

# New ASTM standards for sand-based fields

BY MICHAEL DEPEW

**A**STM International has recently published a new standard for the design and construction of high performance, sand-based natural turf sports fields. This new standard is available through ASTM (see [www.astm.org](http://www.astm.org)) as ASTM F2396 "Standard Guide for Construction of High Performance Sand-Based Rootzones for Sports Fields."

Recent trends in sports field construction have led to a proliferation in the new generation of "infilled" synthetic turf sports fields. These installations entail the use of a carpet system in which the carpeting is filled with materials ranging from sand to rubber, a sand/rubber combination, or other resilient fill materials.

Occasionally, some of these systems may also have an underlying shock pad. Long carpet fibers extend from the backing layer through and above the infilled materials. The carpet fibers serve to hold the infill material in place and to provide a "turf" cover.

These types of systems are an improvement over the old type of synthetic turf installations where a turf-type carpet would have been installed with a pad over a hard surface (often concrete or asphalt). The use of infill materials increases the resiliency and shock attenuation characteristics of synthetic turf systems.

The improvement in synthetic turf systems has provided new incentives for installation of these systems. While certain sites or situations warrant the use of synthetic turf systems, aggressive sales efforts have resulted in these costly systems being installed in locations and situations where they may not be warranted. Indoor fields and intensively used practice facilities are venues in which synthetic turf systems may be practical. Many stadiums and game field facilities where use is less intensive may not justify installing a synthetic system.

While the economic and playability issues of synthetic vs. natural turf systems may be debated, few would debate the need to improve on the design and construction standards for natural turf sports field installations. In order to meet the demands of the industry to produce better high-performance, natural turf sports field installations, ASTM subcommittee F08.64 (for Natural Playing Surfaces) with the support of the STMA began the process to develop this new standard.

ASTM F2396 is a standard that was developed over a 4-year process. The STMA Technical Standards Committee first drafted the standard and industry rep-

resentatives including landscape architects, engineers, agronomists, university researchers, contractors, and sports field managers reviewed it. After the development process within the STMA it was then presented within ASTM International for balloting and approval via a consensus process. This new standard was approved and set for publication in December 2004.

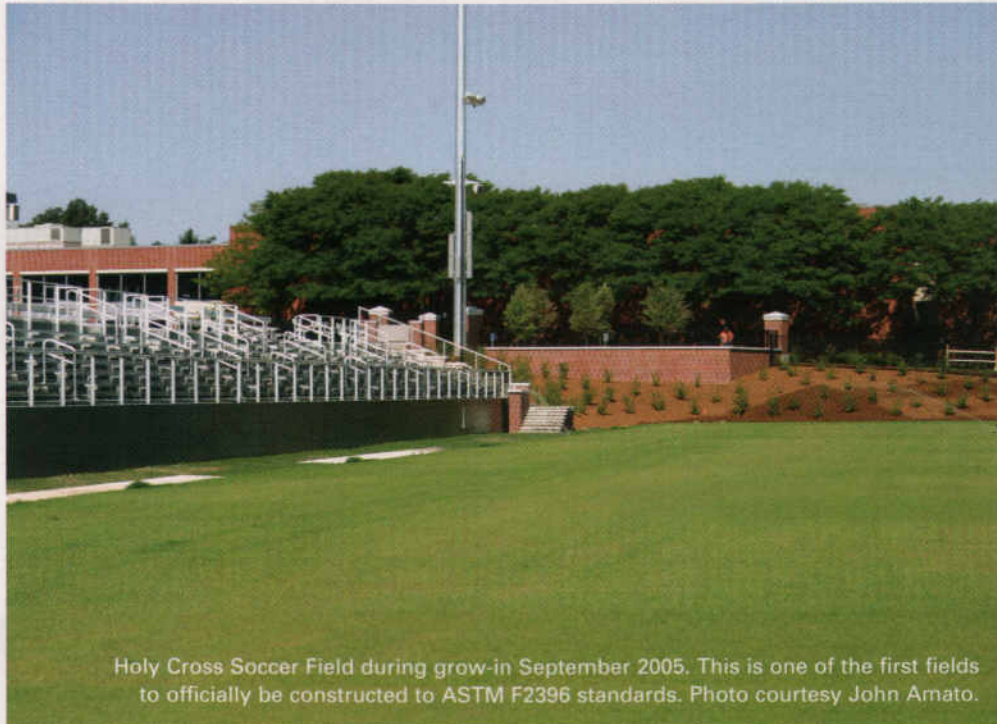
The ASTM F2396 standard is unlike other rootzone design specifications. Other construction standards used for sports field design include methods for putting green construction (USGA, 1993; University of California, 1990) and various state extension publications (California, 1974; Florida, 1999; Minnesota, 1987; Pennsylvania, 1983; Washington, 1983). [See ASTM F2396 for a full reference to these publications.]

These standards each have a proposed specification for construction. ASTM F2396 on the other hand has various options for design and construction and presents the critical design elements that should be employed when using each of the various design options. For example, ASTM F2396 specification fields could have a gravel drainage layer or be constructed without; may be a sand-peat blend or a sand-soil blend or a sand-soil-organic blend; or may vary in profile depth from 8 inches to 16+ inches.

Other critical design elements within ASTM F2396 include: drainage system design; profile depth design considerations; sand types and particle sizes; soil amendment considerations; organic amendment considerations; quality control program considera-

tions; calibration and blending programs; blended rootzone stockpiling and transportation considerations; grading requirements and tolerances, irrigation installation and design efficiency tolerances; installation procedures and steps; final field preparations and finish grading; turf establishment methods including sod-soil compatibility specifications and sod/seed quality considerations; and recommended rootzone performance criteria which includes physical, chemical, and mechanical performance specifications.

The ASTM F2396 guidelines are developed with the intent that they are to be used by industry professionals with the technical background to understand the design elements at issue in sand-based sports field development. It is not a "cook-book" design specification that can be "cut and pasted" to form a construction specification. Rather this standard gives a set of guidelines to be used when considering field design and the local materials available for construction. For example, Table 3 of the standard guideline has organic amendment characteristics with a rating scale that includes "preferred," "acceptable," "marginal," and "unaccept-



able." Likewise Table 4 of the standard guideline includes the same rating scale for sod compatibility for sod-soil criteria such as the sod-soil to rootzone particle size differences (D50 ratio), silt and clay content, silt to clay ratio, and gravel content. (Sod-soil is the soil that is cut with and accompanies the sod.)

**Using the standard**

At least three installations have been constructed this year using this new ASTM F2396 standard: the soccer stadium at Holy Cross University in Worcester, MA; a multi-use sports field at Monte Vista Park in Rancho Santa Margarita, CA; and the turf course at Hollywood Park racetrack, Inglewood, CA.

While a new standard, these same guidelines have been employed by the author in the past for the design and construction of several good performing fields ranging from two and one half to seven years old, including: the turf track at Tampa Bay Downs, Oldham, FL; the sports fields at the Home Depot Center in Carson, CA; Phillipello Park multi-use field, Watertown, MA; and Raley Field (AAA), Sacramento, CA.

The proper use of ASTM F2396 as a standard guideline for developing high performance sand-based sports fields can dramatically improve the quality of sports

field installations. Other ASTM standards can be used in conjunction with F2396 for design of warning tracks, skinned infields/mounds, and for maintenance and testing considerations (see sidebar). Other standards under ASTM development or consideration for development include a construction QC standard, putting green construction standard, cricket wicket construction standard, and sand-based field maintenance standards.

Proper construction and maintenance techniques are needed to improve the quality of high performance, natural turf installations and provide a high performance alternative to synthetic turf installations. Natural turf fields with performance conditions that are highly variable depending upon field location or that have loose footing, thin (or no) turf cover, muddy conditions, or poor drainage only strengthen the marketing arguments of the synthetic turf industry. ASTM F2396 is one tool in the arsenal for developing high quality, natural turf fields in this competitive environment. **ST**

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**Sports Turf and Playing Field Related ASTM Standards, September 2005**

Developed by Subcommittee: F08.64  
F1632-03 Standard Test Method for Particle Size Analysis and Sand Shape Grading of Golf Course Putting Green and Sports Field Rootzone Mixes

F1647-02a Standard Test Methods for Organic Matter Content of Putting Green and Sports Turf Root Zone Mixes

F1702-96 (2002) e1 Standard Test Method for Measuring Shock-Absorption Characteristics of Natural Playing Surface Systems Using Lightweight Portable Apparatus

F1815-97 Standard Test Method for Saturated Hydraulic Conductivity, Water Retention, Porosity, Particle Density, and Bulk Density of Putting Green and Sports Turf Root Zones

F2060-00 Standard Guide for Maintaining Cool Season Turfgrasses on Athletic Fields

F2107-01e1 Standard Guide for Construction and Maintenance of Skinned Areas on Sports Fields

F2269-03 Standard Guide for Maintaining Warm Season Turfgrasses on Athletic Fields  
F2270-04 Standard Guide for Construction and Maintenance of Warning Track Areas on Sports Fields

F2396-04 Standard Guide for Construction of High Performance Sand-Based Rootzones for Sports Fields

Under Development by Subcommittee: F08.64

WK490 Guide for Quality Control Procedures during Construction of Natural Playing Surfaces

Developed by Subcommittee: F08.65  
F1551-03 Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials  
F1015-03 Standard Test Method for Relative Abrasiveness of Synthetic Turf

Stadium Field at the Home Depot Center in Carson, CA. Photo courtesy of Steve Guise.



**Playing Surfaces**

F1936-98 Standard Specification for Shock-Absorbing Properties of North American Football Field Playing Systems as Measured in the Field

Developed by Subcommittee: F08.52  
F355-01 Standard Test Method for Shock-Absorbing Properties of Playing Surface Systems and Materials

F1543-96 (2002) e1 Standard Specification for Shock Attenuation Properties of Fencing Surfaces

F2117-01 Standard Test Method for Vertical Rebound Characteristics of Sports Surface/Ball Systems; Acoustical Measurement

Under Development by Subcommittee: F08.80

WK4979 Standard Terminology Relating to Impact Testing for Sports and Sports Surfaces

WK Standard Guide for Quality Control Related to Impact Testing of Sports Surfaces  
WK Standard Terminology Relating to

Soils, Aggregates and Earthy Materials for Sports and Sport Surfaces

Other Committee/Subcommittee Standards related to sports fields:

F1953-99 (2003) Standard Guide for Construction and Maintenance of Grass Tennis Courts

F1938-98 (2004) Guide for Safer Use of Movable Soccer Goals

F2056-00 Standard Safety and Performance Specification for Soccer Goals

F2000-00a Standard Guide for Fences for Ballfields and Other Sports Facilities

F969-01 Standard Practice for Construction of Chain-Link Tennis Court Fence

STP 1313 Safety in Baseball/Softball (1997)

The physics of baseball/softball equipment; the latest advances in protective equipment; innovative baseball/softball field design; Improved operations and maintenance systems; Spectator safety management; the causes of baseball/softball injuries.

STP 1305 Safety in American Football (1997) Analyzing Risks; Assessment; Science; Management: Facilities, Surfaces and Systems

STP 1073 Natural and Artificial Playing Fields: Characteristics and Safety Features (1990)

Playing field standards; surface traction; testing and correlation to actual field experience; state-of-the-art natural and artificial surfaces

Under Development by Other Subcommittees:

WK4498 Standard Guide for Fences/Barriers for public and commercial soccer, field hockey and related facilities

# Buying quality sod 101

BY JOHN R. HALL III

**T**hough many readers of *SportsTurf* have purchased sod before, many of you have not. And hopefully when your organization or school district next prepares to buy sod, you'll be the lead person they turn to for answers. Here are some questions to consider:

**1. What variety or varieties are in sod?** With more than 125 cultivars of Kentucky Bluegrass, 100 cultivars of Tall Fescue, 20 cultivars of Bermudagrass and Zoysiagrass, it is very important to know if the varieties in the sod have performed well in your area. Most land grant universities conduct National Turfgrass Evaluation Programs (NTEP) and make specific variety recommendations. Pay heed to the experts.

**2. Are the varieties in the turf from certified seed or sprigs?** Certification insures genetic purity. It provides assurance that the product you are purchasing contains the varieties indicated. Quality sod growers should be willing to provide copies of the seed or sprig certification labels or documents upon request.

**3. Is the sod certified?** Some states have sod certification programs that ensure genetic purity and certain levels of quality.

**4. If it is a mixture of grasses, what was the ratio of the planted mixture?** You cannot know how to properly manage a turf unless you know what turfgrass you purchased. Kentucky Bluegrass sod is sometimes grown with creeping red fescue or perennial ryegrass as a minor component. Bluegrass is also blended in small amounts with Tall Fescue. It is important to know the dominant grass in the mixture so an appropriate management program can be put in place. Tall fescue sod is normally planted with 80 to 90 percent Tall Fescue and 10 to 20 percent Kentucky Bluegrass on a weight basis. These ratios perform very well and are predominantly Tall Fescue at the time of harvest.

**5. What is the actual grass content of the sod mixture?** Tall Fescue-Kentucky Bluegrass mixtures, although planted 90% Tall Fescue on a weight basis, are almost a 1:1 mixture on a seed count basis. Tall Fescue requires a much warmer soil than Kentucky Bluegrass to germinate. Therefore, 90-10 mixtures planted early in the summer or later in the spring on warmer soils, tend to contain significantly more Tall Fescue than 90-10 mixtures planted late in the fall or early in the spring when soil temperatures are cold. If you want Tall Fescue sod and you end up purchasing a sod that has a high Kentucky Bluegrass content, it may not perform as you would expect.

**6. How old is the turfgrass sod?** Old sod is not necessarily bad sod. However, some turfs such as Kentucky Bluegrass, Bermudagrass, and Zoysiagrass tend to produce thatch with age. Excessive thatch leads to crowns that are elevated in the thatch and predisposed to drought stress. If you are purchasing a sod with excessive thatch, it may be slower to root and you will want to include extensive aeration in the maintenance program to reinvolute the thatch with soil, increasing decomposition. Most sod is produced in 9 to 18 months without netting. Production time is generally shorter when netting is used.

**7. Does the turfgrass sod have netting?** Some sod is grown with netting to increase sod strength and shorten the production time. This netting can be troublesome in situations where cleats are used, but in most other situations it is no problem. Netted Tall Fescue sod is sometimes grown without Kentucky Bluegrass and if you manage turfgrass that is going to be heavily trafficked, you want to be sure it does have the Kentucky Bluegrass in it to ensure you have lateral healing potential provided by the Bluegrass.

**8. At what depth is the turfgrass sod cut?** Sod is normally cut with 3/4 inch plus or minus 1/4 inch of soil attached. Thick sod roots slower, but obviously has a less frequent watering requirement than thin sod. Sod producers obviously don't want to send any more soil with sod than is necessary to ship a quality product. On a daily basis, they vary the thickness of the cut, based on age and quality of the sod, soil moisture, etc. Knowing the sod cutting depth will help you determine adequate irrigation frequency and how fast the sod will become rooted.

**9. What type of soil is the turfgrass sod grown on?** Large differences between soil types of the sod and the soil it is laid on can lead to layering interfaces that promote rooting problems. Laying traditional soil or organic matter sod on sandy media has been noted to restrict rooting into the sandy soil. Most problems have occurred where heavier mineral soil sod has been placed on lighter, sandy soils. It is best to try to purchase sod grown on soil that is reasonably close to the texture of the soil at the installation site. If significant textural differences exist between the sod and the installation site soil, it would be beneficial to plan several core aerifications and draggings as early as possible during the establishment phase to minimize the impact of layering upon rooting.

**10. What will be the lag time between turfgrass sod harvest and delivery?** Significant delays between harvest and delivery waste stored food reserves in the grass plants in respiratory survival processes. Delay is particularly harmful during hot weather when respiration rates are maximum. In addition, it is known that higher mowing heights, higher nitrogen levels, thinner cut sod, and returned clippings all contribute to faster sod heating on the pallet. It is desirable to get sod installed within 8 hours of harvest. Sod that has been delayed, will have lower stored food reserves, less potential to develop an immediately, aggressive root system and is likely to be predisposed to disease activity.

**11. What was the mowing height at the turfgrass sod farm?** It is important to know what mowing height the sod was produced under as this would naturally be a stable mowing height to continue. Lowering the mowing height at the time of installation is not advised as this is a time when the grass actually needs maximum photosynthetic potential to compensate for the drawdown on stored food

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reserves associated with the shock of sod harvest and transport. Slightly higher mowing heights at installation are beneficial to establishment rooting.

**12. Is the turfgrass sod rolled or folded on the pallet?** Rolled sod generally is hand carried from the pallet to the site of installation with less tearing than folded sod. If a lot of handling of the sod is going to be necessary at the installation site, you may prefer rolled sod. If the sod is mature and strong either type handles well.

**13. Has the turfgrass sod been treated with a preemergence herbicide?** If you are getting the sod in the spring, you need to know if it needs an application for crabgrass or goosegrass control. If it has already received an application, an additional application may be harmful to root development. If it has not received an application of preemergence herbicide you may need to apply one, especially if the area to be planted has the potential for crabgrass or goosegrass between the sod pieces. Some preemergence herbicides tend to have a negative impact on sod rooting when applied at the time of sodding, therefore controlling breakthroughs with postemergence materials may be the best approach.

**14. Has the turfgrass sod been treated with a growth regulator?** Some sod growers may be using growth regulators to reduce mowing and increase sod-rooting potential. It would be important in these instances to know how recently the material has been applied, and what residual effect might be expected. This would assist in setting up a reasonable mowing schedule.

**15. When was the turfgrass sod last fertilized?** It is particularly important to know when the last nitrogen application was made to the sod, how much was applied and what was the source of nitrogen. If you are using cool season sod like

Kentucky Bluegrass or Tall Fescue, and the sod just received soluble nitrogen at the farm, you may be providing too much nitrogen with establishment fertilization. A similar problem could occur with Bermudagrass being installed late in the season.

**16. Has the turfgrass sod received any applications of iron or biostimulant in the last 30 days?** Researchers have demonstrated substantial root and shoot stimulation and significant increases in sod shear strength with applications of seaweed extractable cytokinins, iron, and "cytokinin like" fungicides to Kentucky Bluegrass. Sod installation rooting 4 weeks after harvest is increased with seaweed extracts, and some fungicides. These applications, if applied, would not need to be repeated. If they have not been applied, they could prove beneficial to sod rooting at establishment.

**17. What pesticides have been applied in the last 30 days?** Have fungicides, broadleaf herbicides or insecticides been recently applied? Some systemic fungicides give up to 28 days control of common diseases like Brown Patch, Dollar Spot, etc. In addition, some insecticides have extended residual control potential. Therefore, reapplication before they are needed would be a waste of money. If broadleaf weeds are present in the sod it is possible they have already been treated and additional treatment could be detrimental. Some sod growers use materials that provide extended residual broadleaf weed control and this could have an impact on the post establishment broadleaf herbicide spray program. **ST**

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