



Maximizing the Durability of Athletic Fields

Durable athletic fields begin with sound construction and careful planning, and good management practices can increase a field's durability. The basic concepts presented here can help field managers extend the usability of athletic fields.

Field managers are asked to maintain premier turf surfaces knowing that the field will be overused and likely not make it through the playing season. Athletic fields are being used to host more and more events and tournaments. The addition of lights is a major reason for this situation. In some cases, new sports such as lacrosse are being added to fields already overburdened with soccer events. Football fields need to double as general purpose fields for special events. Of course, at some point, a field will begin showing signs of wear. And at some point, the field can fail.

Because field wear is influenced by so many variables, no definitive equation exists to predict when a field will begin showing signs of wear or when it will fail. Such a prediction would be invaluable to schools and municipalities as they face increased legal questions and liability issues regarding injuries associated with poorly designed or constructed facilities, and/or mismanaged facilities. Field managers struggle to accommodate all participating groups without damaging the fields. If fields are overused, then the likelihood of a player becoming injured due to poor field conditions increases. What is a field manager to do?

Ideally, adequate numbers of fields would be available so use could be properly distributed. It is best to have specific game and practice fields dedicated only to one sport to eliminate compound wear from two or more sports. Additionally, a

sound turf maintenance program promotes turf growth and recovery. Unfortunately, budgets for field management are often the most limiting factor.

Good fields begin with a sound construction strategy, and careful planning is imperative for long-term success.

ENSURE ADEQUATE DRAINAGE

Several construction strategies can maximize field durability. At the top of the list is adequate drainage. Wet fields are more prone to damage than dry fields. Adequate drainage not only prevents rain-outs; it can also prolong a field's life. Drainage can be achieved by using surface flow off fields that are crowned or by using subsurface drainage lines. Subsurface drainage depends on good water infiltration of the field. For this reason, a sand-based field will move the water from the field surface much more effectively than relying on surface flow alone. In addition, sand-based fields are less likely to compact. A compacted field generally has lower water infiltration rates, so the surface may remain wet for longer periods of time following a moderate rain.

SELECT A DURABLE TURFGRASS

Bermudagrass is the ideal turfgrass surface for most of North Carolina's athletic fields. The exception may be fields in the upper elevations in

the western part of the state. In upper elevations, winterkill of bermudagrass may be a significant concern. Bermudagrasses released since 2000 have increased tolerance to cold temperatures and may offer these areas an opportunity to use bermudagrass.

Bermudagrass forms a tight, resilient playing surface with high wear tolerance and fast recuperative potential. These traits are most obvious in the summer and early fall when the bermudagrass is actively growing. If the turf goes dormant in late fall or winter, the above-ground tissue can be easily worn off during heavy play. Maintaining reasonable fertility practices during the fall can help the turf recover through the winter and spring. Overseeding fields with perennial ryegrass is one option that gives a green playing surface to dormant bermudagrass fields.

TRACK FIELD USE AND CONDITION

How much use can a field withstand? This question is best answered using on-site field-use data from previous years. Field data collection requires some careful documentation of games, practices, and other events. As the demands on fields increase, more managers are starting to track field use. Probably the easiest data to track is the number of hours the fields are in use during the year.

Before a field is ever used, planners, designers, and managers should understand its expected level of use and performance. These expectations should be realistic. Those involved in planning and maintaining a field should consider the maintenance budget, available equipment, and labor. It is often helpful to have one field labeled as a “championship” field and the other fields labeled as “practice” fields. This can help everyone involved define how each field can be managed via maintenance inputs and controlled scheduling to maximize its condition. Often the higher quality championship fields can be used as examples to encourage

the construction of new fields that alleviate use or to increase maintenance budgets of existing fields.

Using data from a number of fields located in the Southeast and talking with turf managers and municipality supervisors, I have made a few general estimates relative to field use and condition (Table 1). These educated predictions are for grass fields (such as fields for football, soccer, or lacrosse) that are used nearly year-round. Baseball and softball should be evaluated differently because a large percentage of each game is played on a clay infield. The estimates assume the field is surfaced with a quality bermudagrass and begins the year with good coverage. The values relate to well-constructed fields that receive at least moderate maintenance and are used under reasonable conditions. The reality is that it takes only one extremely wet game to destroy a field. The values are based on all the events that occur on the field, including practices. Practices can also cause appreciable damage due to their repetitive activity in particular areas of a field, so practices must also be put into the equation.

The number of events a field can handle will ultimately depend upon field construction, weather conditions during the season (especially just before and during games), maintenance practices, recuperative periods, and the time of year.

RESTRICT FIELD USE IF NECESSARY

Obviously, the more traffic you put on the field, the faster the turf declines. Also, particular sports cause more severe field damage in localized areas. Football tends to cause extreme wear between the hash marks. Soccer wears the quickest in the middle of the field, in front of the goal mouths, along the sidelines (due to linesmen), and in the corner kick areas. Any repetitive action on the same area of the field accelerates wear. That is why practices and warm-up drills are often more damaging than games. But it is not just the athletes

Table 1. Expected Field Condition Based on Hours of Field Use per Year

Expected Field Condition	Field Use (Hours per Year)
Sustained good field conditions	200 hours or less
Good field conditions with some thinning of the turf and localized wear areas	400 to 600 hours
Fair field conditions; expect significant thinning and wear.	800 to 1,000 hours
Significant turf loss, field surface damage, increased potential for athlete injury	More than 1,000 hours

on the field who can cause wear problems. A marching band is extremely hard on a field because bands tend to march along the same lines all the time, both during a game and in practice. Cheerleaders and pep squads during games may also result in turf damage due to heavy use in a confined area.

Some reduction in traffic damage can be avoided by doing the following:

- Restrict use when soil is very wet.
- Restrict use when soil is very dry and turf is wilted.
- Always have coaches rotate heavy play areas during practices.
- Use portable goals when possible, and move them around the field.
- If possible, move a soccer field's sidelines during the year
- If a space is large enough to accommodate field rotation (see Figure 1), periodically rotate the entire field.
- On game fields, restrict the number of practices to a minimum.
- Have a reduced game schedule when grass is dormant.
- Have regularly scheduled rest times that are used to repair minor damages.
- Do not allow unofficial play.
- Use tarps (covers) on bench areas to reduce severe wear by coaches and team members,
- Use tarps (covers) on sideline areas used by the cheerleaders.

In most cases, field users will need to be informed of potential wear problems. Most users do not understand

the damage that they can cause. Although it may be obvious to a field manager that a field is too wet for play, it is not obvious to most field users. Close fields when necessary. If the field manager is not allowed to close the field, the decision-makers should be made aware of the potential short and long-term damage that may result from field use given the situation. Unfortunately, some fields are scheduled the same as basketball courts or hard-surface tennis courts, without consideration of the turf surface's wearability. The field manager is in the best position to decide how much wear is too much.

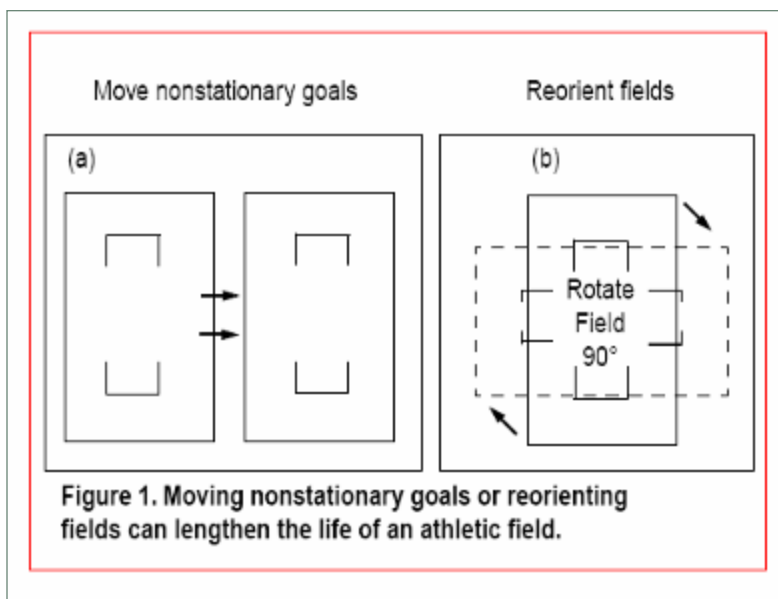
USE GOOD MANAGEMENT PRACTICES

Field managers can use a few practices that will maximize a field's ability to handle wear.

First, make every effort to begin the sporting season with 100 percent turf coverage. At the beginning of the year, schedule recuperative times during the season, realizing that non-overseeded bermudagrass fields will not recuperate very quickly in the late fall or winter months. Overseeding can be used to protect dormant bermudagrass if excessive wear is expected during the cooler months. But remember, the overseeding grass often can be a significant competitor with the bermudagrass in late spring to early summer when the bermudagrass is trying to grow. If premier conditions are needed during those months, then the overseed may need to be chemically removed to allow the bermudagrass to more easily re-establish.

Adjust maintenance practices to address the condition of the fields. Increase or decrease inputs (particularly irrigation and fertilization) as dictated by environmental conditions and the turf's growth.

Manage high wear areas differently than the rest of the field. This allows a manager to improve the entire field surface without dramatically increasing the budget. The most helpful practice along these lines is applying supplemental nitrogen fertilizer to the high wear areas to promote recuperation. The bermudagrass will respond to the added fertilization and promote more rapid growth, filling in divots and rip-outs quicker. The same can be done with aerification, soil amendments, and seeding. Think of a field as many parts, rather than just one field. The goal mouths of five fields in close proximity can be core cultivated in the same amount of time as one entire field. If the field routinely has localized standing water after a small shower, aerify those areas



and backfill with an appropriate coarser textured soil amendment (such as sand or calcined clay). Spread seed (if appropriate) in wear areas before games and practices.

Some management practices that can reduce field wear may be more controversial. Advocate that less aggressive cleat patterns be worn by athletes. Studies have shown that cleat design can dramatically influence turf damage. In one study, a trainer shoe produced 37 percent less turf damage than a standard soccer cleat. A 6-stud replacement cleat was 34 percent more damaging than the standard soccer cleat. The numbers are more relative than absolute, but they illustrate the impact on turf damage from something as simple as a shoe. Shoes with a greater number of smaller cleats will cause less wear and compaction damage (more cleats

displace weight better) than more traditional cleat design. Of course there is a trade off—reduced traction by the user. The trainer shoe in the above-mentioned study required 47 percent less force to break traction than a standard soccer cleat. This difference may be unacceptable at certain levels of athletic competition.

To maximize field use and durability, there must be open communication among the field manager, the people responsible for scheduling the field, and the field users. Once excessive wear and field overuse results in hazardous and unsafe playing conditions, the field manager must request that the field be closed. Safety of the users is paramount. With good field design, construction, management, reasonable care and maintenance, and proper use, fields can continue to provide an acceptable playing surface.

Prepared by

Grady L. Miller, *Professor and Extension Specialist*
Department of Crop Science
North Carolina State University

Published by

North Carolina Cooperative Extension

Cover photo: R. Winstead, N.C. State University