

ISA LAKE BRIDGE
Yellowstone Roads and Bridges
Spanning Isa Lake on Grand Loop Road
Yellowstone National Park
Teton County
Wyoming

HAER No. WY-31

HAER
WYO
20-YELNAP,
6-

BLACK & WHITE PHOTOGRAPHS
WRITTEN HISTORICAL & DESCRIPTIVE DATA

Historic American Engineering Record
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HISTORIC AMERICAN ENGINEERING RECORD

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Location: Spanning Isa Lake on Grand Loop Road, 8 miles south of Old Faithful Geyser, Yellowstone National Park, Teton County, Wyoming
UTM: West Thumb, WY, Quad. 12/522400/4920700

Date of Construction: 1942

Designer: Architectural plans (1936) by Thomas Carpenter, Branch of Plans and Design, National Park Service; Architectural plans (1940) by Branch of Plans and Design, National Park Service
General plans and specifications by A.R. Klein, Bureau of Public Roads

Builder: Peter Kiewitt Sons, Sheridan, Wyoming

Owner: Yellowstone National Park, National Park Service

Use: Vehicular bridge

Significance: Isa Lake Bridge typifies the early design philosophy of the National Park Service, which was to use indigenous materials to harmonize man-made features with their natural surroundings. This philosophy is embodied in many of the park's Rustic Style buildings and structures. The collaboration of the National Park Service landscape architects with the Bureau of Public Roads engineers during the 1920s and 1930s produced many fine examples of this philosophy. Isa Lake Bridge is also significant for its interpretive role in the park. It was carefully designed to promote interpretation of westerly and easterly drainage of park waters into the Atlantic and Pacific oceans.

Project Information: Documentation of Isa Lake Bridge is a part of the Yellowstone Roads and Bridges Recording Project, conducted during the summer of 1989 by the Historic American Engineering Record, a division of the National Park Service, under the co-sponsorship of Yellowstone National Park, the NPS Roads and Bridges Program, and the NPS Rocky Mountain Regional Office, Denver. Historical research and written narrative by Mary Shivers Culpin, Historian, NPS Rocky Mountain Regional Office. Engineering description by Steven M. Varner, Virginia Polytechnic Institute. Edited and transmitted by Lola Bennett, HAER Historian, 1993.

HISTORY OF OLD FAITHFUL TO WEST THUMB ROAD

In 1872 approximately 2,500 acres were set aside in northwestern Wyoming Territory as America's first national park, Yellowstone. The authorizing legislation stated that the park should be "set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people." Thus, the first superintendent, Nathaniel P. Langford, conceived the idea of a circuit road, which combined with good wagon approach roads, would enable visitors to reach the significant scientific and scenic wonders of Yellowstone.¹

The need for the construction of a road system remained a top priority with the first superintendents, but it took six years before Congress appropriated funds for any improvements in the park. The first wagons entered the park in 1877 with one having to be disassembled before it could be taken over the only bridge, Baronett Bridge. Prior to that time, and for many years hence on many of the routes, only pack-trains could manage the park roads.

By the end of 1882, 104 miles of the 140-mile circuit system had been completed, however, the general quality of the roads was poor due to lack of sufficient funds and over-ambitious planning. In 1883 the U.S. Army Corps of Engineers assumed road construction responsibility from the civilian superintendent who was under the direction of the Secretary of the Interior. The Army Corps' involvement with the road program in Yellowstone lasted for thirty-four years. Fortunately, the engineering officers who had the most influence on the road projects, Dan Kingman and Hiram Chittenden, developed a philosophy which called for harmonizing man-made features with the landscape. This landscape ethic was expanded in later years by landscape architects of the National Park Service.

Funds were limited and construction of roads continued to be slow, so Yellowstone Park Company President Charles Gibson began lobbying efforts in 1888. The park concessioner pushed for completion of a "grand loop" system, citing that visitors were unable to view some the park's spectacular scenery. Gibson's plea before the House of Representative's committee on appropriations reveals the importance of the Grand Loop to the interpretation of the park:

When one stands before the majesty of nature in the park, and then sees the roads, he feels like the peacock when looks down upon his feet. When he is being jostled over the stumps, gullies, and rocks of the trails in the park his spread-eagle Americanism droops in shame. ... If these are never to be built, why was the park established? And if they are to be made, why not make them now?²

Shortly afterward, Engineering Officer William Craighill became the first person to survey the Old Faithful to West Thumb route. Not knowing the precise route that the road would take, Craighill had crews working from either end. Before the road was completed, Craighill was replaced by a significant figure in Yellowstone's history, Lt. Hiram Chittenden. One of Chittenden's first assignments was to complete Craighill's project from Old Faithful to West Thumb road. In 1891, Congress required that the route be built by the shortest practicable route.³

Thus, Chittenden's recommended route, which closely paralleled today's road, did not skirt Shoshone Lake as Captain Kingman proposed, but instead crossed Isa Lake and crossed the Continental Divide twice. According to a Yellowstone historian Aubrey Haines, Chittenden discovered that crews on the Old Faithful end were following the old Norris trail. "That was Mr. Lamaratine's idea of locating a road--to follow a trail with all its irregularities and excuses of gradients, regardless of what improvements could be made by something of a survey." Haines

wrote, "Chittenden found it necessary to do the locating himself, working alternately at the two ends of the line with a hand level, a five foot staff, and the assistance of two laborers."⁴ The road, completed during the summer of 1892, is one-third shorter than Kingman's proposed route via Shoshone.⁵

In 1891 or 1892, a trestle bridge was constructed to span a ravine 1½ miles from West Thumb and Log Cabin Bridge across Heron Creek was built. Log Cabin Bridge consisted of "two piers built up of logs resembling a log cabin, hence its name. There are also two wooden abutments. The spaces between the piers are spanned by stringers of white pine logs."⁶

The Grand Loop was finally completed in 1905. In 1908 a small bridge was built on the flat near DeLacy Creek and repairs were made to bridges over Heron Creek and DeLacy Creek.⁷ In 1909 Engineering Officer Wildurr Willing made a thorough inspection of the bridges in the park. He recommended that the trestle bridge near West Thumb be replaced with a low truss, pin connected steel span, 60' in length, which would rest on concrete abutments. He called for replacement of Log Cabin Bridge with a 60-foot steel arch span with steel approaches at either end. Due to an abrupt turn at one end of the bridge, that end had to be widened "so as to permit the four-horse teams to swing onto the bridge with ease". Another trestle bridge, 60' in length and constructed of pole bents and stringers, which spanned a ravine one mile west of West Thumb, was scheduled to be replaced by a 4-foot culvert pipe.⁸ It was replaced in 1913 by a concrete culvert and earth-filled wooden crib.⁹ In 1912 a road assessment was conducted to determine the suitability from an engineering standpoint of the system for the introduction of automobile traffic in the Park. Army Corps officer Captain Knight concluded that it would be better to reconstruct the existing system than to create a separate system for motorized vehicles, as some had suggested. Not much work was done on Old Faithful to West Thumb Road but a 25-log bridge had been constructed in 1911 (exact location not known).¹⁰ In 1915 three concrete culverts from 4- to 6-foot spans and been built along Spring Creek and the foundation for three more, plus several galvanized culverts, had been installed along the road segment. These replaced older wooden ones.¹¹

In 1918 the newly-created National Park Service assumed the responsibility for road improvement and construction in Yellowstone National Park. The Secretary of the Interior, Franklin Lane reaffirmed the Army Corps of Engineers' philosophy toward road construction in the park. In his statement of National Park policy, he addressed road construction specifically by calling for harmonizing roads, trails, buildings and other improvements with the landscape, and employing "trained engineers who either possess the knowledge of landscape architecture or have a proper appreciation of the aesthetic value of park lands."¹²

LANDSCAPE ARCHITECTS AND THE BUREAU OF PUBLIC ROADS

In 1926 the National Park Service and the Bureau of Public Roads (BPR) reached an agreement that the BPR would survey, construct and improve the road system in the Park. As part of the terms of the agreement, the BPR would provide all of the technical expertise and the National Park Service would provide design work and special treatments pertaining to landscape architecture. National Park Service landscape architects worked closely with the Bureau in order for the road system including the bridges to harmonize with the natural features and surroundings. At that time, most of the park roads were considered unimproved and some of the roads were so narrow that they were restricted to one-way traffic. The Old Faithful to West Thumb segment as well as Dunraven Pass, through Gibbon Canyon from Norris to Madison Junction were one-way roads. With the exception of several selected areas, none of the roads were surfaced. Mud during the wet season, and dust during the dry season presented many maintenance problems. The Grand Loop was treated daily with a dust palliative.

Weather, short construction seasons, thermal features, topography, existing weak bridges, traffic, and unusual geological features presented many hindrances in the design and construction of the improvements and new roads. Limited annual funds and careful examination and review of all proposed plans of the Bureau of Public Roads by the National Park Service resulted in the roads projects stretching over many years.

It was preferable to follow the earlier-designed Grand Loop system as that configuration had been well thought out, it gave access to many of the scenic wonders, developments were already established along its route, and it would prevent excessive and additional scaring and excavations. However, some realignment was necessary, including the realignment of the Old Faithful to West Thumb route.¹³ A 1926 park report suggested that the wooden bridge just south of Old Faithful be replaced with a concrete structure, and that all of the Dry Creek culverts have their capacity increased. The report also called for installation of metal culverts for that section of the road.¹⁴ Intensive reconnaissance surveys of this segment were completed by Worth Ross in 1927 and by A.C. Stinson in 1934 at the request of Superintendent Roger Toll. Toll urged for a speedy completion of the survey with expectations of going into construction the following year. Records for 1934 recall that this segment, which is an integral part of the Grand Loop system, was the "lowest type and poorest main road in the Park."¹⁵ BPR engineers felt that the road was far below the standards of roads elsewhere in the park. During 1934, the road was being traveled by approximately 250 cars daily, whereas the approximate daily use for other segments was 500 cars daily. These figures were based on records of previous years indicating 50,000 cars entering the park during the 100-day season. Officials felt that low usage of this segment was due to one-way traffic regulations and poor road conditions.

A \$10,000 allotment for the 1934 survey was approved, and the survey began July 5. The fifteen-man crew completed the staked lines survey October 22 of that year. Later, an additional \$4,000 was approved for the survey project. The surveying crew found the crooked and narrow one-lane road following, "most of the devious windings of the water courses, which it employs in the ascent to and descent from the two crossings of the Continental Divide. The road employs a great many sharp curves and a few sketches of excessive grades ..."¹⁶ The road width varied from 12' to 20'. The wider sections were found in the flatter country and also at the beginning of the ascent to Craig Pass which also has some of the rockiest sections of the route. Less rocky country, but very crooked alignment was found in the lower section of Dry Creek, while the upper section of Dry Creek was described as "rolling hilly country of less rugged nature." The descent road from the second Continental Divide crossing to West Thumb ranged from gentle to very steep slopes as one neared Yellowstone Lake. The survey team reported that earlier work had been designed to incorporate a "fine view" of the Yellowstone Lake at one of the very sharp curves and further down the road an overlook was built for a view of Duck Lake, a spring-fed lake lying between the bluffs and Yellowstone Lake.

At the conclusion of the survey, the Bureau of Public Roads made seven different proposals, some of which followed similar alignments but dealt with specific problem areas. The selected proposed route was a compromise between the National Park Service, which imposed strict guidelines concerning landscape, design, vistas, and the use of the segment for interpretation and the Bureau of Public Roads whose aim was to find the most suitable ground for a modern highway. The 1934 survey report recommended some new road construction, some incorporation of the earlier road, and the use of a 24-inch culvert as an equalizer between the two lakes (Isa Lake) with the road running on the left side of the first lake and the right side of the second lake. It proposed parking spaces at Shoshone Point for views of Shoshone Lake and the Teton Mountains, at Mt. View where selected clearing would provide fine views of mountain peaks, and Yellowstone Lake. Other vistas considered on this segment were views of Flat Mountain at the south end of Yellowstone Lake, the Trident in the southeastern section of the park, and views of

Yellowstone Lake. The report stated, "This is a magnificent and worthwhile view (Yellowstone Lake) and should be preserved." The engineer admitted that another approach to West Thumb was more favorable and less expensive but "does not develop this view, and, although occupying better exposure, results in probably a little less satisfactory alignment."¹⁷

The proposed route shaved 2.7 miles off the earlier route. The length of the 1934 route was 17 miles, the route crossed Firehole River and four creeks. The report recommended concrete box culverts for the creeks and remaining drainage cared for by corrugated, metal pipes or in high erosion areas, paved inverts for some of the pipes. The park afforded one of the major concessioners, W.M. Nichols, President of Yellowstone Park Hotel Company, to comment on the proposed new alignment. Nichols suggested that the old section through Spring Creek Canyon, which he considered "one of the prettiest short trips on the Loop," might be also retained as a one-way east-bound road. He stated, "As for our own buses, it would make a delightful trip, because, as you know, the buses have their tops down most of the time, and people can view scenery even in a narrow canyon like Spring Creek."¹⁸

Prior to the 1934 survey, the discussion of road width was an important topic and one of disagreement between the Bureau of Public Roads and the National Park Service. In a 1931 letter, the BPR's District Engineer discussed construction width, shoulder-to-shoulder, for all sections of Grand Loop Road. The National Park Service responded by telegram, calling it "a matter of overdesign." After several conversations and the BPR's survey reason for the greater width, the 28-foot width was accepted and some projects proceeded using the 28-foot standard. In a February 12, 1934, letter from Superintendent Toll to the Director of the National Park Service, Toll questioned whether a recognized agreement on the 28-foot width existed.¹⁹ The previous 24-foot accepted standard for all park was raised to 28' for Grand Loop Road and 26' for entrance roads.

By 1936, ten years after the initial road survey, 200 miles of the park road system had been improved to a drain and grade standard. Approximately 100 miles had been base course surfaced which consisted of crushed rock, spread the full width of the graded section to a compacted thickness carrying from 4" to 9" depending on subgrade conditions. Approximately fifty miles had a bituminous treated surface which was 20' wide with a 2½-inch minimum compacted thickness with a seal coat and a wearing surface of stone chips. This treatment was the desired ultimate completed surfacing for all of the roads. Approximately thirty miles was under construction for bituminous surfacing; nineteen major bridges including the new Golden Gate Viaduct were either completed or near completion. With approximately 60 percent of the project completed the total cost, including 1936 work in progress, was \$7,000,000. However, the Old Faithful to West Thumb segment was not completed.²⁰

Refinements of the details and revisions of the 1934 report and recommendations began almost immediately after the publishing of the report. In fact, in the published report, the author acknowledges the cooperation of Superintendent Toll, but indicates that they had "less effective" cooperation with the Landscape Division of the National Park Service.²¹ Perhaps this indicates the importance of the Landscape Division's input toward the completion of the park's road system to park standards. One of the requests from Resident Landscape Architect Sanford Hill was, "the cleanup of old logs and down timber along the small creeks and particularly along Isa Lake be held to the minimum. We feel that the cleanup along these streams would tend to destroy a natural condition, and also destroy a natural check on erosion."²²

Very early in the park road development, concern for visual quality, interpretive values, and limited destruction of the landscape is evidenced in U.S. Army Corps of Engineer's Captain Kingman's standards, which were continued through the 1930s and 1940s. The landscape architects in the National Park Service Branch of Plans and Design collaborated with BPR engineers during the survey and throughout the planning and design stages of construction. The

park's resident landscape architect monitored the actual construction and supervised the development and construction of landscape features. Among the examples throughout the park of a landscape architects input are the roadside pullouts, trails, cut-and-fill slopes and other special design features. "The rounding of tops of cut slopes and the flattening of cut and fill slopes in earth material" had long been standard practice for the National Park Service road design. In the Rocky Mountain West, the state highway departments adopted the same practice. Another landscape problem was rehabilitation of abandoned roads, a problem which existed on the Old Faithful to West Thumb segment. The problem was addressed by reversing construction procedures and "placing the materials from fills back into the cuts and attempting to reestablish the original contour and topography of the terrain."²³ In wooded areas trees were planted, and in barren areas the old roads were covered with duff and top-soil to promote vegetative cover and prevent erosion.

Travel on this segment of the Grand Loop had increased to nearly 1,200 cars daily. The new alignment at a point just east of Isa Lake followed the old road, swinging north, crossing Herron Creek, and down to DeLacy Creek crossing on a high fill to Shoshone Point. A parking area was constructed at Shoshone Point to enable the visitors to experience the beautiful view of Shoshone Lake with the Teton Mountains as a backdrop on the horizon. From the parking area, the new road followed the older road until leaving the old alignment and headed to Dry Creek continuing in a southeasterly direction "along the west slopes of Dry Creek and DeLacy Creek basins to the rim of the Continental Divide then the descent into the West Thumb. As the road descends on a combination of tangent and very light curves, the mountains to the east become visible. As the road passes through a triple compound curve to the right, one could see Lake Yellowstone just before reaching West Thumb. This view was intended to take in not Lake Yellowstone, but the lake's islands and the Absaroka Range. It was during this approximate time that the steel Herron Creek bridge was removed and culvert work was done and also at DeLacy Creek. Log guard rails were constructed on both segments. At one point on the road the landscape architects had a hand-placed embankment put around a lodgepole pine tree just on the edge of the road."²⁴

The grading project continued from 1935 to 1938, with contractors under the supervision of the Public Roads Administration completing the job. Combined with the final costs on surfacing completed in July 1941, the total cost for the 17.083 miles was \$359,949.75, or approximately \$21,000 per mile. Upon its completion, the engineers recommended centerline striping over the entire length, with double-line striping for curves. The engineers felt that the maintenance work would be reduced if the gutters were paved and other roadside measures taken. The engineers stated, "No unusual or difficult engineering problems were encountered" during construction."²⁵

DESIGN AND CONSTRUCTION OF ISA LAKE BRIDGE

One of the controversial topics of the Old Faithful to West Thumb segment was the road alignment at Isa Lake and the architectural details of the proposed Isa Lake Bridge. The National Park Service was opposed to the use of a culvert to suffice drainage purposes, but requested construction of a low timber bridge "to preserve the natural existing conditions as near as possible."²⁶ The decision to construct the bridge was accepted but several years would pass before the final details were worked out and construction took place.

During 1936 the maintenance of a log bridge was discussed in a letter to the BPR's District Engineer J.A. Elliot from Acting Superintendent J.W. Emmert, in which Emmert pointed out that drawing No. YELL 3242 had logs located in positions that promoted rapid decay. He proposed a penetration treatment method, or the use of redwood logs to prolong the life of the bridge and

keep maintenance costs to a minimum.²⁷ In September of 1936 the subject of concrete decking and its color was addressed in a letter to Superintendent Edmund Rogers from Regional Landscape Architect Ernest Davidson. The use of the concrete decking allowed the bridge to be "kept about a foot lower in elevation than if a timber deck were used." The landscape architect recommended that "the road slab be stained with road oil to have a similar color to the adjoining sections of road."²⁸

Rogers responded, "the concrete slab should be stained as suggested ... in order to avoid any sharp break in color contrast between roadway and bridge." He also wrote, "We feel that the missing bridge links on the loop highway are very important and should be pushed along as rapidly as possible."²⁹

In 1938 Park Naturalist C. Max Bauer sent a memorandum to the Superintendent stating his preference for a "simple type of structure," as he felt the current plans were too elaborate. He wrote, "I am particularly interested in preserving Isa Lake as nearly as possible like it is at present and any structure which would be any higher than the present fill would seem to me to be objectionable."³⁰

A September 1940 memorandum to NPS Chief of Planning Thomas Vint from Deputy Chief of Planning Thomas Carpenter, revealed that a proposed revised location for the road and bridge had been made by the BPR engineer. The BPR engineer would be presenting the proposed location of the road and a new architectural plan for the log bridge.³¹

The following June, Carpenter sent a memorandum to Vint telling him that he had addressed Vint's review comments and was enclosing a set of prints of the revised plans (YELL-2050A and YELL-2051A). Carpenter stated that almost all of the fill shown in connection with the first design had been eliminated. In order to achieve the landscape architect's desire "to give the effect that the bridge is crossing the lake and is not the division between two small lakes ... it has been necessary to go to a length of some 120 feet in the north elevation." This memorandum brought up the discussion of the use of sidewalks. The Park Service was not in favor of adding sidewalks to the Isa Lake Bridge, while the BPR was. The Park Service presented a compromise, in which a 12"-wide log curb on the northerly side of the bridge would be used for pedestrian traffic. Carpenter felt that the National Park Service may have to agree to add 1' or 2' to the width to avoid raising the height of the railings as designed. Carpenter explained that the BPR planned to place signs on either approach to the bridge "indicating that this would be zoned for slow speed."³²

Regional Landscape Architect Howard Baker responded to the Chief of Planning in a July 2, 1940, memorandum regarding the sidewalk issue. In response to the BPR's insistence that "some sort of walk" be put on Isa Lake Bridge, Baker and the park landscape architect surveyed other Yellowstone bridges with sidewalks. He wrote that many of them showed no wear or usage, which "leads me to believe that we can dispense with walks on bridges except in very congested and highly developed areas." He noted that the addition would complicate construction and increase the cost. He closed by writing, "I hardly see any necessity for even widening the bridge over the width that is now proposed."³³ Vint agreed with Baker's assessment that sidewalks should be omitted and that the laying of a 14-inch log down on the deck (to serve as a sidewalk) was inadequate for its purpose and was an additional place for rot to set in. He suggested an alternative of a 8-inch log supported 1" or so above the deck so that the top of the log is 1" above the deck level. Vint agreed, "the additional length of the bridge will help a good deal toward helping the visitor to realize that Isa Lake is one body of water, rather than two. I feel this is particularly important when we point out that the lake is located on the Continental Divide with two outlets--one going to the Pacific and the other to the Atlantic."³⁴

The revised plans (YELL 2050A and 2051A) were sent to the Bureau of Public Roads office in San Francisco July 17, 1940, with the following request:

1. The construction of the treated timber is based on the design of "having a bridge which will give the appearance of crossing the lake rather than being a division between two small lakes," thus the National Park Service requests that the bridge width is kept as narrow as possible. The designed top surfacing width was 20 feet on a graded width of 24 feet shoulder to shoulder. Mr. Carpenter points out that National Park Service studies indicated that fitting the bridge to the alignment required the additional width as drawn on the plans in carrying the curvature across the bridge.

2. The National Park Service agreed with the Bureau of Public Roads that the area should be zoned for low speeds. The National Park Service recommends a speed of 15 miles per hour through the area. He stated that the park administration customarily recommends slower speeds through areas of special interest where people may wish to stop. He wrote, "Because of this area being zoned for slow speed it should be possible to design for a minimum of super elevation on the bridge."

3. Again the National Park Service officials suggested that the sidewalks be eliminated for several reasons--it would increase the width; it would make it difficult to maintain the log railings; and it would encourage visitors to cross the bridge in a westerly direction, then cross the road on the inside of a curve--the park felt that the visitor could get an adequate view from the walk around the proposed parking area.

4. National Park Service recommended that the grading and sloping details be carefully carried out. "The cut slopes would be constructed flatter in either direction depending upon the height of the cut, and transition rounding would be introduced in the cut and fill slopes in order to obtain as nearly as possible, slopes with a natural angle of repose which will aid in restoring proposed environment for the lake shores."

5. The National Park Service recommended that top soil or a type of soil that will readily support vegetation be used to cover any cut or fill slopes.

6. The National Park Service felt that the old road encroached on the lake so the park "would suggest that some removal of this fill should be considered".

Carpenter pointed out that this project was scheduled for the proposed 1941 Fiscal Year construction season. He asked the Bureau to proceed with the preparation of engineering drawings for the bridge "on the basis of our preliminary architectural plans."³⁵

In August Carpenter wrote Park Landscape Architect Hill that Dr. Hewes of the Public Roads Administration (formerly Bureau of Public Roads) agreed to the elimination of sidewalks, but proposed to leave the top of the railings 2'-4" above the bridge deck. Carpenter would have preferred it lower, but believed it would provide a satisfactory design. The plans called for bituminous surfacing for the bridge deck which would "get away from calling attention to the skew at the easterly end of the bridge. Lastly, the Public Roads people and the National Park Service agreed that the simplest location for detouring traffic while the bridge was under construction wa a bypass on the south side of the bridge."³⁶

By November 1940, the Public Roads Administration was ready to forward the plans to the

National Park Service for approval. Their estimated cost for the bridge was \$15,000 and the estimated cost for the grading and parking area was \$17,000. These estimates did not include surfacing which was figured into the entire road segment project which had been estimated at about \$125,000.

District Engineer B.W. Matteson wrote, "It is our (Public Roads Administration) understanding that only two parking areas are proposed for improvement on this route--at Kepler Cascades and at Isa Lake." He also wrote that Park Landscape Architect Hill and Superintendent Rogers wanted paved gutter and rolled edges on fills. He requested sketches of these from the National Park Service immediately before the plans had proceeded much further.⁵⁷

In response to gutter and parking areas details, Sanford Hill, Resident Landscape Architect sent a memorandum to Carpenter stating that the park engineers "recommended that the gutter design be worked out so that the ditch provides a gutter area for carrying off the drainage. It is suggested that perhaps a 6:1 slope could be used to develop a slightly deeper ditch and possibly increase the width of the paved gutter." He proposed the use of a rougher texture on the paved gutter section and that the paved gutter sections be carried through all the cuts because of the existing soil types. Hill recommended that a cobblestone-type pavement as a marker be used for the round shoulder and also shoulder be used before the Kepler Cascade and Isa Lake parking areas. Hill pointed out that all of the guardrail on this road segment had been erected. He stated that "a guardrail was merely suggestion for handling the entire width of fill sections."⁵⁸

In October 1941, Senior Highway Engineer Capes filed a location survey report on the project stating that the survey and final plans for the West Thumb area and the Isa Lake Bridge area were completed during the winter of 1940-41 and that the final plans for the Old Faithful area had been delayed due to the complications of the relocation of concession buildings. The purpose of relocation of the segment is to move the main road farther away from Old Faithful Geyser and thus relieve traffic congestion immediately in front of the geyser. The 1941 report revealed the latest traffic count indicated that this segment was now the heaviest traveled section of the Grand Loop. Capes wrote, "In order to comply with the requirements of the Landscape Architects, it is proposed to construct a timber bridge cross the Isa Lake ... Its construction is justified primarily by the sentiment attached to the small lake on the summit of the Continental Divide and to desire to preserve the lake, out of which water flows easterly to the Atlantic watershed and westerly to the Pacific."⁵⁹ The report stated that the timber for the construction of the bridge would be secured from a West Coast region source and that "there is no particular inducement for pedestrian traffic across the bridge, no sidewalks should be built."⁴⁰

Capes reported that the Standard Specifications for Forest and Park Highway and Bridge Construction would satisfy most of the projected construction, however, special provisions were necessary for some features--smaller maximum size cover aggregate for sidewalks, barrier stones, pavement guide markers, special log curbing, and the removal of power and telephone lines and the construction of underground systems to replace them.

Shortly after Capes' report was sent, the United States entered World War II. Construction activity in the parks virtually came to a halt during the war years. The National Park Service Director, Newton Drury advised H.K. Bishop, Chief of Division of Construction for the Public Roads Administration that the Secretary of the Interior was instructed by the War Production Board to discontinue all projects "costing over \$10,000, due to the fact that the aggregate demands of the war program for materials, labor and transportation are so great as to be jeopardized by a continuance of federal non-war projects."⁴¹ However, Isa Lake Bridge was completed in July 1942.

DESCRIPTION

The eight-span timber and log bridge with maximum span length of 24'. Five spans are 24' while three spans are 20'. The span length is measured from center of support to center of support. The bridge is 160' long and has a deck width of 28', curb-to-curb. The two-lane bridge has no sidewalks and the deck surface is 5-inch asphalt; the railings are 9½"-diameter logs, and the bents and pilings are logs. The pilings for the trestle piers form a line perpendicular to the bridge center line while the pilings for the trestle abutments form an angle of about 45 degrees with the bridge center line. The abutments are on a line that is nearly north-south. All pilings are capped with a 1"-diameter cap log. On the outside of the bridge are logs spanning longitudinally between cap logs. An untreated deck rests on the cap logs. The guard rail consists of log posts rising over the logs that span between the cap logs. These posts are located at the cap logs and at midspan. They support a longitudinal log rail which has a top 1'-6" above the deck.

Originally the plans called for Port Orford cedar pilings treated with salts preservative, but due to the shortage of the cedar, Coast Region Douglas Fir treated with Wolman Salts was used. The change in wood types resulted in increasing the amount of creosoted bulkhead planks required. The shortage of creosote preservatives also resulted in the use of Wolman Salts for the timber deck.⁴²

After the bridge was completed the remainder of the road project, placing the final surface, finishing the fill slopes, obliterating the borrow pits and the obliteration of the old road, was postponed. The park landscape architects reported that the bridge turned out "very satisfactorily, [but] the approach to the bridge from the Old Faithful end is not well designed as the opposite approach. It appears that we have cut the bridge short and filled unnecessarily into Isa Lake."⁴³

In 1944 the project was considered 67 percent finished with some miscellaneous minor work and the bituminous surfacing yet to be completed. By October 1947 the major construction project was completed. The road, in 1947, was considered the heaviest traveled in the park carrying between 3,100 and 3,800 vehicles per day during July and August.

RECENT HISTORY OF OLD FAITHFUL TO WEST THUMB ROAD

By 1945, seeding of the roadsides had been completed, but the planting of trees, as specified in the contract, had been done. The contract called for an unspecified number of 2-year old pine and fir seedling stock trees and additional number of trees up to 8' in height. The National Park Service felt that some natural reseeding of lodgepole pines had already begun and that any transplanted stock would have to come from within the Park.⁴⁴

In 1947 work on completing the surfacing of the road continued. Using material from the following sites, McLaughlin, Incorporated of Great Falls, Montana began work on June 15, 1947.

Plant mix aggregate--Stockpile at Dry Creek pit, 4½ miles east of project
Cover aggregate--Stockpile at Old Faithful--originally produced from Basalt rock slide, 2½ miles east of West Yellowstone
Concrete aggregate--Sand from pit left of Sta. 342, Sec. 1-C2, Gravel from Yellowstone River at Livingston
Topsoil--Pit on old road 5½ miles east of project
Liquid Asphaltic--Rusky Oil Company Refinery, Cody, Wyoming
CGSM Pipe--Armco pipe from Hardesty Manufacturing Company, Denver, Colorado

When the project was completed the following materials were stockpiled for use by the maintenance crews:

1850 tons plant mix--Dry Creek pit
165 tons 2" base course--Dry Creek pit
700 tons 3/4" cover aggregate--at Dry Creek pit
85 tons 3/8" cover aggregate--along road six miles east of Old Faithful, and at Old Faithful power house.⁴⁵

The new contractor used the same road camp, that was approximately at the midway point of the project, that the previous contractor, Peter Kiwiet had used in the early 1940s.

Part of this final work was the surfacing and finishing of the parking area on the east side of Isa Lake Bridge. The finished work included a boulder pavement guide marker between the traffic lane and the parking area. The guide marker at the Kepler Cascade parking area, completed at the same time, was a black, 1-inch chip material.

In 1960 more surfacing was done to the road segment amounting to \$2,192,708.76. In 1980s, the road segment continues to be a primary public access road to major points of interest in the Park. The 1988 the reconstruction of this section of road was undertaken by the Federal Highway Administration.

In addition to historic Isa Lake Bridge, the road also has three significant stone culverts and headwalls--Herron Creek, DeLacy Creek, and Dry Creek. The road also has ninety-six stone-faced culverts of different types and sizes. Herron Creek Culvert is a reinforced stone faced concrete box culvert with a 5'-4" x 9'-0" x 142'-0" stone masonry headwalls. DeLacy Creek Culvert is a reinforced stone faced concrete box culvert with a 5'-4" x 11'-3" x 185'-0". Dry Creek Culvert is a reinforced stone faced box culvert with 7'-4" x 11'-3" x 185'-0".

Several modern bridges are also on this segment. Old Faithful Interchange is a 32-foot shoulder to shoulder paved roadway constructed in the mid-1960s. The interchange has a three-span cantilevered reinforced concrete T-Beam, 102-foot long, two-lane bridge with steel railings and a deck width of 32'. A two-span concrete continuous T-Beam bridge, 80' long, with a 32-foot deck width curb to curb, built in 1969, is near the Biscuit Basin Parking area just west of Old Faithful Interchange. The bridge, sited over a major hot spring in an active thermal area, has steel tubular rails. The roadway in this area is 62' wide, shoulder-to-shoulder. The pavement surface is concrete. Just south of Old Faithful Interchange is Firehole River Bridge (II) built in 1970. This bridge is a three-span continuous reinforced concrete T-Beam type. The two-lane bridge is 168'-8 3/4" in length and has a 28-foot deck, curb-to-curb. The bridge has 3-foot sidewalks on either side. The roadway width in this area is 34' wide, shoulder-to-shoulder, with the road surface being bituminous plant mix.

The 1985 statistics indicate that approximately 6900 vehicles travel this road daily with a projection for 2005 of 8,500 vehicles.⁴⁶

ENDNOTES

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4. Aubrey Haines, The Yellowstone Story, vol. II (Boulder: Colorado Associated Press, 1977) p. 218.
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6. Captain Wildurr Willing, "Report of Inspection of Bridges in the Yellowstone National Park, Made September 24, 25, and 26, 1909, With Recommendations by Request of Captain Wildurr Willing, Corps of Engineers, U.S.A."
7. Captain Ernest Peak and Major Hiram Chittenden, "Report on the Upon the Construction, Repair, and Maintenance of Roads and Bridges in the Yellowstone National Park and Report Upon the Road Into Mount Rainier National Park" (Washington D.C.: Government Printing Office, 1908) p.2544.
8. Willing.
9. Captain C.H. Knight, Major J.B. Cavanaugh and Major Jay J. Morrow, "Report Upon the Construction, Repair, and Maintenance of Roads and Bridges in the Yellowstone National Park. Report Upon the Road Into Mount Rainier National Park" (Washington D.C.: Government Printing Office, 1913) p.3268.
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12. Report of the Director of the National Park Service to the Secretary of the Interior for the Fiscal Year Ended June 30, 1918 (Washington D.C.: Government Printing Office, 1918) p.274.
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14. "Tentative Suggestions for Improvements to Park Roads," 1926.
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19.Ibid, p.15.

20.Ibid.

21.Ibid, pp.27-28.

22.Memorandum to C.F. Capes, Bureau of Public Roads, from Sanford Hill, Resident Landscape Architect, 2 June 1936.

23.Capes, "Highway Improvements in Yellowstone National Park."

24.F.E. Ammann, "Final Construction Report (1936-37-38) Grand Loop National Park Project 1-D2 Grading Yellowstone National Park," Public Roads Administration, D-3 Federal Works Agency.

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26.Stinson, p.17.

27.Letter to J.A. Elliot, Bureau of Public Roads District Engineer, to Acting Superintendent, Yellowstone National Park, J.W. Emmert, 14 February 1936.

28.Letter to Superintendent Edmund Rogers, Yellowstone National Park, from Ernest Danielson, Regional Landscape Architect, 5 September 1936.

29.Letter to Ernest Davidson from Edmund Rogers, 10 September 1936.

30.Memorandum to Edmund Rogers from Max Bauer, Park Naturalist, 23 August 1938.

31.Memorandum to Thomas Vint, Chief of Planning, National Park Service, from Thomas Carpenter, Deputy Chief of Planning, National Park Service, 7 September 1939.

32.Memorandum to Thomas Vint, Chief of Planning, National Park Service from Thomas Carpenter, Deputy Chief of Planning, National Park Service, 24 June 1940.

33.Memorandum to Thomas Vint, Chief of Planning, National Park Service from Howard Baker, Regional Landscape Architect, 2 July 1940.

34.Memorandum to Thomas Carpenter, Deputy Chief of Planning, National Park Service from Thomas Vint, Chief of Planning, National Park Service, 8 July 1940.

35. Letter to Dr. L.I. Hewes, Chief of Western Region Public Roads Administration from Thomas Carpenter, Deputy Chief of Planning, National Park Service, 17 July 1940.

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39. C.F. Capes, "Location Survey Report (1939-40) on General Loop 1-D Bridge Design; 1-D1, D2 Improvements, Yellowstone National Park, Wyoming," pp.3-5.

40. Capes, p.5.

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