeply 0.4 miles to the Walhalla pueblo ruins thirty yards right of the road. A few hundred feet farther, the Walhalla Overlook is reached on the left. This is the largest parking area along the entire road (except at the end), but it is configured much like the last with asphaltic surface, curbing, and walkway (7' wide); masonry and wood interpretive monument and glass-encased sign; and no masonry walls nor parapets. The distinguishing feature of this overlook (aside from the scenery) is the massive boulder retaining wall fronting the parking lot, also placed within the 1959-63 reconstruction projects. A combination of magnificent views down to the Colorado River at Unkar Delta (with its extensive Kayenta Anasazi pueblo sites) plus the nearby ruins makes this a popular interpretive stop on the way to Cape Royal.

The pre-1929 pioneer scenic road to Cape Royal probably did not reach far beyond the Walhalla Overlook as the terrain begins to discourage any type of vehicular travel. For 0.9 miles the road exhibits deep cuts and accompanying sharp curves through Kaibab Limestone until reaching a small pullout on the left which affords a close picturesque view of the massive natural arch called Angel's Window. Cliff Spring Trail begins at this point across the road. This pullout, which is nothing more than a thin slice of asphalt fronted by an asphalt curb and walk, is found on the outside of a narrow curve where the roadway immediately starts up on its final climb to Cape Royal.

Road engineers saved the greatest piece of work for last as the remaining 0.6 mile segment of roadway employs a double switchback and steep final tangent to achieve the parking lot short of Cape Royal. Lang Transportation Company blasted their way up this final obstacle in 1928-29, and lost a power shovel over the side for their efforts. The initial switchback climbs to the west with a string of wooden posts and reflectors and a segment of original stone guardrail on the outside (right). It then uses a deeply-excavated tight radius curve to the left with a posted 15 mph speed limit to continue upward in an easterly direction. Along this second switchback, several long segments of W-beam and post guardrail line the outside (left) as the road curves into the final tangent with stone guardrail on the outside (left).

The road ends at the beginning of the loop parking area atop the final reach of Walhalla Plateau.

Today's parking area is basically the same as constructed by Lang Transportation Company and Lord and Bishop in 1929-31. Broad parking lanes are surfaced in crushed aggregate and lined with the original stone guardrails. A 6'-wide asphaltic walkway lined with stones placed carefully end to end begins at the parking lot and continues perhaps 1/4 mile or more to Cape Royal. Signs point out various vegetation types along the way. Some half-log benches dating to the CCC are found along the walk and at Cape Royal Overlook. An asphaltic walkway spur leaves the Cape Royal walk about half way along and leads to the top of Angel's Window.

Point Imperial Spur

Point Imperial spur begins at the intersection described earlier and continues 2.9 miles up Neal Canyon and along the highest northwestern edge of Nankoweap Canyon to Point Imperial at an elevation of 8803'. For its entire length the surface course resembles the rough aggregate seal coat described for Cape Royal Road and remains roughly 21' wide with 9' lanes. Every foot of the way is uphill, occasioning many drainage culverts with dry rubble masonry headwalls (inflow side only) dating to the late 1920s. Speed limits range from 35 mph along the initial tangent to 25 mph at the many curves thereafter.

The roadway starts out on the right (east) side of the drainage, at first just above flood level but steadily ascending along the east canyon slope in a fairly straight line such that upslope cuts are on the right and downslope embankments on the left. After 0.6 miles, the road begins to curve east and leave Neal Canyon as it crosses to the left side of another drainage then passes through a deep cut and fill area. From this point, the road is cut into the left (north) side of canyon slopes and its narrow shoulders are virtually unseen for the thick vegetative cover.

The sole pullout afforded by Point Imperial spur is reached two miles along the roadway on the right. At this point a fine view of Nankoweap Canyon might be obtained except for the thick undergrowth between the road and canyon edge. The pullout itself is only a narrow asphaltic extension of the roadway surface with room for a few vehicles to parallel park. Just beyond the pullout the road passes through a heavily excavated area with a deep cut and sharp curve. Soon thereafter the road loops one way to the right and reaches the scenic viewpoint's long parking lot fronting the Canyon rim. The loop continues beyond the parking then curves continuously left until regaining the spur road. The

Saddle Mountain and Nankoweap trails can be accessed from the north side of the parking loop.

As far as parking lot features are concerned, Point Imperial is the most developed of the scenic viewpoints along the Cape Royal Road. The diagonal parking which faces the Canyon is fronted by asphaltic curbing with a 7'-wide asphalt walkway which runs the entire length of the lot. The Canyon side of the walkway is delineated by a crudely-mortared cement rubble masonry wall which is topped by a wooden rail fence. The wall varies from 0'-6" to 1'-0" in height. The fence consists of rounded posts 2'-10" to 3'-0" high, spaced at 8' centers, and mortared directly into the masonry wall with two rounded wooden rails, all painted brown. A three rail wooden fence runs perpendicular from near the end of the masonry wall east toward the Canyon for about 35 feet.

The intent of the two fence segments is to funnel visitors to the north side of the lot, then down a 6'-wide asphaltic walkway lined with unmortared stone curbing to Point Imperial itself. As the walkway approaches the point it descends in a modern segment (1950s or later) of concrete steps lined with metal hand rails to the final asphaltic pad at the point. This pad is surrounded by the older style, curved metal guardrails seen at scenic points along south rim's West Rim and East Rim drives. Most of the viewpoint's structures likely date to early 1960s reconstruction efforts along Cape Royal Road, but the last mentioned railings, masonry wall, and half-log bench east of the fence may date to the 1930s.

SIGNIFICANCE/CONCLUSIONS

Cape Royal Road is significant as an early example of the cooperative agreement between the National Park Service and Bureau of Public Roads (Federal Highway Administration) to build quality automotive roads within the national parks. It is one 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 1927-31 projects were few, they survive in the many dry rubble masonry culvert headwalls, stone guardrails, and essential roadway alignment.

Cape Royal Road also achieves significance as an example of scenic roads deliberately constructed without scenic vistas. This road can be compared with East Rim and West Rim drives on Grand Canyon's south rim which the NPS/BPR designed for similar purposes but constructed and reconstructed differently based on topographical and usage differences. All were built as interior roads with pullouts, spurs, and parking loops to serve alternate

purposes as scenic highways. In age and length Cape Royal Road resembles East Rim Drive, yet the former must overcome rugged north rim terrain to achieve and hold the Canyon edge while the latter easily touches upon more than a dozen scenic viewpoints all along its length. Too, the former remains a dead end scenic highway with comparatively minor use, thus retains its original narrow sinuous path and most of its historic structures. East Rim Drive quickly became an alternate south rim access highway and in the process of reconstruction and realignment lost many of its associated historic structures. West Rim Drive like Cape Royal Road has remained a dead end scenic highway, and although traffic numbers have increased over the years, has been able to retain its original narrow alignment and therefore most associated structures.

As differently as these three roads have evolved, they clearly emerge from the same basic ideas of pioneer tourism operators, U.S. Forest Service planners, and 1920s and 1950s National Park Service administrators and landscape engineers. Cape Royal Road and Point Imperial spur reflect the goal of an unobtrusive road passing through natural landscape unmarred by road construction. Although lacking prominent masonry structures along the roadway and for the most part at scenic points, this conforms to the north rim landscape which is noticed more for its thick stands of aspen, fir, and pine; comparatively heavy undergrowth and deeper (though not deep) topsoil; and few natural rock outcroppings along the roadway. Masonry structures within this environment might confirm opinions of 1950s NPS landscape architects that the rustic style is simply a romantic affectation.

Cape Royal Road also conforms to the basic idea of moving the motorist along without "distracting" vistas while providing one scenic spur road with a developed viewpoint at its end and several scenic pullouts and parking areas. The number of these spurs, pullouts, and parking areas is fewer than along south rim roads and could be increased with spurs to points such as Atoko and Naji points and Cape Final. More Canyon-side pullouts could easily be developed at locations south of Vista Encantada. But these developments would only be extensions of the same basic concept, which precludes road alignments too close to the Canyon edge as well as rim-side clearing which would afford the passing motorist brief glimpses of the chasm. At Grand Canyon National Park, motorists ironically walk to admire the views found along its scenic drives.

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 the Big Saddle Hunting Camp on the north rim, and others who the author has interviewed in Fredonia and Kanab, talk about doing their driving early on cold autumn and spring mornings to take advantage of the 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 early roads in the Zion-North Rim area.

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 the Grand Canyon Lodge (and was there when it burned down) recalled nothing of the Cape Royal Road but remembered the pioneer entrance road as early as 1916 when she and her husband made their first automobile trip and spent the first night with Uncle Jimmy Owens.

4. Elizabeth Wylie McKee to the Director, letter, 23 November 1926; Elizabeth Wylie McKee to J.R. Eakin, letter, 17 August 1924; J.R. Eakin to the Director, letter, 10 January 1925; all in Reference File--"Wylie Way" Camp, GCNPL.

5. Elizabeth McKee letter, 17 August 1924; Elizabeth Wylie McKee to the Director, letter, 8 January 1925; both in Reference File--"Wylie Way" Camp, GCNPL; J.R. Eakin to C.C. Parry, letter, 29 December 1926, Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL.

6. See Superintendent's Annual Report, 1926-27, which notes that a contract was signed with the Utah Parks Company in June 1927 to develop north rim. This contract reflects tourist traffic and road improvements in progress which met the Union Pacific's conditions for development. The McKees would operate their camp until June 1927 at which time Utah Parks took over its management.

7. See HAER No. UT-72 for the development of regional roads in southeast Utah and the Arizona Strip as well as the relationship between the Union Pacific, NPS, and BPR during this development period. All railroad concessioners pressured the NPS to build better roads before they themselves would invest millions in tourism infrastructure.

Many letters within Reference File--"Wylie Way" Camp, GCNPL, reveal the McKees' perfect understanding that they would ultimately

be replaced. The same had happened to Elizabeth McKee's father, W.W. Wylie (who developed the Wylie Way tent-cabin type of park tourist camp at Yellowstone) at Zion NP, where he had been replaced by the Union Pacific in 1924-25.

Although Stephen Mather insisted that small tourism operators ultimately be replaced by wealthy monopolies, and this caused hardship for small operators and bitterness among many, he was--in this author's opinion at least--an honorable man who ensured that the Utah Parks Company bought out the McKees and paid them a fair price. He had done the same for Wylie at Zion and Bill Bass at Grand Canyon's south rim. The McKees, who applied directly to Mather for their permit each year and corresponded regularly, understood the situation and appear not to have reacted with bitterness when they were bought out in 1927-28.

8. Eakin to Mrs. Thomas H. McKee, letter, 12 May 1924, Reference File--"Wylie Way' Camp, GCNPL.

9. Eakin to the Director, letter, 18 July 1925, Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL; Eakin to Thomas McKee, letter, 21 July 1925, Reference File--"Wylie Way" Camp, GCNPL.

McKee, of course, did not like this plan because it would allow tourists to go in two of three directions without reaching his camp at B.A. Point. It is unlikely, however, that his objection influenced the NPS decision to abandon this survey.

10. L.I. Hewes, BPR Deputy Chief Engineer, to H.K. Bishop, BPR Construction Chief, letter, 27 April 1926, Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL; Superintendent's Annual Report, 1926-27, notes that House Bill No. 9916, passed 25 February 1927, expanded the northern section of the park by 73 square miles. It is unclear whether this included the national forest segment north to Little Park, but in any event, the road was resurveyed.

11. USDA, BPR, "Location Survey Report on the Bright Angel-Cape Royal Highway, Grand Canyon Route 3," by D.G. Evans, 1927, Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL.

12. USDA, BPR, Location Survey Report, 1927. Note that the old entrance road alignment was different than that seen today. It used to leave today's alignment as the road comes down from the south to Thompson Canyon and continued generally along today's road to the Widforss trailhead area, then swung northward, paralleling today's road where it came out at Lindberg Hill. The old alignment today is a utility corridor, still visible for its tree-less line, and accessible by a dirt road.

13. USDA, BPR, Location Survey Report, 1927.

14. USDI, NPS, "Bid and Contract for National Park Road Construction, Project North Rim--Grand Canyon National Park Highway System, 3A and 3C," 1927, Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL.

15. USDI, NPS, "Plans for Proposed Project 3-A1-A2-B-C-D, Surfacing Sections A, B, C and D, Route No. 3--Bright Angel Point-Cape Royal," title sheet, 1929, Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL.

16. USDA, BPR, "Final Construction Report (1927-1929) on Fuller Canyon-Far View and Point Imperial Sections, Bright Angel Point-Cape Royal Route, Project 3-A1, B, D, Grading, Grand Canyon National Park Highway System," by R. Thirion, 1930, Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL.

17. USDA, BPR, "Final Construction Report (1927-1929)." Acceptance letters from Langley and Tillotson as well as project cost and quantities information are attached to this report.

18. USDA, BPR, "Final Construction Report (1928-1929) on Bright Angel Point-Cape Royal Project 3-A2, C, Grading, Grand Canyon National Park Highway System," by R. Thirion, 1930, Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL.

19. USDA, BPR, "Final Construction Report (1928-1929)."

20. USDI, NPS, "Cape Royal Parking Area," by the NPS Landscape Division, construction drawing, 6 June 1929, copy in Professional Services, GCNP; C.H. Sweetser to Tillotson, letter, 12 August 1929, Misc Construction D30-B.A. Cape Royal Road, 1925-, GCNPL.

21. Sweetser to Tillotson, telegram, 18 October 1929; Sweetser to Tillotson, letter, 5 November 1929; both in Misc Construction D30--B.A. Cape Royal Road 1925-, GCNPL. See also USDI, NPS, "Plans for Proposed Project 3-A1-A2-B-C-D, Surfacing Sections A, B, C, and D, Route No. 3--Bright Angel-Cape Royal," project drawings, [1930], Sheet 4, which indicates the stone guard rail.

22. Salaries obtained from the final construction reports noted above.

23. USDA, BPR, "Final Construction Report (1927-1929)"; Superintendents' Annual Reports, 1925-28. 14,557 visitors in 4,682 automobiles arrived at north rim in the 1928 travel season.

24. USDI, NPS, "Bid, Contract, and Bond for National Park Road Construction, Grand Canyon National Park, Route No. 3, Bright Angel Point-Cape Royal, Project 3A1, A2, B, C, D," 1929; USDA, BPR, "Final Construction Report on Bright Angel Point-Cape Royal

Highway, Grand Canyon Project 3-A1, A2, B, C, D Surfacing," [1932]; both in Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL.

25. USDI, NPS, "Bid, Contract, and Bond, 1929."

26. USDI, NPS, "Bid, Contract, and Bond, 1929."

27. USDA, BPR, "Final Construction Report, [1932]."

28. USDA, BPR, "Final Construction Report, [1932]."

29. Tillotson to the Director, letter, 19 June 1931; Demaray to H.K. Bishop, BPR Chief of Construction, letter, [June 1931]; both in Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL.

30. USDA, BPR, "Final Construction Report, [1932]."

31. Tillotson to Sweetser, letter, 11 September 1931, Misc Construction D30--B.A. Cape Royal Road 1925-, GCNPL.

32. Tillotson to the Director, letter, 12 September 1931, Misc Construction D30--B.A. Cape Royal Road 1925-, GCNPL.

33. Tillotson, memorandum for the files, 29 September 1931; Tillotson to the Director, letter, 26 October 1931; Tillotson to Sweetser, letter, 21 March 1932; Sweetser to Tillotson, letter, 25 March 1932; all in Misc Construction D30--B.A. Cape Royal Road 1925-, GCNPL.

34. Tillotson to Sweetser, letter, 15 June 1932, Misc Construction D30--B.A. Cape Royal Road July 1925-, GCNPL.

35. Superintendent's Annual Report, 1932-33.

36. Superintendent's Annual Reports, 1932-37. Superintendent Tillotson made it a point to list the various ongoing projects within GCNP and his annual reports contain much more information than is included in this report.

37. USDI, NPS, "Final Construction Report on Project No. 507, Guard Rails--Force Account," by C.M. Carrel, 30 August 1938, Misc North Rim Roads--Final Reports 1932, 1938, 1940, GCNPL; Superintendent's Annual Report, 1936-37; USDI, NPS, "Guard Rails--Cape Royal & North Entrance Road," construction drawing (1 sheet), July 1937, NPGC-2050, copy in Professional Services, GCNP.

The construction report mentions the rails being erected in "four locations." The construction drawing indicates nine rail segments totalling over 3,500' in what might be considered four distinct locations. All nine rails were likely constructed.

38. USDI, NPS, "Final Construction Report, 30 August 1938"; USDI, NPS "Job Application and Completion Record, Seats (construction), Job 152-721," 25 April 1938, GRCA 61773, Box 4, GCSC; Superintendent's Annual Report, 1938-39.

39. Superintendents' Annual Reports, 1941-45.

40. Superintendents Annual Reports, 1945-53, were researched for the preceding paragraphs. Very little is mentioned of roads, as park administration coped with other problems brought on by the explosion in visitation. The author also researched GCNP files which contain road reports and found nothing more in relation to north rim roads until the late 1950s.

41. Department of Commerce (DOC), BPR, "Final Construction Report, Grand Canyon National Park 3-B6, Cape Royal, North Rim, 1959-1961," 1961, GRCA 61773, Box 5, GCSC; USDI, NPS, "Cape Royal Road, Routes 3-A, B, C Reconstruction Including Parking Areas," tally of costs, 25 July 1961, GRCA 61773, Box 5, GCSC.

42. DOC, BPR, "As Constructed Plans for Project 3-B6, Route No. 3--Cape Royal Road," as constructed drawings (32 sheets), revised February 1962, Drawing No. 113/41,917, copy in Professional Services, GCNP.

43. DOC, BPR, "Final Construction Report, 1959-1961"; USDI, NPS, "As Constructed Plans, February 1962."

44. USDI, Information Service, "Contract Awarded for Reconstruction and Paving of Grand Canyon National Park Roads, " press release, 21 June 1961, Reference File--Roads, GCNPL; USDI, NPS, "Cape Royal and Point Imperial Roads, Routes 3-A, B, C, Reconstruction and Surfacing (Compl.)," expense tally and day labor summary, October 1963, GRCA 61773, Box 5, GCSC.

45. USDI, NPS, "As Constructed Plans for Project 3-A6, B7, C5, Route No. 3--Cape Royal Road," construction drawings (12 sheets), revised as constructed February 1963, Drawing No. 113/41,900, copy in Professional Services, GCNP.

46. USDI, NPS, "Roadside Parking Areas, Cape Royal Road Route 3," working drawings (6 sheets), April 1959, NPGC-3411; and USDI, NPS, "Point Imperial Parking Area, Cape Royal Road--Route 3," elevation and profile drawing, August 1960, NPGC-3501; copies of both in Professional Services, GCNP.

47. USDI, NPS, "Traffic and Interpretive Signs and Striping, Rts. 3A, B, C (Por.)," summary report, July 1962; USDI, NPS, "Cape Royal and Point Imperial Roads, Routes 3-A, B, C, Reconstruction and

Surfacing (Compl.)," day labor summary and cost tally only, October 1963; both in GRCA 61773, Box 5 and 6, GCSC.

48. USDI, NPS, "Traffic and Interpretive Signs, July 1962."

49. Vernon Ruesch, North Rim District Ranger, to Chief Park Ranger, memorandum, 5 February 1962, Gen. Admin.--N. Rim Gen. Operations & Annual Reports, GCNPL.

50. Joe Bice, GCNP Roads Supervisor, interview with author, 28 July 1994, tape recording.

51. The following descriptions are based on the author's field observations during summer 1994 unless otherwise noted.

52. Joe Bice interview, 28 July 1994.

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Anderson, Michael F. Field observations, notes, and photographs, June - August 1994.

Bice, Joe. Interview by author, 28 July 1994, Grand Canyon National Park. Tape Recording.

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Mattoon, W.R. "A Working Plan for Grand Canyon National Monument, 23 June 1909." Professional Services, GCNP.

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USDA, BPR. "Final Construction Report on Bright Angel Point-Cape Royal Highway, Grand Canyon Project 3-A1, A2, B, C, D Surfacing [1932]." GCNPL.

USDA, BPR. "Final Construction Report (1928-1929) on Bright Angel Point-Cape Royal Project 3-A2, C, Grading, Grand Canyon National Park Highway System, 1930." GCNPL.

USDA, BPR. "Final Construction Report (1927-1929) on Fuller Canyon-Far View and Point Imperial Sections, Bright Angel Point-Cape Royal Route, Project 3-A1, B, D, Grading, Grand Canyon National Park Highway System, 1930." GCNPL.

USDA, BPR. "Location Survey Report on the Bright Angel-Cape Royal Highway, Grand Canyon Route 3, 1927." GCNPL.

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USDI, NPS. "As Constructed Plans for Project 3-A6, B7, C5, Route No. 3--Cape Royal Road, February 1963." Professional Services, GCNP.

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

Reference File--Roads

Reference File--"Wylie Way" Camp

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HISTORIC AMERICAN ENGINEERING RECORD

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CAPE ROYAL ROAD
(Grand Canyon Route #3)
(Point Imperial-Cape Royal Road)
Between Cape Royal and Point Imperial
Grand Canyon National Park
Coconino County
Arizona

HAER No. AZ-40

Brian C. Grogan, photographer, 1994

AZ-40-1 CULVERT ON CAPE ROYAL ROAD, NORTH RIM, .5 MILE FROM INTERSECTION WITH NORTH ENTRANCE ROAD, FACING NE.

AZ-40-2 CAPE ROYAL ROAD VIEW. POST ON RIGHT SIDE OF ROAD, CENTER OF IMAGE, MARKS CULVERT LOCATION. FACING SSW.

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