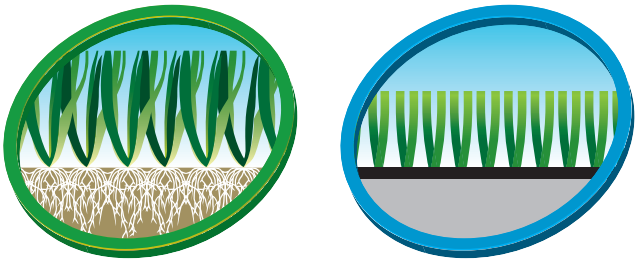
4TH EDITION

A Guide to Synthetic and Natural Turfgrass for Sports Fields

Selection, Construction and Maintenance Considerations



SportsTurf MANAGERS ASSOCIATION

Experts on the Field, Partners in the Game.

There were many in the industry who provided information for the Guide. Special recognition goes to the 2005 STMA Synthetic / Natural Turfgrass Task Force for their dedication to this 10-month project and for their collaborative work on this Guide, and to the 2008 Synthetic / Natural Turfgrass Task Group, 2014 and 2018 STMA Information Outreach Committee, and Synthetic Turf Council for their review and updates.

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Selection, Construction and Maintenance Considerations

Introduction

The Sports Turf Managers Association (STMA), the authority on sports field management issues, has prepared this Guide to provide basic information about the selection and maintenance of synthetic turf and natural turfgrass fields. This guide is directed to:

- Athletic directors
- School boards
- Municipalities
- Community sports organizations
- Coaches
- Parents
- Athletes
- General public

Because each field is different, this Guide offers general information with additional sources to access for your specific situation.

The Guide is divided into topics that are important for you to consider for the safety of the players and the long-term viability of a newly constructed or renovated field. The cost ranges are generalized for field construction projects throughout the continental U.S. However regional variances may be reflected in these estimates. This information is not relevant to indoor facilities or to baseball/softball fields. All references to synthetic turf are to the newer rubber infill technology, which has had more widespread use since 1997. All references to natural turfgrass are for native soil fields, unless otherwise specified. This Guide also includes a glossary of terms.

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Constructing the Field

The most commonly asked question about sports fields relates to the cost to construct them.

So, what are the average construction costs for synthetic turf and natural turfgrass fields?

The cost to construct either field type will vary dramatically depending upon its:

- Field size
- Geographic location
- Labor costs*
- Construction schedule
- Amount of site work required
- Irrigation system (as needed for each field type)
- Estimated number of games and variety of activities

There also may be state and local regulations governing construction, such as requiring an environmental impact study prior to construction including stormwater management.

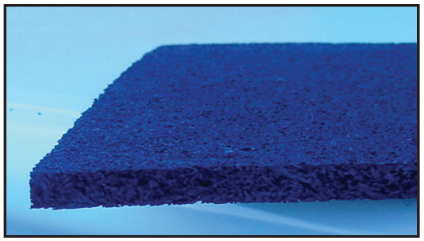
* Prevailing wage may set precedence on government, state, or city job sites.

Items that are Typical to any Athletic Field Construction

Following is a list of items that should be considered when developing a scope of work for athletic field construction.

- Architectural & Engineering
- Light Towers
- Environmental Impact
- Consulting
- Excavations/Site Prep
- Permits
- Bonds and Insurance
- Engineering & As-Builts
- Surveys
- Earthwork/Grading
- Proper Sourcing and Quality Control Testing of Rootzone and Drainage Materials
- Erosion & Sediment Control
  - (a) Silt Fence
  - (b) Inlet Sediment Trap
  - (c) Construction Entrance
  - (d) Permanent Grassing
  - (e) Monitoring
- Storm Drainage System
  - (a) Perimeter Drain
  - (b) Tie into Catch Basin
  - (c) Outfall installations
  - (d) Base Trench Drain
- Bleachers
- Sidewalks
- Fencing

To help you calculate average construction costs for synthetic and natural turfgrass fields, the actual playing surface of U.S. football fields are typically 360' x 160' or 57,600 sq. ft. Normally, a field will extend at least another 15' around the playing field boundary. Another standard area of measure for cost comparisons would be the square footage within a quarter-mile/400 meter track - approximately 97,400 square feet.



Example of a synthetic field pad showing its thickness. Photo: Darian Daily

Construction profile for a synthetic field. Photo: Darian Daily

Seam construction on a synthetic field. Photo: Darian Daily

Installation of a special logo on a synthetic field. Photo: Darian Daily

Synthetic turf

Additional factors may affect the cost of constructing a synthetic turf field. These include:

- Accessibility for heavy equipment
- Type of underground drainage system
- Drainage profile
- Cost of freight
- Design and engineering
- Edge material
- Type of attachment along edges
- Turf density or denier as they vary from product to product
- Type of backing
- Sewed or glued lines and seams
- Type and quantity of infill
- Intricacy of logos and end-zone lettering, borders and other inlaid markings

Following is a typical cost range and what is included in that range to build a single synthetic field.

Synthetic Infill- $6.00-$10.25 per sq. ft.
Includes:

- Rough Grades
- Curbing and Tack Strip
- Carpet & Rubber Fill
- Lines and Logos
- Geo Textile
- Labor
- Base Design and Installation
- Stone & Freight for Base
- Drain Collector
- Lateral Drains
- Sod & Topsoil Backfill of Curb
- Laser Grading & Compaction
- Equipment & Trenching

- Demolition and Excavation
- Quality Control Testing
- Adequate Water Source for Cleaning and Field Maintenance
- Material Distribution Labor
- Cleanup

Optional items that may be reflected in cost range:

- Water Meters
- Irrigation System
- Maintenance Equipment
- Underlying Shock Absorbing Pad
- Backflow Prevention
- Goal Posts

Natural turfgrass

In addition to the factors that are relevant to the construction of all field types, there are some specific items that may affect the cost of native soil fields. These include:

- Drainage
- Top soil costs
- Type of turfgrass cultivar, propagation and its accessibility
- Sod vs. Sprigs vs. Seed
- Cost of freight
- Sod thickness
- Seed mixture and seeding rate
- Accessibility for heavy equipment
- Design and engineering
- Sod accessibility and soil interface issues, if sodding a field

Following is a typical cost range and what is included in that range to build a natural turfgrass field constructed of native soil(s).

Example of bad conduit installation along edge of a natural turfgrass field and reconstruction to fix it. Photo: Tony L. Strickland, CSFM

Poor field drainage on a soccer field improperly constructed. Photo: Tony L. Strickland, CSFM

Example of laying sod on a football field. Photo: Ross Kurcab, CSFM

Natural with Native Soils - $1.50-$3.00 per sq. ft.

Includes:

- Rough Grades
- Tilling/Fertilization/Lime
- 2"- 4" Topsoil
- Sprigging or Sod Installation
- Field Lay-out & Stripping
- Topdressing
- Laser Grading & Compaction
- Equipment & Trenching
- Material Distribution Labor
- Cleanup

Optional items that may be reflected in cost range:

- Water meters
- Irrigation System - optional in some regions and necessary in others
- Turfgrass establishment
- Maintenance Equipment
- Backflow Prevention
- Goal Posts

Natural with On-site Native Soil - $0.60-$1.50 per sq. ft.

(no added top soil or sod)

Includes:

- Rough Grades
- Laser Grading
- Seed or Sprigging
- Clean Up
- Final Tillage, Fertilization, Lime Addition

Optional items that may be reflected in coast range:

- Turfgrass Establishment
- Irrigation System - optional in some regions and necessary in others.

Although this guide specifically focuses on native soil fields, it may be helpful for comparison purposes to have cost ranges for constructing two types of sand-modified fields. These ranges also assume that the excavated subgrade is already provided.

Natural with Sand and Drainage - $5.50-$8.00 per sq. ft.

This includes everything noted in constructing a natural with native soils field, excluding the topsoil; with the addition of an 8"- 12" sand rootzone, 4"- 6" perforated piping trenched below a 3"- 4" gravel layer. These fields are typically built for colleges or professional sports where play must occur during almost any weather condition.

Natural with Sand Cap - $2.75-$4.00 per sq. ft.

This includes everything noted in constructing a natural with native soils field, but replaces the topsoil with a 4"-6" sand layer.

Because many factors can contribute to the field's construction cost, it is recommended that your sports turf manager researches recent field construction that has like characteristics and a similar environment. For further information, contact the STMA at ph. 800-323-3875 for referral to relevant local and regional resources. Additional information may be obtained by contacting the ASTM, www.ASTM.org, which has released a standard on sand-based field construction (F2396-04); the Synthetic Turf Council, www.syntheticturfcouncil.org/, the American Sports Builders Association, www.sportsbuilders.org and the Turfgrass Producers International (TPI) at www.turfgrasssod.org/.

Protecting the Asset: Your Field

What are the typical maintenance activities for proper management of synthetic and natural turfgrass fields?

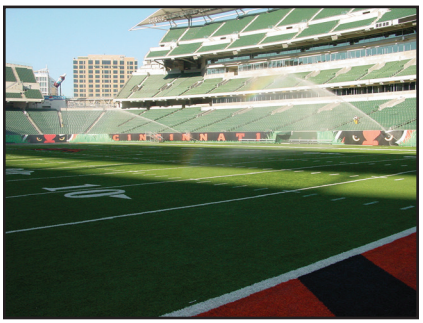
As with any major asset, synthetic and natural turfgrass sports fields need well-planned and funded management programs to protect the owner's investment. This includes hiring a dedicated and knowledgeable sports turf manager to develop and implement the program. Management of both types of surfaces also requires a budget that reflects the amount of activities that may be on the fields. The budget must have the flexibility to expand as the demand for field time increases.

Maintenance and cultural practices will vary based upon these factors:

- amount of use and level of play
- multi-sport use
- weather and climate
- soil and terrain
- water availability and irrigation system
- budget including personnel availability
- owner's goals
- type and quality of field construction
- field security (protection against vandalism, non-regulated play, etc.)

A sports turf manager can develop a cost effective program specific to each field's requirements. For further field management information, contact the STMA at ph. 800-323-3875, for referral to relevant local and regional resources.

Synthetic turf



Irrigating synthetic turf. Photo: Darian Daily

All synthetic turf manufacturers have recommended maintenance practices. These include sweeping, dragging, loosening and redistribution of infill and cleaning. Cleaning may involve watering and the use of special solvents and cleansers. Depending upon use and weather conditions, infill material levels may be depleted. Check and maintain proper infill levels to provide a consistent surface. Consider topdressing annually to help restore the field's resiliency. The sports turf manager will also need special knowledge in troubleshooting and minor repairs,

such as seam repair and snow removal. The installer can provide this information per the manufacturer's guidelines.

On a multi-use field, develop a plan that follows the manufacturer's recommendations for changing markings. Options may include using different colors of paint for different sports; painting over existing lines with green paint; or removing the lines and repainting.

Rubber mix used for resiliency on synthetic fields. Photo: Darian Daily

Typical Maintenance Costs

The typical cost range to maintain a synthetic field will vary. However, an average field can require approximately $5,000 - $8,000 per year in material costs and approximately 300-500 hours of labor cost per year to maintain.* (Material costs include infill, paint, paint remover, disinfectants, gum remover, etc. It does not include equipment expenditures.) It is much more expensive to maintain synthetic fields that are highly visible or when used for multiple sports. The cost can even be higher if field markings must be painted and cleaned often, or if frequent repairs are necessary.

Dragging the field to prepare for game day. Photo: Darian Daily

*Cost and hours provided by Ron Hostick, CSFM and Brad Fresenburg, Ph.D.

For more information, visit the Synthetic Turf Council website for their Guidelines for Maintenance of Infilled Synthetic Turf Sports Fields - https://www.syntheticturfcouncil.org/general/custom.asp?page=Technical_Guidelines

Natural turfgrass

Fields for schools and recreational use are usually constructed of native soils. Water moves through most native soils slower than synthetic turf and sand modified fields, and a minimum 1.0% crown is suggested for most fields.

All natural turfgrass fields are living, breathing organisms that require mowing, watering, fertilizing, time off from play, and depending upon disease and pests, the application of plant protectants. To help ease compaction from heavy play, fields may be aerified multiple times a year. High sand content fields require more attention to

watering and fertilization. They may also require additional maintenance with top-dressing. Debris is usually removed by mowing, sweeping, and flushing the field with water.

Example of a sports field being aerified. Photo: Ross Kurcab, CSFM

Example of topdressing a football field. Photo: Ross Kurcab, CSFM

Typical Maintenance Costs

Many factors affect maintenance costs. Following are some specific examples to help you plan. However, for relevant costs in your area, contact the STMA at ph. 800-323-3875.

EXAMPLE: A Denver-area native soil field with Kentucky bluegrass and perennial ryegrass that hosts approximately 110 soccer events annually will spend between $7,000 and $10,000 annually on material costs (not including equipment) and will require 415 hours of labor cost per year for general maintenance.*

EXAMPLE: In New York State, a high school native soil field with perennial ryegrass and Kentucky bluegrass that hosts approximately 15 fall football games and 30 Lacrosse games in the spring will spend approximately $4,000-$6,000 annually on material costs (not including equipment) and will require approximately 250 hours of labor cost per year for general maintenance.**

EXAMPLE: A Denver-area sand-modified field constructed of 90% sand and 10% peat, with four varieties of Kentucky bluegrass that hosts 35 football games and 10 other events, will spend between $10,000-$14,000 annually on material costs (not including equipment) and will require 750 hours of labor cost per year for general maintenance.*

* Ezra Paddock, Jeffco Stadium, Lakewood, Colorado

** John Gaffney, Rush-Henrietta Central School District, Henrietta, New York

Managing Special Events

Is there anything special required to host non-sports and atypical sports events for synthetic turf and natural turfgrass, and how will the special event affect the warranty?

Set up for a concert showing field protective coverings. Photo: Ross Kurcab, CSFM

These events could include:

- concerts
- graduations
- fireworks
- overflow parking
- conventions
- truck, car, or motorcycle events
- wrestling or boxing
- archery

Care must be taken to protect each type of field surface. Typically, a sports turf manager will place a protective covering over the turf and will develop a plan to safeguard the turf during the event. Types of materials that should be considered to protect the field surfaces for staging and roadways are:

- ¾ inch plywood (may require multiple layers)
- Turf protection flooring; and
- Geo-textile blanket.

Other materials are available for flooring protection under the staging and for the seating areas. These products should be investigated to find the one that best suits the event situation. The use of these additional materials to host such events should be taken into consideration and incorporated into the overall cost to produce the event.

Synthetic turf

Concerns from these events are:

- burns from fireworks, cigars and cigarettes
- surface contamination (debris)
- security
- uneven wear
- uneven compaction
- displacement of infill
- stains
- contamination from spilled liquids (gas and oil)
- weight of materials (staging) if not properly designed and planned for may result in damage to the grade.

Flooring that is more specialized for seating may be necessary for certain events (graduation and concerts). Warranties should be reviewed prior to holding an event.

Natural turfgrass

Preventive fungicide applications may be necessary based on the climate conditions and the duration of the event. Consider aerifying the field prior to a special event. Aerifying can help the field better handle compaction as well as help with air movement under the floor covering. Surface contamination (debris), weight of materials (staging) are concerns that should be addressed during planning. Sod and grade may be adversely affected by the weight, length, and type of event, which could result in major grade repair and/or sod replacement. When planning for the event, the field's normal schedule must be able to accommodate the additional time necessary following the event to repair the turf. If the length of the event has caused irreparable damage to the turfgrass, irrigation equipment, and/or soil, time and resources must be allocated for repair and replacement. Warranties still in effect should be reviewed prior to an event.

Developing an Equipment List

Your sports turf manager will develop a capital budget, replacement schedule, and a utilization schedule to optimize the use of all equipment and accessories. School and park districts often share equipment across departments. Care should be taken to utilize all equipment per the manufacturer's instructions.

What is a typical equipment list for each type of turf?

Synthetic turf

- Grooming equipment: typically some type of broom, brush or tine that is dragged over the field to stand the synthetic fibers up and to distribute the crumb rubber.
- Utility cart for grooming/cleaning equipment, pushing snow or operating sprayer.
- Spraying equipment: for the application of weed control, cleaning agents, wetting agents to lessen the static charge to aid in drainage.
- Sweepers/Blowers: to remove trash and other materials from the playing surface.
- Vacuum: to remove small items, such as sunflower shells and peanut shells.
- Top dressing equipment: to periodically re-dress areas that have lost crumb rubber.
- Field magnet: to remove metal debris
- G-Max testing instrument: Clegg Impact Tester, Triax 2000, or F-355
- Infill depth gauge / fireproofing depth gauge

Optional:

- Pressure washers or other flushing equipment: to remove unwanted fluids or contaminants.
- Spiking equipment: for de-compaction and/or to help with redistribution of crumb rubber.
- Irrigation system (some manufacturers require irrigation to maintain warranty.)
- Painters for adding additional lines and mechanical scrubbers or extractors for cleaning painted lines on the synthetic turf.
- Special rubber blade snow plow
- Seam repair supplies

Natural turfgrass

- Mower: rotary or reel depending on species, quality requirements, etc.
- Irrigation system (optional in some climates, required in others)
- Aerator: core, plug, or slicing type, typically pulled behind a tractor or utility vehicle.
- Seed/Fertilizer spreader
- Weed and pest control application equipment
- Line Painter: available in walk-behind or riding configurations
- Tractor or utility vehicle to pull equipment
- Aeration core collection equipment
- Field magnet: to remove metal debris
- G-Max testing instrument: Clegg Impact Tester, Triax 2000, or F-355

Optional:

- Blower and / or sweeper: for debris / litter management
- Deep tine aerator
- De-thatching equipment: typically pulled behind a tractor
- Groove or Slit Seeder
- Top Dresser
- Field roller
- Dragging implement: sweeper or steel drag

Addressing Heat on Fields

What are the temperature differences between synthetic turf and natural turfgrass fields?

Synthetic turf

High field surface temperatures are directly related to clear, sunny, and hot conditions. Surface temperatures typically are not very high during hazy, humid conditions. Penn State University's Center for Sports Surface Research* has compared surface temperatures of synthetic turfs composed of various fiber and infill colors/materials. Maximum surface temperatures during hot, sunny conditions averaged from 140 to 170°F. No product in the study produced a substantial reduction in surface temperature compared to a standard green fiber/black rubber system. Companies are working on alternative infill products that may in the future significantly reduce field temperatures.

Photo: Tony L. Strickland, CSFM

Dangerous temperatures occur at the surface and directly above the surface, which can increase the chances for heat related stress in athletes. Air temperatures measured 2 and 5 feet above the surface are approximately 5-10 degrees higher than ambient air temperatures. Watering the field cools the turf surface, but temperatures quickly rebound in about 20 minutes. During clear, sunny conditions, it is suggested that sports turf managers, coaches, and trainers monitor heat index and surface temperatures and make appropriate adjustments to practice and game schedules. It is strongly recommended to use an infrared thermometer to easily monitor surface temperatures. For more information, go to https://plantscience.psu.edu/research/centers/ssrc.

* T J Serensits, A S McNitt and D M Petrunak. 2011. Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology DOI: 10.1177/1754337111398407.

For more information, visit the Synthetic Turf Council website for their Guidelines for Minimizing the Risk of Heat-Related Illnesses - https://syntheticturfcouncil.site-ym.com/store/ViewProduct.aspx?id=2181930

Natural turfgrass

Natural grass has been shown to be a temperature reducer. According to a United States Golf Association study, natural grass keeps areas cooler on a hot day. The temperature of natural grass rarely rises above 85 degrees Fahrenheit, regardless of air temperature.

Protecting the Health and Safety of Athletes

The most important element of a sports turf manager's job is to provide the safest fields for athletes, regardless of the level of play.


Synthetic turf


Natural turfgrass

Research continues to be conducted on the safety and playability of sports fields. These studies provide owners and administrators with scientific data that will help them to determine the most appropriate playing surface for their unique situation. Make certain that the data is from a reliable entity. Be aware that there could be biased information from organizations aligned with synthetic turf and from those that support natural grass.

Gmax Testing

Gmax testing, also known as impact testing, measures the shock-attenuation performance of synthetic turf and natural turfgrass athletic fields. Surface hardness is measured by dropping a weight (referred to as a missile) from a fixed height onto the playing surface. The missile contains an accelerometer that measures how fast the missile stops once it hits the surface. A numerical value, referred to as Gmax, is then generated. A high Gmax value indicates the missile stopped quickly and the surface is harder than a surface with a lower Gmax. Harder surfaces may influence athlete injury. The Clegg Impact Tester (ASTM F355 missile D) or ASTM F355 (missile A) device can be used to measure surface hardness. Gmax values generated from each of these devices are not interchangeable because the missiles are different weights and are not dropped from the same height. In other words, 100 Gmax measured with the Clegg is different from 100 Gmax measured with the F355 missile A.


Clegg Impact Tester – Photo courtesy of Tom Serensits

The Clegg Impact Tester is the device most commonly used to measure Gmax on natural turfgrass fields. The NFL requires the Clegg Impact Tester be used to measure Gmax prior to every game. All areas within the field of play must be below 100 Gmax. If any area of the field is above 100, steps must be taken to reduce surface hardness and the field must be re-tested.

Gmax should be tested at numerous locations across the field, with special attention being paid to high-use locations, such as mid-field areas and goalmouths. At a minimum, testing should occur yearly. However, Gmax of natural turfgrass fields can vary greatly over a relatively short period of time. Changes in soil water content

and the amount of field usage (and resulting soil compaction), each have significant influence on Gmax. Frequent Gmax testing allows hardness levels to be tracked over time, which helps identify areas of concern before the 100 Gmax threshold is reached. It may be beneficial to simultaneously measure soil water content and Gmax on natural turfgrass fields in order to inform the sports turf manager's water management scheme.

F355 Device – Photo courtesy of Tom Serensits

The Clegg Impact Tester (F355 missile D) and the ASTM F355 missile A device can be used to measure Gmax on synthetic turf fields. The NFL also requires Gmax measurements on synthetic fields prior to every game. If the Clegg Impact Tester is used, all areas within the field of play must be below 100 Gmax. If the ASTM F355 missile A device is used, the maximum limit listed in ASTM 1936 is 200 Gmax. According to ASTM, values of 200 Gmax and above are considered values at which life-threatening head injuries may be expected to occur. The Synthetic Turf Council (STC) recommends Gmax not exceed 164 for the life of the field when using the F355 missile A device. If areas are above the limit, additional infill should be added, and the field should be re-tested. Infill depth can have a strong influence on Gmax. Inexpensive infill depth measuring devices (fireproofing depth gauge) can be used to frequently monitor the infill depth of a synthetic turf field. This is especially important if Gmax testing is only being performed annually. An infill depth spreadsheet like the one used by the NFL is available for a sports field manager's record keeping at: https://plantscience.psu.edu/research/centers/ssrc/resources/copy_of_infilldepthworksheet.xlsx

Gmax should be tested at various locations across synthetic fields, with special attention being paid to inlays, painted areas, seams, and high-use areas. Testing should occur at least annually, with more frequent testing suggested on heavily-used fields.

Both the Clegg Impact Tester and ASTM F355 missile A device can be purchased and used by field owners or testing can be contracted to a field testing agency. The cost of a Clegg Impact Tester is approximately $4,500. F355 missile A devices are more expensive. If testing must be conducted by an outside agency, contact STMA or the Synthetic Turf Council for testing labs in your area.

For more information on Gmax testing, click here: http://plantscience.psu.edu/research/centers/ssrc/documents/roundrobinreport3.pdf Or here: Synthetic Turf Council - https://syntheticturfcouncil.site-ym.com/?page=Testing_Videos

Health Concerns

Staphylococcus aureus is a common bacterium found on human skin that typically causes relatively minor, treatable skin infections. However, commonly used antibiotics are ineffective against methicillin-resistant *S. aureus* (MRSA) isolates. MRSA can cause serious infections and result in severe health complications.

In a study conducted by Penn State University, 20 fields were tested for the presence of *S. aureus*. The 20 fields included natural turfgrass fields, synthetic turf fields, both indoor and outdoor fields, and high and low use areas on fields. No *S. aureus* was found at any test location. An additional test was conducted to evaluate how long staph bacteria can survive on synthetic turf. Results found that levels of bacteria on outdoor fields quickly dropped to very low levels. The bacteria survival rate on natural turfgrass fields was comparable. Sunlight reduces bacterial survival rate. On indoor fields, bacteria survived on synthetic turf and natural grass for multiple days. The population decreased significantly with time. Treatment of surfaces with anti-microbial treatment and detergent significantly decreased bacterial survival rate on indoor surfaces; however, it is important to note that the NFL has banned the use of antimicrobials on fields.

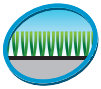
It is the responsibility of the sports turf manager to properly manage the playing surfaces of all types of athletic fields for the safety of the athletes. For up-to-date and impartial information on health and safety issues, check the STMA web site, www.STMA.org. The Synthetic Turf Council (STC) has Independent Research on the Safety and Playability of synthetic turf sports fields (https://syntheticturfcouncil.site-ym.com/?page=Research) and has also developed Guidelines for Synthetic Turf Performance (https://cdn.ymaws.com/www.syntheticturfcouncil.org/resource/resmgr/files/stc_guidelines_for_synthetic.pdf). The Center for Disease Control (CDC) may also be helpful: www.cdc.gov/ and click on Environmental Health or use the search bar on the site.

Assessing Warranties

What is the purpose of a warranty?

Warranties provide the sports turf manager with assurances from the provider that the product is what was specified in the contract and that it will perform as expected. A warranty should not be confused with the expectation for the life of the product.

What are some key points of the warranty?



Synthetic turf

Synthetic turf warranties are usually based on how long the fiber company warrants the "life" of the fiber, not the field's use, location, or maintenance practices. The standard warranty in the industry is for 8 years. Typically, the warranty that comes with the carpet covers two separate things: 1) durability and performance of the product, and 2) installation of the product. The following may be defined in the warranty:

- Measurable benchmarks (impact testing, G-Max)
- Pile fiber integrity and loss
- Shock-absorbency
- Drainage
- Seam and inlay integrity
- Events that would void warranty

Warranties may have exclusions. Examples may include:

- Use of improper cleaning methods or products
- Acts of God and other conditions beyond reasonable control
- Normal wear
- Failure to properly maintain, protect, or repair
- Burns, cuts, accidents
- Failure of subbase
- Use of incorrect grade of infill
- Failure to maintain infill at correct level
- Use of improper footwear or equipment
- Use of incorrect paint to mark a field

For more information, visit the Synthetic Turf Council website for information on Removal, Recovery, Reuse and Recycling of Synthetic Turf and Its System Components (https://www.syntheticturfcouncil.org/page/Technical_Guidelines).

Natural turfgrass

Natural grass usually has limited warranty coverage for newly constructed and renovated fields only, typically from installation until acceptance by the owner. Drainage and irrigation are usually covered for the first 12 months. The following may be defined in the warranty:

- Installation Benchmarks (survey/ grading marks)
- Soil testing (particle testing-sand specific)
- Seed/sod testing (verify product) and certified as weed free
- Events that would void warranty
- A recommended maintenance schedule

How should warranties be evaluated?

A warranty is a promise to perform from the contractor. It is best to investigate the financial strength of the product manufacturer and check existing customer references to determine how different companies honor warranty obligations. Failure to follow prescribed maintenance practices can void a warranty. Insured warranties help ease fears that the warranty is protected in case a company goes out of business. Most bonds will protect the field in case of bankruptcy by the contractor. Insured warranties are not all the same. Make sure that you read the warranty, ask questions about the warranty and get answers in writing, and consult with a non-biased party to determine if they are worth the extra monies that they cost.

Some key questions when considering a warranty:

- Who is the warranty provider?
- Who is the person to contact with a warranty issue?
- What does the warranty outline as acceptable performance ranges?
- How is "normal wear" determined on the warranty?
- Do provisions need to be added to the warranty to adjust it to your specific situation?
- What does the warranty exclude?
- How does the warranty require a maintenance log?

How can you avoid voiding a warranty?

Be aware of all the specifications on the warranty as some maintenance activities may void the warranty. Maintaining a simple log book that documents dates of maintenance practices and what occurred supplies proof that you are in compliance with the manufacturer's warranty. Companies want to know what, when, and how a sports turf manager performed certain maintenance requirements and will require records to show possible liability for problems. Good recordkeeping is crucial to validate activities you did to keep the warranty valid and current.

Other Considerations

As you evaluate your specific needs for a new sports field, you may want to consider the following:

- Hiring an independent consultant to represent your facilities' interest. Good independent consultants can negotiate changes to the warranty. Only select qualified consultants who have prior experience with the type of natural and/or synthetic sports surface you intend to install. You may want to seek a certified sports field manager, a sports turf manager, or an agronomist who has prior experience with the construction of natural and synthetic sports fields.
- The qualifications of the contracting firm, and in particular the experience of the project manager assigned to your project. The number of fields the project manager has installed is particularly important. Other information to obtain could include the company's project references, years in business, insurance coverage, litigation history, warranty, etc.
- Owners need to review core insurance policies to confirm if coverage is in place for synthetic or natural grass fields for Acts of God, vandalism or other unwarranted mishaps. Add-ons to the owner's insurance policy or purchasing an additional policy may be needed.
- Budgeting for the cost to replace a synthetic field. Plan on an approximate range of $6.50 to $7.80 per sq. ft. for the disposal and resurfacing of a synthetic field.

As you move through the qualification process, you may want to ask these questions of a contractor:

- Explain the most common things that can go wrong with a project and how you might prevent those things?
- How can we save money on the construction of this field?
- How do you see the field performing in light of the usage we have described?

Glossary

aerified – the mechanical process of re-introducing air and pore spaces on a natural grass field to relieve compaction and allow quicker movement of water, nutrients and gases through the root-zone for better root development. A turf surface is considered aerified when a mechanical aerifier is used to make holes a few inches deep and on two-to-six inch centers.

choker layer – a layer of coarse sand or fine gravel that separates the finer textured surface rooting media from the coarse drainage gravel when using the sand construction method.

compaction – the reduction of air space between the soil/root-zone particles of a natural grass field, or of the in-fill material of a synthetic field. A turf surface is considered compacted when heavy vehicular or foot traffic compresses the top two or three inches of soil on a grass field and reduces the movement of the in-fill material on synthetic fields. Compaction makes fields very firm.

crown – the highest elevation of an athletic field used to facilitate excess water run-off. Native soil fields are commonly constructed with a center elevation (crown) up to 18" inches higher than the sidelines. Sand-based and synthetic fields utilize a very minimal crown and sometimes are completely flat.

crumb rubber – coarse sand-sized to small gravel-sized rubber pellets used as an infill material in an artificial turf or topdressed on a natural grass playing field.

Cultivar – a variety or subdivision of a plant species that, because of similar morphology and performance characteristics, can be distinguished from other plants within the species.

cultural practices – mowing, fertilizing, irrigating, aerification and preventive pest control practices used to produce a quality natural turfgrass surface.

density – the number of tillers, leaves or fibers in a unit area. A dense turf is usually very resilient.

denier – a unit of weight that expresses the density of a synthetic fiber. The lower the denier, the finer the fiber.

drainage modification – the utilization of coarse sand, gravel and/or perforated piping used to speed the removal of gravitational water after it permeates through the sports turf surface.

drainage profile – a vertical section of the root-zone sub-surface soil and any drainage enhancements, such as coarse sand, gravel and drainage pipe systems that will allow mapping and facilitating the downward movement of water into, through, and out of the soil.

dragging – pulling or pushing a mat or tine rake over a surface to smooth out undulations, re-incorporate finer particles, or stand-up turf fibers or tillers.

epidemiological issues – health issues that can affect many individuals, i.e. heat exhaustion, or the presence of heavy metals, carcinogens, and infectious fungi.

face weight – the unit of measure to determine the amount of yarn per square yard.

field hardness – the ability of a surface to absorb energy. Shock absorbing properties are measured in Gmax.

field markings – indications/markings on a field, such as inbound lines, numbers, and goal areas that are regulated by the governing bodies for the particular level of play and sport.

Geo-textile – manufactured fiber materials made into a variety of fabric constructions and used in civil engineering and construction applications

Gmax – a unitless measure used to express the impact attenuation (hardness) of a surface. It is the maximum ration of the magnitude of missile acceleration during impacts to the acceleration of gravity, expressed in the same units.

Grade – the desired slope or elevations of an athletic field achieved by using earthmoving equipment. A proper grade will remove excess water.

Grooming – the dragging of a mat, broom, turf comb or spring-toothed rake on the surface to stand up the turfgrass, synthetic fibers or infield material after traffic has occurred.

Heat Index (HI) – the temperature the body feels when heat and humidity are combined. Exposure to direct sunlight can increase the HI by up to 15°F.

impact testing - a measurement of the hardness of a playing surface. A weight is dropped from a given height through a guide tube. An accelerometer is mounted inside the weight and measures the maximum deceleration upon impact with the surface. The surface hardness is expressed as Gmax. The higher the Gmax, the harder the surface.

monofilament – yarn fiber made in one single strand. Yarn is extruded out of a shower head-type extruder versus a film tape for slit-film yarn fibers.

native soil – unamended soil that is commonly found in a specified area.

pad – shock absorbing layer sometimes installed below carpet backing for additional field cushioning.

pile fiber loss – the reduction of the diameter, denier, total fiber and/or density of the carpet fibers due to abrasive actions, such as field traffic, grooming or other action that may affect the fibers over a period of time.

plant protectant – an application of a pesticide before the outbreak of disease or infestation, usually on grass that has a history of such outbreaks or infestations.

resiliency – the ability of a surface to recover from, or adjust easily to, change from objects that strike the surface.

road mat – a protective cover used to prevent turf damage in high traffic areas, such as Enkamat® and Bravomat.

root-zone – layer of soil in which the roots of the grass plants are found. Also a growing medium.

rubber infill – granulated car tires or sneakers used as an infill material on synthetic surfaces.

sand-based fields – a field that has a rootzone/ growing medium that consists of sand as the primary growth material.

sand-modified fields – a native soil field that is modified with sand. This is intended to improve the rootzone, which increases the water and nutrient retention and increases field stability.

sand/rubber mix – a percentage of sand and rubber particles that are combined to create an "infill material," which is used on the new generation of synthetic surfaces. This mix fills in the areas between the fibers to provide structural support of the fibers, padding for the players, and ballast to weigh it down.

seam/inlay integrity – the strength, trueness and durability of the area between two edges of synthetic material, which can be hand-sewn or adhered with adhesives. Numbers, logos, and line markings are typically done this way. This is a critical area that needs to be addressed during construction

shock-absorbency – the ability of an object to reduce or dissipate energy from the sudden impact of another object.

site work – earthwork that is necessary before field construction can take place, i.e. the removal of buildings, trees, rocks, soil; installing utilities, improving or installing drainage.

soil profile – a vertical section of soil showing natural or incorporated layers of different colors, textures or materials.

spiking – vertically puncturing the soil to promote turf density and lightly aerify the thatch layer on natural grass, or loosening the crumb rubber on synthetic surfaces.

static charge: producing stationary charges of electricity.

subgrade – the soil base upon which a field is constructed and into which drainage lines are added.

sun exposure – the amount of Ultra Violet exposure that materials will undergo based on the amount of sun exposure. The most particular concern is the loss of useful tensile properties in products made from polypropylene materials.

synthetic fibers – manufactured fibers resulting from chemical synthesis.

synthetic turf – textile product designed to simulate the appearance and playability of natural grass utilizing a synthetic fiber grass blade constructed into fabric form.

synthetic turf backing – intermediate material used in the manufacturing process of a synthetic turf system to provide a stable medium to insert the synthetic fiber grass blades. The backing also provides dimensional stability for the synthetic turf system.

sweeping – maintenance process used on synthetic turf systems to remove loose debris from the surface and groom the synthetic fiber grass blades.

thatch – an intermingled layer of living and dead grass stems, roots, and other organic matter found between the soil surface and the grass blades.

topdress – process utilized on synthetic and natural turf systems in which a material, such as sand or granulate rubber, is applied mechanically to the turf to create a consistent, level playing surface.

turfgrass – narrow-leaved grass species that form a uniform, long-lived ground cover that can tolerate traffic and low mowing heights (usually two inches or below).

underground drainage – system installed beneath a natural or synthetic turf system to permit the uniform and speedy exit of moisture from the playing surface. It may consist of natural materials, (sand/soil), and/or engineered products (pipes, drainage mats or synthetic stone substitutes).

wetting agent – a chemical additive that improves the spreading, dispersing and/or wetting properties of water.

For more information go to www.STMA.org

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