



Cross-Drainage Culverts

Forest Management Practices Fact Sheet Managing Water Series #10

Introduction

Cross-drainage culverts let water that isn't confined to a perennial or intermittent stream channel move from one side of the road to the other without crossing the surface. Proper use of cross-drainage culverts can improve water quality while allowing forest operations to continue.

Best Management Practices (BMPs) can prevent or minimize the impact of forestry activities on rivers, lakes, streams, groundwater, wetlands, and visual quality.

Where Used

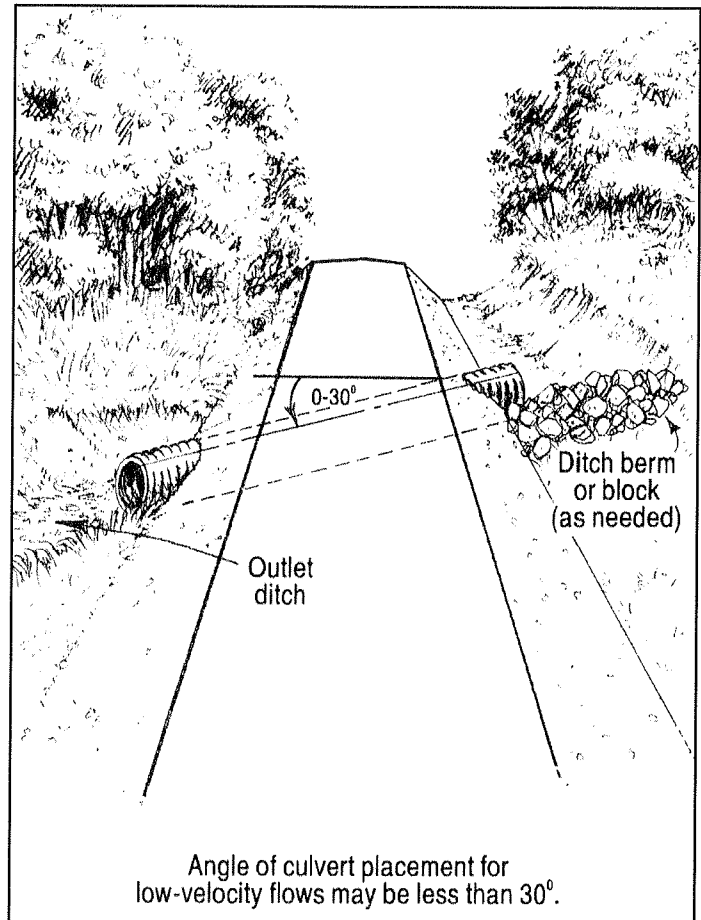
Operators can place cross-drainage culverts at regular intervals along grades, below banked seepages, and where water will run directly onto log landings or forest roads and trails.

Application

When installing cross-drainage culverts:

- ▶ Use culverts that are at least 12 inches in diameter to prevent plugging. Plugged culverts could cause a backup and damage the traffic surface. Larger culverts may be needed where roadside ditch flows or other factors might result in high volumes of water.
- ▶ Extend culverts 1 foot beyond the base of the road fill on each side.
- ▶ Place the culvert so the bottom is at the same level as the bottom of the ditch or adjoining slope.

Typical upland cross-drainage culvert



Angle of culvert placement for low-velocity flows may be less than 30°.

- ▶ Locate the low end of the culvert at least 2 inches lower than the upper end. Follow the natural slope of the land from end to end whenever practical.
- ▶ Place the culvert so the water is turned no more than 30- to 45-degrees from its direction of flow. Sharper turns create turbulence that can erode the fill around the culvert.
- ▶ Firmly pack material around culverts, especially around the bottom half. This will firmly anchor them and fill will not easily wash out.
- ▶ Cover tops of culverts with at least 12 inches of fill, or to a depth of one-half of the pipe diameter (whichever is greater). This minimizes damage to pipes during road maintenance. It also distributes the weight of passing vehicles, preventing culverts from crushing.
- ▶ Consider placing riprap around the inlet or outlet of a culvert. This will prevent erosion due to turbulent water flow. Riprap is most effective when it is placed on top of a geotextile material. (Geotextile is a fabric mat that allows water to drain through it while supporting materials above.)
- ▶ Space culverts according to your state's water quality BMP guidelines. Spacing between culverts decreases as road grades increase.

Advantages

Culverts move water from one side of the road or landing to the other without eroding surfaces.

Disadvantages

Culverts are expensive to install and require frequent maintenance.

Maintenance

Keep culverts free of debris at all times. Otherwise, they will plug up and become ineffective. Adequately drain road grades during placement of culverts.

Related Fact Sheets in This Series

Project Planning: Locating Roads, Landings, Skid Trails, and Crossings (FS-6970); Managing Water on Roads, Skid Trails, and Landings (FS-6971); Earth-Berm Water Bars (FS-6972); Using Logging Debris or Logs to Build Water Bars (FS-6973); Conveyor Belt Water Bars (FS-6974); Broad-Based Dips (FS-6975); Open-Top Culverts (FS-6976); Shaping Roads and Trails (FS-6977); Roadside and Diversion Ditches (FS-6978); Project Closure (FS-6980); Making and Using Measurement Tools—Basal Area (FS-6981); and Making and Using Measurement Tools—Slope (FS-6982).

Cooperators

University of Minnesota Extension Service, Minnesota Department of Natural Resources, Minnesota Logger Education Program, Michigan Department of Natural Resources, Michigan State University Extension, and Wisconsin Department of Natural Resources.



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