

Triple Arches

Spanning a rift on the side of Pollock Mtn.,
beneath Going-to-the-Sun Road

Glacier National Park

Flathead County

Montana

WEST
GLACIER

HAER No. MT-79

HAER
MONT,
15-NEGLA,
12-

PHOTOGRAPHS
REDUCED COPIES OF MEASURED DRAWINGS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, DC 20013-7127

HISTORIC AMERICAN ENGINEERING RECORD

TRIPLE ARCHES
HAER MT-79

HAER
MONT,
15-WEGLA.
12-

Location: Spanning a rift on the side of Pollock Mountain, beneath Going-to-the-Sun Road, approximately twenty-nine miles northeast of the park entrance at West Glacier, Glacier National Park, Montana
UTM: Logan Pass Quad. 12/300100/5399300

Date of Construction: c. 1926-28

Structural Type: Three-span masonry arch bridge/retaining wall

Contractor: Williams & Douglas, Tacoma, Washington

Engineer: Bureau of Public Roads

Owner: Glacier National Park

Use: Vehicular bridge/retaining wall

Significance: The Triple Arches is one of approximately seventeen prominent masonry and concrete structures on Going-to-the-Sun Road in Glacier National Park. The 51-mile stretch of scenic road is significant as a unique engineering accomplishment of the early twentieth century, and as the first product of a 1925 cooperative agreement between the National Park Service and the Bureau of Public Roads. The Triple Arches, a unique three-span half-bridge, was a more creative, less expensive, and less imposing design for this site, than a solid masonry retaining wall would have been.

Project Information: Documentation of the Triple Arches is part of the Going-to-the-Sun Road Recording Project, conducted during the summer of 1990 under the co-sponsorship of HABS/HAER and Glacier National Park. Researched and written by Kathryn Steen, HAER Historian, 1990. Edited and transmitted by Lola Bennett, HAER Historian, 1992.

Going-to-the-Sun Road

The Triple Arches is a three-span masonry arch half-bridge located about two miles west of Logan Pass on Going-to-the-Sun Road in Glacier National Park. Going-to-the-Sun Road is a scenic park road that winds through the spectacular mountains and valleys in the middle of Glacier National Park. The 51-mile road, built in sections between 1911 and 1933, and rebuilt during the next two decades, runs east and west through the park. Starting in the west, the road runs from West Glacier and along the 10-mile shore of Lake McDonald and then up McDonald Creek for an additional ten miles. About one mile beyond the junction with Logan Creek, the road begins its ascent to Logan Pass. The road climbs at a 6-percent grade, passes through a tunnel, and turns at a major switchback called "The Loop." Following the contours of the sides of Haystack Butte and Pollock Mountain, the road passes over several bridges, culverts, and retaining walls--including the Triple Arches--before reaching Logan Pass. The road descends to the east along the sides of Piegan Mountain and Going-to-the-Sun Mountain before running along the north shore of St. Mary Lake. The road exits the park as it crosses Divide Creek near St. Mary, Montana.¹

Significance of the Road

Going-to-the-Sun Road is significant as an outstanding engineering feat of the early twentieth century. In addition, the road was the first product of the interagency cooperative agreement between the National Park Service and the Bureau of Public Roads. The agreement, signed in 1925, allowed the National Parks to utilize the roadbuilding expertise of the Bureau of Public Roads, while still retaining control to protect the landscape.²

Construction

In 1925, Glacier National Park signed a \$900,000 contract with the construction firm of D.A. Williams and A.R. Douglas of Tacoma, Washington, to build a twelve-mile section on the Going-to-the-Sun Road. The section ran from 1½ miles west of Logan Creek up to Logan Pass. The contractors worked on the road for four seasons and completed the project in October, 1928. There were several structures along Williams and Douglas' section of road, including the Logan Creek bridge, the Granite Creek culvert and retaining wall, and the Haystack Creek culvert. The Triple Arches, built sometime between 1926 and 1928--most likely in 1927--is perhaps one of the most memorable structures on the entire route.³

Williams and Douglas built several retaining walls to hold the road to the mountainsides. W. G. Peters, the Bureau of Public Roads' resident engineer supervising the Williams and Douglas contract, estimated that the contractors built 7242 linear feet of retaining wall, containing 8708 cubic yards of material. To ensure stability, most of the retaining walls were built with a triangular cross section with the base equalling one-half the height of the wall. Very few of Williams & Douglas' retaining walls, particularly those on straight sections of road, exceeded 11' in height

because of the base-to-height ratio.⁴

Triple Arches

At the location of the Triple Arches, the contractors were faced with building a solid retaining wall in excess of twenty feet in depth. In order to create a stable wall, the contractor would have had to excavate a massive amount of material at the base. Instead, the contractor--or more likely--one of their subcontractors, developed on-site the less expensive plan for the Triple Arches to span the rifts of the mountain face. The new plan incorporated the solid rock cliffs and ledges of Pollock Mountain as bases for the arches of the retaining wall, thus eliminating the need for costly and time-consuming excavation.⁵

The landscape architects and engineers of the National Park Service approved the plans for all of the structures on the Going-to-the-Sun Road. Changes in the construction plans at the Triple Arches site were probably discussed with and approved by the resident landscape architect, Ernest A. Davidson, but he apparently did not see the actual working plans until the arches were already under construction. As a result, the contractors built the first arch--the one on the downhill side away from Logan Pass--with the arch's spring line (the imaginary line connecting the base points of the curves) parallel to the 6 percent grade of the road instead of running horizontally. Davidson corrected the workmen before they constructed the remaining two arches.⁶

The landscape architect felt the error would not be noticeable to most visitors in the park. In general, Davidson was satisfied with the way the Triple Arches met the concerns of the landscape division. He believed the Triple Arches was "less obtrusive in the landscape picture as a whole" than a large solid wall would have been.⁷

Description

The Triple Arches is a three-span, stone masonry arch structure on the Going-to-the-Sun Road. The arches act as a substitute for a retaining wall and are built as half-culverts--no water runs underneath and the arches support only part of the road's width.

The westernmost arch is 16'- $\frac{1}{2}$ " wide and its spring line is parallel to the 6-percent grade of the road. The middle arch is 16'-0" wide and the eastern arch is 16'- $5\frac{1}{2}$ " wide. The spring line in each of the latter two arches is horizontal. The arches rise approximately 5' from the springline.

At its deepest point, the masonry in the Triple Arches reaches 19'-6" from the base to the top of the guardrail.

ENDNOTES

1. See the Historic American Engineering Record report HAER MT-67 on the Coing-to-the-Sun Road.

2. C.H. Purcell, F.A. Kittredge, J.A. Elliott, T.C. Vint, and C.J. Kraebel, Suggested Procedure for Cooperation Between the National Park Service and the Bureau of Public Roads in Major Traffic-Way Projects Within the National Parks, April 22, 1925 (Record Group 79, National Archives, Washington, D.C.)

3. W.C. Peters, "The Transmountain Highway, Clacier National Park," Western Construction News (August 10, 1929), pp. 395, 401. There seems to be no evidence indicating the exact date of the construction, but most of the masonry work in the Williams & Douglas contract occurred in 1927.

4. Peters, p. 398.

5. Ernest A. Davidson, "Report to Chief of Division of Landscape Architecture Covering Features of Landscape Interest in Construction of Avalanche-Logan Pass Section of Transmountain Highway, Clacier National Park, 1925 to 1928," April 24, 1929, p. 7 (Record Group 79, National Archives, Washington, D.C.)

6. Davidson, p. 7.

7. Davidson, p. 7.

BIBLIOGRAPHY

- Davidson, Ernest A. "Report to Chief of Division of Landscape Architecture Covering Features of Landscape Interest in Construction of Avalanche-Logan Pass Section of Transmountain Highway, Glacier National Park, 1925 to 1928." April 24, 1929 (Record Group 79, National Archives, Washington, D.C.)
- Historic American Engineering Record. "HAER MT-67: Going-to-the-Sun Road." (Library of Congress, Washington, D.C.)
- Peters, W.C. "The Transmountain Highway, Glacier National Park," Western Construction News, August 10, 1929, pp. 394-401.
- Purcell, C.H., F.A. Kittredge, J.A. Elliott, T.C. Vint, and C.J. Kraebel. Suggested Procedure for Cooperation Between the National Park Service and the Bureau of Public Roads in Major Traffic-Way Projects Within the National Parks. April 22, 1925 (Record Group 79, National Archives, Washington, D.C.)