



INTRODUCTION:

When building temporary logging roads, stream crossings can be very costly and challenging projects, particularly in that good stewardship calls for protecting soil and water quality. Often parcel boundaries, steep terrain, and stream drainage can limit the placement and construction of temporary bridges. Moreover, the costs for advanced fabricated structures such as concrete box culverts or double-walled plastic culverts far exceed the budgets for temporary access needs. Consequently, innovative thinking and engineering can make use of low cost materials to build adequate, efficient, and safe load-bearing log bridges.

GENERAL FEATURES:

As foresters and road crew managers analyze temporary access across ephemeral or perennial streams for logging timber, they are faced with decisions that have a direct impact on soil and water quality.



Fig. 1: Log bridge side view.

The construction of stream crossings is dictated by the terrain and the volume of water flow through the channel. For stream crossings that span 16 feet or

more and have uphill or downhill grades on approach, conventional temporary bridges (wood or steel) or culvert structures may not provide the best options or cost efficiencies for the crossing.

Fabricating a log bridge can provide the needed specifications for a safe crossing that meets stringent BMP standards for protecting soil and water quality at an affordable cost. Log bridges offer a three- to five-year window for use and provide access for harvesting and silvicultural operations.

OPERATION:

As the temporary log road was built, felled right-of-way timber was used as support structures for a log bridge at the stream crossing. The structure was fabricated by cutting pole



Fig. 2: Log bridge abutments.



sized timber (10- to 12-inch dbh). Log runners and log crossmembers were set for support. Steel cable was used to lash the structure together, and the bridge was capped with road fabric and crusher run (stone) for a driving surface. A three-man crew used a 550 John Deere dozer and a 490 John Deere track hoe to build the log bridge in approximately 46 man and equipment hours.

APPLICATION:

The log bridge can safely support traffic by fully loaded log trucks not exceeding 120,000 pounds. The bridge will facilitate infrequent harvesting or silvicultural operations. Since the construction leaves an open flow channel, water moves freely under the bridge with minimal impact to the bridge embankments or the surrounding stream channel. Unrestricted flow reduces maintenance and water quality issues that can arise from using traditional galvanized steel culverts. The log bridge is far less costly than double walled plastic culverts or concrete box structures when temporary access is all that is needed.

SPECIFICATIONS AND COSTS:

The log bridge was constructed of 20-foot log runners (length) and 30-foot cross members (width). Since the grade approach and exit were steep, the bridge clearance was approximately five feet high over the streambed to meet the overall road grade. Approximately 200 feet of 5/16-inch cable was used to lash the logs together, and 200 square feet of



Fig. 3: Log bridge provides cost-effective access.

road fabric was used for the bridge deck and approaches. More than 80 tons of crusher run were used to cap the bridge deck and approaches. The stream banks were protected with a log buttress that also supported the bridge. The banks were then stoned with rip rap, seeded, and strawed; and erosion fences were placed to prevent soil erosion into the stream.

The equivalent market cost for the log bridge construction is approximately \$1,700 in material and \$3,270 in labor and equipment, for a total cost of \$4,970. The material costs alone for a double walled plastic culvert (8 feet by 40 feet) is estimated to cost \$10,200, and a pre-fabricated concrete box culvert is estimated to cost \$20,780. The log bridge has proven to be a very innovative and cost-effective construction. It will be used to access a 75-acre block of timber that will be harvested and planted with pine.

For additional information about the log bridge construction, please contact the authors.

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