



A specially designed drainage system and lime treatments helped keep the Berkeley project on schedule. *Courtesy: CMX Group*

Overcoming obstacles

We faced a particular challenge when California-Berkeley brought us in to help convert its football field at Memorial Stadium back to grass from artificial turf. We knew going in that Strawberry Creek ran through a drainage structure under the stadium.

In the information-gathering stage, we looked at the stadium's "as-built" records,

which dated back to the 1920s. We brought in local expertise, and took soil borings for pre-evaluation and analysis.

During our geotechnical soils testing, we discovered that there were natural springs under the stands. These would likely empty into the lowered playing field area during construction, so we needed to address the situation immediately.

We designed a drainage system to intercept the water, and then used a special lime treatment to stabilize the soil

under the stadium. These procedures became even more necessary when heavier than normal winter rains kept the local water table high and the stadium soil very moist. If we hadn't addressed the uniqueness of the project early on, it would not have been completed on schedule.

Sports projects are intense, highly-visible endeavors with tight budgets and even tighter time schedules. There's constant media scrutiny and no margin for error.

It's never easy, but by starting with a firm foundation and developing contingency plans, it can be most exciting and satisfying. □

Don Dillon is chief executive officer and Mike Lloyd is president of CMX Group, Inc. 1515 E. Missouri Ave., Suite 115, Phoenix, AZ 85014. Phone: (602) 279-8436, Fax: (602) 265-1191, Web: <http://www.cmxinc.com>.

It was a great experience. The review and communication process was intense and constant. Our plans needed to be extremely precise. The Cardinals remained involved in all phases of the field installation, from setting the root-zone specifications to incorporating a unique subsurface irrigation system.

The results speak for themselves. The fields have held up exceptionally well, and the training facility still ranks as one of the best in the NFL.

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Sports Turf Research Report

Forward Motion

Evaluation of various athletic field rootzone inclusions

by Andrew McNitt

In this study, we wanted to determine whether various soil inclusions affect physical properties and/or playing surface quality in soils with high sand content.

Physical properties include texture (percent sand, silt, and clay), bulk density (weight per unit volume of soil), and water infiltration rate. These directly affect the soil's ability to exchange air and water, which turfgrass roots need to survive.

Playing surface quality can be defined as the suitability of a surface for a particular sport, as measured in terms of the interactions between the surface and players. A player interacts with a surface in two ways: through impact or through player to shoe to surface interaction (traction).

Our study

We established field plots at the Joseph Valentine Turfgrass Research Center at Penn State University. The plot area consisted of an under-drained gravel layer approximately six inches deep, overlaid by a 2.5-inch intermediate layer of fine gravel and coarse sand. Over the intermediate layer, we installed four inches of 90-percent sand/10-percent sphagnum peat (by volume) rootzone mix.

We filled a series of 10-foot by 10-foot by six-inch frames with mixed soil inclusion/rootzone treatments. After removing the frames, we seeded the plots with SR 4200 perennial ryegrass. We applied nutrients and water as needed, and mowed the turf to a height of 1.5 inches twice a week with a reel mower.

We split the treatment plots into three subplots, and added different

levels of wear to each. Some subplots received no wear, medium wear approximated three NFL games per week, and high wear simulated seven games per week.

We collected turfgrass density, soil bulk density, soil water, traction, and hardness data on six dates over two years.

Preliminary results

The **Summary Table** shows how the experimental treatments differed from the control on the six rating dates of the study. Results appear to vary depending on the size, shape, and application rate of the inclusion. They also vary based on whether the inclusion is newly manufactured or recycled.

Netlon, Turfgrids, and Sportgrass are products manufactured for use as soil inclusions. DuPont Shredded Carpet and Nike Inclusions are recycled products.

Sportgrass is unique because it is an oriented soil inclusion that lies exclusively at the soil surface. All of the other inclusions are randomly oriented, and occupy the top six inches of soil.

The recycled products tended to reduce soil bulk density, which translates to lower soil compaction. On the other hand, manufactured products produced higher Gmax values than either the control or the recycled product treatments on each rating date over both years of the test.

All of the treatments outperformed the control on the divot test. The presence of inclusions added some shear strength to the turf's surface, reducing divot length. This was most

evident after the turf was exposed to wear.

None of the treatments produced consistent differences in field traction.

Results for the other observed properties were mixed. Individual product performance data follows.

DuPont Shredded Carpet

Adding DuPont Shredded Carpet to the sand root zone significantly reduced soil bulk density. Although this trend was evident when no wear was applied, it became greater as the wear level increased. This indicates that the material lowers bulk density, and it resists compaction as wear increases.

At the three-percent rate, DuPont Shredded Carpet always provided lower surface hardness values than the control, and all rates reduced divot length when compared to the control. There was a slight increase in turfgrass density, especially in the high-wear plots. The product produced no consistent change in traction or soil water content over the control.

Netlon

Netlon significantly reduced divot length when compared to the control. It increased surface hardness on all rating dates over the two-year study. The 0.5-percent rate produced a bulk density that measured significantly higher than the control on five of the six rating dates.

Overall, Netlon had no consistent effect on traction, infiltration, turfgrass density, or soil water content under the conditions of the study.

Nike Light and Heavies

These two products produced similar results for some properties and different results for others.

They both reduced soil bulk density on five out of six rating dates, and both showed greater wear resistance than the control on more than half of the rating dates.

Nike Light measured lower in soil water content than the control on four dates, while Nike Heavies measured lower on only one.

Sportgrass

On average, Sportgrass reduced divot size more than any other treatment. It was the only treatment to measure higher traction than the control.

Sportgrass was significantly higher in surface hardness than the control on

all six rating dates, and it had lower soil water content than the control on five rating dates. It also had a lower turf-

cent both reduced divot length after wear was applied. Turfgrids 0.5 percent was the only treatment to reduce divot length when no wear was applied.

Both Turfgrids treatments tested higher in surface hardness than the control on all rating dates. The 0.3-percent variety had lower traction values than the control on two of the six dates.

Turfgrids had no consistent effect on soil bulk density or turfgrass density. □

Summary Table. Number of rating dates (max 6) that a treatment main effect mean is significantly different (higher or lower) than the control. Divot length was measured only once. The mean divot length is listed in the table.

Turfgrass Density (wear resistance)		Soil Bulk Density (compaction resistance)		Soil Water Content		Surface Hardness		Traction		Divotting (length)	
Treatment	# rating dates	Treatment	# rating dates	Treatment	# rating dates	Treatment	# rating dates	Treatment	# rating dates	Treatment	cm
Nike Lights	5	DuPont S. C. 3%	6	Turfgrids 0.3%	4	DuPont S. C. 3%	6	Sportgrass	1	Sportgrass	15.2
Nike Heavies	4	DuPont S. C. 1%	5	Turfgrids 0.3%	3	Nike Lights	6	↑ Higher CONTROL ↓ Lower	4	Turfgrids 0.5%	16.6
DuPont S. C. 2%	2	DuPont S. C. 2%	5	DuPont S. C. 1%	2	DuPont S. C. 2%	4	↑ Higher CONTROL ↓ Lower	4	DuPont S. C. 3%	18.2
DuPont S. C. 3%	1	Nike Heavies	5	DuPont S. C. 0.5%	1	DuPont S. C. 1%	1	DuPont S. C. 2%	1	Turfgrids 0.3%	18.6
Turfgrids 0.3%	1	Nike Lights	5	DuPont S. C. 2%	1	Nike Heavies	1	Nike Heavies	1	DuPont S. C. 2%	20.0
↑ Higher CONTROL ↓ Lower		DuPont S. C. 0.5%	3	↑ Higher CONTROL ↓ Lower		↑ Softer CONTROL ↓ Harder		Nike Lights	1	Netlon 0.5%	20.8
		Turfgrids 0.3%	1	↑ Higher CONTROL ↓ Lower		↑ Softer CONTROL ↓ Harder		Turfgrids 0.3%	1	DuPont S. C. 1%	22.5
		Turfgrids 0.5%	1	DuPont S. C. 0.5%	1	DuPont S. C. 0.5%	1	Turfgrids 0.3%	2	Netlon 0.3%	23.3
		Sportgrass	3	↑ Lower CONTROL ↓ Higher		Netlon 0.3%	6	Netlon 0.3%	6	Nike Light	23.4
				DuPont S. C. 3%	2	Netlon 0.5%	6	DuPont S. C. 0.5%	1	DuPont S. C. 0.5%	24.4
				Netlon 0.5%	2	Sportgrass	6	Nike Heavies	5	Nike Heavies	24.5
				Turfgrids 0.5%	1	Turfgrids 0.5%	2	Turfgrids 0.3%	6	CONTROL	29.4
				Netlon 0.5%	5	Nike Lights	5	Turfgrids 0.5%	6	led	3.0
				Sportgrass	5						

Andrew McNitt is a faculty instructor at Pennsylvania State

University's Department of Agronomy. If you have current research to share with readers, please contact STMA Headquarters: (800) 323-3875.

grass density than the control on three rating dates.

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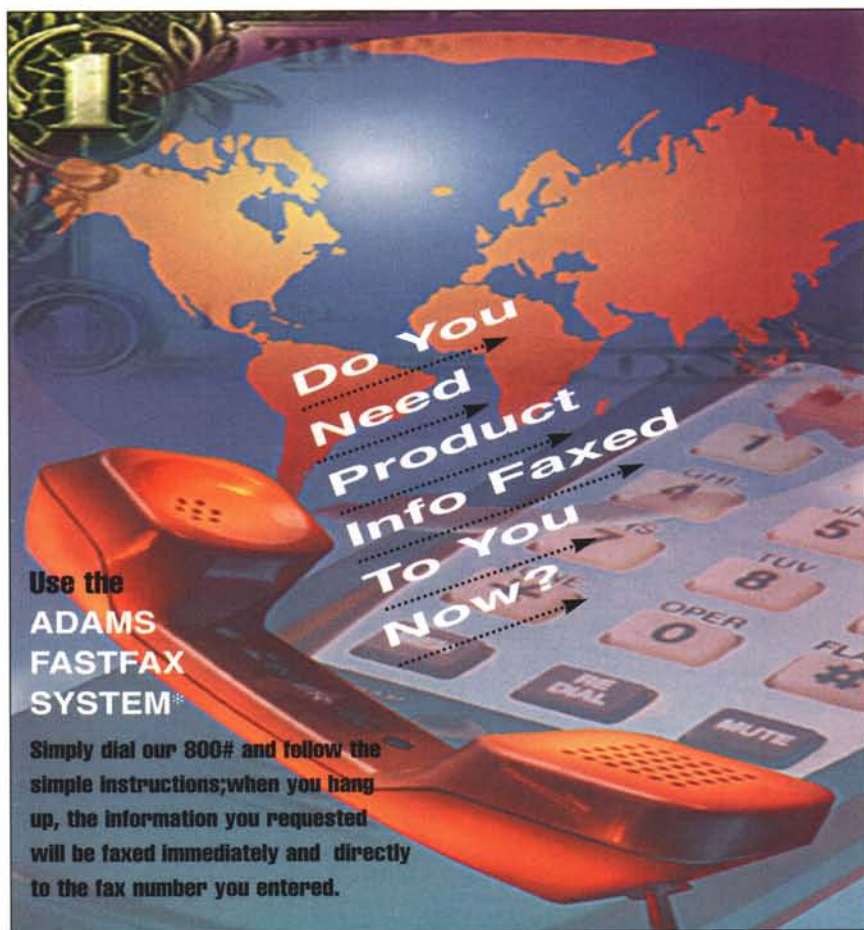
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Budgeting



by Rich Moffitt

Budgeting is the first step in developing your strategic game plan, and it's a vital tool in your ongoing success. There will always be more needs and wants than resources, no matter how extensive or well-funded your program is.

Budgeting gives you the ability to project costs, set priorities, and allocate spending to produce desired results and meet expectations of field owners and users. Budgeting also gives you a specific set of guidelines for measuring progress and for fine-tuning future activities.

Define your needs

When sitting down to develop your budget, first determine and prioritize your needs.

Generally, budgets fall into three separate categories: an operational budget, which covers general maintenance and repairs; a capital improvement budget to fund acquisitions, major renovations, building projects, and related expenditures; and a capital equipment budget, which covers major new equipment purchases.

Your operational budget forms the guidelines for your day to day and year to year maintenance practices. By assessing field resources and levels of field-use demands from one year to the next, you can project needs and prepare an adequate funding base.

Commit to a program that con-

Figure 1. Operational budget: month to month five year comparison
Total Expenditures (materials, equipment, and labor)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
1999												
1998												
1997												
1996												
1995												

** This same type of grid can be used for each individual material item, piece of equipment, or category of labor.

forms to the facility owner's specifications. It may be necessary to set up several, well-defined maintenance levels for each field. Take into consideration projected levels of use, costs of each maintenance level noted, and the relationship between cost and field quality.

Be realistic with your model budgets. Consider equipment, material and labor costs, and contingency factors such as weather. In other words, be prepared to deliver the promised level of maintenance within the budget level you propose.

Document

Document all of your maintenance procedures. Include times, names of workers, and materials and equipment involved in each job. Keep a daily, weekly, and monthly log of expenditures, equipment, materials, and labor allocations. Record any unusual weather conditions or extended field use which might have a positive or negative impact on the effectiveness of the procedures. Analyze the usage level and maintenance program of each field.

Set up a budget tracking system that works for you and fits the format established by your facility. If your facility uses a computer accounting program with pre-set categories for spending, your budget and budget tracking program should reflect those categories.

Have your crews fill out forms that break down the components of

each work day. Stress the importance of accuracy in these daily records. You need to know where each pound of fertilizer or topdressing material was used, when it was used, and on which portion of which athletic field. You need to know where each replacement part was used, on which segment of what irrigation system, and which labor resources were required to perform that maintenance. You need to know exactly what is being spent to effectively control costs and allocate resources.

Data from these forms can be entered into the computer to record and track actual use. Compare actual-use data to your budget projections to provide up to date operational budget status reports.

Use purchase orders and requisition forms to control budgeted funds. Also, standardize a spending authorization system.

Track and analyze budget trends. If costs are rising, has field use increased because more user groups are being added, or because existing user groups are holding more games and practices? Has the facility acquired additional land or converted existing space to field use that now falls within the operational maintenance budget?

Allocate realistically

Set priorities for allocation of resource dollars, materials, and labor based on the maintenance necessary to achieve the agreed upon

quality at the projected use level. Consider the budget span (the starting and ending dates of the fiscal year), and where key projects or tasks fall within that year.

Remember, safety and playability are the top priorities for athletic fields. Aesthetics are a secondary concern.

Consider the long-term budget impact of increased maintenance that naturally follows completion of most capital improvement projects. A new sand-based field or a renovated native-soil practice field will attract more use. Build realistic additional costs into the operational budget.

Labor costs will be your single biggest expense. It may equal two-thirds of your total operational budget.

Analyze your use of personnel, and study cost-cutting alternatives. Look at additional training and cross-training options to increase your crew's effectiveness and flexibility. Where technical expertise or specialized equipment is needed, compare the overall costs of in-house personnel with those of outside contract labor.

Remember that labor and equipment use are as tangible as materials expenses. Flexibility here may be your most effective budget stretcher. Extended heavy rains or extremely heavy use may increase sports field compaction, which will require additional core aeration and topdressing. The added labor, equipment use, and materials might be offset by aerating and topdressing only key areas of one or two low-use fields.

Explore options for products, materials, and services. Set up test plots to measure product effectiveness in your specific conditions. Discuss your needs with current suppliers, and seek their assistance in formulating such cost-effective alternatives as quantity purchases or full-season purchase commitments.

Budget sufficient funds for equipment operation and upkeep. Preventive maintenance is less costly than repairs, especially when down time is allocated properly. Track equipment use and expense per machine to determine when it's cost-effective to replace equipment.

Set preventive maintenance intervals for such operating systems as lighting and irrigation. Plan for replacement of key components and budget funds for parts and installation costs.

Keep records of any unusual costs, and document when and why they occurred. Use these records to allocate from other areas in your budget, or to back up requests for supplemental funding. Determine if the impact of these costs will have an effect on your long-term operational budget.

Consider capital equipment expenditures that will cost money initially, but save funds in the long term. A single piece of equipment may enable one person to do the work of two or three people in specialized tasks.

Long-term planning

When budgeting capital improvement projects, consider long-term maintenance needs as well as up-front costs. Include provisions for equipment you'll use during construction and grow-in periods, as well as equipment you'll use for long-term maintenance procedures once the field is established.

Design one-time field construction or renovation budgets with enough flexibility to allow you to cover material costs during the initial season. Use this period to more accurately assess the maintenance needs of the new or improved area, and work adequate funding into your overall budget for the following season.

Seek additional resources

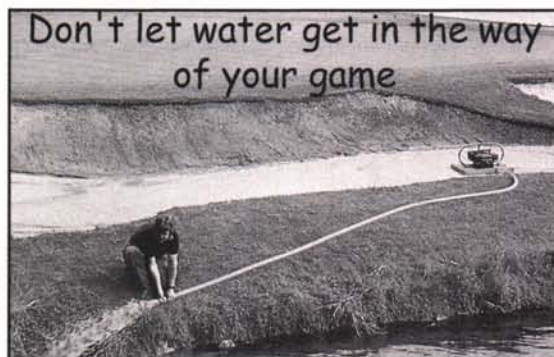
When you've fine-tuned your maintenance and budget program internally, look for external solutions to funding needs. You may be able to share resources with other departments within your facility, or with other local facilities.

Most facilities will have multiple groups with vested interests in field condition. For school systems, interest groups include the entire athletic department, all coaches and players, and Booster clubs. For municipalities and parks and recreation departments, all user groups and their supporters are possible resources. Seek their cooperation, contributions, volunteer labor, and fund raising abilities. Area businesses and service organizations may also be resources for funding, material donations, and labor power.

Publicly acknowledge contributors' support within sports event programs, on signs posted on the field fence or scoreboard, or in articles or letters to the editor in local newspapers. This helps build long-term relationships with the contributors, and also attracts community attention to your programs.

By constantly fine-tuning your strategic budget plan, you can end each season with a winning record. □

Rich Moffitt is director of grounds and materials management for Saint Louis University in St. Louis, MO. He's president-elect of the Sports Turf Managers Association.



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Birds of a Feather

What do Orioles and Ravens have in common? Besides being birds, they are the nicknames of two popular sports teams in Baltimore. They also share the area of Baltimore known as Camden Yards, and they both have talented individuals that were willing to share their expertise with the MAFMO Chapter Oct. 1.

More than 80 sports turf managers, groundskeepers, and others responsible for the care of athletic fields in the Mid-Atlantic area met on the sunny fall day. After sign in and refreshments, the group heard welcoming remarks from Chapter President Tim Moore in the end-zone stands of the Ravens' spacious new stadium.

STMA Executive Director Steve Trusty attended the meeting as part of STMA's Chapter Development program. These trips are generously sponsored by John Deere and Novartis at the Gold Level; and by Alpine Services, Hunter Services, and the Scotts Company at the Silver Level.

Trusty discussed the soon to be available Certified Sports Turf Manager program. He urged attendees to get involved on both the local and national levels to help increase professionalism in the industry, and to reach out to others and help them get involved.

Baltimore Ravens Field Maintenance Manager Vince Patterozzi talked about construction of the new field. He discussed issues faced while working with the team's temporary home, and the differences encountered with work at the training facility.

Patterozzi feels that Zoysia and

Bermuda are both good choices for athletic fields in the Mid-Atlantic region. He also went into detail about the need for stabilizers in the rootzone of high-use, high-profile fields. He mentioned several stabilizers on the market, and talked about their respective benefits.

Though he now manages what he called the Ravens' "big experimental field," Patterozzi thoroughly understands tight budgets and limited resources. He showed that he is willing to share his acquired knowledge in any way he can to help others.

same used by Little League fields.

Zwaska is very active on the Category I Committee for STMA. He urged attendees to get involved and to help each other by sharing information.

Guided tours of Oriole Park capped off the afternoon. Attendees got to see many areas that the general public seldom, if ever, sees.

As is customary with chapter functions such as this, friendships were made, ideas were exchanged, and much was learned.



MAFMO Chapter Field Day attendees get a first-hand look at Ravens Field. *Courtesy: Trusty & Assoc.*

A guided tour of the entire stadium rounded out the morning. During the lunch break, vendors showcased their latest products. Attendees moved to the other side of the facility in the afternoon for a look at Oriole Park.

Head Groundskeeper Paul Zwaska discussed care at the Major League Baseball field. He gave a fine presentation on infield mixes and preparation, and his crew demonstrated the step by step processes of preparing the home-plate area for a game. Zwaska emphasized that the process was basically the

presentation by Rich Genoff, sports turf manager for the San Francisco 49ers. Activities will move to the field in the afternoon for demonstrations and a lawn mower competition.

For information, contact Sal Genito, UC Davis: (530) 752-1691.

Midwest Chapter: The chapter will again participate in the North Central Turfgrass Exposition (NCTE) Nov. 30-Dec. 3 at Pheasant Run Resort in St. Charles, IL.

For information, call the chapter hotline: (847) 622-3517.

Chapter news

Florida Chapter #1:

Rain Bird is sponsoring an irrigation meeting Nov. 17 at the City of Parkland Parks and Recreation Department. It will include a tour of the completed field construction project the chapter viewed in process approximately one year ago.

For information, contact John Mascaro: (954) 938-7477.

Northern California

Chapter: The chapter's Fall Seminar will be held Nov. 18 at the Simpkins Center at San Jose State University Stadium in San Jose. Morning seminar sessions will include