

# Technical Bulletin

## Shallow Crosspipes

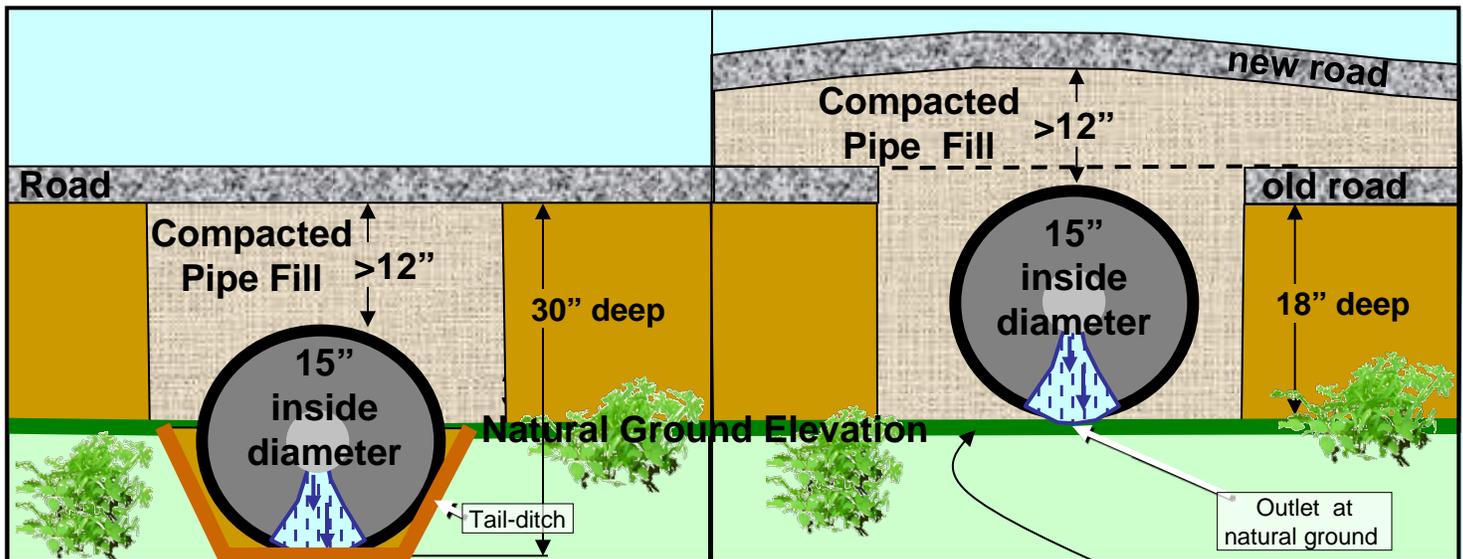
**SHALLOW CROSSPIPES** -- A drainage culvert (not stream pipe) that is installed so the pipe outlet discharges at natural ground elevation, avoiding the need for outlet trenches or "tail-ditches."

Please see the Center's related technical bulletins for general pipe information or crosspipe installation procedures.

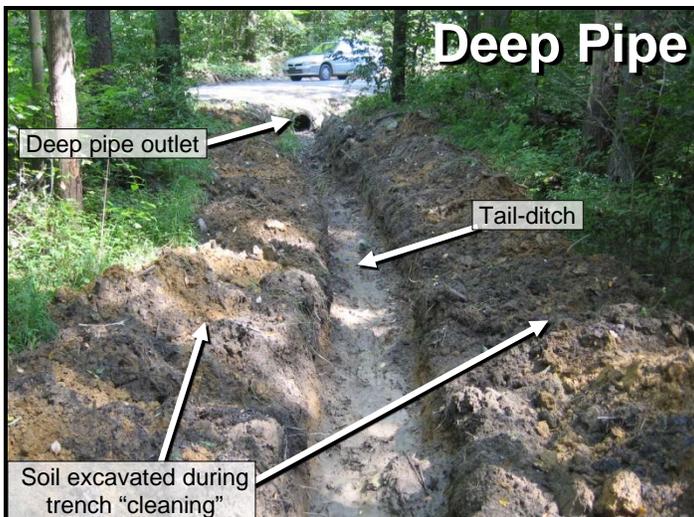
The key to *shallow crosspipes* is to allow the "Natural Ground Elevation" at the pipe outlet determine the crosspipe elevation. Natural Ground Elevation simply refers to the height of the existing land at the pipe outlet. Typical **deep crosspipes**, illustrated on the left below, use the road elevation to determine pipe installation depth. This often results in excessively deep pipes because the required pipe cover is achieved by digging deeper below the road. The associated "outlet trenches", or "tail-ditches" are a constant source of maintenance and erosion. When installing a **shallow crosspipe**, the pipe is placed at an elevation where it drains to natural ground. Necessary pipe cover is obtained by importing fill over the pipe, not by digging deeper into the road base. The best way to understand a shallow pipe is to compare it to a traditional deep pipe as shown below.

### Deep Pipe

### Shallow Pipe



Side View, looking through crosspipe from outlet, comparing deep and shallow pipe placements. Note the green "natural ground elevation" line. Deep pipes dig down to obtain pipe cover. Shallow pipe placements are based off the natural ground elevation, and use fill to achieve pipe cover.





The crosspipe shown here is partially installed. Notice that the outlet of the pipe is at the elevation of the existing ground, no outlet trench or tail-ditch is required. Also notice that the top of the pipe is actually ABOVE the existing road surface. The minimum of 12 inches of pipe cover will be obtained by importing cover. When completed, the cover will create a gradebreak over the pipe.

If this pipe would have been installed based off the road elevation, the pipe would have been placed ~20 inches deeper to achieve cover under the existing road. This would have created a long deep tail-ditch that outlets drainage into the nearby stream

### PROBLEMS ASSOCIATED WITH TRADITIONAL “DEEP PIPES”

When a pipe outlet is placed below the surface of the ground, it creates the need for continual maintenance of a “tail-ditch” to keep water flowing away from the road (illustrated in bottom left photo on page 1).

- Constant “cleaning” of tail-ditches costs money and generates large amounts of sediment.
- Unmaintained tail-ditches often clog, resulting in standing water at the outlet that can breed mosquitoes, saturate the road base, and lead to clogged pipes.
- Tail-ditches channel carry drainage far from the road, making stream and wetland pollution more likely.

### BENEFITS OF SHALLOW CROSSPIPES

- *Less maintenance*: No tail-ditch to maintain will save time and money.
- *Less problems*: No tail-ditch means no standing water to saturate road or breed mosquitoes.
- *Less pollution*: Outletting drainage quickly on natural ground gives maximum opportunity for infiltration.
- *Shallower inlet*: A shallower pipe means a shallower inlet that is less likely to plug or need maintenance.
- *Potential “grade break”*: The material imported to cover a *shallow crosspipe* can sometimes be used to create a grade break. These structures are designed to prevent water from flowing down the road by forcing it into road ditches. More info on grade breaks at [www.dirtandgravelroads.org](http://www.dirtandgravelroads.org): resources: tech bulletins

### INSTALLING A SHALLOW CROSSPIPE

1. Determine proper outlet elevation: Ideally, bottom of pipe outlet should rest on natural ground as pictured above.
2. Dig pipe trench: Pipe trench should be excavated based on outlet elevation. Ideally, pipe inlet should be placed in existing ditch line. Insure minimum ¼ inch per foot fall across trench.
3. Install pipe: Separate bulletin about proper crosspipe installation available at: [www.dirtandgravelroads.org](http://www.dirtandgravelroads.org): resources: tech bulletins.
4. Cover pipe: Shallow pipe installations typically require 30 to 60 tons of fill to obtain necessary pipe cover. Proper compaction is critical to avoid settling and pipe strain. Pipes should be covered with a minimum of 12 inches of compacted material (not including surface aggregate) before allowing traffic on the road. The fill should be tapered into the existing road elevation on either side of the pipe. The amount of fill needed and length of fill taper will depend on site conditions such as road slope and pipe depth. Transitions should be sufficiently long to accommodate expected traffic. In some cases, a grade break can be created with fill that forces water off the road and into the ditches and pipe.

**“Crosspipe elevation should be determined by the elevation of the existing ground at the pipe outlet, not of the elevation of the road surface.”**



This shallow pipe is being covered with fill. The fill will be ~18 inches above the existing road over the pipe, and taper out for 50+ feet in both directions