

Slit Drainage: A Cutting-Edge Tool in Sports Field

Construction and Renovation

by François Hébert

Poor drainage is at the root of many problems plaguing sports fields today: turf grass disease, low wear resistance, soil compaction and related problems, poor playing quality, high maintenance costs; the list goes on and on. With all of its effects on the overall quality of fields, drainage is certainly one of the greatest challenges facing today's sports turf manager.

Water-related turf damage is usually caused by failure to remove surface water, which causes puddling and saturation of the soil. Some specialized construction techniques, such as sand carpet and suspended water table, have been developed to alleviate these problems and shortfalls. Still, most installations are constructed following traditional methods of drainage, specifically surface and sub-surface drainage.

The former is effective in situations where slope is sufficient to move surface runoff. For this technique to be effective, water must sometimes cover great distances to exit the playing surface. Often, great amounts of water permeate the soil in the process. Since it is

most often used in conjunction with slow draining native soils, this technique is by far the least effective.

On the other hand, sub-surface drainage depends mostly on the soil's ability to transmit water through pores in the surface. Poor granular

turfgrass surfaces. It also provides an innovative drainage option in new constructions.

One could say that slit drainage is among the best kept secrets of sports field construction and maintenance, despite the fact that the technique has

been around for more than thirty years. In recent years, slit drainage has undergone great technical evolution, and today it stands as an interesting and practical tool for solving many of the problems associated with excess water on intensively used natural surfaces.



Modern slit drainage equipment limits installation time even in existing fields by simultaneously cutting, excavating, and filling slits in one pass. Courtesy: Lanco.

distribution and compaction directly effect this type of drainage system.

Slit drainage stands halfway between these two approaches. It offers a cost-effective solution to severe drainage problems effecting existing

sand or a combination of these.

The drainage slits are typically cut between two and three inches wide. Any narrower and they tend to clog up with time. Any wider and grass will have difficulty surviving over the fin-

Collecting surface runoff

A typical slit drainage installation consists of a series of narrow trenches cut into the playing surface with a huge trenching wheel. These drainage slits are filled with a drainage medium, such as pea gravel, fine crushed stone, coarse drainage

ished drainage system. Usually, the slits are cut at regular intervals of three to six feet. The narrower the interval, the more effective the system will be.

A narrow sequence is generally used for high-wear areas, such as the center of a soccer field. Drainage is most important in these areas, because most of the play is concentrated here. Tight patterns will also be used when surface percolation rates are low, such as in skinned areas or when there is little or no surface slope.

Slits are cut perpendicular to the surface slope to intercept surface runoff. As water moves down the slope, it passes over coarse material and seeps into the surface (grass or skinned). Finally, the slits transmit excess water to an underground pipe system. Water does not percolate through the soil to reach the collector drains, and drainage performance is not dependent on soil characteristics.

A two-tiered system

As water is absorbed by the drainage slits, it travels down through gravel or sand to be evacuated by an underground drainage system. The traditional drainage tile in a stone-filled trench is very effective for this. Slits penetrate the surface to such a depth that they connect with the coarse material surrounding the drain tile. This creates a continuous path for the water to travel out of the field.

Of course, it's essential to control cutting depth so that the tile is not damaged by the cutting wheel. The advent of laser leveling has produced

significant developments in slit drainage cutting techniques. The cutting wheel can now be fitted with hydraulic systems to control cutting depths.

This development has paved the way for drainage machines that simultaneously cut the slit and lay drainage pipe with very precise slopes. This allows the slit to take on the dual task of runoff interception and water evacuation. The drainage system can now be placed in situations of little or no

mance. One important characteristic of modern slit drainage techniques is the ability to evacuate trenching spoils directly into a trailer immediately after excavation with minimum spillage.

It's also important to limit the length of time the drainage slit remains empty after it has been cut. Systems exist which allow the drainage slit to be filled as it is being trenched. The process becomes a three-step (cutting, excavation and filling), one-pass operation. This method protects the slit's sides from crumbling or caving-in before filling.

Draining a new playing surface.

Installing modern slit drainage in new field constructions is a very straightforward and quick process. Once main collector pipes are set at the perimeter of the field and final surface grading has been approved, pipe fitted drainage slits can be set lengthwise at regular intervals using small diameter (one or two inch) perforated pipe.

As explained previously, site conditions, soil type and surface slope determine the appropriate distance between the drain lines. As with slit filling, this method integrates pipe laying into the one-pass process. Once the drainage pipes are set in place and the slits are filled, the pipes can be connected to the collector.

For seeded fields, a one-inch topping of sand acts as a seedbed. If a field is to be sodded, the sod must be grown in sandy soil prior to installation to prevent contamination of the slits. Of course, washed sod completely eliminates all risk of contamination.



A typical slit drainage installation consists of a series of narrow trenches cut into the playing surface and filled with a drainage medium, such as pea gravel, fine crushed stone or coarse drainage sand. Courtesy: Lanco.

surface slope, since the drainage pipe can now carry water on its own.

A three-step, one-pass operation

As slit drainage equipment evolved, construction techniques improved. Drainage of existing turfgrass surfaces, particularly drainage of the difficult contours of golf courses, imposed certain standards on the quality of work methods.

Contamination of the slit's surface or manipulation of soil over and around the drainage slit can adversely affect the drainage system's perfor-

Skinned surfaces can also be drained

In many instances, skinned surfaces consist of a mix of medium grade sand and silt, or other materials that offer sufficient permeability to allow the installation of an efficient slit drainage system.

Typically, such a drainage system requires a very tight set, so that minimal surface water movement is needed. A fine layer of drainage sand must cover the slits to bridge the gap between the fine granular curve of the surface layer and that of a coarser material used to fill the drainage slits.

Slit drainage systems in skinned soil areas are less efficient than systems set under a grass cover, but the design still eliminates surface water in very little time.

Renovating existing surfaces

Since slit drainage uses such nar-

row channels, they can be cut into an existing grass or skinned surface with very little destructive effect. Of



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course, work crews must use low pressure tires when working on sports surfaces, especially when slit drainage

has already been established. Because modern slit drainage machines can effectively evacuate spoils with little or no spill-over, such a system can be installed very cleanly with practically no repair work.

Once the system is in place, the slits can be seeded over or covered by natural spreading of the turf plants. In fact, a retrofitted system will perform more effectively than one that is installed in a new construction, because the drain slits are not being covered with heavy soil-laden sod.

When renovating skinned surfaces, the slits are covered over with a layer of the surface mix before it is smoothed over, just as in regular maintenance.

An effective and versatile drainage option

A slit drainage system allows for fast evacuation of water independently of the percolation characteristics of the soil in which it is established. It can effectively solve severe drainage problems where other drainage solutions have failed.

In association with the use of sand-based rootzone mixes and automatic irrigation systems, slit drainage has proven to be an important component in the economical construction of high performance sports fields. More importantly, the system can be invaluable in the rehabilitation of existing sports fields. This is especially true for those fields constructed from native soils that are often plagued with poor percolation.

Slit drained sports fields require careful maintenance in order to prevent contamination of the drainage network. But when properly cared for, they can provide reliable service for a great many years. □

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Lanco Aménagement Inc.
1110 Place Verner
Laval, Quebec
Canada, H7E 4P2
Tel.: (888) 664-7489
Fax.: (514) 664-4555
e-mail: lanco@total.net

Circle 113 on Postage Free Card

François Hébert is a landscape architect for Lanco Aménagement, 1110 Place Verner, Laval, Quebec, Canada H7E 4P2. Tel: (888) 664-7489, Fax: (514) 664-4555, e-mail: lanco@total.net