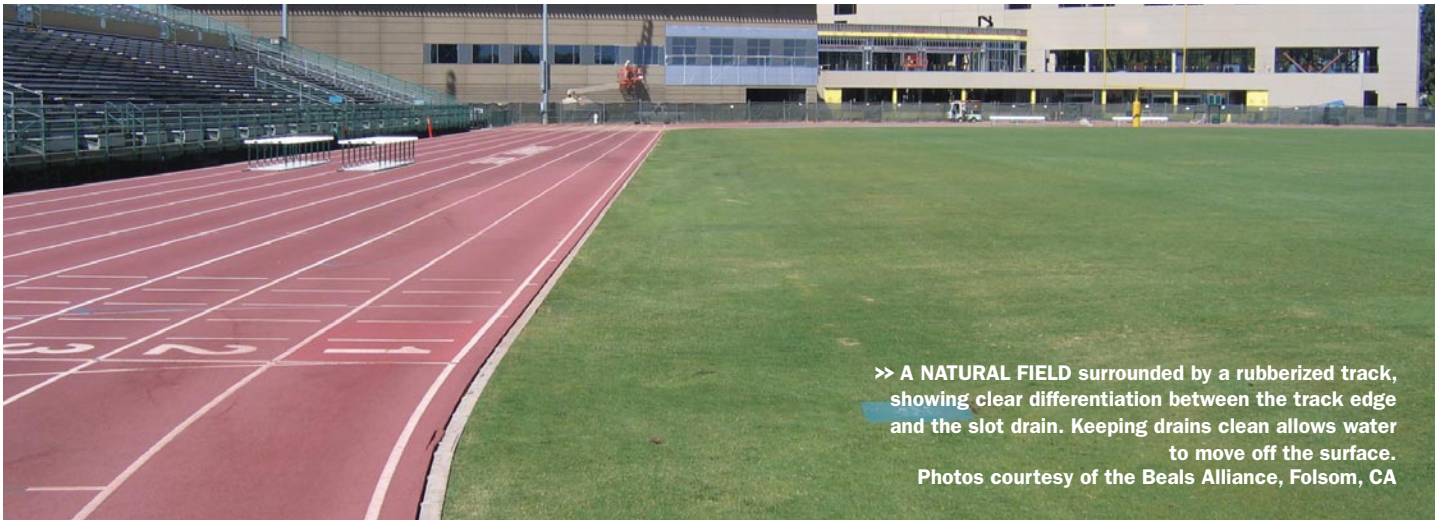

>> A NATURAL FIELD surrounded by a rubberized track, showing clear differentiation between the track edge and the slot drain. Keeping drains clean allows water to move off the surface.
Photos courtesy of the Beals Alliance, Folsom, CA

Principles of good drainage

NO MATTER how great it looks, no matter how many important games are played on it, a field is going to be judged by how well it rebounds from a rainstorm and is ready for action. So unless you feel a deep-seated urge to call coaches on a regular basis to tell them to find a rain date, you need to make sure your drainage is up to par.

Much attention has been paid to the drainage systems installed in synthetic fields, but not everyone recognizes that a natural field, too, can be designed to make it through the rain and be ready for business. It needs two main ingredients: good construction (this includes having the right soil for its weather conditions and use), and regular maintenance.

There are two basic types of natural grass fields: native soil and sand-based. A native soil field may be a true native field, in which only the soil found at the site is present, or a modified native soil field, or a sand-cap field.

A sand-based system, meanwhile, is one in which the native soil is completely removed, and replaced with an under-drain system and a drainage media layer (principally stone and rootzone material that is largely sand) to improve drainage.

Neither type of field is 'better,' per se; however, one may be better under the given conditions. According to the book, *Sports Fields: A Construction and Maintenance Manual*, "The main problem with native soil fields is drainage. Most native soils absorb water quite slowly and cannot handle large amounts; therefore, without additional provision for drainage, these fields can easily become muddy, worn and/or unusable."

Dan Wright of SportsTurf Company, Inc. in Whitesburg, Georgia, says that because of its composition, a native soil field can compact over time, particularly with continued play, mowing and more.

"Thatch and mulch builds up and when water falls on the field, the field will absorb the water but the water doesn't really go anywhere. That's what usually causes the problem. Then you have wet soil and if people play on it, it tears the field apart."

DRAINAGE PRINCIPLES

According to the book, "to facilitate drainage, the preferred site would be a relatively level plane that is higher than the surrounding terrain. Realistically, however, many sites for athletic facilities are less than ideal."

Turf managers know the first step to good drainage is insuring that any water that goes on the field comes from either rainwater or planned irrigation. In other words, it is important to make sure that water isn't coming onto the field from another source: running down bleachers, dripping off dugout roofs, running down nearby hillsides, etc. Proper drainage around and under such areas can go a long way toward helping alleviate ponding on the field.

SITE GRADING

The phrase, "level playing field" isn't just a metaphor for fair competition; it's a description of something that is absolutely critical in construction. Even a slight dip in the field can cause water to collect on the surface or for some areas to remain muddy after the rest of the field is playable.

...experts agree that both the usefulness of the field and its long-term performance, are tied to having an effective drainage system.

>> **UNDERGROUND DRAINS** are commonly used on natural and artificial fields. The concerns with this type drain are usually not addressed but are significant to drainage performance.

Just as fields for various sports have different size and marking requirements, they have different slope and crown requirements. A qualified field contractor will know the correct figures for each sport and, since tolerances are very exact, will probably use laser-guided equipment to achieve them.

"The key to good drainage is moving water the shortest distance possible in order to get it off the field," says Wright. "For example, in a baseball field, you wouldn't want it to drain from home plate to the outfield."

The high point of a baseball or softball field generally would be the pitcher's mound, which is 10" above home plate. The field is then sloped in all four directions away from the mound and across the skinned areas.

Rectangular sports fields, those used for sports such as soccer, field hockey, lacrosse and more, also have specific slope requirements and generally include a crown running down the center of the field so that water drains in two different directions, toward some type of collector drain system described above. (An exception to this rule would be a grass tennis court, which while it is a rectangle, must drain in one true plane). Different governing bodies, such as the NCAA or the NFHS, will require varying degrees of slope for each sport. Ascertain you are working with the most current version of the rules for the correct governing body prior to embarking on any grading work.

Assuming your facility design now ensures that all the water now falling on your field is from precipitation or irrigation, and assuming your field design includes correct slope, you can concentrate on some of the additional mechanisms used to help natural fields drain properly.

A subsurface drainage system (so called because it manages water that makes its way underground) can help fields dry more quickly, avoiding rainouts, unsafe conditions for athletes, and the chance of the turf being torn up while a game is in progress. Unfortunately, extra drainage, because it is invisible to the naked eye (unlike, say, a new scoreboard or a press box) is where field owners sometimes skimp, trying to save money. However, experts agree that both the usefulness of the field and its long-term performance, are tied to having an effective drainage system.

Many factors must be considered in determining the correct drainage system, including (but not limited to) soil type, local precipitation, field use, budget, existing slope and local regulations. Work with a design professional to help choose the right type, with the correct specifications for the amount of water you want to move.

The traditional type of drainage system for a sports field has been the pipe drain which uses perforated pipe placed in trenches in the subgrade. These pipes are laid in trenches, surrounded by coarse sand or clean stone to within 4 inches of the surface of the subgrade and capped with sand. Water then drains through the rootzone and stops in the trench where it enters the pipe from the bottom. Drains are typically placed 3 to 10 feet apart for native soil, and 10 to 30 feet apart for sand-based fields. They are surrounded by clean stone or coarse sand.

Another type of system exists: flat drains, sometimes called strip drains, 6 to 18 inches wide and 1 to 2 inches thick, without a wrapping of filter fabric, which are placed horizontally on the subgrade during construction. They also may be trenched in and placed vertically after installation of the rootzone in either native or sand-cap fields.

In addition, say builders, there's the least expensive (and still highly effective) sand vein system, sometimes called a sand silt system. This in particular works well in a native soil field, says Devin Conway, Verde Design Group, Santa Clara, CA) when attention is paid to the finer points of installation.

"A few items I would suggest an owner consider for natural turf fields in terms of drainage (assuming the field is not sand-based and the native soil has high levels of silt and clay content) would include a drainage system that extends into the playing field area, and not just at the field's low points," says Conway. "An example of a system that would suffice is a slit sand drainage system, which would have a series of shallow trenches (typically less than 12 inches in depth, typically no wider than a few inches) filled with sand or blended imported rootzone materials with known high infiltration rates) at a relatively narrow spacing (typically less than 3 feet on center) that are crossed by deeper trenches (typically around 12 to18 inches in depth, typically between 2 and 6 inches in width) with small diameter perforated drains. These drain trenches run perpendicular to the shallow sand trenches and follow the field slope in order to de-water the field. This type of sand drainage system is a cost-effective method of building into a native soil field some of the same benefits of a sand-based field, without many of the large construction costs, and the field also uses much less water than a traditional sand-based field. Other traditional methods of drainage for a natural turf field include surface drain inlets (though these should only be used outside the area of play for obvious safety reasons) and subsurface drain tiles, such as French drain."

Most everyone knows about proper irrigation. But not everyone, it seems, knows about maintenance beyond that.

And sometimes, says Andy Hord of Precision Sports Surfaces, Inc. in Charlottesville, Virginia, those tried and true systems last because, well, they're tried and true.

"Last summer, I started to dig up a 30-year-old sand-based drain along the edge of a track we were stripping and overlaying," Hord notes. "After tearing out the first 50 feet we stopped as it appeared to be working as well as it did the day it was put in. We stopped and rebuilt the part we had removed."

MAINTENANCE

It's the least glamorous of all subjects when it comes to fields. Everyone knows about mowing. Most everyone knows about proper irrigation. But not everyone, it seems, knows about maintenance beyond that.

"Proper maintenance will really help drainage issues," says Dan Wright. But, he adds, like drainage itself, it's where too many cut back in order to save money.

"If you're a pro team or a major university, you can probably afford it," he notes, "but a park and rec or a local high school often has budget issues, and that's where they might cut."

Conway recommends doing regular walk-throughs of fields to keep an eye out for problems.

"Tell-tale signs to keep an eye out for include the obvious, such as standing water after irrigation cycles or rain events, as well as soft areas, even in warm weather, which can indicate water is not getting through the soil profile quickly."

He also recommends going over all aspects of the drainage system in order to make sure it isn't degrading with time.

"As with any system, the drainage infrastructure should be checked at least on a semi-annual basis. If the field has a slit sand drainage system, it is recommended the shallow sand trenches be supplemented with additional sand at least every ten years, if not sooner, in order to continue to improve the water pathways to the in-field piping (and as an added benefit, it improves the soil characteristics of the native soil field over time by improving the sand content in the playing field). Drain lines and surface drain inlets should be inspected and cleaned, and low spots and depressions should be addressed so that the water can flow uniformly towards the intended drainage vehicles."

Of course, says Hord, not all maintenance people have been trained in proper field care.

"We see people covering storm inlets with impervious covers and leaving them in place," he says dryly. "Makes me scream."

Keep inlets clean, and keep Bermuda grass trimmed back in order to facilitate drainage. If a track encircles the field, check the adjacent drains routinely to make sure they have not become covered or clogged—something else that contributes to water ponding on both the field and the track.

If, as with a baseball or softball field, there are skinned areas that are dragged in order to ensure uniformity, make sure the dragged material isn't creating a dam at the edge of the grass and impeding drainage off the field. ■

Mary Kay Sprecher wrote this article on the behalf of the American Sports Builders Association, which helps designers, builders, owners, operators and users understand quality sports facility construction. www.sportsbuilders.org