

Table 4. Typical costs for a rectangular field, City of Oshawa, 2009.

Item	Quantity	Product	Man Hours	Equipment	TOTAL
Soil test	1/year	\$15	\$5	\$20	\$40
Aerate	2/month	n/a	\$130	\$120	\$256
Overseed	2/year	\$1,440	\$78	\$100	\$1,618
Fertilize G*	1/month	\$560	\$364	\$231	\$1,155
Fertilize L**	1/month	\$500	\$364	\$231	\$1,095
Compost	1/year	\$20	\$156	\$100	\$276
Grass cutting	1/week	n/a	\$348	\$1,363	\$1,711
TOTAL					\$6,151

* G, granular ** L, liquid

Table 5. Cost comparisons for hard surface treatments, City of Oshawa.

	Product Cost	Wages & Equipment	TOTAL
Roundup 2007	\$1,000	\$7,428	\$8,628
Vinegar 2009	\$12,000	\$11,643	\$23,643

Table 6. Modified practices due to the pesticide ban, City of Mississauga.

Location	Existing Practice	New Practice
Specialized Horticultural Beds	Pesticide treatment to deal with diseases, fungus etc.	Class 11 pesticides
Shrub & Perennial Beds	Hand weeding, mulching	No change
General Parkland	Periodic cultural practices	No change
Minor Fields	Periodic cultural practices	No change
Lit Irrigated Fields	Cultural practices, spot spraying	Cultural practices, periodic resodding
Baseball Warning Tracks	Roundup	Roto tilling; alternate surface
Boulevards	Bi-annual spraying	Cultural practices, Class 11 pesticides
Hard Surfaces	Bi-annual spraying	Class 11 pesticides
Forest Infestations	Treatment as needed (e.g. BTK)	No change
Invasive/Harmful Plants	Treatment as needed	No change, MNR approval required

As noted previously, cultural practices (fertilizing, aeration, topdressing and overseeding) have been embedded in our operating budgets since the mid 1990s so the pesticide ban did not impact operating costs from this perspective. The average cost for a major lit field remains at \$8,700. It is anticipated however that major turf renovations may be required eventually for some fields. This would represent a periodic cost of \$200,000.

A major impact of the 2009 legislation has been changes in the maintenance of baseball warning tracks. This job now requires six staff for 2-4 hours. Previously, using Roundup, one staff person could treat a warning track in an hour. This represents incremental labour costs of \$500 per diamond per treatment.

Another cost increase that has to be budgeted for is hard surface maintenance. Treating twice per year with horticultural vinegar results in incremental costs of \$50K. Lastly, the impact on specialized horticulture like roses and rhododendrons has yet to be determined, though no major problems have surfaced as of yet. Overall, the history of pesticide policy in Mississauga put the city in a good position to deal with the new provincial legislation

All three municipalities implemented pesticide reduction programs prior to the Cosmetic Pesticides Ban Act. As a consequence, many of the practices and alternative products to allow for effective maintenance under the new legislation were already in use. So while there were incremental costs in some specific areas, impacts were not as severe as they might have been.

All Ontario municipalities and other turf managers will need to continue to adapt to the changing "tool kit" available to them as a result of legislative changes. It is hoped that research and innovation on the part of turf managers will allow for more effective alternative products and practices for the future. ■

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Maximizing the durability of athletic fields

Athletic fields are being used to host more and more events and tournaments. The addition of lights is a major reason for this situation. In some cases, new sports such as lacrosse are being added to fields already overburdened with soccer events.



DURABLE ATHLETIC FIELDS begin with sound construction and careful planning, and good management practices can increase a field's durability. The basic concepts presented here can help field managers extend the usability of athletic fields.

Field managers are asked to maintain premier turf surfaces knowing that the field will be overused and likely not make it through the playing season. Athletic fields are being used to host more and more events and tournaments. The addition of lights is a major reason for this

Wet fields are more prone to damage than dry fields. Adequate drainage not only prevents rainouts; *it can also prolong a field's life.*



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situation. In some cases, new sports such as lacrosse are being added to fields already overburdened with soccer events. Football fields need to double as general purpose fields for special events. Of course, at some point, a field will begin showing signs of wear. And at some point, the field can fail.

Because field wear is influenced by so many variables, no definitive equation exists to predict when a field will begin showing signs of wear or when it will fail. Such a prediction would be invaluable to schools and municipalities as they face increased legal questions and liability issues regarding injuries associated with poorly designed or constructed facilities, and/or mismanaged facilities. Field managers struggle to accommodate all participating groups without damaging the fields. If fields are overused, then the likelihood of a player becoming injured due to poor field conditions increases. What is a field manager to do?

Ideally, adequate numbers of fields would be available so use could be properly distributed. It is best to have specific game and practice fields dedicated only to one sport to eliminate compound wear from two or more sports. Additionally, sound turf maintenance program promotes turf growth and recovery. Unfortunately, budgets for field management are often the most limiting factor.

Good fields begin with a sound construction strategy, and careful planning is imperative for long-term success.

ENSURE ADEQUATE DRAINAGE

Several construction strategies can maximize field durability. At the top of

the list is adequate drainage. Wet fields are more prone to damage than dry fields. Adequate drainage not only prevents rainouts; it can also prolong a field's life. Drainage can be achieved by using surface flow off fields that are crowned or by using subsurface drainage lines. Subsurface drainage depends on good water infiltration of the field. For this reason, a sand-based field will move the water from the field surface much more effectively than relying on surface flow alone. In addition, sand-based fields are less likely to compact. A compacted field generally has lower water infiltration rates, so the surface may remain wet for longer periods of time following a moderate rain.

How much use can a field withstand? This question is best answered using on-site field-use data from previous years. Field data collection requires some careful documentation of games, practices, and other events. As the demands on fields increase, more managers are starting to track field use. Probably the easiest data to track is the number of hours the fields are in use during the year.

Before a field is ever used, planners, designers, and managers should understand its expected level of use and performance. These expectations should be realistic. Those involved in planning and maintaining a field should consider the maintenance budget, available equipment, and labor. It is often helpful to have one field labeled as a "championship" field and the other fields labeled as "practice" fields. This can help everyone involved define how each field can be managed via maintenance inputs and controlled scheduling to maximize its condition. Often the higher quality championship fields can be used as examples to encourage the construction of new fields that alleviate use or to increase maintenance budgets of existing fields.

Baseball and softball should be evaluated differently because a large percentage of each game is played on a clay infield. The reality is that it takes only one extremely wet game to destroy a field. Practices can also cause appreciable damage due to their repetitive activity in particular areas of a field, so practices must also be put into the equation.

The number of events a field can handle will ultimately depend upon field construction, weather conditions during the season (especially just before and during games), maintenance practices, recuperative periods, and the time of year.

RESTRICT FIELD USE IF NECESSARY

Obviously, the more traffic you put on the field, the faster the turf declines. Also, particular sports cause more severe field damage in localized areas. Football tends to cause extreme wear between the hash marks. Soccer wears the quickest in the middle of the field, in front of the goal mouths, along the sidelines (due to line-men), and in the corner kick areas. Any repetitive action on the same area of the field accelerates wear. That is why practices and warm-up drills are often more damaging than games. But it is not just the athletes on the field who can cause wear problems. A marching band is extremely hard on a field because bands tend to march along the same lines all the time, both during a game and in practice. Cheerleaders and pep squads during games may also result in turf damage due to heavy use in a confined area.

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Some reduction in traffic damage can be avoided by doing the following:

- Restrict use when soil is very wet.
- Restrict use when soil is very dry and turf is wilted.
- Always have coaches rotate heavy play areas during practices.
- Use portable goals when possible, and move them around the field.
- If possible, move a soccer field's side-lines during the year
- If a space is large enough to accommodate field rotation (see Figure 1), periodically rotate the entire field.
- On game fields, restrict the number of practices to a minimum.
- Have a reduced game schedule when grass is dormant.
- Have regularly scheduled rest times that are used to repair minor damages.
- Do not allow unofficial play.
- Use tarps (covers) on bench areas to reduce severe wear by coaches and team members,
- Use tarps (covers) on sideline areas

used by the cheerleaders.

In most cases, field users will need to be informed of potential wear problems. Most users do not understand the damage that they can cause. Although it may be obvious to a field manager that a field is too wet for play, it is not obvious to most field users. Close fields when necessary. If the field manager is not allowed to close the field, the decision-makers should be made aware of the potential short and long-term damage that may result from field use given the situation. Unfortunately, some fields are scheduled the same as basketball courts or hard-surface tennis courts, without consideration of the turf surface's wearability. The field manager is in the best position to decide how much wear is too much.

Field managers can use a few practices that will maximize a field's ability to handle wear.

First, make every effort to begin the sporting season with 100 percent turf coverage. At the beginning of the year, schedule recuperative times during the season,

realizing that non-overseeded bermudagrass fields will not recuperate very quickly in the late fall or winter months. Overseeding can be used to protect dormant bermudagrass if excessive wear is expected during the cooler months. But remember, the overseeding grass often can be a significant competitor with the bermudagrass in late spring to early summer when the bermudagrass is trying to grow. If premier conditions are needed during those months, then the overseed may need to be chemically removed to allow the bermudagrass to more easily re-establish.

Adjust maintenance practices to address the condition of the fields. Increase or decrease inputs (particularly irrigation and fertilization) as dictated by environmental conditions and the turf's growth. Manage high wear areas differently than the rest of the field. This allows a manager to improve the entire field surface without dramatically increasing the budget. The most helpful practice along these lines is applying supplemental nitrogen fertilizer to the high

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wear areas to promote recuperation. The bermudagrass will respond to the added fertilization and promote more rapid growth, filling in divots and rip-outs quicker. The same can be done with aerification, soil amendments, and seeding. Think of a field as many parts, rather than just one field. The goal mouths of five fields in close proximity can be core cultivated in the same amount of time as one entire field. If the field routinely has localized standing water after a small shower, aerify those areas and backfill with an appropriate coarser textured soil amendment (such as sand or calcined clay). Spread seed (if appropriate) in wear areas before games and practices.

Some management practices that can reduce field wear may be more controversial. Advocate that less aggressive cleat patterns be worn by athletes. Studies have shown that cleat design can dramatically influence turf damage. In one study, a trainer shoe produced 37 percent less turf damage than a standard soccer cleat. A 6-stud replacement cleat was 34 percent more damaging than the standard soccer cleat. The numbers are more relative than absolute, but they illustrate the impact on turf damage from something as simple as a shoe. Shoes with a greater number of smaller cleats will cause less wear and compaction damage (more cleats displace weight better) than more traditional cleat design. Of course there is a trade off—reduced traction by the user. The trainer shoe in the above-mentioned study required 47 percent less force to break traction than a standard soccer cleat. This difference may be unacceptable at certain levels of athletic competition.

To maximize field use and durability, there must be open communication among the field manager, the people responsible for scheduling the field, and the field users. Once excessive wear and field overuse results in hazardous and unsafe playing conditions, the field manager must request that the field be closed. Safety of the users is paramount. With good field design, construction, management, reasonable care and maintenance, and proper use, fields can continue to provide an acceptable playing surface. ■

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Technology

and the turfgrass management industry

Technological advances have swept across the turf industry in recent years. Irrigation systems that were once operated by mechanical time clocks are now controlled by state-of-the-art computer systems with software tools that allow the user to know exactly how much water flowed through the system during the last irrigation cycle. Similarly, sensors connected to the same computer monitor pressure and can shut the entire system off in the event of a sudden loss of pressure possibly due to a broken irrigation line. These same irrigation systems can be remotely monitored and activated or deactivated with the use of most Smartphones. Other uses of technology include computerized parts inventory systems, digital time keeping systems, GPS/GIS, golf cart monitoring systems, TRIMS Grounds Management Software® – just to name a few.

These advances demonstrate that we live in a digital world, a fact that can no longer be denied. As inhabitants of a digital world, we come from differing perspectives. Marc Prensky, author of “Digital Natives, Digital Immigrants,” describes a Digital Native as a person who was born into the digital era; an era where digital technology such as computers, the Internet, mobile phones and MP3s have always existed. In other words, the digital world is as natural and indigenous to them as an American being born in the United States.

Conversely, a Digital Immigrant is an

individual who grew up without digital technology and adopted it later. This is akin to native-born Russian immigrating to the United States where he/she is expected to adapt and assimilate to their newly adopted home. Palfrey and Gasser write of Digital Settlers, individuals who grew up in the analog world but immersed themselves into digital technologies and were part of digital evolution. Another group in the digital world is the Digital Dropouts. These are individuals who choose not to or weren’t able to understand or use digital technology.

So which are you?

THE TOOLS

The past couple of years have brought several interesting “tools” to the digital world, namely social networking applications (“Apps” for short). A social network is a social structure made of individuals or organizations called “nodes,” which are tied (connected) by one or more specific types of interdependency, such as friendship, kinship, financial exchange, dislike, or relationships of beliefs, knowledge or prestige.” Social networks are mainstream; especially amongst the younger generation. The Pew Research Center cites that

35% of adults have profiles on social networking sites while 55% of online teens use social networking sites. The primary social networks are:

Facebook. "Giving people the power to share and make the world more open and connected." Facebook allows registered users to "interact" with one another on the "Wall," a space on every user's profile page that allows "friends" to post messages for the user to see. Facebook users can update their "Status" to inform their friends of their whereabouts and actions and you can "Chat" with friends who are online. Facebook also allows users to upload photos. All of these features are available from the computer or on most Smartphones. Some suggest that Facebook has greater privacy than MySpace but hackers have managed to infiltrate it. Profile settings regulate who sees what. Visit www.facebook.com to learn more about Facebook features. Feel free to check out the University of Florida's Golf and Sports Turf Management Facebook Fan page (www.facebook.com/ufturf) and be

sure to "Become a Fan" if you would like to keep in touch.

MySpace. "A place for friends." MySpace is similar to Facebook but with one significant difference between the two websites: the level of customization. MySpace allows users to decorate their profiles using different backgrounds, pictures, etc. MySpace has been formed with entertainment and music in mind and so videos, music, and pictures are found on many of the MySpace pages. MySpace is deemed to be more "open" and your content can be seen by more people. As with Facebook, profile settings regulates who sees what. Check out www.myspace.com for more information.

Twitter. "Share and discover what's happening right now, anywhere in the world." Twitter is a social networking and blogging service that allows users to send and read messages known as "tweets." Tweets are text-based posts of up to 140 characters that are displayed on your profile page and delivered to your subscribers who are known as "followers." Tweepers can restrict delivery

of their updates to those in their circle of friends or allow open access for all to see. You can learn more about Twitter at www.twitter.com.

Google Buzz. "Go beyond status messages." Google Buzz is a relative newcomer to the social networking stage. Backed by the resources and people responsible for the most popular webpage in the world, Google Buzz has positioned itself as a simple means of communicating whatever it is that you find interesting. They have integrated sharing of photos and video in a manner that is seamless and in-line with status updates. Using their existing GMAIL account holders as the early adopters they have created what could turn out to be the third largest social networking tool overnight. One standout difference with Google Buzz is the built-in feature that allows users to share their location when posting updates. Individuals can post public updates complete with location information that show up on a map on Google. If you are new to an area you may choose to browse those comments to learn



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TOOLS

Flickr. Flickr is an image and video hosting website (www.flickr.com) web services suite, and online community.

Twitpic. Similar to Flickr, Twitpic is a website (www.twitpic.com) that allows users to post pictures to the Twitter service.

Blog. Short for Web Log, blogs are places for you to write about anything you so desire.

YouTube. A video hosting website where one can place videos of just about anything.

Google docs. "Create and share your work online." Google docs is a free tool that offers a number of great features.

what people think of the public golf course or to check on reviews of a restaurant. You can learn more about Google Buzz at www.buzz.google.com.

Linkedin. "Relationships matter." LinkedIn is a business-oriented social networking site mainly used for professional networking. Registered users can maintain a list of contact details of people they know and trust in business. The people in the list are called "Connections." The list of connections is then cross-referenced allowing users to network with a "connection of a connection" or "friend of a friend." There is also a Q&A section where you can ask business related questions or share business related answers. You can learn more about LinkedIn at www.linkedin.com.

Regardless of where you feel that you fit, there is a good chance that you will interact with one of the many digital tools that you can find on the internet. The purpose of each social network varies slightly, and in some cases, may not be all that evident. MySpace is still the dominant social network, especially among the younger generation (Digital Natives). However, a quick internet search reveals that Facebook is rapidly becoming the most used social network and has likely surpassed MySpace. Research shows that different social networks appeal to those of differing ages. Teenagers are drawn to MySpace whereas LinkedIn is used commonly by working-aged individuals.

In addition to these primary social networking sites, many applications have been developed to assist those who partici-

pate in social networks. Examples of tools to compliment social networking sites include:

Flickr. Flickr is an image and video hosting website (www.flickr.com) web services suite, and online community. In addition to being a popular website for users to share and embed personal photographs, the service is widely used by bloggers to host images that they embed in blogs and social media. Flickr offers two levels of service: a "Free" membership that allows you to upload a reasonable number of pictures and video and a "Pro" membership that provides unlimited uploads. There are many photo hosting sites similar to Flickr, each with their own unique traits and features. Regularly uploading all of your pictures to a site like Flickr offers the added bonus of a free backup of your files in the event that you suffer from an unexpected hard drive failure.



Twitpic. Similar to Flickr, Twitpic is a website (www.twitpic.com) that allows users to post pictures to the Twitter service. If you have a Twitter account then you already have a Twitpic account and you can login to Twitpic with your Twitter username and password.

Blog. Short for Web Log, blogs are places for you to write about anything you so desire. Some use blogs to "rant and rave" about political activities while others use blogs as a personal journal or chronicle of their life activities. An example of a turf related blog is:

<http://www.turfdiseases.blogspot.com/>

YouTube. A video hosting website where one can place videos of just about