Dirt Gravel and Low Volume Road Program

# WEBINAR

3/2/23, 9am

# Sectional Fill

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**CDGRS**

Eric Nevel

ern106@psu.edu

Steve Bloser

smb201@psu.edu


SCC

PennState Center for Dirt and Gravel Road Studies

# Purpose:

- Refresher on Road fill and some issues seen on fill projects.

- Overview of “Sectional Fill” as an alternative to “Continuous Fill

# Sectional Fill

- **Introduction**
- Continuous Fill
- Issues seen with Continuous fill projects
- Sectional Fill Alternative

**A 100-year-old road that loses 1/2 inch of material that is not replaced each year will be entrenched 4’ today.**

# Filling Road Cross-Section

## Entrenched Roads

- Lower than surrounding ground on both sides
- Make it impossible to get water off the road

**Traditional Maintenance:**

**Clean ditches and regrade, repeat, repeat, repeat**

**Road gets lower year by year**

**Ditches drain directly to stream**

# Sectional Fill

- Introduction
- **Continuous Fill**
- Issues seen with Continuous fill projects
- Sectional Fill Alternative

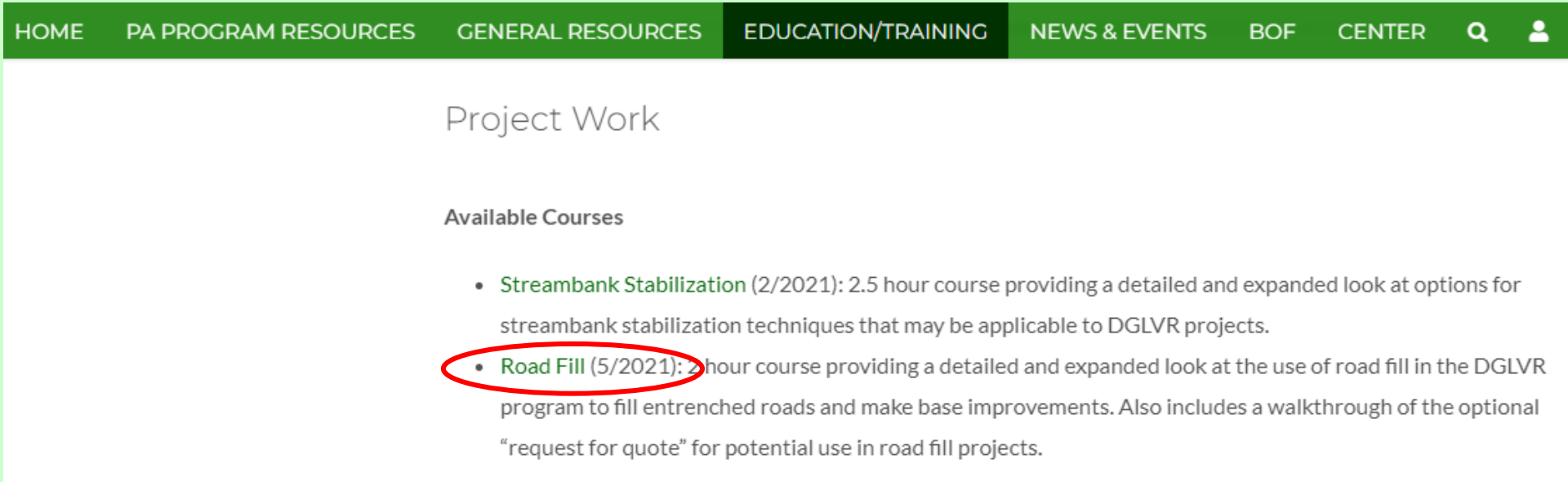
# Road Fill

This is only a quick refresher

## Road Fill:

- 2 Hour Remote Training recorded 5/2021
- Recording and PPT Available
  - www.dirtandgravelroad.org
  - Education/Training – Remote Learning Center

**Background – example projects - fill types – RFP – more**

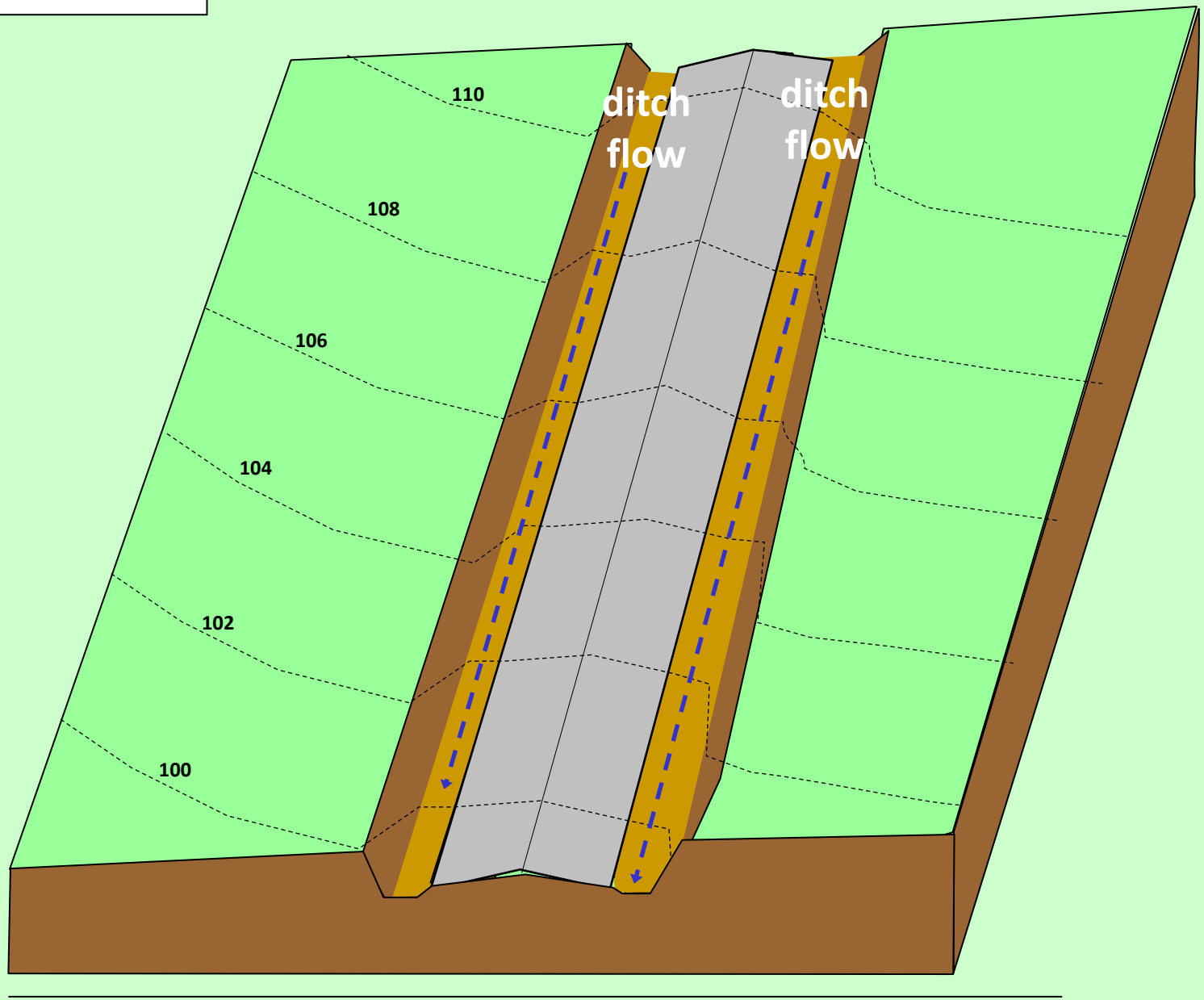


# ESMP

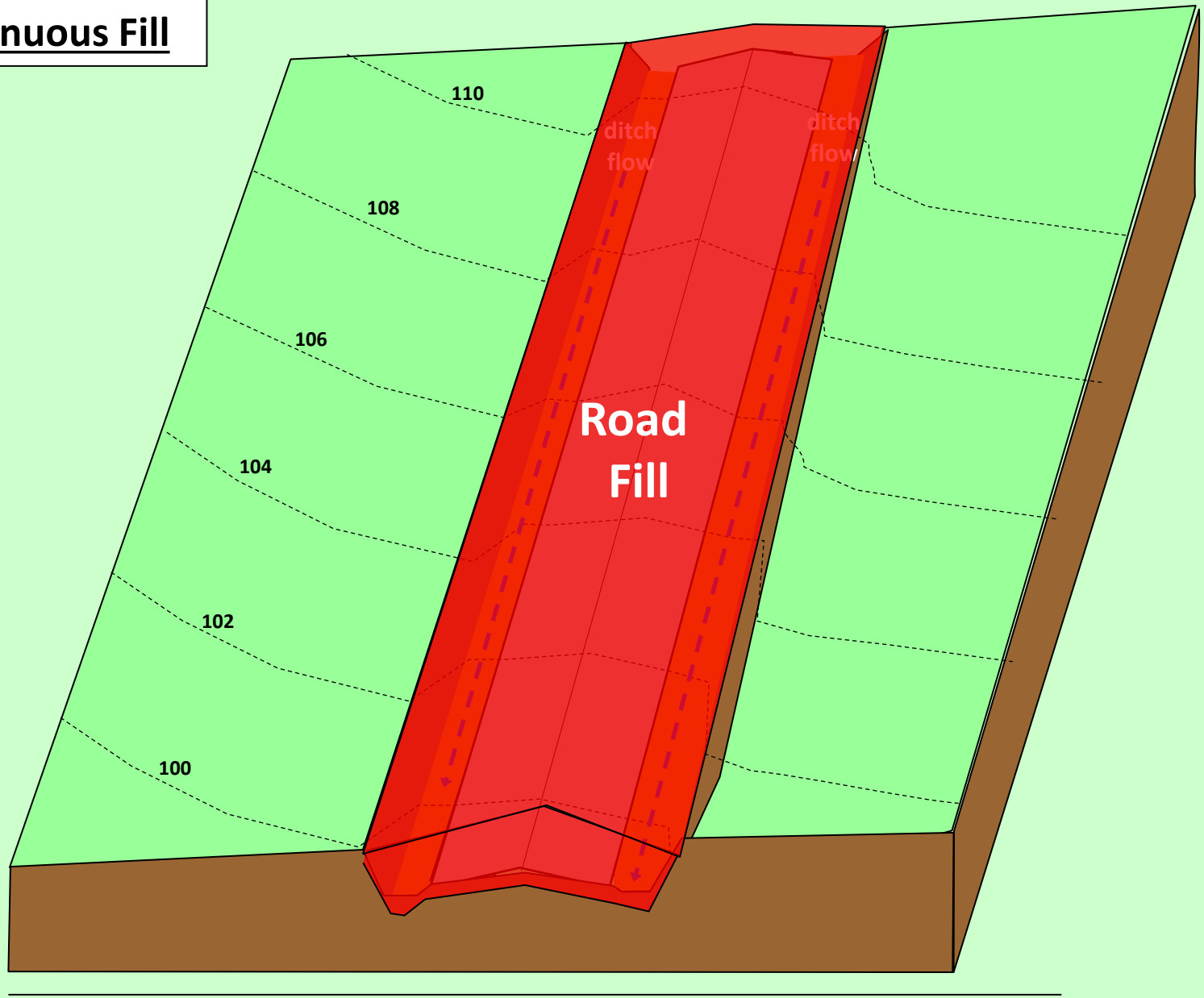
1. Avoid Concentrating Drainage
2. Minimize Flow Volumes
3. Reduce Effects of Concentrated Drainage
4. Prevent Surface Erosion
5. Reduce Cost and Frequency of Road Maintenance

***These are the goals of ALL of the practices in the DGLVR Program***

## Entrenched Road



**Entrenched Road**
**Continuous Fill**



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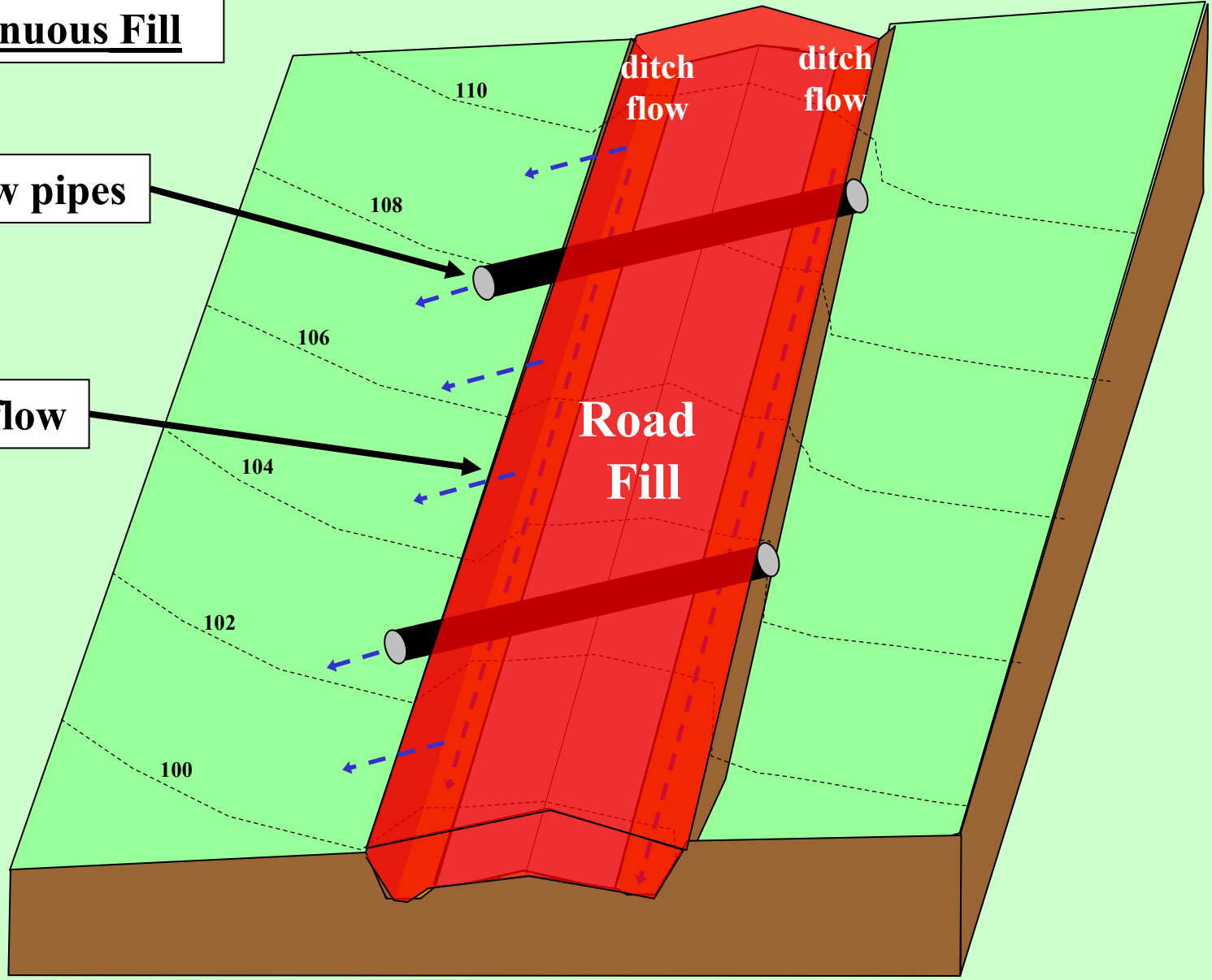


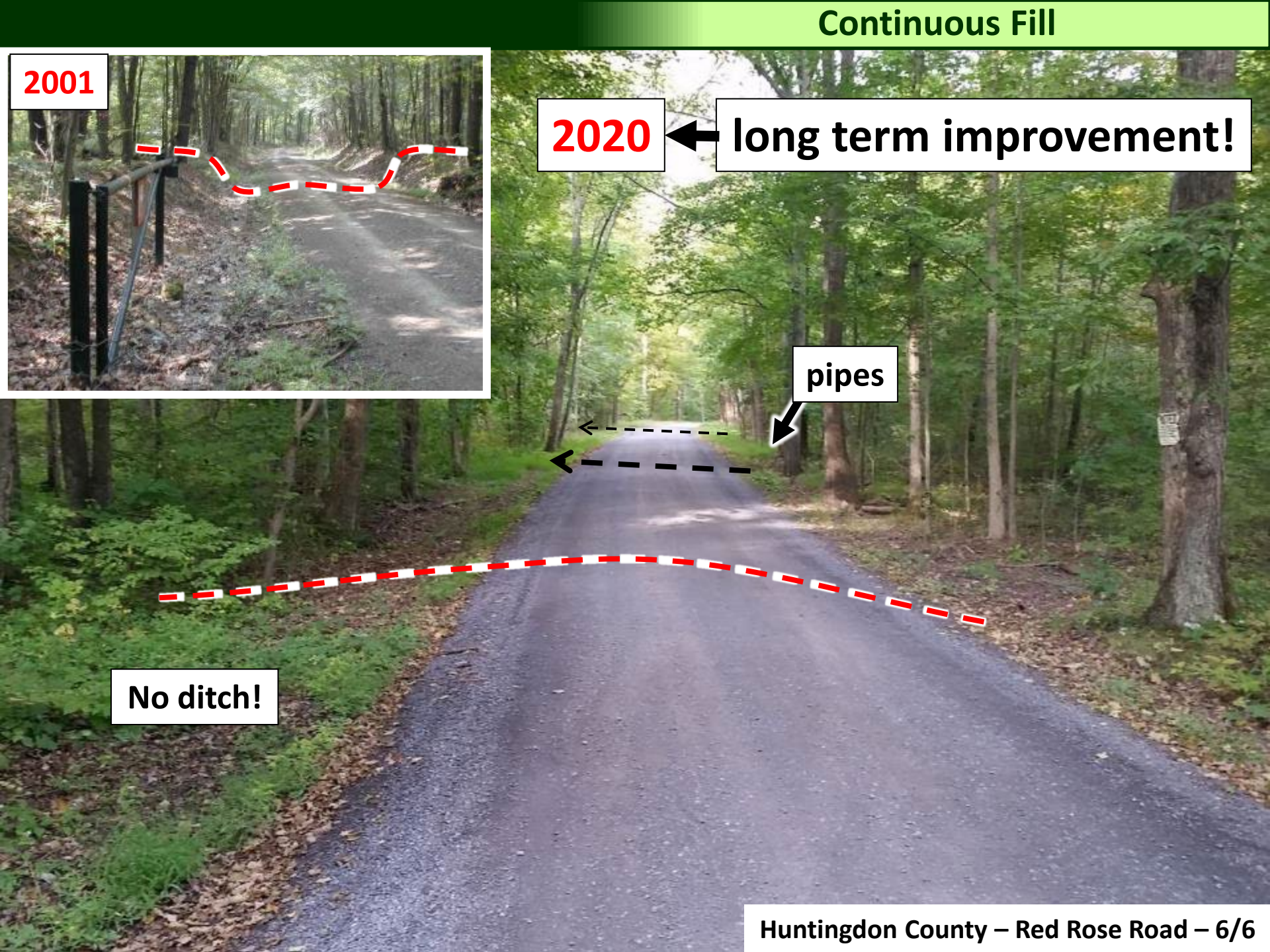
# Drainage Disconnection and infiltration are the goals of the DGLVR Program

- Hallmarks of the DGLVR program
- Keeping sediment & excess runoff out of the stream
- Getting water into the ground


**BEFORE**: Entrenched road draining to stream.

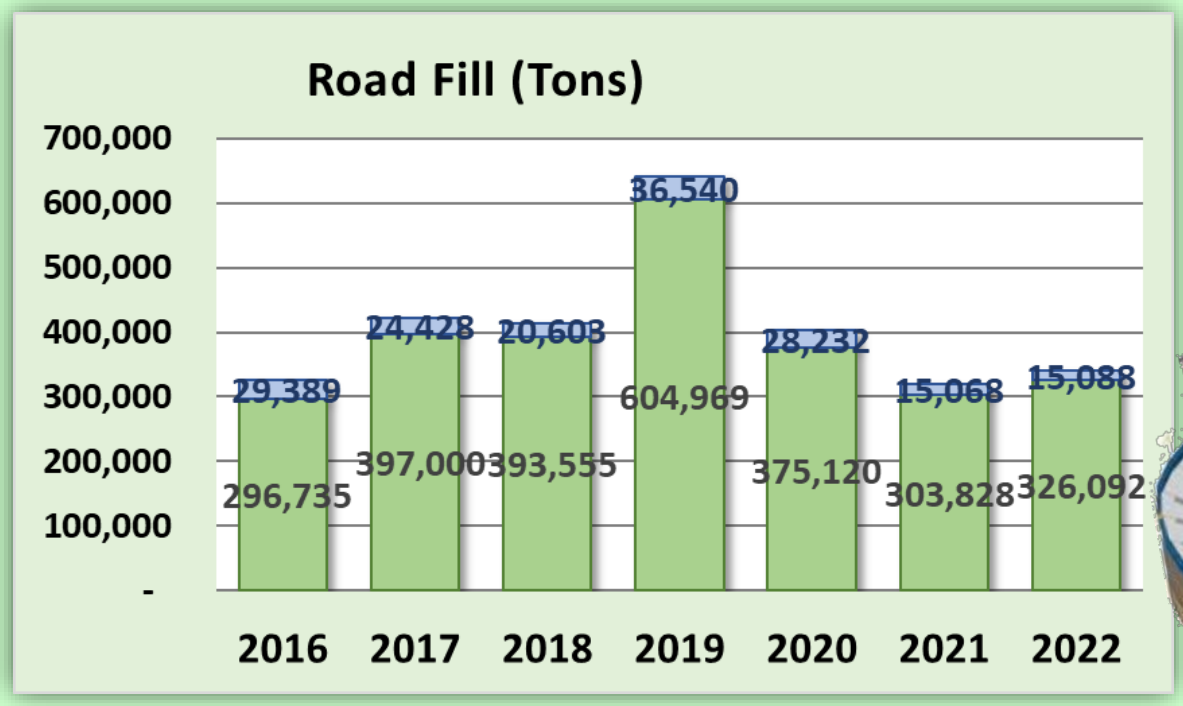

**AFTER**: Road filled and surfaced with new crosspipes.

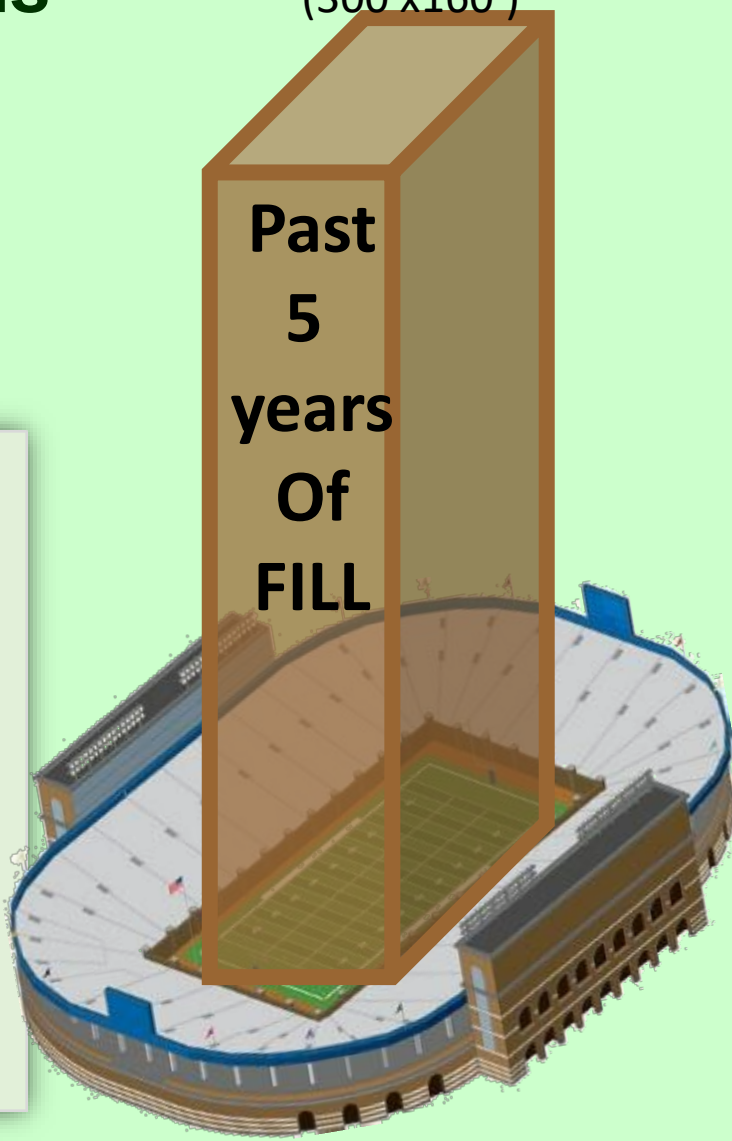
# Continuous Fill




Huntingdon County – Red Rose Road – 6/6

## Program uses over 300,000 tons annually (13,500+ tri-axles)



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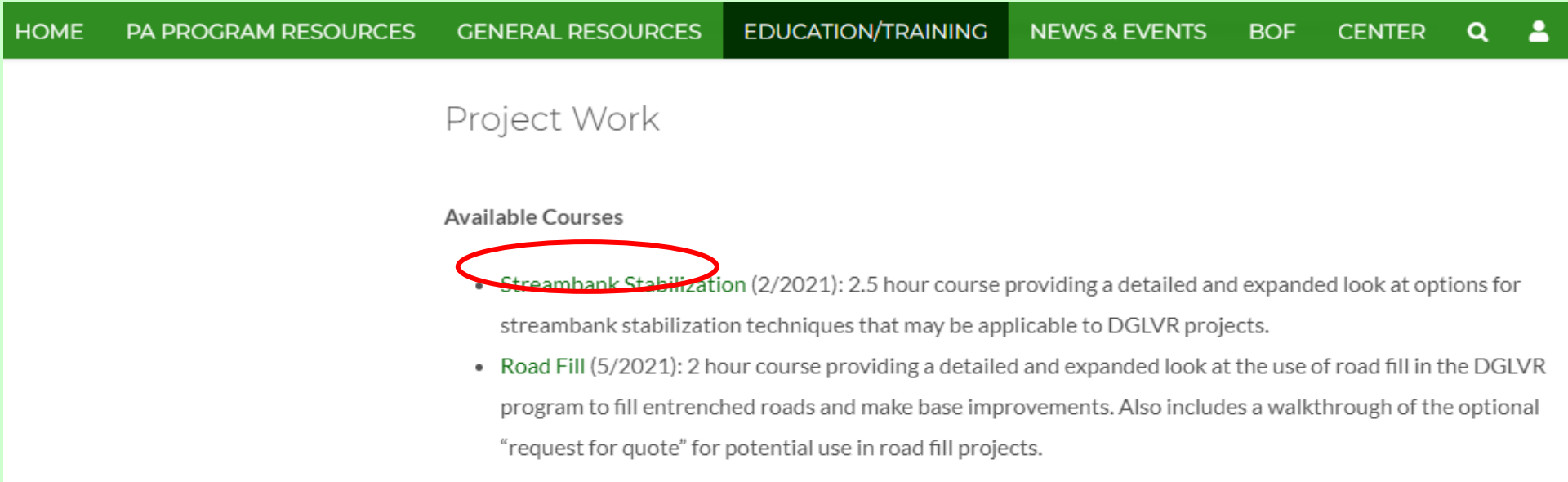


# Sectional Fill

- Introduction
- Continuous Fill
- **Issues seen with Continuous fill projects**
- Sectional Fill Alternative

## Road Fill

**Dollar for Dollar, one of the best drainage improvement practice available when done correctly.**

**Some issues seen in the field:**

- Not achieving sheet flow (not enough fill)
- Not building above ground elevation
- No surface features = water still runs down road even though it is not entrenched

# Filling the Road

## Completed Project: Road fill & underdrain

- Road filled ~18”, but did not achieve sheet flow

# Filling the Road

## Completed Project: Road fill & turnouts and ditch stabilization

- No grade changes in road to divert runoff
- Looks good now (months old), what about in 2 years?
- Note this is a dead-end road…likely meaning minimal maintenance to keep

# Filling the Road


**Completed Project (~$100K): Road fill & cross pipes on steep hill**

- Water is unable to reach ditch or new cross pipes.
- Fill higher than lower side of road.
- Need grade changes to divert runoff!

# Filling the Road

## Completed Project: Road fill & turnouts

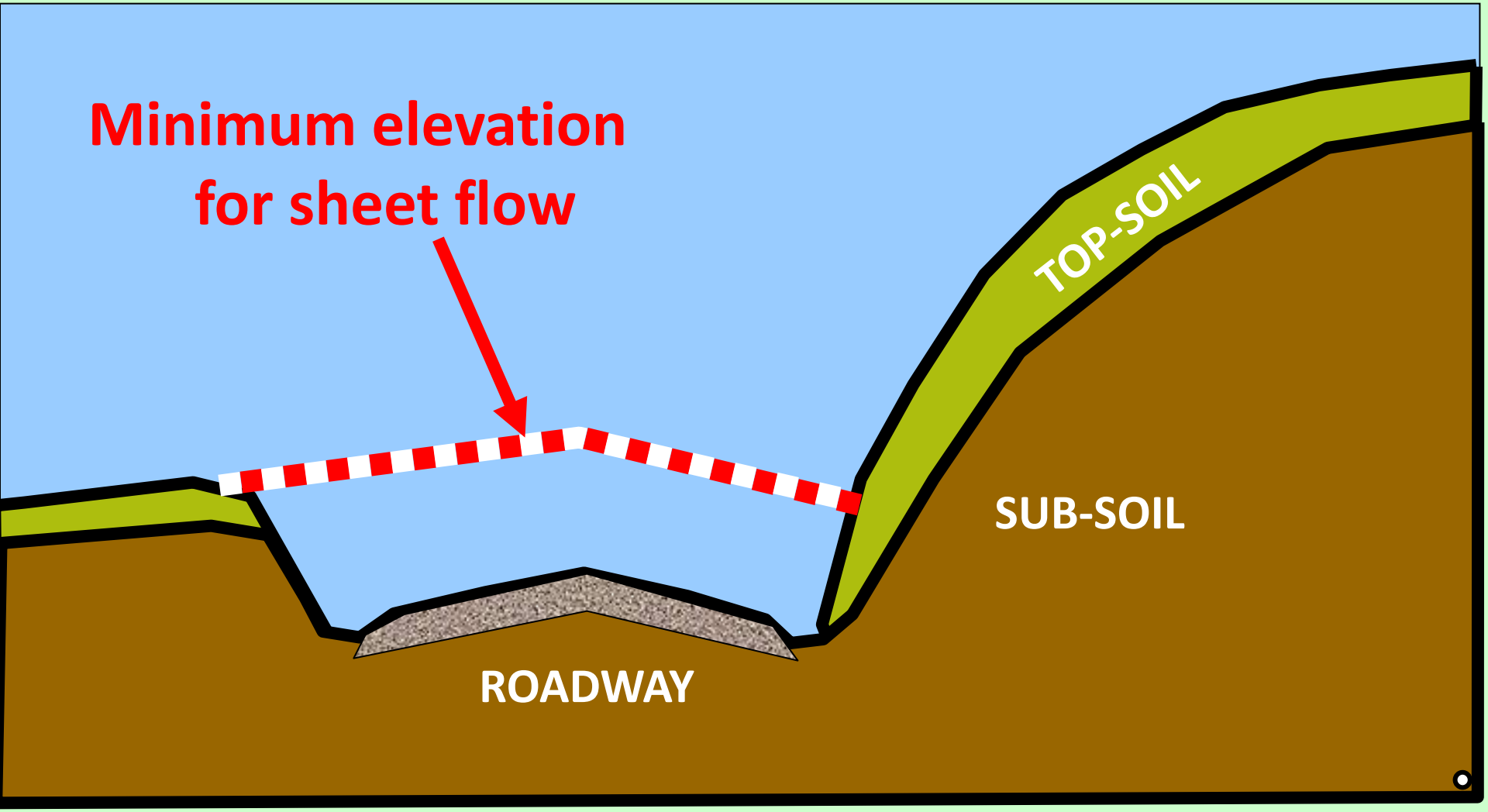
- After 2 years, water running down road again
- Lack of maintenance was again an issue

# Road Fill

## Improvement option 1: Overfill the road

- Road Fill settles
- Traffic and erosion wear surface away
- Ensure sheet flow in year 10, not just year 1

# How: Where banks are higher on both sides of the road



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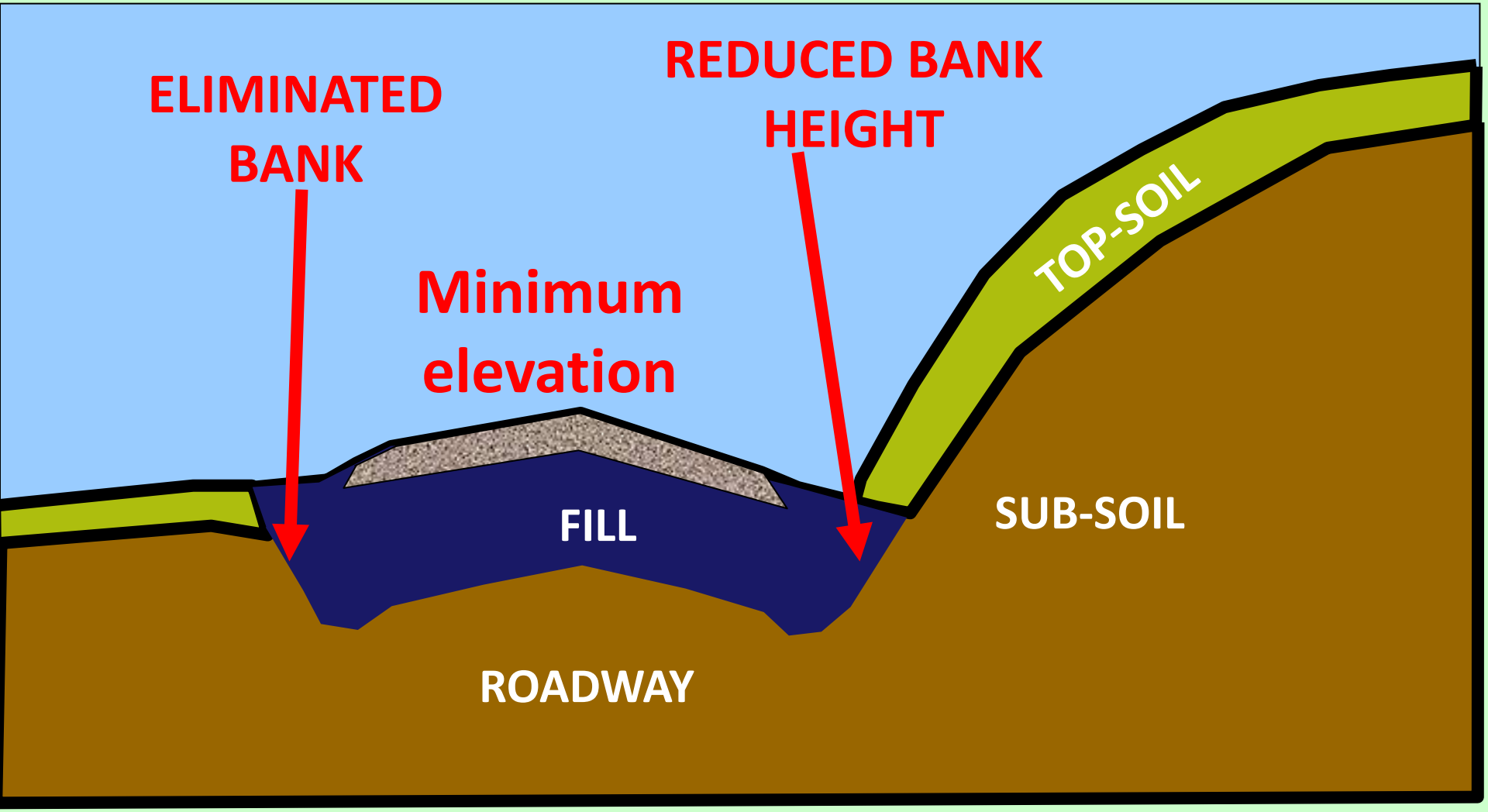

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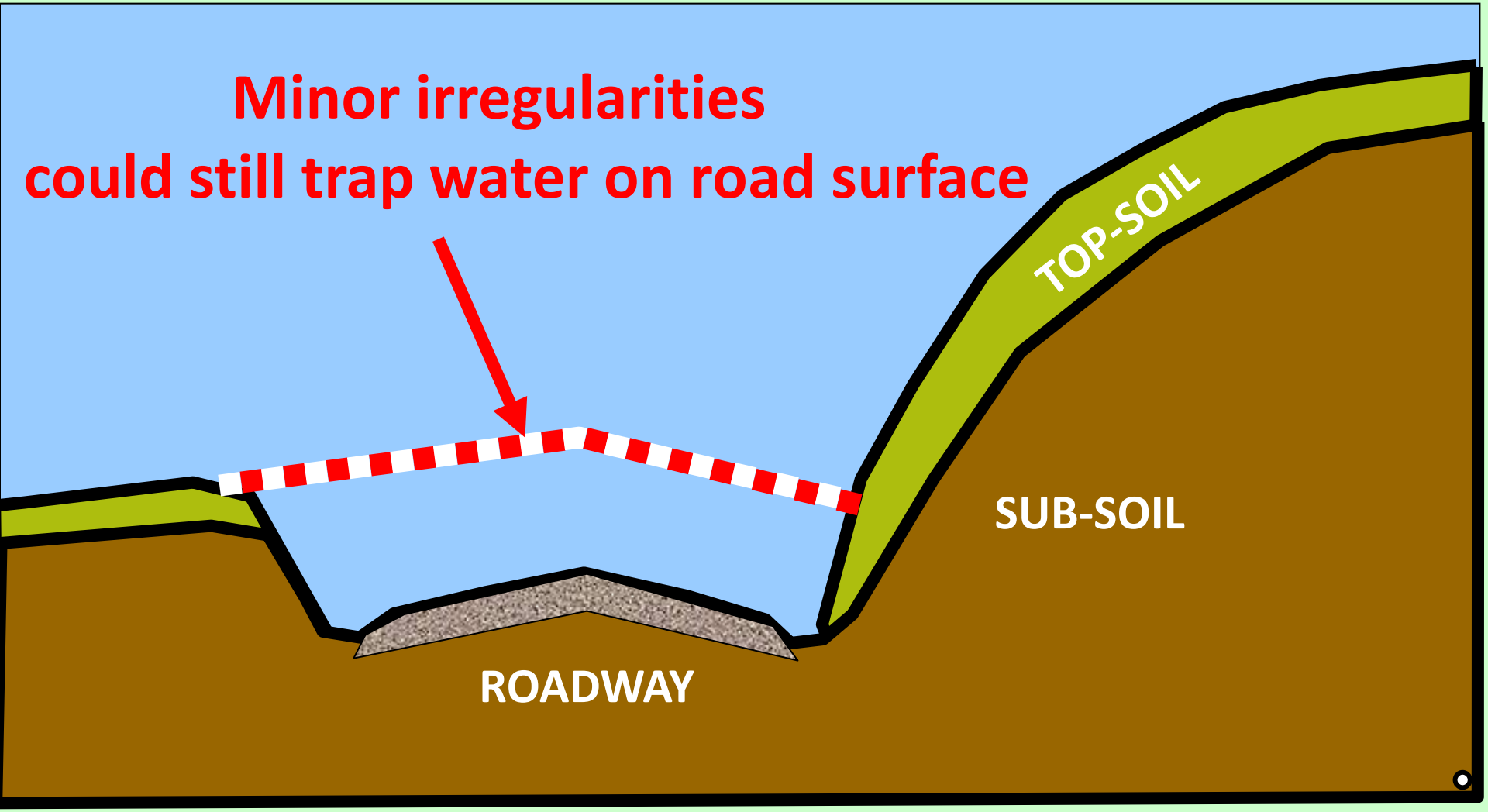
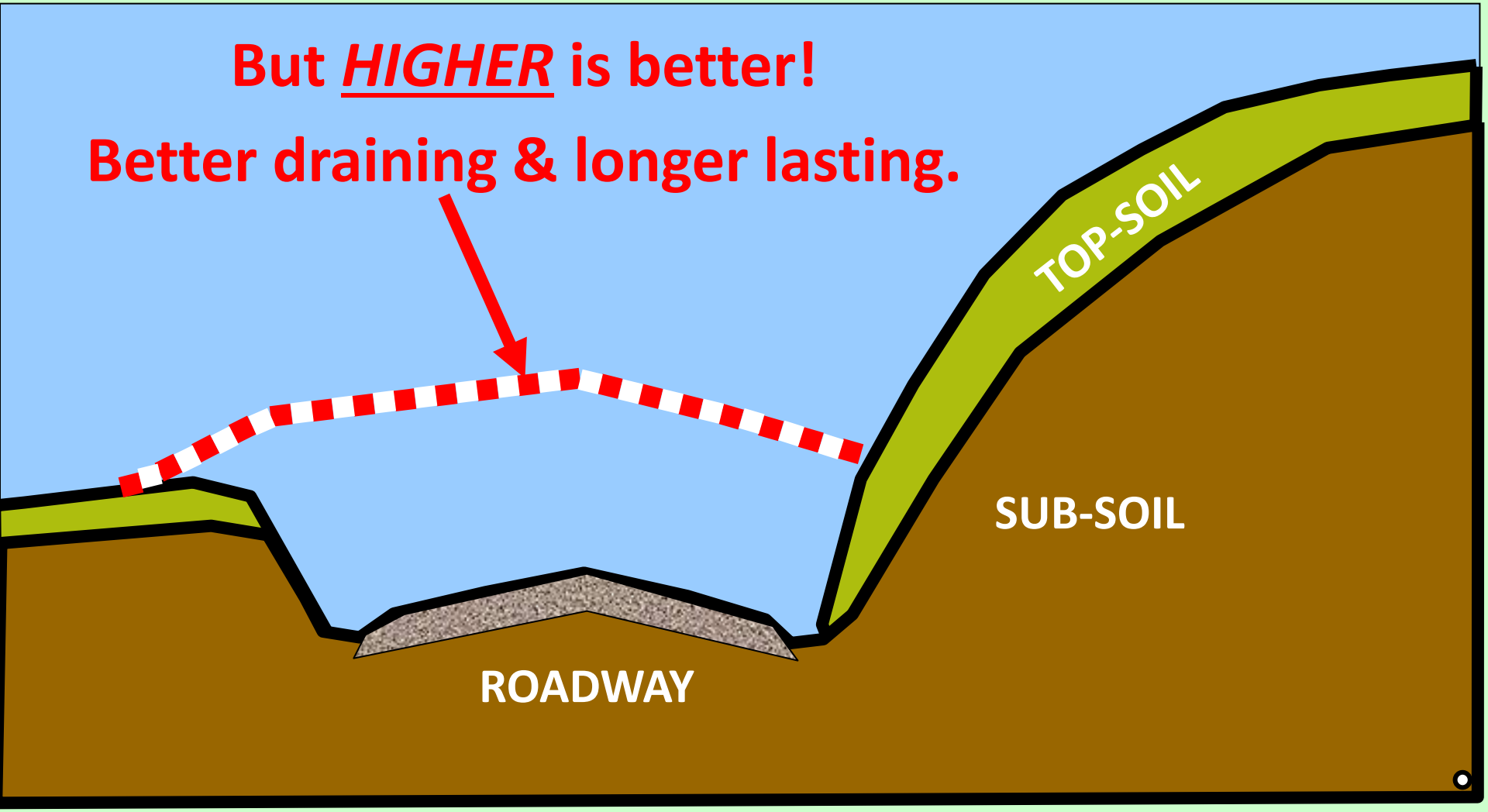



**NEW ESM Training Updates for 2023**

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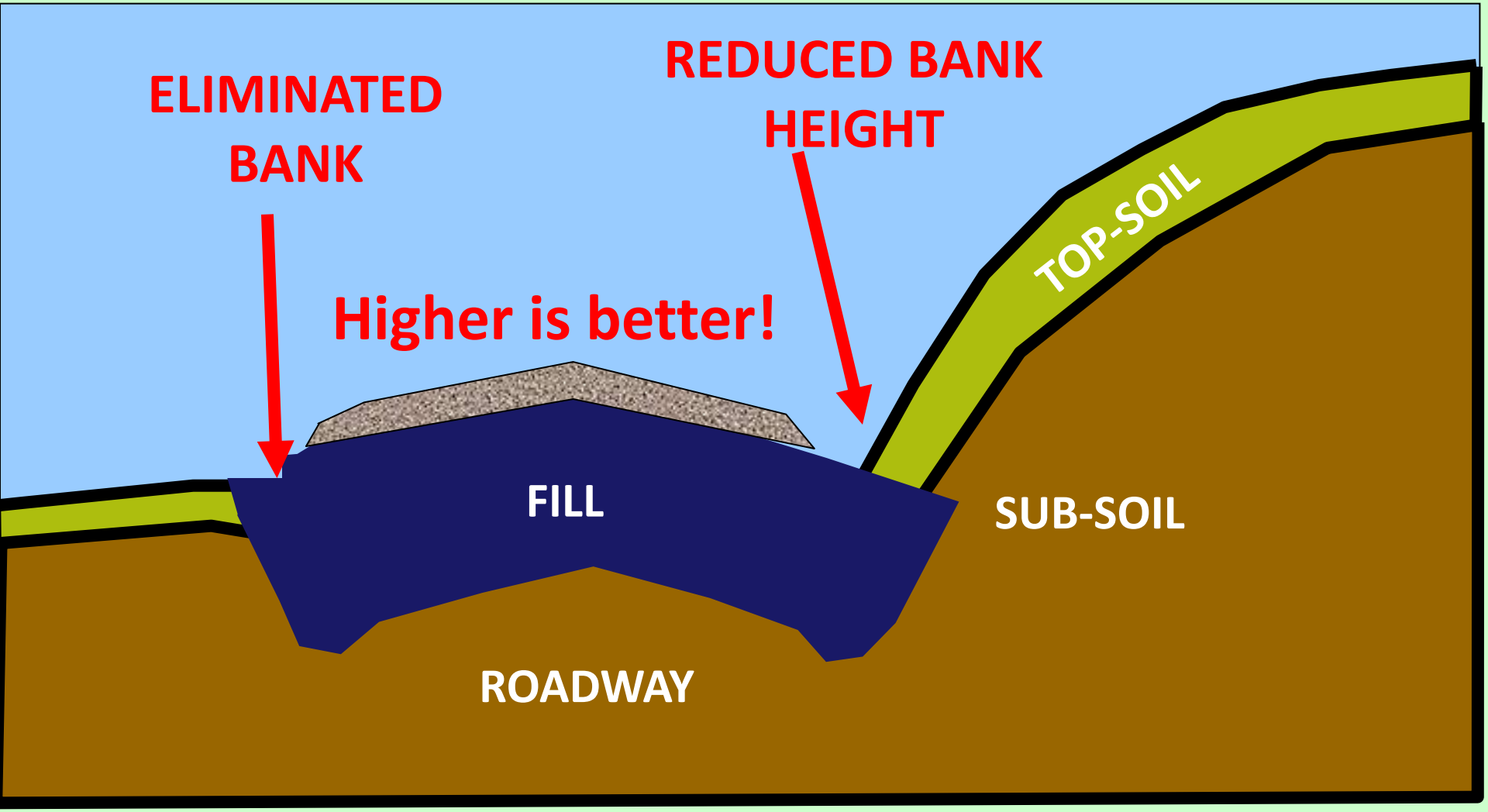
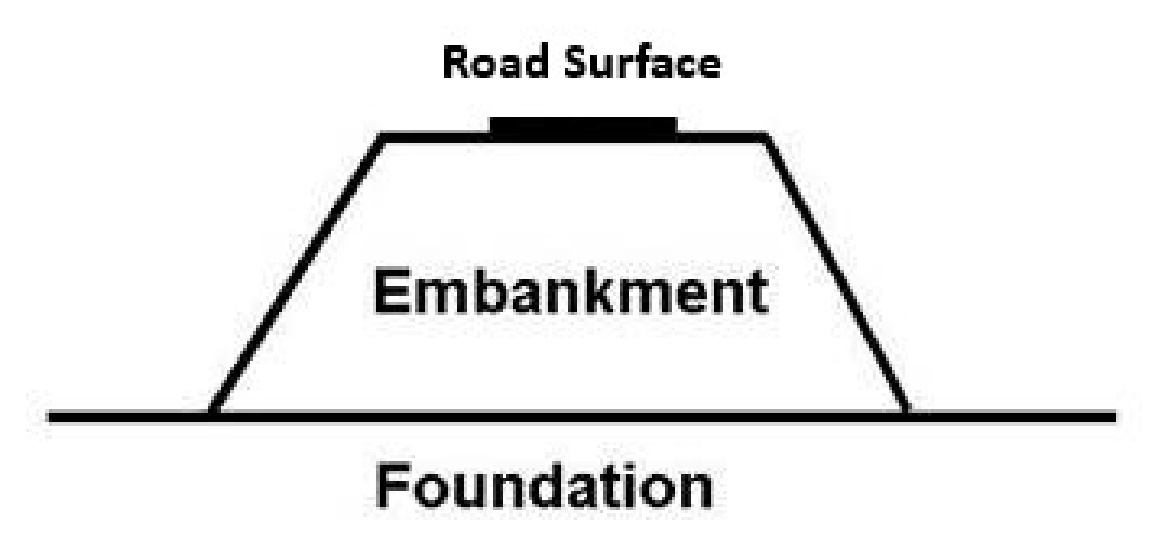



**NEW ESM Training Updates for 2023**

## Fill Above Existing Terrain:

- Goal is to promote **long-term** sheet flow. Consider settling and future erosion.
- Final road elevation should be a foot or more above natural ground for long-term drainage.
- Prevents road from eroding below road berms.
- Over filling is vital to **long-term** benefits

# Fill the hole, build a foundation, and elevate the road surface




*Scale exaggerated to show concept*

**Whenever possible or necessary strive to elevate the road surface by building an embankment**

# Filling the Road

**There is a reason why most major roads are elevated**
**We can utilize this concept on a smaller scale.**

http://www.envicom.eu/en/portfolio-posts/sizing-and-calculation-of-a-supporting-structure-necessary-to-ensure-stability-of-an-embankment-road-infrastructure-2/

**Whenever possible or necessary strive to elevate the road surface above the terrain by building an embankment**

# Filling the Road

- Strive to elevate the road surface by building an embankment
- Often called “turnpiking”

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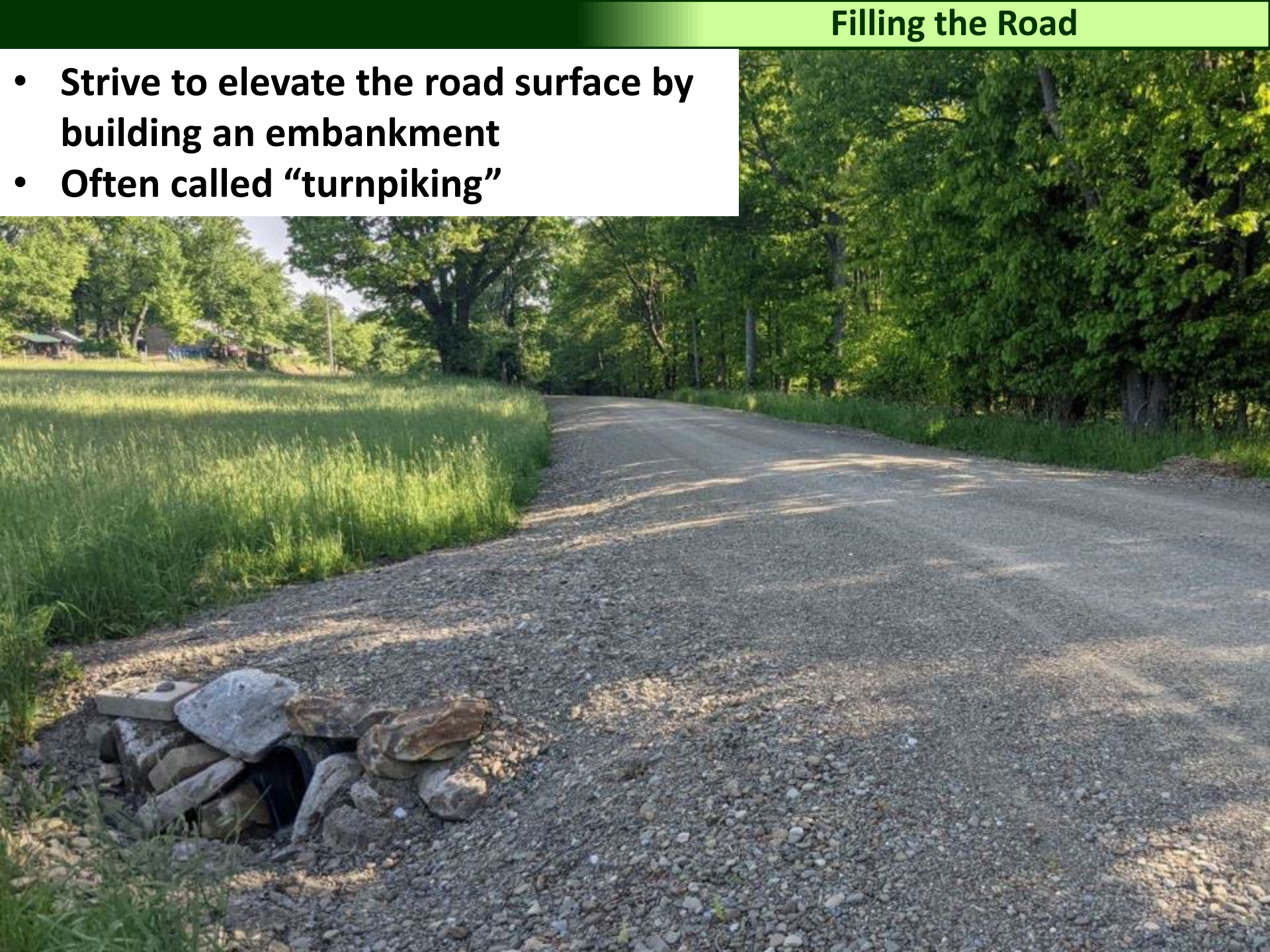


# Continuous Fill


2020 ← long term improvement!

pipes

No ditch!

**Why does it work 20 years later?**

- Road Was Overfilled
- Included two grade breaks
- Maintenance

# Road Fill

## Improvement option 2: Sectional Fill

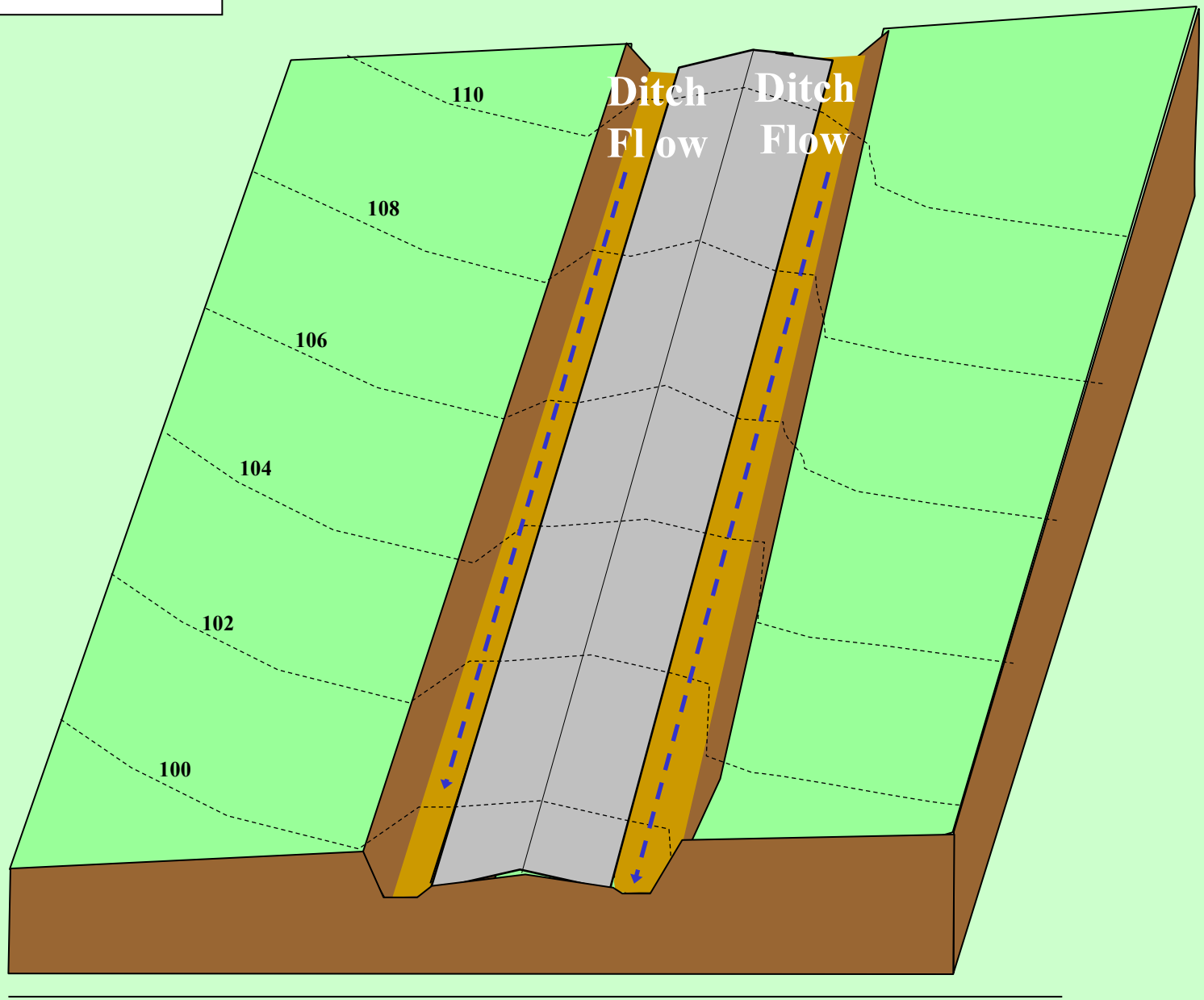
# Sectional Fill

- Introduction
- Continuous Fill
- Issues seen with Continuous fill projects
- **Sectional Fill Alternative**

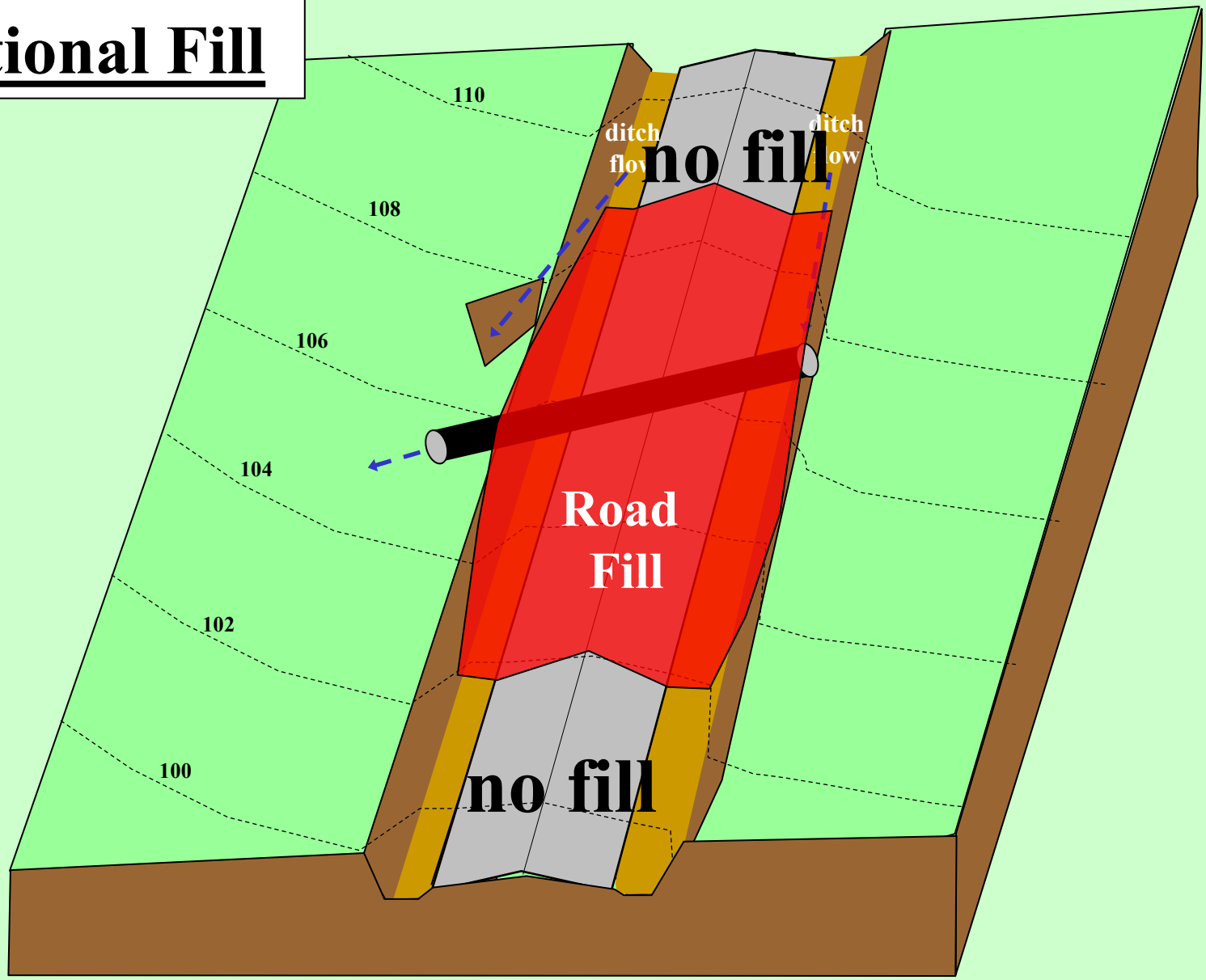
**Sectional Fill:**

- When you can't fill the entire road due to logistics, lack of material and/or cost
- Transition into and out of road fill.
- Short section of fill forces ditch turnout and provides cover for a new cross pipe.
- Can be more effective and less costly than continuous fill

# Entrenched Road



# Entrenched Road
# sectional Fill



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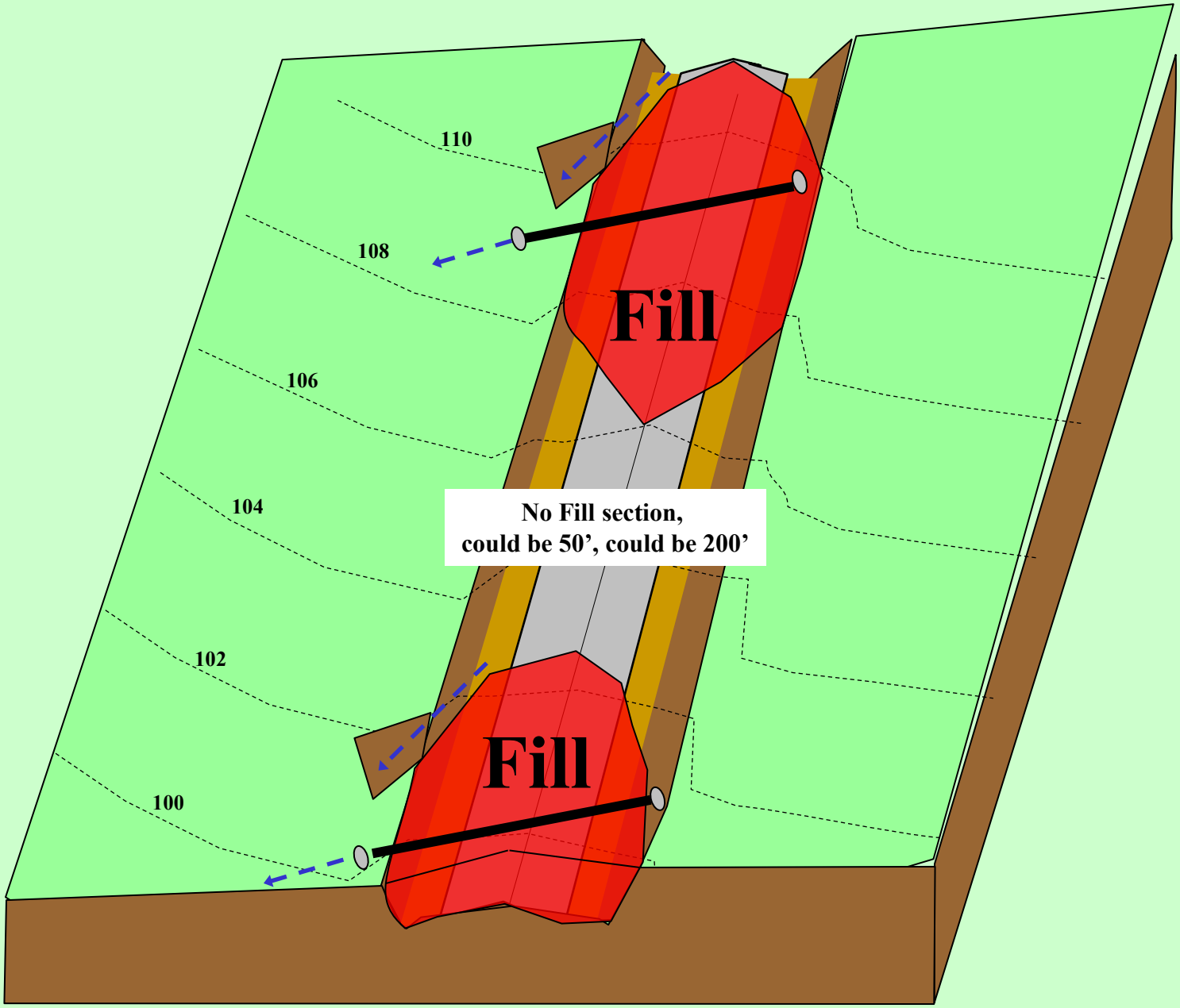
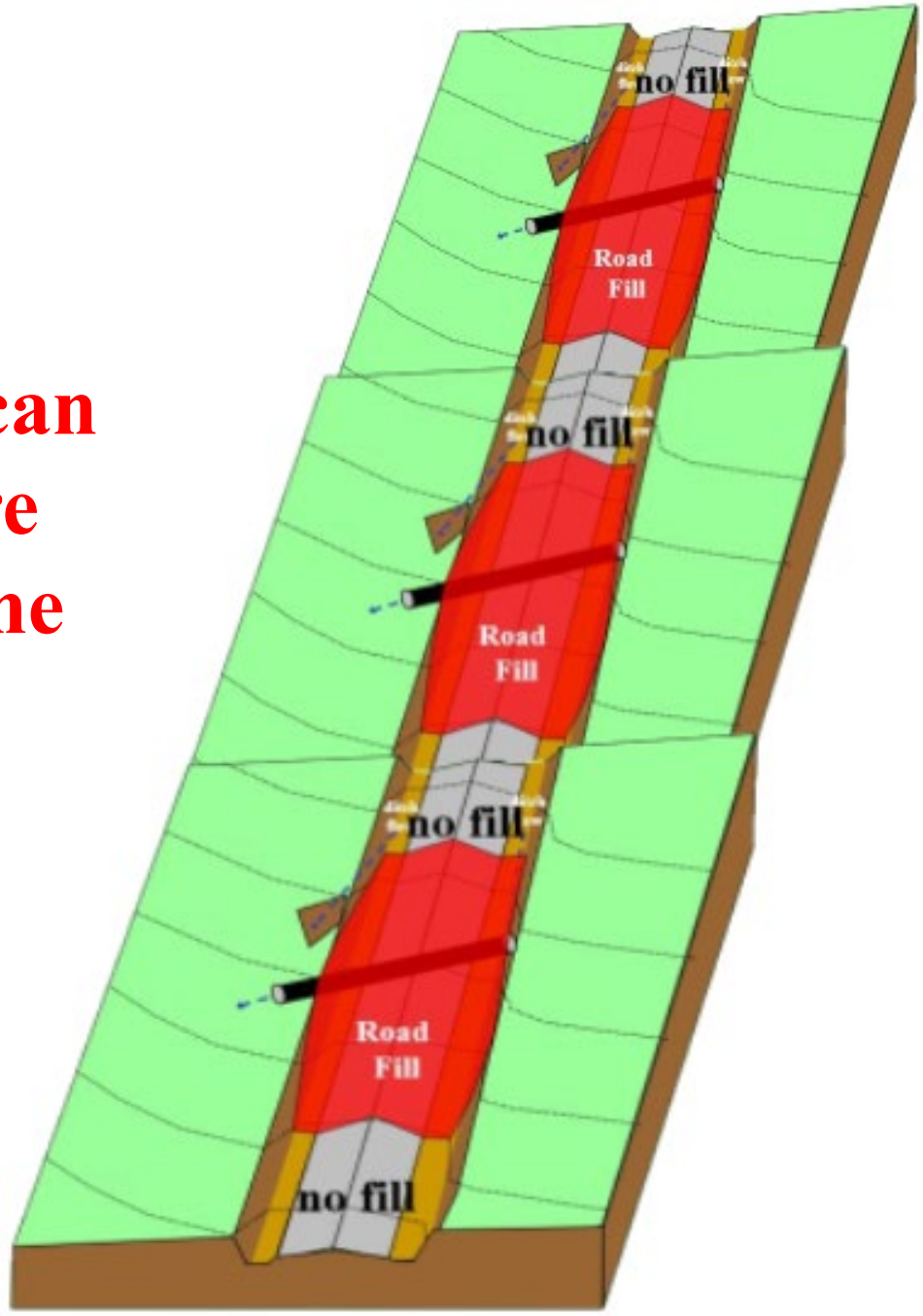


Entrenched Road

# sectional Fill

**On hills, a series of sectional fill sections can be less costly and more effective than filling the full road length**

**Limitations on steep slopes**



# Sectional Fill


McKean Cty – Prospect Rd – 1/7

# Sectional Fill

McKean Cty – Prospect Rd – 1/7

# Sectional Fill

BEFORE

McKean Cty – Prospect Rd – 2/7

# Sectional Fill

**Adding Fill**

**Enough fill used to**

- **build crown**
- **reestablish ditch function**
- **reduce the flow volume reaching stream.**

**McKean Cty – Prospect Rd – 3/7**

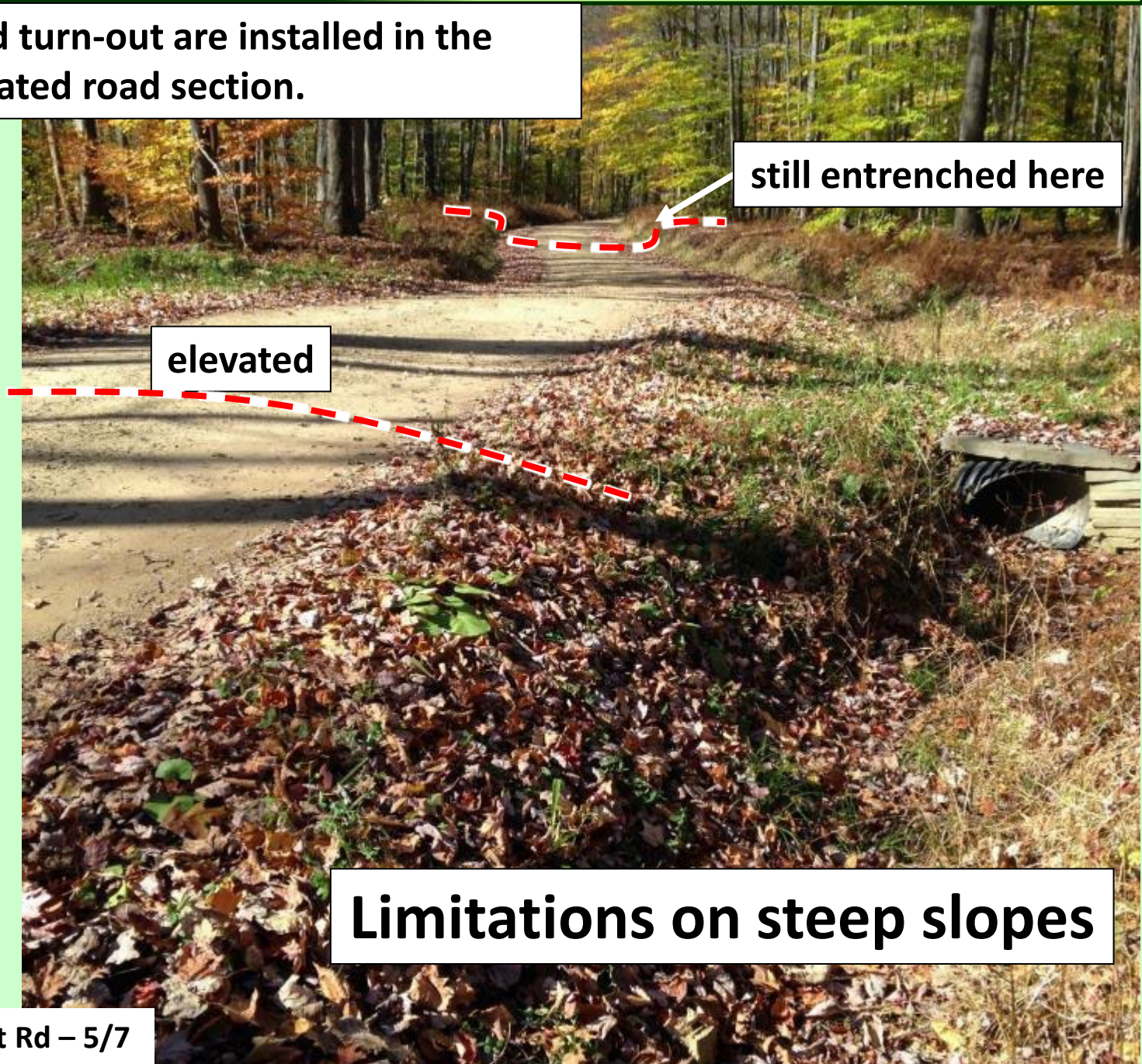
# Sectional Fill

**At a select location near the project midpoint enough fill is used to create ditch outlets.**

**McKean Cty – Prospect Rd – 4/7**

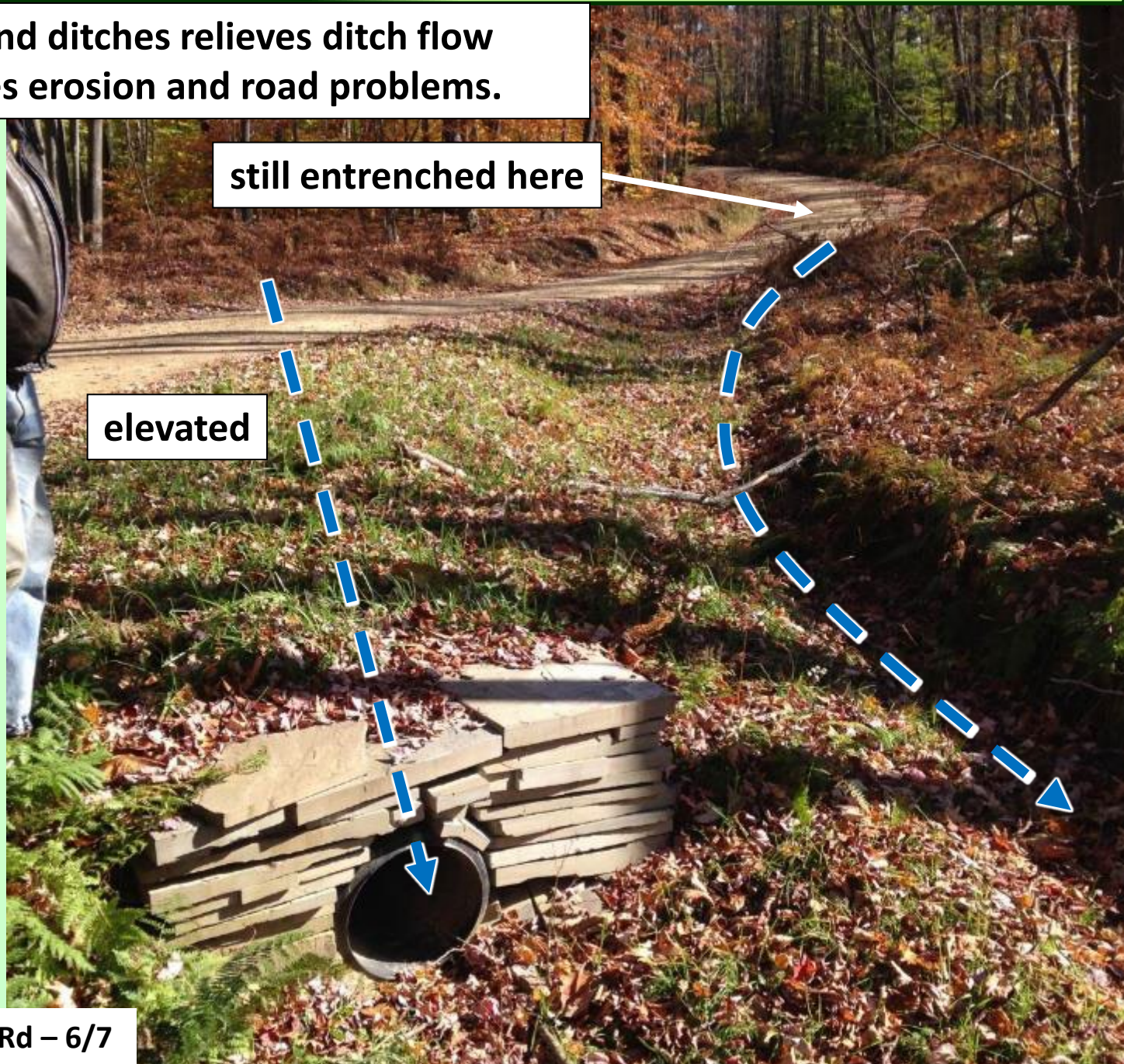
A crosspipe and turn-out are installed in the elevated road section.

AFTER



**Elevated road and ditches relieves ditch flow volumes, reduces erosion and road problems.**

**AFTER**




McKean Cty – Prospect Rd – 6/7

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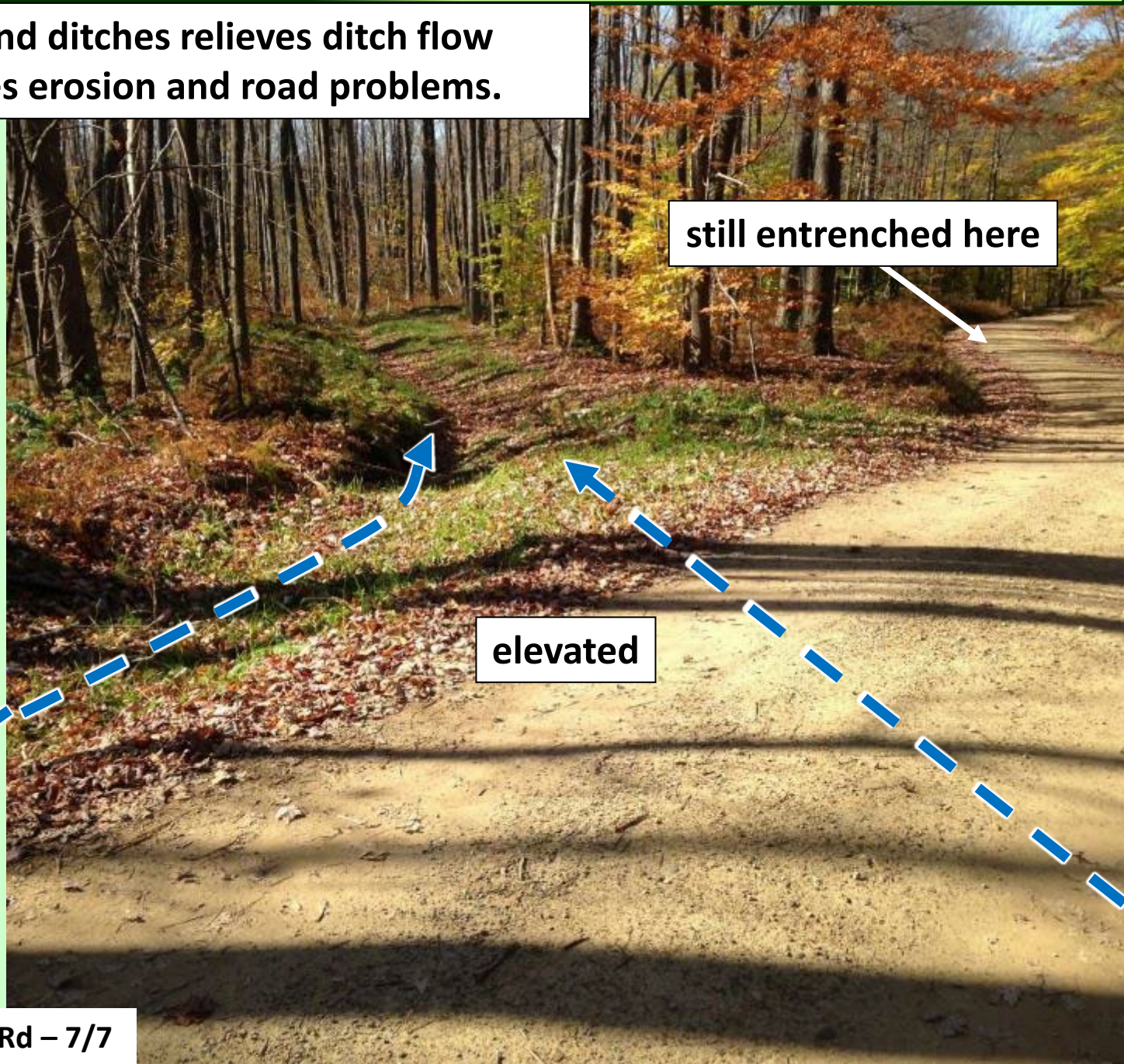
AFTER




Susquehanna County
Road Fill Overview
No fill
Fill or “extended grade break”
No fill

**Susquehanna County**
Road Fill Overview

## Sectional Fill Advantages:

- Less Costly than continuous fill (uses less fill)
- Still provides benefits of fill (improves road, allows turnouts and pipes, etc)
- **More "neglect –proof":** Excellent option in locations where you know maintenance will be limited.

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## Continuous Fill Reminders:

- Overfill the road (for long term sheet flow)
- Use surface drainage features when possible.

# Questions? Discussion?

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