

HAER
ARIZ
3-GRACAN,
11-

WEST RIM DRIVE
(Grand Canyon Route #8)
Between Grand Canyon Village
and Hermit Rest
Grand Canyon National Park
Coconino County
Arizona

HAER No. AZ-42

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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

HAER
ARIZ
3-GRACAN,
11-

HISTORIC AMERICAN ENGINEERING RECORD

WEST RIM DRIVE
(Grand Canyon Route #8)
(~~Hermit Rim Road~~)
HAER No. AZ-42

Location: The approximate 7.1-mile scenic road begins within Grand Canyon Village at its intersection with Village Loop Drive and continues west along the Grand Canyon rim to Hermit Rest, Coconino County, Arizona.

UTM A: 12 3990690 396800 /Village Loop Int.
UTM B: 12 3991320 391060 /Hermit Rest Park.
Grand Canyon, Arizona USGS Quadrangle, 1988

Date of Construction: 1934-35

Type of Structure: Scenic roadway

Use: Scenic roadway

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

Builders: G.R Daley, Vincent & Pringle, Phoenix, AZ

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 quality automotive roads within the national parks. Extant features of West Rim Drive representative of these early efforts include pullouts, parking areas and road spurs which offer scenic views; easy road grades; minimal landscape scarring; and rustic style culvert headwalls and retaining walls. The entire road retains its 1935 alignment.

Project Information: Documentation of West Rim Drive is part of the NPS Roads and Bridges Recording Project, conducted in the summer of 1994 under the co-sponsorship of Grand Canyon National Park and HABS/HAER. This report was researched and written by Michael F. Anderson, HAER Historian, September, 1994.

INTRODUCTION

The 7.1-mile West Rim Drive begins at the western edge of Grand Canyon Village and runs west, generally along the Canyon rim, to Hermit Rest. Completed in 1935, it replaced the park's earliest paved scenic wagon road, the Hermit Rim Road, built by the Santa Fe Land Improvement Company in 1911-13. West Rim Drive allows access to numerous views into Grand Canyon, including major parking loops at Powell Memorial, Maricopa Point, Hopi Point, Mohave Point, Pima Point, and Hermit Rest.

HISTORICAL CONTEXT

When the National Park Service assumed management of Grand Canyon National Park in 1919, they inherited a network of insufficient, 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 park boundaries at best resembled approach and entrance roads; at worst, they were bridle paths, widened mostly through the passing of tourist operators' buggies. Summarily, the typical park road in 1919 was an 8'- to 12'-wide, sinuous set of wagon tracks through terrain spotted with dense ponderosa pines, shallow but steep gullies, and frequent outcroppings of Kaibab Limestone. All were dusty in summer and impassable in winter or following any measurable rain.¹

Hermit Rim Road represented the single exception to this stereotype. It had been built in response to tourists' desire to access scenic points along the south rim of the Canyon to the west of the emerging Grand Canyon Village. Early tourism operator Sanford Rowe had worn a trail to the head of the inner-Canyon Bright Angel Trail and to Rowes Point (later renamed Hopi Point) in the 1890s. Another tourism operator, Martin Buggeln, built a short wagon road from his Bright Angel Hotel (at the site of today's Bright Angel Lodge) to Hopi Point about 1898. The Santa Fe spent \$8,000.00 to improve this scenic spur for its concession partner, the Fred Harvey Company, in 1907-08. After 1908, tourist guides used this road to take customers as far as Hopi Point, and followed another path up Shoskey Canyon to reach viewpoints at Mohave Point and the Abyss.²

With tourist numbers and demands for west rim access increasing in the first decade of the twentieth century, the Santa Fe--which had completed its 65-mile spur railroad to the south rim in 1901 and capitalized Fred Harvey's concession ventures since 1904--decided in 1909 to build an inner-Canyon trail leading to a new hotel within Hermit Basin. The U.S. Forest Service, managers of

Grand Canyon National Monument at the time, issued a special use permit to the Santa Fe Land Improvement Company to build the hotel, trail, rest stop atop the rim (Hermit Rest), and a new road which would connect the facilities to Grand Canyon Village. Despite the protests of a half-dozen small tourism operators, and legal obstacles thrown up by Ralph Cameron--who operated Cameron's Hotel & Camps near the Bright Angel Hotel and held a number of dubious mining claims in the proposed roadway's path--the Santa Fe immediately went to work on its improvements.³

The new Hermit Rim Road, surveyed in 1909 and graded and paved during the years 1911-13, was nearly 15 years ahead of its time for Grand Canyon road construction. The Santa Fe worked with the U.S. Forest Service and landscape architect George E. Kessler to survey the best scenic viewpoints and to carefully open up vistas through the trees by brush clearing. They then contracted with L.J. Smith Company of Kansas City to grade the road along with several miles of village roads for a reported \$250,000.00--an unheard of sum for ten miles of roadway in those years (Hermit Road itself was 7.9 miles long). Mr. O.O. Farmer of Phoenix completed a macadam surface in 1912-13 for \$4,500.00 per mile. The macadam was composed of volcanic cinders (plentiful in northern Arizona) and road oil of 95% asphaltic content, with a top course of oil and crushed limestone passing a 1/4-inch mesh. Upon completion in August 1913, Grand Canyon National Park had its first all weather road.⁴

Although one of the finer regional wagon roads, better constructed than the transcontinental National Old Trails Highway (U.S. 66) to the south, the Hermit Rim Road was unfortunately built for wagons at the dawn of the automobile era. Surface and subgrade held up well to horse-drawn vehicles, but the builders had not anticipated more and heavier machines operating at higher speeds along its 12'-wide roadway. When the NPS assumed responsibility for the road in 1919, and in the same year allowed automobiles onto it for the first time, the surface quickly deteriorated. In 1920, Park Superintendent W.H. Peters noted that maintenance crews were at work repaving the roadway, but that it would eventually have to be rebuilt to modern automotive standards which were emerging by the late 1910s.⁵

NPS forces paid especial attention to the maintenance of the Hermit Rim Road through the 1920s. They "reconstructed" about 1/3 of its length in 1922 and purchased equipment to do more. Repaving projects were undertaken in 1921, 1923, and most other years. Park forces occasionally repaired shoulders and gradually widened the roadway to fourteen feet.⁶ Because it was the best of the park's roads during these years, however, and superintendents had to contend with some 150 miles of other



Figure 1. The new macadam road built by the Santa Fe Land Improvement Company in 1911-13. This photograph is dated 5 December 1911. (GRCA Image #9605, GCSC)



Figure 2. Three horse-drawn Fred Harvey tour coaches on Hermit
Rim Road ca. 1915. (GRCA Image #5428, GCSC)



Figure 3. NPS allows automobiles on the old Hermit Rim Road in 1919. These autos are ascending Hopi Hill ca. 1920. (GRCA Image #5426, GCSC)

approach, entrance, and scenic roads (all of them dirt), Hermit Rim Road awaited the middle 1930s for replacement as more pressing transportation needs were addressed. Completed in 1935, the new West Rim Drive (Grand Canyon Route #8) was the last of the major automotive roads constructed within Grand Canyon National Park.

HISTORY OF THE STRUCTURE

Location and Survey

GCNP Superintendent Minor R. Tillotson (1927-1939) juggled five major road construction projects in 1928, but had the energy (and temerity) in that year to ask for funds to survey a new road to Hermit Rest. NPS Chief Engineer Frank A. Kittredge demurred, explaining that survey costs were mounting in these hectic years of national park road construction, and that a survey should be postponed until the service programmed funds for construction.⁷ Three more years passed before BPR engineers came to the Canyon and began the reconnaissance for a long-awaited replacement to Hermit Rim Road.

BPR Associate Highway Engineer W.R.F. Wallace and Senior Engineering Aid F.H. Horton performed the reconnaissance in July 1931, setting in motion the survey and review process which would continue for another three years. These men began a preliminary location at a point adjacent to the old Fred Harvey Garage (today's Grand Canyon Lodges' administrative offices) and continued approximately 1/2 mile north of the railroad tracks to the western edge of Grand Canyon Village. This section of road, which extended from Station -1+00 to Station 28+00 of the 1934-35 construction project, is today considered a portion of Village Loop Drive. In 1931, the concept of a "village loop" had not been developed, and this first half-mile segment was simply considered a replacement for the 20-year-old road segment which left the railway depot below the El Tovar Hotel and continued west past the Bright Angel Lodge to the public campground turnoff.

Landscape considerations, uppermost in NPS road building minds in the 1920s and 1930s, influenced Wallace and Horton to plot a line which followed the existing road as closely as possible. New alignments were necessary, however, especially in the first two miles through the village and up Hopi Hill until the upper rim area had been reached. The old alignment ascended in a sharp grade to the slope immediately below the El Tovar, then descended to today's grade immediately below the Colter dormitory. This old segment was replaced with a line closer to the depot and farther downslope of the El Tovar between Stations 1+00 and 9+25.

The proposed alignment then followed the existing road beyond the campground turnoff to the point where it began its steep ascent of Hopi Hill.

The Santa Fe in 1912-13 had constructed the Hermit Rim Road directly north and northwest up Hopi Hill and on to Hopi Point without touching upon the Canyon rim at any point--a steep and unusual alignment for a scenic drive. Wallace and Horton plotted a line from Station 41+00 which reduced grades to 6-7 percent and added scenic pullouts as well. The new road would swing west along Hopi Hill as it ascended, then return east in a long radius curve to the rim, crossing the old road just south of today's Trailview I overlook and hugging the rim from that area to Maricopa Point. Trailview I, Trailview II (called El Tovar Point in the 1930s), and Maricopa Point overlooks were to be developed for the first time within this project.

Engineers would have liked a more direct line between Maricopa and Hopi points, but Tillotson insisted that the road avoid by at least 200-300 feet a patented mining claim at the rim directly southeast of the Powell Memorial. This was the Orphan Mine, claimed and developed by Grand Canyon pioneer Dan Hogan in the early 1890s. By the 1930s, Hogan, who still owned the claim, had allowed a nightclub to be built at the site. Tillotson, who was no doubt upset by an unregulated enterprise so close to the village, had no intention of delivering customers directly to Hogan's door. The NPS attempted to buy the property late in 1931 for \$5,555 in order to straighten the road line. Hogan refused.⁸ New owners developed the roughly 20-acre claim into a uranium mine in the 1950s, and the inholding did not revert to the government until the 1980s.

Wallace and Horton located the new line atop the old alignment from the Powell Memorial and Hopi Point area to Station 302+00, with only minor exceptions. From Station 302+00 to 381+00 the new line continued a short distance away from the rim and old alignment, touching briefly at Station 355+50 to allow a scenic spur loop at Pima Point. While Hermit Rim Road extended to the south and west of Hermit Rest (the segment used today to the Boucher Trailhead parking area), the new line ended at Station 405+54.97 in a loop parking area, directly east of Hermit Rest.⁹

The BPR, Park Superintendent Tillotson (who was GCNP engineer from 1923-27 and knew something about roads), and the NPS Landscape Engineering Division represented by Chief Landscape Architect Thomas C. Vint and park landscape architects Harry Langley and Thomas E. Carpenter generally agreed to the proposed alignment by late 1931. Principal disagreement lay in the width of the roadway. Tillotson lobbied hard for a 30'-wide, 3-lane road with 3' shoulders which would allow motorists to pull off

anywhere along the road that they chose. Vint and NPS Director Horace Albright argued for a Forest Highway Standard 18' roadway with 9' lanes, 3' shoulders, and parking limited to desirable locations at widened turnout strips, roadside parking areas, and spur road loops. Ultimately, most of the roadway would be built along the lines proposed by Albright et al, but Tillotson succeeded in keeping a 30' width for the road segment within the village (Stations -1+00 to 27+62).¹⁰

Despite the early reconnaissance and intense interest in the new road's design, final survey and specifications of "Route 8, Hermit Rest" were not completed until late spring 1934. It is probable that with all the road projects going on at Grand Canyon during this time, Tillotson had difficulty programming funds until that year. While engineers and landscape architects tinkered with final design, Tillotson--seemingly frustrated by delays--rounded up a crew of Civilian Conservation Corps (CCC) men and went to work clearing a 24'-wide strip along the proposed roadway, taking care to spare the many trees personally marked by landscape architect Langley. They reached Station 124+00 before District Engineer Sweetser called the superintendent back (much to his irritation) with further survey changes.¹¹

The BPR completed final survey and specifications in summer 1934. The project called for 0'-6" of compacted subgrade reinforcement and 0'-6" of compacted grade surfacing from Station -1+00 to 405+04.53 on the main road, for a total of 7.65 miles; and an additional 1.491 miles of wye connections, spurs, loops, and turnouts, for a total project length of 9.141 miles. The 18' roadway (widened at curves and with 3' shoulders) was designed with a 7 percent maximum grade, minimum radius curves of 345', a center crown sloping toward the shoulders at a rate of 1/8" per foot, and superelevations amenable to a maximum speed of 30 miles per hour. Loops and spurs were designed for speeds not to exceed 15 miles per hour.

Other specifications reflect the interest of landscape architects to hide roadways within the near environment. Park forces and CCC crews cleared the area of the predominant vegetation--pinon pine, juniper, and brush--to a width sufficient for construction activities but no more. Since 85 percent of excavation consisted of solid Kaibab Limestone, cuts were limited with one exception to two feet in height (few were required as it turned out). Park forces chose unobtrusive sites for borrow pits and quarries--at points 1,490 feet northwest of Station 82+00, 200 feet left of station 207+00, 1,700 feet left of Station 245+50 (quarry), 800 feet northwest of Station 284+00, and 1,500 feet northeast of Station 381+00. All embankments were to be watered and rolled for compaction and covered with topsoil. Traces of Hermit Rim Road were to be obliterated, with its oil-mat surface stripped

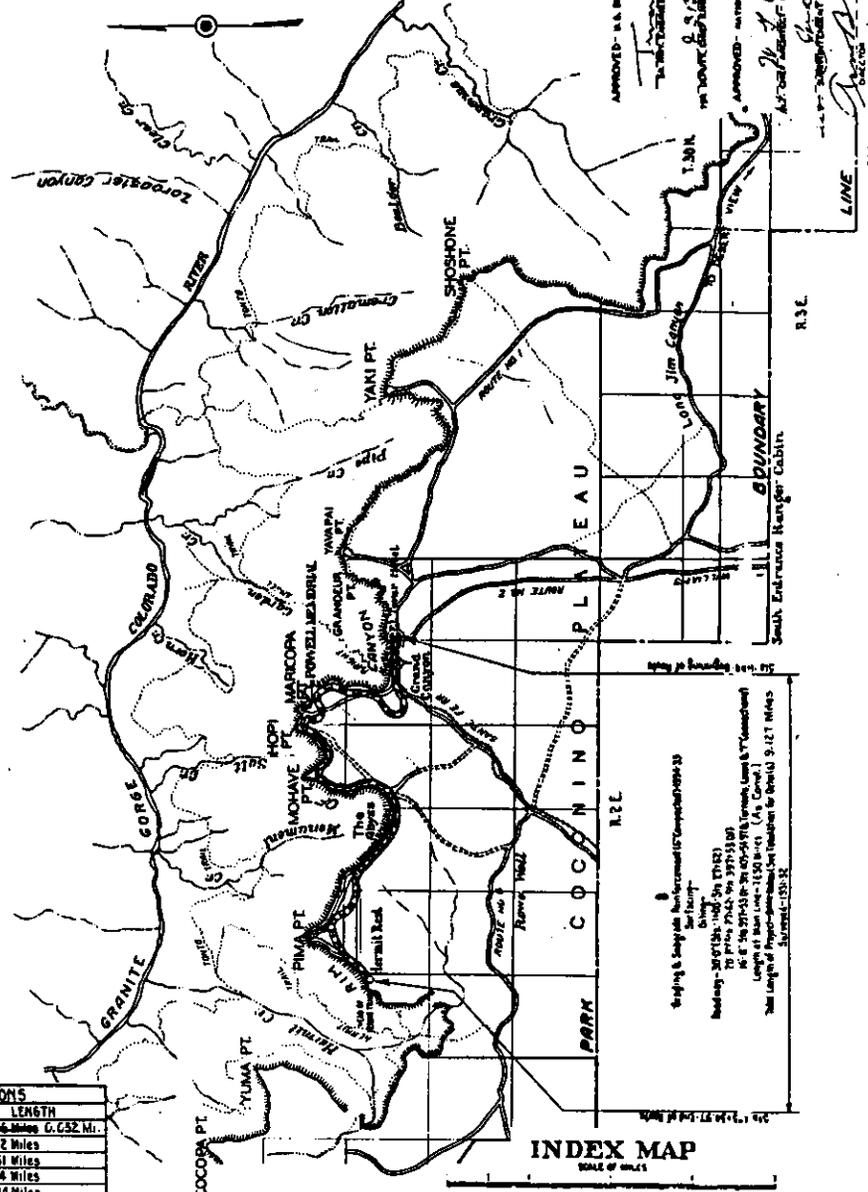
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

AS CONSTRUCTED PLANS FOR
PROJECT NR-8, GRADING AND
SUBGRADE REINFORCEMENT
ROUTE NO. 8 ~ HERMIT REST
GRAND CANYON NATIONAL PARK
HIGHWAY SYSTEM
ARIZONA

TABULATION OF TURNOUTS, LOOPS AND "Y" CONNECTIONS			
NAME	STATION TO STATION	LENGTH	
Camp Ground Junction	26+33.08 - 28+57.76 & 28+30-29+11.03	0.246 Miles	G. 632 M.
Signs Well Connection	33+10.75 - 34+04.64 & 33+76.87-34+66.99	0.122 Miles	
Yorav Point Turnout	102+62.61 - 103+53.81	0.091 Miles	
Maricopa Point Turnout	116+11.07 - 123+16.99	0.114 Miles	
Powell Memorial Loop	141+62.01 - 36+30.88	0.234 Miles	
Hopi Point Loop	150+62.01 - 158+29.45	0.124 Miles	
Hopi Point Turnout	153+66.15 - 6+11.64	0.058 Miles	
Mohave Point Loop	189+44.22 - 204+06.08	0.243 Miles	
Pipe Point Loop	355+24.48 - 383+07.54 & 358+93.86 - 360+99.70	0.499 Miles	
TOTAL		1.477 Miles	

INDEX TO SHEETS	
NO.	DESCRIPTION
1	Yuma Blvd.
2	DeWitts Branch, P.M. Co.
3	Yuma Valley, P.M. Co.
4-8	Range & Frontier, T. 100 N. - R. 100 E.
9	Detail of Bridge, Angel Camp Approach
20-A	20-A-24, Paving, Angel Details
25	Detail of Bridge, Angel Details
26	Detail of Bridge, Angel Details
27	Detail of Bridge, Angel Details
28	Detail of Bridge, Angel Details
29	Detail of Bridge, Angel Details
30	Detail of Bridge, Angel Details

APPROVED FOR CONSTRUCTION -
Project NR-8, Grading and Subgrade
Reinforcement. Sta. 1+100 - Sta. 405+54.97.
Contract includes turnouts, loops and "Y"
connections as shown in tabulation at left.



PREPARED BY
U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

APPROVED - U.S. BUREAU OF PUBLIC ROADS

APPROVED - NATIONAL PARK SERVICE

APPROVED - MARICOPA COUNTY

APPROVED - GRAND CANYON NATIONAL PARK

APPROVED - YUMA COUNTY

APPROVED - COCHISE COUNTY

APPROVED - COCONINO COUNTY

APPROVED - PIMA COUNTY

Figure 4. Specifications cover sheet for the 1934-35 construction of West Rim Drive.

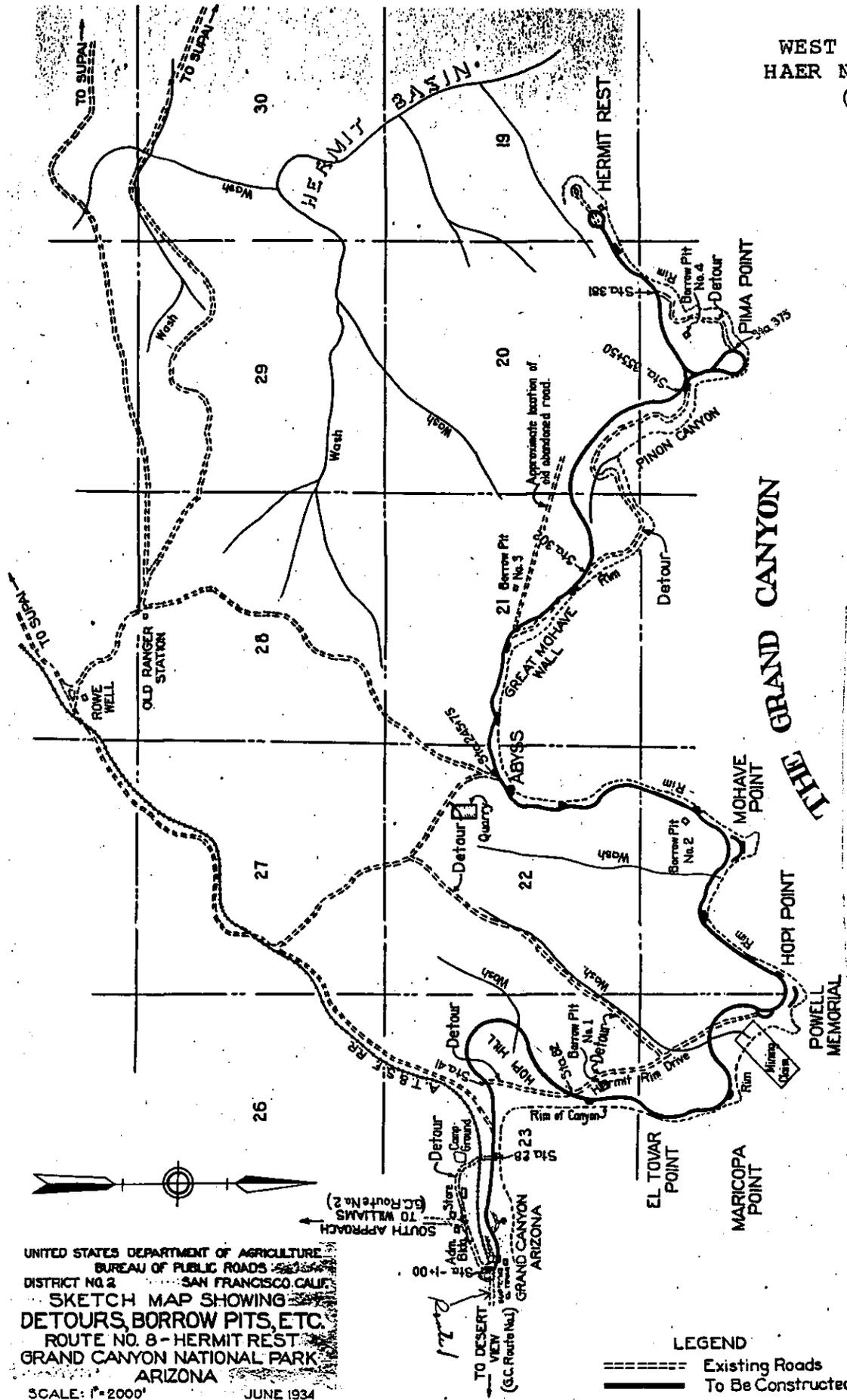


Figure 5. Sketch map from 1934 construction specifications indicating the alignment of the old Hermit Rim Road as well as the new West Rim Drive

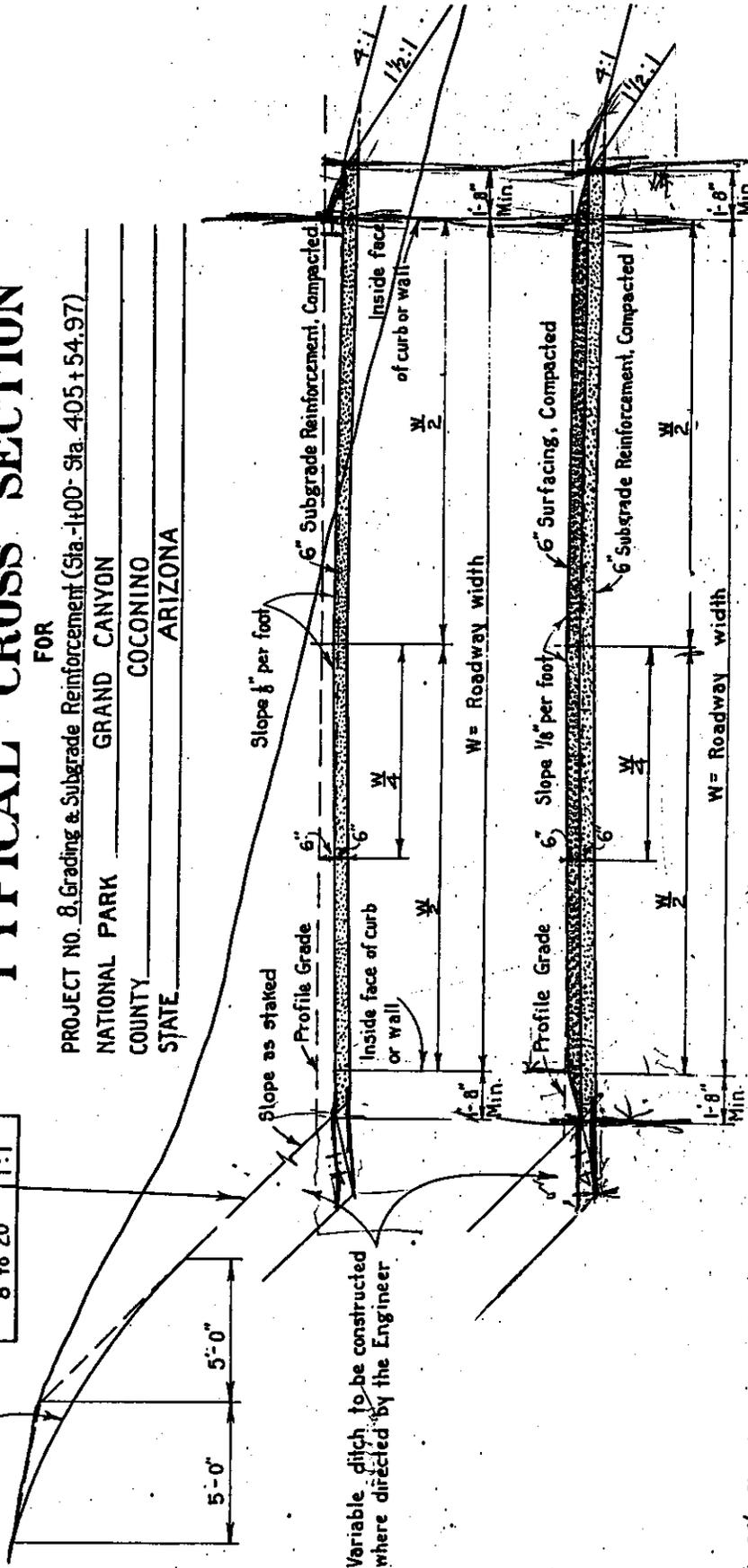
UNITED STATES DEPARTMENT OF AGRICULTURE
 BUREAU OF PUBLIC ROADS
 DISTRICT TWO

TYPICAL CROSS SECTION

FOR
 PROJECT NO. 8, Grading & Subgrade Reinforcement (Sta. -1400- Sta. 405+54.97)
 NATIONAL PARK GRAND CANYON
 COUNTY COCONINO
 STATE ARIZONA

SHOULDER CUT	SLOPE
0' to 5'	2:1
5' to 8'	1 1/2:1
8' to 20'	1:1

Cut slopes rounded in accordance with the specifications



W = 30' - Sta. -1400 - Sta. 27+62.
 W = 20' - 8" - Sta. 27+62 - Sta. 397+53.01.
 W = 16' - 8" - Sta. 397+53.01 - Sta. 405+54.97 (Hermi Rest Loop) and turnouts, loops and Connections.

SURFACED SECTION
 (Does Not Apply to this Contract.)

All curves are to be widened and superelevated as per instructions.
 Where drainage conditions require larger side ditches the necessary widening shall be done.
 Maximum Superelevation = 0.128' per foot width of roadway.

Figure 6. Cross section of road grade for the 1934-35 project.

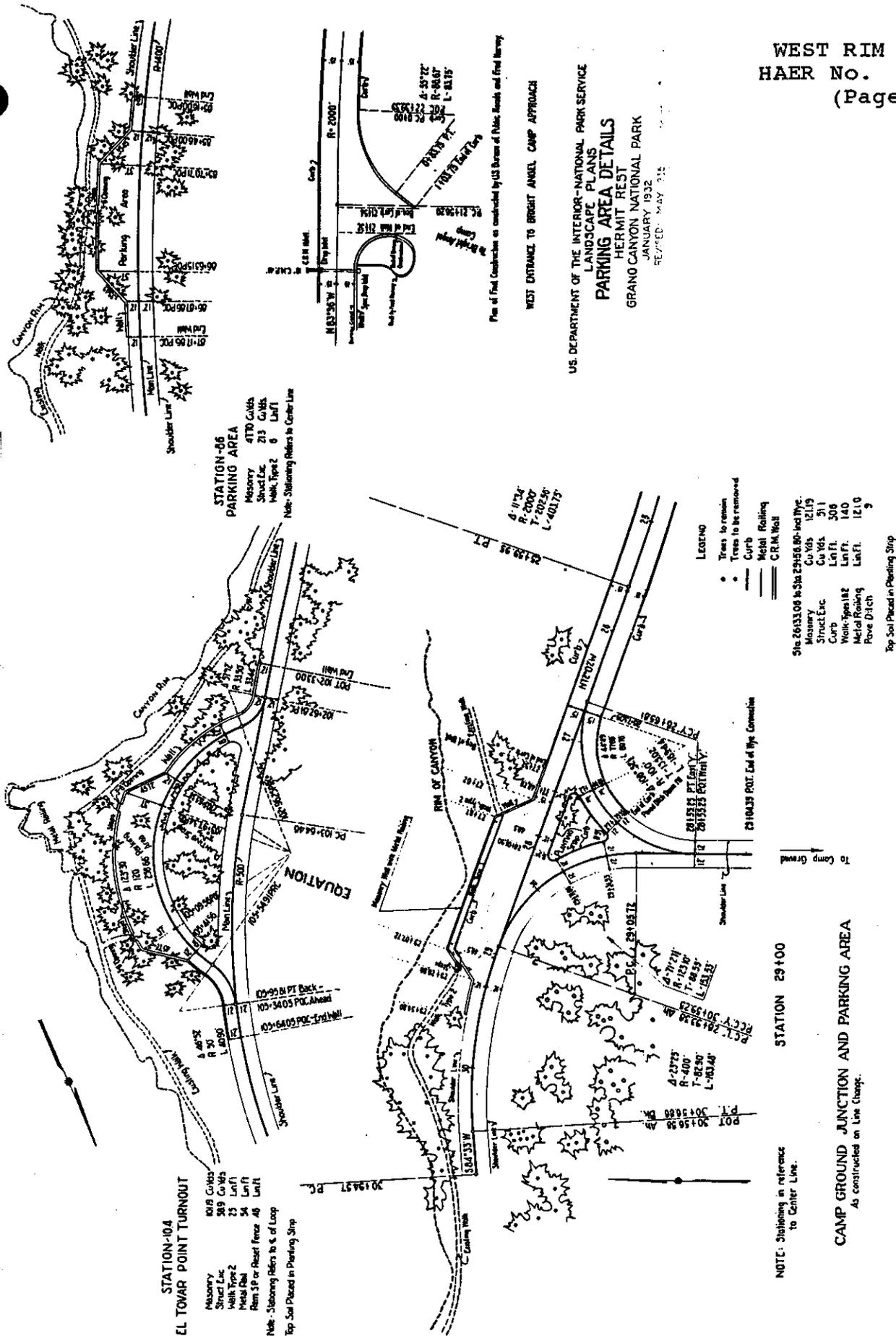
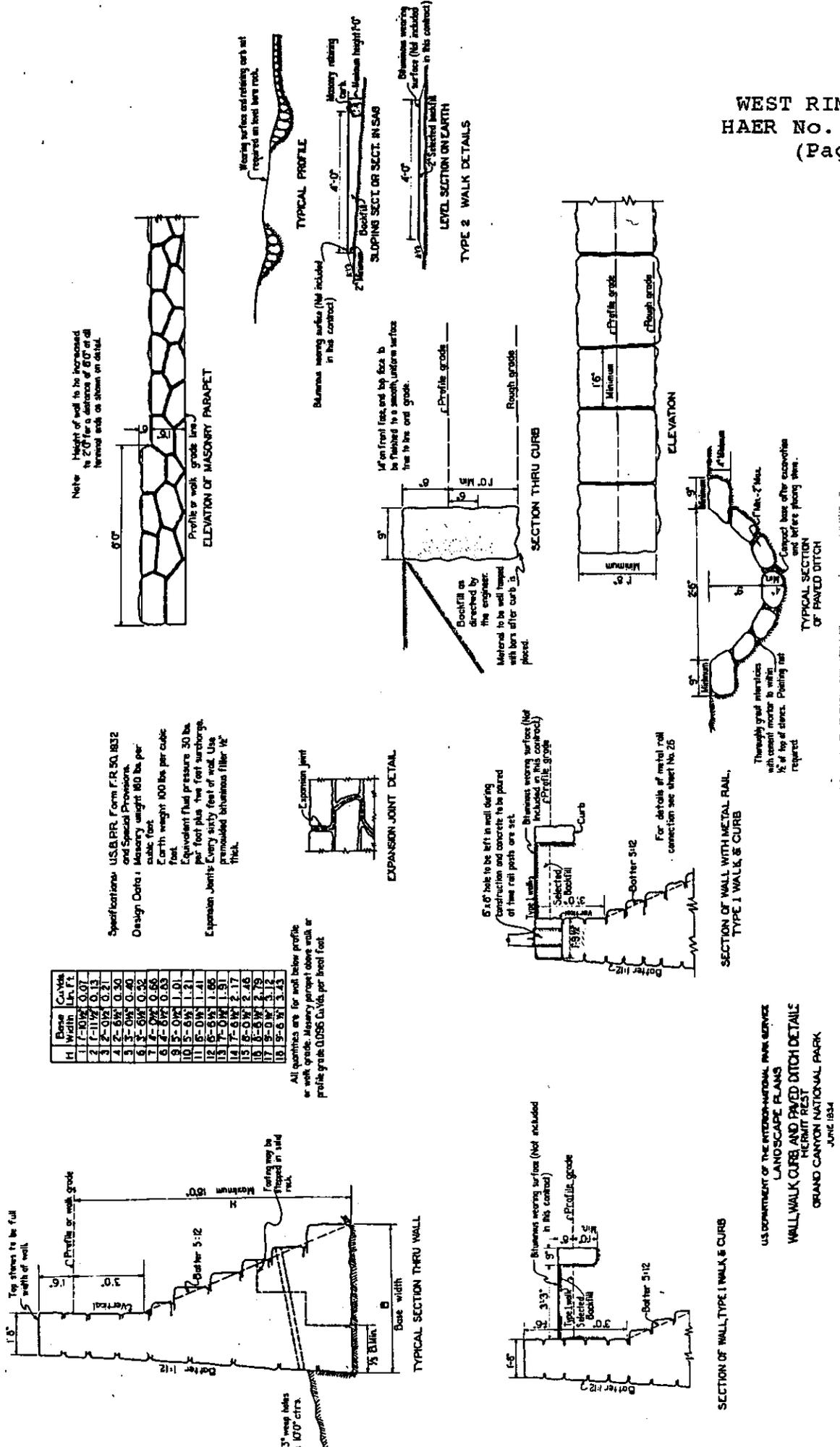
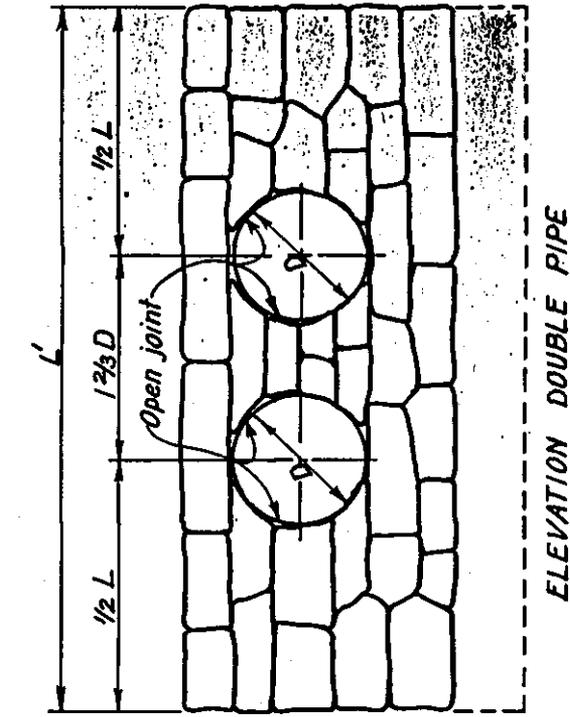


Figure 7. Detail sheet from 1934-35 construction drawings showing the major turnouts and intersections.

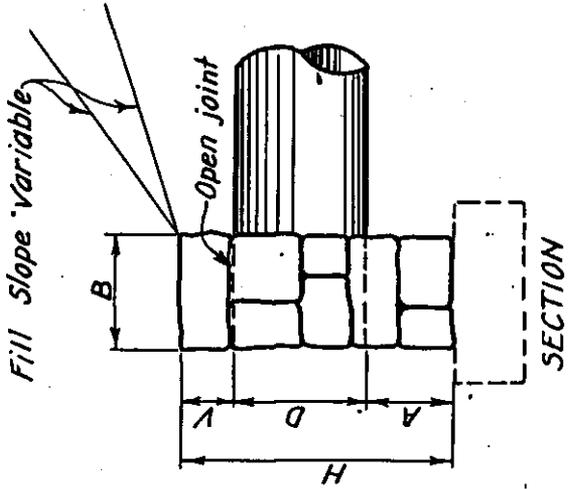
Figure 12. Paved ditching, walls, walks, and curbs specifications from 1934-35 construction drawings.



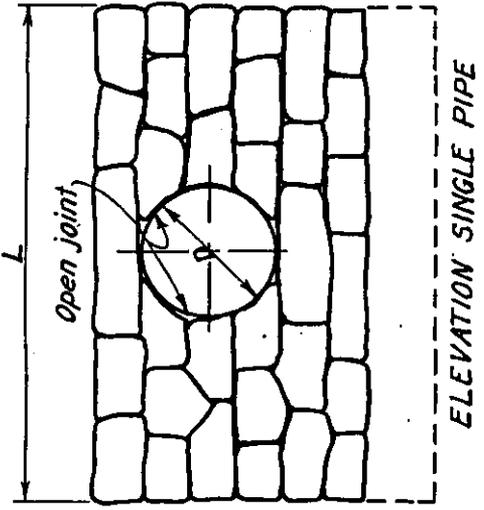
U.S. DEPARTMENT OF THE INTERIOR-NATIONAL PARK SERVICE
LANDSCAPE PLANS
WALL WALK CURB AND PAVED DITCH DETAILS
HERMIT REST
GRAND CANYON NATIONAL PARK
JUNE 1934



ELEVATION DOUBLE PIPE



Fill Slope Variable



ELEVATION SINGLE PIPE

Notes:
 Specifications, Bureau of Public Roads Form F.R. 50, Revised 1932.
 Dimension "v" can be varied from 6" to 9", so that advantage can be taken of the stratification of available stone. Pay Quantities and the values of "H" are based on "v" = 6".
 12" and 15" pipe to be used only for farm entrances/crossings.
 Headwalls in all cases to be parallel to center line of road.
 Provide good foundations under headwalls. Dimension "A" given in table are minimum values to be used except in solid rock. Where necessary to go deeper for good foundation make footings as indicated by the dotted lines.
 Joints between the pipe and headwall above center line of pipe to be left open for expansion.

D	Single Pipe			Double Pipe	
	A	B	H	Cu. Yds. 2 Walls	L'
12"	1'-0"	1'-2"	2'-6"	3'-8"	0.72 5'-4" 1.02
15"	1'-0"	1'-4"	2'-9"	4'-4"	1.05 6'-5" 1.60
18"	1'-0"	1'-6"	3'-0"	5'-0"	1.48 7'-6" 2.11
24"	1'-4"	1'-10"	3'-10"	6'-4"	2.87 9'-8" 4.17
30"	1'-8"	2'-2"	4'-8"	7'-6"	4.92 11'-10" 7.29
36"	2'-0"	2'-6"	5'-6"	9'-0"	7.86 14'-0" 11.69

UNITED STATES DEPARTMENT OF AGRICULTURE
 BUREAU OF PUBLIC ROADS
 DISTRICT NO. 2 SAN FRANCISCO
 SPECIAL MASONRY HEADWALLS
 FOR
 PIPE CULVERTS

Figure 13. Culvert masonry headwall specifications from 1934-35 construction drawings.

and reused as subgrade reinforcement on the new road. All portions of the old roadway visible from the new road were to be restored to original contours.¹²

The old Hermit Rim Road rested an average one foot above the surrounding ground, had twenty-one culverts under the roadway consisting of bare corrugated metal pipe (CMP) ranging in widths of 12"-24" and lengths of 20'-36', and an unknown number of cement masonry or dry rubble masonry (stacked-stone) retaining walls and culvert headwalls. Approximately half of the culverts would be reused while an additional forty-seven would be placed, thirteen of which were drop inlets. Nearly all of the culverts to be added would have masonry headwalls at inlet and outlet ends. Roadway guard rails were not included in this project, but specifications called for approximately 5,500 linear feet of masonry walls and 4,400 linear feet of masonry curbs. Nearly all walls were designed as retaining walls with 2'-high parapets at scenic pullouts, viewpoints, and the road segment within the village. Engineers designed masonry curbing to take the place of shoulders within the village area, forming what they termed an "urban roadway" through Station 27+50 at the campground turnoff.¹³

Based on these specifications, the BPR advertised for bids for grading and subgrade reinforcement in August and September 1934, and opened the five submitted bids on 13 September 1934. G.R. Daley and Vinson & Pringle of Phoenix, Arizona was the low bidder at \$184,857.90--approximately 92% of the engineer's estimate. The Secretary of the Interior notified the contractor that his bid had been accepted on 29 September 1934.¹⁴

Construction

The project to build West Rim Drive was financed with federal funds for new highway construction authorized by recovery acts in the early years of the great depression.¹⁵ During 1933-41, hundreds of CCC, CWA, and PWA men were quartered at Grand Canyon within several camps performing miscellaneous--typically unskilled--labor tasks, including road projects. Superintendent Tillotson used some of these men to clear portions of the roadway prior to the invitation for construction bids, and there are indications that public works men labored on a few miscellaneous tasks related to construction of West Rim Drive. Most of the work, however, including the many masonry walls and curbs, was done by the contractor. Employee wages ranged from 50 cents per hour for unskilled labor to 75 cents per hour for tractor operators, \$1.00 per hour for carpenters, and \$1.25 per hour for foremen.¹⁶ The contractor kept from forty-five to 175 of these men on the job, with an average work force of about one hundred.

Employees of the BPR surveyed and managed the project on-site from start to end. These men included Associate Highway Engineer and resident foreman J.H. Brannan; Senior Engineering Aid F.H. Horton; Senior Levelmen A.R. Tanner, C.H. McDonald, D.L. Williams, and N.H. Stratton; and chainmen A.F. Gray, A.D. Heath, J.H. Dresden, H.L. Dulaney, and R.L. Greene. They resurveyed lines, interpreted plans and specifications, answered contractor questions, inspected work, and reported progress throughout the project. By all accounts, the contractor worked well with BPR and NPS forces, which resulted in a successful project completed in the allotted time.¹⁷

Several dozen grading, subgrade reinforcement, and surfacing road projects were completed at Grand Canyon during 1928-39. The success of each depended in large part on the type and quality of equipment brought on-site by the contractor. Even in these years of advancing automotive technology, some builders relied heavily on stock to pull graders and other equipment, while others used old machinery which failed often. Daley, Vinson & Pringle appear to have used the latest and best road building equipment available, including Fresno shovels, 1-1/2 and 3-ton trucks, "60" and "65" Caterpillar tractors equipped with blade graders and scarifiers, and a wide assortment of rippers, carryalls, rollers, and jackhammers. Construction reports indicate few breakdowns and efficient use of equipment as needed at various locations throughout the project.¹⁸

Actual construction began in October 1934 at several points along the surveyed line. Workmen first cleared the entire route, then opened Borrow Pit #1 near Trailview #1 pullout, began rough grading between Stations 42+00 and 150+00, and went to work on the "great wall" extending from Station 6+50 to 16+00. By mid-November, Landscape Architect Harry Langley described "rapid" progress on the project and a few minor changes to specifications approved on-site. The new road adjacent to the Fred Harvey garage was widened, with the nearby walkway and depot terminal wall extended to Station 1+25 and culverts at that point rearranged. The resident engineer shifted the line approximately ten feet south (downslope) of plan through most of the village area. Several old structures near Hermit Rest were removed. Progress had not proceeded far beyond these activities when the BPR notified the contractor to cease operations due to inclement weather on 13 December 1934.¹⁹

Work resumed on 12 April 1935 within the village and along the line from Hopi Hill to the Abyss. Major activities in April included laying culverts, rounding and trimming slopes, balancing slight cuts and fills, and masonry work on culvert headwalls and retaining walls. When suitable rock at the old quarry ran low, landscape architects approved an additional quarry to the left of

Station 302 at Pinon Cove. As work progressed east of the Abyss, traffic was detoured along an old road which ran from a point on Rowes Well Road, 1.2 miles southwest of the campground turnoff, past the old quarry and contractor's camp to the Abyss. Automobiles and Fred Harvey busses were allowed to take the old Hermit Rim Road as far as the Powell Memorial, but had to turn around at that point and take the detour if they wanted to travel west of the Abyss to Hermit Rest.²⁰

In May, crews completed the roadway through Station 245+00 to the extent that traffic was allowed to pass along the new road from the village to the Abyss. Work on masonry walls, loops, and spurs continued in this section as the contractor moved much of his heavy equipment west along the Great Mohave Wall (a Canyon cliff formation). Masons completed the 950'-long wall extending west from the railroad depot (Stations 6+50 - 16+00) by the end of the month.

By late summer 1935, construction had moved along well, with few problems worth noting. One persistent nuisance, however, was traffic over the untreated roadway which caused horrendous dust storms. Superintendent Tillotson noted the constant danger of head-on collisions as automobiles trailed dust plumes and entered others with abandon at zero visibility. He also remarked that visitors complained bitterly of eating dust and that the Fred Harvey Company was losing customers for their scenic excursions. He received funds to apply an oil-based palliative, but August rains solved the immediate problem and a planned oiling project was postponed until project completion.²¹

Other problems concerned excavation for the new roadway in the congested village area. The Santa Fe and Fred Harvey Company had been developing village infrastructure for thirty years prior to this project, and in the early years before NPS arrival had done so haphazardly. Engineer Brannon complained that workers repeatedly struck buried steam, water, and sewer pipes for which there were no location maps available. He added that

there is only one Santa Fe man that has any recollection of their near location and that is more or less brought back to his memory after they have been torn up.²²

A further problem was a long-running dispute between the NPS and the Santa Fe as to who would pay for the movement of steam pipes in several areas east of Station 16+00. Ultimately, the park service paid for structures to accommodate the pipes, in large part because the Santa Fe--which owned this portion of the village with its 20-acre depot patent (and still does)--cooperated fully in granting a right-of-way for the new road.

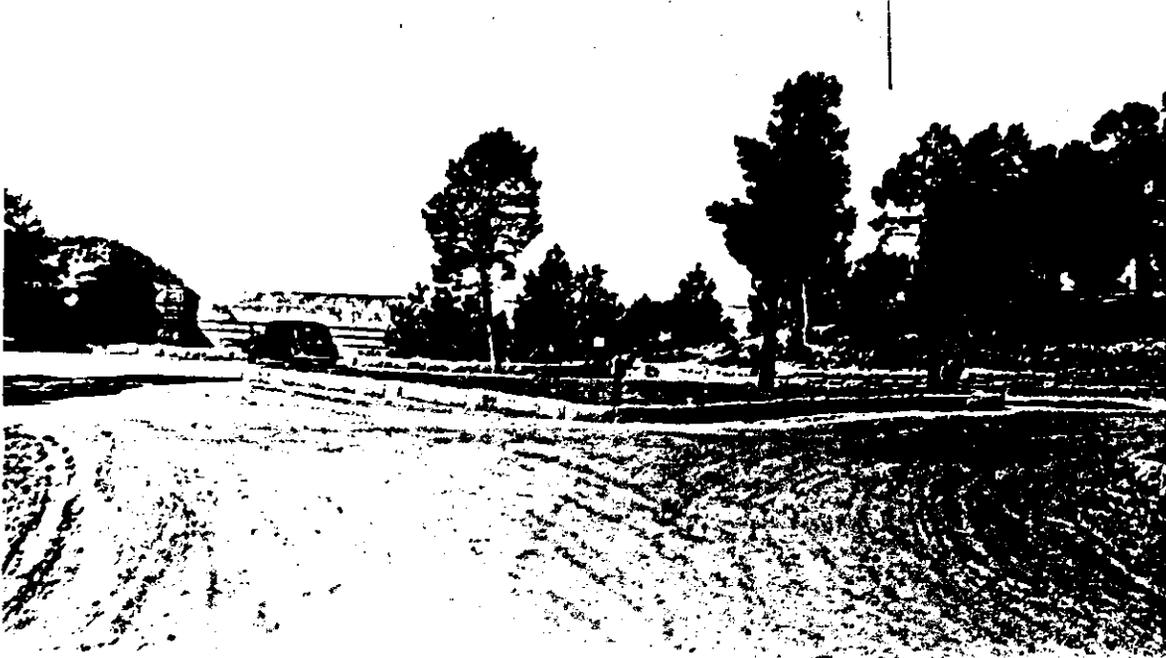


Figure 14. Above: Island with masonry curbing at Station 28, the beginning of today's West Rim Drive, facing north, 1935. Note the auto at the first pullout. (GCNP Photo Collection, Image #7601).

Below: A pullout along the recently completed West Rim Drive, 1935. (GRCA Image #7600, GCSC)



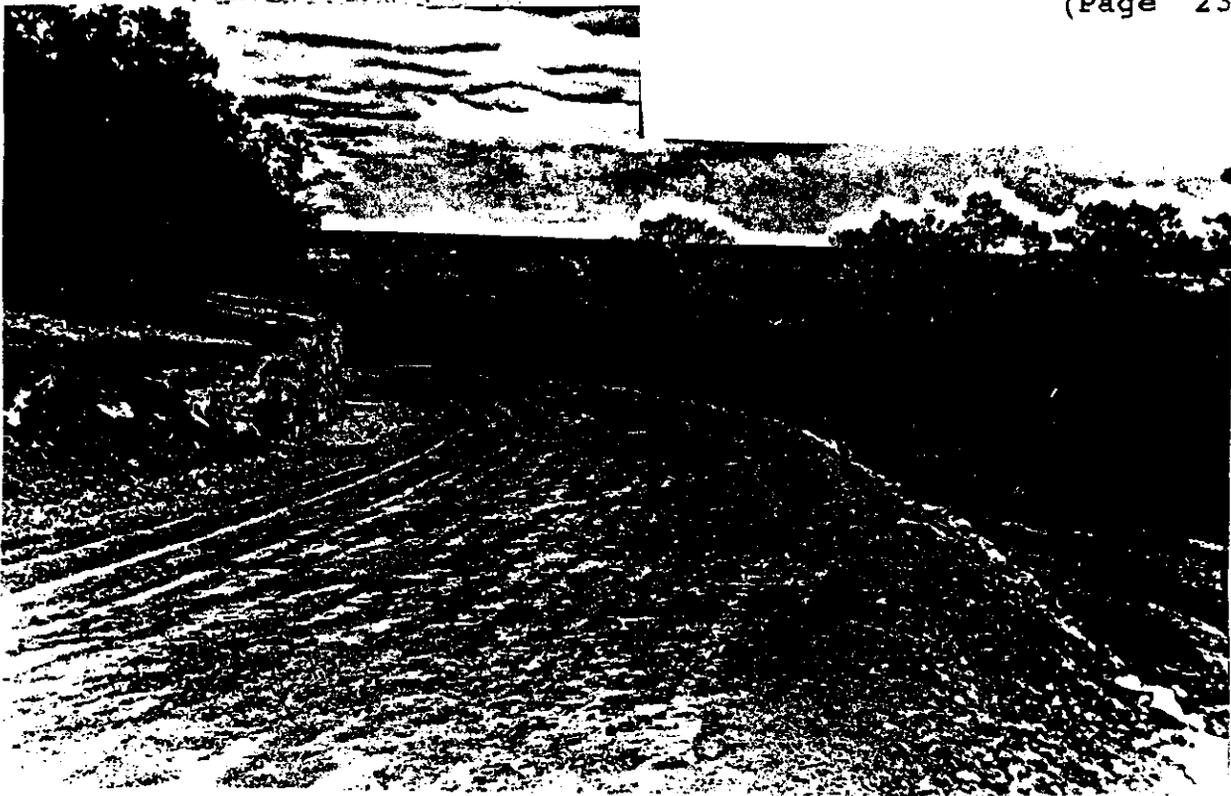


Figure 15. Completed section of the West Rim Drive at Hopi Hill before surfacing, 17 May 1935. (GRCA Image #2874, GCSC)



Figure 16. Hopi Point loop under construction, 8 July 1935. (GRCA Image #2985, GCSC)



Figure 17. Workers engaged in roadside cleanup and old road obliteration, 1935. (GRCA Image #2873, GCSC)



Figure 18. Fine masonry wall beside pedestrian guardrails at a pullout, 1935. (GRCA Image #8873, GCSC)

These minor difficulties resolved, the contractor completed all project construction and cleanup in mid-October 1935.

Superintendent Tillotson and others who inspected the work had warm words for the contractor and his work crews. Tillotson's acceptance was extended on 22 October 1935. Harry Langley's acceptance from a landscape perspective was forthcoming on 1 November 1935.²³

Surfacing of West Rim Drive did not follow immediately. In June through August 1936 contractor Jack Casson applied an oil-based dust palliative to alleviate the chronic problem noted by Tillotson. Casson returned in May 1937 to apply an "oil cake," followed by a seal coat in July of the same year.²⁴

Major Repairs and Alterations

Work on West Rim Drive since initial construction and surfacing has consisted of routine maintenance and landscaping. Tillotson noted that wild flowers were sown along park roads in 1937, and this activity probably included West Rim Drive. The CCC planted some 5,000 trees and shrubs around the park as well as along roads in 1939-40. Some of these may have been planted along the drive to obscure construction scars. Before CCC forces left the park in 1942, they completed countless road-related tasks including construction of masonry walls, ditch clearing, slope rounding, and improvements to scenic spur roads, parking loops, and viewpoints. They no doubt did some of this work along the drive, but despite popular belief, the 1934-35 contractor built nearly all of the masonry walls associated with this scenic roadway.²⁵

During the World War II years, visitation to the national parks and thus travel atop their roads was severely curtailed. Grand Canyon was no exception. The Fred Harvey Company discontinued scenic trips along West Rim Drive and closed Hermit Rest for the duration, in fact, and resumed operations only in spring 1946. A review of superintendents' reports for these years and into the late 1940s reveals that little funding was available for road repairs and maintenance, and it is likely West Rim Drive received only the standard ditch clearing and asphaltic patching applied to park roads in general.²⁶

With increases in road maintenance funds by 1950, these maintenance activities were expanded to include periodic seal-coating (chip sealing). The entire West Rim Drive main roadway received a RC-2 oil and volcanic cinder seal coat in June 1954 and its spur roads and parking loops were so treated the following year.²⁷ Since that time, park road crews have

performed chip-sealing jobs to the drive on an approximate 7-10 year cycle, depending on road maintenance funding. At Grand Canyon, the chip seal process typically consists of poured CRS-2, asphaltic oil with a polymer, followed by an application of shattered aggregate chips to twice the depth of the oil, then rolled. Park crews today deliberately use a light-colored aggregate which, after a period of wear, gives the roadway a whiter appearance (somewhat mimicking the native Kaibab Limestone) than standard asphaltic surfacing.²⁸

Other standard road maintenance activities have included striping, curb and wall repair work, culvert clearing, oil and asphaltic patching, and shoulder rounding. In recent years, young men of the Youth Conservation Corps (YCC) have worked at the scenic viewpoints, pullouts, and parking loops along West Rim Drive to expand walls and walkways as well as revegetate and landscape along the lines of existing structures and vegetation. YCC crews were at work at Pima and Hopi points while this study was underway. Their work is so good (at least on this project), it is difficult to tell the old from the new--a point to keep in mind when studying the history of particular structures. Joe Bice, Park Roads Supervisor, notes that YCC crews have not been used for projects along the main roadway, however.²⁹

DESCRIPTION

The 1934-35 project to construct West Rim Drive began at Station -1+00 adjacent to today's Fred Harvey administrative offices and continued to Station 26+73.09 at the west edge of the village at the turnoff to the public campground. This segment of the early project is today considered a portion of Village Loop Drive, and is described in the report associated with that road. Today, West Rim Drive begins at the latter station where Village Loop enters a 100'-radius curve to the south. West Rim Drive begins west and north of the wye thus formed. In the immediate vicinity between Stations 26+73 and 29+56.80 there are a number of related road structures (described below), many of which date to original construction.³⁰

The road as completed in 1935 contained a landscaped island at the center of the wye intersection, surrounded by masonry curbing. This island, which channeled 150 automobiles and five or six Fred Harvey busses per day in 1935 (contemporary traffic estimates) is replaced today by a wye intersection painted in yellow atop the asphalt. A shuttle bus stop occupies the space on the north side of the roadway approximately between Stations 26+75 and 27+35, and the entire roadway is blocked by wooden fencing and gates. The latter features are new, results of increased traffic on West Rim Drive (a dead end road) which

requires closure to private vehicles and the use of shuttles in summer months. Another new feature is the shuttle turnaround on the southwest corner of the intersection, designed in 1973 and constructed soon thereafter.³¹

Features at this intersection which date to 1935 include the pullout with associated structures on the north side of the roadway between Stations 27+32 and 29+56. The location of this pullout represents one of few concessions made by Chief Landscape Architect Thomas Vint, who at first argued that the parking area should be on the south side of the roadway. The BPR asked Vint and resident architect Harry Langley to reconsider, and they did, suggesting that the pullout could be built as it is today if it were made 20' wide rather than the standard 25' of other pullouts along the drive.³²

The masonry curbs and walls, walk, and metal railing at this pullout remain as constructed in 1935. Walks originally built along West Rim Drive were 4' wide, curbed with masonry no higher than one foot, and surfaced with compacted gravel, but the specs called for bituminous surfacing under separate contract. Today's walk is so curbed and surfaced in asphalt. The surface may have been poured soon after construction or as a result of pullout and parking rehabilitation completed in 1962.³³

The masonry walls at this pullout were constructed per 1934 specifications with native stone (typically weathered, which is preferred), and completed in May and June 1935. These walls as well as all masonry walls in the 1934-35 project, are of rock quarried from the pits west of the Abyss or Pinon Cove and built to the necessary height below profile grade with uniform 16" parapets above profile grade. These walls generally have 8'-long end sections which are two feet in height--also called for in the original specifications. Major portions of these walls--perhaps 90 percent or more of all walls along the roadway, loops, spurs, and parking areas today--appear to date to the 1934-35 project.

Metal railings at this pullout are also typical of 1934 specifications and representative of all railings at scenic overlooks, spurs, and loops along West Rim Drive. These are galvanized wrought-iron posts with metal pipe rails. Posts are curved inward toward the onlooker and bolted into 16" of concrete atop masonry walls (as found at this pullout), or similarly bolted into rimrock limestone where walls are not present. Three pipe rails (1-1/2" diameter on top; 1-1/4" diameter in the middle and bottom) are inserted through cored holes in the posts, which are spaced 9'-6" apart. Unskilled laborers assembled these



Figure 19. 1962 modifications: Bituminous walk with masonry curb and wall (background) at Hermits Rest. (From completion report, GRCA 61773, Box 6, GCSC; all following photos from same report)



1962 modifications: Bituminous walk with masonry curbing at Hermits Rest.



Figure 20. 1962 modifications: Bituminous walk leading to Maricopa Point viewpoint.



1962 modifications: Bituminous walk with masonry curb leading to "comfort station" at Hermits Rest.



Figure 21. 1962 modifications: Bituminous walk behind rock curbing at Maricopa Point parking loop.



1962 modifications: Bituminous walk from Maricopa Point parking loop to the rim walk.



Figure 22. 1962 modifications: New guardrail and chain link fencing at Trailview pullout.



1962 modifications: Rock curbing at Maricopa Point parking loop.



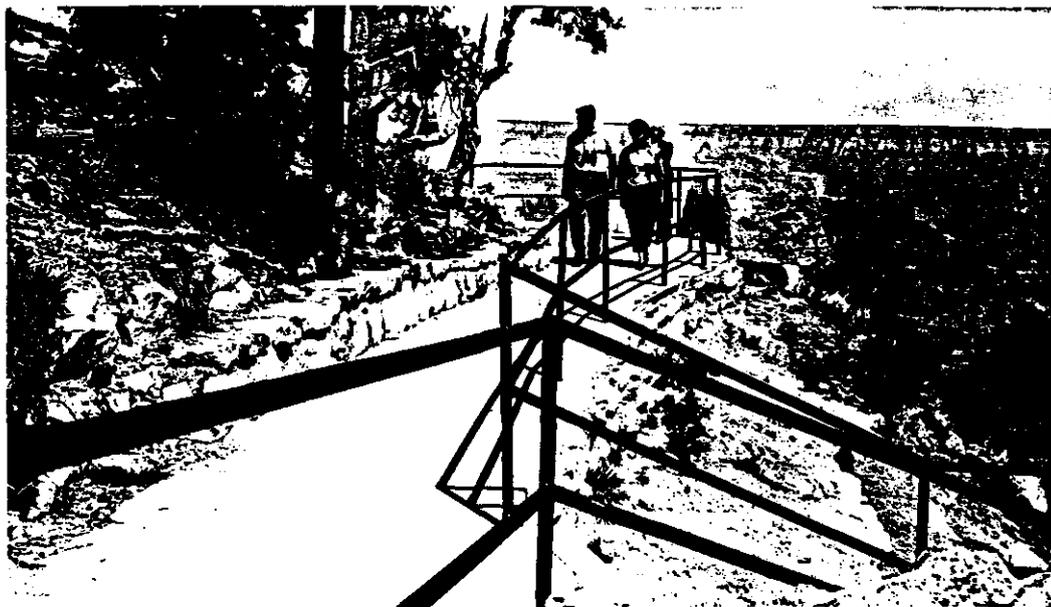
Figure 23. 1962 modifications: Lower level concrete walk, steps, and pipe handrail at Trailview Point.



1962 modifications: Lower level concrete walk, steps, and pipe handrail at Trailview Point.



Figure 25. 1962 modifications: Upper level concrete walk, steps, and pipe handrail at Trailview Point.



1962 modifications: Upper level concrete walk, handrail, stone curbing, and stone foundation at Trailview Point.

pedestrian guardrails all along the project in 1935, bending pipe rails on-site to fit curves and contours.

At the west end of the pullout, beginning at Station 29+26, the roadway narrows to its standard 9' lanes with 3' gravel shoulders, painted white shoulder lines, and painted yellow double center lines. The original oil cake surfacing has, of course, been overlaid with chip seal over the years, but subgrade and roadway width appear from visual inspection, written reports, and interviews to be the same as constructed in 1934-35 along the entire alignment from this point to Hermit Rest.

Note the scenic walkway to the right (north) of the roadway at Station 30+00, which is 3'-4' wide, asphalt-surfaced, and curbed with unmortared rocks. This footpath continues between the road and Canyon rim as far as Mohave Point, after which point it continues unpaved and may be an informal path worn by generations of hikers. The footpath (as far as Hopi Point, at least) predates construction of West Rim Drive. The 1934 specifications called for sections of walkways to be built at the various pullouts and loops, but narrative reports do not mention them nor long intervening sections connecting the various loops and pullouts. Walkways at Trailview Overlook, Maricopa Loop, and Hermit Rest were constructed, or perhaps simply improved, in 1962.

As the road begins its ascent of Hopi Hill, the intersection with Rowes Well Road is reached at approximately Station 35+00. As constructed in 1934-35, this intersection formed a wye, with the eastern terminus at Station 33+20 and the western terminus at Station 35+00. The project included this new segment of Rowes Well Road for a distance of about 600 feet south to connect with the old (1890s) road. Wye intersections were common in 1920s-1930s road construction projects, but most--like this one--have been modified to "T" intersections since the 1950s.

From the Rowes Well intersection the road steeply ascends Hopi Hill in a sweeping, fairly-uniform, 220-degree curve with a 650' radius and grades not exceeding 7 percent to the Trailview I pullout at Station 85+16. This segment of road was one of the more difficult 1934-35 construction tasks as well as the most significant improvement over the old roadway. Today it exhibits moderate sagging, or "channelling," at many points, which reflects minor failure in the subgrade and major failure in the surfacing caused principally by bus traffic. There is also a considerable amount of surface patching, which also results from heavy vehicles laboring up and down the steep hill. A few hundred yards beyond the Rowes Well intersection the road passes beside 10'-high cliffs of Kaibab Limestone on the north side. This cliff was formed by blasting to cut the roadway along the

slope to maintain an even grade. Specifications called for seven 18" and one 36" culverts with masonry headwalls beneath the roadway along this segment.

As the road crests Hopi Hill, a segment of the old Hermit Rim Road can be seen leading to the south and NNW at Station 82+00. This and other segments of the old road were obliterated in the 1934-35 project, but apparently not revegetated with pinon-juniper as the clearing through the trees easily traces the old alignment sixty years after abandonment.

Immediately beyond this point the second Canyon pullout is reached, running from Station 85+16 to 87+17. This was constructed in 1935 as an unnamed overlook and is today called Trailview I because an extensive view of the Bright Angel Trail is possible from the rim. It remains as constructed to the 25'-wide standard. Approximately 200 linear feet of masonry wall lines the pullout on the Canyon side. The wall was part of the original construction specs and does not appear to have been modified in the intervening years. It is roughly (sloppily) mortared and exhibits moderate cracking and crumbling.

The roadway from Trailview I is through gently rolling terrain with moderately thick stands of juniper, pinon pine, and low brush. This topography and vegetation type remains fairly consistent from this point to the terminus at Hermit Rest.

The Trailview II pullout--formerly called El Tovar Point Pullout because an exquisite view of Grand Canyon Village backed by the San Francisco Peaks is obtained here--is reached at Station 102+62 and continues to Station 105+95. This is an actual loop pullout with a landscaped island intervening between roadway and parking area. The loop roadway broadens to the Canyon side into a 25'-wide, 106'-long parking area--the entire loop and parking area fronted on the Canyon side by a masonry wall. Original specifications called for 331 feet of wall. Extensive modifications at this pullout completed in 1962 suggest that walls were added or existing walls modified in that year to a height of 3'-0" for 106 linear feet. Narrative reports for 1934-35 do not indicate whether metal guardrails contained in the specifications were actually built. Today's guardrails at the Canyon rim appear relatively new, and the 1962 project included 495 linear feet of guardrail, thus, all metal railing at this point may date to the latter year. The entire parking area and 54 linear feet of 4'-wide walkway were surfaced with bituminous asphalt in 1962.

The next pullout is at Maricopa Point at Station 118+23 to 120+83. This is a loop pullout with landscaped island between roadway and parking area. Also constructed in 1935, with 260

linear feet of masonry walls surrounding the parking area and metal guardrails at the rim. Maricopa Point is a short stroll north of the pullout. The distance is suggested by the addition of bituminous walkways in 1962: 460 linear feet at a 5' width and 435 linear feet at a 4' width. Four hundred and fifty linear feet of rock curbing were also added in the parking area in 1962. Today, a modern wood-rail fence fronting the east side of the parking area protects a revegetation area.

These last three scenic pullouts at Trailview I, Trailview II, and Maricopa Point were deliberate improvements of the 1934-35 project over the old Hermit Rim Road, which itself tracked a more-or-less beeline out of sight of the rim to Hopi Point. From Maricopa Point, West Rim Drive moves away from the rim in a long-radius curve for the sole purpose of avoiding the Orphan Mine. It crosses the property's entrance road about .4 miles west of Maricopa Point and intersects the old Hermit Rim Road grade perhaps 150 feet farther along. It continues the sweeping curve until reaching the Powell Point turnout near the rim at Stations 146+98 to 150+19. This is the general vicinity of Hopi Point where early roads of the 1890s and 1900s terminated. From this point to Station 302+00, West Rim Drive (with minor exceptions) was basically superimposed over the Hermit Rim Road alignment.

The Powell loop is somewhat farther from the roadway than previously-mentioned loops, with a larger landscaped island intervening between roadway and parking. In 1935, 320 linear feet of masonry walls were constructed fronting the parking area. Today, there is a small amount of wall reconstruction underway where the walk leaves the parking area for the Powell Memorial about seventy yards to the northeast. The author understands (informally) that this work is part of a class demonstration of masonry wall-building techniques underway in 1994.

As the roadway curves to the west, the Hopi loop parking area is reached at Stations 153+16 to 156+90. This, too, is a deep pullout with a landscaped island intervening between roadway and parking. Approximately 370 linear feet of masonry walls as well as metal guardrails at the Canyon rim were constructed here in 1935. An original drop inlet culvert is found against the island curbing near the point, ten feet away from the elevation marker (7071'). This is a good example of the dozen or so drop inlets leading to 18"-24" CMP culverts constructed within the pullouts and spurs in 1935. The reinforced concrete box is surrounded by a cast steel frame and covered with a cast steel grate.

As the road runs along the Canyon rim from Hopi Point, sometimes within fifteen feet of the edge, two narrow pullouts--called "parking strips" in 1935 nomenclature--are located at about Stations 161+00 and 177+00. These are nine feet wide and fronted

on the Canyon side with masonry walls. Five of these were built during the 1934-35 project, and were designed for motorists to briefly pull off the roadway and admire the view from their vehicles. Superintendent Tillotson had envisioned a 9' lane along the entire road to allow universal parking along the roadway, and these pullouts appear as small vestiges to his original idea.

The Mohave Point loop is reached at Stations 196+33 to 198+61. This, too, is a minor loop with a landscaped island between roadway and parking. The 1934-35 project called for about 230 linear feet of masonry walls as well as metal guardrails at this point.

At Stations 218+97 to 221+32 there is another 25'-wide pullout with impressive masonry walls and adjacent metal guardrails along the Canyon rim. A few yards to the northeast of this pullout on the southeast side of the road is an 18" culvert with masonry headwall, typical of those constructed in 1935. The headwall is two feet high, four feet wide, and two feet deep, parallel to the roadway, and unobtrusive (nearly invisible from the road). Six of these headwalls were noted during field studies and all are built to 1933 BPR specifications. More (perhaps all) of these original structures can be found if one walks the 7.1-mile roadway, since the subgrade appears unchanged from 1935.

Another 9'-wide pullout is passed at Station 233+00 before arriving at the Abyss pullout at Stations 244+50 to 247+10. This 25'-wide pullout is fronted by masonry walls with metal guardrails at the Canyon rim. Across from the pullout is the gravel and dirt road which served as a primary detour during 1934-35 construction. This detour road almost immediately forks to the southeast and southwest. The former fork runs past an old quarry (probably dating to the 1911-13 construction of Hermit Rim Road and used in 1934-35), at which point the roadway is blocked by an earthen berm. The latter fork runs up to the site of the old Rowes Well Ranger Station and Rowes Well automobile camp where it meets with the old (pre-1930) road to Supai. This latter section was the initial segment of the "truck trail" to Pasture Wash, built by CCC forces in the middle 1930s. It is today called Fire Road W6. At one time the NPS considered developing these roads as major shortcuts to Rowes Well and Supai, but abandoned their plans after the 1930s.

Between the Abyss and Station 302 there are three pullouts located at Stations 265+00 (9'), 279+00 (25'), and 292+00 (25'), which are constructed like all others, that is, masonry walls fronting the entire area of parking and metal guardrails. Just beyond the pullout at Station 292+00 there is an old alignment that leaves the roadway to the left which was used in 1934-35

construction to access Borrow Pit #3. This is very old and may predate the 1913 Hermit Rim Road. At this same point, another former alignment is detected north of the roadway--a slight segment of the old Hermit Rim Road which ran a bit closer to the Canyon Rim.

From Station 302+00 to 355+50, West Rim Drive leaves the Canyon rim to obtain better alignment than the old Hermit Rim Road, which ran along the rim in this segment known in the 1930s as Pinon Cove and Pinon Canyon. At Station 355+00 there is another 25'-wide pullout immediately east of the Pima Point spur road and scenic loop.

Pima Point, unlike other pullouts along the roadway, is accessed by a spur road and then a loop so that West Rim Drive can continue slightly south of west in a direct line to Hermit Rest. As constructed in 1935, the spur intersected West Rim Drive in a wye with a landscaped island. The old Hermit Rim Road ran beneath today's spur road to the Canyon rim, then swung west and south along the rim until meeting with West Rim Drive at Station 381+00. One final 25'-pullout is passed at Station 392+00 before the roadway enters its terminal loop at Hermit Rest.

As constructed in 1913, the old Rim Road continued south of Hermit Rest to a parking loop at the head of the Boucher Trail. This segment of roadway and parking loop are still used by backpackers planning to descend the inner-Canyon trails at this point. As constructed in 1935, West Rim Drive terminated (and still terminates) in a parking loop east of Hermit Rest. This loop has a narrow landscaped island in the center, with masonry walls lining the island and outer sides of the loop. An asphalt-surfaced walkway continues along the north side of the loop to Hermit Rest, with an overlook and metal guardrail immediately to the east. Much of the masonry found along this terminal loop dates to original construction, but the 1962 rehabilitation project mentioned earlier added 978 linear feet of masonry curbing, 80 square feet of masonry walls, and bituminous walkways for a length of 258 feet (5' wide), 184 feet (6' wide), and 305 feet (7' wide).

Summarily, West Rim Drive is not a "scenic drive" as constructed in other parks which offer grand distant views or towering cliffs from the roadway. It suffers in a scenic sense from the fact that most of the scenery is below roadway level. This is, of course, typical of Grand Canyon rim roads and was well understood by early tourism promoters, village planners, and GCNP superintendents. Although one account was found of "vista clearing" along the rim roads in the 1950s, this probably referred to brush clearing at the many scenic parking strips, pullouts, spurs, and loops. The BPR and NPS planned and built

West Rim Drive such that motorists would have to stop, and in many cases walk a few paces, to admire the nearby grandeur. This makes sense along a roadway where nature's adjacent cut slope is a vertical mile deep.

The roadway alignment and most of its associated structures date to 1934-35 construction. Almost all masonry walls bear the stamp of 1930s construction including the use of weathered, rough-cut stone chosen to mimic natural cliff formations. Many of the metal pedestrian guardrails at viewpoints, too, date to 1935. Both walls and guardrails conform to 1934 specifications, and narrative reports confirm that they were built where found today. It is necessary to note, however, that subsequent reports evidence a few wall and rail additions, relocations, and deletions, and unfortunately are not specific as to the location of these modifications. In 1978, for example, park crews rehabilitated 700 linear feet of guardrail and added another 300 linear feet along East Rim and West Rim drives.³⁴ Segments of these changes and additions (sympathetic to the original structures) were noted along West Rim Drive's scenic overlooks during this study.

SIGNIFICANCE/CONCLUSIONS

West Rim Drive is significant as an early example of the cooperative agreement between the NPS and BPR to build quality automotive roads within the national parks. The especial significance of this road over most other Grand Canyon roads is that the roadway and associated pullouts, spurs, and parking loops have been little modified since construction in 1934-35. The road retains its original alignment and has not been widened, thus, culvert headwalls and most retaining walls with parapets remain as originally constructed.

West Rim Drive, along with other rim drives within Grand Canyon National Park, should also be considered significant as examples of scenic roads deliberately constructed without scenic vistas from the roadway itself. This seeming paradox is explained by the danger of building too close to the Canyon rim in order to afford a view of the sculpted cliffs below. Early USFS and NPS planners conceived and constructed a scenic road system that employed interior roads with turnouts, spur roads, parking loops, and pedestrian viewpoints fronted by guardrails to offer scenery in a more casual and safe manner. West Rim Drive is the best example of this planning at Grand Canyon with more pullouts than others (despite its far fewer road miles) and retention of nearly all original rustic features.

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. H.C. Bryant to Horace M. Albright, letter, 12 July 1949, Reference File--Roads, Grand Canyon National Park Library (GCNPL); "Excerpts from Report made Jan. 25, 1910, to Forest Supervisor F.C.W. Pooler, on Roads and Trails in Grand Canyon," Reference File--Roads, GCNPL; Mattoon, "A Working Plan," 39.
3. "Special Use Permit to Santa Fe Land Improvement Company," 3 May 1909, copy in Cameron Papers, Box 5, File "Grand Canyon Legal Papers 1903, 1906-07, 1909-12," Special Collections Library, University of Arizona, Tucson; Pete Berry to Ralph Cameron, 14 June 1909, L.L. Ferrall to Ralph Cameron, 23 July 1909, Ralph Cameron to Gifford Pinchot, 7 August 1909, letters, Cameron Papers, Box 4, File 5; Ferrall to Cameron, 14 and 16 December 1909, Niles Cameron to Ralph Cameron, 18 December 1909, Box 4, File 7, Cameron Papers.
4. M.R. Tillotson, "Memorandum for the Files," 7 August 1931, Misc Construction D30--Hermit Rim Road Part I--Jan 1927-Sept 1934, GCNPL; Mattoon, "A Working Plan," 59-62.
5. "Report of Director of National Park Service," for Fiscal Year ended June 30, 1920, copy in Reference File--Roads, GCNPL; Superintendent's Annual Report, 1920, GCNPL.
6. Superintendents' Annual Reports, 1920-28; USDA, BPR, "Report of Survey and Proposed Construction on all of Route 8, Hermit Rest," 1934, copy in Misc Construction D30--Hermit Rim Road Part I--Jan 1927 - Sept 1934, GCNPL. This report is hereafter referred to as 1934 Route 8 Survey.
7. F.A. Kittredge to M.R. Tillotson, letter, 9 January 1928, Misc Construction D30--Hermit Rim Road Part I--Jan 1927 - Sept 1934, GCNPL.
8. M.R. Tillotson to G.L. McLane, letter, 31 December 1931, Misc Construction D30--Hermit Rim Road Part I..., GCNPL. This was one of several instances where private inholdings cost the NPS time and money on road projects, and necessitated poorer road alignments. Martin Buggeln's property along East Rim Drive caused even greater problems and actually led to a minor addition to GCNP.
9. Location information in the above paragraphs extracted from W.R.F. Wallace, "Reconnaissance, Hermit Rim Survey," 16-17 July 1931, Misc Construction D30--Hermit Rim Road Part I..., GCNPL.

10. Tillotson to C.H. Sweetser, BPR District Engineer, 12 September 1931; Sweetser to Tillotson, 15 September 1931; Vint to Tillotson, 19 September 1931; Vint to the Director, 1 October 1931; all letters in Misc Construction D30--Hermit Rim Road Part I..., GCNPL. This give and take continued into 1934, ironing out small details between the park, BPR, and landscape division. The numerous related correspondence indicate a cooperative effort to balance a modern highway design with one sensitive to the environment.

11. Tillotson to field headquarters [San Francisco], telegram, [December 1933] and Tillotson to Sweetser, letter, 3 January 1934, and Sweetser to McLane, letter, 12 January 1934, Misc Construction D30--Hermit Rim Road Part I..., GCNPL.

In the 1933-34 Annual Superintendent's Report, Tillotson mentions a 50' strip six miles long cleared of timber and brush, and that 6000 cords of firewood were thus obtained. This was probably clearing performed after the initial clearing to a width of 24'.

12. Tillotson to the Director, 15 September 1934, and Hillory A. Tolson to the Superintendent, 27 September 1934, both letters in Misc Construction D30--Hermit Rim Road Part II--Sept 1934 - Dec 1935, GCNPL. These references applicable to the obliteration work only.

13. 1934 Route 8 Survey. I have summarized the material contained in this survey report, but note that detailed information is contained within, including specifics on superelevations; and exact locations of each road approach (intersection), former culverts, new culverts, masonry curbs and walls, walkways, and metal railings.

14. C.H. Sweetser to Chief of the BPR, 13 September 1934, and First Assistant Secretary to C.H Daley and Vinson & Pringle, 29 September 1934, both letters in Misc Construction D30--Hermit Rim Road Part II--Sept 1934 - Dec 1935, GCNPL.

15. Acting Chief of Bureau [BPR] to Arno Cammerer, NPS Director, letter, 21 September 1934, Misc Construction D30--Hermit Rim Road Part II..., GCNPL.

16. USDA, BPR, "Extra Work Order No. 1," 1 November 1934, "Extra Work Order No. 2," 22 November 1934, and "Extra Work Order No. 4," 22 May 1935, Misc Construction D30--Hermit Rim Road Part II..., GCNPL.

17. Narrative reports, 13 April 1935, 25 May 1935, 29 June 1935, 27 July 1935, 29 September 1935, Misc Construction D30--Hermit Rim Road Part II..., GCNPL.

18. Change orders and narrative reports previously noted in Misc Construction D30--Hermit Rim Road Part II..., GCNPL, identify this equipment and its movement during the project.

19. 1934 Route 8 Survey; Vinson & Pringle to USDA, BPR, 9 October 1934; Langley to Thomas Carpenter, 19 November 1934; J.H. Brannon to G.R. Daley and Vinson & Pringle, 13 December 1934, all letters in Misc Construction D30--Hermit Rim Road Part II..., GCNPL.

20. Tillotson memorandum, 13 April 1935; Langley to Tillotson, memorandum, 13 April 1935; Narrative Reports of the BPR, 13, 20, 27 April 1935; all in Misc Construction D30--Hermit Rim Road Part II..., GCNPL. No final completion report was found for this project, but progress is tracked through varied correspondence and weekly narrative reports issued by J.H. Brannon, resident highway engineer.

Construction drawings (noted elsewhere), Sheet 2 of 30, show a second detour route running southwest from the old road near El Tovar Point, but narratives do not mention this detour being used.

21. Tillotson to the Director, letter, 26 July 1935; Hillory Tolson to E.K. Burlew, memorandum, 14 August 1935; G.L. McLane to Tillotson, letter, 20 August 1935; Weekly narrative reports, June - August, 1935; all in Misc Construction D30--Hermit Rim Road Part II..., GCNPL.

22. Narrative report, 3 August 1935.

23. Chief Ranger Brooks to the Superintendent, memorandum, 18 October 1935; Tillotson to the Director, letter, 22 October 1935; Langley to W.G. Carnes, letter, 1 November 1935; all in Misc Construction D30--Hermit Rim Road Part II..., GCNPL.

Reference 1932 Route 8 Survey; extra work orders and change orders, weekly narrative reports (a fairly complete set was assembled by the author), all found in the above-named file on microfiche. Also USDI, NPS, "As Constructed Plans for Project NR-8, Grading and Subgrade Reinforcement, Route No. 8--Hermit Rest," 1932-37 [varied sheets assembled], copy in Professional Services, GCNPL.

24. Annual Superintendent's Reports, 1935-36, 1936-37. All reports of superintendents and other park personnel herein noted are found in the GCNP Library on microfiche or in the GCNP Study Collection in hard copy.

25. Superintendents' Annual Reports, 1935 through 1942.

26. Superintendents' Annual Reports, 1942 through 1948.

27. Superintendent's Monthly Report, June 1954; Park Engineer's Monthly Report, June 1954; Park Engineer's Monthly Report, May 1955.

28. Joe Bice, GCNP Roads Supervisor, taped interview by author, 28 July 1994.

29. Joe Bice interview, 28 July 1994.

30. General sources used in the description section include the "As Constructed Plans for Project NR-8"; 1934 Route 8 Survey; weekly narrative reports, extra work orders, and change orders; all referenced earlier in this report. Also used throughout this section are field notes taken by the author 1 June 1994; and field photographs taken by the author 1 June 1994. Other sources used are referenced as required.

31. USDI, NPS, "Bus Turn-A-Round," drawings, November 1973, Denver Service Center (DSC) Technical Information Center (TIC) Drawing No. 113/60228.

32. Harry Langley to Thomas Vint, letter, 10 May 1932, Misc Construction D30--Hermit Rim Road Part I..., GCNPL.

33. USDI, NPS, "Construct and Rehabilitate Footpaths and Overlooks (Grandview, Yaki, Hermit Rest Overlooks), and Construct Various Village Footpaths," January 1962, GRCA 61773, Box 6, Grand Canyon Study Collection (GCSC), GCNP.

34. Trails Foreman to Chief of Maintenance, memorandum, 20 September 1978, GRCA 61773, Box 4, GCSC.

SOURCES CONSULTED

- Anderson, Michael F. Field observations, notes, and photographs, May - August 1994.
- Bice, Joe, Roads Supervisor. Interview by author, 28 July 1994, Grand Canyon National Park. Tape recording.
- Bryant, H.C., to Horace M. Albright, 12 July 1949. Reference File--Roads, Grand Canyon National Park Library (GCNPL).
- Mattoon, W.R. "A Working Plan for Grand Canyon National Monument, 23 June 1909." Copy in Professional Services, GCNP.
- Narrative Reports of Construction, weekly, August 1934 through November 1935. Misc Construction D30--Hermit Rim Road Part II--Sept 1934 - Dec 1935, GCNPL.
- Park Engineer's Monthly Reports, June 1954, May 1955. Grand Canyon National Park Study Collection (GCSC).
- Pooler, F.C.W. "Excerpts from Report Made Jan. 25, 1910, to Forest Supervisor F.C.W. Pooler, on Roads and Trails in Grand Canyon." Reference File--Roads, GCNPL.
- "Special Use Permit to Santa Fe Land Improvement Company, 3 May 1909." Cameron Papers, Box 5, File "Grand Canyon Legal Papers 1903, 1906-07, 1909-12," Special Collections Library, University of Arizona, Tucson.
- Superintendents' Annual Reports, 1920-54. GCSC.
- Superintendents' Monthly Reports, June 1954. GCSC.
- United States Department of Agriculture (USDA), Bureau of Public Roads (BPR). "Report of Survey and Proposed Construction on all of Route 8, Hermit Rest, 1934." Misc Construction D30--Hermit Rim Road Part I--Jan 1927 - Sept 1934, GCNPL.
- United States Department of the Interior (USDI), National Park Service (NPS). "As Constructed Plans for Project NR-8, Grading and Subgrade Reinforcement, Route No. 8--Hermit Rest, 1932-37." Copy in Professional Services, GCNP.
- USDI, NPS. "Bus Turn-A-Round, November 1973." Denver Service Center (DSC), Technical Information Center (TIC), Denver, Colorado.

USDI, NPS. "Construct and Rehabilitate Footpaths and Overlooks (Grandview, Yaki, Hermit Rest Overlooks), and Construct Various Village footpaths, January 1962." GRCA 61773, Box 6, GCSC.

Wallace, W.R.F. "Reconnaissance, Hermit Rim Survey, 16-17 July 1931." Misc Construction D30--Hermit Rim Road Part I--Jan 1927 - Sept 1934, GCNPL.

Numerous letters, memorandums, and reports identified in the endnotes were taken from the following files at Grand Canyon National Park Library and Grand Canyon National Park Study Collections:

Reference File--Roads

Misc Construction D30--Hermit Rim Road Part I--Jan 1927-Sep 1934

Misc Construction D30--Hermit Rim Road Part II--Sep 1934-Dec 1935