INSTRUCTOR GUIDE

TRAIL ALIGNMENT AND ISSUES WITH WATER

Mark Carroll Photography

TRAIL DESIGN & ALIGNMENT CONCEPTS

Ask if anyone has ever walked on a trail or section of a Trail that was like walking in a river. Discuss the qualities that contribute to this effect that may include:

- Fall line trail alignment
- A cupped (or gullied) treadway
- An absence of drains (or maintained drains)
- Microbursts / sever weather events (as these become more common with climate change, our job to maintain drains is all the more important)

Discuss the dynamics of water on the trail.

- Faster moving water is able to pick up more soil and carry it away.
- The more sediment water carries the greater the erosive force of water.
- Slowed or stopped water drops sediment.
- The goal of drains is to escort water off the trail in a controlled fashion at at a consistent speed.
- "Slow water" is best achieved either through sidehill when water flows across a 3-5% outsloped trail.
- Water wants to run straight, so sharp turns don't work.
- Water doesn't run uphill, which is why grade reversals - where the trail goes down and then back up are places where water wants to leave the footpath.

Offer that rainy days offer a great opportunity to see the trail and water flow in action. Even doing trail work a day or two after a heavy rain can help maintainers see water's impact.

ILLUSTRATE OUTSLOPE

A partially-full transparent water bottle can be laid perpendicular to the trail to act as a bubble level to show the tread surface is in-sloped, flat, or outsloped.

DISCUSS REPORTING OBSERVED ISSUES FOR FUTURE WORK

INSTRUCTION MATERIALS FOR COURSE

- **Field work and hand tools JHA**
- **Variety of Grubbing Tools and Loppers**
- **Personal protective equipment (PPE)**
- **Pin flags**
- **Orange**
- **Protractor and/or Framing square**

As part of the tool talk for this module

Offer an introduction to each tool and any unique aspect to why it works well for digging drains, removing berms, cutting out roots, or resetting backslope, etc.

Demonstrate proper ergonomics such as pulling discard material toward you when you stand downslope rather than twisting your body to remove sediment.

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Put it into Practice

WALK THE TRAIL WITH TRAIL EYES

Two ways to deliver this learning exercise:
1) As an entire group, instructor points out qualities of the surface of the trail where the trail is more and less impacted by erosion or muddiness.
2) Set pin flags when scouting workday. Label flags so each group as a "start and end" flag. Ask groups of up to 4 people to walk their section and make observations about the trail's alignment and water. Give them 15 minutes to make assessments while instructor circulates and assists with concepts. Then have all groups re-convene to get a "3 minute tour." Instructor offers any additional observations or clarifications to improve learning outcomes.

Identify and Maintain Drains

Point out waterbars, grade reversals, natural drains, and other trail structures built to separate water from the footpath.

The work of the course does not need to be to clean every drain on the section. Instead, focus on intentional efforts to improve drains that need it, and help participants know how to plan for new drains.

If the course location provides the opportunity, the instructor should demonstrate cleaning a waterbar drain and a grade reversal drain, and fully discarding all material downhill away from the trail. Then assign people to a drain and circulate to inspect and provide feedback.

IDEAS FOR INSTRUCTION

Follow the Flow

Prior to cleaning a drain (particularly one that is clogged), roll an orange down the trail. It is likely to roll over the trail structure rather than follow the intended outflow. After cleaning the drain, you can perform the same exercise to see the likely course of water. Set a "catcher" below the drain so you don't lose your fruit.

"What's Not Right Here? "

Take advantage of available examples when drains are:

- too steep or too narrow,
- at the wrong angle
- being walked around,
- "draining" uphill or to relatively flat terrain, or
- damaged, such as when the armoring structure is
  - undercut
  - rotten/decaying wood
  - kicked loose

If examples aren't present, Hurray! It's still great to discuss what signals a failing drain.

Imagine and Verify

Ask a participant to view a section of trail. Ask them if any the area could benefit from any new drains, and ask that they walk to the place where those should be made.
If a nick in the berm, or berm removal is identified, ask that they do that.

If they indicate that a steeper section needs a waterbar, hand them a stick and request they put it at the location and at the angle they think is appropriate, imagining that it the right length, circumference and species for the job. The angle could be verified by placing a framing square so that the right angles are aligned to the backslope and perpendicular to the trail, and the long side of the triangle demonstrates the desired 45 degree angle for the waterbar placement. A protractor at the backslope could also offer the same opportunity.