

# 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.

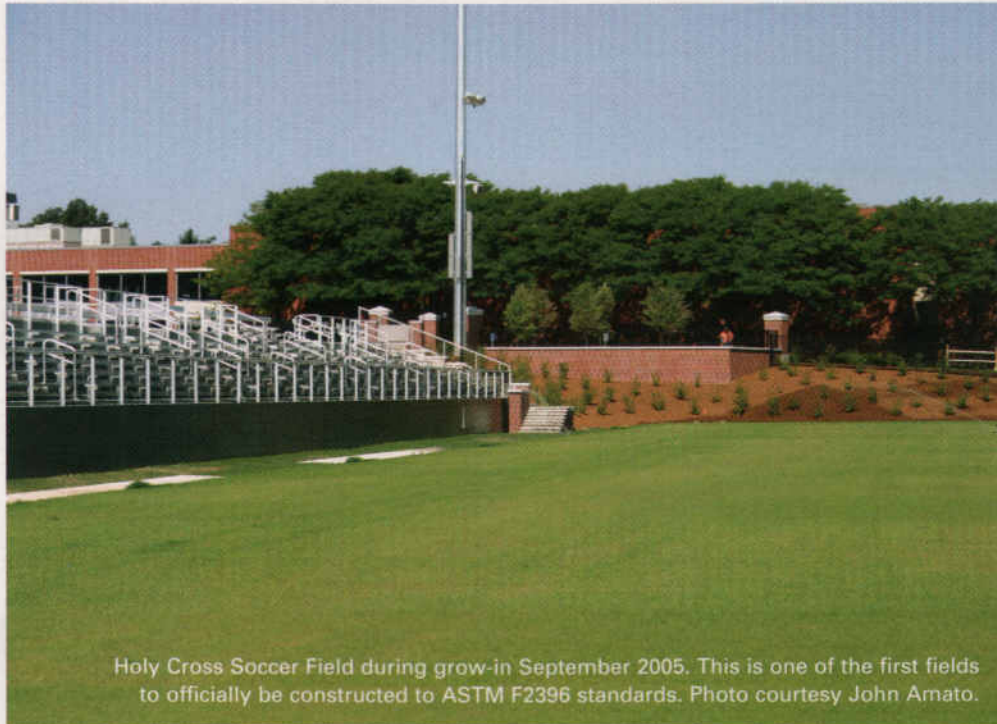
The improvement in synthetic turf systems has provided new incentives for installation of these systems. While certain sites or situations warrant the use of synthetic turf systems, aggressive sales efforts have resulted in these costly systems being installed in locations and situations where they may 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.]



Holy Cross Soccer Field during grow-in September 2005. This is one of the first fields to officially be constructed to ASTM F2396 standards. Photo courtesy John Amato.

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**

*Michael DePew is a consulting sports turf agronomist, chairman of the STMA Technical Standards subcommittee, and ASTM technical contact for the F2396 standard. He can be reached at proturf@hotmail.com.*

**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