

# Technical Bulletin

## The Road Profile

**WHAT IS THE ROAD PROFILE?** – The road profile is the cross-sectional shape of the road surface in relation to the road corridor traversing the surrounding landscape. Road corridors that cross high meadows or forested ground encounter different environmental conditions than corridors along riparian buffer areas or streambanks. A road's profile, the shape and elevation of its surface, is critically important to the road corridor's ability to withstand the unrelenting forces of nature.

### WHY RAISE THE ROAD PROFILE?

Routine road maintenance practices (surface grading, snow removal, shoulder cutting, ditch cleaning, etc.) combined with the wear and tear of traffic and natural erosive forces have the cumulative effect of lowering the elevation of the road in relation to the surrounding terrain. As the road profile drops, water draining to the road is trapped and concentrated in parallel ditches and the road begins to function as a channel for downslope water flow (see fig. 2).

Over time, natural erosive forces, vehicle traffic, and routine maintenance practices can transform the road's original profile (fig. 1) into a deeply entrenched road (fig. 2) that is difficult to maintain without causing further soil erosion and increased maintenance costs.

As water flows downhill, it gains volume and velocity, becoming "hungry" and aggressively erosive. It is this "hungry" water that is a roadmaster's worst enemy, robbing the road of valuable surface material as well as ditch and bank soil that supports stabilizing vegetation.

With road managers ever encouraged to keep water "off of, out of, and away from" the road, the result is deeper and deeper ditches and steeper and steeper banks. The resulting depressed, or entrenched, road profiles offer increasingly difficult challenges for road managers trying to install cross pipes, turnouts, and other drainage features to shed water from the road. Raising the road profile can eliminate the persistent maintenance difficulties associated with an entrenched road.

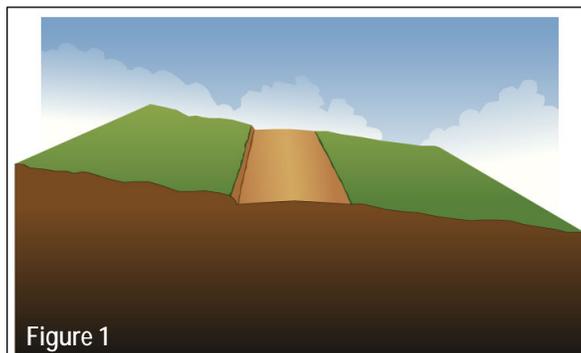


Figure 1

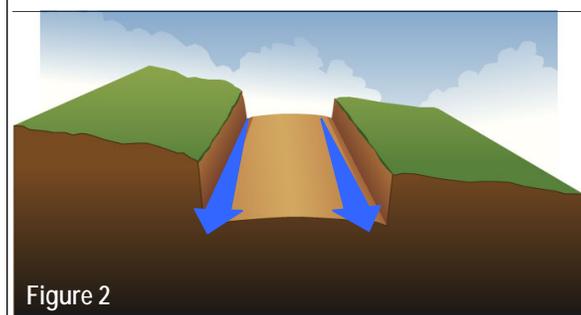
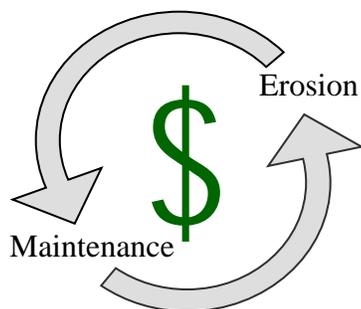


Figure 2

Over time, natural erosive forces, vehicle traffic, and routine maintenance practices can transform the road's original profile (fig. 1) into a deeply entrenched road (fig. 2) that is difficult to maintain without causing further soil erosion and increased maintenance costs.



### CONSEQUENCES OF ENTRENCHED ROAD PROFILES

Erosion and maintenance which cost money, money, money!

- loss of road surface material
- soil collapsing into deep pipe or drainage inlets
- soil collapsing from steep banks undercut during maintenance operations and by water flowing in ditches
- road edges undercut by concentrated ditch flow
- difficulty plowing snow and finding a location to place plowed snow
- pipe installations with steep, unstable banks at inlets and long, difficult to maintain outlet tail ditches

## BENEFITS OF RAISING THE ROAD PROFILE

- can effectively eliminate parallel ditchflow and encourage low-volume, low-velocity sheetflow off the road
- adds additional base support for the roadway
- widens the road (not always a benefit)
- allows room for snow removal
- reduces concentrated “hungry” water flow and associated loss of surface material
- less expensive maintenance of ditches and reduced need to armor ditches with costly rock treatments
- raises the elevation of pipe inlets and outlets in relationship to the surrounding terrain thereby eliminating the need for long deep armored outlets and steep drop inlets which cause environmental and maintenance problems
- eliminates/reduces the need for turnouts

## MATERIALS COMMONLY USED FOR MASS FILLING

- native shale; use caution where shale is known to leach acid
- any kind of rock spoil
- bank run gravel
- concrete waste/demolition waste
- tire shreds
- spent sandblasting sand
- ground glass
- mining spoil
- coal combustion waste

Special caution and permits may be required for handling some of these materials. Work with your local conservation district to determine if materials pose any danger or require special handling procedures.



This deeply entrenched road traps drainage and is a persistent source of maintenance and erosion. Additional maintenance efforts and vehicle traffic compound the problem by lowering the road elevation further.



Filling the road profile here, as shown above, with appropriate center-line crown, eliminates concentrated parallel ditchflow and allows water to sheet flow off the road into surrounding terrain, reducing the erosive force of “hungry” water and saving scarce maintenance funds.

## GENERAL CONSIDERATIONS

- To be cost-effective, the fill material must be low-cost and nearby. Often transportation hauling is the biggest expense. In many cases, fill can be borrowed from locations where removing material will be beneficial.
- Many property owners with vested interest in improvements to their local roads have suitable material for road filling. Municipalities can take material for roadwork without the constraints of mining permits. However, reclamation is still required. Work closely with your conservation district to establish what regulations apply. Use Dirt & Gravel Road Program funds to purchase material only from approved or permitted suppliers, not from un-permitted mines site or other locations.