

and contribute to nutrient re-cycling. The material should be highly organic and decomposed (or manufactured from such materials). Material high in recognizable wood chips may have higher C/N ratios and slower decomposition rates. Moisture contents of 30-50% are generally desirable. At levels above 60% the material is hard to handle and clumps; below 25% it may be excessively dusty. Moisture levels can be critical to effective spreading and/or ease of incorporation.

The reaction (pH) of the material should be between 6 and 8. In soil, pH is unlikely to be a significant issue; however, on a sand base, incorporation of compost may influence the overall pH and could affect nutrient availability. Because of the highly variable input sources that can be used for composting, it is also essential to obtain a measure of the salt content – some products are sufficiently high in salts to create additional soil problems. Composts, as with most organic materials, provide slow release, low analysis fertilizer inputs to the turfgrass system. In particular, the release of some materials may be particularly low in the first year. At higher application rates, this may lead to nitrogen immobilization. This uncertainty can be a particular challenge for the “unprocessed” composts that tend to be more variable in composition and less defined in terms of release rates than fertilizers that have been manufactured from composted sources.

Other organic amendments include materials such as humates and a range of biostimulants products such as kelp extracts, microbial inoculants and other biologically derived materials. Humic substances are “naturally-occurring,

highly decomposed organic substances with very complex structures.” They normally include humic acid, fulvic acid and humins, which are distinguished on the basis of their solubility characteristics. Many of the characteristics attributed to natural soil OM have also been associated with humic substances – they are not fertilizers, but have been correlated with increased mineral nutrient absorption, enhanced soil microbial populations, reduced aluminum toxicity, increased plant hormone activity, etc. The challenge with humic substances is that because they are defined on the basis of solubility, materials with similar solubility may be from very different sources, have different chemical structure and properties, and have a very different effect on plant growth. With such materials, it is clearly critical to have specific and dependable evidence for the performance claims of the specific source material.

That category of materials known as biostimulants is probably the most challenging group of products to assess. They are diverse in origin and offer a similar range of benefits to other organics – nutrient uptake enhancement, beneficial microbial activity, soil structural benefits, stress tolerance, etc. Our experience with some of these kinds of products is that they are generally more likely to be efficacious under stress conditions – when growing conditions are near optimal, often little benefit is observed. As with any other group of products, independent evidence to substantiate claims is an important part of the assessment. As James Baird of the USGA pointed out at the recent Ontario Turfgrass Symposium, red flags should be

raised when product claims are preceded by the statement “*this product is so good, it didn't need any research.*” It is also essential that there be a clear rationale for the inclusion of these organic materials into the management program. Biostimulants, or any other organic amendment, are not substitutes for good turfgrass management.

Putting Organics to Use

In a sand-based sports field, and for soils in which OM deficits are clearly problematic, a strong argument can be made for the use of organic amendments in the initial design/ construction phase, and/or as part of the long-term maintenance strategy. As product availability increases, the ability to make an informed choice becomes more challenging. Particular attention should be paid to the basic rationale for including an organic amendment, to the properties of the material relative to the intended use, to appropriate incorporation of the material into the overall management strategy, and particularly to the scientific evidence used to substantiate the claims made for the product. If organic amendments have been incorporated into your management program, don't assume that is the end of the process. Continue to monitor the turf and its response to inclusion of any new organic amendment and to review the outcome in the context of your overall cultural management. Organic amendments may not be the elixir of life for your turf, but careful selection of materials with demonstrated potential can form an important part of an integrated cultural management program. ■

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J. Robert Dippel

SEEDS

Budgeting for Sports Field Construction

CHRIS MARK • TOWN OF OAKVILLE • STA DIRECTOR

In the past year, the Town of Oakville has undertaken construction of four soccer fields that will collectively form one of the Town's primary locations for tournaments. Field construction began in late winter 2001 with the fields anticipated being open in May 2002. Three fields were topsoil fields with each field measuring 100 m x 64 m and one field measured 105 m x 73 m. This article will discuss the costs associated with constructing quality athletic soccer fields along with some helpful hints to save money and potential headaches.

The costs associated with quality athletic fields is significant, not only in the initial construction but also later in terms of ongoing maintenance. Financial and land decisions with regard to the size and number of fields usually must be made several years in advance of actual field and park construction. The key is to develop a plan and remain true to your vision because there will be many bumps along the path to success.

With losing the ability to purchase parkland under the Development Charges Act, most municipalities do not have the luxury to purchase additional land for major sports parks. Hence obtaining enough parkland for a major sports park with only the 5% parkland dedication available under the Planning Act often means amassing land from several landowners. These negotiations, discussions with your finance staff to ensure the funding is in place, and ultimately, the approval by

elected officials can prove challenging and difficult. However, if one remains focused on the quality of the fields and venue, the results can be most gratifying.

In planning athletic fields, the use of the fields should govern the type of construction and follow-up maintenance program. Are you constructing fields to be used for a couple of days per week, or daily? If your requirements dictate a need for fields for use during weekends, it is difficult to justify spending the approximate \$250,000 premium for a sand base field. If you are planning to install lights so the field can host two games per evening, plus weekend play and tournaments, the additional costs associated with proper drainage, irrigation and a modified root zone are well worth the extra money. Another critical planning decision is whether you can afford the follow-up maintenance program. This program must be geared to the type of field constructed. A sand base field, complete with lighting and irrigation, will require significantly more maintenance dollars than a topsoil field without lights or irrigation. Do not construct a field you cannot afford to maintain following construction!

Another important decision is tendering the field(s) for construction. Do you want to tender through a public tender or through the developer? Typically we have achieved good success by tendering large park and athletic field construction projects through the developer. All bidders are pre-qualified to ensure they have the

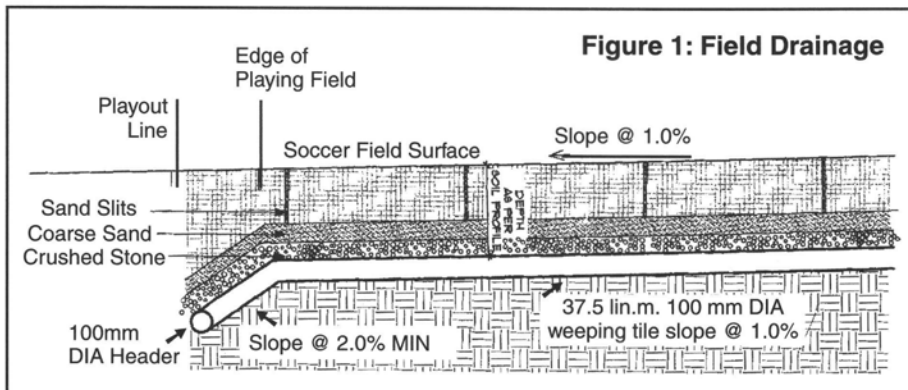
experience and expertise to construct quality athletic fields. We have also identified qualified sub-contractors to ensure that drainage, irrigation and electrical elements are installed by quality trades. Ensure quality sub-trades are hired for the project that includes a soil agronomist who can recommend proper sand and soil and thoroughly interpret a soil analysis.

Field Sub-Grading \$5,500/field

Park pre-servicing costs are minimized by having the developer undertake the grading and servicing at the same time they are performing similar work in the surrounding subdivision. Typically the developer will have large earthmovers and scrapers already on site so partner with them to have the park block graded by this equipment. Bringing such equipment back at a later date will cost 2-3 times more than undertaking the grading in tandem with the subdivision. If water, sanitary and electrical services are required for the park, coordinate their installation at the same time these services are being installed in the surrounding subdivision. Once again, the savings will be substantial.

With overall park grading completed by large earthmovers and scrapers, the rough grading is completed using dozers equipped with laser levels. Sub-grades for the fields is 1% and in our most recent fields, the sub-grade was completely flat.

Field Drainage \$25,000/field
(4 in. O-Pipe)



Drainage is an area where if you cut costs initially, it can increase ongoing maintenance costs at a later date. The fields were drained with 4 inch O-pipe without a filter sock. The drainage was installed upon completion of the sub-grading and all material from the trenches was removed off-site. The tile was laid on approximate 20 ft. centres across the entire field (including sideline areas where players benches will be placed) with the tile

graded at a 1% slope across the field and then 2% into the header trench (see Fig. 1). All tile was installed using laser controlled equipment which ensured the work was done accurately and quickly. Extreme care was taken to ensure no native soil migrated into the trenches.

On the topsoil fields, the trenches were filled with 10 mm of gravel followed by 100 mm of sand. It was important to select a stone that did not allow the topsoil fines to move down into the tile and potentially leading to a blockage. On the sand base field, the trenches were filled with gravel followed by a 100 mm blanket layer of gravel across the entire field followed by 12 inches of sand.

Field Drainage \$17,000/field
(Slit Drainage)

On the topsoil fields, it was decided to include slit drainage as well as the 4 in O-pipe drainage. The slits are approximately 2-3 inches wide and are filled with coarse sand. The slits extend down the length of the field and are installed to the depth of the O-pipe. This work is done when the fields are sodded and well rooted. It is anticipated the slit drainage will be installed in fall 2002.

Field Profile

Sand Base \$250,000/field
Topsoil Base \$100,000/field

As one can see, the premium cost for a sand base field profile is significant. In both cases, the field profile was 12 inches/300 mm. The individual field profiles are listed as Fig.2 and Fig. 3. For specific information with regard to the sand and topsoil specification, the author may be contacted, or consult the Sports Turf Association publications *Understanding Turf Management* or *Constructing the Sports Field*.

Irrigation

Irrigation System \$14,000/field
Irrigation Building \$10,000 lump sum

In Oakville, we use pre-cast concrete buildings that serve as both irrigation and electrical buildings. One of the critical design criteria was to ensure the water

Figure 2: Sand-based Field

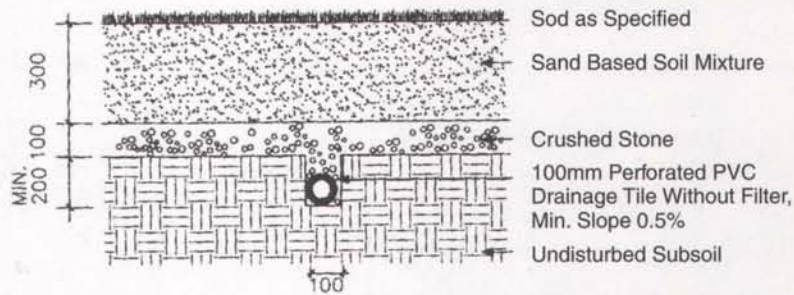
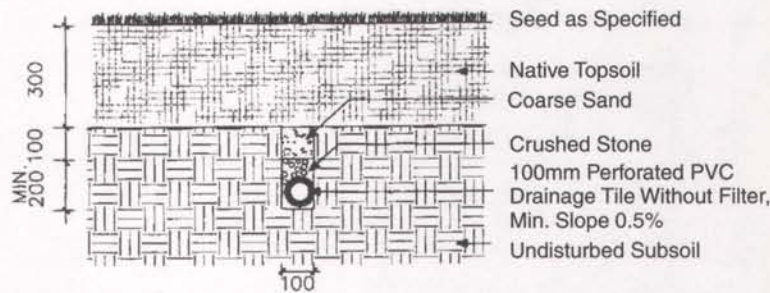


Figure 3: Soil-based Field



service and pipe sizing permitted all four fields to be watered in one night. (ie. begin irrigation at 11:30 pm and be completed by 6:30 am) Another important design element was ensuring that each field system could be isolated for repairs or different shut down schedules in the fall. Since we seeded the fields, it was critical to have the system installed prior to the actual seeding. We have had good success with both Rainbird and Toro irrigation systems.

Seeding \$10,500/field
Sodding \$17,000/field

Seeding or sodding the fields is an important decision for the turf manager. One is more expensive than the other, but cost alone should not be the only consideration. Expected use of the field following construction will also have to be considered when deciding whether to seed or sod. The general rule of thumb for field use following completion is six months for seed and six weeks for sod. In Oakville, we prefer to seed the fields if time permits to incorporate the best sport field blends at the outset. For the topsoil fields,

we used 75% bluegrass (varieties of Washington, Alpine and Touchdown) and 25% turf-type perennial rye (Cutter). For non-irrigated fields, we have specified 50% Mustang tall fescue with 40% Kentucky blue and 10% Shortstop tall fescue.

Electrical Lighting \$110,000/field

On average, \$110,000 per field is needed for lighting, that includes bringing the power from the local utility to your on-site electrical building. All fields were lit with 1,000 watt metal halide fixtures with full cut-off controls with minimal light spillage. Field lighting uniformity is absolutely critical. Do not try and save money by using fewer poles and shorter poles. The fields were lit with either 70 ft. or 80 ft. poles. Due to the significant lead time required for pole delivery (4-6 months), we ordered the poles separately from the contract to ensure delivery coincided with the contract tender award. Push button controls are installed at each field for users to turn on/off the lights. Receptacles are also installed in each power control post for PA systems, portable generators, etc. for tournaments.

This sports park is located near a residential community. The fields will be lit nightly from May to September. We made sure the developer building the homes backing directly onto the lit sports park included a warning clause in each sales agreement. This warning clause indicated they had purchased a home adjacent to a lit park facility. It is also helpful to install the lights prior to building permit issuance.

Fencing \$20,000/field

For premier fields, we fence the entire field to restrict access to users with a facility permit. It costs approximately \$42.50/linear meter (6 ft. high) using Schedule 40 pipe, 9 gauge fabric. Double gates are installed at both ends of the field on both sides for maintenance equipment. One of the design criteria was ensuring a bucket truck could drive down the sidelines of the field to service the lights without crossing the field. In many cases, we increase the height of the fencing behind goal nets to 10 ft. in an attempt to keep

balls in play (and out of neighbours yards).

Misc. Items \$20,000/field
(bleachers, goal posts, benches, waste receptacle)

Our typical bleachers are aluminum, 4 rows and just under 4 feet in height. The ends of the bleachers are painted yellow for greater visibility to avoid accidents from glare. Benches are anodized aluminum. Players' benches are also aluminum, 5 meters long and installed permanently in the ground. Goal posts are 8 feet high x 24 feet wide painted white with an epoxy powdercoat finish. Waste receptacles that have been very successful are the deep below ground 300 gallon units that hold large volumes of garbage and do not need frequent pickups.

Final Costs

In conclusion, costs associated with athletic field construction are significant and careful choices and decisions must be

made that have impacts on the initial construction cost and the future maintenance costs. Do not build a field you cannot afford to maintain or build a field that does not coincide with the intended usage.

The average construction cost for a premier sand base field (tile drained, irrigated, lit, fully fenced with bleachers, players bench and goal posts) is approximately \$465,000 for a seeded surface, \$471,500 as a sodded surface. The average cost for a premier topsoil base field (tile drained, slit drained, irrigated, lit, fully fenced with bleachers, players benches and goal posts) is approximately \$332,000 for a seeded surface. As a sodded surface, the cost would be in the range of \$338,500. ■

Coming Events

Mark Your Calendar!

STA's Annual Field Day will be moved from August to September this year. Stay tuned for details.



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Budgeting for Sports Field Maintenance

JANE ARNETT-RIVERS • TOWN OF OAKVILLE • PAST STA PRESIDENT

Depending on your perspective, time and/or money is the item you always need more of. At some point, unless staffing compliments increase with workloads, all the money in the world will not help you get the work done. The following is a description of general maintenance items, the equipment to do it, staff required and materials needed. You decide, is it about time or money?!

In Oakville we have 61 diamonds and 77 soccer fields. We host 16,000 players using our fields for 47,000 hours. What does all this mean to fields? Turf wear and tear. What does all this mean to you? You'd better find ways of doing more in less time with less money. If the field is lit, it will receive at least twice the play. If it is irrigated and lit, it will be used for tournaments assuming the quality of turf will be high. During tournaments, the field could see 5 to 6 games per day for 4 consecutive days. If applying appropriate funds to appropriate amounts of play, open up the purse strings on these fields – they will cost the most. Premier fields definitely see the largest percentage of funds, unfortunately the others must settle with being kept safe.

At a past Sports Turf Association Field Day, Marc Altman said put your money where your play is. In other words, don't treat the infield the same as the outfield. If home plate sees most of the action, spend more there. Compaction will be



more of a problem on 30% of a soccer field. Keep that in mind while going through the following points.

BALL DIAMONDS

First, always first, mark your irrigation heads. Whether aerating, overseeding or rolling, mark the heads. Damage to the lines is costly and will slow any operation down.

Infield and Outfield \$38, 1 hour

Aerating can achieve so many things in the soil – whether to assist in moving water or increasing the O₂ in the soil,

therefore increasing microbial activity or relieving surface compaction. Optimum is 12 to 16 holes per square foot, 2 to 3 passes. It should be done with any renovation. Aerating should disturb the soil in a controlled way and be done when the crowns have time to heal. Some studies have shown it increases control when done prior to weed spraying.

Infield \$40, 1/2 hour
Outfield \$100, 1 hour

Overseeding

On infields, we use establishment rates of 20 pounds/1,000 square feet, on out



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fields, we use 10 pounds. We like to overseed the infields 3 times and outfields once. During play we use a perennial ryegrass blend, in fall we use a Kentucky bluegrass.

Infields \$120-\$170, 1/2 hour
Outfields \$240-\$340, 1 hour

Topdressing

This is the only chance you have to change surface soil. Soil dictates the movement of water, whether through gravitational flow or capillary flow through micropores. Soil can hold nutrients or release them. It can be your biggest problem. You want water to move fast enough to keep the field playable, but slow enough to allow fertility levels to stay high as long as possible. Find the mix which best suits your existing soil. You should not attempt to radically change the soil type, this could result in a layering problem further causing drainage problems. No more than 3/8" should be applied at one

time. To stretch money, use a higher quality material on infields than outfields.

Infields \$210, 1 hour
Outfields \$500, 2 hours

Grooming Infield & Warning Track

Change the point of entry each time the equipment accesses the infield. Ensure the operator carries a rake and trash bags as well as a short check list. Stress the importance of speed, too much will cause lips to form on the edge of the infield. If grooming is done slowly, less infield material will be thrown out. Our infields are groomed daily, warning tracks 2x/week.

Infield \$35, 1 hour
Warning Track \$35, 1 hour

Cutting Lips (Edge of the Infield)

This is done when the season is not in play, spring or fall, and prior to tournaments for detailing. It will prevent a lip from forming. Be sure to mark the irriga-

tion heads before cutting. Be prepared to add infield mix after hauling away debris, often existing mix cannot be leveled out adequately.

Hardball \$145, 2 hours
Softball \$100, 2 hours

Brooming Lips

Five times per season will help stop a lip from developing. We use a sweepster 3' broom with plastic bristles. Be sure to broom into the infield. \$25, 1 hour

Cutting and Fertilizing

Not including fertilizer costs. Equipment to cut irrigated fields is floated and cut more often.

Irrigated \$75, 1 hour
Non-irrigated \$55, 1 hour

Installing a Mound

For permanent mounds we have used 'Mound Master.' It takes approximately 50



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bags at \$5 a bag. It constructs a more permanent structure requiring less reinforcing. Be sure to have accurate measurements. Talk with the groups using the diamond first to see what they want. If reconstructing the infield, mark the mound dimensions and leave it until all other work is complete.

Installing \$350, 8 hours
Maintaining \$75, 2 hours

Home Plate Construction and Installation

Purchase rubbers framed in and filled with concrete. We also use clay brick around the home plate area. This cuts down on constantly replacing material and checking for divots. Be sure to have at least 1-1/2 inches of material on top of brick so players can still 'dig in.'

With Clay \$850, 8 hours
Without Clay \$85, 1 hour

Weekly Inspection

This is one of the most important things you can do. Use a form to ensure the inspection is done and nothing is missed. It is the time when holes are filled and seeded; irrigation heads are checked; and lips, fence lines, base paths and home plate are level. Recommended inspection sheets are available from the Sports Turf Association.

SOCCER

Again, always begin with marking irrigation heads before starting work on the field. \$38, 1 hour

Aerating

Soil strength is measured by its ability to hold when pressure is put on either vertically or horizontally. This is critical for traction. Moisture levels will affect soil strength. Aerating can improve moisture levels and air in soil. \$140, 2 hours

Overseeding

Choice of seed depends on time of the year. During mid season play, germination times are critical, while in fall seeding, over wintering of seed is more of a factor. Guaranteed germination rates are on the bag, ask the supplier for them if

they're not. How you store the seed will also affect germination rates. When a seed is cultivated there is a goal. Wear resistance, drought resistance and disease suppression are all factors. There is a cost involved with developing new seed. They do it for a reason, find out what that reason is.

Perennial Ryegrass Blend \$400, 2 hours
Kentucky Bluegrass Blend \$600, 2 hours

Topdressing

You want soil to hold nutrients in the root zone for the plant to take up. You also want the water to drain to keep the field playable. An optimum root zone will allow you to fertilize less frequently by cutting down on leaching. Be sure not to alter material too much from existing soils to avoid layering.

Sand \$900, 4 hours
Soil \$700, 4 hours

Layout and Lining

Cutting down lines first with a push mower will help keep them longer, especially on irrigated surfaces. User builders block paint; mix it 1:1 with water.

Initial Lining \$130, 3 hours
Weekly Lining \$65, 1 hour

Painting Goal Posts

Done once a year using latex paint. \$55, 1 hour

Cutting and Fertilizing

Irrigated fields are cut with a mower, which is floated and cut 2 times per week. Non-irrigated fields are cut every 10 days. This cost does not include fertilizer.

Irrigated \$75, 1 hour
Non-irrigated \$55, 1 hour

Weekly Inspection

As with the ball diamonds, designing and distributing a checklist is very worthwhile ensuring that work completed is recorded and all points are checked. Again, inspection sheets are available from the Sports Turf Association. ■



COSTS BREAKDOWN

Yearly Ball Diamond Maintenance

Irrigated

Labour 244 hours
 Equipment \$8,950
 Materials \$3,000 to \$6,500

Non-irrigated

Labour 154 hours
 Equipment \$5,265
 Materials \$550



Yearly Soccer Field Maintenance

Irrigated

Labour 136 hours
 Equipment \$5,140
 Materials \$2,150

Non-Irrigated

Labour 50 hours
 Equipment \$925
 Materials \$745

Spinning the Numbers

- One person can maintain 5 irrigated ball diamonds.
- One person can maintain 9 irrigated soccer fields.

This does not include:

- Irrigation shut down or start up
- Light maintenance
- Drainage installation
- Infield/soil amendments application
- Warning track amendment
- Installing fence protectors
- Sodding in fall
- Bleacher maintenance.

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COMING EVENTS

March 24-26

International IPM Conference
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Toronto, ON. Info: www.gov.on.ca/OMAFRA/ipmconference/

March 25

Industry Task Force II on
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April 28 - May 3

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Association 47th Annual Profes-
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May 1 & 2

Sports Turf Research Institute
*Breeding & Evaluation of
Turfgrasses Technical Conference*
West Yorkshire, UK, Tel: 01274
565131, email info@stri.co.uk

August 13

Guelph Turfgrass Institute
Summer Research Field Day
Guelph, ON, Info: (519) 767-5009

September

STA Annual Field Day
Date and location TBA

October 23

STA/ORFA Educational Workshop
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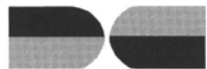


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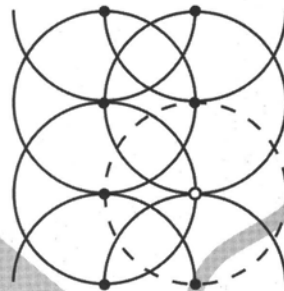
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