Preparation of the garden.

- A site where sports field, park and turfgrass managers and golf course superintendents have access to a comparison of a wide range of cool and warm season turf grasses, both in their natural and maintained forms;
- An educational resource for faculty, extension specialists, students, industry professionals and the general public;
- A source of mature and established plant material for greenhouse and student research projects; and
- A means of informal annual evaluation of the short and long term performance of various common and uncommon turfgrass species grown under southern Ontario conditions.

Construction of the Turfgrass Species Display Garden began in August 2009 with much of the work being done by student interns from the University of Guelph Turfgrass Management program. The area was first sprayed with glyphosate, then the sod was stripped off and garden areas rototilled. Twenty species of cool season grasses (Table 1) were planted in September. Grasses were planted in 1-m wide, side-by-side rows with a divider in-between each row to reduce spreading of the grasses. Two-thirds of each species was mowed and the remainder left unmown so the grasses could be viewed in their cultivated and natural forms. A series of paths and benches were constructed throughout the garden for easy access to the grasses and all species were well labeled.

A putting green was also planted in five separate sections, each containing a different species of fine-type turf (Table 2). Putters and golf balls are left on site so that visitors can practice putt as they evaluate the different grass putting surfaces. A selection of warm season grasses was planted in June, 2010 (Table 3). It will be interesting to see how these warm season grasses handle our southern Ontario winter. The official dedication of the garden took place at the Guelph Turfgrass Institute's Research Field Day in August, 2010. Please come and view the new garden and see if you can incorporate any of these grasses into your golf course or turf areas. Visitors are always welcome.

We thank the Ontario Turfgrass Research Foundation, Ontario Horticultural Trades Foundation, the Georgian Bay Golf Superintendent's Association and Pickseed for generously supporting this project.

Table 1: Cool season grass species planted in the Turfgrass Species Display Garden.

Grass (common name)	Species Name
Fairway Wheatgrass	Agropyron cristatum
Crested Wheatgrass	Agropyrum desertorum
Redtop	Agrostis gigantea
Creeping Bentgrass	Agrostis stolonifera
Smooth Bromegrass	Bromus inermis
Orchardgrass	Dactylis glomerata
Sheep Fescue	Festuca ovina
Red Fescue	Festuca rubra
Chewings Fescue	Festuca rubra var. commutata
Hard Fescue	Festuca trachyphylla
Tall Fescue	Lolium arundinaceum
Perennial Ryegrass	Lolium perenne
Annual Ryegrass	Lolium perenne ssp. multiflorum
Western Wheatgrass	Pascopyrum smithii
Timothy	Phleum pratense
Canada Bluegrass	Poa compressa
Kentucky Bluegrass	Poa pratensis
Texas Bluegrass Hybrids	Poa pratensis × Poa arachnifera
Rough Bluegrass	Poa trivialis
Weeping Alkaligrass	Puccinellia distans

Table 2: Grass species planted in the putting green.

Grass (common name)	Species Name
Annual Bluegrass	Poa annua
Colonial Bentgrass	Agrostis capillaris
Creeping Bentgrass	Agrostis stolonifera
Fine Fescue Mix	Festuca trachyphylla; Festuca ovina; Festuca rubra; and Festuca rubra var. commutata
Velvet Bentgrass	Agrostis canina

Table 3: Warm season grass species planted in the Turfgrass Species Display Garden.

Grass (common name)	Species Name
Sideoats Grama	Bouteloua curtipendula
Blue Grama	Bouteloua gracilis
Buffalograss	Buchloe dactyloides
Bermudagrass	Cynodon Dactylon
Zoysia Grass	Zoysia japonica

POSA Synthetic Turf Highlight: Proper Maintenance Equipment

Paul Hollis, Executive Vice President, Redexim North America

The sports turf industry has seen a large increase in the number of synthetic turf fields over the last decade. Unlike the first and second generations of synthetic turf, third generation playing fields have longer fibers and are filled with rubber, sand, or a mixture of both to reduce the hardness of the playing surface. One of the characteristics that turf manufacturers boasted about this new turf was that it was maintenance free. Now after seeing many fields that are 6-8 years old that have not been maintained, these same manufacturers are admitting that there needs to be a degree of maintenance done to prolong the life of the field and keep them aesthetically pleasing. The most disappointing thing to the sports turf manager is that many manufacturers also suggest that only they or one of their installers can properly maintain the carpet. But the bottom line is that we vacuum our carpet at home, so why can't we clean and groom our carpet at work?

To better understand the maintenance required of today's synthetic fields, one must understand the basic construction of the synthetic playing surface. It consists of fibers or carpet, the infill (sand or rubber), backing material, a choker stone layer, open grade and soil. It may sound complicated, but in essence the fields are not all that different from your typical household carpet.

In order to select the proper maintenance machine for your field you must remember three basic components of field preservation:

- Keep the surface free of debris.
- Keep the fibers in an upright position.
- Keep the infill free of compaction.

A Debris-Free Surface

To keep the surface free of debris, obviously it must be removed. Organic material such as leaves should not be allowed to remain on the surface for any length of time. They can start to decompose and move into the infill system, which can impede field drainage. Some companies may

SYNTHETIC TURF
Coverage from October POSA Session.

instruct the owner to use a brush or backpack blower to remove the material from the surface. This may work for larger items, but when small debris such as sunflower seeds are a problem, a blower just moves the pollutant from one spot to another. To properly remove debris, it is recommended to use a mechanical sweeper or vacuum to collect and remove the material. The amount of maintenance needed varies from location to location, but clearly a maintenance machine must be well maintained and the instructions must be followed carefully so as to not cause any damage to the playing surface.

TIP: Make a maintenance schedule and log all activity.

Upright Fibers

Regular grooming is a must to keep the carpet fibers in an upright position. If an artificial playing surface is not groomed regularly with a proper drag brush, the surface will become slick and the fibers will wear prematurely. If the fibers are allowed to lay over and remain bent too long, they may be difficult to stand upright again so they need regular attention. A drag brush can easily be found that can be used behind any power unit, including small tractors, utility vehicles, golf carts or even small mowers. Dragging will improve footing, redistribute infill, reduce static electricity, and improve the look of the playing surface.

TIP: Pick a drag brush that is designed specifically for synthetic playing surfaces.

Zero Compaction

Just like natural turf, all types of infill become compacted over time. Through research, we know that GMAX ratings or surface hardness (measured with a Clegg drop hammer) over 200 pose greater risks for athletes. To reduce compaction levels, it is imperative to use a drag brush with spring tines to loosen the infill mix. Infill mixes that use sand, or a sand/rubber mix, tend to see higher GMAX levels due to their design. They use sand not only as a weighted base, but to make the infill stiffer for a faster and harder playing surface.

TIP: Always put a rope through the spring tines in case one comes loose or breaks.

Courtesy of OPA

Courtesy of ORFA (top & bottom)

Maintenance Budget

When planning your purchases, make sure to include the price of these three machines for proper maintenance. The maintenance of a playing surface is a program that will not only provide a better looking and safer playing surface, but it is also an investment to ensure a longer life for your synthetic playing surface.

Although many turf manufacturers still stand by the "no maintenance" needed mantra, it is likely that most educated buyers have seen past that fallacy when budgeting for new synthetic sports fields. When looking to purchase a synthetic field remember to ask these key questions before making your decision:

- Can I do my own maintenance?
- Is there a recommended maintenance program?
- Is there a recommended or approved list of maintenance equipment?

As stated previously, many turf manufacturers will suggest that only they or their installers can maintain a synthetic field. Many have an approved list of machines that can be used on their fields that you can buy only from them which limits your choices and increases your costs. Some companies have clauses that restrict users by hours of use, maintenance schedules and other items such as improper footwear. When gym class, band practice and actual game time is added up, it not only voids the warranty, but shortens the life of a playing field. All this must be considered when budgeting for a new synthetic sports field.

TIP: Look closely at manufacturer warranties before making a buying decision.

STMA Advisory Bulletins

DETERMINING THE RIGHT SPORTS FIELD & NEEDED EQUIPMENT

Town of Oakville Sixteen Mile Sports Complex

Foreword & Further Information

The Sports Turf Managers Association (STMA) has developed a series of advisory bulletins on synthetic and natural fields. The bulletins are sequenced to provide information and resources throughout the process of selecting and building a new sports field. Often decisions that seem small and insignificant in the short-term can affect the quality of the field for years to come. Visit their website at www.stma.org to access these and other titles referenced.

1. DETERMINING THE RIGHT SPORTS FIELD FOR YOUR ATHLETES

Your organization has decided to build a new sports field. This is an excellent decision that will benefit your athletes, the fans and the community. With sports participation and viewership on the rise, the focus on fitness, and the desire for environmentally friendly recreational venues, now is an ideal time to build a sports field.

As a sports turf manager, you are responsible for the quality of the new field. Most importantly, your goal is to manage it to a high level of playability and safety, thus reducing an athlete's likelihood of suffering a surface related injury. The first step is to ensure that your organization has decided to build the most suitable field based on use, budget, management expertise, and many other factors specific to your situation.

The answers to these assessment questions should help to guide your organization to make the best choice for your athletes.

SUGGESTED SPORTS FIELD ASSESSMENT QUESTIONS

Overall Project Questions

1. Are there Certified Sports Field Managers*/sports field managers available for this project? Yes No

*The Certified Sports Field Manager is a certification program sponsored by the Sports Turf Managers Association (US). This program is available to members of the STA. Please contact us for further information.

2. Will the sports field manager be involved with the field selection and construction process? Yes No

3a) How many events are you planning to hold on the field? b) How often will the field be used (games & events/wk)?

4. What sports will be played on it?

5. How many non-sporting events will be held on this field?

6. Will the field use increase over time? Yes No

7. If you increase the number of events on the field are you able to allocate the necessary funding to provide the additional maintenance? Yes No

8a) When (what time of year) will the bulk of your events be held? b) How does the event schedule overlay with weather limitations patterns?

9a) How many other athletic fields at your institution do you manage? b) Are any synthetic? Yes No

10. Have you set an appropriate budget for the number of events you are planning? Yes No

11. What time-frame has been established for completion of this project?

12. What are the long-term expectations and goals?

13. What is your estimated project budget?

14a) What is the projected capital budget (usually includes equipment with purchase costs of $1,000+)? b) Projected operational budget (includes all inputs, water and labour costs)?

15. Have the safety concerns for the field type been identified and discussed? Yes No

16a) Have you selected an appropriate site for the installation of the field? Yes No
b) Does it have a north, south, east or west orientation? North South East West

17a) Do you have standards set for quality, field conditions and safety? Yes No
b) Have you set thresholds for which you are willing to accept liability? Yes No
c) Have you identified the potential health issues associated with each field type? Yes No

18. Do you have an appropriate budget for the maintenance to provide the standards noted in question 17? Yes No

19. When was the last new field installed at your institution (may indicate the projected life expectancy of the new field)?

20. Have you read/are you familiar with STMA's "Guide to Synthetic & Natural Turfgrass for Sports Fields: Selection, Construction & Maintenance Considerations"? Yes No

21a) Have nearby institutions at your level of competition installed new fields recently? Yes No
b) Were they synthetic? Yes No

22. What is the security plan for the area during construction? After construction?

Natural Fields

1a) Do you allow appropriate time for renovations, re-work or repairs to your fields by not scheduling the field during these times? Yes No. b) Does your budget allow for the items above? Yes No

2. Will you be able to rest the field during the prime growing season? Yes No

3. Do you have enough fields to allow for field rotation to provide the necessary rest periods for your field? Yes No

4a) Are funds available for an irrigation system? Yes No. b) If no, will watering costs be included in the operating budget? Yes No

5. Will there be footwear restrictions? Yes No

6. Do you have the appropriate equipment* to do the necessary maintenance on your field? Yes No

* See Following Advisory Bulletin #2, Suggested Equipment List, which starts on the next page.

Synthetic Fields

1a) If you are considering a synthetic field, will you charge user fees for the removal and environmental disposal of the synthetic turf when it becomes worn? Yes No b) Are you budgeting for the costs associated with replacing the synthetic material? Yes No

2. Do you or your staff have the expertise to monitor, groom or repair the synthetic field? Yes No

3a) Are funds available for an irrigation system? Yes No. b) If no, will the cost of water to cool the turf be included in the operating budget? Yes No

4a) What type of permanent field markings are desired or required?
b) What type of decorative or revenue generating logos are desired?
c) Do you intend to change field uses/markings and/or logos on the field? Yes No

5a) Do you have the appropriate equipment* to do the necessary maintenance on your field? Yes No.
b) Will the budget allow for purchase of specialty tools to maintain and repair synthetic turf? Yes No.
c) Will the budget allow for training the staff on how to use them correctly? Yes No

* See Following Advisory Bulletin #2, Suggested Equipment List, which starts on the next page.

6. Will there be footwear restrictions? Yes No

The content of these bulletins is intended for informational purposes and is not intended as a substitute for specific professional consultation.

STMA Bulletin #2. Suggested Equipment List

Specialized equipment is necessary to maintain natural turfgrass and synthetic surfaces on sports fields. Trained staff, using the right equipment on a sound maintenance schedule, can positively affect the quality of the playing surface. Following are typical pieces of equipment used for natural and synthetic surfaces. Some equipment may be leased or services contracted out. Typically, equipment that costs $1,000 or more should be included in the capital budget, but check with your finance and accounting department for its capital expenditure threshold. For equipment use on synthetic surfaces, please consult your manufacturer's warranty.

Natural Surfaces: Necessary Equipment

Mower. Rotary or reel type depending upon turfgrass species and quality/aesthetic requirements. Reel mowers are commonly used to maintain turfgrass at cutting heights of ~1.5" or lower, while rotary mowers are used when a higher height of cut is desired.

Fertilizer spreader. Fertilizer will need to be applied throughout the growing season to maintain a healthy turfgrass stand. Models are typically pulled by a tractor or utility vehicle, but walk-behind models are available for smaller applications. Annual calibration is required to deliver accurate amounts of material to the field.

Weed/pest control sprayer. In accordance with Ontario's Cosmetic Pesticides Ban or local legislation, weed/pest control products may need to be applied throughout the growing season to maintain healthy turfgrass. Models are typically pulled by a tractor or utility vehicle, with a 100 gallon tank (or greater) considered desirable. Annual calibration is required to deliver accurate amounts of material to the field. Backpack versions are available for small scale applications.

Irrigation system. Water will need to be applied throughout the growing season to maintain a healthy turfgrass stand. Both above and below ground systems are available with a wide range of pipe, head and nozzle types to choose from.

Aerator. Aeration should be performed two to five times per year to reduce soil compaction resulting from excessive player traffic (use). It is also a key tool in managing organic matter/thatch build-up in the root zone. Excessive soil compaction weakens the turfgrass root system, which in turn reduces a field's ability to withstand wear and increases its divoting potential. Highly compacted fields may become hard enough to create an unsafe environment for the athlete. Both hollow tine and solid tine models are available, with hollow tine models removing material from the root zone (cores). A piston-action model is preferred, which is capable of pulling a 3" core. A reciprocating piston-action model is typically pulled behind a tractor or utility vehicle.

Tractor. Used to mount/carry multiple pieces of equipment and load bulk materials. A model with a 50-60 horsepower engine, PTO of 45 hp, front-end loader and turf tires is desirable.

Paint sprayer. Game lines (side lines, yard lines, etc.) will need to be painted onto the field. Paint sprayers are available in walk-behind or riding configurations. Tape measures and string lines are required for accurate painting, while templates and stencils can be used for adding numbers and logos.

Hand tools. Assorted hand tools (i.e. rakes, shovels, hammers, string trimmer, edger, wrenches, etc.) will be needed to work on small areas across the field.

Natural: Optional Equipment

Core harvester. Used to collect cores that are pulled to the surface following hollow tine aeration. This is critical for sand-based root zones, where organic matter accumulation negatively affects internal drainage, but may be unnecessary for native soils. Can be used to gather thatch, similar to a sweeper.

Overseeder. Fields should be overseeded continually throughout the season to maintain a dense turfgrass stand. A dense turfgrass stand is not only aesthetically desirable, but necessary to maintain an adequate level of playability. Various models are pulled behind a tractor, but walk-behind models (i.e. rotary spreaders) are available for small applications. Overseeders are a valuable tool when renovating a field.

Topdresser. Fields are topdressed with sand for a number of reasons including altering the physical properties of the root zone, preventing thatch build-up, and smoothing the surface. Topdressers can be mounted to utility vehicles or pulled behind a tractor. A model capable of carrying 1 cubic yard is desirable.

Verticutter. Vertical mowing (verticutting) is performed on an as needed basis to remove thatch from the root zone. Can remove thatch, relieve shallow compaction and may be appropriate to use prior to seeding for good seed-to-soil contact. It can also

Natural: Optional Equipment

Verticutter continued. be used to break up cores following hollow tine aeration. Verticutting units are typically pulled behind a tractor, but walk-behind models are available for smaller areas.

Deep-tine aerator. Deep tine aeration is done on an as needed basis to alleviate soil compaction at levels deeper (lower) than those reached during conventional aeration. Models are typically pulled behind a tractor.

Truck/utility vehicle. Used to move assorted pieces of equipment as well as materials. Models should be capable of holding two passengers, capable of towing 1,500 pounds, and have a hydraulic lift bed with a capacity of at least 800 pounds.

Hoses/nozzles. Hoses and specialized nozzles are needed for small scale irrigation (syringing). They are a necessary piece of equipment for baseball fields, as they are used to manage moisture on skinned areas.

Turf sweeper/blower/vacuum. Used to remove debris from fields. Turf sweepers can be employed to remove debris from vertical mowing and as a replacement to the core harvester in removing cores brought to the surface following hollow tine aeration. These pieces can be pulled behind a tractor, but walk-behind models are available for small applications.

Skidster. Versatile piece of equipment used for multiple applications based on attachment (i.e. front-end loader, plow, fork-lift). A model with turf tracks is desirable.

Synthetic Surfaces: Necessary Equipment

Grooming/spiking equipment. Typically some type of broom, brush or tine that is dragged over the field to stand the synthetic fibers up and re-distribute the crumb rubber. This practice is analogous to aerating natural turfgrass fields as it reduces compaction of rubber particles and prevents fields from becoming excessively hard. Models can be pulled behind a tractor or utility vehicle.

Sprayer. In accordance with Ontario's Cosmetic Pesticides Ban or local legislation, liquid applications may be required to prevent weeds from growing through the synthetic surface and lessen the static charge from the crumb rubber. Wetting agents are applied on an as needed basis to improve infiltration of water into the rubber. Sanitation products may need to be applied to prevent bacterial growth from bodily fluids. Models are typically pulled by a tractor or utility vehicle with a 100 gallon tank (or greater) considered desirable. Annual calibration is required to deliver accurate amounts of material to the field. Backpack versions are available for small scale applications.

Topdresser. Crumb rubber will have to periodically be applied to the field as some material is lost over time. Topdressers can be mounted to utility vehicles or pulled behind a tractor. A model capable of carrying 1 cubic yard is desirable.

Utility vehicle. Used to move assorted pieces of equipment as well as materials. Models should be capable of holding two passengers, capable of towing 1,500 pounds, and have a hydraulic lift bed with a capacity of at least 800 pounds.

Turf sweeper/blowers/vacuum. Used to blow trash such as sunflower seeds and peanut shells off the playing surface. Models can be towed behind a tractor. Backpack models are available for smaller applications.

Hand tools. Assorted hand tools (i.e. rakes, shovels, hammers, string trimmer, edger, wrenches, etc.) will be needed to work on small areas across the field.

Courtesy of ORFA

Synthetic: Optional Equipment

Irrigation system. Water may need to be applied to reduce the temperature of the playing surface. Some manufacturers require irrigation to maintain the manufacturer's warranty. Both above and below ground systems are available with a wide range of pipe, head and nozzle types to choose from.

Hoses/nozzles. Hoses and specialized nozzles are needed for small scale irrigation (syringing). They are a necessary piece of equipment for baseball fields as they are used to manage moisture on skinned areas.

Paint sprayer. Game lines (side lines, yard lines, etc.) may need to be painted onto the field if they are not inlaid. Paint sprayers are available in walk-behind or riding configurations. Tape measures and string lines are required for accurate painting, while templates and stencils can be used for adding numbers and logos.

Mechanical scrubbers. Can be used to remove painted lines.

Pressure washers. Used to remove unwanted fluids or contaminants from the surface.

Rubber blade snow plow. Used to remove snow.

EDITOR'S NOTE

If natural turf is identified as the desirable option, the STA's "Athletic Field Construction Manual" is an invaluable resource! Visit www.sportsturfassociation.com for all the details.

Sports Turf Fertility & The Nitrogen Factor

John Sorochan, Ph.D., Department of Plant Sciences, University of Tennessee

Maintaining competitive and safe playing surfaces has long been the goal for all sports turf managers. Many cultural practices are used to promote proper growth and health of the turf which is important to prevent injury to players. Sports turf managers core cultivate, topdress with sand, and apply fertilizers to grow an optimum playing surface. Often times however, fertility can be a puzzling matter. Considerations must be made to the location, amount of traffic, and disease and pest incidence in order to apply correct amounts of nutrients. Over-applications of nutrients are wasteful and potentially harmful to the environment, not to mention the extra labour and money involved. So, where does a sports turf manager begin when creating a fertility program suitable for his or her field?

Soil Testing

The first step to creating a fertility program is to determine the actual amount of nutrients currently available in the soil. In order to do this, samples need to be sent to a soil testing or university extension lab for analysis. Soil sampling is a simple procedure. Randomly select 10 to 12 locations on the field. At each location, remove the sod and take a sample at least six inches in depth. All samples should then be mixed well in a bucket. From this mixture, fill a soil sampling box or a 4x7 inch bubble envelope and mail (Puhalla *et al*., 1999).

The soil testing lab will send back a report that tells the amount of available phosphorus, potassium, calcium, magnesium and zinc. Phosphorus should be maintained at levels ranging from 30 to 120 pounds per acre. Potassium should be maintained at much higher levels ranging from 300-500 lb per acre (Puhalla *et al*., 1999). Generally, potassium should be applied depending upon nitrogen levels. Low levels of nitrogen decreases the amounts of potassium used by the plant.

A Closer Look at Nitrogen

Typically, soil test reports also make recommendations for fertilizer applications based upon nutrient requirements. Soil testing is a cheap and effective way to prevent over- and under-applications of nutrients, which saves both time and money. However, soil analysis does not measure the level of nitrogen, which is likely the most limiting factor in turfgrass growth and vigour (Puhalla *et al.*, 1999).

Determining actual levels of nitrogen in the soil is pointless due to the volatile and mobile nature of the nutrient. A soil sample sent off to a soil testing lab will likely have a different amount of nitrogen when it arrives at the lab than it did before it was taken (Puhalla *et al*., 1999). Instead, nitrogen applications must be determined individually based upon geographic location, root zone mix, deficiency symptoms, turfgrass species selection and the expected quality of the turf.

Applications should be made only during months of active turfgrass growth. Tissue analysis does, however, determine actual amounts of nitrogen and other nutrients in the plant. Leaves for tissue analysis should be taken at random and sent to a lab for testing. Optimum levels for nitrogen in plant tissue should be 3-5% of the total dry weight (Turgeon, 1996).