

are mostly sand, and the subsurface drip tubing — almost seven miles of it — is buried six inches below grade in runs of 120 feet in length with integral self-cleaning, pressure-compensating drippers spaced 12 inches apart.

"Normally," says Teal, "we specify tubing burial between four and six inches below the surface. On this project we placed and secured the drip tubing exactly six inches down, with the heating tubes two inches below, so that the turf could be regularly aerated down to three to four inches, and filled in with a sand-and-soil mix to encourage percolation and aeration and provide for new growth. Most people are surprised to find that water will actually migrate up to the surface from a six-inch depth, even in sand, after approximately 25 minutes run time. The truth is that water percolates both upward and outward by cohesive forces."

According to Teal, who has been designing subsurface drip irrigation systems for landscape applications for

17 years, it is essential to combine quality design with reliable products and careful installation to achieve long-term satisfaction. In the Phoenix area, one of his first under-turf subsurface drip projects measures six acres and continues to do very well after eight years.

Teal insists that, during construction, the tubing goes in clean. That means the minute the lengths are cut they are capped, taped or connected to fittings to eliminate the chance of debris getting in there. Taking just a few seconds to do that during installation will avoid hours and days of trouble-shooting later on.

"I always tell my clients that subsurface drip irrigation is preventative maintenance, not repair maintenance," Teal says. "There are no moving parts, so you're not replacing components due to wear and tear — you've got much, much less irrigation maintenance cost in terms of materials and labor. However, you do need to make sure you zone your system to give you maximum flexibility,

and make sure you install sufficient flush valves for adequate flows through each tube and exhaust header.

"With the Sonoran Clubhouse project, we provided three main zones: one covering the entire grass court area and one on each side covering the out-of-bounds areas. We also created separate zones for the terraced seating areas with check valves installed between each header for each level, so water doesn't back down due to elevation changes. To obtain optimum results, it was essential that the tubing be secured at a uniform depth and deviate less than one inch from either side of the center line."

Teal says that, because of the porosity of the sand, he used one-gallon-per-hour emitters versus the typical half gallon. And he made sure that at the perimeters, near the walls, the tubing was installed less than four inches away. The reason, he says, is that "during our Southwest summers the heat is extreme, and the hard-scapes heat up and wick moisture out of the soil very quickly."

continued on page 12

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WATER HOG Jr.

Underground Heating

continued from page 11

Below Ground Heating

The Desert Mountain community is located at an altitude ranging from 3,000 to 5,000 feet, so heavy frosts are variable between November and February. Air temperature can drop to the low- to mid-20s while soil temperature varies from the mid- to upper-40s.

"Normally, we would have to keep the grass tennis court closed until 9 or 10 a.m. during the winter, which is our busiest season," says Wally Camp. "Using our underground heating system, we are able to keep the soil temperature at approximately 78 degrees consistently, so we can assure our members a frost-free and well-performing court between 7 and 7:30 a.m. each day.

"Originally, we had consulted with leading agronomists all over the world and thought we might be able to prevent winter dormancy by utilizing underground heating. In reality, we noticed signs of stress our first winter season — perhaps from the lack of solar radiation — so we began overseeding all turf areas with premium rye for the winter months. We do feel that the under-

ground heating has contributed greatly to helping us maintain superior quality in our overseeded areas throughout the winter," Camp concludes.

The heating system is designed to heat water in three boilers located in the pool equipment room, then distribute that water through manifolds and out beneath the surface of the grass tennis court in half-inch-diameter, thick-walled poly tubing placed two inches below the drip irrigation tubing, running parallel on six-inch centers. Temperature sensors located underground monitor current readings, and the system automatically regulates itself.

Easy Maintenance

"By and large, we have very few problems with maintenance," says Monte Varah, assistant environmental manager at the Sonoran Clubhouse. "It took us a short while to get everything precisely dialed in to achieve maximum performance, but that's normal.

"As far as turf care is concerned, we cut all the turf areas three times a week with a greensmower to the same height as greens are kept: 0.150 inch. We fertilize every week in the winter and every two weeks in the summer. Because we don't have the compaction of normal

soils, we only have to aerate two times a year. And we do very little to the irrigation system.

"Four times a year, we check and clean our screens and filters. We keep 15 pounds of pressure at our regulators, and during the hot summer season, we double our run times. During the winter, our water consumption is very low. We use multiple cycle starts — five or six times for a total of 45 minutes to an hour per day at each station in the summer months. From what I understand, the fact that we keep our soils at ideal moisture levels without letting them dry out, together with the fact that the Techline product has a physical barrier, is the main reason we experience no problem with root intrusion. And we, of course, have different pressure regulators installed at each zone.

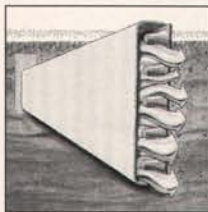
"As part of our refinement process, we installed small Y-strainer micron filter screens to eliminate any incidental debris and upgraded the pressure regulators from plastic to brass with dial indicators. It's all come together very nicely, and our owners, club members and guests are very pleased." □

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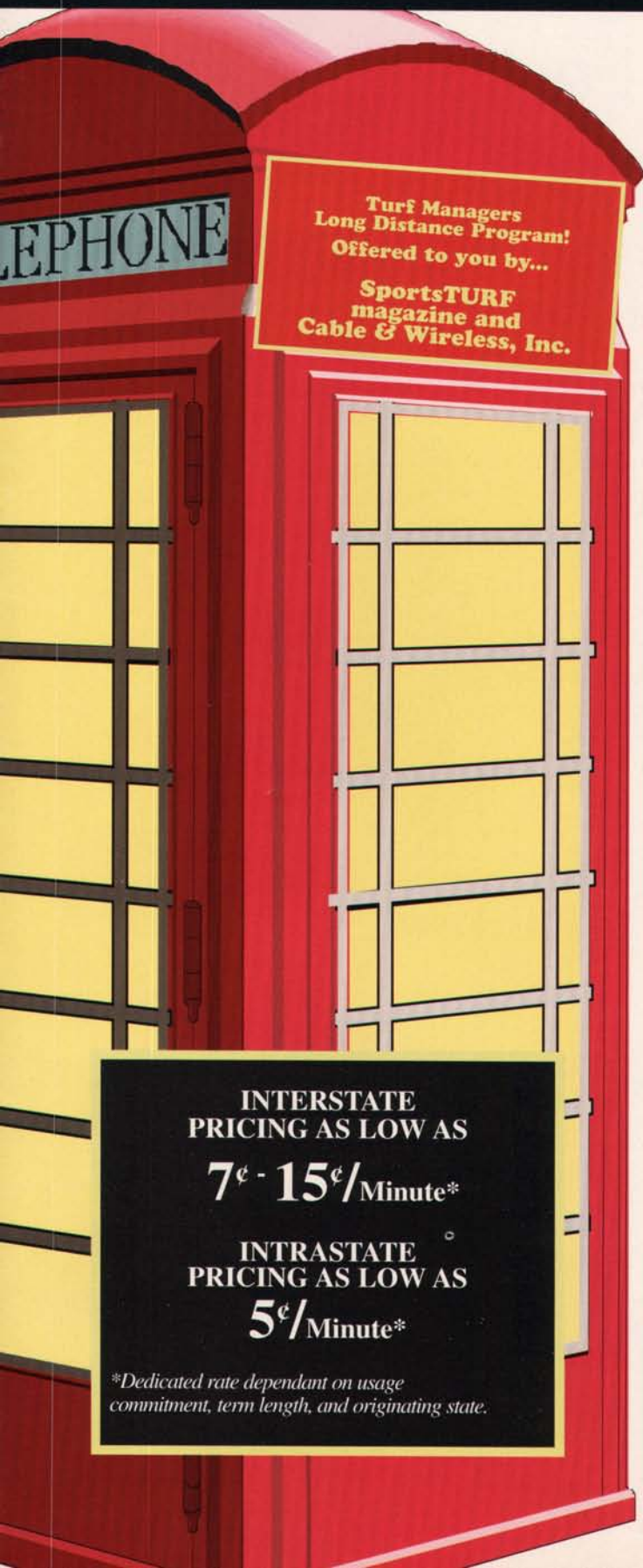
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Cincinnati Hosts 7th Green Fest

The Green Industry Expo is billed as "more than just a trade show." The Associated Landscape Contractors of America (ALCA), the Professional Lawn Care Association of America (PLCAA) and the Professional Grounds Management Society (PGMS) serve an "educational extravaganza" of seminars, business and technical sessions, networking opportunities, and entertainment.

Attendants can mix and match sessions from any of the three conferences: "PLCAA 2000: Growing Leaders — Preparing You and Your Business for the Next Century," sponsored by PLCAA; "Landscape and Grounds Maintenance Conference — Increasing Your Profitability," sponsored by ALCA; and "1911-1996 — A Milestone and a New Beginning," sponsored by PGMS. All full-conference registrations include a free pass to the GIE trade show and outdoor equipment demonstration. Registration for the trade show only will be available on-site for \$15.

Ohio is the number-one membership state for PGMS, so the society believes Cincinnati is the perfect site for its 85th annual conference. The society will offer sessions such as "Survival Tips for the Year 2000 — Will You Still Be in Business?" and "Pruning Challenges," as well as "How to Deal Effectively with the News Media" and "Setting Up an In-House Training Program." PGMS is headquartered at The Westin Hotel and can be contacted at (410) 584-9754.

PLCAA is headquartered at the Hyatt Regency. Its conference highlights include a two-part session on stress management led by Dr. Stephen Douglas and seminars on "Keys to Success in Full-Service Maintenance," "How to Reduce Fleet/Equipment Downtime for Greater Profit," and "Pesticide Technology Update,"



One of the highlights of GIE is the outdoor equipment demonstration.

to name a few. Contact PLCAA at (800) 458-3466 or visit its Web site: <http://www.plcaa.org>.

ALCA, headquartered at the Omni Netherland Plaza Hotel, will start each day with "Breakfast with Champions," featuring 40 networking topics. ALCA's docket of seminars includes "Pricing for Profit," "Competing in the Future," "Developing a Hispanic Workforce," "How to Deal with People You Can't Stand," and "Team Building." Contact ALCA at (800) 395-2522.

The GIE officially opens November 18 at 2:30 p.m. with the keynote session, followed by the grand opening from 4 to 7 p.m. The keynote speaker is Robert E. Farrell, founder of Farrell's Ice Cream Parlour chain and winner of the Rags to Riches Horatio Alger Award. Farrell's address, "Give 'Em the Pickle," applies to businesses that want to succeed by giving an extra level of service.

Trade show hours November 19-20 are 10 a.m. to 4 p.m. Conference sessions are scheduled for 7:30 a.m. to 2:15 p.m. November 18; 7:30 a.m. to 10 a.m. and 4 to 5:30 p.m. November 19; and 7:30 a.m. to 11:45 a.m. November 20. (Educational session hours do not conflict with trade show hours.) The GIE New Product Showcase spotlights exhibits of the latest market innovations.

Attendants are invited to "try before you buy" at the outdoor equipment demonstration, 9 a.m. to noon at Schmidt Field on November 21. Throughout the GIE, complimentary shuttle service will be available. □

Information about Cincinnati is highlighted on the Greater Cincinnati Page on the World Wide Web: <http://www.cinci.com>. Golf in the tri-state area is detailed on a Web site: <http://www.cin-cyrgolf.com>.

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4004 Price: \$59.95

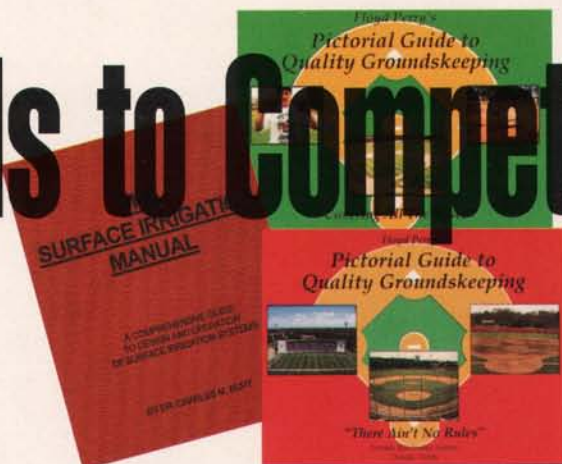
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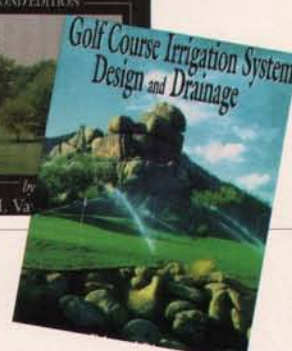
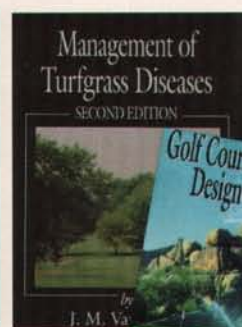
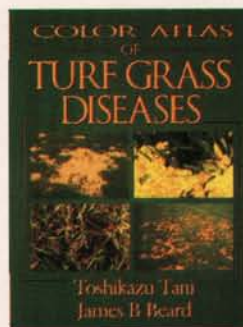
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Delaware Back on Solid Ground

By Richard Valentine

Rain has always been a problem at University of Delaware Stadium in Newark, DE. Originally built in 1951, the playing field had a high clay and silt content in its soil. Coupled with the absence of an effective drainage system, it made for soggy, slippery and generally poor field conditions during and after a heavy rain. Delaware's legendary head football coach, "Tubby" Raymond, recalls times when rain turned the field into muck so deep that on occasion the university's marching band was prevented from performing its half-time show.

Over the years, the university had tried various alternatives to improve the stadium's turf, including an unsuccessful attempt to convert to ryegrass. In the fall of 1992, after exhausting many soil modification options, Delaware decided to bite the bullet. The old field would be totally replaced.

The search for an experienced contractor led to Hummer Turfgrass Systems, headquartered in Lancaster, PA. The sports field specialist had handled similar projects for dozens of high school, college and professional clients. In addition, Delaware had formerly hired the company for other sports field work with good results.

Upon receiving university of approval to proceed, the contractor put together a set of specifications for the new field, based on budget, utilization requirements and time constraints.

The basic strategy was to remove the poor draining soil, install new sand-based topsoil, crown the field properly, install a sand-grid drainage system and lay sod consisting of a blend of mature bluegrasses.

"Delaware Stadium is situated in a geographical transition zone where it is difficult to grow high-quality turf," says Bob Hummer, president of Hummer Turfgrass Systems. "One of our first objectives on the project was to identify and locate an appropriate root zone material to replace the existing dark, boggy soil. The selected material had to have much better drainage capabilities than the old soil and still contain good water retention and availability properties. Because of budget limitations, purchase of a USGA sand mix was out of the question."

Following a suggestion by one of the university maintenance people, Hummer found an acceptable sand-based topsoil stockpiled in southern Delaware. Interestingly, it was soil removed during construction of the nearby Chesapeake & Delaware Canal years earlier. The sand portion of the topsoil very nearly matched USGA specs, which gave Hummer confidence to use it. Also, it belonged to the state and was available to the university free — which helped make the decision easier.

In the spring of 1993, Hummer's firm removed the sod and top nine inches of old soil from Delaware Stadium. A new sprinkler irrigation system was

installed. Workers then laid down eight to ten inches of the new soil mix. It was amended with lime, organic NPK, AgroRoots biostimulant, trace minerals and a small amount of composted organic sludge.

Improving Sand

To ensure the best possible mix, a sample was sent to A&L Great Lakes Lab for analysis of the physical properties. Test results showed that a significant improvement of the important physical properties of the mix was obtained when ten percent calcined "diatomaceous earth" (d.e.), an inorganic soil amendment, was added. Based upon the test results, which showed improved infiltration rate, porosity, lower bulk density and increased available water properties, it was decided to incorporate ten percent Axis Regular calcined d.e. into the soil mix to ensure the best possible soil structure.

Hummer explains he finds that a calcined d.e. helps improve drainage, reduces compaction and speeds establishment of both sod and seed. It also increases available water during dry periods, and makes slit-drains more effective. For many applications, he says, a d.e. "makes agronomic sense."

The new sand-based topsoil mixture was prepared in several steps. Rough grading was followed by on-site mixing with power tilling equipment, with the d.e. tilled into the top six inches. To achieve a homogeneous soil blend, the power tillers ran criss-cross patterns



An inorganic soil amendment — a calcined "diatomaceous earth" — was incorporated into the field to help reduce compaction, encourage deep rooting and improve water retention during dry spells.

several times across the entire field. The top of the new root zone mix was smoothed, with a slight crown, and prepared for new sod.

The next step was to roll on the new sod. A conscious effort was made to select a hardy turf variety that could stand up to the pounding it would take during the football season.

"The sod we finally selected was a one-year-old blend of three vigorous Kentucky bluegrasses," Hummer reports. "It's a great blend for sports fields because it resists drought and bounces right back after heavy use. The sod was grown in sandy soil similar to the soil on the new field, so we knew it would develop good root mass quickly."

Prior to the start of the project, the University of Delaware had requested that the stadium be ready for May graduation ceremonies. To meet this deadline, Hummer decided to wait to put in the finished drainage system. The newly installed turf was watered, rolled and mowed in preparation for graduation day. Ceremonies went off on schedule,



Slit trenches, 14 inches deep, are fitted with perforated collector drainage pipes at the bottom and a 3 1/2-inch layer of washed pea gravel, then backfilled with a mixture of sand, peat and calcined d.e. These slits were covered with matching sod.

with a large stage and thousands of people and chairs placed on the field.

With phase one of the reconstruction effort complete, Hummer's group returned to equip the field with a new sand grid drainage system, a critical element in keeping the turf in top condition. Sand grid drainage is a sports turf system developed in Europe more than 20 years ago. It consists of a network of

crossing two-inch-wide slit trenches designed to absorb storm water quickly and carry it away from the playing surface to a connecting storm sewer.

In June, once the sod was more firmly established, 14-inch-deep trenches were cut into the playing field and fitted with perforated collector drainage pipes at the bottom. For the system to work efficiently, trenches must be spaced properly and be backfilled with a special mixture of clean, uniform materials. Hummer used a combination of 55 percent high-grade sand, 25 percent peat and 20 percent calcined d.e. placed on top of 3 1/2 inches of washed pea gravel to fill the trenches level with the soil surface. When the sand grid system was completed, workers cut two-inch slivers of the Kentucky bluegrass and laid them on top of the narrow trenches to make the field ready for football by the end of August.

Hummer used only high-quality sand in the trenches because it helps the percolation rate in a drainage system.

continued on page 18

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Delaware Back

continued from page 17

The calcined d.e. likewise increases the permeability of the backfill; plus it retains moisture much better than sand and won't break down. Hummer has found that the water conductivity and water-holding capability of a d.e. makes slit-drains more effective. "The drain grid patterns show less stress during droughty conditions," he says.

"The sand grid system promotes faster field drainage and also provides water savings due to more efficient irrigation," he concludes. "This has certainly been the case at Delaware Stadium."

Rave Reviews

After a new field is installed, Hummer provides all of his clients with a one-year warranty and maintenance follow-up that covers everything except normal mowing. Prior to the start of Delaware's 1993 football season, workers returned and completely aerated the field. They subsequently filled the holes with a topdressing containing pure sand and five



The University of Delaware field has never been better for players or spectators.

percent calcined d.e. to combat compaction. The goal was to provide better traction and to prevent slippage by athletic cleats.

Delaware's new field earns high marks from its own players as well as from opposing teams. Hummer says that most people rated it as the best field in the league that first year, in terms of appearance, firmness, drainage, traction and resilience. After the Delaware-Lehigh

game, Lehigh University officials even phoned to congratulate him and to find out what had been done to the field.

One additional benefit has been quick recovery following games. "We find new roots knitting divots back into the root zone before a week goes by," says Stadium Grounds Manager Tom Taylor. "The renovation has made our maintenance easier, more cost effective, and with better results."

"Delaware Stadium's field has been a great success story," Hummer proudly states. "During the past two years, the turf has developed a deep and healthy root system that bodes well for the future. Additionally, the field's sand grid drainage system should help keep the playing surface dry and safer for competition." □

Richard Valentine served as golf course superintendent at Merion Golf Club, near Philadelphia, PA, for nearly 40 years. Retired from the superintendent position since 1989, Valentine today works as a consultant to the sports turf industry.

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Typar turf blankets are made of a strong, continuous filament spunbonded polypropylene that will not ravel or fray. Porous enough to let sunlight, air and water pass through to the soil, the blankets also act as a physical barrier to insects that lay their eggs in the soil.

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Professional Lawn Care Association of America
<http://www.plcaa.org>



AMPAC Seed Co.
<http://www.ampacseed.com>



Gravelly International
<http://www.gravelly.com>



Sanders Hydroseeding Inc.
<http://www.aip.com/sandershydroseeding>



Sports Turf Managers Association
<http://www.aip.com/STMA>



James Hardie Irrigation
<http://www.hardie.com>



McCrometer, Inc.
<http://www.mccrometer.com>



Husqvarna Forest & Garden Co.
<http://www.husqvarna.com>



Imperial Sprinkler Supply, Inc.
<http://www.aip.com/imperialsprinkler>



CLCA
<http://www.clca.org>



Excalibur Extrusions Inc.
<http://www.excaliburext.com>



KBI
<http://www.kbi.com>



ICD / Innovative Concrete Design Corp.
<http://www.aip.com/icdcorp>



Inject-O-Meter Mfg. Co., Inc.
<http://members.aol.com/injectomtr>



AmeriQuip
<http://www.aip.com/ameriquip>



The Toro Company
<http://www.toro.com>



Barton Corp.
<http://www.primenet.com/~barton>



DrWater, Inc.
<http://www.drwater.com>



Brownline Pipe Inc.
<http://www.brownlinepipe.com>



Hunter Industries, Inc.
<http://www.hunterirrig.com>



West Coast Turf
<http://www.aip.com/westcoasturf>



The Grasshopper Co.
<http://www.grasshoppermowers.com>



J. R. Simplot Company / Best
<http://www.aip.com/jrsimplot>



K-Rain Mfg. Corp.
<http://www.k-rain.com>



Clinton D. Wagner
<http://members.aol.com/nad538/book.htm>



Deep Root Partners, L.P.
<http://www.aip.com/deeproot>



Weathermatic
<http://www.weathermatic.com>



Leatzow & Associates, Inc.
<http://www.leatzow.com>



West Coast Turf
<http://www.aip.com/westcoasturf>



John Deere Company
<http://www.deere.com>



Tanaka Power Equipment
<http://www.tanakapowerequipment.com>



GMC Truck Division
<http://www.gmc.com>



J.P. Carlton Co.
<http://www.aip.com/jpcarlton>



Lotte Seed, Inc.
<http://www.lotte.com>



Germain's Seeds
<http://www.aip.com/germainseeds>



Technic Tool Corporation
<http://www.power-pruner.com>



Gro-Power, Inc.
<http://www.aip.com/gropower>



DFW / HPI
<http://www.aip.com/dfw>



Irrigator Co., Inc.
<http://www.inet.net/irrometer>



Smart Rain
<http://www.smartrain.com>



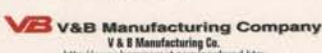
Fel-Pro Chemical Products L.P.



Diamond Z Manufacturing
<http://www.diamondz.com>



Landscaper Connection
<http://www.landscapers.com>



V & B Manufacturing Co.
<http://www.hammet.com/gardprod.htm>



Vermeer Manufacturing Co.
<http://www.vermeer.com>



Trims Software International
<http://www.trims.com>



West AG Irrigation
<http://www.westag.com>

Training with the Bears

On July 24, Midwest STMA Chapter members converged on the Chicago Bears Training Facilities at Lake Forest, IL, to check out the new state-of-the-art practice field in the works for "Da Bears."

Ken Mrock, superintendent of grounds, opened the program in "McBubble," a tent-like structure supported by hot air that houses the Bears' indoor, AstroTurf practice facility. Mrock gave a slide presentation "walk-through" of the new practice field's construction.

The 200,000 square foot area was cleared and materials brought in during December of 1995. The field base includes 6,700 tons of gravel and 12,600 tons of growing medium, which incorporates sphagnum peat moss, USGA specification sand and 300 tons of Profile (a porous ceramic material).

Mrock had drain tile installed to blow heat or pull air to control the temperature of the field. An additional heating system was installed, comprised of 17 miles of one-inch rubber hose, to maintain a soil temperature of 50 degrees. The intent is to keep the field "always" playable, despite the Midwest's changeable weather conditions.

A blend of Kentucky bluegrasses, Athletic Super Pro, was seeded in March and mowed for the first time in June.

The field design could be a precedent-setting model blueprint for other sports fields. The first public presentation took place on June 27.

The workshop closed with a raffle for prizes donated by the Chicago Bears, the Chicago White Sox, Northwestern University and the Kane County Cougars. The funds generated from the raffle were added to the MC:STMA Scholarship Fund.

For information on the Midwest Chapter, call The Chapter Hotline, (847) 439-4727.

STMA Chapter News

Colorado Chapter: CSTMA continues to focus on preparations for hosting the national STMA Conference & Exhibition, which will be held in Colorado Springs January 15 to 19, 1997. Those interested in lending a hand during this opportunity for CSTMA to "show our stuff" are invited to call the Chapter.

Besides the excellent educational sessions and trade show, CSTMA has planned

two of the best ever Seminar on Wheels tours, one to Colorado Springs sports turf venues on Wednesday and one to Denver sports turf venues on Sunday, along with an optional trip back to the Old West with the Friday night Cripple Creek visit, and a spouse trip to one of the nation's top outlet malls. CSTMA even has special plans in the works for the Wednesday night Welcome Reception.

For information, call the 24-Hour CSTMA Chapter Hotline/FAX, (303) 438-9645, and leave a message or contact Troy Smith, Denver Broncos, at (303) 649-9000.

Florida Chapter #1: The Florida Chapter will meet on December 3 at the Homestead Stadium in Homestead, FL. Jose Sota will host the meeting. Baseball field maintenance and preparation will be the focus, and a hands-on mound building demonstration will be included.

For more information, contact John Mascaro, (305) 938-7477.

Southern California Chapter: The Southern California Chapter will hold a pesticide workshop in December.

For information, contact Chris Bunnell at (619) 432-2421.

Minnesota Chapter: The Minnesota Chapter's annual meeting will be held in conjunction with the Minnesota Turf and Grounds Foundation (MTGF) Conference, December 11-13 at the Minneapolis Convention Center. Topics will include "Construction with Washed Sod for Golf Courses, Parks and Athletic Fields," presented by Mike Kelly on December 12 from 2:20 to 3:05 p.m.

The Sports Turf Track — Concurrent Session IV — is scheduled for Thursday afternoon, December 12, starting at 1:30 p.m. Mike Trigg will present "Maintaining Fields with Limited Budgets," Dr. Roch Gaussoin "The Science of Aerification" and Mike Trigg "New Field Construction Methods."

Friday morning's concurrent Session II by Dr. John Ball focuses on "The Turf-Tree Relationship," Session III by Dr. Roch Gaussoin on "Organic Residue Management in Turf and Ornamentals," and Session IV on "Safety/Liability Considerations."

For more on the MTGF, contact Scott Turtinen at 612/473-8169. For information on the Minnesota Chapter, contact Brian Deyak at (320) 255-7223.

Iowa STMA: The Iowa Sports Turf Managers Association will hold its next meeting at the Des Moines Convention

Center on January 27-29, 1997, in conjunction with the 63rd Annual Iowa Turfgrass Conference and Trade Show.

On Monday, January 27, the Sports Turf Workshop runs from 8:30 a.m. to 4:00 p.m. Topics are: "Sports Injuries," Frank Randall, ISU Trainer; "Planning for Construction," Bob Sodders; "Painting, Mixing, Marking and Graphics," Jon Graves; "Late Season Maintenance for Football Fields," Gary Peterson; "Multiple Use of Facilities," Steve Wightman; "Creating a Tough Bluegrass Base," Dr. Doug Brede; and "Irrigation," Lynda Wightman.

The Tuesday morning general sessions begin at 8:00 a.m. The afternoon Sports Turf sessions begin at 1:30 p.m. Topics are: "Make the Best of What You've Got," Steve Wightman; "Safety Liability," Doug Struyk; and "ISTMA/STMA: It's Your Function & Responsibility," Steve Trusty, Gary Peterson and Mike Andresen.

Wednesday morning general sessions begin at 8:00 a.m. Sports Turf sessions start at 10:00 a.m. Topics are: "Weather Systems," Jay Ferguson; "Maximizing Your Equipment," Mike Andresen; and "Plant Growth Regulators for Athletic Fields," Dr. Mike Agnew. Continuing pesticide instructional courses start at 1:30 p.m.

For more information, contact Lori Westrum at The Turf Office, (515) 232-8222 (phone) or (515) 232-8228 (fax).

STMA Chapters on the Grow

Great Plains STMA: The Great Plains STMA will hold its next meeting on Wednesday, November 27.

For site and further details, contact Mark Schimming, of Wichita Baseball Inc., at (316) 292-2907, extension 205.

Arizona: The STMA of Arizona will hold a meeting on December 6 with the Yuma Parks and Recreation Association. The morning's educational events will begin at 8:00 a.m., with the field day portion of the program running from 11:00 a.m. to 4 p.m. Field day events will include demonstrations by vendors and hands-on demonstrations of baseball infield maintenance procedures.

For more details on the Yuma meeting, contact Larry Munoz, parks supervisor, City of Yuma, at (520) 329-2824.

For more details about the Arizona Chapter, contact Bill Murphy, City of Scottsdale Parks and Recreation Department, at (602) 994-7954. □