

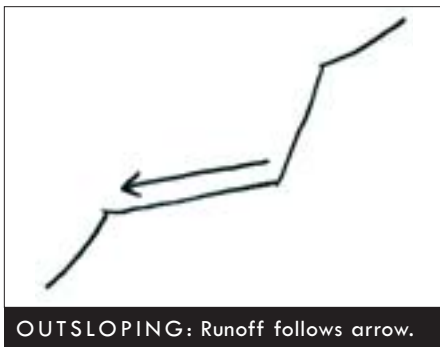
road surfacing

minimize erosion from road bed, ditch, cutbank and fillslope surfaces

Choosing the right surface for your road is key and can have a dramatic impact on your maintenance costs. There are generally two types of surfaces: *outsloping* and *insloping*. The type you choose is an important factor in the quality of road you build and will determine the amount of maintenance you will have to perform. There is also a combination of the two, the result of which is called a *crowned* road. Below are some details you'll need to help you choose.



surface types



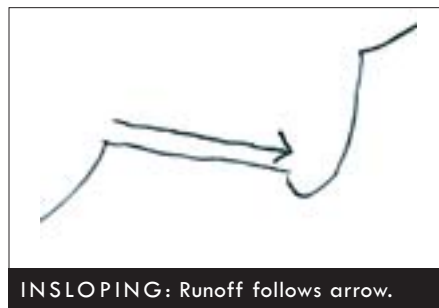
① **OUTSLOPING** is generally the least expensive road surface to construct and maintain. This method is often preferred because of its ability to disperse and drain surface runoff uniformly across the outer edge of the road.

- Rolling dips and a smooth road surface are key to creating a well-drained, outsloped road. A rolling dip is a break in the slope of the road that allows for drainage of surface runoff and prevents erosion. Rolling dips are preferable to water bars, especially with road which are used year-round, because water bars will more readily break down with heavy traffic.

- There are two types of water bars for roads with grades greater than 8%: sub-grade material and rubber bars. Sub-grade, made of soil or aggregate, is temporary in nature and easily broken down by traffic. Rubber water bars last longer than subgrade material bars, and are easy to fabricate. Rubber water bars are relatively inexpensive when

compared to other drainage structures, though more expensive than sub-grade water bars. Rubber water bars must be placed close enough to each other so that runoff erosion is not a problem, generally at 200 foot intervals on 10-18% grade roads.

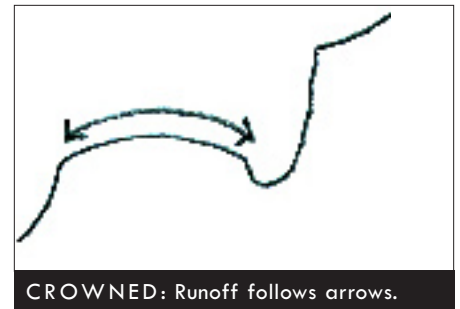
- Outsloping is NOT ideal where seeps or springs require short segments of inboard ditch to collect and remove road surface runoff. Outsloped roads are generally not recommended for areas where roads cross landslides, as it is dangerous to have a concentration of water in an unstable area.



② **INSLOPING** is the most common method used in the Mattole watershed, but is considered to be the "less preferred" because it is generally more expensive to construct and maintain. It is used where an inslope is needed to keep runoff and debris away from the road surface.

- Any runoff drains to the inside of the road and often into a ditch, where it is combined with flow from the cutslope and upslope

hillside areas and then discharged through culverts.



③ **CROWNED** This combination of the two previous methods results in a rounded surface with a ditch on the inboard side. Any surface flow will drain off of both sides.

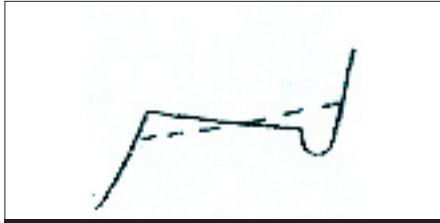
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ROAD SURFACING

For more information, see: **Handbook for Forest and Ranch Roads**, by William E. Weaver, PhD. and Danny K. Hagans of Pacific Watershed Associates. This book is available through the Mendocino County Resource Conservation District at \$20/copy. **Write to:** 405 Orchard Avenue, Ukiah, CA 95482; or call (707) 468-9223.

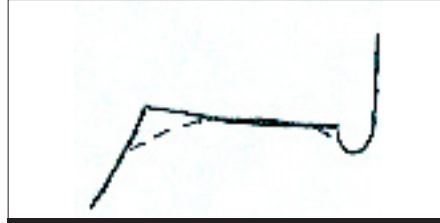
See other side for continued diagrams.

surfacing tips -----



INSLOPING to OUTSLOPING

This road surface is cheaper to build because it does not require ditch relief culverts. It also requires less maintenance because roads with inboard ditches need to be cleaned out during winter storms. Make an outsloping road from an inslope by filling in the inboard ditch and adding an outsloping angle.



INSLOPING to CROWNED

A crowned road surface is great for steep roads. It minimizes the amount of water that enters the inboard ditch by directing a portion of the rainfall down the adjacent slope. This conversion is possible by adding an outsloping angle and modifying the insloping one if needed or working more on the existing ditch.



CROWNED to OUTSLOPING

Outsloped roads are the least likely to cause disturbance, erosion, or other environmental impacts. It is not always advisable to outslope roads which are steep. To outslope a crowned road, fill in the ditch and add an outsloping angle.

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