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Each year, from late December to mid-April, visitors can witness the awe-inspiring migration of more than 15,000 Pacific grey whales passing through Long Beach on their way to their breeding and birthing grounds in Mexico. Whale watching excursions are available through several companies.

From award-winning drama and cutting-edge opera to historic museums, visitors will enjoy an exciting range of artistic expressions that comprise the city's rich heritage. Long Beach is home to a number of impressive museums, including the Museum of Latin American Art (MoLAA), the only museum in the country to focus exclusively on the contemporary art of Mexico, Central and South America and the Spanish-speaking Caribbean. Visitors can also explore the city's unique galleries in the thriving East Village arts community, listen to a renowned symphony orchestra or watch a play from a variety of first-class performing arts companies.

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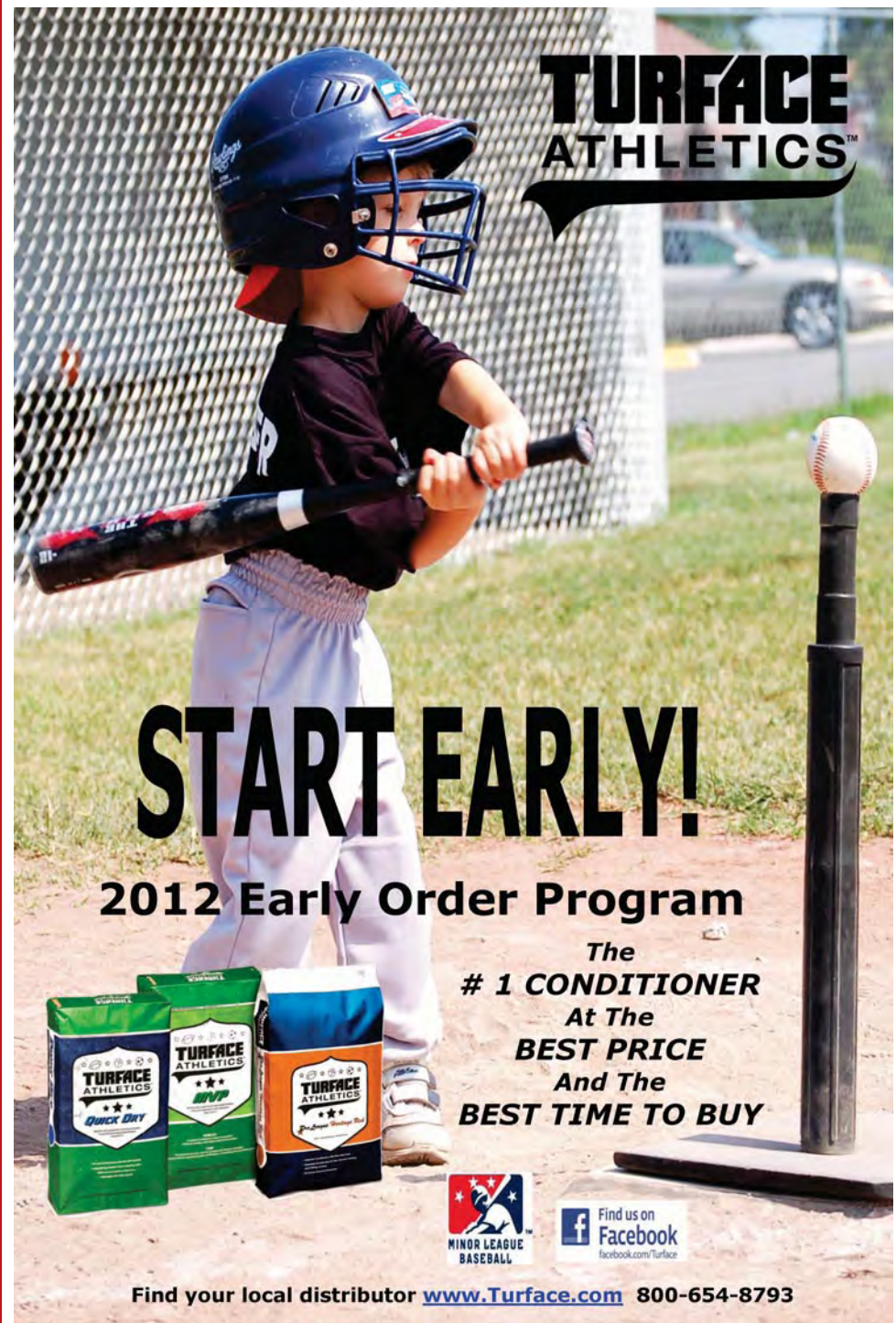
No other community in Southern California is as visitor friendly as Long Beach—and getting here is easy. Fly directly into the Long Beach Airport (LGB) on Alaska Air, Allegiant, American Airlines, Delta, JetBlue Airways and US Airways. Direct flights are available to many major cities, including New York, Washington DC, Austin, San Francisco, Seattle, Boston, Chicago and more. If you prefer to fly into Los Angeles (LAX) or Orange County (SNA), Long Beach is just a short 25-minute drive from either airport. While in town, the Passport local shuttle service offers complimentary

transportation to all of downtown Long Beach's most popular attractions including the Aquarium, Queen Mary, Shoreline Village and Pine Avenue. For just \$1.25, the Passport can transport visitors down to Belmont Shores/Naples and Cal State Long Beach.

In addition, water taxi service is offered by the Aquabus, and can transport guests across the water to Shoreline Village, the

Aquarium, or the Queen Mary. The Aqualink is a high-speed catamaran water taxi from downtown to Alamitos Bay. For your convenience, friendly downtown guides dressed in blue "Long Beach" shirts, blue caps and khaki pants are stationed in a 40-block area and help visitors find restaurants, shops and attractions.

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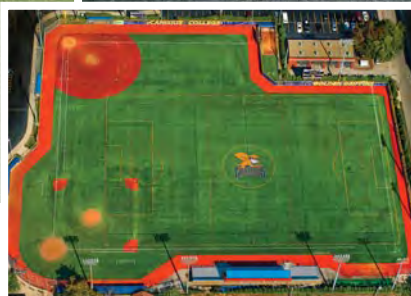
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>> CARDINAL NEWMAN HS, Santa Rosa, CA



>> Top left: EASTERN KENTUCKY UNIVERSITY, Richmond, KY

>> Bottom left: CANISIUS COLLEGE, Buffalo, NY

## Maintaining a synthetic baseball infield

**A**T ELON UNIVERSITY the baseball field consists of a synthetic (FieldTurf) infield and a natural, 419 bermudagrass outfield. Our maintenance plan of the synthetic baseball infield is developed around field use and weather. More maintenance is required for higher field use or inclement weather.

The basic daily maintenance includes working on the high-wear areas, including batters boxes, around the pitching mound, around all the bases, and around dugouts and entrances to the fields. For the most part, the work requires just a push broom or backpack blower to move the crumb rubber back into place. The rubber is pushed back to its original location and then water is used to help settle the rubber back into place.

Around the mound area, we push any clay back on the mound. This will also push crumb rubber on the mound. We believe that the

crumb rubber is easier to remove from the mound surface than the clay is to remove from the synthetic surface. During certain times of the year we use backpack blowers daily to blow debris off the surface. Fortunately our synthetic infield surface is only about 40,000 square feet so the time for this process is minimal.

Monthly, we drag the field using the Field-Turf drag. The FieldTurf drag has three different tools: a broom, an aerator, and tines. We use the broom and the tine part of the drag the most often. These two parts help to move the infill (rubber and sand) around, as well as stand the plastic fibers back up on the infield.

After we get done brooming the field, we use three 3-foot magnets to roll across the field to pick up any metal debris. Since the crumb rubber is from old tires there are small fragments of metal, about the size of staples, which we have been collecting off the field. We also sanitize the field monthly. To do this, we use a Gator with four nozzle boom that sprays FieldTurf detergent on the field. We then use four Hunter I-90 heads to water the cleaner into the field.

There are two edges of the field that we must maintain: the edge where the synthetic meets the grass and the synthetic around the dirt mound. For the grass edge, we have found that the best method to remove the runners from the

edge is hand pull them every 2 weeks throughout the bermudagrass growing season. We will also use a weed eater to edge. This gives a clean look without cutting the synthetic fibers. For the mound we use push brooms and backpack blowers to remove the clay from the synthetic fibers. If the clay builds up too much then we use a hose and shop-vac to remove the clay. This is typically done twice a year, once at the end of the fall and again at the end of the spring.

The biggest thing that we have learned in taking care of the field is to stay on top of the maintenance. If we let the clay to build up, then it becomes harder to remove. If we allow the grass to grow too far into the synthetic then the grass becomes well rooted and is harder to pull out. If we allow debris to collect on the surface then it is tougher to remove them. With the help of the coaches and players we are able to stay on top of the maintenance.

Scott Stevens is sports turf manager for Elon University, Elon, NC.

Sports Turf Manager

### CARDINAL NEWMAN HS, SANTA ROSA, CA

Mike Truesdell, president of Cardinal Newman High School, says, "It seems to me, a neophyte, that the separation between the dirt of the mound and the turf of the (Tiger-Turf) field works well. If dirt is kicked into the field it can be swept back. The rubber beads can be replaced if the reverse happens.

"Matt Brown (installer) just completed a major sweeping and disinfecting of the entire surface. I believe that is an annual event. On a quarterly basis our maintenance team pulls a brush device to redistribute the infill. And where it is significantly displaced around the bags and home plate more infill is added," Truesdell says.

"During our planning stages we went back and forth as to whether the area around home plate should be dirt like the mound. Given our required repairs to the batters' boxes, and the apparent ease of keeping the mound dirt and field turf infill separated, it might be worth rethinking that decision," he says.

Matt Brown of Precision Surfacing, Inc., says, "We installed the baseball field at

The biggest thing that we have learned in taking care of the field is to stay on top of the maintenance.

— Scott Stevens

Marin Catholic High School with the three bases, home plate and the pitcher's mound all dirt and the rest of the field synthetic turf. Three years later, they had us tear out the dirt except at the mound and install a brown colored synthetic turf at home plate area and all the bases. The dirt infiltrating into the turf was a maintenance headache around the bases."

### EASTERN KENTUCKY UNIVERSITY, RICHMOND

"Our infield is all synthetic (Tiger Turf), parts of it are just clay colored," head baseball coach Jason Stein says. "Our outfield is natural sod." During the season Stein grooms the synthetic turf with the machine he was given by the field builder. "I just run it behind the John Deere for 15 minutes a week during the season," he says. This is the field's third year and Stein reports no problems, no rips in sliding areas. "I am a proponent of the synthetic infield," he says. "Even though I have a turf degree!" Stein earned a bachelor's degree in ornamental horticulture from EKU as well as a master's degree in sports administration.

### CANISIUS COLLEGE, BUFFALO

"We are a multi-use (A-Turf) field and have turf everywhere except our mounds and home plates (bb/sb) to work," says Jon Lyons, assistant facility director for Canisius College. Daily maintenance, we hit the removed dirt with a garden rake and steel brush to loosen it and then hit it with a push broom back into the circles. We let it go our first year and had a lot of work to do to get the circle back into shape. We used a power washer and that worked great to blast the hardened clay out and we then filled the rubber back in. We now do the power wash once a year.

"Game days are similar to our daily/weekly work. We run into trouble with time because we have soccer and lacrosse going on as we try to do work on it, it can get a little dangerous with lacrosse out there," he says.

"The migration of dirt/clay into the turf surrounding the mounds and home plates is a constant battle, but it is nothing compared to the work involved [when] we had a grass field.

"Looking back and talking with our coaching staff, being in the Northeast we should have 'turfed' home plate. It would allow us to use it in a great deal more in all seasons," Lyons says. ■

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Paul Heron, Grounds Supervisor,  
Unionville-Chadds Ford School District, PA

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# Packers, Red Bull use grow lighting system

**A** LLEN JOHNSON, CSFM, FIELD MANAGER FOR THE GREEN BAY PACKERS AND STMA BOARD MEMBER, reports he has been testing and using the SGL Concept lighting system to help grow grass this fall.

**SportsTurf:** What prompted you to investigate using the SGL system?

**Johnson:** Nico [the system's inventor, Nico van Vuuren] and a representative from his company were doing a tour of the states to find suitable places to introduce their technology. I was aware that this technology was being used elsewhere but hadn't really been investigating it. I got a call from Henry Wilkinson from the University of Illinois one day asking if I would be interested in letting the group visit and talk about their technology. It went from there.

**ST:** How did your testing process work and what were the results?

**Johnson:** We were given three of the large MU360 units which allowed us to test approximately 40% of our field. We treated the southern end with the lighting units and complemented it with our underground heat system set at 50 degrees. The northern half of the field was treated traditionally by me without any supplemental lighting and the heat system set low at 38 degrees. We started October 7 and ran the trial through the first week of December. We had to stop when the ambient air temperature consistently started to drop below freezing.

"By the end of October we were collecting three times the amount of clippings than the 'control' end of the field. By late November the clipping yield on the treated half doubled from the late October amounts and the 'control' half of the field had started to go dormant and did not

yield any clippings. It was interesting, because of the layout utilized we actually had four different plots so to observe A) turf with no supplemental light and minimal heating B) turf with supplemental light and minimal heating C) turf with enhanced heat set at 50 degrees but no supplemental lighting and D) turf with both supplemental lighting and enhanced heat set at 50 degrees. The areas of the field that had both the enhanced heat and supplemental lighting produced the greatest growth and density easily."

**ST:** How do you plan on implementing the system [as of Sept 27]?

**Johnson:** Based on our observations from the trial and discussions amongst the front-office executives the organization decided to purchase 9 MU360 units, which is enough to treat our entire playing surface consistently. Those units have been delivered this past month and will be put into use following our game on October 2.

**ST:** How much work has been involved in setting up and using the system?

**Johnson:** The units came pretty much assembled. We had to update our infrastructure in regards to getting the proper electricity down to the field's edge to power the units.

Johnson also replied: "Our organization has also decided to add on to Lambeau Field. We will be filling in the south end zone with stadium seats, adding approximately 6,600. The new wall of bleachers and updated scoreboard will create significant areas of shade that we had not previously had before. The south end was fairly open and allowed a lot of natural sunlight into the bowl and down on the field. Our purpose in purchasing the lights was to assist the growing season a bit in October and November, but also to replace any sunlight lost to the new expansion of the stadium. That expansion is set to be completed in 2 years.

Dan Shemesh, director of grounds, New York Red Bulls, also has used the SGL system. "I started looking into grow lights my first day on the job back in November of 2009. Red Bull Arena has a similar design to many European soccer stadiums that have partial roofs and covered seats. When I took a look at the shade study I thought it might not be that bad since part of the roof is a certain percentage "translucent." I found out very quickly that the roof was not translucent at all and the days and sun hours were much worse when you experience them in person as opposed to a shade analysis on paper."



January 3, 2011 with no lighting treatment.



January 3, 2011 with lighting treatment.



**ST:** What were your growing issues before using the system?

**Shemesh:** Before we started using the system we had multiple shade related problems, we still do now but they have decreased significantly. On the first day of spring and fall the best part of our field sees between 3.5 and 4 hours of natural light on a sunny day. The entire south end 18 yd box including the top arc is in complete shadow all day. On the first day of summer the best part of the field receives about 5.5 to 6 hours of natural light. There is still an area in the south 6 yd goalie box in complete shadow.

On the first day of winter more than half of the field is in complete darkness. So as you can imagine we experience limited rooting, slow growth, cooler soil temperatures, excessive wetness and increased disease potential. In 2009 we did a full midseason resod at the end of July and another resod of the south 18 yard box before playoffs because of the poor turf quality.

**ST:** How much work is involved in

setting up and using the system?

**Shemesh:** There is some work involved with setting up the grow light system. We own 3 large rigs which takes two people about one hour to get in place and turn on. The greater the distance becomes between the lights and power source means more cabling and setup time. The lights require close monitoring along with the area of treatment. The lights generate some heat which can cause ET rates to go up. We also keep track of the amount of natural PAR light our field gets and turn off the lights during the day if the treatment area receives adequate sunlight.

**ST:** How has system performed?

**Shemesh:** The system had performed very well and we are still learning how to utilize the lights for the maximum benefit of the field. We have not exchanged any sod so far this year and do not plan on doing so. The south end of our field which has received the most hours of artificial lighting has the highest turf density compared to other parts. ■

## About the manufacturer of SGL

**THE SGL CONCEPT** is for growing grass under any condition in any stadium, even during winter, by controlling all growth factors such as light, temperature, CO2, water, air and nourishment. The use of assimilation lighting is an important factor in SGL Concept.

The idea for the SGL Concept came from Nico van Vuuren. As a successful grower of roses van Vuuren has lots of experience with growing plants. Following a theoretical investigation to see what were the possibilities to optimize grass growth van Vuuren wondered why companies didn't put time into assimilation lighting tests. During the months with lower natural light intensities turf will even show negative growth. On the one hand this is caused by the fading light intensity and on the other caused by the partly or fully closed construction of today's stadium, which results in a very large temperature difference between inner and outer temperature.

At first it was thought that the problem with natural grass could be solved by just applying assimilation lighting. But it soon appeared that for a real success, a combination of all the growth factors is needed. It's the goal of SGL to provide a high quality pitch throughout the whole year. Achieving this goal needs more than just turning on the lamps. You have to combine a lot of different expertise such as knowledge about the soil, grass seeds, grass growth, growth techniques, lighting and stadium construction, the company says.

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**-Chad Huss, Head Groundskeeper, Oakland A's  
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# Putting your turf to bed for winter

**O**FTEN TIMES it seems that immediately after the fall season begins, we begin bracing for winter. This actually has some merit as far as a turf manager is concerned. While you are quite likely still devoted to managing fields week after week for football or soccer practice, it's not too early to start thinking ahead to steps that you can take to put your field to bed for the winter.

It is a bad assumption to think that turf management ends the minute the final whistle of the season is blown. In fact, some of the most important work is done in November and December, especially if you will have traffic on the field in early March. The following are some tips that you should consider before turning out the lights on what has hopefully been an enjoyable season:

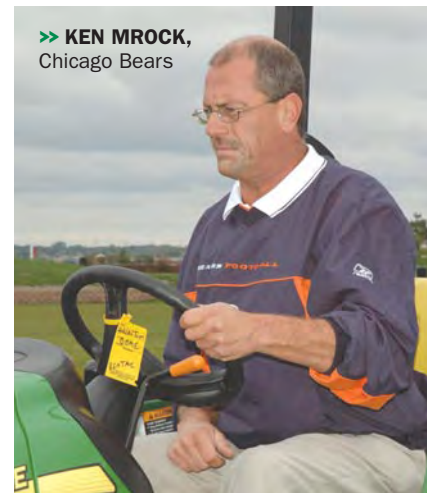
## AERIFY THE TURF AFTER THE END OF THE SEASON

Chances are good that your turf has become compacted during the course of the football or soccer season, given the amount of heavy traffic a field can get, especially if teams have games and practices on the surface. Help open up space for air and water to move in the root zone with a postseason aeration. No matter how late your season extends you can aerify and topdress as long as the field has not frozen solid.

If you haven't yet incorporated conditioner into the field, now is a good time to do so. I use Field & Fairway at a rate of 750 lbs./1000 ft<sup>2</sup> across the entire area. Use a chain link drag, broom, or mat drag to break up soil cores and to move your conditioner into the aeration holes. Selecting a calcined clay conditioner will help bring air and water porosity to the rootzone for a long time.

## REPAIR WORN OR DAMAGED AREAS AS SOON AS POSSIBLE

By taking the time to patch the field at the end of the fall season, you give your turf a significantly better chance of coming on strong by the time spring practice comes around. A field that has been badly beaten up will likely require some resodding. If turf



>> **KEN MROCK,**  
Chicago Bears

damage is light to moderate, you may be able to get by with seeding to help reestablish a strong stand of turf.

Plan ahead, considering what kind of use your field will have in the spring. A multi-use field that needs to be ready for lacrosse and other spring events needs to go into the winter in much better shape than a field that is reserved for a single sport like football.

## CONSIDER SEEDING OPTIONS BASED ON CLIMATE

If you are in a climate where soil temperatures drop significantly by the end of the season, dormant seeding is an option for you. Dormant seeding can have benefits because the freeze/thaw cycle of your soil will relieve compaction and provide space for seed to work its way into the soil crevices over the winter. Seed will remain protected over the winter months and germinate in a hospitable environment in the early spring. In milder climates, a good option is to pre-germinate seed by submerging your seed bag into a 55-gallon drum of water. Change the water every 8 to 12 hours over several days until the seed swells and pops, putting out the beginning of the root. Drain the seed and mix with sand or conditioner to prevent clumping and allow spreading. The exposed seed will take up root nicely in the winter months and provide good plant growth early in the spring.

A vertical advertisement for Natural Sand Company. At the top, a young boy in a black baseball cap with the company logo and a black and white jersey is shown from the side, holding a baseball glove. Below the image, the text reads "Passion for the game" and "Passion for the dirt" in a stylized font. Further down, it says "It's more than dirt; it's the difference between game days and rain delays." and "Grant's Engineered Soil Technology ensures that the quality we promise is the product we deliver." Below this is a list of "Engineered Soil Products": DuraEdge™ Infield Mixes, FieldSaver™ Infield Amendment, and DuraPitch™ Premium Mound Clay. At the bottom, it says "Not all dirt is created equal." and features the Natural Sand Company logo and contact information: 1-866-867-0052 and www.naturalsand.com.

## THINK AHEAD TO SPRING CRABGRASS TREATMENT

It is common to implement some kind of crabgrass treatment program in the spring season. What is often overlooked is the impact that this can have on seeding. If your plan is to apply herbicides in the spring, it is even more important that you schedule post-season fall seeding accordingly.

## TURN ON THE HEAT

Turf blankets can extend your window of warm soil temperatures by several weeks, lengthening the amount of growing time before winter, and promoting earlier green-up at the end of winter. The blankets keep soil temperatures warm enough to promote seed germination, and allow existing turf to grow instead of going dormant. This results in thicker and stronger turf when blankets come off later in the winter. Blankets are best put down in November or December in cool climates—too early and the soil will overheat—and should be removed two to three weeks before traffic returns to the field. After removing the blankets, mow the turf several times to harden it prior to field usage.

In all winter conditions and especially if you are laying turf blankets consider a fungicide application to help avoid snow molds since air movement will be restricted to the turf. This will help prevent unwanted and damaging disease from forming over the winter.

## ADJUST MOWING HEIGHTS

Mowing should be infrequent, if at all, following the end of play for the season. Be sure to avoid mowing when there is any frost on the turf, as this can cause damage. Adjust the mowing height to 2 to 3 inches following the end of season, and be sure that blades have not become dull over the course of the season.

## WINTERIZE IRRIGATION SYSTEM AND EQUIPMENT

Water will have remained in the lines, even when the system is turned off. Take an air compressor to blow the water out of the lines to prevent freezing and expansion, which will rupture pipes.

Also, after going through the rigors of the fall season, there may be equipment issues that have come to light. Winter months can pro-

vide the necessary time for proper repairs or rebuilds in place of short-term fixes that got you through the season. Take the time to clean out maintenance equipment, sharpen blades, wipe down machines, tighten fuel caps and cover anything that might be left exposed to the winter weather. All small engines should be drained of fuel and winterized them also running the gas tank empty.

## ADJUST FERTILIZATION TO TIMING OF THE SEASON, CLIMATE

In cool climates, a late-season fertilizer application will promote rooting and carbohydrate storage. In warm climates, reduce or restrict the amount of nitrogen so that turf can be put to bed. In all cases, wait until the spring flush before starting next year's fertility program.

Remember, just because play concludes for the season doesn't mean your job is complete. Take advantage of every available hour when it comes to turf management. ■

*Ken Mrock is Head Groundskeeper of the Chicago Bears.*



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## Repair/diagnostic tools that must be in every turf manager's shop

*Editor's note: We asked a wide range of readers, What is on your short list of repair or diagnostic tools that must be in every turf manager's shop?*

**M**Y FAVORITE DIAGNOSTIC TOOLS are only two which I have under lock and key: my soil probe and my macro scope. These two tools are essential for my watering and pest management program.-Kevin Mercer, LICM, superintendent of grounds, St Mary's College of MD

A height gauge for reel mowers and strips of paper to check the quality of cut. Using the DPA reels it is much faster and easier to adjust this setting each day before we mow. Also it is helpful to have anyone who grew up or currently lives on a farm because they usually find a way to fix anything even if it is only temporary to keep you working for the day.-Josh McPherson, CSFM, director of sports turf management, University of Missouri

1. Ground thermometer 2. Hex plugger 3. Soil profiler 4. Stress glasses 5. Moisture meter-Stephen Crockett, CSFM, director of turf management and athletic operations, City of Union City, TN

[The] two most important items in my shop are the equipment service manual and the parts manual. Without those two items

servicing and repairing equipment is really a shot in the dark. The service manual allows my crew to perform for the correct and complete maintenance on the equipment (which reduces equipment down time and increases productivity). Also, the service manual typically has a troubleshooting section, which really helps minimize the time and uncertainty of what is causing a piece of machinery to be down.

The parts manual with drawings and part numbers enables me to have an intelligent conversation with the equipment supplier's part department. Having this information also means I can usually order the part online, speeding up delivery, and most manufacturers offer a discount for parts ordered online, which helps my parts budget.-Josh Bertrand, manager of turf operations, Infinity Park, Glendale, CO

Diagnostic tools: soil profiler, hand lens, pocket knife, measuring tape. Repair tools: spring rake, spreader, shovel, sprinkler head tool, grass seed.-David J. Pinsonneault CSFM, CPRP, DPW operations manager, Lexington, MA

Diagnostic: a soil probe, smell and feel are both important when checking the core.

Repair tools: Hula hoe, a flat square point shovel, a multi tool pocket knife and hand trowel, all kept sharp.-Ron Hostick, CSFM, lead groundsworker, San Diego State University

Here is our short list: Diagnostic tools—soil probe, prism, pocket knife, eyes and good sunglasses. Repair tools—leaf rake, backpack blower, hula hoe/edger/sod cutter, nitrogen.-Jeff Salmond, CSFM, director of athletic field management, University of Oklahoma

- Aerator
- Sod cutter
- Soil probe
- Shovel
- Seed
- Turf disease book
- Money!!!

Money is the tough one!-Bret Baird, head turf manager, Dick's Sporting Goods Park, Commerce City, CO

I think a voltage meter. Being able to check to see if there is power coming through a piece of equipment or not helps to narrow down the list of things that might be causing a problem. But nothing replaces a handy maintenance guy that is not afraid to take something apart to figure it out and make the repair.-Andy Gossel, athletic director, Covenant Christian HS, Indianapolis

Shovel, multifunction knife, camera, phone, computer, (don't have a smart phone yet!) soil sample bags, soil thermometer, work ethic, plus *The Mathematics of Turfgrass Maintenance* by Nick Christians and Michael Agnew, AND *Sports Fields*





by Puhalla, Krans, and Goatley.-Martin Kaufman, CSFM, head groundsman, Ensworth Schools, Nashville, TN

A cell phone, today you can take a picture send it to your network of buddies and you can have a second opinion in there in a few seconds! A history log, we have history records dating back to 1999, so we can see our disease history. Access to an onsite sod farm, even if it is only a few strips, to repair any small hiccups. Rely on your assistant's knowledge and your own educational background to prevent and repair any issues that may come up.-Joey Stevenson, head groundskeeper, Indianapolis Indians

- Soil probe
- Digital camera
- Voltmeter
- Assorted shovels (trenching shovel a must)
- Cell phone
- Soil thermometer
- Assorted tool set (wrenches, sockets, etc)

David M. Presnell, CSFM, assistant parks maintenance supervisor, Gainesville, GA

My short list would include: the Internet with the world of resources it puts at our fingertips; the digital camera which gives us the ability to share a view instead of just an explanation; and the cell phone for enabling us to communicate with other people conveniently. Since many of us carry mobile devices that provide each of these functions in one pocket-size package, I would list it as the most important diagnostic tool in our shop.-Kenny Nichols, Westerville (OH) City Schools

- Irrigation quick coupler stem; handy to check irrigation head repairs, spray distance and rotation
- Golf course cup cutter; quickly trims grass around irrigation heads and tells soil profile story
- Golf course divot filling jugs; quickly pour sand and seed into large divots
- Leatherman pocket tool
- Digital camera

Mark Frever, CSFM, Albion College (MI)

My short list:

Digital multimeter. Invaluable for diagnos-

ing all those pesky electrical issues that seem to leave you stranded at the most inconvenient times.

Gear-type wrenches. One of the best additions to my tool box in a long time. They allow you to really work in tight conditions and also speed up basic mechanical work.

Calibration pitcher. Extremely useful for making sure the sprayer is working properly and the tips are in good condition. In the end, it helps save money by making sure the sprayer is set properly. My Athletic Director likes it when I save money.-Marc Moran, Atlee HS, Mechanicsville, VA



#### FROM LINKEDIN

Jim Cornelius, CSFM: Latest soil sample report, divot mix, soil profiler, thermometer, calcined clay.

Timothy Legare, CSFM: soil probe, soil profiler and moisture sensor.

Mike Tarantino: Clegg impact hammer, soil thermometer, soil probe. ■




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## Sprinkler systems for non-field applications

**Editor's note:** Jim Laiche, business development manager for Toro Irrigation, answered a few questions on upgrading or installing new sprinkler systems.

**SportsTurf:** Say I'm a turf manager responsible for improving the irrigation system for landscaped areas at a campus, in a park or around sports facilities. How should I evaluate what I have and find out what I need?

**Laiche:** This is a broad based question, but in most cases evaluating and possibly upgrading both the delivery method (sprinkler heads and nozzles) and the control system will provide the best results. Most people believe simply upgrading a control system will make their plant material look better while using less water. It does, if you are already running a well-designed and maintained in-ground irrigation system.

Things to look for in the field:

- Head to head coverage from

sprinkler heads (one sprinkler head throwing water to the next)

- Adequate water pressure at the sprinkler heads; too high makes the sprinkler heads mist while too low creates dry areas around sprinkler heads (doughnuts)

- Properly adjusted sprinkler heads, coverage area is correct
- Areas with low head drainage
- Zone audit. This measures the

DU (distribution uniformity) of sprinkler heads in an area. It essentially is a measurement of the lightest watered areas to the heaviest. Many irrigation professionals provide this as a service.

- Measurement of PR (precipitation rate). This indicates how fast sprinkler heads apply water to an area in Inches per hour. This

information is necessary if converting to an ET or weather-based control system.

Once you have the field sprinklers analyzed and perhaps modified, then you look at the control system. Most irrigation managers can only modify their irrigation controller programs a few times per year. With a central control system they essentially change daily with changing weather conditions. Most systems tie directly into an onsite weather station or an internet-based ET (evapotranspiration). This value is used to adjust sprinkler runtimes up or down depending on local conditions. Hundreds of controllers are shutdown automatically for rain and other site conditions.

Things to identify on your control system:

- How often can you make changes to the programs?
- How long does it take to shut down for a rain event, do all controllers shut down?
- Do runtimes meet both the local weather conditions for time of year and the soil infiltration rates?
- Is the system running at times it should not?
- Can I manage a large water source that supplies irrigation to multiple controllers?
- Do I have hand-held control on every controller?
- Do you need water use records from irrigation?
- Do you often have breaks in the system that go undetected?

**ST:** How do you determine costs of putting in sprinkler system vs. using a system that involves manpower and moving hoses around?

**Laiche:** With manual irrigation you have to consider the hourly cost of labor, transportation expense and wasted water. This can add up quickly and results in very inefficient irrigation practices. Compared to manual irrigation, you can save 30 to 40% of your water cost and 90% of your labor by automating the irrigation.

**ST:** What's the newest in water-saving technology in this product category?

**Laiche:** High efficiency spray nozzles improve uniformity while reducing water by up to 30%. Rotating spray nozzles distribute water up to 26 feet from a spray head body. Weather-based stand-alone controllers adjust the runtime based on both local and historical temperatures and solar radiation.

Central control systems run large groups of controllers from a single location. You can adjust with local weather station, plus monitor and record flow. Soil moisture sensing reads soil moisture, temperature and salinity and reports back to a computer. Adjustments can be made to the irrigation system based on real-time soil conditions. ■

## Using smart water technologies

**Editor's note:** Troy Leezy, marketing manager for Hunter Industries, and a certified irrigation designer, water auditor and water conservation manager, wrote this update

**W**ITH INCREASING FOCUS on water conservation and efficient irrigation practices come new opportunities. Whether it is a product upgrade or replacing an aging irrigation system, a wide variety of efficient product solutions exist in the