

WOODLAND TRAILS

LAYOUT, BUILDING AND MAINTENANCE

by Shad Baker

TRAIL HISTORY

Trails have always been a part of Kentucky woodlands. From the millennia-old swath through Cumberland Gap trampled as bison crossed between the grassy fields and cane-breaks of Kentucky to the companion grounds of Virginia and Tennessee, to the Trail of Tears forged across western Kentucky as early Americans were forced on a long, treacherous, and often fatal trek to resettle west of the Mississippi River, trails have defined Kentucky's history and played a huge role in shaping its future. Many of these one-time paths later became the corridors for our modern highways, including U.S. 25 in southeastern Kentucky, U.S. 23 in eastern Kentucky, and U.S. 60 in central Kentucky. Almost every major thoroughfare in the commonwealth began as a humble trail.

Woodland trails are used for a wide range of activities. Some are used by woodland travelers to reach a cherished destination like a hunter's trail that provides for a stealthy approach to a favorite hickory tree or a trail to a prime birding habitat. Hikers, horseback riders, and many other woodland visitors enjoy a trail that allows them to take in miles of scenery without needless struggle or damage to the land. Many Kentuckians are relearning the importance exercise plays to their health and wellness, and there is no better workout for the body and mind than a regular walk in the woods. Ask anyone who has spent more than 20 minutes on a treadmill, and they'll tell you that they would much rather be outdoors where the scenery changes and the exertion level naturally varies. Finally, woodland owners build working trails to help protect and manage their properties.

THE NEED FOR PLANNING AND DESIGNING A WELL-BUILT TRAIL

Most people will recognize that a well-planned and well-built trail allows them to better use and manage their land for almost any purpose. Even as a road permits us to quickly and easily get from one town to another, well-placed trails make timber evaluation and logging easier, fire suppression more manageable, and recreational pursuits more pleasant, and they benefit the property owner in countless ways with minimal disturbance to soil, vegetation, and wildlife habitats. The one-time disturbance caused during trail construction pales in comparison to the wear and tear created when many different routes are taken under varying weather conditions and over many years. Properly built trails also afford us the opportunity to teach the next generation about wildlife, forestry, conservation, or any other woodland subject. Little feet are more likely to join us on a well-worn path than in pushing through green-briar or cedar thickets.

Signs can be a valuable enhancement to a trail system. Signs are often used at trailheads and junctions to inform trail users of destinations and distances. Additional signs (reassurance markers) can be useful if the trail is long or difficult to follow.

Photo courtesy: Shad Baker

Public access to trails on private land can have a tremendous potential benefit for the landowner. Some may be proud to learn that their land is appealing enough to draw others to visit. Others may be surprised to learn that lands used by public trail systems typically also enjoy a significant tax break while allowing the landowner to retain almost all other rights. A case in point is the 80 percent tax break for private landowners who have a conservation easement for the Kentucky Pine Mountain Trail in southeastern Kentucky. In exchange for permitting public use of your land, you may find that you can





still enjoy your land as before and with a greatly reduced tax burden.

TRAIL ESTABLISHMENT

Whether a trail is kept small for foot traffic or widened enough to permit horse-drawn wagons, a well-designed and well-built trail makes traveling through the landscape easier. But good trails don't just happen spontaneously: they have to be designed and built. A trail that just "happens" is almost always too steep or too narrow, lies poorly on the contour, and is typically badly eroded. Frequently, such trails cross through or actually meander directly up streambeds, disturbing the soil and muddying the creek. Such trails typically fall into disuse when the damage is severe, and a new, equally poor trail develops. This type of trail should be retired and re-vegetated.

The first step in building any trail is to consider its primary purpose. Do you want it wide enough to permit a vehicle to access areas for woodland management purposes or narrow so that unwanted visitors don't turn your land into an ATV obstacle course? Is it to be a ridge-line trail to monitor boundary lines or a trail along a stream to allow for easy access to a favorite fishing hole? Once this decision is made, you can move onto deciding the actual location of the trail and the construction methods to be used.

The surveyor's plastic flagging in trees and brush to help you get a rough idea of where the trail should go. You may want to use a device called a clinometer to make sure the trail doesn't exceed 10 percent slope (10 feet of rise or fall for every 100 feet of horizontal distance). Maintaining a grade of less than 10 percent protects the trail from gulleying and helps prevent fatigue by users (you'll want to be able to enjoy the trail when you are 80 or more, right?). Any stream crossings should be gentle; slopes of less than 2 percent are preferable. You'll want to pass on the upper side of large trees to avoid damaging roots with the digging. Doing so will also save you a lot of work, as tree roots make for tough digging. Once the general path has been established, use staked flags to denote the upper edge of the trail-bed to be dug. While the slope of the trail bed is important, the slope of the hillside that the trail is on also plays a part in its construction. Figure 1 provides an idea of the proper use of cut and fill as the slope of the hillside increases.

If you opt to have someone else do the construction, you should know that the cost of a foot-trail averages roughly \$2 per foot. Several firms around the region and country specialize in trail building for public and private groups. This construction cost can be significantly reduced if you are willing to take some time and build it yourself. If you choose to do it on your own, you will want to refer to publications that contain detailed information on trail establishment (see the section on the next page on "Trail Resources"). These resources will help you understand the basics and provide suggestions for tools, techniques, and other relevant information.

With the trail marked and a firm knowledge of trail building techniques in mind, it is now time to choose the construction method. Will you use hand tools or mechanized equipment? This decision is a mix of personal preference, physical ability, and the intended trail use.

Those seeking to build a low-impact, natural-looking path that doesn't disturb wildflowers and minimizes unwanted uses will likely prefer to dig the trail by hand. This approach typically requires only hand pruners (loppers), saws, fire rakes, and a Pulaski (a combination of a heavy-duty grubbing hoe and axe). The loppers and saws are for cutting back limbs and shrubs, while the fire rake and Pulaski are for removing duff (the organic root layer) and then digging and shaping the trail-bed.

Those wanting a larger trail-bed for horses, ATVs, or other uses will likely prefer a rubber-tracked back-hoe, mini skid steer, or a light dozer. Keep in mind that while the digging itself may be easier with this approach, you will still want to put a fair amount



Photo courtesy: Shad Baker

Overtime trails can become entrenched and require maintenance. In addition to rehabbing the trail surface, working to redirect water off the trail (by busting through the berm on the left and installing cross-drain structures) can increase the life of the trail. Try to include users in the maintenance and upkeep of the trail as it is their best interest that the trail be kept in peak condition.

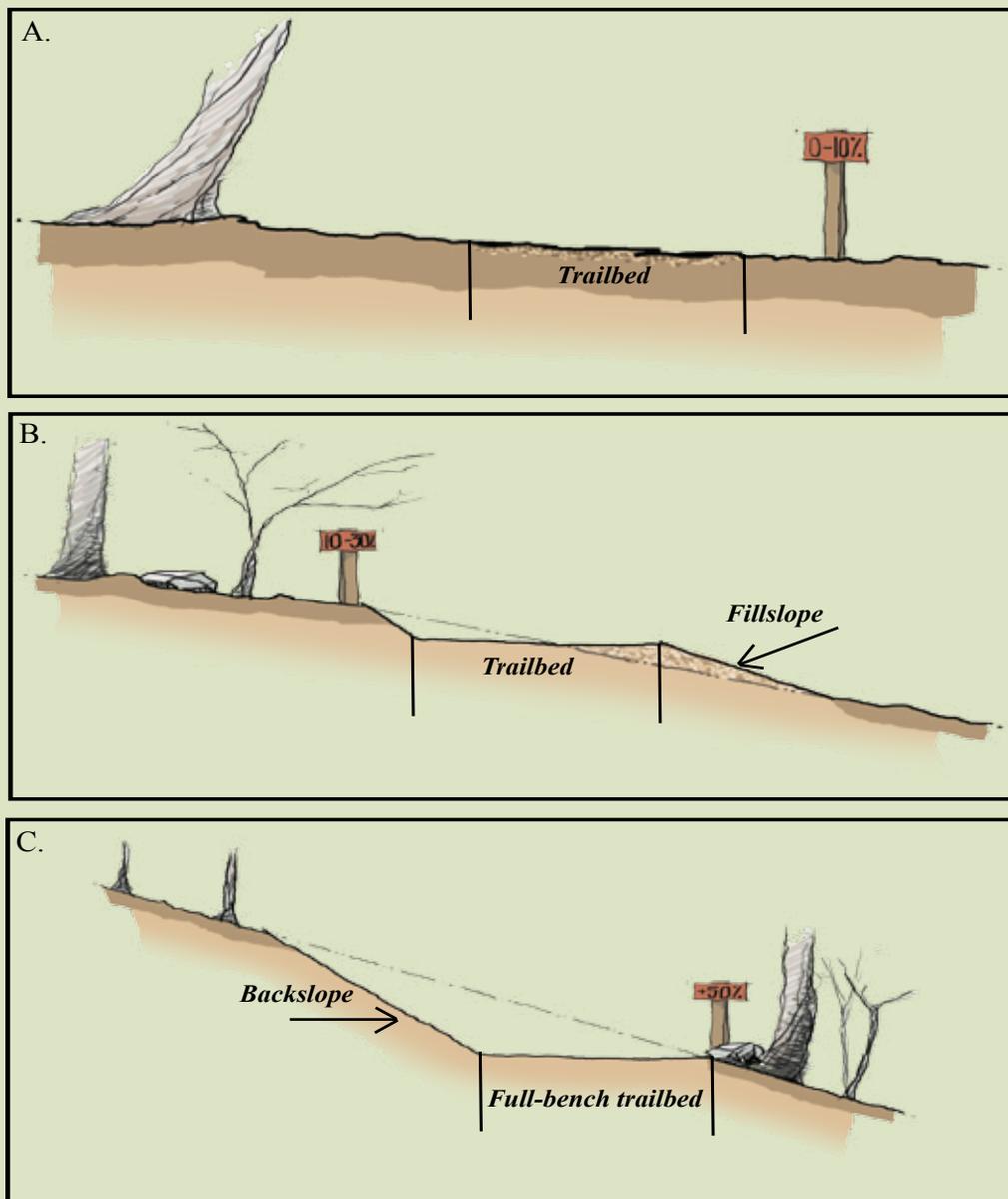


Figure 1. When establishing trails on hillsides the amount of excavated material generally increases as the slope increases.

- (A) Slopes less than 10% require little excavation to create the trailbed, and the small amount of excavated soil can be deposited over the hill.
- (B) As the slope of the hill increases, some excavation may be needed. Fill can be used to create part of a foot trail, but it needs to be compacted and used only to a limited extent. If the trail is to be used for horses, avoid using fill to form the trailbed.
- (C) On steep slopes (>50%), a full-bench trailbed should be established; the excavated material should not be used for the trailbed.

For more specific information on all aspects of trail construction and maintenance please see "Trail Construction and Maintenance Notebook, USDA, Forest Service, 2007 Edition" by visiting www.fhwa.dot.gov/environment/fspubs/07232806/index.htm.

of effort into the design and layout. Otherwise, you'll end up with a muddy mess that requires more money and time to repair later. In making a larger trail, consider whether you intend to harvest timber at some point. If so, a wide, well-designed trail system with gentle turns can greatly lessen the impact ecologically and aesthetically.

Many of the same principles involved in designing and maintaining a successful logging road or skid trail also figure into successful trail design and maintenance. Your greatest adversary is erosion. Minimizing erosion means that trails must be well drained, and water must not be allowed to run in a concentrated flow down the trail so that a gully is eventually formed. Where possible, build the trail so that it is sloped a bit (1 percent) across the trail (this is termed outsloping). The outsloping allows water to flow in an even sheet across and off the trail. There will be places where the water will collect or where the trail is not outsloped. A variety of different drainage structures can be used to drain water from the trail at these locations. These are referred to as cross-drain structures. They are designed to stop the downward flow of the water and move the water across the trail and into the undisturbed soil. These include partially burying a pole across the trail or constructing a shallow dip at an angle across the trail so it catches water moving down the trail and directs it into undisturbed soil. These should be spaced so that water does not come close to creating a gully. Overtime, trail use will tend to compact the center of the trail and therefore channel water down the middle. This means you'll occasionally want to knock off the

outer edge of the trail (berm) and permit the water to flow off the trail.

Other regular maintenance will include clearing blow-downs, lopping limbs back from the trail (approximately 3 feet on either side of the trail edge), and removing piles of leaves or sprouting seedlings (sassafras is especially prolific in many trails in the state). A string trimmer is good for this task, as it will brush away the leaves and kill any sprouting seedlings. If you have waited too long, a blade attachment can help. This discussion shows how varied the size, steepness, and implements used to construct and maintain trails are relative to their use. Table 1 provides a summary of key elements by trail use. In conclusion, building a proper trail is gratifying and will help everyone enjoy the woods. A proper trail must be well planned, making sure to keep the slope gentle and provide proper drainage. Watch your trails and plan for proper maintenance, and they will provide you with many years of enjoyment.

Table 1. Trail Types and General Guidelines

Trail Types	Specifications
Foot	<ul style="list-style-type: none">• Limit width to 3 to 5 feet.• Maximum slope of 10% on short sections.• Hand dug or machine assisted.• Use outslloping to manage erosion.
Horse	<ul style="list-style-type: none">• 5 to 8 feet minimum width.• Slope is variable; 20 to 25% maximum for short sections.• Hand dug or machine assisted.• Outslloping generally not effective; use cross-drain structures for drainage.
ATV	<ul style="list-style-type: none">• 6 to 10 feet wide.• Slope variable.• 30 to 35% maximum for short stretches.• Both outslloping and cross-drain structures can be used for drainage.
Vehicles	<ul style="list-style-type: none">• 8 to 12 feet wide.• Slope less than 15% when possible.• Machine constructed.• Outslloping and cross-drain structures can be used for drainage.
Logging	<ul style="list-style-type: none">• 12 to 16 feet wide.• Slope less than 40% when possible.• Machine constructed.• Cross-drain structures preferred for drainage.
Fire	<ul style="list-style-type: none">• Limit width to 8 to 10 feet.• Slope is variable but should be minimized.• Machine construction.• Outslloping should be used to facilitate drainage.
Multiple use	<ul style="list-style-type: none">• Match width to the widest use.• Use a combination of water control structures, and minimize grade.

A FEW FAMOUS KENTUCKY TRAILS

Bad Branch State Nature Preserve Trail – 7.4-mile trail on a 1940s logging road that permits views of Bad Branch Gorge, 60-foot high Bad Branch Falls, mature hemlock forests, and High Rock.

Pine Mountain Trail – 44 miles and growing; affords multiple cliff-line views of Cumberland Plateau, pioneer homesteads, moonshine still remnants, upland bogs, rock-shelters, and historic sites in the largest remaining wilderness-type area in the state.

North-South Trail – 65 miles; runs the length of the Land Between the Lakes; follows old logging and fire roads through meadows, mature forests, and old home sites.

Sheltowee Trace National Recreation Trail – 269 miles; multi-use; runs the length of Daniel Boone National Forest, cliffs, canyons, gorges, waterfalls, and historic sites.

Wilderness Road National Recreation Trail – 2.6 miles; follows or parallels Wilderness Road of historic fame; mixed oak forest.

TRAIL RESOURCES

- *The Complete Guide to Trail Building and Maintenance* by Carl Demrow and David Salisbury, 1998.
- *Lightly on the Land: The SCA Trail-Building and Maintenance Manual* by Robert C. Birkby, 1996.
- *Appalachian Trail Design, Construction, and Maintenance* by William Birchard Jr. and Robert D. Proudman, 2000.
- *Trail Construction and Maintenance Notebook*, USDA, Forest Service, 2007.

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