

KHTA Trail Building Guidelines

Suzanne Mittenthal, revised 7/11/16

I. OVERVIEW

- A. Trails should give hikers a natural-seeming experience while minimizing disturbance to the environment they traverse. A trail's design should resist erosion and require little maintenance.
- B. This simple Guide shows how to build a hiking trail along a predetermined route. It doesn't cover the task of finding and laying out the route, it doesn't cover water control structures such as drains, and it doesn't go into detail about the reasons behind the procedures. It's for people who are new to trail building.
- C. ***But there is one important trail design principle you will notice: all the trail layouts avoid straight lines. All the curves and wiggles serve a purpose: to send water off the trail. They must be observed. [For the record, straight trails are also the enemies of parents; seeing how far the trail stretches in front of young children can be a major turn-off.]***
- D. **When you start working, look closely at the trail layout.** Does it seem to make sense? This is the last chance for the trail design to be improved. If your hiking or trail work experience suggests that a route should go up around a tree instead of down, **please talk to the crew leader.** It's hard to notice every angle when siting a trail. Extra eyes can help, **but never make changes without consulting the leader.**
- E. Different people will find some trail building activities more appealing than others. What's easy for one person may be difficult or disagreeable for someone else. We encourage people to try different tools and different activities, **and to use your own judgment about how much work of any one kind you want to do.** Trail building can be strenuous, but it can also be fun! When done right, everyone feels pride in the beautiful trail they've created at the end of the day.
- F. **When starting, remember: It's better to do a shorter section of trail and get it right than a longer section that requires more work later.**
- G. The work is usually done in four (4) stages; *usually each done separately.*
1. Exploring to find a desirable/feasible site.
 2. Flagging the route.
 3. Clearing the route.
 4. Building the trail bed.



II. SAFETY

- A. Pace yourself – you're a volunteer.
- B. Drink plenty of water, especially during hot weather.
- C. Carry tools at your side, not over your shoulder.
- D. While working, leave at least 2 tool-lengths of space between you and people near you.
- E. It's better to have two or more people moving a heavy object....
- F. It's very rare that you would need to swing a tool over your head; use pushing and pulling motions that don't endanger others—let them help instead.

III. TOOLS

A. CLEARING AND CLIPPING TOOLS

1. Fire rake – for clearing leaves and small sticks from the trail corridor
2. Loppers – for cutting branches and small saplings in the trail corridor
3. Clippers – for cutting small branches and bushes
4. Hand saws – for cutting larger branches, saplings, and bushes

B. DIGGING TOOLS

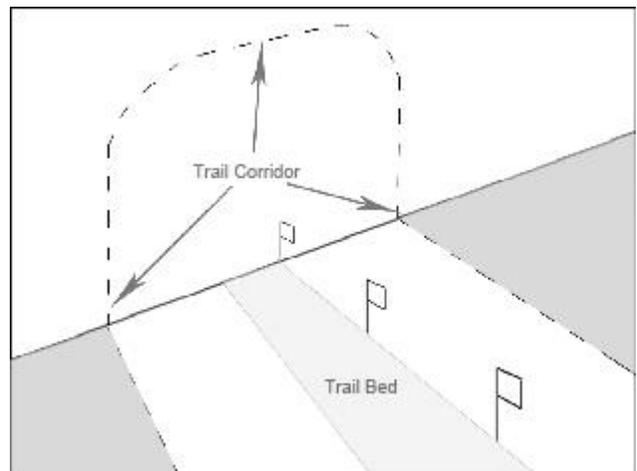
1. Pulaski – A firefighting tool, used by trail builders all over the U.S. Mattock head is used for grubbing, loosening dirt, and **removing greenery in** the trail bed. Axe head is for chopping out those pesky roots that might trip hikers.
2. Rogue Hoe – for grubbing, loosening, and **smoothing dirt**, along new trail bed, and dragging debris downslope away from the trail.
3. Shovel – for **removing dirt** from the trail bed; a boot can scoot the soil off too.

IV. PROCEDURE

A. CLEAR THE TRAIL CORRIDOR

1. The trail corridor is marked with surveyor, or pin, flags. These small flags are stuck in the ground on what will be the uphill side of the trail bed (or tread).

- a. The trail corridor is an area that extends **about FIVE feet on THE UPHILL side of the flags AND 10 FEET DOWNHILL FROM THE FLAGS** and about eight feet above the ground.



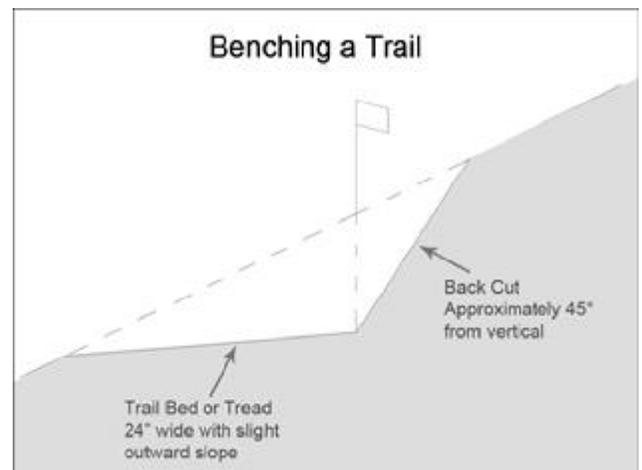
- b. The trail bed is on the ground where the actual trail will be, on the downhill side of the flags.
Clear downed limbs from the trail corridor.
- c. If a limb is too big to move, leave it for the chainsaw.
- d. Drag limbs and other debris downhill from the trail bed and outside the trail corridor, **so debris will not collect and prevent water from draining off the trail.**

2. Use fire rakes or Rogue hoes to rake leaves and small sticks from around the trail bed.
 - e. Clear an area about four feet downhill from the flags, and about two feet uphill from the flags.
 - f. You don't have to dig into the soil or cut plants while raking.
 - g. Rake the leaves into piles downhill from the trail bed, or **scatter well below the trail bed.**
 - h. Don't leave a ridge or berm of leaves and branches along the trail bed; this will prevent drainage of rainwater off the trail.
 - i. **NEVER LINE THE DOWNHILL SIDE OF A TRAIL WITH LOGS.** This will prevent water draining off the side, and guarantee erosion of the trail bed.
3. Pull or dig bushes and other small plants out of the trail corridor.
 - j. If you can easily pull a plant out with its roots intact, that's better than cutting it and leaving the roots in the ground.

- k. If you need to cut a plant in the trail bed, leave about twelve inches of stalk so its roots can more easily be dug out during the benching phase.
 - l. If you need to cut a plant outside the trail bed, cut it down to the ground without leaving any stalk.
 - m. Throw or drag cut plants downhill from the trail corridor with their cut ends facing away from the trail.
4. Trim away any branches that extend into the trail corridor.
 - a. Think about how branches and plants will grow in the years to come, and cut them back so that they won't need to be trimmed again for a long time.
 - b. **Try to cut branches about 1/4 in. from their origin on a trunk or larger branch. This allows the tree to grow a "sleeve" to close up the cut.**
 - c. Throw or drag cut branches downhill from the trail corridor with their cut ends facing away from the trail.
 5. Ferns, flowers, and other desirable plants can be transplanted near the trail at the builder's discretion.
 6. Pricker bushes.
 - a. Greenbrier—green canes, likes to climb up trees. Deer do eat them.
 - i. Try to dig it out with as much root as possible. The roots run underground for many feet and come together in junctions that can be dug out.
 - ii. Cut it back near the ground so that any new growth will occur outside the trail corridor.
 - iii. Pulaskis and long-handled Rogue hoes are good for digging root clusters and chopping and dragging greenbrier.
 - iv. Never leave clipped canes in a tangle on or near the trail.**
 - b. Multiflora or Brier Rose—invasive, planted years ago.
 - j. This plant sends stalks out from a central location
 - ii. The roots are shallow and the whole plant can often be pulled or dug out easily. Planted originally in sunny places.
 - iii. It's important to dig this out if it's growing near the trail, as it regrows fast and could block the trail in later years. This will cut down on the need for maintenance.**
 7. Small and medium sized trees can be bypassed and usually do not need to be cut down. If in doubt about whether to cut something, ask someone for advice.

C. CREATE THE TRAIL BED.

1. **Digging the trail bed (also called the "tread") is known as "benching," where a level cut or "bench" is made into the slope of a hill.** It is the most labor-intensive activity in trail construction. The trail needs to have a nearly level surface, known as a bench, so that it will be easy to walk on and will shed water that flows onto it. This process is like what road builders do.



2. **This is not simple; if you have questions, please ask the crew leader.**
3. **Loosen the soft humus soil covering the trail bed** down to the harder clay surface. This is also known as grubbing. When clearing this humus away, you

will discover and clear out annual weeds and many perennial plants too. This will keep the trail visible throughout the year. **Objective: 1 ½ ft. wide path.**

- a. Use a long or short handled Rogue hoe or the mattock end of a Pulaski.
- b. It's best to work along the trail instead of across it.
- c. Make a vertical edge on the uphill side of the trail. The edge of the trail will be at the line defined by the pin flags.
- d. Start on the uphill side of the trail bed near the flags and use a pulling motion to chop/shave/hoe dirt toward you.
- e. Move across the trail toward the downhill side, reducing your depth as you near the downhill side, leaving the surface with a very slight outward tilt.
- f. Dig to a depth that is nearly level with, but not below, the level of the ground on the downhill side of the trail. You may want to use several passes to achieve a level trail surface. Dig out any saplings that were left by the trail clearers.
- g. Chop out all roots that you find growing across the trail, and any clusters of yellow greenbrier roots.

4. Shoveling the dirt off the trail.

- a. Use either a flat or round shovel to remove loose dirt from the trail bed and pile it or scatter it away from the downhill side of the trail.
- b. Try not to dig into the ground below the loose dirt.
- c. **The dirt must not be left near the edge of the trail** or it may form a berm that will prevent water from shedding off the trail. **Or, it may create the impression of a wider trail.**

5. Smooth the trail surface.

- a. Use a **Rogue hoe** or flat shovel to smooth the trail surface.
- b. This hoe can be used like a carpenter's plane, to scrape a surface flat.

6. Make a "back cut" or "back slope" (consult drawing above).

- a. The uphill edge of the trail should have a bevel, **or slanting** back cut. **This allows the back cut to heal, and prevents water from undercutting the edge of the soil above the trail.** To keep the trail depth and width consistent, it's best to finish this cut after the trail is level.
- b. **The back cut should slant** about forty-five degrees where possible; for deep bench cuts this angle will be reduced.
- c. Use a shovel or hoe to make a slanted cut from behind the pin flags to the uphill edge of the trail, making sure to shovel the dirt off the trail.
- d. For shallow benches, you can often just use your foot to press/stomp a slant into the uphill edge.

7. Finishing the tread.

- a. **When the backslope is in, and debris cleared from the edge of the trail, check the major objective of a flat surface, about 1 ½ feet wide, with a small but visible water-draining outward slope.**
- b. **Check with your feet, to see that it is not humped or bumpy. It's better to do a shorter section of trail and get it right than a longer section that requires more work later. Ask someone to take over if you are just tired of working on it!**
- c. **Ask your neighbor to help you evaluate your work; it's hard to judge something when you've been working so close to it for a long time.**

D. CLEAN UP THE TRAIL.

1. Review your work. Talk to the crew leader if you suggest it could use more work. It happens all the time.
2. Remove plastic surveyors marking tape and surveyors pin flags.