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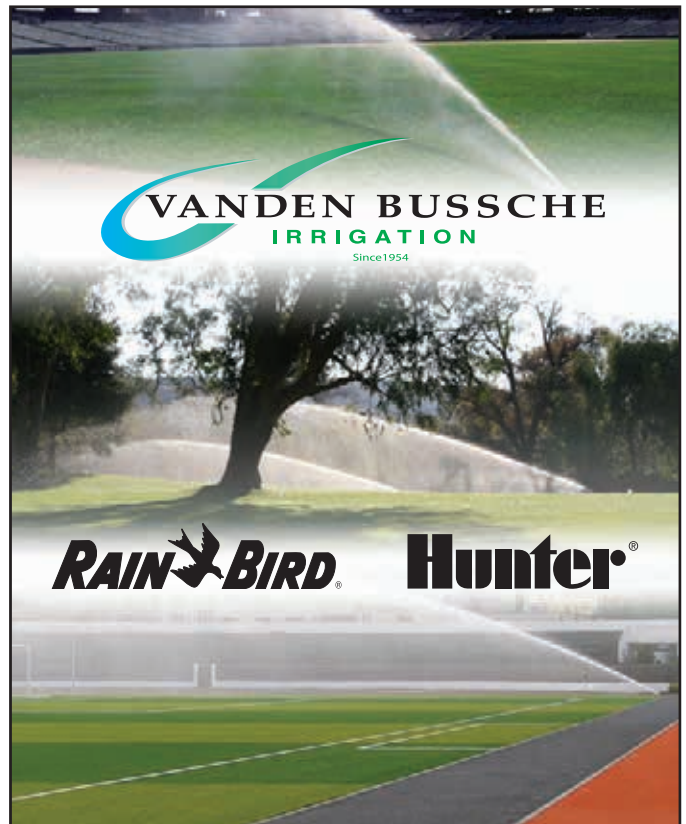
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# Synthetic Turf Fields: How Do I Choose?

Ben Tymchyshyn, BLA, MBCSLA, OALA, CSLA,  
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Photos: MMM Group Limited

Synthetic or artificial turf was first developed in the 1960's and was introduced in Canada at the Nepean Sports Complex in Ottawa, Ontario in 1984. It is by anyone's standards relatively new and technical requirements specifically for field accreditation are far more stringent than the first application at the Houston Astrodome. Within this article we are going to discuss understanding synthetic turf needs which includes programming, design requirements as well as how to mitigate risk, issues and problems prior to construction and finally, a general overview regarding costs of synthetic turf fields.

## Understanding the Unique Needs

Based on the experience of our firm over the past several years, the selection between high performance synthetic turf and community use synthetic turf fields can be a difficult choice for the client as the costs for many of the fields can range from \$1.2 million to \$2.0 million. Site selection is a major factor in determining the type of sports field you wish to use. The

## PROGRAMMING OF THE ATHLETIC FIELD IS CRITICAL TO ENSURE THAT YOUR FACILITY RECEIVES THE BEST FIT POSSIBLE FOR ALL USERS AND THE COMMUNITY AS A WHOLE.

following is a list of factors you may need to be aware of when placing your sports field: existing field being replaced, building on new (green site), re-development of a brownfield, landfill and engineered fill site.

Programming of the athletic field is critical to ensure that your facility receives the best fit possible for all users and the community as a whole. A stakeholder consultation is critical to determining the needs of the facility prior to any design development taking place.

Before selecting a synthetic turf field, there are a number of decisions that must be made. These assumptions require a matrix:

- Does your maintenance team have the skill set for a synthetic turf field?
- Does the field fit into the overall development plans or master plans for athletic fields within the system?
- What can you afford?
- What are the programming needs for these proposed athletic fields?
- Is the site selected correct for this development?

Many questions need to be asked by the consultant team prior to design. Some of the questions that may be asked are:

- What sports are going to be played on the synthetic field?
  - Rugby
  - Soccer
  - Football (touch or tackle)
  - Ultimate frisbee
  - Field lacrosse
  - Cricket
  - Field hockey

- What do air support structures need to enclose?
  - Field only
- What type of international standards does the athletic field facility want to meet?
- What are the basic requirements for the field house building?
  - Change rooms
  - Showers
  - Rest areas
  - Concessions

Many municipalities, institutions and private organizations are now constructing synthetic turf fields. Synthetic turf fields can be used on a regular basis by sport organizations without the fear of wear and damage as well as prolonging seasonal sports by approximately 2 – 3 months if the field is lit.

The unique design needs for community or high performance synthetic turf are as follows:

- Design of the overall plan requires the separation of spectators from the field area.
- Design of a fence to enclose and protect the field from any vandalism.
- Design of the concrete curb around the field is crucial to ensure that there are no issues with securing the synthetic turf to the required edging.
- Design of the synthetic turf field must have a free flowing granular base to allow for water movement away from surface and to prevent flooding at field level.
- Ensure that there is positive drainage on the field so that water can move through freely into a storm water sewer system or drainage outlet.
- Proper selection of the synthetic turf product is critical to ensure that the proper product has been chosen for the specified sports that will be played on the field; the product selected can be either slit film or a mono-filament synthetic turf or dual fibre construction.
- Proper signage is critical for synthetic field projects to ensure no damage is done during use.
- Design of the sports field lighting system is critical so that minimum lighting levels are met for high recreational play as well as ensuring that light spill from the system is kept to an absolute minimum.

More Questions Arise:

- Do you require FIFA accreditation or accreditation from another international organization?
- Does the consultant have experience with and understanding of synthetic turf?
- Is a geotechnical investigation of the site a requirement?
- Do you require an e-layer (shock pad under the turf layer)?
- Base design for synthetic turf is similar to road base construction, but the one exception is it must be clear of free draining stone.
- What is a geo-membrane and what is it used for? Geomembranes are a kind of geosynthetic material made up of impermeable membranes. Their uses include solid waste containment (such as landfill liners), mining, and water containment applications.

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## How to Mitigate Risks, Issues, and Problems

Many of the risks and problems associated with synthetic turf fields are based on the following:

- One major item that must be addressed is utilizing qualified contractors to complete the work:
  - Select a general contractor with several years of successful project completion and experience
  - If you must tender the project, consider either invited bid only, or pre-qualify the contractors to bid on the project
  - Select only contractors with proven experience and the right equipment for the job
- Lack of site information that fully covers the entire sports field.
  - Solution – Geotechnical investigation report that grids the field with minimum of 12 boreholes per field.
- Improper base design (granular base) for the synthetic turf field.
  - Each synthetic field site is unique and cannot be designed using typical details. Understanding soil science and how soil drainage and infiltration of water into the sub soil is critical for proper base design.
- Lack of sub-surface drainage for the current site.
  - Solution – Ensure that the sub-granular base for the synthetic turf field has a positive outflow to a storm sewer system, bio swale or tank and pump system.

Cost of Synthetic Turf Fields	
Synthetic Turf	Price per Field
Non E-Layer	\$1,200,000
E- Layer	\$1,700,000
Lighting	Price per Field
	\$200,000 to \$300,000

The pricing is based upon a new (green) build site or a renovation within an existing open space. Assumptions for the above pricing include the following:

- Field will be contained within a 120 x 75 square metre area
  - 200 mm granular base with geomembrane layers with drainage system typically multi-flow on 5 metre spacing
  - Native sub-grade with no settlement issues
- There are currently numerous designs for granular bases for synthetic turf systems and the pricing of those systems can vary greatly from consultant to consultant.

**One key point is that before you spend \$1,000,000+ on a new athletic field complex make sure that you have an internal team and consultant team that will lead your project from start to finish.**

In conclusion:

- It is important to educate yourself to ensure you purchase a quality surface in the first place because you cannot change it after the fact.
- Today's synthetic turf surfaces are more like sports equipment in that they are not all created equal, although they may look similar from the surface. There are distinct safety and performance characteristics of each type of synthetic turf that needs to be engineered into a professional quality surface.
- Not all surfaces are designed and engineered with the same level of care, and you will require testing, not marketing, to determine which surfaces are high performers and which ones will not perform as promised.
- Not all synthetic turf surfaces are created equal. No one component guarantees the required performance you should demand from a surface. Each of the components that goes into making a synthetic turf surface MUST work in harmony to maximize the safety and performance of the surface.
- The fiber, the infill, the backings, all contribute to the design of a professional grade surface.
- There are 21 applicable ASTM tests for a synthetic turf system. Some are as common as a Gmax test and others are less obvious, like an ADA test for wheelchair access.

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# Sports Turf Industry Fact Sheet

The Department of Plant Sciences at the University of Missouri released some interesting statistics regarding the U.S. Sports Turf Industry based on a survey that was conducted within the Sports Turf Managers Association.

## Overview

- The annual purchases of sports turf products and services is over \$1.29 billion on over 2.8 million acres. That's approximately \$457 per acre. These figures do not include salaries.
- Parks and recreation makes up \$480 million in annual purchases while schools are at \$685 million, college/universities \$71 million, and professional facilities spend approximately \$52 million.
- Professional sports facilities average approximately 15 acres spending \$4,333 per acre, colleges/universities spend \$1,075 per acre on an average of 30 acres, schools spend \$658 per acre on an average of 65 acres, and parks spend an average of \$284 per acre over 130 acres.
- Average annual spending on equipment and supplies at colleges/universities is \$32,300, while parks spend \$38,850. Schools spend \$42,750 and professional facilities spend \$65,000.
- It is estimated that there are approximately 16,000 schools, 2,200 colleges/universities, 13,000 parks, and 800 professional facilities.

## U.S. Sports Turf Managers

- The average sports turf manager has worked in the industry for 13 years.
- Typical manager has been in his/her current position 7.5 years, while 38% had more than 10 years tenure in their position.
- Twenty percent of managers have a single field to maintain.
- Forty-two percent of managers maintain 5 – 10 fields.
- Two in three sports turf managers have a four-year college degree or an advanced degree.
- The average crew has 16 full-time and five part-time.
- Seasonal staff average is approximately nine.

## Root Zones

- Cool-season bluegrass fields: 81% native soil, 19% sand based.
- Warm-season bermudagrass fields: 82% native soil, 18% sand based.
- Sports turf managers expressed a 3 to 1 preference for sand-based fields. Major reasons: (1) Greater resistance to compaction and (2) Better playability under wet conditions.

- Greater soil strength was cited as the most important advantage of native soil fields.
- Loss of nutrients to leaching was the major problem encountered with sand-based fields.

## Mowing

- Frequent mowing is essential for healthy, dense turf because it reduces scalping, disease incidence, the need for sweeping and it improves field appearance.
- Of those surveyed, all mow more than once a week - 2 times (21%), 3 times (30%), 4 times (9%), and daily (40%).

## Soil Testing

- Annually (42%), 2 times annually (22%), 6 times annually (10%), 12 times annually (2%), bi-annually (22%), tri-annually (2%).
- More frequent soil testing was reported by managers who have sand-based fields.
- The use of tissue testing is a standard practice by 44% of survey respondents.

## Fertilizers

- All managers use more than one type of nitrogen fertilizer (soluble, slow-release, specialty, and natural organics).
- Sulfur-coated urea (SCU) was the most widely used slow release source due to acceptable performance and lower cost per unit.

## Irrigation

- Eighty percent of sports fields have pop-up sprinklers, 11% have water cannons, 7% have quick coupler, and 2% have travel or tow impact sprinklers.

**Interested in seeing the entire survey? Go to the following link:**  
<http://turf.missouri.edu/stat/reports/pdf/industry.pdf>

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*Thank you to Brad Fresenburg, Assistant Extension Professor, Division of Plant Sciences, University of Missouri for permission to reprint. Turfgrass Producers International, TPI E-Newsletter, October 2012.*



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