

## 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, or becomes entrenched, 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 photo 1).

Entrenched road profiles make installation of crosspipes, turnouts and other drainage features to shed water from the road increasingly challenging. Raising the road can eliminate the persistent maintenance difficulties associated with an entrenched road.



Because the elevation of the road is lower than the surrounding terrain, drainage on the road is trapped. As this drainage flows downhill, its velocity increases. Fast-moving water washes road material away and means more frequent road maintenance.

## Typical Requirements

- Low-cost fill material that is nearby. Commonly used fill materials include: native shale, rock or mining spoil, bank run gravel, concrete or demolition waste, tire shreds, ground glass, spent sand from sandblasting, and coal combustion waste.
- Hauling of material to the site.
- Grader or bulldozer to place and shape fill material.
- Geo-textile fabric to strengthen the road base (not always necessary).
- Compaction equipment to compact the fill in 8" to 12" lifts. Compaction is critical. A large static roller, vibratory roller or sheep's foot roller should be used to thoroughly compact each lift of fill.
- Durable road surfacing material to cap the newly filled road surface.

## Important Considerations

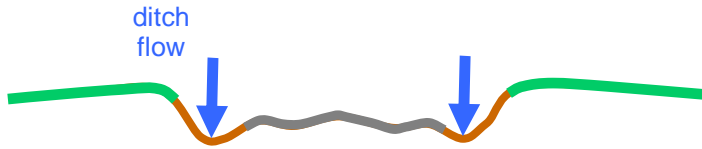
- Select fill material carefully. Some materials may need permits or require special handling.
- When adding fill material, it is ideal to raise the road enough that drainage is restored to a natural condition. In other words, ditch flow is eliminated from either the downslope side of the road or both sides of the road (depending on topography) allowing road drainage to sheet flow off the road into the surrounding landscape.
- Raising the road profile coincides well with installation of underdrain. Please see the Underdrain Informational Bulletin and the Installing Perforated Underdrain Technical Bulletin for more information.

The publishers of this publication gratefully acknowledge the financial support of the Pennsylvania State Conservation Commission. For additional information or assistance, contact: Center for Dirt & Gravel Roads Studies, Penn State University, 207 Research Unit D, University Park, PA 16802 (Toll-Free Phone: 1-866-668-6683, Fax: 814-863-6787, Email: [dirtandgravel@psu.edu](mailto:dirtandgravel@psu.edu)). Additional copies available on our website at: [www.dirtandgravelroads.org](http://www.dirtandgravelroads.org)



## Construction Sequence

**Before:** An entrenched road traps road drainage on the road in parallel ditches. This is a situation that requires constant maintenance. Raising the road eliminates the persistent maintenance associated with a road that is lower than the surrounding terrain.



Cross-section #1

**During:** Prep the existing road base with proper crown before adding fill material. Place fill material in the road profile in 8" to 12" lifts. Each lift of material should be placed with proper crown of 1/2" to 3/4" per foot. Compact each lift of material to ensure a solid road base. Geo-textile fabric can be used in between lifts of material to add strength to the road base. Whenever possible, add enough fill material to raise the elevation of the road to restore natural drainage patterns.

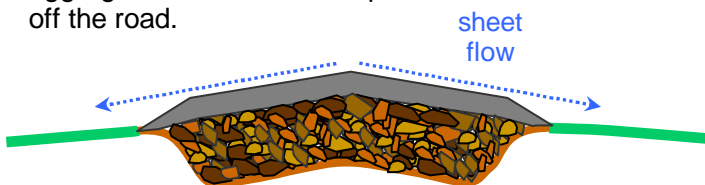


Cross-section #2: The existing road base is re-shaped with proper crown. The first lift of fill material is placed, crowned and compacted.



Cross-section #3: The second lift of fill material is laid on top of the first lift, crowned and compacted.

**After:** Place aggregate on the fill material. Because the fill has been crowned or shaped properly, the aggregate will retain its shape and facilitate sheet flow off the road.



Cross-section #4



**Filling the road: before, during, and after.** Here native shale was used to fill the road and eliminate the ditch on both sides of the road. Driving surface aggregate (DSA) was placed on top of the prepared shale surface.