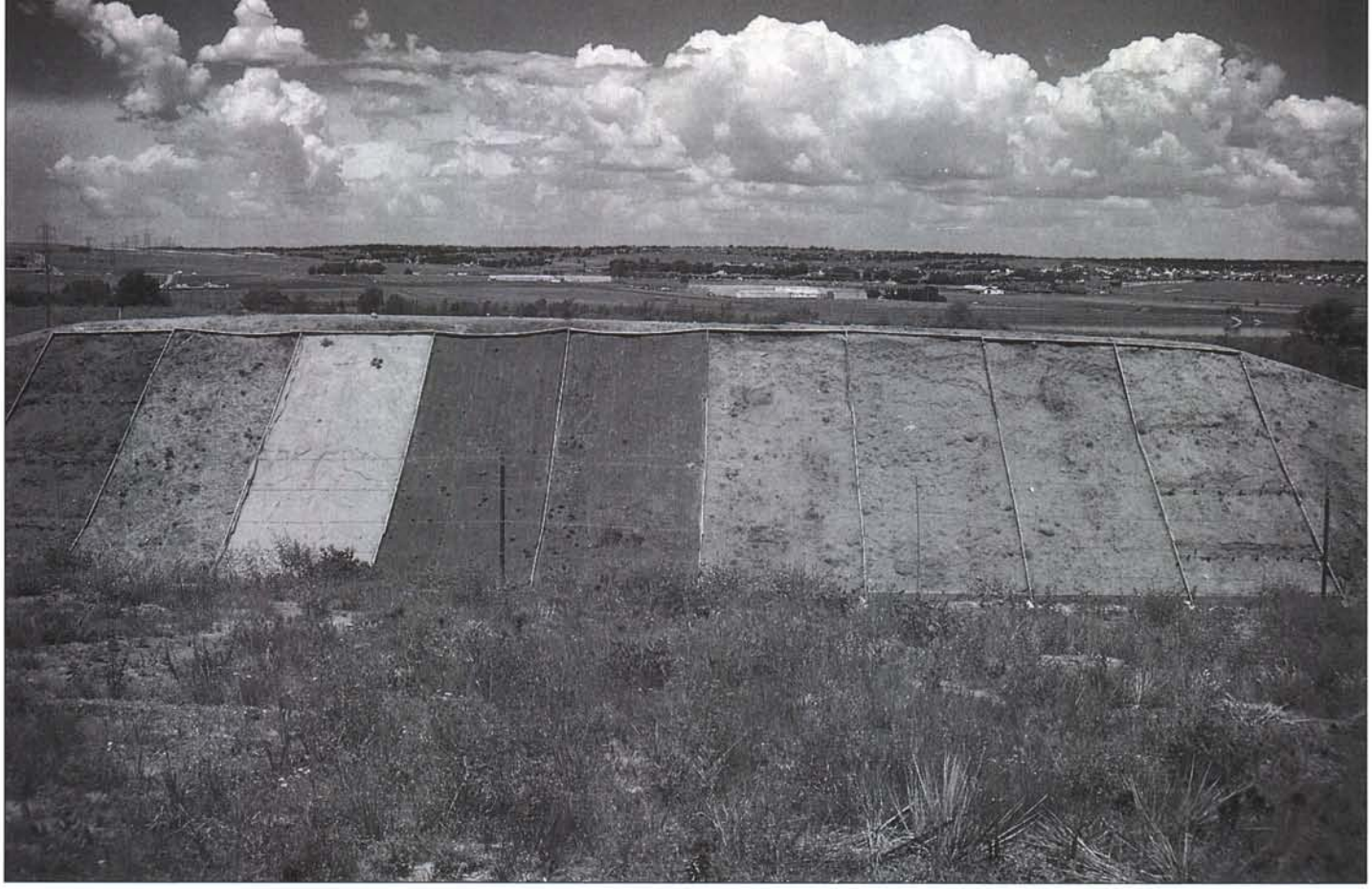

Erosion control products on test slope (L to R): wattles, wood fiber hydraulic mulch, paper hydraulic mulch, bare ground, jute, coconut fiber mat, polyester blanket, and hay with tackifier. Photo courtesy: Hydro Dynamics.

Erosion Control: Keeping Sediment In Its Place

By Matthew Trulio

Purely flat, featureless courses might be easy to maintain, but they aren't necessarily memorable. Topographical features such as hills, berms, lakes, ponds, rivers, and streams lift courses above the one-dimensional. These features enhance the beauty of the course, while adding challenges for the players. What they *shouldn't* add, however, is sediment caused by erosion. And such courses are particularly susceptible to erosion during construction and reconstruction.

"Sediment is the number one pollutant of our waterways now, and some of that comes directly from erosion on construction sites," says Ben Northcutt, executive director of the International Erosion Control Association based in Steamboat Springs, CO. "Golf course superintendents and sports facility managers must be aware of the consequences of not controlling erosion on construction sites and wildlife habitats."

Sediment can foul watersheds. It can obstruct natural and manmade channels and cause flooding, which can result in serious property damage. Sediment deposits can cut the life of a reservoir in half.

Erosion, caused by either water (rainfall, irrigation, etc.) or wind, is the prime mover of sediment. And while the vast erosion that occurs every day in nature is beyond the control of the sports turf manager and others, the erosion that occurs on golf courses is not.

"In general terms, whenever you have a project that's being built, you're going to be disturbing the ground," explains Northcutt. "Whenever you disturb the ground, the potential for erosion and sediment leaving the site exists. The thing you should consider, in terms of erosion related problems, is how to keep the sediment on the site."

No Time Like The Present

When it comes to erosion control, time *isn't* on your side. In fact, its short-term effects, in relation to sediment loss, are probably greater than its long-term ones. Northcutt explains, "Usually, a site is most susceptible to erosion problems during the first season of weather and construction activity, but it's also susceptible during the entire construction process, whether that's three months or two years."

The sooner you stabilize "erodeable" soil, says Northcutt, the better off you'll be. If a two-year project isn't stabilized,

he points out, two years of weather will affect it. "That's just an example, but that's a lot of time for weather events to be operating on that site, and taking sediment away," he says. "It's better to control erosion from the onset, than to go ahead with the project and worry about it later. If you put off erosion control, not only will you impact watersheds and drainage downstream, but also, when you get around to treating the site, it will be more expensive than if you'd taken care of it from the start."

In some parts of the country, Northcutt points out, developers cannot obtain building permits until they submit erosion control plans. The legislative trend toward erosion control has been propelled by the Clean Water Act, as well as the National Pollution Discharge System Elimination Act, which means that municipalities and industry, where applicable, must have erosion control plans in order to receive a permit to conduct business.

Erosion Control Armaments

"There are so many really good erosion control products on the market," says Jerry Fifield of HydroDynamics, a hydrologic engineering firm in Parker, CO. "It's amazing to me that people aren't more aware of the options available to them."

Fifield and Northcutt travel the country presenting seminars on erosion control. In addition to the erosion control work Fifield's firm performs, it has also tested more than 40 different erosion control products, and can make specific recommendations. However, the two men note, it's important to first know the general product categories and uses before moving on to specify a specific product. Here's a look, from Fifield and Northcutt, at a few basic types of erosion control products, and a few of their applications.

Silt fences. Generally made of woven geotextiles (although straw bales are often used for the same purpose, with varying degrees of success), silt fences act as filtering systems for sediment. Typically, these fabrics stand two to three feet high and are attached to wooden posts. The bottom six inches of the fabric must be buried below the ground, Northcutt observes, for them to be effective.

Silt fences can be placed anywhere on a site where water may exit. They are not dams and should not be used in areas of high water velocity. Rather, they are filters, allowing the water to pass through them while keeping sediment on the site.

Covers, blankets, and mats. From jute netting to synthetic mats, these products serve as "coverings" for areas that are particularly susceptible to erosion. According to Northcutt, they are best used and most cost effective on steep slopes (3:1 or greater), or areas that have relatively low velocities of "channelized" flowing water. Natural blankets tend to be made of fibers such as jute, coconut, straw, and even recycled paper products. Synthetic mats can be made of various plastics and geotextiles.

"The synthetic mats will last longer than the natural blankets," says Northcutt. "In the right application, they both can work very well. What you use may depend on your budget, as well as your philosophy about what you put in the ground. The synthetic products cost more, but they last longer. The natural

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Erosion Control

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products can do many of the same things, for a shorter period of time, and they're biodegradable."

Hydraulic mulching and hydroseeding. Although it goes by many different names, depending on the part of the country in which you're standing, hydraulic mulching involves spraying wood fiber or recycled paper products, and water, often combined with a tackifier, a type of natural "glue," onto an area for erosion control. The application process, spraying, often hundreds of feet from where the operator is standing, makes hydraulic mulching ideal for erosion control in areas with limited access.

Hydroseeding, like the name implies, involves spraying seed mixes onto areas for both erosion control and *revegetation*. Vegetation is particularly important to long-term erosion control.

"Hydraulic mulching and hydroseeding are probably unsurpassed in applying mulch and seed to slopes—they really shine in this area," says Northcutt. Hydraulic methods are generally most effective on slopes that are 2:1 or less, including flat ground, although other methods may be more cost-effective on flat terrain."

Silt fence installed to capture sediment. Photo courtesy: Jerry Fifield.

One of the most crucial elements in the hydroseeding process, Northcutt notes, is the seed mixture. Some mixtures are better suited to certain situations than others.

"If you specify a water-loving grass for a south facing slope, it's probably not going to do very well," he observes. "In terms of the seed mix, it's better to have more than one species involved because you have a better range of adaptability. That's particularly true on large sites, which may have their own range of soil and micro-climate conditions."

In addition to tackifier/mulch and tackifier/seed combination, there are also synthetic emulsions that can be sprayed onto the soil to hold it in place. Fifield says his company has tested some of these products, and that they offer promise.

Elements To Consider

Fifield works frequently works with a variety of design professionals on erosion control plans. Although every site is unique and requires a different approach, or a combination of approaches to erosion control, a few things in his plans remain constant.

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"Any erosion control plan has to be effective, practical, understandable, and fairly simple, so that the contractor can do the job right," he points out. "If, for example, you have an area that's going to be overlot graded, you have to identify which area should be graded first."

In most cases, says Fifield, particularly in real estate development, erosion control must also be aesthetically pleasing—it can't be an eyesore if the goal of the project is to attract potential buyers or tenants. Appearance, both present and future, cannot be left out of an erosion control plan, and methods such as hydroseeding for revegetation, with an attractive yet durable seed mix, can offer nice looking and functional solutions.

One element frequently left unconsidered in erosion control plans, Fifield reveals, is wind. "Wind erosion can move far more sediment than rainfall," he says. "A lot of wind problems can be easily solved with products such as wind fences or tackifiers, but often nobody thinks about it. Another thing people tend to forget is irrigation—erosion control without irrigation is a whole new ball game. If you hydroseed a south or west facing slope, in an area of low rainfall, and it isn't irrigated, then that slope will probably fail in terms of erosion control."

Timing, says Fifield, is everything. "If you're going to establish a dryland grass, let's say, to control flat land erosion, when you choose to do it is very important. Here in Colorado, for example, it doesn't make sense to worry about rain erosion in the winter, because we don't have any rain in the winter. But we do have snow, and we do have plenty of wind erosion. So on a given project, you might want to consider a wind fence or tackifier to knock down wind erosion. But come spring, then you have to worry more about erosion caused by rainfall. And in either case, erosion control methods should be employed in a timely manner—not after the fact."

Stopping The Problem Before It Starts

Northcutt and Fifield agree that no matter how all-encompassing an erosion control plan may be, and how meticulous its implementation, a certain amount of sediment will *always* escape from a construction site. To expect no sediment to leave a site is unrealistic, they suggest. However, by becoming familiar with various products and their applications, working with hydrologic engineers and erosion control specialists when necessary, and through actual experience, you can go a long way toward controlling erosion, and its resulting misplaced sediment, when such plans become your responsibility.

Says Northcutt, "You're not going to be able to control it all, but you can control it to the point where our natural systems can handle it. There are environmental and economic impacts to *not* controlling erosion, whether that means spending tax dollars to clean water, dredge a reservoir, or even return soil to its original site. And if your project was to cause a flood, through, let's say, the deposition of sediment in a culvert or natural channel, and that water made its way into somebody's basement, liability issues could easily follow." ❑

Editor's Note: The International Erosion Control Association's annual Conference and Trade Exposition will be held February 18-21 in Reno, NV. For more information contact Ben Northcutt, (303) 979-3010.

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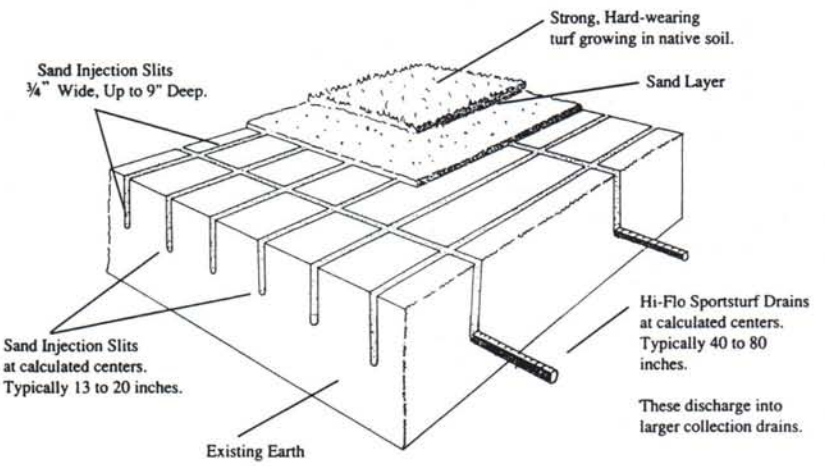

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