

Case Study 10. Black Canyon Concrete Plank Ford

Location

North central Idaho. Clearwater National Forest. North Fork Clearwater River. Road 250, about 45 miles from Superior, Montana, and 55 miles from Pierce, Idaho.

Crossing Description

This vented ford is one of several built in 1998 on a valley bottom road that crosses the lower end of several steep (greater than 70 percent) perennial streams prone to debris and snow slides. This structure consists of concrete planks and riprap, with a 24-inch culvert installed below the planks.



Figure A60. Ford is located on a valley bottom road at the base of an avalanche chute.

Setting

Northern Rockies Section (M333-C). In the Black Canyon area, the North Fork Clearwater River is bordered by very steep, dissected breaklands.

Why Was This Structure Selected?

This type of structure was selected to stormproof the road; that is, to handle large, almost annual snow and debris avalanches without failing. The secondary objective was to reduce maintenance requirements on the road.

Crossing Site History

These structures replaced concrete slab fords that had been constructed in 1983. The slab fords were starting to breakup (inadequate rebar) and were pitched too steeply for easy crossing by recreational traffic such as trailers and campers.

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Road Management

Objectives

Forest Road 250 is an arterial gravel road (maintenance level 3). It accesses one developed recreational site and numerous dispersed recreational sites. The crossing must accommodate sporadic log and equipment haul as well as summer and fall recreation traffic. The road is closed during winter.

Stream Environment

Hydrology: The North Fork Clearwater River is a steep perennial river. The side drainages experience massive snow slides most years (figure A61). Summer low flows on the side drainages are generally about 1 to 2 feet wide and a few inches deep.



Figure A61. Spring snow slide on top of ford, April 2003.

Channel Description: The ford is located on a steep tributary channel, a Rosgen A1a+ in a bedrock avalanche chute (figure A62). Drainage area is approximately 320 acres, and near the bottom of the slope the channel is approximately 6 feet wide. Banks are not well vegetated or particularly stable.

Aquatic Organisms: There are no known needs for aquatic organism passage. However, the North Fork Clearwater River is a high value fishery and every effort is being made to reduce road-related sediment delivery.

Water Quality: The watershed has high surface soil erosion potential and very high sediment delivery efficiency.



Figure A62. Looking upstream across the ford to the channel. The culvert is to the right out of the frame.

Structure Details

Structure: The concrete planks are 8 inches by 14 inches by 15 feet with steel rebar reinforcement. Planks are separated by 1 to 2 inches. The planks were cabled together and laid over a 1-foot-thick foundation of crushed aggregate that was compacted in two 6-inch layers. A 24-inch culvert is located below the planks (figure A63). Riprap was placed at the outlet end of the ford with the top elevation of the riprap conforming to the top elevation of the concrete planks.



Figure A63. Looking downstream toward the North Fork Clearwater River. Note the sediment catch basin in foreground.

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Cost: The total Black Canyon project included several fords installed in 1998, with a cost of approximately \$300 per plank. The work was accomplished by a national forest (force account) crew.

Safety: Safety is a primary concern. Traffic is allowed only after the road is completely clear of avalanche debris and high flows have subsided. This usually happens in June to early July depending on the amount of snow and debris that has accumulated at each crossing.

Flood and Maintenance History

As expected, snow, sediment, logs, and rocks are deposited on the structure annually. The structures are inspected and cleaned each year before the road opens. Expectations are that the structures will be cheaper to repair than slab fords, since individual planks can be replaced if they are broken by rock or debris during a slide.

Summary and Recommendations

This structure has been in place for 5 years and, like the other plank fords in avalanche chute areas, it has performed well handling annual slides. The ‘channels’ between the planks, and the culvert under the planks, allow for continued water passage even when the structure is covered with debris. In hindsight, the forest would recommend using a larger culvert (36 or 48 inches), in anticipation of a 100-year runoff event.

Information on the Black Canyon ford was provided by Brian Hensley, watershed restoration technician; Anne Connor, watershed restoration engineer; and Norm Steadman, engineer, of the Clearwater National Forest.