Photo courtesy of GMB Architecture & Engineering, Holland, MI

PRINCIPLES OF DRAINAGE: A BEGINNER COURSE

UNDER NORMAL CIRCUMSTANCES, the drainage for your synthetic field is invisible, at least to spectators and players. And that's the way it's supposed to be. The field should shed water and remain playable. After all, the only way drainage becomes noticeable is if it doesn't work.

Keeping the drainage working well starts with understanding it. And among all the decisions that can be made regarding a field, it's the drainage system that will be one of the most important to its success or failure as a facility.

Sounds dramatic, doesn't it? Consider this: it doesn't matter how great your scoreboard is, how nice the seating is or whether you have a press box if the field isn't draining well enough to be playable. Therefore, the investment in drainage on the front end of the project will allow all those other amenities to be appreciated and admired.

The biggest mistake many field owners make is cutting corners on drainage. Why? Because, to return to an earlier point, drainage is invisible. But how invisible is it really? When drainage isn't adequate to the amount of rainfall or watering the field gets, it means that water ultimately remains on the subgrade instead of moving away from the field. Over time, this can and will cause the subgrade to become unstable and allow the base to move. It may even allow water to back up through the base and onto the surface, washing out the infill or stretching the carpet.

And at that moment, the field owner won't be cherishing the money he or she saved by not installing adequate drainage.

To facilitate discussions with your drainage designer, you can estimate the amount of water your field will need to handle with the following formula:
Length of the field in feet x width of the field in feet x .623 gallons = gallons of water produced by 1" of rainfall

There are a number of options for drainage on the market. Ultimately, the system chosen will depend on several factors:

- the specific use or uses of the field
- the local climate
- the availability and cost of materials
- the quality and characteristics of local stone
- the financial resources and commitment of the owner
- time constraints for field construction, and
- the annual amount and intensity of rainfall, local codes and regulations regarding storm water management.

FIND A GOOD PARTNER

If you find the array of options confusing, arrange for assistance. A design professional who understands field construction and who has worked with drainage for synthetic fields can understand the issues and help devise a plan that works in your situation. The professional will specify pipe diameters or the sizes of flat drains, location and distance of laterals, collection systems and storm sewer tie-ins for the drainage system.

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Note: Drainage products are rated by gallons of flow per hour.

There are various types of subsurface drainage systems used with fields. One type consists of flat drains, 6"-18" wide and 1"-2" thick, with or without a wrapping of filter fabric, placed horizontally on the subgrade in a diagonal, herringbone pattern.

Because synthetic turf fields drain quickly and have the potential to capture significant amounts of water, internal drainage lines usually can be placed farther apart (15' to 25') than for natural grass. However, the closer the lines are placed, the more quickly the field will drain. Closer drain line spacing will cost more.

The rate of drainage also will depend on the depth of the subgrade and the slope of the drains, usually .5% - 1%. The deeper the drains are placed, the slower the initial response time. Ideally a sports field, particularly synthetic turf, will be used only for sports; however, if you are aware that other activities will take place, and if these have the possibility of puncturing or damaging the turf, make sure the builder knows that the drainage system must be deep enough to protect it from potential damage.

Photo courtesy of Stantec Sport, Boston, MA

» **Stone and sand can function as a filter** to remove those particles and prevent them from entering the drainage system.

An alternate system uses perforated pipes, 4" - 10" in diameter, laid in a diagonal or herringbone pattern 10' – 30' apart. Pipes must be sized and spaced correctly by the design professional, depending on the amount of water they should be expected to handle. These perforated pipes are laid in trenches, surrounded by filter fabric and clean stone or coarse sand.

Whether using flat drains or traditional drainage pipes, water flowing into the drainage system can carry with it silt or clay particles or other contaminants. Therefore, it is important to surround the drainage pipes with clean stone (without silt or clay contamination) or coarse sand. Stone and sand can function as a filter to remove those particles and prevent them from entering the drainage system.


Photo courtesy of Medallion Athletic Products, Inc., Mooresville, NC


Photo courtesy of Lone Mountain Contracting, Inc., Bosque Farms, NM


Photo courtesy of Rettler Corporation, Stevens Point, WI


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Slope is another essential aspect of good drainage. Both flat drains and trench drains are sloped to the outside edges of a rectangular field. The drains should extend 10' – 15' beyond the sidelines themselves to an area where the water is deposited in perimeter collector pipes. Depending on the grading plan, the amount of water to be moved and other factors, intermediate collector pipes also may be included in the drainage plan. This is something your design professional can also decide.

Most baseball or softball fields include intermediate collector pipes starting approximately halfway up the sideline and running parallel to the centerline. It is also possible that football or soccer fields may include intermediate collector pipes depending upon the grade of the subbase, the amount of water expected, how quickly the field must be available after rain and other factors. These intermediate collector pipes as well as the drainage pipes move the water to perimeter collector pipes. From there, the water moves to a disposal site such as a storm drain or catch basin.

Most of the projects being designed today for synthetic turf consist of a "drainage layer" of stone (typically 6" to 8" deep) under the entire field to move water vertically as well as horizontally. Even without any piping, the slope of the subgrade and field will move water in a positive direction through the "drainage layer" of stone and along the designed slope. Perforated and sloped piping of any sort will make this more efficient and will move water more quickly to the established collection/exit points.

Though synthetic turf fields drain well, site drainage on areas adjacent to the field is still necessary in most cases. Where areas around the field naturally slope and drain toward the field or where existing pavement or structures such as bleachers drain onto the field, storm water can carry suspended silts and other solids onto the field impacting drainage and performance. Additionally, excess storm water draining onto the field may overtax its vertical drainage and impact play. Finally, synthetic turf fields will not drain vertically when frozen.

For all these reasons, it should be the goal of the drainage plan that the only water handled by the field drainage is from rain or direct irrigation. (In other words, the field should not be receiving runoff from the bleachers, dugout, track, any buildings or adjacent structures). Your design professional can provide information on site drainage, including interceptor drains, catch basins, retention ponds and the harvesting and dispersing of storm water. ■

Mary Helen Sprecher is a free lance writer who wrote this article on behalf of the American Sports Builders Association. ASBA is a non-profit association helping designers, builders, owners, operators and users understand quality athletic field construction. ASBA offers the publication, "Sports Fields: A Construction and Maintenance Manual," which discusses, among other topics, sustainability in the construction and maintenance of synthetic fields, as well as synthetic turf recycling. For information, visit www.sportsbuilders.org.