



Access Today

PARKS • RECREATION • TOURISM

Fall 2001

A publication of the National Center on Accessibility

Special Volume, Issue 1

Trail Surfaces: What do I Need to Know Now?

Surface is a critical component of an accessible trail. There are two main aspects for consideration regarding accessible trail surfaces.

" We must start with the understanding that generally human made products do not interact well with natural surfaces"

– USDA Forest Service

First, the surface must be firm and stable so that the users with disabilities do not expend unnecessary energy that could be used enjoying the trail.

Second, there are a variety of surface materials available to enhance accessibility, therefore, the functionality and aesthetics of each product should be considered.



Crushed fine surface used on the Boiling River Trail at Yellowstone NP.

Background

Americans with disabilities have experienced discrimination, not only by misconceptions and attitudes based on ignorance, but also by designs of the physical environment that fail to account for the natural variations in human mobility and understanding. The U. S. Access Board is responsible for developing minimum accessibility guidelines to prevent and

eliminate physical barriers created by such designs. In 1997, the US Access Board appointed the Regulatory Negotiation Committee to develop recommendations for accessibility to Outdoor Developed Areas. Until final guidelines are approved, the report generated by the work of this Committee provides the best information available for making trails accessible. Understanding and following accessibility guidelines will provide increased trail opportunities and



Concrete trail with rest area.

experiences for a broader spectrum of visitors with varying abilities.

Firm & Stable

The proposed accessibility guidelines require a trail surface to be firm and stable. The intended use and length of the trail may regulate the degree of firmness and stability preferred. For example, a trail with a length greater than .5 miles should be very firm and very stable. Trail lengths between .1 and .5 miles should be moderately firm and stable. Firmness means the surface "does not give way significantly under

foot." Stability means surfaces "do not shift from side-to-side or when turning." For example, when one walks or wheels on sand, the sand shifts and the foot or wheel sinks. When turning, a foot or wheel will displace the sand. Therefore, sand is neither firm nor stable.

Firmness and stability can be measured using a rotational penetrometer. When controlled pressure is applied to the penetrometer, the penetration depth of the device is measured as the degree of firmness while rotating the penetrometer will provide the stability measurement. The

ANSI/RESNA Standards for Firmness & Stability

	Very Firm/Stable	Moderately Firm/Stable	Not Firm/Stable
Firmness	0.3 inch or less	>0.3 & <0.5 inch	>.5 inch
Stability	0.5 inch or less	>0.5 & <1.0 inch	>1.0 inch



The National Center on Accessibility is a program of Indiana University's

Department of Recreation and Park Administration and is funded in part by the U.S. Congress through the National Park Service. NCA focuses primarily on accessibility as it relates to parks, recreation, and tourism industries. Major objectives include: conducting research, providing technical assistance, developing resources and training materials, and conducting educational programs.

Access Today is a publication of the National Center on Accessibility. As a continuing service of technical assistance, the National Center on Accessibility has published a series of tech sheets on access to outdoor recreation environments. These tech sheets are intended to be used only a resource. They are not intended to be used as a design guide. As a result of evolving accessibility guidelines, some technical specifications presented herein may change as new accessibility guidelines are released. This publication is available in alternate format upon request.

National Center on Accessibility

2805 East 10th St,
Suite 190

Bloomington, IN 47408

(812) 856-4422 Voice

(812) 856-4421 TTY

(812) 856-4480 Fax

nca@indiana.edu

www.ncaonline.org

penetration guidelines below further illustrate characteristics of firmness and stability.

When deciding on a trail surface material, a site manager should ask the following questions:

- ✓ What is the goal of the trail experience?
- ✓ Who is the primary user group?
- ✓ What are my budget and maintenance constraints?
- ✓ What are the geographical characteristics of the trail site?

If the goal of the trail is to provide a physically and mentally challenging experience for hikers, it may alter the function of the trail to use an accessible surface. However, if the goal of the trail is to provide a leisurely nature walk, an accessible surface is sure to enhance the trail experience for most visitors.



Trail surface with compacted gravel and crusher fines.

Budget Considerations

There are two aspects to consider regarding budget constraints. First, the cost of the surface material must fit into the funding available to construct or alter the trail. Second, current and

Some surface materials will have a higher initial cost and use less maintenance, while other surfaces may cost less to install but require more maintenance in the long run.

future maintenance budgets should be considered. Some surface materials will have a higher initial cost and use less maintenance resources in the future. On the other hand, some materials may cost less to

install, but require a higher percentage of the maintenance budget in the long run. Consider the following situations to illustrate this point:

Decision-Maker A has received one-time funding to build a trail. Decision-Maker A reviews her maintenance budget and decides she has relatively no resources to maintain the trail's accessibility in the future. Although the initial cost is higher than other surfaces she received estimates on, decision-Maker A decides to use concrete as the surface material for the trail because it requires less maintenance resources over the long run.

Decision-Maker B recently received a small sum of money to create an accessible trail. When reviewing his site's budget, he realizes the maintenance budget can absorb the material and personnel cost of keeping the trail accessible in the coming years. Decision-Maker B decides to use a compacted small gravel and fines mixture as the trail surface because the initial cost is lower than other estimates he received and his site has the personnel and money to maintain this trail year after year.



Surface Types

Considerations to Ensure Access

The type of surface you choose will also depend on the geographical and climatic characteristics of your site. Some surfaces work better in sandy, dry regions and others will be most beneficial in flat, humid areas. It is important to ask the surface supplier for references regarding the use of their product in a region similar to your own. Then talk to the trail personnel that have experience with the surface application. What has their experience with the surface been? How has it held up over time? Has the surface required any maintenance? If they were building a new trail, would they use the same surface again?

There are a variety of materials available for firming and stabilizing trails. A common type of material

is a soil stabilizer; a product that binds different surfaces together. Stabilizers can be applied directly to the native soil or be mixed with other products. As a trail surface

Some surface products will work better than others based on the geographical, climatic and soil characteristics of the site.

material, however, it is more common, and possibly less costly in the long run, to prepare a base surface for application. The soil stabilization product is mixed with quarter-minus stone and fines, compacted and then smoothed and

shaped according to trail drainage requirements.

Unitary surfaces, such as concrete and asphalt, are considered accessible surfaces. Many site managers feel these two surfaces are not natural looking and therefore lower the natural experience for the visitor. However, it is now possible to stain, stencil and color concrete to a more desirable pattern.

Wood is a firm and stable surface initially, yet it is susceptible to environmental conditions. Wet weather can rot wooden planks and the hot sun makes them brittle. Even with treated wood or sealants, wood surfaces are often subject to "heaving" in extreme seasonal temperature changes.

Another option that may provide a natural feel to the trail for the visitor is recycled plastic lumber. This lumber is made from recycled plastic, such as milk jugs, then colored and designed to give the look of natural wood. The initial installation of this product is quite labor intensive, however the future maintenance needs are considerably lower than that of natural wood.



(Left) Brick surface buckled by freezing and thawing. (Right) Asphalt surface edge breaking away.

Maintenance & Installation

As with any product, maintenance is integral to the accessibility of a product. Maintenance needs depend on many variables including weather, climate, volume of use, type of product, installation procedures and age.

A concrete trail may have been accessible when it was installed twenty years ago, but other variables may have caused the concrete to buckle and crack. If the condition of the material causes an aspect of the trail not to comply with standards, then the trail is not accessible. A good example of this is brick. When first installed, it is possible that brick surfacing is compliant with accessibility standards for trails. However, freezing and thawing may cause brick to buckle or "heave" causing a tread obstruction in the trail.

Installation and application

procedures need to be followed closely to ensure the accessibility of the surface. The planning, preparation and surface product may be correct for

As with any product, maintenance is integral to the accessibility of a product.

accessibility, however, if the installation procedures are not carefully followed and monitored, the end trail may not be accessible.

For soil stabilizers and concrete, any variation in the compound mixing or compaction may cause the product to fail.

Natural wood and plastic lumber will need to be anchored properly and placed in a manner that

combats increased spacing between the boards.

Asphalt may need to be sealed to hinder cracking and compacted gravel will need to properly compact.



Stained concrete.

Other Considerations for Selecting Surface Materials

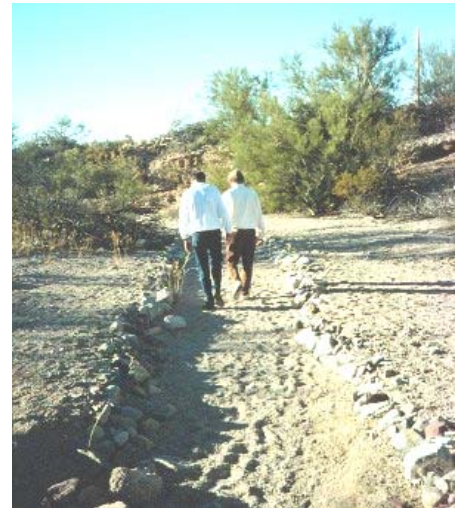
There are a variety of surfaces that are not accessible to people with mobility impairments.

Deciding on a surface material for an accessible trail will take time and effort. Keep in mind that just because someone claims a surface is accessible, does not mean it is.

Through both research and case law, several surfaces have been determined to be inaccessible.

Sand particles are too fine to give support, therefore retreating under pressure. Pea gravel, mulch and woodchips are pushed aside by crutches and wheelchairs, thereby creating an unstable surface to traverse. Large gravel rocks are an extremely difficult surface on which to maneuver wheelchair tires and crutches. Soil indigenous to the area may be accessible if properly compacted and maintained, however, weather conditions can alter the accessibility of such a surface in a matter of minutes.

Deciding on a surface material for an accessible trail will take time and effort. Keep in mind that



Visible footprints in a sand trail.

just because someone claims a surface is accessible, does not mean it is. A thorough evaluation of your needs and comprehensive research into the materials and their suppliers should ensure an accessible trail surface that can be enjoyed by all visitors.



For more information on Trail Accessibility and Surface Product Vendors

Visit the National Center on Accessibility's website at www.ncaonline.org, or contact NCA at:
 (812) 856-4422 (voice)
 (812) 856-4421 (tty)

Final Report on Outdoor Developed Areas

U.S. Access Board
www.access-board.gov/outdoor/outdoor-rec-rpt.htm