Trail Development

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Introduction

In the early days of our nation, trails were a way to get from one place to another in the wild and untamed countryside. Today our trails have more of a recreational orientation, and many wander about to expose the hikers to a variety of natural and environmental experiences. Regardless of whether the trail function is to provide access or recreation opportunities, or whether the trail is in the mountains, piedmont or coastal plains, certain basic fundamentals of planning, design, construction and management must be satisfied to produce an effective hiking trail.

Hiking is an increasingly popular form of outdoor recreation. Hikers are a diverse group with a variety of expectations. Some hikers view mountain hiking as a way to enjoy the outdoors, and others enjoy just walking through the "back 40" to watch the birds or other wildlife and get some exercise. The construction of good, quality trails for both user groups is quite a challenge but one most landowners can handle.

Planning Trails

Trail users usually have specific interests which are manifested in their desires to pursue specific trail-related activities. Whether viewing beautiful scenery, testing outdoor skills, escaping the confines of a structured environment, socializing with other users with similar interests, or becoming better informed about the natural environment, the degree to which these pursuits are satisfied often depend on the location of the trail.

A well-located and designed trail reflects the mood and feeling of the area through which it traverses and "lies softly upon the land." The trail should be routed to take advantage of important features or points of interest. Consider "sequential experience" or how trail users are guided from one feature to another to enhance the overall quality of their experience.

A good job of trail location is one of the most important aspects of the total trail effort. Application of sound principles of trail location, route alignment and grade will eliminate many future operation and maintenance problems as well as produce a facility which meets the planned objectives of land and resource management and user desires.

A well-planned forest trail system should reflect five basic objectives:

- Satisfaction of user needs
- Protection of the resources
- Minimize user conflicts
- Minimize cost and effort
- Minimize maintenance

To satisfy these objectives, a trail system should be designed to:

- Provide the specific recreational activities desired by the landowner at the highest quality level possible.
- Provide users the opportunity to renew self and spirit, practice learned skills, and to escape the confines of a structured environment.

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— Provide users a way to experience a variety of environments, seasons of the year, and modes of travel.

— Provide adequate facilities for user convenience, safety, and comfort as required by the trail activity allowed and the experience level provided.

— Promote and enhance family-oriented activities and opportunities.

— Minimize or eliminate conflicting and non-compatible activities.

Location/Alignment/Grade

Having determined the purpose or destination of the trail from the trail planning process, preliminary or alternative routes may be identified using maps, aerial photos, personal knowledge of the area and other available information. It will be helpful at this point to contact family members or user groups for their input.

Location

Here are some general guidelines which are useful in trail location:

— Always locate the trail with drainage in mind; drainage is by far the most important criterion.

— Locate route to take best advantage of differing seasonal experiences.

— Contour routes to best fit topography.

— Provide openings, overlooks, or observation points for scenic vistas and wildlife observation.

— As allowed by the experience level provided, utilize natural stream fords in lieu of bridge construction.

— On flat ridges, the trail should be "snaked" to provide vistas on either side of the ridge. Be sure, however, to consider drainage since it could be a problem.

Areas to avoid include those that exhibit the following:

— Unstable and highly erosive soils

— Creek bottoms subject to predictable flooding

— Rock, land slide areas

— Use of constant service roads as trails

— Frequent stream crossings

— Lightning prone areas

— Extensive use of switchbacks and long straight stretches

— Known habitats of threatened or endangered species

— Unwanted contact with developed areas and other non-compatible trail activities

— Never run a trail perpendicular to the contour, i.e., straight up and down a slope.

Attempt to favor those natural areas that exhibit the following:

— Natural trail drainage
— Natural openings
— Scenic views
— Open timber
— Light brush
— Uniform grades
— Natural stream crossings
— Well-drained soils that resist erosion
— Areas suitable for future development
— Areas with varied vegetation types.

Alignment

As a rule, trail alignment should follow the contours of the land and be a series of gently sweeping, elongated curves. Long, straight stretches (tangents) and sharp, angular turns should be avoided. Avoid pine stump holes. They are difficult to fill adequately.

Always angle the trail across the natural slope of the land. Locating the trail directly up or down a slope results in no opportunity to drain damaging water off the trail tread and will cause erosion of the trail.

Alignment should take advantage of natural drainage to minimize the need for major drainage modifications. Proper drainage is a long-term investment which pays off in reduced future maintenance, reconstruction and relocation work.

Avoid blackberry and poison ivy thickets if at all possible.

Trails should cross streams at as near right angles as practicable. This will allow for better drainage and require less materials for construction of the bridge.

Grade

Trails with a rolling grade should be designed with care and consideration for the user. For instance, rolling grades of 6-7% would be very tiring for a hiker. Avoid zero grades where possible; however, it is understood that trails located through fields and low areas may require stretches of the trail to be flat in places. Short runs of steps should be considered when grades between points on the trail would be excessive for either user comfort or soil stability. Serious consideration should be given to soil types and their allowed use when planning grades to assure minimum trail erosion. The following chart gives suggested grade criteria for various trail types. When a trail serves more that one planned purpose, grades should be based on the most restrictive grade of the combined use.

Trail Type	Grade (%) Preferred	Max.	Allowable Distance At % Sustained Grade
Hiking	I-7	15	1 000'@ 7-1 O%, 600'@ 1 O-1 5%
Horse	I-7	10	1000' @ 7-l 0%
Bicycle	I-7	6	800' @ 3-6%
Interpretive	I-4	8	200' @ 4-6%, 1 OO'@ 6-8%
Handicapped	o-3	5	60' @ 3-5% Followed by Flat Rest

Construction

Because of the difficulty in transporting building materials, structures such as bridges or benches should be held to a minimum. Alternative routes or innovative designs should be considered to eliminate or reduce the need for such structures. However, if such structures in remote locations are determined to be necessary, they should be built on site, utilizing native materials.

Removal of vegetative material within prescribed limits along the route of the trail should be accomplished using the following guidelines:

— Stumps, roots and other material which present safety hazards to the user or interfere with trail tread construction should be removed

— Clearing limits should reflect consideration of the trail activities offered, visual effects, vegetative growth rate (as it affects frequency of maintenance), user safety and convenience, and other user-related factors peculiar to your situation

— Cut all brush and tree stumps flush with the ground or, if necessary, grub these materials out of the trail tread to keep them from sprouting and eventually sticking up in the trail (always grub out blackberry canes).

— Remove all dead trees which are likely to fall across the trail.

— Always trim limbs flush with the tree trunk. Never leave sharp protrusions on trimmed adjacent trees or in the trail tread which might injure the user or be visually obtrusive.

— Dispose of debris from the clearing operation by scattering it sufficiently away from the trail (preferably downhill) so as to be visually acceptable.

Trail Surface Materials

The vast majority of trails are unsurfaced, i.e. native soil. The decision to put a surface on the trail should be made only if absolutely necessary because it is extremely labor intensive. Other things to consider when choosing a surfacing material include: availability of the surface material, cost to purchase the material and install it, life expectancy, accessibility, cost of maintaining the surface and user acceptance and satisfaction. Most small forest landowners use what nature provides. Other larger landowners import surfacing materials that will meet their special needs. Multi-use trails more often than not, have a more substantial surface that will support the anticipated hard use. Whereas, single-use trails often use softer materials such as native soils and wood chips. The following discusses the pros and cons of these two types of materials:

Native soil: Natural surfaces including existing soil and vegetation will require less preparation than harder surfaces, but rocks, tree roots, and other obstructions will need to be removed. Maintenance will consist of fixing drainage problems, repairing eroded areas, and removing new vegetation. If a natural surface is well drained and properly sloped, it will last longer and serve the landowner well.

Wood chips or bark from a hardwood mill: An attractive surface, wood chips/bark blend extremely well with the natural environment. Both hikers and equestrians like this soft, spongy surface. However, this surface decomposes rapidly under prolong exposure to the sun, heat, and humidity requiring almost constant maintenance to keep the proper width and depth. Minimum thickness at the time of installation should be no less than **3** inches, and the entire surface needs to be replaced at least every two years. One drawback of this material is the fact that it has limited availability in some areas and is very expensive in terms of labor.

Maintenance

By far, the most long-term commitment of the entire trail development process is maintenance. This effort begins immediately following trail construction and continues until the trail is abandoned or obliterated. As a landowner planning a trail of any type, be sure to remember to prepare for its upkeep. The objective of maintenance is the upkeep of a trail to provide for user safety, protect adjacent resources, preserve trail investment, and provide for user access and convenience.

The following tasks should be a part of a good maintenance schedule for any trail:

Signs: Inspect signs for wear and tear or vandalism — replacing those that are worn or missing.

Surface Repair: Patch or fill in holes or ruts in the trail surface on a regular basis.

Vegetation: Spot prune and remove encroaching vegetation and remove any fallen trees.

Drainage: Repair any trail damaged by time or heavy seasonal rains. Identify source of the drainage problems and take steps to remedy it. Rebuild waterbars and other drainage structures at least once a year. Waterbars, set at an angle across the trail, direct water off the trail. They can be made out of a variety of materials, but they are most often made of a rot-resistant log, or in fairly flat terrain, native soil. The object of a waterbar is to shun rain water off of the trail before it can wash away the soil. This is done by either digging a trench or raising a barrier with the log. In order to be efficient, the waterbar must be at an angle, generally 30 to 40 degrees to the treadway and are usually installed in a curve in the trail. This allows the water to run straight (diverted by the waterbar) while the trail makes a turn.

Summary

Providing quality trail opportunities while protecting the forest resource is a major concern and challenge to most landowners. As an integral part of a forest management plan, a well managed trail system can provide access to recreational sites, hunting stands, nature observation sites, and a variety of other destinations. Following the above suggestions and guidelines will provide the average landowner with a place to start in the development of their own trail system.

Appreciation is expressed to the U.S. Forest Service for information in this leaflet which was adapted from the publication ***Trails South, A Guide Dealing With Forest Trails in the Southern Region.***