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## INTRODUCTION

Whether you have been involved in a sports facility management role or not, the process of bringing an artificial turf field to life can be a tricky one. There are many steps and stages that need to be considered in order to ensure that the best interests of your facility, finances and future are being taken care of. With so many issues to account for and without the proper guidance, obtaining a quality artificial turf field can be overwhelming.

The Field Building Handbook is a comprehensive manual and guide into the world of artificial turf. Everything you need to know about artificial turf, from the planning and design phase to budgeting and fundraising strategies to the construction procedure. All major facets of the process are explained in this Handbook.

The order of topics in this Handbook are presented to you to simulate the successive stages of obtaining an artificial turf field. With each completed chapter you will be one step closer to your field of dreams.

When it comes time to making a decision which will have a significant and direct impact on the future of your facility, being well informed is the best way to ensure success. With the help of this Field Building Handbook, you will be able to understand, identify and decide on which options best suit your needs.

Is FieldTurf right for you?

There are 5 basic questions to answer in order to determine if FieldTurf is a good fit for your organization

Do you have trouble with your current grass surface?  
 Are you spending too much on field maintenance?  
 Is there a lack of performance from your current surface?  
 Have certain elements of your field become a safety hazard?  
 Does your current field make a positive contribution to the environment?

### Questions? Comments?

Visit [www.fieldturf.com/field-building-handbook](http://www.fieldturf.com/field-building-handbook) or email [fbh@fieldturf.com](mailto:fbh@fieldturf.com)

## FIRST STEPS

### PLANNING AND DESIGN TEAM

A good planning team can make the difference between a poorly executed facility improvement and a well-planned operation. No other step in the field building process is as expensive and complicated as the Design and Construction phase. Planning usually involves one or many design professionals such as architects, engineers, and/or landscape architects. The individuals responsible for planning can include consultants, facility users, managers, and maintenance staff. In some cases, an experienced manufacturer can have the ability and expertise to provide Design/Build services. Design/Build is a construction project delivery system used to reduce the project delivery time by overlapping the design phase and construction phase of a project. FieldTurf has recognized over the years that clients will often demand Design/Build services on their fields and other sports surfacing systems. This is because many clients realize from experience with other projects that the Design/Build process can save time and money while using the expertise and resources of expert vendors. FieldTurf has engineers and architects on staff and a library of field designs, all CAD-based. This experience can be brought to bear on most projects. Although there are many experienced architects, engineers and consultants operating in North America today, many clients cannot afford the "up-front" costs associated with doing business with these firms and the time consuming and planning process of hiring a firm and designing a field.

Local firms are often unfamiliar with designing artificial turf bases and drainage systems, and specifying turf systems. This leads to a learning curve for clients that can result in delays and additional expenses. Often inexperienced firms simply ask the vendors to provide most of the design work. FieldTurf, as the industry leader, has been approached so often to help design projects, offer advice, undertake complicated calculations related to storm water management and other tasks, that it has developed a large infrastructure over the years to support its sales efforts from a technical standpoint. In most cases, FieldTurf will team up with our pre-approved national "experts", local firms or your existing team that can develop designs and stamp drawings. The Design/Build process, however, is a good option for many clients who want to tap into FieldTurf's existing resources at little up-front cost. Putting out a Design/Build package saves time and in many cases, money. These savings incurred by selecting the Design/Build method of an expert manufacturer can free up money to invest in a higher quality turf system. Be leery of inexperienced design professionals as some will try to "re-invent the wheel" which escalates costs since these professionals tend to bill hourly or daily.

FieldTurf can provide conceptual design, project programming, budgetary cost models, value engineering, construction drawings and complete construction services with pre-approved subcontractors.

### PLANNING AND DESIGN CONSIDERATIONS

#### Water Management

One of the most important considerations in site selection and facility design is the ability to design and build an efficient water management system. To improve drainage, the site should be a relatively flat plane that is elevated from the surrounding terrain. Water Management is even more important for municipalities with older drainage systems that may or may not be suitable for this type of project.



Both surface and subsurface drainage are needed to adequately support and protect a turf field. The main function of a drainage system is to move water away from the field. The desired surface drainage ensures that no other water but rain falls on the surface. To minimize the effect of freeze-thaw, subsurface drainage ensures that there is no significant water buildup in the earth under the field.

Drainage costs should never be cut in a way that will affect the completed field. Problems arising from a poorly designed drainage system will be more expensive to fix in the long run than had the system been designed properly in the first place. Storm water management is very important, especially in urban field locations. Lack of knowledge can delay a potential project for weeks, months, or even years. FieldTurf itself is a permeable system, allowing water to drain vertically through it into a drainage collection system that moves it away from the field. Catch basins may also be installed around the field to collect surface water and move it toward a storm sewer or an area where it will evaporate. To prevent

flooding from the odd heavy rainfall, it may be required to build retention areas to temporarily control the disposal of the excess water. In many areas, codes require these water retention and disposal facilities to be built. Most architectural firms offer drainage design as part of their overall services. FieldTurf, with over 3,000 projects to their experience, offers storm water management solutions as part of their design-build services.

#### Security

Every form of property can be a target of vandalism, including artificial turf fields. When designing your athletic facility, keep in mind that sufficient security and protection is necessary to discourage and prevent illegal acts.

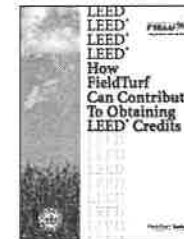
#### Trees and Other Vegetation

When selecting a site, try to choose an area which requires the least amount of removal of trees and other vegetation. It is at this point in time when an Environmental Impact Study may be necessary. This is a crucial stage as not all land is adequate for new field constructions or field renovations. It is imperative to make sure the land is suitable for field construction.

While trees and other vegetation can add to the natural beauty of a site, as well as providing many other advantages, the type and location of these trees should be carefully planned. For example, tall trees can block out the sun and create distracting shadows on the field. Tree roots that reach under the field area must be removed prior to construction. For this reason, it is recommended to remove all vegetation within at least 10' of the edge of the construction zone.

#### ENVIRONMENTAL DESIGN

The Environmental Design Process is a key step in the establishment of a proper and pleasing appearance for your facility. Ultimately, the facility which you design should blend well with its surrounding environment. In order to achieve this level of architectural and environmental synergy it is important to consult with your architects in order to ensure that natural elements such as plants, trees and bushes are incorporated into the design in a constructive manner.



An important topic related to the Environmental Design Process revolves around Green Building. Green Building as a practice is a movement which seeks to reduce the negative and harmful effects of construction on the environment while promoting the efficient use of natural resources. Be sure to discuss the topic of Green Building with your architect to get a better idea of his or her Green Building experience. The Leadership in Energy and Environmental Design (LEED®) Green Building Rating System™ represents the U.S. Green Building Council's effort to provide a national standard for what constitutes as a "greenbuilding". Architects and designers are provided with a set of rated guidelines which describe the most efficient and environmentally friendly design and build techniques. The architects and designers earn points and accreditation on a multitude of levels with each job they complete that complies with the LEED standards. Ultimately, these points are translated into a final score for the architect and designer which relate to four classes of certification. Ask us for our [LEED brochure](#) outlining the credits that you can potentially earn by installing FieldTurf. FieldTurf's synthetic turf systems for athletic fields are designed to meet stringent criteria required to potentially earn points under certain categories of LEED-NC. Based on this criteria, FieldTurf's products can assist architects and designers in obtaining up to 10 points toward LEED certification.

The installation of FieldTurf eliminates the use of harmful pesticides, fertilizers and herbicides, while at the same time removes thousands of tires from landfill sites. FieldTurf eliminates the need for mowing, fertilizing, reseeding or watering. All of FieldTurf's surfaces are developed, produced and installed with a concentration on sustainability and a commitment to protecting the environment. The company calls it 'Environmental Intelligence' and lives by this principle in every way. For a listing of the hundreds of studies carried out and a collection of the actual research and the factual conclusions, please call FieldTurf at 1-800-724-2969 or visit [www.fieldturf.com/enviro](http://www.fieldturf.com/enviro). The first step in constructing an environmentally friendly facility is to survey the site and its surrounding areas. All efforts should be made in order to preserve all natural resources and historically or culturally sensitive areas. If possible, the placement and arrangement of the facility should be designed in order to reduce the need for excavation and storm water run-off. When discussing the topic of landscaping, every effort should be made to preserve natural resources such as mature trees and vegetation and topsoil. Mature trees and vegetation add a significant amount of oxygen to the surrounding community and also work to provide shade and protection from the wind. In some instances, naturally occurring topsoil can take over 1,000 years to evolve, making it an extremely difficult resource to replace. It is important to discuss these issues with your contractor before grading your site in order to ensure that all construction procedures relating to topsoil and mature vegetation conservation are practiced in accordance with the local law.

If you are planning on installing lights for your facility you must check with your local regulations as some communities require local and neighborhood approval before the installation of lighting can occur. This issue is often addressed in order to reduce the effects and likelihood of light pollution. Light pollution is typically characterized by three components: glare, spill and sky glow. In order to avoid light pollution appropriate measures should be taken to:

# Field Building Handbook

- Avoid over lighting
- Incorporate glare reduction devices
- Use full cutoff fixtures for all site lighting
- Use proper and appropriate pole heights
- Use efficient light sources to minimize electrical usage
- Clean the lenses of the lights to maximize output
- Turn off non-critical light at night to conserve energy



## Access

When searching for a location to build your athletic facility it is important to select a site that can provide access for both construction equipment and users. Ideally a path should be created which leads up to the facility with enough space for two players to walk side by side while carrying their equipment. Parking should be situated nearby; however, in order to prevent any distractions for players and spectators, the parking lot should not be located next to the field. The Americans with Disabilities Act (ADA) requires that handicapped parking zones must be incorporated into the design of the parking lot. FieldTurf is ADA approved.

## Utilities

Often overlooked during the Planning and Design process is the topic of utilities. The availability of utilities will ultimately affect the overall cost of the project. Issues relating to electricity for lighting, telephone lines and septic systems should be discussed with the Design Team before the project begins. FieldTurf can study and incorporate existing utilities to minimize project costs.

## Scope of the Project

With the field being the primary construction concern it is easy to overlook several other important aspects of the planning phase. Be sure to consider such issues as: lighting, fencing, seating, press facilities, locker rooms, rest rooms, offices, parking, concession stands and maintenance facilities. Future thought should also be given towards the idea of expansion or upgrades.

## Permitting

Prior to the construction phase, it is absolutely essential that all permits are obtained and that all local codes are being adhered to. Be sure to check with your municipal permitting agencies in order to ensure that your project complies with all of their construction and environmental regulations.

## Layout and Orientation

Once the site of your facility has been selected it is time to begin planning the physical layout of the facility and its surroundings. Consideration must be given to accommodate safety, convenience and efficiency. Be sure to assess the site from the competitor's, spectator's, player's, official's and maintenance worker's point of view. FieldTurf's complete and thorough planning process will only help to increase the success of your facility for many years to come.

## Usage Intent

FieldTurf fields may be used for competition by athletes of all ages participating in one sport or many. The intended use of the facility plays a big role in determining important factors in the design phase – the measurements of the field, certain accessories, field markings (permanent or temporary), the type of turf, the type of infill components, among many other factors. Typically, new projects begin with considering the current state of the field. What is the condition of the field? Are there any drainage problems? What is the status of lighting and other amenities? What sports and non-sporting events does the field plan to host? There is also a good possibility that the field owner will need to protect the field with turf coverings or convert field markings from one sport to another. It is important that all fields conform to appropriate standards, if necessary. Standards exist for the safety of players to ensure consistency and to be able to host official league games. It is important to know the rules of any governing body that your organization is a part of. The first stage in building a state-of-the-art athletic turf field is to determine the desired use of the field(s) as it can be used for many sports. The majority of synthetic turf fields in North America are multi-purpose fields at the high school or community use level. It is imperative to consider whether the facility will be used year-round or if it will be seasonal. Will lighting need to be installed for night time use? Will the field be secured after hours? Can facility staff provide the proper and effective maintenance needed? What level of expertise can the staff provide?

## Requirements

The site must be large enough to fit the proposed layout of the field/facility. It is of paramount importance to know the end users of the facility since their levels of play and ages will determine which league requirements must be followed. In most cases, a licensed site surveyor should complete a site analysis concerning elements such as elevations, site features, utilities, and property lines. See Appendix for typical field layouts of each field size. FieldTurf's expert design team can assist to streamline this process.

The rules are constantly under review by the governing bodies and are subject to change. Please consult the latest rule book for updated rules, and official regulations of the sports/leagues that apply to your facility. Experience is the key factor in selecting a design consultant. It is absolutely crucial to ask how many fields they have done and what kind of designs they are experienced with. No other company in the industry is as experienced as FieldTurf when it comes to guiding a client through a project from start to finish. Another key element to finding your design consultant is whether or not the firm in question has ample resources to get the job done. Can they devote the time, energy and skill set to the project? Often design consultants are selected because of proximity to the site. Although this is a big advantage because they need to be available to inspect and supervise key aspects of the work, make sure your organization is not compromising quality for proximity. They need to be licensed, obviously, and technically proficient. The design professional will help assess the proposed site, but the following general considerations apply:

## New construction facility/field

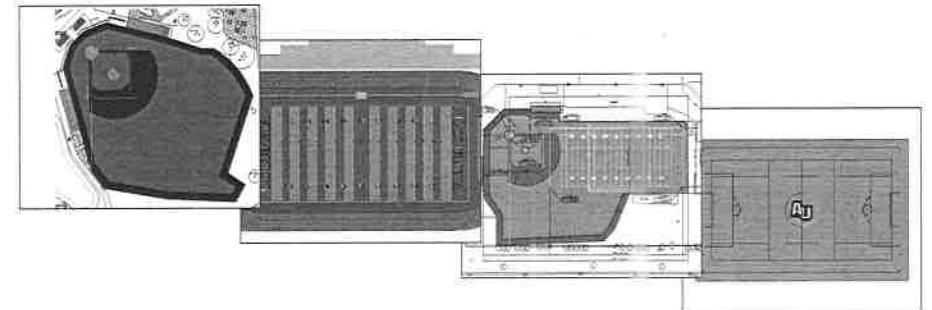
FieldTurf's design-build staff can work with your existing design professional to provide a workable solution.

Here are some important questions to consider:

- How large a site is available? \_\_\_\_\_
- Does a potential site allow for proper drainage and stormwater management? \_\_\_\_\_
- Is the site reasonably level and sufficiently stable? \_\_\_\_\_
- What type of soil exists at the site? \_\_\_\_\_
- Have core samples been obtained by a soils engineer? \_\_\_\_\_
- Is the site accessible for construction? \_\_\_\_\_
- Where are underground utilities? \_\_\_\_\_
- Where is the prevailing wind? \_\_\_\_\_

## Existing facility enhancements

In most cases, the main concern with renovating an existing facility is to protect existing structures. The most common structure is the running track. The field contractor will need to protect the track surface and edge. If the track has no curb, it will be necessary to prepare the inside edge for anchoring and securing the turf. Consult with the turf contractor and design professional for existing facility renovations similar to this. Another element to consider is the track drainage.



## BUDGETING

Estimating and staying within a budget is often a daunting task. As a project progresses, unexpected costs can change a budget, leaving you to deal with unexpected expenses and delays. An accurate outline of the entire scope of the project should be drawn out and detailed. The following is a quick overview of what you and your team may need to plan for, and an estimate of the costs involved.

### Site Location

An existing grass field is typically excavated and replaced. If building a new facility, site selection requires more thought than just the area needed to build the field. The intended use of the facility will have impact on how much land is needed, and on what piece of land it is located on. Orientation of a field and/or track surface must also be diligently planned so that athletes have options with regards to playing with or against the wind. The usual scenario is that an existing grass field is excavated and replaced.

However, if building a new facility at a yet-to-be-determined location, site selection requires taking into consideration many factors not limited to simply enough area required to fit the dimensions of the proposed field. The intended use of the facility will have a strong influence on how much land is needed, and where this land is located. The orientation of a field and/or track surface must also be diligently planned to take in factors such as wind direction. Depending on the scope of your project, additional area may be needed to accommodate bleachers, restrooms, concessions, press box, scoreboard, parking, etc. Careful planning will help you determine the properties of the site to be earmarked for development.

Once the site has been located, extensive soil testing and analysis must be done to determine if the area can accommodate a field. A site should be selected where the need to move earth and major elements such as trees, is minimal. Once a site has been determined, in-depth soil testing and analysis must be completed to determine if the sub-surface is suitable for a sports field.

This can affect and/or blow a budget especially if unsuitable soils are found. The site should be chosen where there is a minimal need to move earth and other major obstacles such as trees. A licensed and proven surveyor should be hired to perform a complete site analysis which includes identifying elevations, property boundaries, structures, utilities, etc. The need to relocate utilities will increase costs significantly. A licensed and reputable surveyor should be hired to undertake a complete site analysis including mapping elevations, property lines, structures and utilities. A site requiring relocation of utilities will significantly increase costs.

### Codes and Permits

To build on a piece of land your site must be properly zoned. Completing all zoning and permitting requirements for a specific site is highly recommended before proceeding with the design phase. Rather than delaying a project, a complete investigation early on can prevent expensive and time-consuming problems.

Codes must be considered including the type of zoning, fence location and height, erosion control, drainage considerations, flood plains, access roads, etc. Check with the municipal office to ensure the proper understanding of regulations pertaining to a specific site. The process of securing the appropriate permits can be a time consuming process.

### Planning and Design

Building a new sports field is a challenging task requiring the assistance of professionals. When it comes to planning and design, much thought and consideration should be put into the hiring of an experienced architectural firm or artificial turf company with in-house design capabilities. Sports field construction is a difficult task requiring the assistance of professional, experienced design and construction companies.

The industry is immersed with experienced architects and consultants who specialize in the design of athletic facilities. The majority of architectural services include soil testing, site evaluation, permitting and planning and design.

FieldTurf has in-house engineering teams which can handle everything from start to completion, including base and drainage design, storm water management, field layouts, lining, logos & end zone lettering. In either case, be sure to heavily scrutinize the companies available. Look at their track record – what other projects have they worked on? Call on these references.

### Field Construction (Base & Surface)

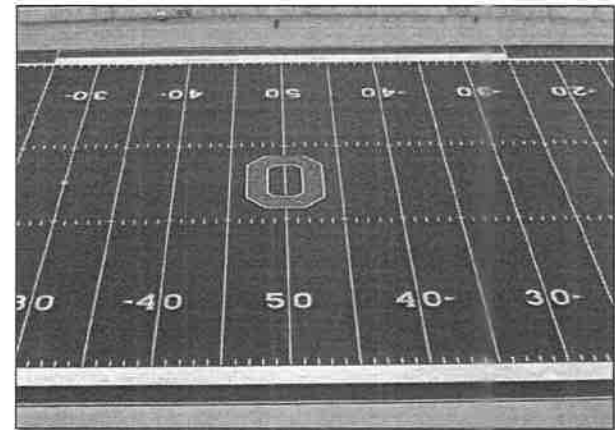
The bulk of the cost of an artificial turf project is in the actual construction of the field. Depending on location, cost of materials and other factors, base work can run in the area of \$3 to \$5 per square foot. Anywhere from 35 to 55% of the cost of an artificial turf project is contained in the actual construction of the field. The cost of excavation, stone, labor and other details can vary with location. The cost of turf and installation depends on the company selected to do the job. It is important to remember that short term savings as a result of lower quality will be negligible over time if a field fails after only a few years of use. FieldTurf is priced higher than most competitors, but it costs less in the long run. FieldTurf offers an "A+" (FieldTurf) product and a "B+" (Prestige) product. The cost ranges from \$4 to \$5 per square foot, and is a direct result of the quality and quantity of materials in the finished surface. No other field lasts longer, and the premium paid will insure you get a field that will last at least eight, and possibly 10 or more years.

### Construction of Amenities

Sports field construction doesn't end with the completion of the playing surface. Accessories, amenities and other related facilities may need to be built as well. Depending on the intended use, this may include – fencing (\$40,000), bleachers (\$250 per seat), scoreboard (\$15,000), lighting (\$250,000), running track (\$350,000), etc.

Be sure to clearly understand the intended use of the facility and plan accordingly for all additional amenities required.

In the end, you can design a fully functional, high-quality surface for slightly less than \$700,000 – or, with upgrades such as a running track, scoreboard, lights, and bleachers – build a fully functional, state-of-the-art stadium for over \$3 million. FieldTurf can provide your facility with comprehensive costs associated with your specific program needs.



The Ohio State University

## FUNDRAISING

Before you begin any sort of funding for your facility upgrade program you must first identify your audience and target market. Parents, community supporters and local businesses generally will form the nucleus of your fundraising campaign.

- Be sure to establish and promote the appropriate offer. It is important that your offer appeals to its target market in an exciting and inviting manner. Most people are constantly being bombarded with requests for charity and financial support. Do your best to make your cause stand out.
- Establish a connection with your prospective donors by making them feel like part of the team. This will increase loyalty to your cause.
- Provide your donors with the opportunity to express and promote your cause. Giving your donors items that contribute to team building is always a good idea.
- Always be sure to thank donors while opening up the possibility for future donations.
- Link the donors to the cause and organization. Donors respond well to being kept in the loop. Keep them informed on updates and organizational news and provide them with the opportunity to submit their suggestions.
- Never settle. Always take advantage of special or unique opportunities to contact donors or establish relationships with new prospective donors. Stay connected with your donors at all times and it will help to increase their level of organizational support.

### Reaching your fundraising goals

The first step in any successful fundraising campaign is identifying your financial needs and defining your financial goals. Once the needs and goals have been established share them with those who will be assisting in the fundraising process. The more people know, the more motivated and likely they will be to commit and dedicate their time and efforts towards reaching the desired goals.

The single most important thing to consider for running a successful fundraising campaign is maintaining a high level of motivation among your team members. Offering additional incentives (such as prizes) can be a great way to maintain a high level of morale. For prizes, you can always politely solicit some of your sponsors. It is also important to remember that not everyone responds or reacts in the same way to the same offers. Taking the time to speak to your team members individually to get a better understanding of who they are and what motivates them can really help.

### Gaining the support of parents

The success of your fundraising efforts relies heavily on the support that you receive from the parent body. In order to ensure continued support from parents it is essential that you maintain a clear and constant level of communication with as many parent volunteers as possible. Provide the parents with a clearly defined set of short term goals while keeping them focused on the big picture. Always make yourself available to the parents for any questions or comments in order to avoid confusion.

### Booster Clubs

Establishing a booster club is an excellent way of organizing a group to help out with the fundraising process. Booster clubs usually consist of parents, alumni or affiliates of the school or organization.

### 14 tips for running a successful booster club

- Booster club meetings should always be advertised and open to members of the public.
- Establish assistance programs for all executive level booster positions.
- In order to successfully achieve the goals of the booster club, it is important to break down all events, activities and responsibilities into simple and easy to manage tasks.
- Be sure to meet with all school directors, coaches and school officials and let them know that you are there for support should they need some assistance.
- Create a rewards program for those who are willing to become members.
- Make it a point to create and distribute a monthly newsletter.
- Maintain contact with old booster club officers, members and alumni.
- Inform the local news and media groups about your cause and events.
- Encourage the school's coaches and administrators to promote the booster club at its regular meetings.
- Create and maintain an open level of communication between the public and the booster club for all input and suggestions.
- Set up activities with the intent of mingling with your supporters.



- Always make it a point to recognize and praise your volunteers.
- Coordinate your schedules so that sufficient time is given for meeting parents and school programmers.
- Create and distribute promotional materials such as handouts and flyers that help to promote your club's goals. Make sure to include information pertaining to what the recipient needs to do in order to join.

Ask us for our [FieldTurf Booster brochure](#) to see how booster clubs can generate interest about field projects.

### Grants

Grants can be awarded to help finance your facility. In most cases grants that have been issued do not need to be paid back. Government agencies tend to sponsor grant programs for a variety of reasons. Before you move forward to the grant proposal stage it is absolutely imperative that you fully understand the goals of the target agency or organization and their available programs. This can be accomplished through careful analysis of the Catalog of Federal Domestic Assistance (CFDA), Request for Initial Proposals (RFIP) or Request for Applications (RFA) and discussions with the information contact listed in each resource description. Through these discussions you may find out more about your project and whether it is in line with their guidelines or if the project might need to be modified. In allocating funds, programs base their decisions on the applicant's ability to fit its proposed activities within the program's interest areas.

### Tips for filing grants

Work backwards from the application or guidelines of the granting organization in order to determine: What is the application asking of foundations who apply? What goal is the granting organization trying to accomplish by awarding this grant?

If you are certain your goals are in line with the grantor and its guidelines, apply! If you are reaching out to a corporation or grantor for funding and a query letter is in order, there is a sample of such on the Non-Profit Guides website, "[www.npguides.org/guide/sample\\_proposals](http://www.npguides.org/guide/sample_proposals)"; it is an excellent source of information along with the Foundation Center at "[fdcenter.org](http://fdcenter.org)".

When preparing your application or query letter, you need to keep in mind the following, as these points speak to what grantors are looking for:

- Does the foundation/program described in the narrative provide a real service?
- Does the service meet a critical community need?
- Does the program have a sustainable impact on the community?
- Can the impact of the program be quantified and qualified (i.e. measured effectively)?
- Does the program have the resources, partnerships, and funding needed to provide the service they describe?
- Are the staff members qualified to provide the services of the programs listed in the grant proposal/application/query letter?
- Is the ratio of dollars spent and people served reasonable and documented?
- Does the program have community support?
- Are all reasonable efforts being made to find and develop community partners who can advance the work of the foundation?
- Is the foundation's financial house in order?
- Is the budget clear and the information accurate?
- Are all supporting documents attached and cross-referenced?
- When figures appear in multiple places do the numbers add up?
- In the financials - what is the ratio between dollars in, dollars spent on administration and dollars spent on programming?
- If it is a pass through foundation, what is the ratio between cost of events and money earned for 3rd party charity?
- With regards to the Board of Directors, do the people on the board have the business, non-profit and community experience and contacts to advance the work of the foundation?
- Is it a working board or a depository of names and dead weight? (This last point may seem a bit harsh, but grantors look very closely at board make up)

Also keep in mind how successful your foundation is at generating media attention and raising awareness within the community. Although not a requirement, interest and support, from both your community and the media can really help to reinforce why you should be given the funding that you are requesting.



## Field Building Handbook

Just some of the available grants for field building:

State grants are available in many different categories such as Land & Water Grants, State Tire Grants, Athletics and Wellness Grants, to name a few. Creating opportunities for high-quality outdoor recreation is the common goal among many of the organizations providing grants. FieldTurf is a perfect match and a product that will allow you to apply for most of these grants. Many State Divisions of Parks and Outdoor Recreation can provide up to 50% matching assistance for the cost of a project if their requirements are met.

### U.S. Soccer Foundation - All Conditions Fields Grants

This grant type, consisting wholly of field development construction, provides a \$100,000 credit toward the cost of constructing a synthetic grass package that includes a FieldTurf field, a set of Musco Sports Lighting lights, 1 set of full size and 2 sets of small-sided youth goals from Kwik Goal, and custom ad/sponsor sign boards from TGI Systems. This grant type also provides a \$50,000 credit toward the cost of constructing Mini All Conditions Fields which are small-sided outdoor synthetic grass fields (no larger than 20,000 square feet in area), comprising the same package elements as the full size fields. Finally, organizations interested in upgrading existing fields with a synthetic grass surface fall under this grant type. Annually, the Foundation gives out a limited number of grants. Find out more by visiting "<http://www.ussoccerfoundation.org>".

### Local Initiatives Support Corporation (LISC)

The National Football League highlights its 10 year partnership with LISC to build playing fields in underserved neighborhoods nationwide. LISC helps resident-led, community-based development organizations transform distressed communities and neighborhoods into healthy ones – good places to live, do business, work and raise families. By providing capital, technical expertise, training and information, LISC supports the development of local leadership and the creation of affordable housing, commercial, industrial and community facilities, businesses and jobs. The addition of a FieldTurf field can help you qualify for financial support from LISC.

There are two levels of funding available: 1) general field support (e.g. irrigation, bleachers, lights, etc.) and, 2) field surface grants.

**Field Surface Grants:** Matching grants of up to \$200,000 are available to help finance the resurfacing of a community, middle school or high school football field. Matching grants of up to \$200,000 will be available to applicants seeking to install new synthetic sports turf surfaces.

### State Tire Grants

These state-specific cleanup programs are designed to provide grants for the removal of waste tires that have been disposed of, and to encourage recycling and reuse of these waste tires. In many cases, grant funds can be used to pay for the removal, recycling and transport of waste tires to a state or county approved storage, disposal or recycling facility. On average, there is approximately 240,000 lbs of rubber in every 80,000 square foot FieldTurf field. Ask us for a state by state compilation of available Tire Grants.

### Land and Water

Existing in the majority of states across the United States, the land and water grant can be used to provide partial funding for the acquisition of outdoor recreation lands and/or development of outdoor recreation facilities. In many cases, the goals of these state programs are to strengthen the health and vitality of all Americans – and FieldTurf goes a long way towards providing a safe and extremely durable field that can be used around the clock.

Before you begin writing the grant proposal:

- Believe that someone wants to give you the money!
- Project your organization into the future.
- Start with the end in mind... look at your organization's big picture. Who are you? What are your strengths and priorities?
- Create a plan not just a proposal.
- Do your homework: Research prospective funders. Try and search locally first. Target funding sources that have interest in your organization and program.
- If you need the money now, you have started too late.

Ask us for a state by state compilation of available Land & Water Grants.

### 10 Grant Writing Hints

1. Always seek grant opportunities that match your program's goals and objectives. If you change your program based on a funder's giving guidelines, you may end up with a project or program that does little in improving your position and achieving your goals. The goal of grant writing is not simply to bring more money in for your organization but to ensure that the needs of your organization are being met.
2. Do your research in order to obtain as much information as possible about a prospective grantor. Understand the goals of the grantor and review past-funded programs to determine the range of grant awards typically given by the agency. Be sure you make a note of any geographical preferences or limitations. By looking at "funding exclusions" and "eligible applicants" first you can save yourself time by determining whether or not your institution or project fits within the guidelines of the funding agency.
3. Most funding agencies publish grant guidelines or requirements. Be sure that you understand them and follow them. Note the deadline and whether the proposal must be received or postmarked by the deadline. Don't have your proposal rejected because you didn't follow the guidelines to the letter.
4. Your "needs statement" drives your entire grant proposal. The proposed program should revolve around the problems which you propose to resolve. The purpose of the grant is to meet the specific needs you have identified. If you have not properly described the reason you need the program, including the use of statistics and other research data when possible, the funder will see no reason to invest in your project.
5. Most proposals should include a short project abstract. The abstract outlines your entire project. Within a paragraph or at most one page, describe your needs, goals, objectives and budget. As always, follow the guidelines of the grantor with regards to the program summary requirements. Remember that it is this summary that is usually read first and it may be the only part of the entire proposal that ever gets read. Consider writing the abstract last.
6. Every proposal will require a section that describes the goals and measurable objectives of your project. You should detail the activities that will be implemented to accomplish the program's goals and objectives. Your budget must closely match the described activities. Your evaluation should carefully measure whether the stated project objectives are being met on a timely basis. Foundation and corporate funders generally expect this section to be no longer than five to ten pages. Federal grants may allow up to 50 pages or more for a thorough discussion of your project. Again, follow the guidelines of the prospective funder.
7. Include a one-page cover letter if not specifically prohibited by the funding agency. The cover letter should briefly introduce your organization and describe your project, including the funding request. The cover letter should be signed by your school's or district's executive officer and should be written on school/district letterhead.
8. When it comes to formatting, use a reasonable font type and size (no smaller than 10-point; preferably 12-point). Leave plenty of white space - use margins of at least 1"; double-space if space limitations allow it. If possible, include graphs, photographs, or sidebars occasionally. Bold headings and sub-headings help break up the proposal and also make it easy for the reviewer to find sections within your proposal. Grammar and spelling errors show a lack of concern on the part of the applicant. Be sure to proofread your work.
9. Even if your proposal is not funded, always send a thank you note to the grantor for the opportunity to submit your proposal. Ask if it is possible to receive reviewer comments so that you can see why your proposal was not funded. Use the reviewer comments to improve upon your proposal-writing techniques. It is important to remember that even the most professional and well written grant proposals are not always accepted so don't get discouraged if your proposal was not selected by a specific agency at this time.
10. If you are fortunate enough to have your proposal funded, send a thank you note for the grant. Next, keep the funding agency informed about your activities, progress and accomplishments. Invite them to come see your program in operation. Send photographs of the program in action. Send quarterly or semi-annual reports that mention how you've used the funds. In short, make the grantor your partner.



## Field Building Handbook



### Financing

In order to help make your program's dreams come true a little quicker, FieldTurf Financial has established a unique financing plan. Now with only a small down payment, you can begin to enjoy all the benefits that FieldTurf has to offer while the remaining balance is gradually paid off over the next 8 years!

There are many advantages to FieldTurf financing, especially compared to a bond. Bonds can be extremely time consuming, especially when you factor in the voting process. With FieldTurf financing there is no voting process so you can begin to see your project unfold almost instantaneously. Under special programs you can get bond rates on your FieldTurf lease. More importantly, the turf is the collateral, not tax revenues or the real estate. The best part about FieldTurf financing is that with monthly maintenance savings of almost \$4,000, your FieldTurf field will practically pay for itself! Ask us for our [FieldTurf Financial brochure](#).

For more information please contact Dennis C. Haynes of FieldTurf Financial.

Dennis C. Haynes  
FieldTurf Financial  
info@fieldturf.com  
(303) 901-6056

### SUCCESSFUL BOND CAMPAIGNS

#### Community Involvement

FieldTurf can help your community or organization get what you need. Through the use of custom made brochures along with studies, product information, injury data, and cost savings information, an entire community or organization can stay well informed throughout the process. Establishing a support group and loyal following within the community is a great way of increasing the likelihood that your organization will benefit from approved tax levies. By practicing strong media relations and involving your supporters in the decision-making process you can strengthen your ties with the community while growing your support network.

Board unity is one of the most critical factors determining whether a referendum can pass. Board members should possess the best information available on the district's needs. If the entire board cannot support the tax issue, then the district finds it very difficult to gain community support. A referendum reflects a "values" vote. The key to value voting is to get as many of the supporters who share the same set of ideals and values as your organization to the polls. Set up transportation and publicize voting dates. A community-based steering committee should oversee the actual referendum campaign. The administration and board certainly may work in the campaign, but the community must play the major role.

Select the chair and members of the steering committee carefully, choosing people who are respected and have credibility in the community. Give consideration and representation to all demographic groups. Voters support issues they understand. Provide adequate time and discussion for explaining the issue and gaining community support. Be sure to establish a feeling of ownership for the building plan, both internally and externally, prior to setting the date of the election. Focus groups and public opinion surveys can help districts plan their public information programs. It's important to know how the community feels about the facility plan prior to the vote. These processes can often identify side issues and misperceptions which may affect your vote unless they are addressed in your written materials and community presentations.

The following checklist items should be followed to make sure the community understands the process.

- ✓ All promotional material should be written clearly in order to avoid confusion. Make sure to focus on what the building program means to the children instead of solely presenting square footage and site requirements. By connecting the voters to issues they can relate to and understand you can establish more of an emotional involvement.
- ✓ Make sure to discuss any and all tax increases in terms of dollars and cents.
- ✓ Support from the school and their supporting families are vital to the success of the campaign. Be sure to involve the teachers and administration in the development of the actual plan. More often than not, those who are undecided or unsure about their vote will reach out to teachers and administrators for advice.

- ✓ School principals play important roles in the development of your campaign since they are seen as leaders within the community. Making sure that she/he supports your cause is crucial in order to influence public opinion.
- ✓ Districts also need support for the vote from elected officials. Because elected officials have their own supporters who historically assist them in their elections, they can influence this network in a positive or negative way towards the district's campaign. Meet with them to explain the district's needs early in the development of the plan.
- ✓ Don't overlook the media in your community. Again, work closely with all representatives to describe the district's needs and gain objectivity, if not support, for the campaign.
- ✓ Other needed support comes from local business leaders, chamber of commerce officials and chief executive officers of local industries. This group knows that a good, sound education system helps bring economic development to a community and they understand what a return on an investment means.
- ✓ After the campaign is over, file away for safe keeping all your research information, names of local support and organizational plans.
- ✓ Referendum campaigns may become even more frequent in the future. A school board which is unified on the bond issue is not just important - it is an absolute must. Board unity is one of the most critical factors in determining whether a referendum can pass.

### CAMPAIGN ORGANIZATION

Active leaders in an organization could mean life or death to your campaign.

It is extremely important to realize that multiple groups are needed to properly organize a campaign for a synthetic turf field or for any large city project for that matter. Below is a list of the type of groups and skilled individuals that will help your organization attain its fundraising goals.

- Steering Committee
- Community Leaders
- Youth Committee
- Finance Committee
- Media Coordinator
- Schools Committee
- Speakers Bureau
- "Get The Vote Out" Committee



City of Chino Hills - California

## RESEARCHING THE MANUFACTURER



City of Seattle - Bobby Morris Playfield

### REFERENCES

It is a necessity in today's marketplace to check references of the turf company you are planning to select for your project. Be careful with companies that do not openly display their references for potential customers to see. This is a clear sign of insecurity towards their product. Speaking with customers who have had turf products for many years will give you a better sense of long-term cost savings and product durability, maintenance and overall profitability. It is the smart thing to do before making the purchase that will enhance the value and durability of your field(s). Visit [www.fieldturf.com](http://www.fieldturf.com) for a complete listing of all FieldTurf fields worldwide.

### TESTING AND MANUFACTURING

In the artificial turf industry, testing and quality manufacturing is the name of the game. Not many companies take these 2 aspects of turf production seriously. Testing and Manufacturing excellence can be the difference between getting your dream field or getting ripped off. Constant testing and strict quality control measures should be in the core company culture of any quality turf company.

#### Bio-Mechanical Properties for Safety & Performance

A long-term, ongoing testing program has proven that FieldTurf is safer than any other turf system and equal to, if not better than, natural grass in most critical areas of player safety. No other company can make such a claim. Independent safety tests and in-house performance testing have been an integral part of our business philosophy since the very first field we installed. With over 2500 fields in the ground - 350 of which are entering their 7th year or more of continuous use - we know how our fields play and how they hold up over time. In particular, testing proves that on FieldTurf:

- Traction, from a sports medicine standpoint, is better.
- Torsional release, critical to minimize non-contact knee and ankle injuries, is quicker.
- Shock attenuation properties are ideal - in fact, vs. natural grass, FieldTurf reduced neural injuries by 55% and cranial/cervical injuries by 47%.

The system was carefully engineered to emulate the best natural grass, not the kind of natural grass found on most fields used by young athletes around the world. To simulate the biomechanics of the best natural grass, FieldTurf has an "open" pile. Unlike other companies who still live in the

"carpet age", FieldTurf does not excessively "bulk up" on its pile fiber, just to be the "heaviest pile" in comparative charts. Rather, FieldTurf uses a wide gauge design - 3/4" between the fiber stitches - to allow proper penetration of the infill by players' cleats. This allows players to properly plant, cut or twist and release, without excessive torque. Heavier pile weights counteract this grass-like bio-mechanical function and should be avoided. The heavier artificial earth of FieldTurf's infill - generally almost double the mass and weight of competing systems - accounts for FieldTurf's excellent long-term shock absorbency (G-max), without the need for a separate shock pad. For all sports, the play occurs on the infill, not on the fiber - and that is what counts the most when comparing the bio-mechanical properties of one turf system to another.

#### Traction of Cleated Shoes On Natural and Artificial Turf Football Surfaces.

The following test results prove that FieldTurf provides the most traction for improved performance and optimal release for a safer playing surface. Just like on natural grass, you can use any kind of cleated shoe on FieldTurf.

#### Slip Resistance

- Records the pulling force while a loaded shoe is dragged across the surface.
- Calculates dynamic translational traction coefficient.
- Resistance to Rotation.
- Records the turning force (moment) while a loaded shoe is rotated on the surface.
- Calculates peak moment resisting rotation.

#### Testing

Strict testing regiments have been part of FieldTurf's culture since the very first field was installed. Over a five year period of competitive play, significant differences in the incidence, type and severity of game-related injuries were observed between playing surfaces. In regards to reducing the number of game-related, high school football injuries, current findings suggest an advantage in selecting FieldTurf over Natural Grass.

#### 35% Less Time Lost to Injury

Injury Time Loss / 1 - 2 Days - A significantly greater percentage of injuries resulting in a 1-2 day time loss were reported on Natural Grass vs FieldTurf. (28.0% Natural Grass vs 18.4% FieldTurf)

#### 45% Less Time Lost to Injury

Injury Time Loss / 22+ Days - Injuries which resulted in a time loss of 22 days or more were reported more frequently on Natural Grass than on FieldTurf. (13.6% Natural Grass vs. 7.5% FieldTurf)

#### 55% Fewer Neural Injuries

Type of Tissue Injured - Based on the total percentage of injuries reported on each playing surface, a significantly greater percentage of neural injuries were reported on Natural Grass vs FieldTurf. (16.8% Natural Grass vs 7.5% FieldTurf)

#### 47% Fewer Cranial / Cervical Injuries

Anatomic Location of Injury - More cranial / cervical injuries were reported on Natural Grass than on FieldTurf. (19.2% Natural Grass vs 10.2% FieldTurf)

#### 38% Fewer 3rd Degree Injuries

Injury Grade - More 3rd degree injuries were reported on Natural Grass than on FieldTurf. (12.8% Natural Grass vs 7.9% FieldTurf)



Comparing the Head Impact Response of Three Artificial Turf Systems

Laboratory impact tests compared the head response of three artificial turf systems: the FieldTurf system; a system comprised of rubber and sand infill; and a system of all rubber infill. Drop tests were done from various heights, with impacts to the rear of an instrumented anthropomorphic mannequin headform. The greatest difference was observed at the lower drop heights. Peak headform acceleration was recorded for both helmeted and bare head hits. In helmeted tests, FieldTurf showed the lowest headform Gmax. In bare head tests, FieldTurf showed the lowest headform peak acceleration Gmax. Ask us for our [Safety Brochure](#).



## Field Building Handbook

### Manufacturing

FieldTurf has steered a high-growth industry in the proper direction with first-class manufacturing facilities; a carefully engineered product, more than 3000 installations, and the blessing of thousands of athletes, coaches, and athletic administrators worldwide. FieldTurf has brought "single source responsibility" and quality to the forefront with its manufacturing plant. This has paved the road towards true innovation and customer service.

From tufting, to coating, to full QC inspections, right on to shipping and installation, the equipment and space available in the Calhoun plant work together to further ensure that FieldTurf is the market leader in quality product. The plant is an impressive site by anyone's standards. Located in Calhoun, GA, it is a 455,000 square foot facility operated by employees totaling well over 400 years of experience in the artificial turf industry. The plant features 10 tufting machines with an annual production capacity of 630,000,000 square feet of turf - enough to supply over 7,800 football fields per year. The new coating line that is at the heart of the Calhoun plant allows FieldTurf to set a new standard for turf quality and durability. It is an innovative coating process that has been developed by the industry leader in order to continue to focus on quality control and customer satisfaction.

To ensure FieldTurf's standards are unmatched, a rigorous quality control process (based on extensive testing and inspections) is undertaken with every field that is put into production. First, yarn testing is performed, which includes tensile strength, elongation, tenacity, denier, shrinkage, and twist (turns per inch). The primary backing is inspected and the "pick count" - or yarn density in relation to the backing - is verified to ensure the right amount of face yarn per square inch. Each tufting operator verifies the pile weight and pile height of the yarn to make sure that quality requirements are met every step of the way. If the pile weight is off by even the slightest amount, then it does not meet FieldTurf's stringent standards and the turf is reproduced to exact measurements. Testing continues throughout the entire tufting process until all rolls for a field are complete.

Once the rolls are complete, the fiber rows on the backing of each roll are carefully coated with polyurethane to complete FieldTurf's patented finger-unit backing design for enhanced fiber strength and optimal drainage efficiency. FieldTurf has full-time experienced coating inspectors at their facility in Calhoun, GA to ensure that the coating is applied properly. One small error and the roll is pulled from the line and reproduced. Once the coating process is complete, every component of the finished carpet undergoes final inspection before it is packaged and loaded onto the trucks for transportation to the job site. Each roll of carpet is numbered and positioned in the exact order that it will be loaded onto the transporters. Once on site, the rolls are unloaded and laid on the field in the specific order that was planned and designated by the head office engineering department. For every 5 rolls that are produced at the plant, a 2 ft by 15 ft sample of turf is retained by the FieldTurf Research & Development department in Calhoun. These samples are carefully filed under the name of the corresponding field. This way the project can be verified through to completion and beyond while the turf samples are analyzed on a regular basis. The state-of-the-art plant located in Calhoun is a big reason why FieldTurf is the number one choice of professional teams, high schools, colleges and facility managers around the world. FieldTurf's ability to ensure the quality of its raw materials and its manufacturing from start to finish is the reason why it enjoys the best record for on-time delivery of its projects.

It is FieldTurf's mission to ensure each customer gets the unique engineered product that they ordered. Nothing is left to third parties and nothing is left to chance.

### QUALITY CONTROL

FieldTurf is the only artificial turf company on the market to meet Q6, the most rigorous and comprehensive of quality control standards. The Q6 standard encompasses the six essential elements of quality control in relation to artificial turf: the ownership and management of a manufacturing plant, the testing of each roll of fiber, the testing and grade of the infill, the success of certified in-house installation crews, the issuing of a 3rd party insured warranty, and the accessibility and responsiveness of the customer service department. By conforming to Q6 standards, FieldTurf is able to ensure the success, safety and durability of every one of its FieldTurf fields.

It is imperative that artificial turf manufacturers implement Q6 standards to protect the investments of their customers. Ask us for more detailed information about our industry-changing quality control measures.

### DESIGN CAPABILITIES

From difficult stormwater management requirements, along with budgetary constraints and challenging soil situations, there are many steps to the process of making your dream field a success. A great product is one. An informed and understanding sales representative is another. But what actions are taken after the sale to ensure that you get the highest quality installation possible? At FieldTurf, we know winning your business is only half the work. Our position as the industry leader is solidified by an outstanding engineering department capable of providing constructive solutions to any unique obstacles. Over the years, we've helped customers deal with specific drainage issues unique to their climate and site, designed field layouts to maximize use of their land and value for their dollar, while following through with a top quality installation built to the exact standards

specified. Rely on FieldTurf and our team to assist in your project planning and execution. Not only do we rely on our own expertise, but the FieldTurf network is comprised of some of the top design professionals in America. Working in conjunction with these professionals, FieldTurf is able to provide our clients with design/build capabilities. Does your stadium host five months of football then seven months of concerts, monster-truck rallies and conventions? It's not a task we can't handle. With its high-performance and quick assembly and disassembly, our FieldTurf Convertible Tray System has provided a unique solution for customers with the challenge of operating a multi-purpose facility.

When you purchase a FieldTurf field, you're putting your trust in a company with unmatched research and development, engineering and operations capabilities. We tackle every job with the same excitement and dedication as if it were our first.

### FIELDTURF 8 YEAR THIRD-PARTY INSURED WARRANTY

FieldTurf is once again setting the standard in the industry for ultimate customer protection. With FieldTurf's industry-leading policy, there is no deductible, no limit per claim, no retention, and no retention period. All FieldTurf fields are automatically covered upon issuance of the Warranty Certificate. In addition to the rock solid warranty policy that is rated A++ (Superior) and Category XV by A.M. Best - the highest rating available, FieldTurf continues to earmark \$500,000 in an 'In Trust' bank account to serve as a preliminary layer of protection which is exclusively for small warranty repairs - to cover any possible repair work needed on projects installed.

This is a very significant financial milestone as this kind of security has never been equaled in the synthetic turf industry. With the failures of artificial turf companies in the past, it should be comforting to clients that FieldTurf is financially protected from catastrophic product failures and that clients themselves are protected in the unlikely event FieldTurf ceases to be around to warrant its fields. Over thirty companies in the artificial turf industry have gone bankrupt in recent years, leaving their customers with no protection and worthless warranties. FieldTurf has invested in its security and the security of its clients - more so than any other artificial turf company in the world.

Ask us for our [Warranty brochure](#) to make sure that you are well covered with a solid warranty.

Selecting an artificial turf vendor can be overwhelming given the amount of turf suppliers in the industry and the number of companies touting that they have what is right for you. It is important to research different artificial turf manufacturers before deciding on which company to select for a purchase that has revamped so many athletic programs across the country. Below are 10 simple factors to consider when shopping around for artificial turf. These are 10 essential factors that your turf vendor must have for your purchase to be considered a safe investment.

### TOP TEN FACTORS TO CONSIDER WHEN SELECTING YOUR ARTIFICIAL TURF VENDOR

#### 1. Proven Performance

FieldTurf has what every athletic program needs. The most durable and the safest turf on earth. That reputation was built at America's Schools - one field at a time.

#### 2. Customer Service Track Record

FieldTurf maintains the only fully functioning and self-sufficient team in the business.

#### 3. Financial Stability & Insured Warranty

FieldTurf enjoys the strongest equity base in the entire industry.

#### 4. Performance Infill

By implementing a three layered silica sand and cryogenic rubber system, FieldTurf fields have been praised as the closest thing to natural grass.

#### 5. True Extruded Monofilament Fibers

Featuring a unique and durable spine within each fiber, FieldTurf's monofilament fibers have been built to last.

### 6. Quality Control

From the beginning, FieldTurf's founders recognized that total quality control could only be guaranteed by being masters of their own destiny. FieldTurf's plants ensure a consistent high quality product and uniform installations around the globe.

### 7. Design Capabilities

Using FieldTurf's design/build structure, you can assure that the best team is assembled - the best supplier with the best design team.

### 8. Installation Experience and Seaming Technology

With so much riding on the quality of the seam construction, FieldTurf has chosen to invest in sewn seams rather than the cheaper glued alternative.

### 9. Long-Term Cost Savings

Despite having a higher initial sticker price, FieldTurf still offers potential savings of almost \$1,000,000.00.

### 10. Testing

A long-term, ongoing testing program has proven that FieldTurf is safer than any other turf system and equal to, if not better than, natural grass in most critical areas of player safety. FieldTurf boasts unprecedented know-how and experience in the art of building sports fields, having completed nearly 3,000 projects worldwide.

When making this extremely crucial decision, consider these critical questions to your potential turf manufacturer:

How old is your oldest field, and in what condition is it? \_\_\_\_\_  
 How many 10 year old fields do you have? How many 9 year old fields? \_\_\_\_\_  
 Has your company done any safety testing, and can you send me the reports? \_\_\_\_\_  
 Will you provide us with audited company financials? \_\_\_\_\_  
 How many North American fields did you complete in 2005, 2006 and 2007? \_\_\_\_\_  
 How many NFL teams use your product? How many NCAA? How many MLS? \_\_\_\_\_  
 Does your company have a third-party insured warranty policy? Can we see the actual policy? \_\_\_\_\_

Ask for and call on references. Research, research, research! The safety of athletes is at stake, and your due diligence will make the difference between a field that lasts only 4-5 years and a field that lasts 10-12 years. These are just a few of the many absolutely vital questions to ask when engaging in close to a million dollar purchase. For a comprehensive list of details to research see FieldTurf's "Questions to Ask Your Turf Vendor" brochure.



A small sample of FieldTurf firsts in the infilled artificial turf industry:

1st FIFA Recommended Field (Nickerson Field, MA)	1st (and only) Independent Safety Testing (Barnhill / 99-03)
1st UEFA Cup Qualifying Round (Torpedo, Moscow)	1st (and only) with Biomechanical Testing (Shorten / 2002)
1st International Rugby League Game (Olympic Stadium, Russia)	1st (and only) Third Party Insured Warranty
1st FIFA Soccer Tournament (Jeux de la Francophonie)	1st NCAA Stadium (University of Nebraska)
1st International Rugby Union Game (Taipei vs Hong Kong)	1st NFL Stadium (Seahawk Stadium, Seattle)
1st Warmup Area of Main Pitch (Twickenham, UK)	1st MLB Stadium (Tropicana Field, FL)
1st (and only) Turf in Top 3 in NFL Best Field Survey (2002)	1st High School Stadium (Ringgold High School, PA)

Artificial Grass Fields Still in Daily Use	FieldTurf	Competition Combined
5 + years old	752	90
6 + years old	625	35
7 + years old	346	14
8 + years old	210	7
9 + years old	101	1
10 + years old	50	0
11 + years old	11	0

Numbers as of 2007

## SPECIFICATION WRITING/RFP/COOPERATIVE PURCHASING

### Writing Specifications

At one point during the process, specifications for both the base and the surface must be drafted. For assistance in specification writing, you may contact your local FieldTurf representative. It is crucial to heavily research the available turf systems and write your specifications to ensure that you get the best possible product to suit your needs. While a generic specification will allow numerous turf providers to bid on the job, you are all but guaranteed to end up with a lower-quality product requiring replacement in just a few years time. While these initial savings look appealing, the 10 year cost will be significantly higher. Specifying a quality product which has been proven to last longer - while providing improved safety and performance - is well worth the additional initial cost. Specifications should outline the scope of work, including sub base, base preparation and surfacing system to be provided. Drawings of the proposed facility, as well as the necessary construction details, are included with the specifications to provide clarification. Specifications can also require specific types of materials, amounts of materials to be used, the methods of installation of materials, and the labor and transportation necessary to complete the work described, as well as clean up of the site following completion of construction. The scope of work may be defined as all or only part of a given project. Specs should also outline performance criteria and testing to be conducted at various phases and at the conclusion of construction, as well as acceptable results for those tests.

### The Bid Process

An owner may research contractors in advance and invite only qualified parties to bid on the project. Public projects, on the other hand, are frequently subject to open bidding. The owner should make note of any differences in the bids and that each bidder satisfies the demands set forth in the specifications. Very low bids should be carefully scrutinized. Why are they so low? Has quality been compromised? FieldTurf can provide the necessary information for your post-bid review to ensure proper analysis of such areas as experience, financial strength and stability, warranty and post-construction field care.

### Request for Proposal (RFP)

In a Request for Proposal, the owner issues a written call for proposals from pre-qualified contractors and designers in the sports field construction industry. RFP invitees are asked to develop and price out a turn-key project. The company whose proposal best suits the owner's needs is issued a contract. Each aspect of each proposal should be rated in terms of importance to gauge which company/product is best, rather than simply going with a low bid.

### Design/Build Projects

For many projects, a design/build format may be the most efficient route to go. In this situation, the owner works with an experienced contractor who designs and builds the field. The main benefit of a design/build option is to streamline the construction process, saving time and money for the owner. Design/build also places responsibility for the entire project on one entity, so any questions and concerns of the owner can be voiced directly to the design/build. When choosing a contractor, extensive current experience in synthetic turf field and track construction is absolutely essential. These are complex projects requiring expert knowledge. While the work of an architectural firm is a viable option, FieldTurf has the infrastructure and engineering capabilities to fully design your track and field facility. Since reversing perceptions on artificial turf over 10 years ago, FieldTurf has completed hundreds of design/build projects. No obstacle can present itself that has not been encountered and resolved in the past. When it comes to professionally executing state-of-the-art track and field facilities, FieldTurf is the runaway leader in the industry. Supported by an outstanding engineering department capable of providing constructive solutions to any obstacles, FieldTurf has helped customers deal with specific drainage and environmental issues unique to their climate and site, designed field layouts to maximize use of their land and value for their dollar, and followed through with a high quality installation built to the exact standards specified. Aside from in-house expertise, the FieldTurf network includes some of the top design professionals in America. Working in conjunction with these experts, FieldTurf is able to provide clients with design/build capabilities. When you purchase a FieldTurf field, you're putting your trust in a company with unmatched research and development, engineering and operations expertise. Ask for **FieldTurf's Project Book** to review some of the complex projects that have been done.



## Field Building Handbook

### Advantages of the Design/Build method with FieldTurf:

- Turn Key solutions
- From Concept to Completion
- 6% reduction on overall costs
- 12% reduction in construction time
- 33% faster overall project completion Higher Quality and owner satisfaction
- No scope of work deficiencies
- Gross Maximum Price (protects Owner) Not to Exceed (protects Owner)
- No Surprises No Excuses
- 1 Warranty/ 1 Financially stable company / ROI

### Design/Bid Projects

Most public projects are built using the design/bid process. This most often involves larger planning teams who work with the owner to devise a facilities plan, prepare construction drawings and specifications, and put the project out to bid to contractors, who, again, may be pre-qualified on the basis of experience, financial stability and/or other factors. An owner may not receive the desired system in this scenario.

### Cooperative Purchasing Programs/State Contracts

Across the United States, school boards and other municipalities are expending needless amounts of energy in pursuit of efficiency. Effectively managing the need for facility improvements amidst cutbacks and reduced resources has proven to be a challenge. The Atlas Cooperative Purchasing Program provides an efficient and legal method for schools and municipalities to purchase a FieldTurf field without duplicating the time consuming bid process. Atlas is an approved vendor on several national cooperative purchasing contracts. These contracts consist of a compilation of state purchasing agencies that have joined together to simultaneously issue Invitations for Bids on a national level.

There are several benefits for organizations to use the Atlas Cooperative Purchasing Program. One is that schools/municipalities retain control of their project and have a procurement process that allows them to specify FieldTurf products. Second is preferential pricing on FieldTurf products. Third is the fact that this process can be expedited very quickly. Since the school or municipality does not have to duplicate the bid process, they can simply issue a PO once the scope of work and pricing are in place.

These cooperative purchasing agencies have all selected FieldTurf, through Atlas, as their turf product of choice. The cooperatives took the work out of the typically long process of selecting and approving a turf vendor to quickly expedite the purchasing process for organizations interested in obtaining a state-of-the-art FieldTurf field without the hassles and extra expense of the typical bid process. The Atlas Cooperative Purchasing Program is comprised of numerous Cooperative Purchasing Contracts. The Association of Educational Purchasing Agencies (AEPA), The Cooperative Purchasing Network (TCPN), and the National Joint Purchasing Alliance (NJPA) are a few examples. Through these and other cooperatives under the Atlas Cooperative Purchasing program, customers can purchase FieldTurf and Prestige brands of synthetic turf, FieldTurf landscape, pets, golf, and playground surfacing products, right on through to synthetic and hardwood basketball; volleyball and gymnasium flooring; squash and racquetball courts; floor protection and covering systems; weight room flooring; and high performance indoor and outdoor running tracks across the US on previously bid contracts with preferential pricing. In addition to the sports surface, these organizations can receive the benefits of including the base preparation for a turn key project through the Atlas Cooperative Purchasing Program. Site work can be included through the alternative costing method and provides the school or municipality with the security of single source responsibility. Finding strength in numbers, these cooperative purchasing contracts unite schools and municipalities from around the country, helping each one of them save valuable time and money for facility enhancement projects. The state coops work on the organization's behalf to secure multi-state volume purchasing contracts. These contracts provide measurable and cost effective benefits that continue to exceed the customer's expectations.

Take the AEPA as an example. Using its purchasing power to negotiate through each bid process, the AEPA saves the customer a substantial amount of time, money and energy. By the time a school board is ready for a facility improvement the AEPA has already negotiated the lowest possible price for the highest quality materials. School improvement projects can be a very long and costly process, with many unforeseen delays. School boards have to go through the hassle of advertising, investigating, obtaining designs, writing specifications, conducting bid meetings, dealing with potentially inexperienced contractors, all while managing and coordinating the installation process. Due to the countless steps associated with the bid process it is not unusual for six months to expire before even breaking ground on a facility improvement job.

The goal of these cooperatives has always been to effectively eliminate all of those steps. One case involves Texas Tech University calling the AEPA about obtaining a FieldTurf field. Five days later the installation process had begun. Examples like these are not uncommon with the AEPA since all the bid work has already been prearranged and negotiated. The school board simply has to decide when and what. The rest is handled by cooperatives like the AEPA. "Everything went fine using the Atlas Cooperative Purchasing Program to purchase our FieldTurf fields," said Paulo Peres, AIA Facilities Planning & Construction. "We purchased two fields through the program to ensure we got the product we wanted- FieldTurf."

The following table highlights the procedural difference between the standard Bid Method and a reliable cooperative purchasing contract. This cooperative method saves school boards a substantial amount of time and energy by effectively reducing a thirteen step process down to two.

	Bid Method	Atlas Cooperative Purchasing Program
Step 1	Research contractors	Contact Atlas or FieldTurf
Step 2	Interview contractors	Site evaluation completed and Atlas issues owner a quote
Step 3	Select contractors	Owner issues a PO
Step 4	Write out specs with contractors	Construction Begins
Step 5	Obtain final designs	
Step 6	Advertise bid meeting	
Step 7	Arrange for bid meeting	
Step 8	Collect bids	
Step 9	Review bids with bid committee	
Step 10	Investigate manufacturers	
Step 11	Bid acceptance	
Step 12	Coordinate installation process	
Step 13	Construction successfully completed	

Lovington High School in Lovington, New Mexico had FieldTurf installed in 2007. The project was partially funded by NFL Pro Bowl linebacker, Brian Urlacher. The school's administration is not one to hide their opinion when it comes to the simplicity of using the Atlas Cooperative Purchasing Program. "We knew we wanted the FieldTurf product," said Lovington High School Facilities Director Bill Lewis. "The Atlas Cooperative Purchasing Program allowed us to get the product we wanted through a quick previously bid process. We are happy with the field."

Facility enhancements generally require a lot of planning, organizing and negotiating. With so many steps and people to account for, the coordinating process can be overwhelming. The AEPA recognizes this problem and has created Single Source Responsibility. Now instead of trying to track down a dozen different people working on a dozen different jobs, each school only needs to be in contact with the AEPA. The AEPA makes facility improvement easy and affordable, freeing up valuable time and money for school boards.

It is not uncommon for school boards to experience feelings of uncertainty when it comes to purchasing new products. Not knowing the product or the installation crew can result in many unforeseen problems. Many stressful hours can be spent researching the product and the reputation of the installation crew. With the Atlas Cooperative Purchasing Program you never have to worry because they understand the importance of safety and quality, which is why they only endorse the highest quality products. When it comes to contractors, an extensive contractor data bank is used to ensure that each school receives nothing but the most reliable and qualified installation crews. This way, you can be certain that you will be receiving both a safe and durable product and an experienced installation crew. Since the year 2000, school boards throughout the United States have joined this purchasing program in order to secure the highest quality product at the absolute lowest possible prices. School boards in

22 states around the U.S. have already saved a significant amount of time and money on school enhancement projects and hundreds of institutions around the U.S. have been able to obtain FieldTurf through the Atlas Cooperative Purchasing Program.



Circle High School in Towanda, Kansas is another example of a high school that could not have been more pleased that they opted for FieldTurf through the Atlas Cooperative Purchasing Program in August 2007. "FieldTurf without a doubt was the way we wanted to go and the Atlas Cooperative Purchasing Program allowed us to get it," said Circle High School Assistant Superintendent Robert Grassino. "The process also allowed us to compare apples to apples on pricing which is tough to do in the normal bid process. In the long run we feel we got a better deal through the Atlas Cooperative Purchasing Program than if we would have gone through the bid process. We are very happy with the process and the FieldTurf product."

**Ask us for our Atlas/FieldTurf Cooperative Purchasing Contract price list.**

The most effective methods to make sure you get the turf product you really want (in order of efficiency):

- 1 - Cooperative Purchasing
- 2 - Negotiations through a private entity
- 3 - Sole Sourcing
- 4 - Request for Proposal (RFP)
- 5 - Separate base bids
- 6 - Straight bid

# BUILDING THE FIELD

## SITE WORK & BASE CONSTRUCTION

### Site Exploration

Site exploration is a crucial element in the construction process. It includes determining the size of the facility and adjusting and managing the project accordingly. Issues which must be considered during the site investigation phase relate to topography, drainage, soil conditions, access, orientation, availability of utilities and site restrictions. Extremely important to the site investigation process is the analysis of the soil. Ensuring that those conditions are considered and incorporated into the specification process is vital. A geotechnical survey can be very helpful in identifying soil conditions. In order to achieve proper grading and consistent compaction, soil conditions must be approved. Soil Boring or Test Pits are most commonly used to determine the amount of topsoil and classification of subgrade soils. Keep in mind that these areas are random samples and may not be representative of the entire existing site conditions. In the event that unsuitable soils are encountered a geotechnical engineer should be involved to determine a stabilization plan of those areas and a unit price will be negotiated between the General Contractor and owner for stabilization.

### Existing Surface

The first stage in the construction and installation of a new artificial turf field is to prepare the site by removing the existing surface. The existing surface might be an old artificial turf field or paved asphalt, but in most cases it will be a sod field or another organic layer.

Dealing with clay soils presents another construction challenge as it becomes extremely hard when dry and develops a slippery, gummy texture when wet. Clay soils are also subject to freeze thaw action which means that it must be removed or remediated to a suitable depth in order to create a stable base. Remediation can include creating separation from the base with the use of a liner, stabilizing them with cement or fly ash or a combination of all of these. For a complete list of options be sure to discuss this with your soils engineer. With most artificial turf field construction projects measuring 80,000 square feet a significant amount of topsoil should be temporarily removed from the site and set aside for reintroduction at a later point in time. This naturally occurring topsoil can in some instances take over 1000 years to evolve, making it a resource worth preserving. Often, laws are put in place that require the approval of a soil and erosion control plan before the start of any construction in order to ensure proper preservation.

In some cases, before construction can begin the sterilization of the site might be required. The surrounding areas to the site can be used as an indication into the potential need for treatment. By monitoring nearby sidewalks, parking lots or any other pavement area for signs of weed growth, heaving, bulging, dips or cracking, you will be able to determine the need for sterilization. Should sterilization be needed, only an experienced professional sterilization service should be used in order to achieve the best results. The 1st stage of construction is to implement proper erosion and sediment controls as necessary to local standards. This usually involves a stone construction entrance and silt fence.

### Grading

Depending on the site, additional excavation might be required in order to obtain proper planarity. If there is a need to replenish certain areas for planarity, you should expect additional costs and delays. The fill tends to be a locally available material such as stone or soil that is free of organic material. Once the subgrade is in place, the contractor will roll and compact the subgrade to a 95% compaction. In certain cases where the sub-base prevents the proper flow of drainage and cannot be fully corrected, an impermeable geotextile separation fabric can be installed. The amount of excavation to subgrade is determined by the topo survey. This is critical in conjunction with Soil Borings or Test Pits in order to determine the amount of Topsoil to remove and calculate the amount of subgrade soils necessary to remove to achieve designed subgrade.

### Nailer or Curbing

Usually before the construction of the base, a concrete curb w/notch or nailer attachment is installed around the perimeter of the field in order to attach the turf.

### Field Drainage

To effectively remove water from the surface of your artificial turf field and direct it towards the drainage areas is one of the most important features your field can offer. Choosing a product that has a reputation for successful drainage can make or break your field. Different systems are made

available depending on the manufacturer and your geographic location. Requirements will vary depending on site conditions, local weather and regulations regarding storm water management.

There are two main types of subsurface drainage. One type consists of a flat drain, 6"-12" wide and 1"-2" thick. Because of their unique shape, these drains allow for the proper movement of water. A more expensive and more efficient system uses perforated pipes, 4"-10" in diameter. Pipes must be sized correctly, depending on the amount of water they can be expected to handle. These perforated pipes are laid in trenches, surrounded by filter and clean stone. Both flat drains and trench drains are sloped to the edges of the field, or sometimes just to the long sidelines, where the water is deposited in drains on the perimeter. These perimeter collector pipes move the water to a disposal site such as a storm drain or catch basin.

In addition to the subsurface drainage, selecting a product with a naturally porous backing will help to ensure effective and timely drainage. Some artificial turf backings are manufactured with holes or perforations. This type of product, although cheaper, does have a tendency to clog, which is why we recommend the use of naturally porous backings. Typically fields are designed to satisfy storm requirements as outlined by the client and the Intensity Duration Frequency (IDF) precipitation curves. Depending on the IDF curve and the design requirements, intercept drains (ID's) may be required to increase drainage capacity. There are several options available when designing ID's and they need to be modeled prior to moving forward with the base and drainage requirements.

### Building the Base

The base not only serves as the platform for the artificial turf, it is necessary for drainage. Before specifying the base, it is imperative that you check with the turf manufacturer and customers who have installed their product in order to evaluate which product or system best suits your needs. Certain companies provide for free in-house design consultation in relation to base work. These free services can go a long way in saving you time and money, while helping to ensure that the best possible base is installed for your artificial turf surface. Before you sign on with a selected contractor, be sure that they will complete a mandatory inspection of the finished base work in order to prevent any unforeseen future problems. More often than not, a failing drainage system has a lot to do with poor base construction. The composition of the base will vary depending on location. Although no two bases are designed and installed in exactly the same way, there are generally two types of bases which are used most often.

### Traditional Base

The aggregate base commonly will vary from 6"-12" thick, but may be up to 36" thick depending on the project. It is very important that the base be designed and installed with the turf manufacturer's requirements in mind so as not to void the turf warranty and to maximize the likelihood of success. The surface grade is usually 2" thick and features a smaller open graded stone that can be compacted to 95% proctor. The surface grade is typically 0.5%-1.5% depending on the intended use. Frequently the grade must be at least 0.5% to meet FIFA preferred soccer standards. The flatter grade has also been appreciated in football since the quarterback has fewer adjustments to make for the curvature of the terrain when executing long throws. The sub grade is typically composed of larger open graded stone and can once again be compacted for stability. The sub grade is typically greater than the surface grade to accommodate drainage. The base should be installed in several stages in order to ensure proper compaction. It is recommended that the aggregate be installed while damp with a laser-guided grader or dozer. Checking the base for any deficiencies prior to proceeding with the turf construction is crucial to the success of the field. An expert should confirm the grade and planarity. A percolation test should be run on the base before the artificial turf surface is installed on top of it. The base should demonstrate percolation values conforming to required standards of approximately 10"-15" per hour.

### Concrete or asphalt base

If the intended use of your field includes large activities or entertainment events such as concerts or monster truck rallies then such a base might be necessary. An engineered base consists of an aggregate foundation topped by a porous or non-porous asphalt pavement, installed in one or two courses. An engineered base will add both cost and stability. Both bases will be designed and engineered in conjunction with the needs and requirements of the facility and the climate, taking into consideration freeze/thaw activity. Aggregate bases typically drain very well and are easily obtained at a good price. Contractors are generally experienced and comfortable with gravel which tends to translate into successful base installations. The drawbacks to gravel are that there are some parts of the country where quality gravel may be difficult to obtain and expensive. If improperly installed, gravel can settle and shift causing an uneven surface while reducing drainage capabilities. Only experienced contractors and turf manufacturers should be considered for these types of projects. Synthetic bases are still a relatively new alternative but they offer some great advantages. Synthetic bases provide for faster drainage than the traditional aggregate base and they take less time to install. They also resist deformation caused by vehicles and other heavy apparatus. While synthetic bases are a relatively new concept and more expensive than aggregate bases, the key to making these systems work is finding the right contractor with a lot of experience in installing these systems.

## Field Building Handbook

### Precision Drainage System

Another state-of-the-art option to consider is the "Precision Drainage System" which delivers the Precision Performance and Maximized Drainage that the player and the facility demand. Consistent response throughout the field ensures that elite levels of play can always be reached. Maximizing the drainage ensures the on field performance when the weather gets tough. Wet or dry your level of play remains the same. The installation of the PDS system is user friendly and reduces base installation time by approximately 30% while reducing base costs by up to 50%. The PDS Concept features organic grass that is stripped and natural soil or fill compacted to 95% proctor. A 3" base of 0"-1/4" road stone (cost efficient) is laser graded and compacted to 95% proctor. A non-permeable liner covers the PDS base and the bottom of the trench. The PDS tile is installed on the liner and across the trench. Finally, FieldTurf is installed over the tile and infilled. Water flows through the turf and tile onto the liner and then into the drains. The PDS tile has been specifically designed for artificial turf installation and addresses drainage, field consistency, load bearing requirements, thermal expansion and contraction, turf grip, liner puncture resistance and installation friendliness. No matter where you are on the field the turf is sitting on the same performance surface. FieldTurf's Precision Drainage System can also contribute towards obtaining the U.S. Green Building Council's LEED Credit certification. In addition to the Precision Performance and Maximized Drainage built into this system, the industry's most innovative drainage system has a positive effect on the environment. Ask us for our [Precision Drainage System brochure](#).



### TURF INSTALLATION - Installing the playing surface and amenities

Once the base and drainage are completed, the events that follow will be determined by your preferences. The installation of fencing, lighting, bleachers, scoreboards, and/or track surfaces can happen before or after the installation of the artificial turf. The installation of the surface will include rolling out the large turf rolls across the field and seaming the rolls together. For optimal performance and longevity, the seams should be sewn together in order to prevent unwanted costs and hazards related to future seam failure.

#### Placement of turf rolls on the field

Every component of the finished carpet should undergo numerous rounds of inspection before it is packaged and loaded onto the trucks for transportation to the job site from the turf company's manufacturing facility. Each roll of carpet is numbered and positioned in the exact order that it will be loaded onto the transporters. Once on site, the rolls are unloaded and laid on the field in the specific order that was planned and designated by the turf company's engineering department.

#### Sewing the turf panels

FieldTurf's sewn seam method is proven in use on hundreds of fields in every locale possible. The key advantage of FieldTurf's sewn seams technique is that the thread does not go through the pile fibers; rather an extra flap of backing material called the selvage edging acts as the sewing medium. FieldTurf's seams are actually hidden under the pile fabric. The number one maintenance problem associated with synthetic fields is that of loose unglued turf seams. Although glued seams are less expensive and easier, requiring no special equipment or expertise, sewing seams is the only way to assure a trouble-free seam and a long lasting, safe field.

#### Installation of Field Markings and Decorative Markings

In order to keep prices down, many turf companies use a cut-out method to install lines, hash marks and logos. Once the turf has been laid out, the installation crew will outline the logo or hash mark and quickly cut it out from the turf's original backing. A turf's backing essentially forms the foundation for the field. As a whole, the foundation remains strong and sturdy, however, with each chunk removed that foundation grows increasingly unstable and brittle. This method should be avoided at all costs. FieldTurf's experienced installation crews take the time to shear the necessary fibers without compromising the durability of the turf backing. Once the fibers have been carefully sheared, an ultra adhesive mixture is applied along the entire surface area of the logos and hash marks before being carefully installed.

#### Installing the Infill

When the lines, numbers, markings and/or logos are completed, the turf is now ready for infilling. The infill is the athlete's source for cutting, planting, shock absorption and energy restitution. While the majority of the competition uses a loose and spongy all ambient rubber system, FieldTurf only incorporates a patented layered infill system that is comprised of silica sand and premium cryogenic rubber. The patented infill layering begins with several layers of clean, washed silica sand. This stabilizes and supports the entire system. This is followed by mixed infill layers. A mix of cryogenic rubber

and silica sand is layered into the system. The rubber and sand particles are a similar size to stay in suspension, neither segregating nor compacting. Up to twenty one passes of the cryogenic rubber and silica sand mix are carefully added. Over 720,000 lbs of infill is layered into a typical, full size sports field. Larger sized cryogenic rubber top layers ensure that the rubber remains on top, providing a safe, forgiving surface.

#### Test the Field

The most common test performed in the industry to measure shock attenuation is Gmax and should be performed by a certified testing laboratory. It is imperative that your field be tested right after the installation is complete and another 2-3 times throughout the life of the field. FieldTurf fields will record a Gmax value of less than 200 over the life of the field. Like most issues relating to filled turf systems, the issue of Gmax is not simple. Generic rubber filled systems are too loose and unstable - and the fill too easily displaced in high use areas - to allow for American football play without a shock pad. FieldTurf, on the other hand, due to its heavier and more stable fill, is more than suitable for such applications without a separate shock pad. FieldTurf systems are well below the ASTM threshold of 200 g's. Moreover, 200 g's is considered the level above which the risk of fatal head injury is "non-zero" - i.e., the level at which fatalities can occur, and thus 200 g's is the threshold at which providers of sports surfacing and playground systems have attempted to stay under for obvious reasons.

### CONSTRUCTION TIMETABLE

The construction timeline for a synthetic turf facility will vary depending on the permit requirements, conditions of the site, the size of the surface being installed, the resources of the contractor and the weather. Planning, design and permitting can take as little as a month or two or as much as several years. It is important to remember that projects should not be bid before environmental and other approvals are obtained, as revisions can lead to costly change orders. Once the permitting and bidding process is complete, the actual turf construction phase, from excavation and base work to the installation of the turf, can take anywhere between 6-7 weeks depending on the weather. Ask us for our [Construction Schedule brochure](#) for a step by step visual portrayal of the field installation process. The typical field construction process is as follows (durations vary depending on the scope of the project):

<b>Stage: 1</b>  Install Construction Entrance/Track Protection along with Erosion and Sediment Controls (if necessary) Duration: 2 Days	<b>Stage: 2</b>  Field Excavation to Subgrade - Duration: 5 Days	<b>Stage: 3</b>  Install Perimeter Concrete Curb/Naile - Duration: 5 Days
<b>Stage: 4</b>  Install Geotextile Fabric and Field Underdrain System (per site specifications) - Duration: 5 Days	<b>Stage: 5</b>  Install Free Draining Base Stone and Finish Stone Duration: 7 Days	<b>Stage: 6</b>  Off-load Turf Rolls and Place Turf - Duration: 2 Days
<b>Stage: 7</b>  Sew Turf Panels - Duration: 7 Days	<b>Stage: 8</b>  Install Field Markings and Decorative Markings Duration: 7 Days	<b>Stage: 9</b>  Install Infill - Duration: 4 Days
<b>Stage: 10</b>  Remove Construction Entrance/Clean Up/Demobilize/Test Field - Duration: 2 Days		
<b>TOTAL - 49 Days</b>		



## POST INSTALL FOLLOW-UP

### Certificate of Completion

The certificate of completion is a document issued by the manufacturer and presented to the customer as soon as the installation of the field is complete. It is the responsibility of the customer to insert all the information required on the document including his or her signature in order to validate the warranty. By signing the document the customer acknowledges that all the work performed has been completed to their standards. Once the certificate is received by either the distributor, sales rep or manufacturer the official warranty will be sent to the customer for their records.

### Maintenance Equipment

Once your artificial turf field is installed, your athletes, students and community will be able to enjoy hour after hour of consistent playability. Ensuring that the level of playability remains consistent will depend entirely on your dedication to maintenance and the equipment that you incorporate into your maintenance program. Although the overall maintenance of your artificial field will be minimal, by maintaining a consistent regimen you can be sure that your field plays in a consistent and high quality manner each and every time out.

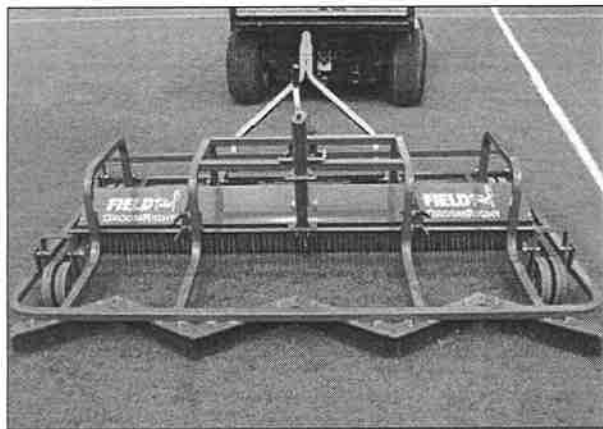
Obtaining the right maintenance equipment will make the difference between a regular artificial turf field and a long lasting high performance artificial turf field. Equipment designed to level the infill, brush the fibers and remove debris will definitely help to extend the lifespan of your field while maintaining consistent levels of playability for those who play on it. With a wide variety of equipment to choose from, be sure to contact your artificial turf manufacturer for a list of recommended maintenance products that best suit and match the needs of their product.



### Payment Schedule

When it comes to payments, planning ahead is the best way to ensure the timely completion of your projects. Most companies will expect roughly a third of the amount due at three separate intervals. Those three intervals tend to be upon the signing of the contract, the delivery of the materials and upon completion of the job. In order to avoid holdups and aggravating delays, be sure to incorporate a payment schedule into the budgeting process.

Consult [FieldTurf's Maintenance Guidelines](#) for detailed descriptions of maintenance.



FieldTurf GroomRight

## FIELD MAINTENANCE

One of the major benefits of a FieldTurf field is the reduction in time and money spent on maintenance. FieldTurf eliminates the need to mow, water, re-seed, fertilize, and paint lines on your field. There are, however, small maintenance guidelines to follow to ensure the maximum performance of your field.

### Prohibitions on the Field

It is important that your field be kept free from glass, cigarettes, fireworks and any sharp objects that will risk damage to the field or injury to players. Your field should also be kept free from debris, leaves, paper and wind-blown material. Your FieldTurf field should be a designated non-smoking area.

### MAINTENANCE TASKS

#### Debris Removal

Windblown debris should be removed from the FieldTurf field's surface as quickly as possible and on a regular basis. This can be accomplished with equipment such as the FieldTurf 46" Sweeper, which can be pulled by a conventional lawn tractor equipped with pneumatic turf tires.

The Hydraulic Sweeper unit is designed specifically for the FieldTurf surface in order to remove excessive debris quickly and efficiently. It is designed to remove debris such as sunflower seeds, etc., that may be embedded in the infill, without damaging the surface. It is equipped with a hopper and screen specifically designed to capture debris and allow the removed infill to filter back through the screen and onto the field surface.

A conventional tractor (16 to 20 hp) equipped with pneumatic turf tires, a 3-point hitch and a hydraulic pump delivering a minimum 7 to 9 gallons per minute is used to pull the Hydraulic Sweeper. Raise the unit off the ground when in transportation mode to avoid damaging the equipment and surrounding surfaces.

#### Brushing and Grooming

The RT Groomer is a custom made unit that will groom the field using its two specific features individually or in tandem. One feature of this unit comprises a reel equipped with spiked wheels designed to penetrate the infill in order to loosen the infill without damaging the grass fibers. Another feature of the groomer is comprised of light raking tines attached to the rear of the unit. The tines are designed to groom the exposed grass fibers to keep them from matting down. The benefit of the RT Groomer is to maintain the designed long-term performance characteristics of the field with the least amount of abrasion to the surface.

The HDT-15, a 15' wide drag brush (7' model also available) and groomer is designed primarily for more rapid maintenance. The purpose of the HDT-15 Groomer is to straighten the flattened exposed fibers and to loosen the top portion of the infill. The brushing direction should be between the panels from sideline to sideline. The HDT-15 Groomer is equipped with rows of tines and brushes used to agitate exposed fibers. The tines and the brushes can be used to groom the field independently or in tandem as required.

The GroomAll is a custom made, all-in-one unit (Hydraulic Sweeper, RT Groomer & Drag Brush). The single unit handles all grooming needs, which include: debris removal, brushing, loosening & leveling infill.

### MAINTENANCE EQUIPMENT

#### FieldTurf GroomRight

The FieldTurf GroomRight is the industry's premier groomer that brushes fibres, perforates infill, stirs up the infill and then levels the infill - all while ensuring that the fibres remain brushed and the field stays in excellent condition. This is yet another state-of-the-art innovation from the world's most trusted turf manufacturer. The GroomRight's W shaped brush reduces infill "jumping" since it shears its way through the fibres. The unit runs flat which allows for rotating tines and "rake" tines. It also picks up debris. The Rotating Tines (RTs) are located behind the front brush. This is the first time that rotating tines have been combined with the brushes in this fashion. The RTs perforate the infill which helps loosen it up. The Regular tines follow the RTs and they stir up the infill and fibres. This also helps loosen the infill and keeps the field performing at an optimum level.



## Field Building Handbook

### Groomer Model RT

The Groomer Model RT is a custom-made unit that will groom the field using its two specific features individually or in tandem. The groomer is equipped with adjustable pneumatic tires, which will allow raising and lowering of the spiked wheel portion of the unit.

### Groomer Model HDT-15

The HDT-15 is a 15" wide groomer designed primarily for the rapid maintenance of football and soccer fields. The purpose of the HDT-15 is to straighten the flattened exposed fibers and to loosen the top portion of the infill. For football fields, the HDT-15 can be handled between the 5 yard lines. The HDT-15 groomer is equipped with rows of tines and brushes used to agitate exposed fibers. The tines and brushes can be used to groom the field independently or in tandem as required.

The HDT-15 unit can be pulled by a conventional tractor equipped with pneumatic turf tires and a 3-point hitch. Raise the unit off the ground when in transportation mode to avoid damaging the equipment and surrounding surfaces.

### Agri-Fab 46" Sweeper

This handy lawn sweeper can be used to remove loose surface debris such as leaves, paper, etc. Several sweepers can be combined together to sweep a wider path, if required. The sweepers can be pulled by conventional lawn tractors equipped with pneumatic turf tires.

### Sweeper Model HDBS

The hydraulically operated, heavy duty Sweeper Model HDBS was specifically designed for the FieldTurf surface to remove excessive debris quickly and efficiently. This sweeper is designed to dig into the field surface in order to remove debris such as sunflower seeds that may have become embedded in the infill, without damaging the surface.

### Typical Maintenance Schedule

#### Frequency & Speed

Every 4 to 6 weeks, groom the field by using the RT Groomer. The rake should be dragged in two directions, at right angles to each other. The RT Groomer should be operated at a maximum speed of 6km/hr (4 mph) at all times.

#### Infill Grooming Frequency

Every 6 to 8 weeks, groom the field by pulling the spiked wheel portion and the tines of the RT Groomer over the field surface. The spiked wheels will penetrate into the infill to loosen it and help restore its optimum playing characteristics. This equipment should be pulled in two directions at right angles to each other. The Groomer unit can be pulled with a small lawn tractor or similar vehicle equipped with pneumatic turf tires.

### Removal of Stains

Stains on the FieldTurf surface caused by oil, bodily fluids, food and/or drink, etc., can be cleaned with FieldTurf Scrub Detergent. It is important to thoroughly flush the cleaning detergent from the affected area to avoid the field surface from being slippery and posing a potential safety hazard.

### Maintaining the Infill

Routine grooming of the field will ensure that the infill is uniformly distributed at all times over the entire field surface. Intensive and repetitive use of certain areas of the field may cause the infill material to be displaced. Particularly for soccer fields, these specific areas are:

• Penalty shot spots • Center spots • Corner kick areas

Uniformity of the infill can be easily maintained by replacing the displaced infill in these specific areas following these steps:

Note: Before proceeding with the infill replacement, make sure the grass and the infill are completely dry.

**Step 1:** Using a medium stiff bristle brush and/or a garden rake with metal tines, agitate the exposed fibers in the area requiring infill. This will raise the exposed grass fibers into a vertical position.

**Step 2:** Brush the infill into the grass by lightly agitating the fibers again using a medium stiff bristle brush.

**Step 3:** The top of the infill should be at a level  $\frac{1}{4}$ " below the tips of the exposed grass fibers. Once the grass has been infilled to the recommended level, gently brush the area to assure that the infill settles below the exposed tips of the grass fibers. If the area is blackened, a small mist of water over the area will help drop the infill to the desired level.

### SNOW & ICE REMOVAL

#### Ice Removal

Snow and ice generally do not affect the characteristics of the FieldTurf surfaces. However, the moisture accumulated in the FieldTurf surface may freeze following a rapid drop in temperature combined with high moisture content. There are various solutions available for thawing out your field surface, some good, and some potentially harmful. Please contact the FieldTurf customer service department for complete information on products recommended to safely thaw out your FieldTurf surface.

#### Snow Removal

The safest method to remove snow from your field is to slip a 6" or 8" PVC pipe over the bottom of a snow plow's steel blade so that only the pipe will slide on the FieldTurf surface. This can be accomplished by choosing the pipe diameter that can fit your particular plow blade. After the pipe size has been determined, a single saw cut can be made in order to fit over the plow blade. A bungee cord may be attached in order to hold the pipe in place.

Spinning of wheels is prohibited, and under no circumstances should tires equipped with anti-skid chains be used on the FieldTurf surface. For additional recommendations on how to remove snow from your FieldTurf surface, please refer to our Maintenance Guidelines, or contact the FieldTurf customer service department.



Snow Removal



Qwest Field

### Traffic

Your FieldTurf field is designed to accommodate vehicle loads without causing damage to the unprotected field surface provided the following conditions and recommendations are followed:

Typically bases supporting your FieldTurf field are designed for a maximum load-bearing capacity of 70 pounds per square inch. Vehicles circulating on your field should conform to this load-bearing capacity limit, unless your base has been specially built to support heavier loads. Please refer to your internal design criteria to verify the maximum acceptable load your base can accommodate.

- Only vehicles equipped with pneumatic rubber turf tires should be allowed to circulate directly on the field surface.
- Turning should be done in a wide radius.
- Turning of the vehicle should only be done when the vehicle is in motion.
- All vehicles should circulate at slow speeds at all times.
- Abrupt and sudden braking should be avoided.
- Sudden acceleration and spinning of wheels must be avoided at all times.
- Vehicle wheels should be clean at all times to prevent mud or dirt from being deposited on the field surface.
- All vehicles in direct contact with FieldTurf surfaces should be inspected for possible leakage of oil or hydraulic fluids prior to accessing the field.
- In order to avoid rutting of the infill and of the underlying base, circulation of vehicles on outdoor saturated fields is not recommended.
- A layer of ¾" thick plywood must be placed over a vinyl tarp covering the field to a minimum distance of 40' to 60' (12 to 20 m). The protective cover, against heavy and automobile sized vehicle circulation, should be installed at all entrance and exit points to the field.

Please note that the FieldTurf surface should be swept and/or groomed following heavy traffic.

### Cleaning of Footwear

Mud and dirt from cleated shoes can be a major source of soiling and staining the field surface. In order to avoid this, it is recommended that each player clean his or her footwear prior to accessing the field. Installing cleat brushes at all designated access points to the field can do this. The cleat brush will assure that the footwear is cleaned on all 3 sides.

## FIELD BUILDING TIMELINE

### Planning & Design Team Formation – 3 weeks

#### Planning & Design Considerations – 4-8 weeks

- Water Management
- Environmental Design
- Usage Intent/Requirements

#### Budgeting – 2-3 weeks

- Site Location
- Permits
- Planning & Design
- Field Construction (Base & Surface)
- Construction of Amenities

#### Fundraising – 6-10 months

- Campaign Organization
- Grants
- Financing
- Bond Campaigns

#### Selecting a synthetic turf system – 3-5 weeks

- Research Manufacturers
- Study Company History and Company Stability for each vendor
- Ask for and check References
- Visit fields and rate product attributes
- Ask vendor for Testing information
- Rate Manufacturing Capabilities of vendors
- Rate Design Capabilities of vendors
- Rate Warranties of vendors
- Consult the "Top Ten Factors" printout outlining the most important things to consider when selecting a turf vendor
- Ask all vendors the questions from the "Questions to Ask your turf vendor" brochure

#### Specification Writing/RFP/Purchasing Agencies – 1 month

- Writing Specifications
- Bid Process
- Request for Proposal (RFP)
- Design/Build Projects
- Design/Bid Projects
- Purchasing Agencies

#### Base Construction Process – 3-4 weeks

- Site Investigation & Permitting
- Install Construction Entrance/Track Protection along with Erosion and Sediment Controls (if necessary)
- Field Excavation to Subgrade
- Install Perimeter Concrete Curb/Nailer
- Install Geotextile Fabric and Field Underdrain System (per site specifications)
- Install Free Draining Base Stone and Finish Stone

#### Turf Installation Process – 3 weeks

- Off load turf rolls and place turf
- Sew turf panels
- Install Field Markings and Decorative Markings
- Install Infill
- Remove Construction Entrance/Clean Up/Demobilize/Test Field

#### Post-Install Follow Up – 2 weeks

- Certificate of Completion
- Warranty
- Maintenance Training/Equipment
- Payment Schedule

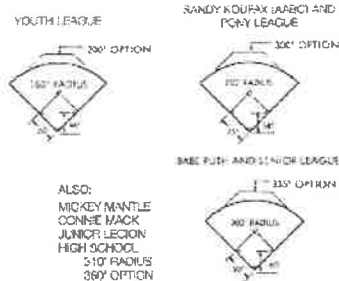
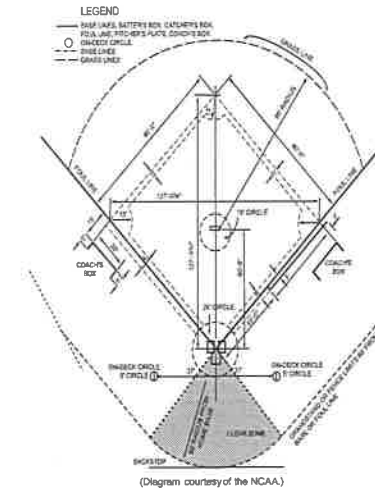
## FIELD BUILDING CHECKLIST

	YES	NO
<b>DESIGN &amp; BUILD</b>		
1. A planning team has been assembled		
2. The intended use/sports to be played on the field have been determined		
3. An appropriate site has been selected		
4. We have ensured that the turf manufacturer offers free in-house design/build consulting		
5. We have ensured that the turf manufacturer offers free in-house water management consulting		
6. We have accounted for lighting, fencing, seating, locker rooms, parking, concession stands, etc.		
7. We have verified if there is an existing running track surface that needs to be taken into account		
8. Permit requirements have been researched and documented		
9. A soil analysis has been conducted		
10. The turf manufacturer is compliant with environmental standards and green building regulations which provide for LEED credits		
<b>BUDGETING</b>		
11. The amount of land needed has been confirmed		
12. The scope of base work that may need to be done is clear		
13. We know without a doubt that we are investing in quality and durability		
14. The life of the manufacturer's turf product has been presented to us based on past performance		
15. A payment schedule has been created		
<b>FUNDRAISING</b>		
16. A fundraising committee has been established		
17. Our financial needs have been identified		
18. We have gained the support of parents involved		
19. A booster club has been created		
20. Grant opportunities have been explored		
21. We have looked at available financing options and the options presented from the turf manufacturer		
22. A petition has been initiated for a bond campaign		

	YES	NO
<b>RESEARCHING THE MANUFACTURER</b>		
23. The turf manufacturer's references have been thoroughly reviewed		
24. The turf manufacturer offers free in-house design/build consulting		
25. Their 8 year third-party insured warranty provides the best coverage available		
26. The manufacturer has achieved an exceptionally high level of quality control		
27. We have verified how many fields the manufacturer has produced/installed that have lasted 8 years or more		
28. The mass of infill per square foot has been confirmed		
29. The composition of the infill is known		
30. The manufacturer's fields conform to Maximum Safety & Performance (MSP) standards throughout the course of their lifespan		
31. Seaming methods used during installation are known and justified		
32. The backing material of the turf product is recognized as being naturally porous or perforated		
33. The fiber technology offered has been explained		
34. An appropriate amount of relevant tests have been carried out		
<b>SPECIFICATION WRITING &amp; THE BID PROCESS</b>		
35. The specification we have drafted will ensure that we get the best turf product with the highest return on investment		
36. I have thoroughly looked into cooperative purchasing programs and state contracts		
37. We are aware of the most efficient ways to get the product we really want		
<b>BUILDING THE FIELD</b>		
38. A soil analysis has been conducted		
39. The base complies with the needs of the turf		
40. Drainage capabilities have been maximized		
41. The experience and references of the turf installers have been researched		
<b>POST INSTALL FOLLOW-UP</b>		
42. The turf manufacturer has provided me with maintenance equipment options		
43. The certificate of completion has been finalized		

## APPENDIX

### BASEBALL

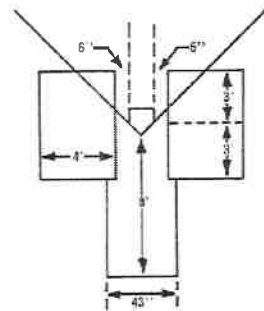


### FOR MORE INFORMATION CONTACT:

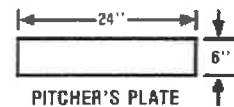
USA Baseball  
P.O. Box 1131  
Durham, NC 27702  
(919) 474-6721  
Fax: (919) 474-8822  
www.usabaseball.com

American Amateur  
Baseball Congress  
100 W. Broadway  
Farmington, NM 87401  
(505) 327-3120  
Fax: (505) 327-3132  
www.aabc.us

National Collegiate  
Athletic Association  
700 W. Washington St.  
Indianapolis, IN 46206  
(317) 917-6222  
Fax: (317) 917-8888  
www.ncaa.org



HOME PLATE



PITCHER'S PLATE

(Diagrams courtesy of USA Baseball.)

### SOFTBALL

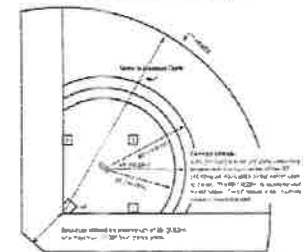
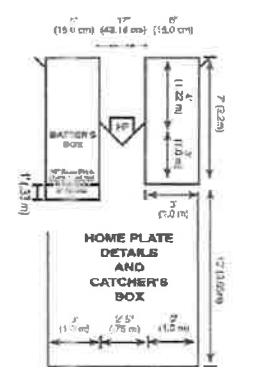


OFFICIAL/DISTANCE TABLE					
ADULT					
GAME	FENCES DIVISION	BASES	PITCHING	Minimum	Maximum
Fast Pitch	Women	60' (18.29 m)	43' (13.11 m)	200' (60.96 m)	250'
	Men	60' (18.29 m)	46' (14.02 m)	225' (68.58 m)	250'
Modified	Women	60' (18.29 m)	40' (12.19 m)	200' (60.96 m)	275'
	Men	60' (18.29 m)	46' (14.02 m)	265' (80.80 m)	300'
Slow Pitch	Women	65' (19.81 m)	50' (15.24 m)	265' (80.80 m)	275'
	Men	65' (19.81 m)	50' (15.24 m)	300' (91.44 m)	315'
16-and	Women	55' (16.76 m)	38' (11.58 m)	200' (60.96 m)	250'
	Men	60' (18.29 m)	38' (11.58 m)	250' (76.20 m)	300'
YOUTH					
GAME	FENCES DIVISION	BASES	PITCHING	Minimum	Maximum
Fast Pitch	G10-U	60' (18.29 m)	35' (10.67 m)	175' (53.34 m)	225'
	G12-U	60' (18.29 m)	40' (12.19 m)	200' (60.96 m)	225'
	G14-U	60' (18.29 m)	40' (12.19 m)	200' (60.96 m)	225'
	G16-U	60' (18.29 m)	40' (12.19 m)	200' (60.96 m)	225'
	G18-U	60' (18.29 m)	40' (12.19 m)	200' (60.96 m)	225'
	G18-U Gold	60' (18.29 m)	43' (13.11 m)	200' (60.96 m)	225'
	G18-U	60' (18.29 m)	35' (10.67 m)	150' (45.72 m)	175'
	B12-U	60' (18.29 m)	40' (12.19 m)	175' (53.34 m)	200'
	G14-U	60' (18.29 m)	46' (14.02 m)	200' (60.96 m)	225'
	G16-U	60' (18.29 m)	46' (14.02 m)	225' (68.58 m)	250'
Slow Pitch	G10-U	60' (18.29 m)	40' (12.19 m)	175' (53.34 m)	200'
	G12-U	60' (18.29 m)	46' (14.02 m)	175' (53.34 m)	200'
	G14-U	65' (19.81 m)	50' (15.24 m)	225' (68.58 m)	250'
	G16-U	65' (19.81 m)	50' (15.24 m)	225' (68.58 m)	250'
	G18-U	60' (18.29 m)	40' (12.19 m)	200' (60.96 m)	225'
	G12-U	60' (18.29 m)	46' (14.02 m)	225' (68.58 m)	250'
	G14-U	65' (19.81 m)	50' (15.24 m)	275' (83.82 m)	300'
	G16-U	65' (19.81 m)	50' (15.24 m)	275' (83.82 m)	300'

If the base distances or the pitching distance is found to be at the wrong dimensions during the course of the game, correct the error with the nearest, and continue playing the game. Every effort should be made by the umpire to obtain the correct dimensions.

\*major church or industrial leagues use 65' base distances.

If the base distances or the pitching distance is found to be at the wrong dimensions during the course of the game, correct the error with no penalty and continue playing the game. Every effort should be made by the umpire to obtain the correct dimensions.  
\*Major youth or indoor leagues use 65' base distances.



(Diagrams courtesy of the ASA.)

Note: The only difference between college and high school is the pitching distance. The slow-pitch pitching distance for high school 12" softball may be 50' (by state association adoption).

High School fast pitch male.....46'  
slow pitch male.....46'  
slow pitch female.....46'  
fast pitch female.....40'  
College.....43'

### FOR MORE INFORMATION CONTACT:

Amateur Softball Association  
2801 N.E. 50th St.  
Oklahoma City, OK 73111  
(405) 424-6266  
Fax: (405) 424-3855  
www.asasoftball.com

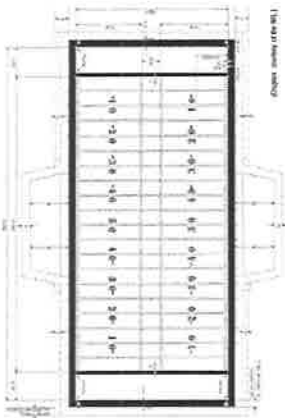


Field Building Handbook



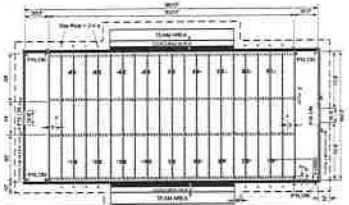
FOOTBALL

PROFESSIONAL

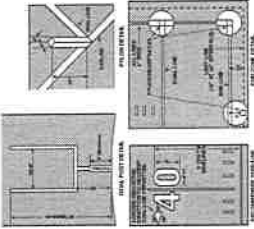


(Diagram courtesy of the NFL)

COLLEGE



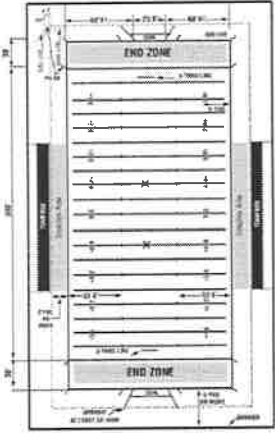
(Diagram courtesy of the NCAA)



FOR MORE INFORMATION CONTACT: National Football League, 1000 Pennsylvania Avenue, N.W., Washington, D.C. 20004-2400, Tel: 202-637-5000, Fax: 202-637-5001, www.nfl.com

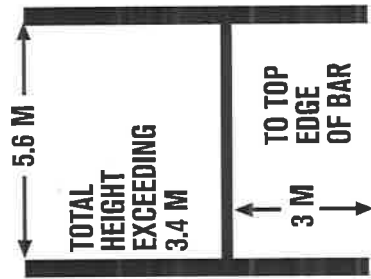
FOR MORE INFORMATION CONTACT: National Football League, 1000 Pennsylvania Avenue, N.W., Washington, D.C. 20004-2400, Tel: 202-637-5000, Fax: 202-637-5001, www.nfl.com

HIGH SCHOOL (11 PLAYER FIELD)



(Diagram courtesy of the NFHS)

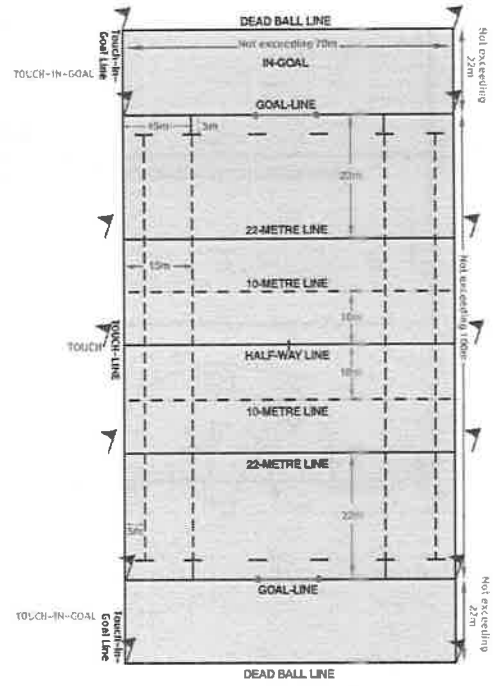
RUGBY



FOR MORE INFORMATION CONTACT:

USA Rugby, 1000 Pennsylvania Avenue, N.W., Washington, D.C. 20004-2400, Tel: 202-637-5000, Fax: 202-637-5001, www.usarugby.org

Note: Posts with flags must exhibit a minimum height of 1.8 meters above ground.



(Diagram: courtesy of USA Rugby)





## LACROSSE

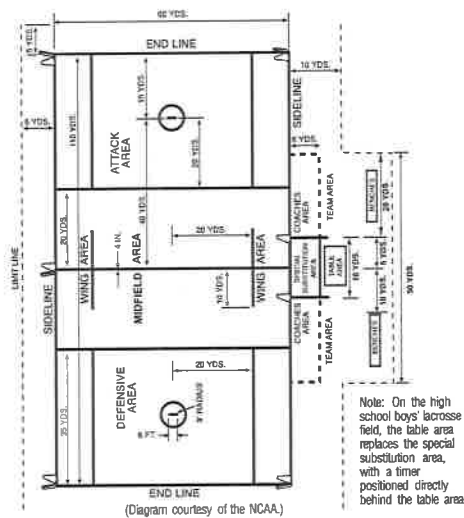
## GLOSSARY

### Synthetic Grass and Artificial Turf Glossary

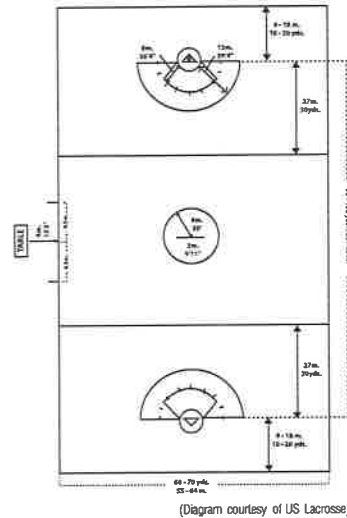
Throughout the course of your Field Building project, you will no doubt run into industry terms that you are unfamiliar with. This glossary will help clarify some of the terminology that is used by construction managers, installers, artificial turf manufacturers, architects, and engineers to describe important elements of the field building process.

TERM	DESCRIPTION
<b>Abrasion</b>	The damage caused by aggressive grooming equipment, heavy traffic with inappropriate footwear, improper vehicle traffic or infill materials that "irritate" or wear the yarn fiber surfaces.
<b>Abrasion Resistant</b>	A measure of the fibers' ability to withstand wear. Abrasion testing is performed mechanically by a tetrapod tester. Actual on-the-floor testing may also be conducted under regulated traffic conditions. Testing onsite at the installation is possible and accredited certification is required of testing facilities.
<b>Accessibility</b>	Ease of access into and from an area - specifically dealing with accessibility as defined by the American Disabilities Act (ADA) in that a public area will be safely accessible to all persons.
<b>Acrylic</b>	A quick drying thermoplastic used for coatings and adhesives.
<b>ADA</b>	American Disabilities Act - sets standards required to be met in public buildings and project sites providing safe, accessible access to all persons. For further details go to <a href="http://www.ada.gov">www.ada.gov</a>
<b>Adhesives</b>	Viscous materials that are used to stick materials together, permanently. (see glue) Adhesives must be selected under various specification criteria; moisture, temperature variances; backing and flooring materials, indoor or outdoor use; conditions of installation; hazardous handling conditions, flammability, contact time frame. Always ask for an MSDS (Materials Safety Description).
<b>Aggregate</b>	Aggregate base materials consist of several different sizes and/or types of crushed quarry rock and dust. Larger, coarser gravels can range from 1/4 inch to over 1.5 inches in average size (radius) and the materials will always be mixed with quarry fines (also known as crusher dust). When used as imported base materials, compaction should occur at every 2 to 4 inch lift or as base materials change.
<b>Ambient Rubber</b>	Ambient rubber is recycled SBR rubber. Ambient rubber crumb has jagged edges and is the most plentiful and cheapest kind available.
<b>Anti-Static</b>	The ability of the fibers to disperse electrostatic charges and reduce the build-up of static electricity.
<b>Anti-Microbial</b>	Yarn or surface materials chemically treated to reduce the growth of common elements. Additives treat specific challenges such as bacteria, fungi, yeast, mold and mildew.
<b>Appearance Retention</b>	Appearance retention, or the ability to remain visually attractive during its expected life, is directly affected by such factors as turf construction, performance of pile yarns, and the appropriateness of the turf selected for the end-use.
<b>ASTM</b>	American Standards
<b>Attached Cushion</b>	A cushioning material, such as foam, rubber or urethane, adhered to the backing fabric side of the turf to provide additional dimensional stability, thickness and padding for fall zone safety.
<b>Average Pile Yarn Weight</b>	Mass per unit area of the pile yarn including buried portions of the pile yarn. In the US - this is usually expressed as ounces per square yard.
<b>Backings</b>	The materials that make up the underside of finished turf. The primary backing anchors the pile yarns, while the secondary backing provides extra dimensional stability and locks in the stitches.
<b>Base Materials</b>	Imported job materials that will be used to construct the foundation over existing sub-base (native soils or other surfaces) and under the final installation of synthetic grass surface materials. Base materials may be comprised of but not limited to, the use of crushed, clean gravel; mine rock and fines; compactable aggregates and road base.
<b>BCF</b>	Bulk Continuous Fiber (BCF). Continuous strands of synthetic fibers that are spun into yarn and texturized to increase bulk and cover.
<b>Bobbin</b>	Yarn fibers are wound around the bobbin to store it and then when mounted on the tufting machine, the bobbin holds the yarn in place while it's fed into the process.

### MEN'S & BOYS'



### WOMEN'S & GIRLS'



### FOR MORE INFORMATION CONTACT:

US Lacrosse  
113W. University Pkwy.  
Baltimore, MD 21210  
(410) 235-6882  
Fax: (410) 366-6735  
[www.uslacrosse.org](http://www.uslacrosse.org)

National Collegiate  
Athletic Association  
700 W. Washington St.  
Indianapolis, IN 46206  
(317) 917-6222  
Fax: (317) 917-6888  
[www.ncaa.org](http://www.ncaa.org)

National Federation of  
State High School Associations  
P.O. Box 690  
Indianapolis, IN 46206  
(317) 972-6900  
Fax: (317) 822-5700  
[www.nfhs.org](http://www.nfhs.org)

## Field Building Handbook

<b>Bonded Urethane Cushion</b>	A urethane foam product, granulated and bonded to form a porous foam sheet, frequently used as an extra cushion or padding.
<b>Breaking Strength</b>	How much resistance is expressed as pounds of force applied to one inch width in both the direction of the warp and the filling yarn.
<b>Broadloom</b>	A term used to define turf materials and other woven items that are produced in widths greater than 6 feet wide.
<b>Brooming</b>	Another term for de-fibrillating or brushing-up the blades of grass or to describe the use of a broom to work infill materials into the surface (brooming in the infill - brooming up the turf fibers).
<b>Buckling</b>	A condition of wrinkling, bubbling, or ridging of turf following installation. Changes in humidity, temperature or base materials can sometimes affect conditions. Buckling can also be a manufacturing defect such as delamination.
<b>Bulking</b>	A method of processing yarn, usually by a mechanical means, to fluff it up and give more coverage with the same weight. Also known as texturizing and lofting.
<b>Butt-fit (Cross) Seam</b>	This seam is set across the width of the materials. Lines of stitches from both pieces are set together to continue the lines of stitches between pieces. The stitch lines are off-set, this seam may show.
<b>CWA</b>	American Clean Water Act which requires that water run-off from rain, snow melt and irrigation be managed to reduce toxic substances introduced into the water and insure public safety.
<b>Chalk and Chalk Line</b>	Chalk is used either in solid form or in powder form for marking. Powder forms of chalk, in various colors, are added to a chalk line to be used to snap a straight line across a surface.
<b>China Marker</b>	Used to mark porcelain pottery and dishware, a "china marker" is a grease pencil that can be used to mark the backing of the synthetic grass materials and fabrics used in construction.
<b>Clay Soils</b>	An earthy soil that retains moisture and when moist can almost be the consistency of putty. When dry, clay soils are notably dusty, hard and unworkable. Devoid of any organic materials, clay soils generally percolate slowly, if at all. Then saturated soils can rut and compact under heavy weight loads.
<b>Colorants</b>	Additional elements introduced into the yarn fiber manufacturing to add color to the finished yarn.
<b>Combination</b>	A term that refers to yarns or fibers that are combined; one yarn is composed of two or more yarn fibers having the same or different fibers or twists: e.g. one yarn may have a low twist and the second yarn little or no twist at all.
<b>Compaction</b>	The act of compressing the surface materials to reduce air content, decrease percolation and increase surface stability. Compaction should happen at every 2 to 4 inches of lift and at every change of material used. It is recommended never to attempt to compact 6 or more inches of lift; you will find that compaction is extremely ineffective and poor results make the area settle in time.
<b>Compounding</b>	Mixing a selection of polymers, pigments, stabilizers and additives to the yarn's style or specification.
<b>Compressional Strength</b>	The amount of resistance to compression from surface weight.
<b>Conditioning Surfaces</b>	Any synthetic turf surface can produce a static charge. New blades can be the typical cause; larger areas and roof-top installations generally need some assistance. When materials are exposed to outdoor elements, over time, the grass tends to lose the ability to create or hold static in any way. To eliminate any potential for static charge or to alleviate a problem, simply condition the area with a 5 to 10% solution of fabric softener and water, sprayed generously across the surfaces. We recommend an unscented liquid, biodegradable where possible. Leave the materials on overnight and then rinse. You may need to repeat the application in a few weeks. Generally, after the first winter, the grass blades are grounded and can't hold a static charge due to the accumulation of materials on the blade surfaces.
<b>Continuous Filament</b>	A single, continuous, strand of synthetic fiber extruded in yarn form.
<b>Cover</b>	The degree to which the backing is concealed by the face yarn.
<b>Creei</b>	A rack or framework at the tufting machine that is designed to hold yarns so that ends can be withdrawn smoothly and evenly without tangling during the tufting process.
<b>Crimping</b>	The processing of yarn, by heat or air pressure, to fix a wavy texture into the yarn and increase bulk.
<b>Cross Seam</b>	Seams made by joining the ends of two pieces of synthetic grass together (aka a butt-fit seam).
<b>Cross Section</b>	The shape of an individual filament or fiber when cut at right angles to its axis. Manufactured fibers used for various turf types can have several solid shapes including: round, trilobal, pentalobal and may even be hollow.
<b>Cross-Dyed</b>	Multi-colored effects produced when turf is tufted using more than one color of yarn fiber.

<b>Crumb Rubber</b>	Granules of new or recycled rubber materials used for infill or top dressing on synthetic grass materials. Granules are specified as new (EBDM) or recycled (SBR) rubber and are sized by the smallest and largest average radius of the granules contained in the packaging. Size of granules used will depend upon the application; putting green surfaces require smaller grain size than lawn areas.
<b>Crushed Gravel</b>	Gravel that does not contain small particles or fines.
<b>Crush Bands</b>	Marks that appear widthwise in the turf pile due to wrinkles in the fabrics, created during rolling or due to the flattening of the turf roll during storage.
<b>Crushing</b>	Crushing is irreparable loss of pile height caused by traffic or weight.
<b>Crush Recovery</b>	Crush recovery describes the ability of the synthetic grass surfaces to rebound back upright after being walked on or having weight from furniture or other elements on it. To encourage good recovery, all synthetic grass surfaces made for lawn and landscape will benefit from some amount of infill materials which provide horizontal and vertical stability as well as UV protection for blades and backings.
<b>Cryogenic Rubber</b>	Cryogenic rubber is recycled SBR rubber that is frozen and shattered, creating smooth-sided spherical particles.
<b>Culvert</b>	An enclosed pipe or pipeline used to carry run-off water; generally under roads and buildings.
<b>Cut Pile</b>	A finished turf surface in which the face is composed of cut ends of pile yarn.
<b>Cut and Loop Pile</b>	A finished turf surface in which the face is composed of a combination of cut ends of pile yarns and loops of other fibers.
<b>Decomposed Granite</b>	Decomposed granite or DG is a common building material used for basic synthetic grass lawn and landscape projects. A minimum of 2 inches to a maximum of 4 inches of DG can be used confidently, under most building conditions. DG can hold moisture and become saturated in damp climates making the surfaces prone to failure (ruts, dents, sinking issues) especially if required to hold heavy weight loads. Under climate conditions where rainfall or snow pack may saturate soil conditions, ASGI recommends use of a minimum of 3 inches of road base or 3/4 inch aggregate with fines, instead of DG.
<b>De-Fibrillation</b>	The "blooming" of turf products prior to installation of infill. Over defibrillation can wear out fibers.
<b>Delamination</b>	Separation of the secondary backing or attached cushion from the primary backing of the turf.
<b>Degradate, Degradation</b>	The "wearing out" or weakening of a system or substance. "The effectiveness of UV protection, the strength of fibers, backing and the porosity of a surface might degradate during the life of the turf."
<b>Denier</b>	Denier, or fiber (or pile) mass, is the amount of yarn fiber (pile) per specified area of turf. Generally by square foot, yard or square meter.
<b>Density</b>	Density refers to the amount of pile yarn per area of turf or the closeness of the tufts. Higher density turf improves resistance to crushing and matting.
<b>Dimensional Stability</b>	Refers to the ability of the finished turf surfaces to retain its original size and shape.
<b>Direct or Double Glue Down</b>	The installation method whereby the turf is adhered to the floor using adhesives. A Double Glue Down refers to the installation of a cushion direct to the flooring and the turf to the cushion.
<b>Double-Glued Seams</b>	Double-glued seams attach turf to bare floor to prevent delaminating and edge ravel. Installers should double-glue seams to prevent fuzzing.
<b>Drain Rock</b>	Any 1/2 to 1.5 inch round rock or gravel used for layers of compactable drainage base material. Drain rock is typically the first materials to be used over native soils, drainage and fabrics. A secondary layer of porous fabrics should be used over the drain rock, prior to additional compactable base materials being imported and compacted on top. This drain rock layer should be a minimum of two inches deep and can be used when constructing dry well or curtain drain applications.
<b>Drop Spreader</b>	A drop spreader is normally used for the application of fertilizers, seeds and other top dressed materials where the calibration of the amount of materials deposited per square foot or acre needs to be measured evenly across the surfaces. Drop spreaders can be designed as walk-behind or tow-behind units and the hoppers can hold from 50 to hundreds of pounds of materials. At the base of the inside of the hopper, a rotating cylinder helps move materials through adjustable openings in the hopper floor, allowing a measured amount of materials to drop out of the bottom of the hopper.
<b>Dry Hand</b>	The feel of the turf is dry to the touch.
<b>DTEX</b>	DTEX is the abbreviation for decitex; the weight of yarn in grams of 10,000 meters of yarn. Most synthetic yarns for turf are specified by DTEX. A general specification of 8800 DTEX is common.

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<b>Dry Well</b>	A dry well describes any type of basin created under ground to catch watershed and help hold it during native soil percolation. Dry wells can be constructed from drums (preferably polyethylene), fabrics and drain rock, or a variation of both. Dry well treatments are an extremely effective way to relieve surface water retention to below a synthetic grass installation in damp climates; especially in heavy clay soil regions. Dry wells can be any depth, size and shape that is appropriate for need and site conditions.
<b>Durability</b>	Durability is a measure of how long something will last under a series of conditions. Synthetic grass materials are extremely durable and stand up to a great deal of traffic, extremes of outdoor conditions, high and low UV factors, use and abuse. Each component of the turf system is engineered with durability in mind and as a system is designed to bring together the best components to deliver the highest durability available.
<b>EDPM Rubber</b>	EPDM rubber (ethylene propylene diene M-class rubber) is most often used in vehicles and for roofing.
<b>Extrusion</b>	Melting the mixture of selected polymers, pigments, process stabilizers and additives used in making yarn fibers.
<b>Fabric</b>	Materials used under and through-out the construction of a synthetic grass project. Woven and non-woven, commercial grade materials provide additional horizontal and vertical stability to every install. See Underlayment Fabric.
<b>Face</b>	Also known as the nap or the pile of the surfaces of turf. It describes the total visible surface of the finished turf materials.
<b>Face Weight</b>	Face weight is the number of ounces of fiber per square yard in the face of the turf (not including the backing). The face weight affects performance and durability. Face weight is different from density because it varies with turf height.
<b>Fading</b>	Loss of color. Caused by actinic radiation, such as sunlight or artificial light; atmospheric gases, including ozone, nitric oxide and hydrogen sulfide; cleaning and bleaching chemicals, such as sodium hypochlorite and other household and industrial products; chlorine chemicals for swimming pools; and other factors. Commercial installations in areas where such exposures occur require extreme care in selection of colorfast turf.
<b>Fadeometer</b>	A laboratory device for determining the effects of light on the properties of yarns, fibers, fabrics, turf, plastic and other materials. It uses a standard light source to simulate approximately the spectrum of sunlight. Generally used for measuring fade resistance of turf colors, which are rated according to the number of units of exposure required to produce visible loss of color.
<b>Feathering</b>	Using a soft, gentle motion, base materials can be "feathered" into one another; one pile of materials into another pile; during base construction. The action of feathering is to achieve a smooth transition between piles or types of materials over the site. You can also "feather" infill materials into a surface where infill may need to be added. The word describes a "light touch" to what ever action you choose.
<b>Fiber</b>	Fiber is the fundamental component of turf. Turf fibers are made from nylon, polypropylene or polyethylene, colorants, stabilizers and other enhancements to provide features such as low-slip, UV protection, anti-static, anti-microbial in nature.
<b>Fiber Material</b>	Yarn fibers can be manufactured from various natural and synthetic materials. Synthetic grasses and artificial turf are typically made from one or a combination of two or more of the following fiber materials; nylon, polypropylene or polyethylene.
<b>Fiber Style</b>	A fiber's style can be made up of several specifications; fiber weight, fiber color, fiber length, etc.
<b>Fiber Thickness</b>	A fiber's thickness is measured by its height on the edge of the fiber. Fibers are processed in several steps and a fiber's finished thickness can vary from its original measure - much like a 2 x 4 piece of lumber is not 2 inches by 4 inches when finished and sold for use in construction. The number of blades per stitch need to be taken into account when reviewing the value of a fiber's thickness for lawn and landscape use unless the project is under extreme traffic or weight loads.
<b>Fiber Width</b>	The width of the fiber is measured across its "face" and can affect the color, shine, vertical recovery and durability of the fibers under extreme conditions; especially field applications.
<b>Filament</b>	A single, continuous strand of synthetic fiber.
<b>Fibrillated Tape</b>	A type of yarn styling that produces tapes that vary in width. The tapes are slit length wise at random intervals, across the width of the tape. The tape is twisted and placed on dowels (bobbins) ready for the mills to tuft it into backings to make turf. These fibrillated tape fibers will split during the infilling steps, causing the turf surfaces to "bloom" or de-fibrillate, creating a natural looking surface.
<b>Fibrillation</b>	Stretched polymers are cut into specified thickness and then cut again to pierce the yarn surfaces for later finishing during installation (commonly called blooming or de-fibrillation).

<b>Fines</b>	You could describe fines as the dust-like and small particles of finer crushed gravels and rocks. The particles mixed with larger gravel help to create a compactable base material. Fines alone can also compact, though denser than fines mixed with larger crushed gravel. Fines are usually described as any quarried material that is smaller than 1/4 inch to the texture of fine silt or talcum powder.
<b>Fire Retardant</b>	Additive to enhance the fire retardancy of the synthetic grass fibers; generally, most fiber materials will not combust, however they will melt at temperatures exceeding 500 degrees (F). Each synthetic grass material will be different and if needed for purposes of liability or accountability, manufacturers are required to have this information on file - ask for the MSDS (Materials Safety Data Sheet) for your product.
<b>First Generation Turf</b>	A tightly curled, nylon fiber, woven into a foam backed material. The first installations were engineered to be glued down on top of hard surfaces, such as concrete and asphalt. The First Generation of turf was inspired by the Ford Foundation's request to improve inner city play areas.
<b>Flammability</b>	See Pill Test.
<b>Flexural Strength</b>	The amount of bend or flex something exhibits against pressure.
<b>Float</b>	To float materials is to gently and smoothly spread them across the installation site. The objective is to level the surfaces without ruts or bumps in the surface; the surfaces level in all directions, etc.
<b>French Drain</b>	A true french drain would only incorporate the use of a swale or culvert and drain rock to provide a channel in which water could shed away from building foundations. Today, most construction techniques that call for a "french drain" system incorporate the use of 3 to 4 inch corrugated, flexible pipe, fittings and the construction of a drain channel, with fabric, drain rock, pipe, pipe sock and call it a "french drain" - either method has its merits and uses and we encourage you to engineer your site plans to accommodate the worst weather conditions possible in your site's area.
<b>Gauge</b>	The distance between two needle points expressed in fractions of an inch in US. Turf is stitched into the backing at pre-set widths between rows--this is the gauge of the stitches. Generally, turf is manufactured at one of the following gauges: 5/16", 3/8", 1/2" to 3/4" stitch gauge.
<b>Glue</b>	Adhesives that make materials stick to one another.
<b>Glue Down</b>	The need to glue the turf materials to the flooring. Adhesives are selected for indoor or outdoor use, moisture, temperature variables, flooring and turf backing materials; use and function.
<b>GMAX</b>	The amount of "bounce" of a synthetic grass surface - GMAX can be estimated for general use such as lawn applications; if used in public works projects where fall zone safe areas are required to meet ASTM standards, GMAX results can be determined by accredited testing facilities that provide onsite testing services and a certificate of validation of test results. GMAX is set on a turf surface in a variety of ways, the most common being the use of rubber pad materials over the base materials and under the turf surfaces; the use of crumb rubber and specific pile height, weight and density to achieve desired results of 6 to 12 foot fall zone safety. Surfaces that rely upon 100% crumb rubber infill and rubber pads to achieve fall zone safe installations should be tested for GMAX compliance every year; especially in high traffic sites in damp climates.
<b>Granulate (Rubber)</b>	Rubber materials that have been processed into small grains of rubber for use in a variety of finished goods including synthetic grass infill materials. See Crumb Rubber and Mesh.
<b>Hand</b>	The feeling you get from the finished turf when you run your hand over it.
<b>Hard Edge</b>	Hard edges are perimeter edges of a synthetic grass installation project that touch elements that will not or cannot move; walkways, driveways, walls, patios, fences, buildings, foundations, etc. Synthetic grass materials must be hand-trimmed to these edges.
<b>Heat-setting</b>	Heat-setting is the process of heating or steaming yarns to hold their twist. Most nylon, olefin, and polyester cut pile turfs are heat-set.
<b>Horizontal Stability</b>	Horizontal stability is the ability for the sub-base, base and turf systems to work together to keep the installation from stretching, shrinking or collapsing. Horizontal stability is engineered into the project by the selection of the site, base materials, edging, trim elements, base construction, drainage and final grade. Horizontal stability in a synthetic grass material refers to the stability of the primary and secondary backing materials to keep the synthetic grass surfaces from stretching, shrinking or buckling over time.
<b>Hygrometer</b>	A device used to measure the moisture content of concrete prior to turf installation.
<b>Infill</b>	Material used to fill the voids between rows of yarn stitches in certain types of turf. Infill materials are also referred to as "top dressing".

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<b>Infill Seam</b>	Seams running the length of the turf (same direction as the lines of stitches). Sometimes called side or length seams.
<b>Impact Stength</b>	The amount of force, abruptly administered (such as striking a surface with a hammer) that it can handle without damage.
<b>Infield Lines</b>	A term used in the sports field industry to describe the white and other colored lines used to mark end zones, goals, and other indicators that cannot be tufted into the sports turf at the mill.
<b>Knit de Knit (KdK)</b>	Knit de knit is a treatment that is applied to straight turf fibers after their initial creation. The yarn is knitted into socks; heat set, unravelled and wound onto bobbins. This process gives the finished yarn a curly appearance and helps to relieve the effect of pile direction in the grass surfaces; making the surface non-directional. Many nylon, non-fill putting greens and newer lawn grass products use KdK yarn.
<b>Knitted</b>	Knitted turf is formed by interlacing yarn in a series of connected loops - generally synthetic turf is tufted, not knitted.
<b>Latex</b>	Latex is a natural product used as a secondary backing material to lock stitches in place and provide additional dimensional stability.
<b>Lift</b>	A lift describes the raising of the base materials. A lift of two inches will raise the construction site by two inches above the previous level, generally with imported materials. Compaction should happen at every 2 to 4 inches of lift and at every change of material used. Never attempt to compact 6 or more inches of lift, you will find that compaction is extremely ineffective and poor results make the area settle in time.
<b>Lisport Test</b>	A sportfield standardized test used in the field industry to determine wear in tufted materials.
<b>Luster</b>	The brightness, sheen or shine of fibers and yarns. Synthetic fibers are produced in various luster classifications including bright, semibright, semidull and dull. Bright fibers usually are clear (have no white pigment), whereas the duller designations have small amounts of white pigments, such as titanium dioxide. Luster of finished turf also depends upon yarn heat-setting methods, dyeing and finishing. In high-traffic, commercial areas using turf products, duller turf fibers are often preferred for soil-hiding ability.
<b>Macro curl</b>	The amount of curl knitted into a KdK yarn. Macro curl, as compared to micro curl, is a more open shape; like a loosely curled ribbon.
<b>Maintenance</b>	Synthetic grass and artificial turf requires maintenance to keep its appearance. Lower maintenance requirements than natural grasses, synthetic materials still must be kept free of debris, decomposing or composting items, weeds and trash. See ASGI Grooming tips for info.
<b>Matting</b>	Matting is the usually irreversible adhesion of turf yarn caused by traffic or dirt. Matting can be minimized by exercising the turf with either power brushes or manual "raking" it back to height.
<b>Memory</b>	Yarn memory refers to texture retention.
<b>Mesh</b>	The definition of a unit of measurement to determine the size variable of the grains of granulated materials such as crumbed rubber and silica sand infill. Mesh is often stated in variances such as 16-30 and 12-24 which denotes the smallest and largest average size of granules found in the delivered products. Smaller numbers actually represent larger grain sizes (or mesh), larger numbers describe smaller and finer grains of material. No synthetic turf system benefits from infill smaller than 30 mesh and most turf systems and system integrators will use a standard 12-24 mesh for lawn areas and a fine mesh of 16-30 for putting greens and bocce court surfaces. To separate materials, a screening process is used to separate out various size grains to standardize on packaging for use.
<b>Micro curl</b>	The amount of curl knitted into a KdK yarn. Micro curl, as compared to macro curl, is a more tightly wound curl.
<b>Miter Joint</b>	Where two pieces of turf are seamed at a 45 degree angle to each other.
<b>Monofilament</b>	Single-stranded polyethylene blades of grass that are individually tufted into the turf's backing. These fibers do not need to be fibrillated at its tips.
<b>MSDS</b>	Materials Safety Data Sheet or MSDS is created by the manufacturer of a product to provide the details needed to be disclosed regarding the components and ingredients of products manufactured or imported into America (most countries have like standards). Your manufacturer or representative should have a copy of the MSDS on all products included in your project plan. For commercial projects, keeping MSDS on file for each component is critical as many solutions providers may use contact glues and adhesives that require special handling, disposal or fire control or safety issues.
<b>Native Soil</b>	We refer to the natural conditions of the soils of the installation site; native soils can be clay, loam, sand, peat, etc. Native soil conditions and, local rainfall, snow and watershed/drainage aspects of the installation must all be weighed against project use goals when engineering a synthetic grass design.

<b>Needle Punched</b>	Needle punched turf is stitched into backing material.
<b>Non-woven</b>	A fabric made up of a web of fibers held together by a chemical or fibrous bonding agent.
<b>Nylon (PA)</b>	Nylon is the primary product in a synthetic polyamide family widely used as a turf face yarn in either BCF or staple yarn form. Two chemical types, nylon-6,6 and nylon-6, are used in turf. Nylon-6,6 is hexamethylene diamine and nylon-6 is polycaprolactam.
<b>Olefin</b>	Any long chain, synthetic polymer composed of at least 85 percent by weight of ethylene, propylene or other olefin units. Polypropylene and polyethylene are used in turf as both backing and pile fiber. See Polypropylene (PP).
<b>Organic Material</b>	Any material that can decompose over time; bark, amended soils, chips, shells, and other mulch materials: weeds, root systems, natural fibers such as jute, unwanted grasses and plants, etc.
<b>Pea Gravel</b>	Small jelly-bean and round shaped pebbles that can range from 1/4 inch to over 1 inch in size. Pea gravel is used in the construction trade when a permeable base material is required that can be compacted and yet remain porous. Pea gravel can be used for many drainage solutions and as a base under stepping and patio stones, pavers and block systems.
<b>Percolation</b>	The ability of a surface to allow the flow of fluids through it - percolation is generally measured in inches per hour, ounces per second over the amount of surface area, defined. (ie: engineered to optimize drainage by gravity, 30 inches of water can percolate through synthetic grass surfaces per hour).
<b>Perforations</b>	Perforations define the holes drilled or heat punched into the backing of some synthetic turf materials. The perforations provide relief for watershed through the surfaces to accommodate percolation.
<b>Perimeter</b>	The outer edge of the installation site of the synthetic grass area. Each area of synthetic grass has its own perimeter.
<b>Permeable</b>	Permeable means that a surface will allow liquids to flow through itself - how permeable a surface is can be determined by a percolation test. Clay soils will be the least permeable and some, sandy soils will typically be the most permeable (porous) of surfaces.
<b>Pigment</b>	Highly colored, insoluble, powdered substance used to impart color to other materials. White pigments, e.g., titanium dioxide, are dispersed in fiber-forming polymers to produce delustered (semi-dull and dull) fibers.
<b>Pile</b>	A pile is the visible surface of a finished product, often called the face or nap of the turf.
<b>Pile Crush</b>	Loss of pile thickness by compression (matting) and blending of tufts caused by high traffic or heavy weight. Grooming turf surfaces will often lift the pile back to original height. All turf will crush to some degree during its life expectancy.
<b>Pile Density</b>	Number of tufts both across (needles per inch or gauge for tufted turf) and lengthwise (stitches per inch) of the turf.
<b>Pile Height</b>	The height of pile measured from the surface of the back to the top of the pile, not including the thickness of the back.
<b>Pile Length</b>	The length of the extended tufts measured from the primary backing top surface to their tips. Pile tufts should be gently extended but not stretched during this measurement.
<b>Pile Reversal</b>	Pile reversal or shading is a feature of cut pile turf. Traffic bends the turf fiber in different directions creating an impression of light and dark areas. Regular grooming can create uniform shades.
<b>Pill Test</b>	Flammability test for turf to determine its ease of ignition by a small incendiary source, e.g., methenamine timed burning tablet. Federal regulations require all turf sold to pass the pill test (FF1- 70).
<b>Ply</b>	A single component in a piled yarn. The number of "plies" tells how many single ends have been ply-twisted together to form a piled yarn (ie: 6 or 8 ply yarn).
<b>Polyester</b>	A fiber-forming, thermoplastic synthetic polymer. Nearly all polyester turf fiber is staple, and the yarns are spun yarns. Polyester for turf is made from terephthalic acid and ethylene glycol and is known chemically as polyethylene terephthalate.
<b>Polymer</b>	In synthetics, the basic chemical unit from which fibers are made. It is made of large complex molecules formed by uniting simple molecules (monomers).
<b>Polymid (PA)</b>	Nylon is the most well known polymid used in manufacturing today.
<b>Polymide</b>	Material component of backing applications.

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<b>Polypropylene (PP)</b>	Synthetic, thermoplastic polymer used for molded items, sheets, films and fibers. Federal Trade Commission classification is olefin. The polymer is made by stereospecific polymerization of propylene. Most polypropylene turf fiber is solution dyed and sometimes contains ultraviolet stabilizers for outdoor use. The turf fiber is available as both bulked continuous filament yarns and staple for spun yarn production. Slit-film polypropylene is used in woven turf backing.
<b>Polyurethane</b>	Material used as a secondary backing on the back side of synthetic grass materials. Applied as a viscous coating, the polyurethane is sprayed across the surface to help lock-in the fiber stitches and increase the horizontal stability of the synthetic grass materials. The secondary backing process is one of the last in the line of steps to producing finished synthetic grass goods.
<b>Porous</b>	Porous describes the ability of a surface to allow liquid to flow through it. How porous a surface area is depends upon many factors and can be determined by a percolation test.
<b>Post Consumer Materials</b>	Of or relating to products that have been used and recycled by consumers.
<b>Post Consumer Recycled Content</b>	A product that contains some percentage of material reclaimed from consumer waste.
<b>Post Industrial Material</b>	Of or relating to industrial manufacturing waste; also called pre-consumer material.
<b>Post Industrial Recycled Content</b>	A product that contains some percentage of manufacturing waste material that has been reclaimed from a process generating the same or a similar product. Also called pre-consumer recycle content.
<b>Powerbroom or brush</b>	A tool used during the construction and grooming of synthetic grass installations, a powerbroom or brush was developed for use as concrete and asphalt sweepers and adopted by the synthetic turf industry as a tool to help defibrillate (or bloom) synthetic grass surface materials and help to distribute infill materials across the surfaces. A powerbroom can also be helpful to groom surfaces.
<b>Primary Backing</b>	A component of tufted turf consisting of woven or nonwoven fabric into which pile yarn tufts are inserted by the tufting needles. It is the carrier fabric for the pile yarn. Most primary backing is either woven or nonwoven polypropylene.
<b>Proctor Density</b>	The Proctor Density is a measurement used to define the amount of compaction achieved with surface materials used under roads, railways and other surface areas that carry any weight load or require a measurement of compaction to determine stability. Good compaction of sub-base and base materials results in minimizing of its settlement on application of load, increases its density thus increasing its shear strength. The higher the Proctor Density test results, the lower the area's permeability leading to a fall in its water absorption and reduction in its swelling or shrinkage. Most synthetic grass installations are compacted to a 95% Proctor Density to allow for percolation and yet provide a stable surface.
<b>Relief Cuts</b>	Cuts made into synthetic grass materials that will help alleviate any tension in the turf while positioning it and trimming it against hard edges that are curved or odd shaped. Relief cuts can simply be straight cuts from the hard edge outward to the end of the turf, they can be shaped in the form of an H or a T to help wrap surface materials around obstacles such as trees; or "pizza slices" can be made into the turf that is located directly on top of a landscape element such as a large rock, to allow the turf materials to be "slipped" over the obstacle and trimmed off at a later time. Relief cuts can streamline cutting surface materials to fit and in helping to fit materials around obstacles in the landscape.
<b>Resilience</b>	The capability of the turf to bounce back to its original appearance after being used. How well a turf can handle high traffic or compressive force is determined by several factors; resilience of fibers and yarn materials, denier (dtx) and infill system of the turf system.
<b>Rippling</b>	Heat and humidity can cause ruffles or waves in some turf. A professional installer may be able to reset the turf to fix the problem.
<b>Road Base</b>	Road base is a common term used for aggregate materials made up of 1/2 to 1 inch gravel and quarry fines and is compactable to 95% Proctor or more. Used heavily in the construction of base structure prior to the completion of concrete, asphalt, pavers and other masonry projects, road base is a flexible and stable base material used in no less than a 3 inch lift. Road base, due to its nature of small chunky rocks and fines, remains porous and can percolate adequately under most conditions. Excellent choice for extreme lifts of 6 inches or more on any surface. Do Not Compact higher than 95% Proctor or you will lose any percolation and you might as well install concrete!

<b>SBR</b>	SBR is manufactured from recycled tire and other rubber products. It has been used as a major component in turf infill systems, resurfacing of sports activity areas, parks, field & track surfaces, horse tracks and a variety of other coatings and formed rubber products such as mats, bumpers and flooring products for restaurants, daycare and the hospitality industry.
<b>Seaming</b>	The line formed where two pieces of turf are joined. The action of setting the turf and seaming using one or more methods; adhesives, sewing, tacks.
<b>Secondary Backing</b>	Backing material laminated to underside of turf for additional dimensional stability and body. Usually latex foam, jute, polypropylene, vinyl, urethane, or E.V.A.
<b>Second Generation Turf</b>	Polypropylene yarns were introduced along with a new "shag turf" like metaphor in the early 1990s. The new yarns were less abrasive than the first generation turf products.
<b>Selva</b>	Additional backing materials at the outer edges on the width of the turf materials. Most selva is used when seams are sewn and cut off when glued.
<b>Shading</b>	Shading is the same as pile reversal. Shading is the change in the appearance of the turf due to localized distortions in the orientation of the fibers. Shading is not a change in the color or hue, but a difference in light reflection which can cause the turf to appear a different color and seams to show. Orient turf in the same direction when installing to avoid shading.
<b>Shedding</b>	New turf appears to shed blades after installation. Many of these blades were cut away during normal installation and were hidden during job site cleaning. They work their way to the surfaces, during use. Regular blowing and grooming will resolve this problem, quickly.
<b>Sheet Rock Knife</b>	A large step above a "box cutter", sheet rock knives are set up to allow for quick blade changes and may have a more comfortable grip and angle to the handle.
<b>Shrink</b>	Synthetic grass surface materials, like most woven products can shrink or shift under certain conditions. Where temperature variances can change from extreme cold to extreme heat, synthetic grass surfaces can expand and contract. A minor amount of "shrink" can occur on surfaces as they age, though, shifting of turf surfaces is more often noticed and can be mis-identified as shrink.
<b>Slide Seams</b>	Seams running the length of the turf (same direction as the lines of blade stitches). Sometimes called inline or length seams.
<b>Silt and Silting</b>	The word silt can describe any material small enough to begin to coat a surface in such a way as to "choke" out light, liquid and air. Under landscape conditions, silting generally describes the clogging of a surface material that increases puddling, decreasing percolation and may contribute to contamination, weed and moss growth, insects and system failure. Remove all unwanted organic materials and refresh and revitalize your synthetic grass surfaces by exercising and grooming with deep-pile carpet rakes or powerbrushes. This will help to keep line materials from filling voids in between infill materials and will help to redistribute and even-out infill materials on the surface.
<b>(Classic Silt Film)</b>	See fibrillated tape.
<b>Snags</b>	Snags can occur when an object tangles in turf. Usually, you can simply cut the snag with sharp scissors.
<b>Snap Line</b>	A snap line is a small box-like device, filled with chalk powder, that has a long string line wound around the inside where the powder can coat it - the chalked snap line is used to mark a straight line.
<b>Soft Edges</b>	Any landscape or lawn edge that does NOT connect or touch upon a hard, unmoving surface material such as a walkway, path, driveway, wall, fenceline, or other surfaces such as field rocks.
<b>Soiling</b>	Soiling occurs when dirt particles build up in turf fibers. Regular grooming, blowing and cleaning will prevent this problem. Do not use high-suds products to groom. A simple vinegar wash will do for all sugars, salts and grease that might be dropped onto turf fibers.
<b>Solutions Provider</b>	Providing you a finished solution, Solutions Providers are licensed professional installers.
<b>Sprouting</b>	Sprouting occurs when higher turf fibers appear on turf surfaces. Simply cut the sprouts with sharp scissors.
<b>Spindle</b>	See bobbin. A cone shaped core upon which yarn fibers are wound and then stored. When needed, spindle can be loaded into the tufting machine and used to deliver the yarns forward.
<b>Square Foot</b>	The total square foot measure of an area is determined by measuring the length and width of the area and multiplying the two factors together; the result is the total square feet (SF) of an area. An area of 10 feet wide by 120 feet long is 1200 square feet of total area.



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<b>Square Yard</b>	The total square yardage of an area is determined by measuring the length and width of an area; multiplying the factors together and dividing by 9. An area of 10 feet wide by 120 feet long results in a total area of 1200 SF; divided by 9 and the area covers 133.33 square yards (SY).
<b>Stability</b>	Horizontal (left to right & reversed) and vertical (up to down and reversed) stability is important to a synthetic grass installation. Turf materials, their backings, the base and sub-base construction of the job all relate to standards of horizontal and vertical stability. A project's sub-base and base construction should maximize horizontal stability to carry weight load. Synthetic grass' primary and secondary backing materials provide the turf system's surface materials to provide additional horizontal stability and the two, engineered together provide the required stability needed to suit the project objectives. To achieve vertical stability, synthetic turf systems are assisted by the use of infill materials to help stand blades upright and provide resiliency and cushion underfoot.
<b>Static Electricity</b>	Cold and low humidity often create isolated motionless charges of electricity. Some turf products may provide static resistance. Humidifiers also limit static electricity buildup when used indoors. To alleviate static charge on any synthetic grass surface, condition the synthetic grass surfaces with a 5 to 10% solution of fabric softener and water, sprayed generously across the surfaces. We recommend an unscented liquid. Leave the materials on overnight and then rinse. You may need to repeat the application in a few weeks.
<b>Stitch</b>	Stitches are measured per inch (US) and the number of yarn tufts lengthwise to one inch of tufted turf surface is designated as X per SPI (or stitches per inch).
<b>Stitch Count</b>	Most stitch counts are based upon a 3 inch square area of the turf. Taking 3 inch by 3 inch square—count the stitches to determine count.
<b>Stitch Length</b>	Total length of yarn from which a tuft is made. It is numerically equal to twice the pile height plus the associated back stitch behind the primary backing.
<b>Stretching</b>	During several steps, the extruded polymer mixture is pulled and stretched to align the molecules and build in strength. Much like an iron smith works metals to build them up, by pounding and folding and reheating, again and again.
<b>Style</b>	A set of specifications that describes a component of or finished construction of turf materials. Style specifications are designated for yarns, backings and finished tufted materials.
<b>Sub-angular Grains</b>	Sub-angular grains are odd shaped granules of materials. Sharper edges, peaks, cracks and fissures in the surfaces of sub-angular materials make them prone to microbial contamination and degradation, especially under heavy traffic. Sub-angular material degradation can lead to silting of surfaces; ie: used as infill, over time, degradation of granules can decrease percolation, increase hardness of surfaces, decrease resiliency and recovery. Sub-angular grains are shaped in such a way as to make them more abrasive as infill materials, which may lead to synthetic grass blade degradation, at increased rates.
<b>Sub-base</b>	Materials that lie under the surfaces of imported job materials. Native soils, concrete, asphalt and other surfaces can all be referred to as the "sub-base"; subterranean base or foundation.
<b>Swale</b>	A swale is typically used as an open channel to direct water run-off from rain and watershed.
<b>System Integrator</b>	A System Integrator has engineered a specific set of components to deliver and install branded synthetic grass and artificial turf solutions.
<b>Tamp and Tamper</b>	A tamper is a hand tool used to compact small areas of soil or base materials. To tamp or tamping is the process of using the tamper to compact the area.
<b>Tape</b>	Seaming tapes are materials used under the edges of two pieces of synthetic grass which will be used as a part of a seaming system to attach the two pieces of synthetic grass together.
<b>Tensile Strength</b>	The amount of stretch the material exhibits before it breaks due to the pressure of pulling on it.
<b>Texture</b>	The visual and tactile (touch) characteristics of the turf's pile. Texture includes luster, yarn twist, pile "hand", and pile effects such as cut, cut-uncut, high-low loop, and level loop.
<b>Texture Retention</b>	Texture retention or turf memory is the ability of tufts to retain their shape under traffic. Caring for turf will help texture retention.
<b>Texturing Yarn</b>	The process of imparting crimp, loops, or other modifications to continuous filament yarns. Textured yarns have increased cover, resiliency, abrasion resistance, and insulation.
<b>Third Generation Turf</b>	Polyethylene yarn fibers were introduced into the synthetic turf industry in the mid-1990s along with an improvement in the turf system's form, function and stability by introducing the use of infill.
<b>Torsional Strength</b>	The amount of strength exhibited when the material is twisted under pressure.

<b>Trim and Trim Elements</b>	Trim is the material or method used to edge the synthetic grass project where trim elements are the actual materials selected for the edging treatment.
<b>Tuft Bind</b>	Force required to pull a tufted blade out of the backing.
<b>Tufted</b>	Term used to describe the process of manufacturing turf by the insertion of tufts of yarn through a backing fabric, creating a pile surface of cut and/or loop ends.
<b>Turf and Turf Systems</b>	Turf is a flooring fabric made from a variety of layers and types of materials. Fibers and backings can vary from type to type of product. Turf products are generally specified by denier, face weight, pile height, stitch gauge and color. Turf Systems are developed by system integrators who select synthetic grass and artificial turf, infill, seaming and base materials.
<b>Twist</b>	Twist is the winding of the yarn around itself. More twist improves turf performance (especially in cut pile).
<b>Twisting</b>	The fibrillated yarns are now twisted into a constant number and sent straight to packaging or on to one other possible process called texturing (see Krait de Krait, Texturing Yarn).
<b>Twist Level</b>	Twist level is the number of turns per inch of yarn.
<b>Underlay</b>	Materials installed directly under the turf, generally thick pads for additional cushion, fall zone safety or other enhancement.
<b>Underlayment Fabric</b>	Fabrics used under and/or in between layers of base materials in the construction of a project.
<b>Waste</b>	The amount of surface materials remaining after the completion of the installation. Waste materials are generally recycled or reused (where possible), however a certain amount of waste is to be expected.
<b>Woven</b>	Interlacing strands of fiber into a yarn forms woven turf.
<b>Yarn</b>	Yarn is made of fibers that are twisted together to form a continuous strand.
<b>Yarn Count</b>	Yarn count reflects the amount of yarn packed into a given area.