

Roadway Safety Solutions

Specially Designed Barriers Improve Road Safety and Preserve Historic Character of Scenic Washington State Park Roadway



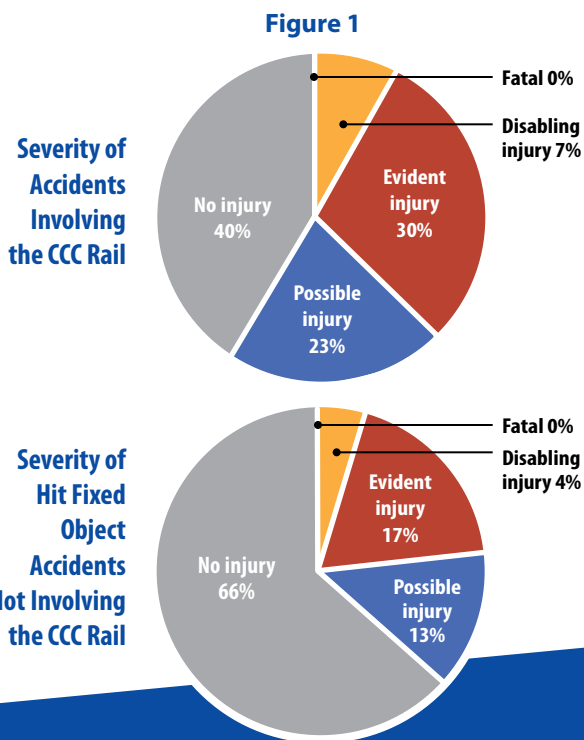
Constructed by Civilian Conservation Corps (CCC) workers during the Great Depression, the original log rail barriers in Deception Pass State Park are of historic significance due to their age, quality of workmanship, and context sensitive design.

Balancing safety needs with aesthetic and historic concerns can be a major challenge for transportation agencies. When crash rates escalated along a two-mile segment inside Deception State Park, the Washington State Department of Transportation (WSDOT) proposed to replace old guardrails with a typical modern crashworthy barrier system. Both the Washington State Parks and Recreation Commission (WSPRC) and the State Historic Preservation Office objected to the replacement of the skillfully crafted log rail and stone masonry barriers, which were constructed by the Civilian Conservation Corps (CCC) in the mid-1930s. By working with stakeholders, WSDOT was able to develop a new barrier design that preserves the beauty and historic character of the popular scenic highway, while substantially improving safety.

The Problem

As the most northerly east-west route in Washington, and the only highway connection between Whidbey Island and the mainland, Washington State Route 20 (SR 20) through Deception Pass State Park carries an average traffic volume of approximately 15,000 vehicles per day, and the 85 percentile speeds vary between 36 and 45 mph—far more highway usage than when the CCC built the road.

Within the two-mile segment of SR 20 inside the Park, the annual number of crashes more than doubled between 1980 and 2000. About half of the crashes involved vehicles hitting fixed objects on the roadside, and about half of the roadside-object crashes (or about one-quarter of all crashes) involved the CCC rail. As shown in Figure 1, the CCC Rail was associated with the more severe crashes.



WSDOT proposed replacement of the CCC rail with a modern crashworthy system, not only to prevent crashes and associated injuries, but because the repair of the CCC rail was very difficult.

The Process

WSDOT brought together a team that included representatives from WSPRC and other stakeholders to discuss the need to replace the existing guardrail and options to minimize the impacts. After analyzing the crash history, the team agreed that replacement of the CCC rail was necessary. They also agreed that, due to the historic and aesthetic concerns, a typical crashworthy barrier system would not be appropriate in this setting.

The team developed the following list of “character defining features” of the CCC rail, which were given to the team charged with developing a new barrier design:



- The bollards (supports) are constructed of rock and mortar.
- The bollards have a distinctive shape.
- Ability to see over and under the rail.
- The log rails are wood.
- The bollard spacing is about 18 feet.
- Bollards are non-uniform.
- The log is discontinuous and aligned at the center of the bollards.
- The log rail sits on the bollard's shoulders.
- The logs have taper.
- The spacing of the bollards is non-uniform.

The designers developed a barrier that incorporated 6 of the 10 character-defining features, which was accepted by the stakeholders.



The new crashworthy barrier is a steel-backed timber log rail with stone-covered concrete bollards.

This photo was taken during construction. It shows how the timber log rail is fastened to the stone bollards.



The Solution

The new barrier is a steel-backed timber log rail with stone fascia bollards. The bollards have natural stone façade over a reinforced concrete core, footing, and a reinforced concrete shaft. The stone supports are designed for a maximum spacing of 18 feet. A concealed steel pipe provides intermediate support.

The new barrier design meets crash test criteria for Test Level 2 as stated in *NCHRP Report 350*. The barrier is suitable for use in any location where an aesthetic barrier is desired and the posted speed is 45 mph or less.

For more information about WSDOT's Deception Pass Log Rail barriers, contact:

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