

### CAMBA TRAIL RESTORATION & REHAB GUIDE

CAMBA has adopted an assortment of strategies to aid in the restoration of all CAMBA trails, with a particular emphasis on the oldest hand-built trails. Priority efforts include techniques that will establish or restore drainage aspects of the trails. Other strategies address improvements to the trail tread to offer a more efficient and pleasant ride.

#### Tools

Common tools used for trail maintenance include several derived from those used in firefighting to dig fire breaks, such as the Pulaski, McCleod, and Mattock. Other tools that are used in gardening and landscaping work well for trails too.

**Pulaski:** Ax head with a flat horizontal, sharp blade on the other end. Good for chopping roots and digging in rocky soil.

**McLeod:** Large sharp straight hoe-like blade with several rake-like tines on the other end.

Good for removing duff, raking large quantities of debris, scraping soil, chopping small roots, and finish work on new construction.

**Mattock:** Similar to a Pulaski with a smaller ax head.

**Rogue Hoe:** Large sharp blade that is excellent for removing duff and chopping small roots.

Not good for rocky soil. There are many variations on the size and configuration of Rogue Hoe tools.

**Steel Rake:** Heavy duty garden rake good for light clearing and finish work.

**Leaf Rake:** Light drain clearing and for final finish work on new construction.

**Rock Bar:** Heavy pry bar to lever out rocks.

#### Safety Considerations

- You must wear proper clothing including good work boots. Running shoes are not appropriate.
- Eye protection is recommended not only for protection from sticks and branches, but from dirt that may be thrown unexpectedly in your face when digging.
- Gloves are highly recommended.
- Position yourself at least one tool length from the nearest worker.
- Maintain a good situational awareness, including your footing, the terrain behind and next to you, roots and rocks, holes, overhead branches, the presence of other workers, and potential stinging insects.
- Transporting tools: Avoid carrying tools over your shoulder. Carry sharp tools with the sharp edge down, gripped near the head and held about a foot from your leg. Note that

on some tools both ends are sharp, so extra caution is necessary. When moving a large number of tools in a wheelbarrow, load the tools with the handles pointing away from you in case you hit a rock or the ground with the wheelbarrow as the tools may kick back toward you.

## **Flagging System**

CAMBA has adopted a flagging system that indicates the type of treatment and work each location will require. The specific pin flagging for each type of project and summarized later in this document.

## **Roots & Rocks**

Tools required include: Pulaski, Pick, Mattock, Large Loppers, Small Hand Saw, Wheelbarrow.

Root and rock removal can significantly improve a rider's experience with only a moderate amount of work. The extent to which this work is performed is dependent on the desired degree of difficulty and character of the particular trail, with more extensive root and rock removal on easier (green-level) trails, a moderate amount of rock and rock removal on intermediate/more difficult (blue-level) trails, and relatively little root and rock removal on most difficult (black-level) trails, primarily where there are drainage issues.

Flagging: There is no specific flagging for these actions, though in special cases, a single pin flag will indicate that the associated root or rock is to be removed.

## **Root Removal**

While it may seem simple, there are a few important considerations that can make the process of removing routes more efficient.

Large diameter roots – 3+ inches in diameter that lie perpendicular to the trail can usually be left alone.

Roots with a diagonal angle to the trail are a priority to remove, as they can present a safety issue.

Larger roots that are clustered together are not usually removed, and instead are covered with dirt to create a ride-over. Sufficient material should be used to provide an appropriate approach (ramp) to the roots and a proper exit.

There is generally more to a root removal than meets the eye. It is most efficient to insert the end of pick Maddox or Pulaski under the middle of a larger root and pry it upward. This will

reveal the two ends of the root, which will likely be further from the center of the root than where you may first have been inclined to chop. Chop the root as far out as you can. Note that there may be additional attached roots beneath the main trunk of the root. You will need to get under it with a Pulaski or similar tool and detach it.

In many cases, large loppers can be more efficient in separating the root, versus swinging a heavy tool such as a Pulaski.

Small to medium-sized roots can be easily chopped or cut with a Pulaski or loppers.

When removed, medium to large roots may leave a depression or divot in the trail. These should be filled with dirt and tamped.

### **Rock Removal**

Tools required: Pick, Rock Bar, Shovel

Depending on the size of the rock and how much of it is buried, rock removal can be quite straightforward. In most cases, it is only necessary to insert the pointed end of a pick or rock bar under a rock and lever it out. Larger rocks or those with a larger percentage buried, may need to be excavated around to get better leverage.

Depressions remaining after removing a rock will need to be filled and tamped.

In areas where there are a significant number of rocks, it may be more efficient to import a large amount of material and create an elevated tread to bury the rocks. This is a labor intensive effort and will require creating a borrow pit and shuttling wheelbarrow loads of dirt to the site.

### **Drainage**

Drainage is the single-most important aspect of trail maintenance and rehab. Most trails should have sufficient drainage built in when originally constructed, which should include a proper outslope to the trail tread, but that has not always been the case. Specific drainage work will depend on the overall condition of the trail, soil type, and its level of sustainability.

### **Deberming**

Tools required: Rogue hoe, McLeod, Pulaski, Rake

When trails are first constructed, a 2-5% outslope, a downhill tilting of the trail surface, is built into the trail to encourage water to shed across and not run down the trail. Over time, the

center of the trail will compact and the outslope edge will revegetate with grass, moss, and other organics. This effectively creates a dam along the edge of the trail that is higher than the depressed area in the center of the trail and must be removed.

Work in line with or perpendicular to the trail facing the trail. Using a Rogue hoe, McLeod, or Pulaski aggressively skim organic material off the downhill edge of the trail. Cast spoils far off the trail. Extend the area that you remove material almost back to the center of the trail and reestablish the outslope. It is extremely important that the new edge of the trail be substantially lower than the center of the trail. It is easy to do this incorrectly or insufficiently so pay attention to how well you've removed the outer edge and created a proper outslope.

Flagging: A series of individual pin flags will be located along the downhill edge of the trail where work is required.

## **Drains**

Tools required: Rogue Hoe, McLeod, Pulaski, Shovel, Rake

Drains are wide, sloped depressions beginning in the middle of the trail tread and extending well off the trail, often 3 to 6 feet. Smaller drains are sometimes referred to as "nicks." It has been our experience that many of our older trails lack sufficient drains. Additional and larger drains may need to be installed to insure that water does not remain on the trail and promote erosion.

Begin by defining the outer edges of the drain by digging V-shaped lines with the wide open end of the V at the edge of the trail. The shape of the drain will end up as more of a U with a rounded end. Once you've established the boundaries of the drain, proceed to rake out all leaves and loose debris with a rake or the rake end of a McCleod. This step can be skipped, but it is sometimes easier to remove the rest of the organics when the leaf mats and other materials have already been removed. Continue excavating all organic material down to mineral soil within the edges of the drain. Cast all spoils well away from the drain. The drain needs to slope away from the trail at a grade lower than the middle of the trail so that there is continuous water flow from the center of the trail off and through the end of the drain.

Older existing drains will need to be aggressively cleaned and redefined to restore water flow off the trail. We do not dig deep, narrow ditches to drain the trail.

Flagging: A flag will be positioned on each side of the opening or mouth of the drain along the edge of the trail. An additional flag is located off the trail forming a triangle where the work is to be performed.

## **Grade Reversals**

Tools required: Rogue Hoe, McLeod, Pulaski, Shovel, Rake

Grade reversals combine a drain with a water diverting rise in the trail. The primary purpose of a grade reversal is to stop water from flowing down the trail on longer, uninterrupted grades. This drainage aspect is usually incorporated as necessary when a trail is constructed. It has become common practice, however, to add more grade reversals over time to improve drainage and mitigate erosion.

First construct a drain as previously described at the point you want water to leave the trail.

Next, build a mound of soil stretching fully across the trail in line with the lower edge of the opening to the drain. The rise of the mound should be tall enough to halt water flowing down the trail, but should not be so tall as to create an unnatural bump in the trail that “bucks” the rider. Some of the soil used in the mound may be sourced from the trail itself, as you will want to lower the grade in front of the drain. It will likely be necessary to harvest additional material from a borrow pit or other source.

Flagging: This action will combine the flagging used for delineating a drain, plus opposing flags on either side of the trail that indicates the top of the rise of the reversal.

## **Borrow Pits**

It will frequently be necessary to add soil to the trail tread to fill in divots left by removing rocks and roots, to build grade reversals, or to elevate the tread. Ideally you can find a decent source of material close to where it needs to go. In most cases you will need to create a “borrow pit” to mine the needed material. In looking for a source, look around for naturally occurring humps or mounds. These may be leftover tree root balls from ancient fallen trees and are often a productive source of material. Choose one close to your work site if possible, cut back brush and remove deadfall, branches, etc. Skim all of the duff/organic layer away to reveal the mineral soil. You may need to loosen it up with a pick or rock bar. Shovel what you can into a wheelbarrow and haul to the site. When finished, rake the organic material back into the pit and try to cover it with sticks and leaves.

## **Pin Flagging System**

Root & Rock Removal: There is no specific flagging for these actions, though in special cases, a single pin flag will indicate that the associated root or rock is to be removed.

Deberming: A series of individual pin flags will be located along the downhill edge of the trail where work is required.

Drains: A flag will be positioned on each side of the opening or mouth of the drain along the edge of the trail. An additional flag is located off the trail forming a triangle where the work is to be performed.

Grade Reversals: This action will combine the flagging used for delineating a drain, plus opposing flags on either side of the trail that indicates the top of the rise of the reversal.

## **Ongoing Maintenance**

### **Leaf Blowing**

Leaf blowing is not as simple as it may sound. Not only do we need to clear leaves from the trail tread to provide a clear, safe riding surface, leaf blowing helps to clean drains and keep them functioning as designed. It also encourages earlier drying of the trails in the spring. It is important to clear leaves, silt, sticks and deadfall from all drains. Wider flow stye trails will require extra attention to clear leaves from the backs of all bermed turns as well as the primary tread including all drains.

### **Drain Clearing**

Drain cleaning is quite straightforward. Old, poorly maintained drains may be difficult to recognize, so be sure to closely inspect the trail. Drains can be cleaned with a leaf blower, steel rake, leaf rake or McLeod, depending how obstructed they are. Be sure to cast all debris as far as you can away from the trail. It is important to remove deadfall and large branches lying across the drain, as they can create a dam and clog the drain.