Gaining Access

When constructing accessible paths, walks, or gardens in your yard, many factors come into play.

With the arrival of summer's fine weather come outdoor activities such as gardening, sports, dining, and entertainment. For wheelchair users to fully enjoy the natural environment, accessible paths and walks must be available. The design of these should be appropriate to their specific setting and anticipated use.

In many instances, construction of paved, impermeable (not penetrable by water) surfaces is neither appropriate nor practical. Objections to walks made with masonry, concrete, or asphalt range from aesthetic considerations to function, cost, and maintenance. In sensitive environmental areas, local regulations often prohibit impervious construction. In recent years, several national studies focused on permeable materials that can be used for accessible paths. To date a universal product that meets all requirements has not been identified, but research has generated ideas and highlighted areas that need further attention. If you are planning to construct accessible paths, walks, or gardens in your yard, there are many factors you should consider.

Design for Differences

Because they are constructed outdoors, each path's setting is unique in many aspects. Most important are macro-climatic differences that include temperature, humidity, and precipitation.

Localized conditions such as sun and wind protection can also be significant. For example, a U.S. Forest Service study on soil stabilizers found substantial differences between trail sections that were protected by tree canopies and those that were not. Furthermore, measurable differences were evident if the adjacent trees were deciduous (leaf-bearing) or evergreen, because fallen leaves

to the Outdoors

by Thomas D. Davies Jr., A.I.A., and Carol Peredo Lopez, A.I.A. / photos by Mark Lichter, A.I.A.

helped retain soil moisture and compaction.

Geological factors are also important to path design. Local subsoil conditions can vary from Florida's marshy wetlands to New Hampshire's granite outcroppings. These base surfaces can determine a permeable path's stability and sustainability. Your trail's setting can also be hilly or flat depending on your yard. Topography affects the route's slope characteristics, drainage properties, and sustainability.

In describing a route's rolling surface, accessibility standards call for firm and stable materials. This means the path surface does not shift as it is traversed. For wheelchair travel, loose surface dressings allow the wheels to "sink in;" this increases friction to the point where forward motion becomes impossible.

Slip resistance is also a desirable property, particularly if your route is sloped, since you need traction to ascend, descend, and maneuver. In the natural environment, path slope must be adjusted to the existing topography. A steep incline's gradient can be partially mitigated by use of a "switchback" route. Dangerous cross slopes can be reduced by construction of low retaining walls on the up- or downhill side. While indoor accessibility standards discourage cross slope, a "crown" is critical to efficient drainage outdoors. Water that remains on a trail or route makes it less useable and can eventually erode the rolling surface.

Gravel is a common path material that is inaccessible when the particle size is too large. Small round stones, like pea gravel, are also unusable because they do not mechanically interlock like more angular particles. Since they remain loose, round stones are ideal for drainage but poor for traction and stability.

You can increase fine gravel's stability if you use soil "binders" to compact and shape the surface. This technique produces a firmer dressing that resists deformation by use and exposure. Crushed seashells can be substituted for gravel to produce an accessible path dressing (see "Case Study").

Fixed edging is an important component if you select a loose surface material. With use and weather exposure, such dressings are subject to

PHOTO CAPTIONS, PREVIOUS TWO PAGES (FROM LEFT):

Note: The first two photos illustrate "Case Study: Enjoying the Water," which begins on page 31.

In many regions of the country, oyster shells are an historic dressing for garden paths and drives. When the shells are broken, the angular chards pack together closely to provide a stable and firm rolling surface that drains well.

Round stones or pea gravel remain loose and will not interlock. Paths made of these materials can be difficult for wheelchairs and ambulatory users to traverse. For traction and stability, surface dressings should be angular in shape.

This driveway uses a cellular system with masonry pavers and grass planted in the voids. While the drive is not accessible to most wheelchair users, the arrival and unloading area is constructed with mortared units installed on a concrete slab. This arrangement provides the homeowners and visitors with an accessible route into the house.

scatter and drift, making travel difficult. Options for edging include landscape timbers, steel dividers, and masonry such as brick, stone, or concrete. In most instances, curbs or edging should be set flush with the path surface to allow drainage. For routes with steep gradients, fixed transverse elements should be installed at regular intervals to keep the unrestrained surface material from slowly migrating downhill. Transverse restraints are also recommended for loose brick or masonry pavers that are set in sand or stone dust.

A relatively new concept for permeable outdoor surfaces is "cellular" or "matrix" paving. These are used for vehicular and pedestrian traffic. All these modular systems have a solid fixed grid and "voids" that can be filled with permeable materials such as grass or gravel. The ratio of solid-to-void varies significantly between products. Environmental pavers appear like conventional concrete units except for small gravel-filled voids that allow drainage. In other systems, the voids are large enough to allow grass to grow and even hide the grid itself. In general, closed-cell systems have a higher load-bearing capacity, and open-cell systems offer better drainage.

Wheelchair accessibility of these systems varies widely between products and installations. Closed-cell systems are similar to conventional paving systems except the ride is bumpier because of the voids. More open systems are generally only as accessible as the permeable surface used to fill the voids. Many grass-filled grids, for example, are not significantly more

The oyster-shell path provides a wheelchair-accessible route to the dock that also complies with local environmental regulations regarding permeable surfaces.

This floating dock rises and falls with the water level. The wood ramp and the metal transition edge are mounted on wheels to accommodate these fluctuations and the associated change in angle of incline.

accessible than well-maintained lawns. Grids that are packed with fine gravel can become dangerous to ambulatory users when the filler is washed out, leaving a hazardous hole.

A new and relatively untested product is called "reinforced turf." This is constructed with selected grasses grown on a geo-membrane and then laid over bedding and prepared sub base. The system's concept is that the grass's bearing capacity is increased and the surface is more stable. Reinforced turf was developed to accommodate low-speed vehicular traffic, but it may have benefits for outdoor wheelchair access.

The Right Path

All paths are made of layers of materials. The three components of all garden paths are sub-grade, sub-base, and surface. The sub-grade is the existing ground below the path after it has been excavated to remove organic material.

The sub-base is the layer that is installed to give the path strength and stability. It usually consists of crushed stone that has been compacted to almost entirely eliminate voids.

The walk surface or dressing can be gravel, shells, or decorative aggregates. It can be applied to the sub-base at the desired thickness and then compacted. With wear, a loose dressing may require periodic "topping up" to maintain a firm stable surface.

If you are constructing garden paths in your yard, pay particular attention to all three elements to ensure the surface is stable and will last a long time with a minimum of maintenance. Carefully plan path routes to minimize longitudinal slopes and to provide efficient walk drainage. A quality accessible path system will add to the enjoyment of your property while you own it—and to its worth when you sell it.

Case Study: Enjoying the Water

For the homeowners in the photos above and on the previous page, the Chesapeake Bay provides recreational activities including boating and crabbing. After purchasing their home, they needed an accessible path to the beautiful creek that bounds their property. In addition, the existing boat dock needed modifications to make it accessible. Their lot's natural topography provided a gentle slope between their home and the creek. Strict environmental laws, however, regulate all construction

The second edition of *Accessible Home Design: Architectural Solutions for the Wheelchair User* will be published later this year. The book has been updated, expanded, and extensively revised with many new drawings and photographs. The "Case Study" and several photographs from the book are used in this article. If you would like to be notified when *Accessible Home Design* becomes available, e-mail PVAArchitecture@pva.org.

along the shoreline. One aspect that is controlled is "impervious" ground surfaces that prevent rain and snow from percolating into the ground. Since water can not penetrate them, impervious surfaces cause runoff and erosion.

The homeowners elected to construct a dock path using crushed oyster shells. This is a traditional material for paths and driveways that recycles a by-product of the local seafood industry. The crushed shells form a surface that is very accessible to wheelchair users. With compaction, they create a path dressing that is firm, and the angular pieces of broken shell provide better traction than does fine gravel. The shells drain quickly; this allows moisture to percolate into the ground and leaves a dry rolling surface after a rainfall.

To make a dock accessible, the rise and fall of tidal waters had to be accommodated. For the upper Chesapeake Bay, tidal fluctuations are relatively modest. The water depth is also influenced by meteorological events, however, such as strong wind. In combination, the total variance on the creek is about three feet.

With a fixed dock, wheelchair users must schedule their maritime activities based on tide timetables. This restriction can be eliminated by installing a floating dock and an access ramp. Accessibility is achieved by the use of a wheeled ramp that spans between the fixed upper pier and the floating dock. The ramp's incline angle changes as the water level rises and falls. The moveable end is tapered to the floating dock by a thin metal ramp that is also wheeled to adjust to tidal fluctuations.

Such carefully planned accessible features allow these homeowners to enjoy the outdoor attributes of their home and still protect the sensitive shoreline environment. ■