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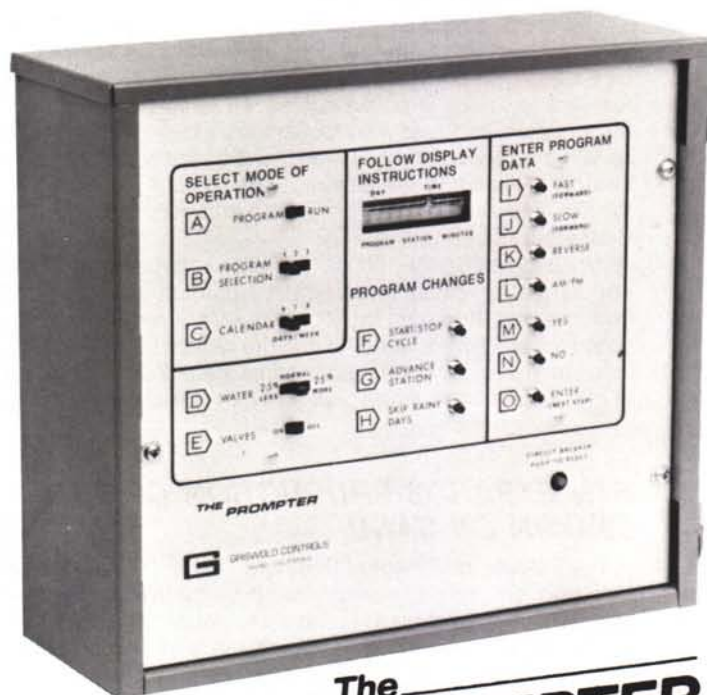
Roberts has continued to study the covers since his early observation. He has not found that they increase the incidence of snow mold or pythium diseases. "If these diseases are a problem on uncovered turf in a particular area or site, then fungicide treatments should be made prior to installation of the blanket," he states.

Some attention needs to be paid to turf after a cover is removed. Having enjoyed protected conditions for an extended period of time, the turf needs time to harden enough to withstand uncovered temperatures and conditions. This adjustment period is shorter for lighter-weight fabrics says Roberts. These can be removed earlier in the spring when used for winter protection than heavier covers.

Anderson recommends that mowing be delayed for a day or two after covers are removed. He also urges turf managers to mow two to three times to gradually bring the height of the turf down to its desired level.

Warren's Emory Hunter says it's important to treat the covers as a reusable tool. The covers will not rot or decay, but debris caught on them will. If hosed down and swept off before storage, the covers should last for more than three years.

Emory adds, "A turf manager should evaluate covers by their cost per square foot per year. A cover that costs ten cents per square foot and lasts for five years is more cost effective than one that costs five cents per square foot and only last two years."



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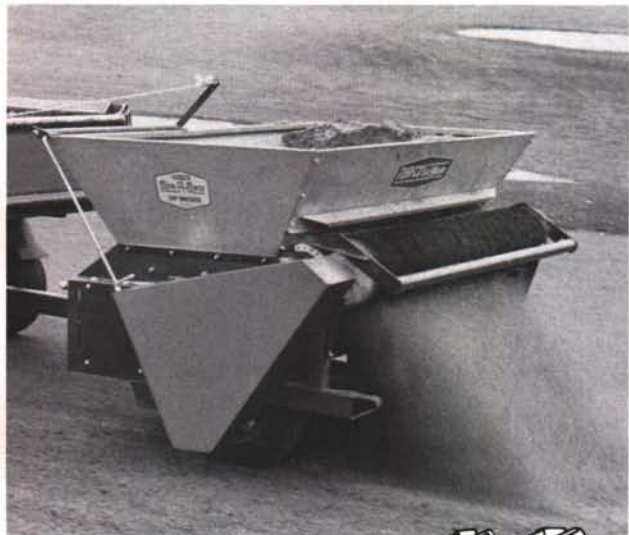
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WEAR SIMULATOR DEVELOPED TO STUDY TURF RECOVERY



To get to the root of many problems with overused athletic fields, scientists need a way to duplicate the punishment inflicted by players upon natural turf during typical use. The answer may have been found recently by Stephen Cockerham, superintendent of agricultural operations at the University of California, Riverside (UCR) and his staff.

Cockerham has been the consulting agronomist for the Los Angeles Coliseum since 1983 and helped prepare the stadium for the 1984 Olympics. "How to manage athletic fields has become a critical question in an era when sports fields are receiving higher and higher use," he points out. "Many of the athletic fields I've seen around the nation are poorer quality than they were ten years ago. There is little research applicable to the problems of high-traffic fields."

The "traffic simulator" was designed to puncture and tear turf more quickly than football players do during a game. Two drums with cleat-type protrusions rotate at different speeds to rip the turf as the device is pulled across. UCR investigators will use the simulator to stress a 50 foot-square experimental plot of turf constructed like a state-of-the-art, sand-based athletic field. "We'll be able to simulate the stress of one football game by driving the simulator up and down the experimental field ten times," states Cockerham.

While stressing the turf daily, the scientists will apply different cultural practices to determine optimum levels of fertilization, mowing, irrigation, aeration, thatch reduction and pest control. Cockerham wants to find the recuperative limits of athletic turf to pinpoint the amount of time state-of-the-art fields need to recover and the cultural practices that speed up that recovery.

STN EXPANDS PRODUCTION OF SOD GROWN ON SAND

Tim Bowyer, president of Southern Turf Nurseries, Inc. (STN) Norcross, GA, recently announced the acquisition of a 300-acre sod farm in Lake Wales, FL, to increase its production of sod grown on sand. The sandy soils of the farm will produce sod for golf courses, athletic fields, soccer pitches and polo fields.

One of the new farm's specialty products, says general manager Bill Wilson, will be certified blue tag Tifdwarf sod grown on sand. This sod will eliminate washing and compatibility problems when used for sand-based greens, tees and sports fields.

The farm will also produce sod of the hybrid bermudagrass Tifgreen, Tifway and Tifway II. Some acreage will also be devoted to Centipedegrass sod. The new farm is located next to STN's sprig farm. Ronnie Hall, a graduate of the University of Georgia turf program, has been hired to manage the new farm.



The problems which are inherent in designing a large, complex system were compounded by water restrictions, the desert environment and the unusual landscaping of the course.

Gainey Ranch Golf Course

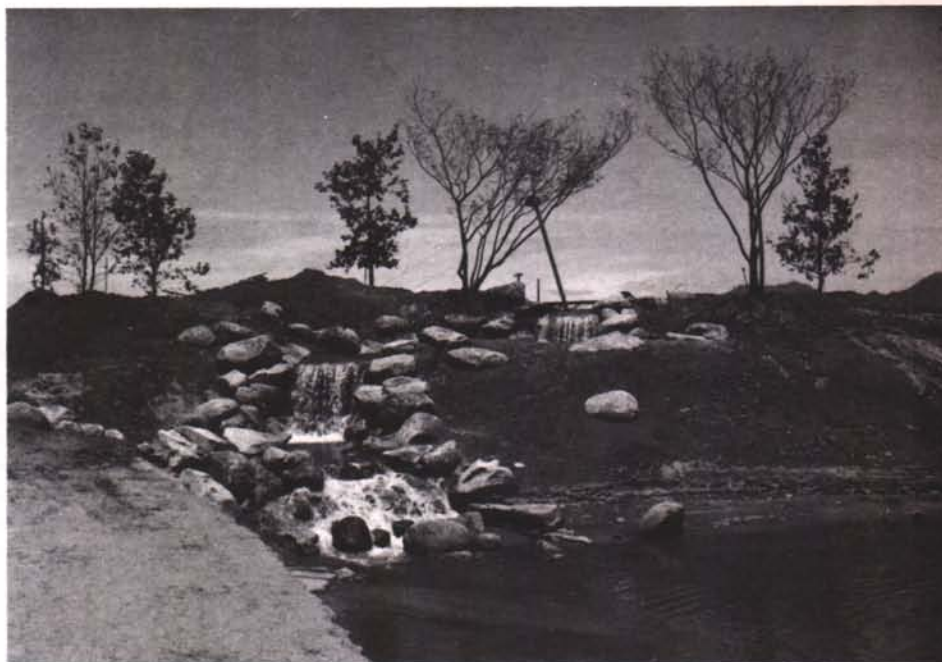
A DESERT SCULPTURE

When most people think of a desert, the images that come to mind are of hot, dry and essentially lifeless places. Some may conceive of a desert as a flat, endless expanse of tumbleweeds and cactus, while others may picture continually shifting dunes in a vast sea of sand.

One look at Gainey Ranch Golf Course in Scottsdale, AZ, is all it takes to realize how the desert image can be transformed into a state-of-the-art golf course by a talented team of developers, irrigation specialists and architects. It's nothing short of remarkable.

In creating Gainey Ranch Golf Course out of the desert, the builders were faced with the enormous task of reshaping an undistinguished piece of property into 220 acres of greens, tees, fairways, roughs and bunkers, all strategically located with meticulous care. Before the site was ready to receive the first plant material, three million cubic yards of earth were moved, and the elevation of portions of the site changed by as much as 40 feet.

The challenge of building such a golf
continued on page 44



Water recirculates constantly over waterfalls between the five lakes on the Lakes course.

course would have been challenging in any environment. In the arid climate and poor soil of the Arizona desert, construction of the Gainey Ranch Golf Course constitutes a gargantuan feat.

Throughout the project's development, the land planners, golf course architects, contractors, irrigation designer and management personnel benefitted from the sure, steady and competent direction of Markland Properties of nearby Phoenix. For more than four years of development and two years of operation, Markland Properties has displayed unwavering dedication to quality.

The 27-hole course was designed by Benz and Poellot, Inc., of Saratoga, CA, and constructed by Siemens Environmental Developers, Inc., of Fresno, CA. One of the reasons why the Gainey Ranch Golf Course is so unique is that each of the facility's three separate nines offer a totally original landscape effect. By varying their 18-hole games among any two of the three nines, golfers find the course challenging game after game. Each hole is designed to stimulate the golfer's strategic thinking by using both new and traditional design concepts. Options are designed into each hole for golfers of all skill levels.

Each of the nines has been painstakingly molded and sculpted to achieve a desired effect. The Arroyo nine is contoured along the banks of a wash (arroyo) running through the ranch. The once ordinary gully has been molded into naturally meandering fairways with traps that the golfer can't ignore.

Approximately 1,500 trees were planted on the Arroyo Course. This was an extremely delicate task since temperatures soared to 110 degrees during construction. The bulk of the trees came from California nurseries, but a few had to be shipped all the way from Illinois. Holding time was kept to a minimum and trees were often planted the day they arrived.

The Dunes nine wraps around a series of spectacular sand dunes complemented by carefully selected plants adapted to arid climates. Hubbs Bros. Seed Co., a specialist in native Sonora desert plants and seeds, landscaped this particular nine.

Specimen native trees were excavated and boxed on the construction site and relocated to the Dunes. Mark Rathert, the architect's representative, worked closely with Jim Hubbs selecting and locating the desert plants, seeds and trees for the course.

Finally, the Lake nine is dotted with water-scapes for a classic resort-type golf course. Players find themselves aiming their shots in and around beautiful lakes, ponds, rolling hills, graceful trees and other fine landscape features. The Gardens Landscaping Co. of Phoenix landscaped the Lake Course. Concrete Finishing Inc., constructed the exposed aggregate cart paths under the careful direction of Benz and Poellot.

A variety of residential dwellings are nestled in and around the three nines, offering the owners excellent views of the



More than 1,500 trees were planted on the Arroyo nine. This proved to be one of the more difficult tasks of the entire project because of extremely hot weather.

paradise-like setting and the convenience of walking to play their favorite sport.

"What stands out about this project is the amount of time that was spent shaping and sculpting the land to achieve the desired effects," explained Nick Siemens, president of Siemens Environmental Developers, Inc. "The owners and architects insisted that every inch of the course portray just the right feeling and playability. They refused to settle for anything less than perfection."

Dale Siemens, the company's vice president, illustrated the attention to detail on the part of the owners and designers by relating the story of how the sand trap near the number five green of the Arroyo nine finally came to be shaped.

Markland and the architect visited the site one day because they weren't comfortable with the trap. They spent an hour walking back and forth, sizing up the area. At one point the architect grabbed a rake and said, "Let me finish this thing the way I think it should be done."

"Never, in the more than 100 golf course contracts we've been involved in, have we seen such meticulous direction," Siemens continued. "I think some real artistry went into the Gainey Ranch."

As the course was being constructed, a number of professional golfers, including Tom Weiskopf and Hale Irwin occasionally toured the facilities and gave their opinions of its playability.

Natural galleries were constructed around each of the 27 holes and the holes were arranged to allow for the easy movement of large numbers of spectators. These pathways are so well blended into the landscape they go unnoticed by golfers who play amid thousands of fine jacarandas, crepe myrtles, eucalyptus, and native desert plants. The plants also serve as windbreaks, provide spectacular color to a previously gray

desert and separate the holes.

However, achieving the primary goal of providing the best possible quality of play consisted of more than shaping the earth. It was determined from the outset that good management would have to be an integral part of the golf course's development, including the most advanced irrigation system available.

As a result, Markland Properties took the unusual step of hiring their first golf course superintendent, Don Lokey, before construction even began. Lokey had input into the development of the facility and followed each phase of construction from beginning to end.

Construction of the golf course was scheduled to begin in January, 1983, but was delayed several weeks by heavy rains. As the work slowly gained momentum, Siemens found that they were using a crew of 85 to 100 men, depending upon the stage of development.

To make their operations more efficient, the company began making innovations in its own work procedures. Nine two-way radios were purchased specifically for the Gainey Ranch job, and they quickly became invaluable tools.

"The radios were an absolute godsend to us," Nick Siemens commented. "We had runners almost constantly on the road. If a man in the field needed something, he could contact the runner and the part would arrive promptly. The radios greatly improved our field capabilities."

If there is one reason that the Gainey Ranch Golf Course is exceptional, it is that Markland demanded that the designs of the golf course architect and the irrigation designer be fulfilled by the contractors. The construction crews were constantly observed by the Markland Properties inspection team, the architect and the irrigation designer. Rather than creating resentment on the part

of the contractor, the high level of scrutini- zation caused the crews to strive for an ever higher quality of work.

"The inspection teams really helped us to police our own quality control," Dale Siemens explained. "From Markland's point of view it was a very smart thing to do."

Precise design and careful installation are also the keys to the Gainey Ranch Golf Course's irrigation system. Bob Oltman Associates of Chandler, AZ, was assigned the tremendous task of meeting the water needs of the three vastly different nines while conserving water as much as possible. "This was the first project I'd ever designed in which you couldn't take it for granted that we'd have an unlimited supply of water," Oltman reflects.

The decision was made not to rely on deep wells or city mains for irrigation water. Instead, the developers took the extraordinary step of building a three-stage water reclamation plant for the city of Scottsdale directly on the site. Effluent generated by residences and businesses of Scottsdale is treated to supply all of the water for the course. Oltman had to determine how much water would be available from the output of the treatment plant as well as on-site storage capacity before he could design the first section.

Implementing conservation measures was a huge job by itself, but Oltman also had to match the system to the unusual landscape effects of the course. Each of the course's three nines are distinguished by considerably different plant materials, some of which are located in very unique planting conditions. In addition, the site contains many unusual contours or oddly-shaped features which challenged conventional irrigation design.

In order to effectively irrigate under these exceptional conditions, the irrigation systems for each of the three nines had to be broken into four or more subsystems. The subsystems, which all feed off the same main, not only help the golf course superintendent attain greater water conservation, but they also afford him a greater degree of control over irrigation.

On the Dunes nine, for example, separate subsystems carry water to turf areas, to drip systems for all trees, a second drip system for shrubs growing in the dunes and a spray system for other types of shrubs growing out of the same dunes. In addition, the Dunes nine has a quick-coupler system located along the banks of a small wash meandering through the course. Although its installation required the same effort as the automatic systems, the quick-coupler will be used only occasionally for tasks such as establishing plants after hydroseeding and after winter overseeding.

For the Arroyo nine, the division of the irrigation system is similar. It also includes a quick-coupler system for periodic use. The Lakes nine does not have a quick-coupler system, but does have the same submain division for turf and drip systems.

By constructing the Gainey Ranch's irri-



The Arroyo nine was sculpted out of a wash running through the ranch.

gation system with subsystems, overwatering has been virtually eliminated. The trees situated in turf areas, for example, will receive less water through their emitter system than trees in non-turf areas since a portion of their water need is met by the turf system.

Oltman acknowledged that constructing an irrigation system in this manner was more expensive, it also contributes greatly to overall system efficiency and future water savings. He gives much credit to the site's owners. It wasn't a case of "Hang the cost, let's do it," he commented. "The decisions were made based on good sound judgement and knowledge of what the money was going to accomplish. They knew what they were after, and were willing to pay for it."

Oltman did not have to devise shortcuts to solve budget restraints. As a result he was able to select and space the spray heads with a great deal of precision. For example, he used part-circle heads to avoid overwatering and to control undesirable plant growth. "By using part-circle sprinklers along the perimeter of the Dunes nine, we carefully restricted where the grass could grow," he explained. "If we were using full circles we'd be throwing water onto the sand dunes. We'd be wasting water, and the superintendent would have a weed problem."

The unusual undulations of the course greatly contributes to its popularity with gol-

fers and attracts homebuyers, but the rolling terrain also posed a number of difficulties for Oltman. The problems of valving, spacing and especially control had to be carefully considered.

"What makes the difference is the control system itself," Oltman points out. The Rain Bird Maxi III system (upgraded from the original Maxi II) provides the capacity to manage the large irrigation system, the pumping system, the water level in the lakes and the amount of water drawn from the treatment plant. Water management consultant Ken Christley works with superintendent George Corthouts to gain maximum benefit from the computerized irrigation controller's capacity.

The numbers behind the system are staggering in themselves. On a 220-acre site, the design includes over a million feet of underground wire, almost 650,000 feet of PVC pipe, 139,000 fittings, thousands of sprinkler heads, 741 electric valves, and 124 field controllers.

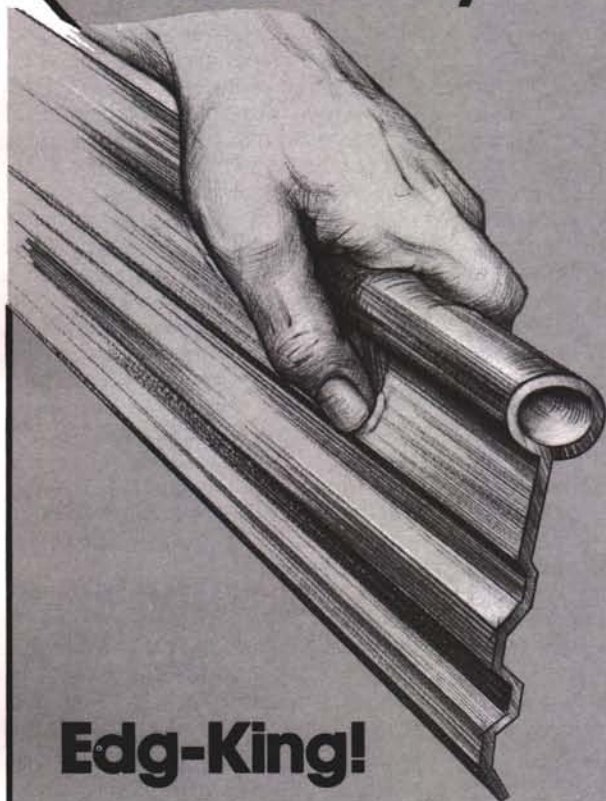
The numbers for the pump station are also staggering. The pump, one of the largest ever designed for golf course irrigation, has the ability to supply the system with 4,000 gallons of water per minute. Moreover, it is complemented by a number of smaller pumps to recirculate lake water in the six lakes on the Lake Course.

continued on page 46



In several areas of the course, hydroseeding was performed for erosion control purposes.

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Gainey Ranch

continued from page 45

Installation of the irrigation system started in 1983 and stretched out for nearly a year. Over the duration of the installation work, there were repeated changes in the design. This was due to the owner's desire that the landscape come first and the irrigation system be designed to fit the landscape, not the other way around.

With the number of changes that were made, the original irrigation plans differed in some cases from the finished system. Because of a strong desire for a complete and accurate set of "as-builts," a series of aerial photographs were made showing exactly where the pipes were laid prior to installation. These photos, combined with the as-builts, have helped greatly since the course was completed. As each section of the irrigation system was completed, Siemens had to prove its performance to the satisfaction of the owner's inspection teams.

Drainage on the Gainey Ranch Golf Course was particularly important. The Scottsdale area is occasionally subjected to sudden, violent downpours. "For once we've seen an owner tackle the drainage problem properly, right from the start," Nick Siemens said. "We have 12- and 18-inch drainage pipes feeding into catch basins all over the course. There are miles of corrugated and perforated pipe running underneath the ground, all tied together into a unified system. Some of this drainage water is captured and put into the storage lakes.

Again, the owner's inspection team checked each phase. "The owners wouldn't accept a green until we ran a hose at the high point and they could see how much water would flow into the catch basin," Seimens adds. "This is the only project we have ever had to prove immediately that the drainage functioned as intended—I think it's highly commendable."

The ornamental lakes on the Lake course are actually storage facilities. The lakes are kept within a foot of the desired level for aesthetic reasons. A sophisticated network of pumps and pipes recirculates the water at all times. Treated effluent enters the highest lake and flows down over waterfalls to each successive lake. When it reaches the lowest lake the water either enters the irrigation system or is recirculated to the top lake.

The amount of water that is pumped into or out of the lakes varies according to the month of the year. Even with precise planning, the lake levels drop within the one foot limit during the end of July when the irrigation needs exceed the production of the treatment plant. That one foot of drop is the three million extra gallons needed to fill the gap.

The treatment process sometimes leaves the water with a higher than normal salt content, a factor that was considered in the design. The primary concern is the drip emitters. They have to allow certain sized particles, such as 30 mesh, through them. After two years, the drip system is operating as designed.

"One thing we've discovered about the drip system for trees," says Courthouts, "is each plant must have a pit around it for the water from its emitter to collect. Without the pits the water just runs down the surface away from the plant."

Courthouts is trying a number of moisture sensors on the course. "One difficulty with the moisture sensors is the wide range of soils we have on the course. Each type of soil gives a different reading on the sensors. It's still in the experimental stage for us. We rely mainly on close inspection of the course and taking core samples frequently."

There are five irrigation specialists for the Gainey Ranch out of a total landscaping and golf course crew of 55. "That may sound like a lot of people," says Courthouts, "but we have acres of plant beds in addition to the course."

Gainey Ranch has been a private golf course from the beginning. One exception is a limited arrangement with the new Hyatt Regency adjacent to the course. Director of Golf Paul Purtzer wants to keep the course busy while preserving its exclusivity.

Those golfers fortunate to play at Gainey Ranch Golf Course experience a golf course of unusual quality. The team that put it together and maintain it today have proven they can overcome a harsh desert environment, a shortage of water and tremendous complexity to provide golfers with a course that gives new meaning to the term "desert course." ●

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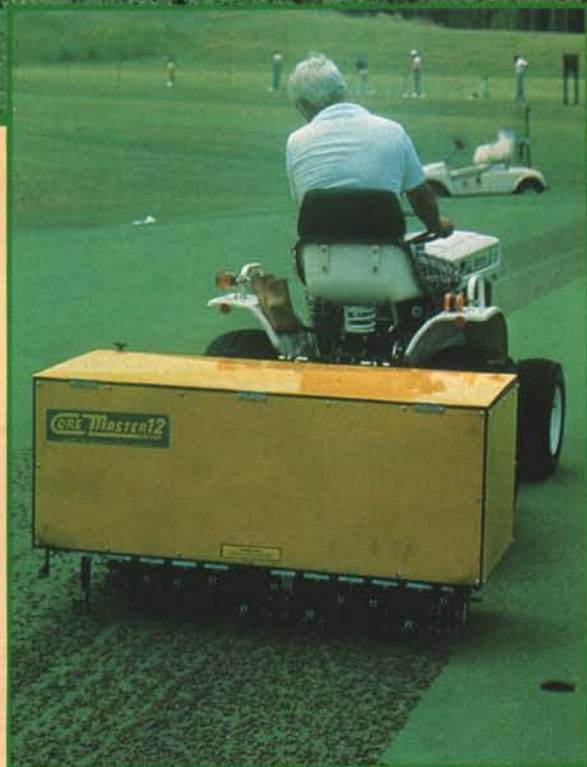
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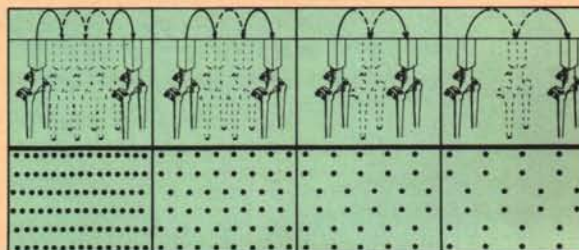
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ATLANTA STADIUM APPROVES PAT FIELD

Ground is being broken this month at Atlanta/Fulton County Stadium in Atlanta, GA, for a new sand-based Prescription Athletic Turf (PAT) field, Tim Bowyer, president of Southern Turf Nurseries, contractor for the project announced recently. "This is the second of three PAT fields we are installing this winter," says Bowyer. "Normally, this is an off period for us, but the popularity of the PAT System is keeping us busy this winter."

Fulton County stadium is the home field for the Atlanta Braves and Falcons. It is also the site of the Peach Bowl, the Freedom Bowl and numerous concerts and Motocross events.

Sam Newpher, grounds superintendent for the Braves, has been a strong proponent of the PAT System. "The Atlanta/Fulton County Stadium Authority has supported important improvements to the field," Newpher says gratefully. The field has experienced poor subsurface drainage in the past few years.

The sand-based PAT System will improve subsurface drainage and encourage deeper rooting of the Tifway bermudagrass in the summer and the perennial ryegrass in the winter, says Dr. William Daniel, inventor of the system. Daniel visited the Stadium and spoke with members of the Stadium Authority before working up the plans.

Southern Turf Nurseries is also building a PAT field at the new Dolphin Stadium in Miami and will soon sign contracts for another major stadium in Florida. Turner Gibson will direct construction at all three locations says Bowyer.

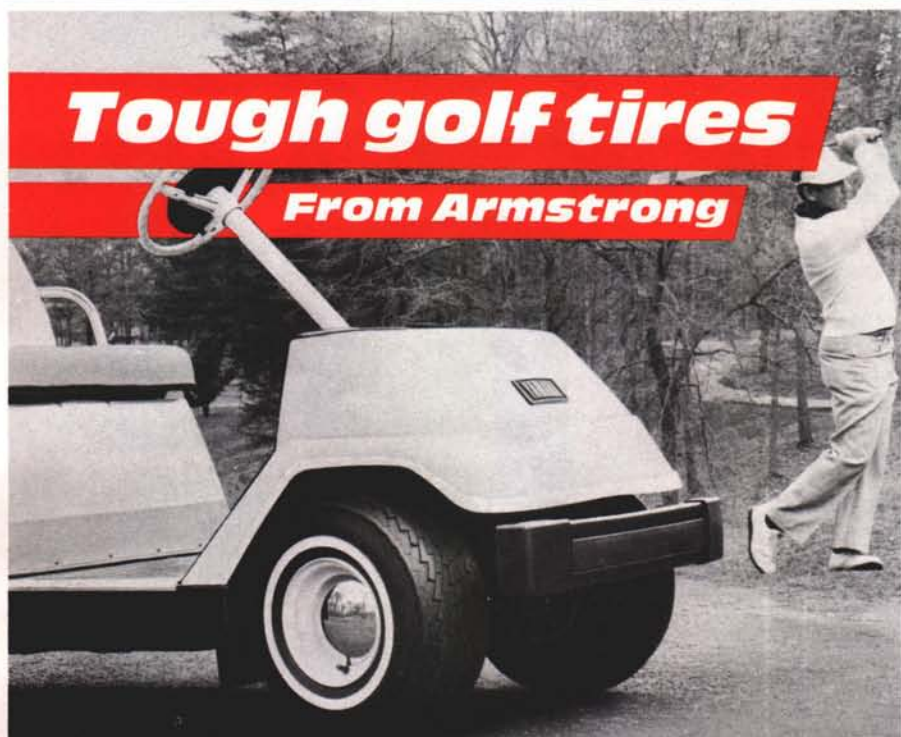
SAND-INJECTION FIRM EXPANDS TO MEET DEMAND

Cambridge Soil Services of Glencoe, AL, is expanding to meet the demand for its patented sand-injection drainage system for golf courses and athletic fields, says John Moreland, president of the company.

"We already have three times the number of installations lined up for this year as we did last year," says Moreland. "There is more interest in California than any other state," he says, "so we've hired a sales manager and will be setting up a new office in Santa Cruz, CA, this winter."

Geoffrey Davison, inventor of the sand-injection machine in England, plans to spend a third of each month in the U.S. to coordinate and plan the expansion of Cambridge and its two current franchisees, Turf Services Inc. in Spring Lake, MI, and Turf Specialist Corp. in Holbrook, NY.

The main emphasis will be on establishing a quality reputation instead of rapid expansion, Moreland says. He predicts a good reputation and a marketing program to be launched this year will attract both new jobs and new franchisees.



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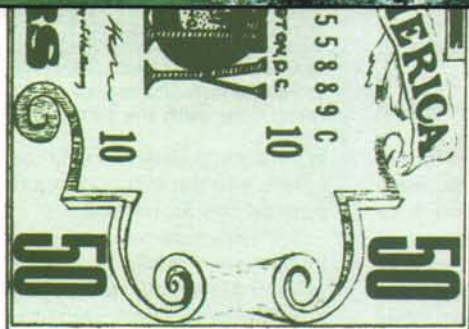


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LOW-VOLUME SPRINKLERS MEET TEMPORARY WATER NEEDS

Clint Granath, director of maintenance at Santa Anita Race Track, used to shut down the famous horse race track's irrigation system after the last race in April. The 40 year-old quick coupler system did not apply a single drop of water to the 18 acres of turf from April through September. "We let the Kentucky bluegrass go dormant for the summer since we didn't race again until late December and we thought saving water was a good idea," says the civil engineer.

The savings in water however, were not equal to the cost or headaches of reviving the turf in the fall. "We ran into serious weed problems and had to use more and more perennial ryegrass to get the grounds into the condition expected of a historic park," he adds.

Atmosphere is very important to the managers of Santa Anita and landscaping is a major part of the atmosphere. The Los Angeles Turf Club, the primary tenant of the track, is very picky about the landscaping. Each year acres of annuals are planted in the infield and in numerous beds surrounding the grandstand. The turf is kept immaculate and weed-free for the thousands of betting customers and those who come just to experience horseracing.

After the final race in April 1983, Granath and his crew went to work on a massive renovation of the 12-acre turf track and the irrigation system for most of the grounds. Granath enlisted the expertise of O. A. Matkin of Soil & Plant Laboratory, Howard Troller & Associates-Landscape Architects, and John Provine, horticulturist at the Los Angeles Arboretum, located conveniently across the street from Santa Anita. A master plan for the turf track and the grounds was drafted, which included more than 600 pop-up heads to replace the quick couplers. A fertilizer injector was installed to feed the tall fescue/perennial ryegrass mixture growing in the new sand-based rootzone of the turf track. A drip irrigation system was added for the hanging baskets around the clubhouse.

Every square foot of turf and plant bed was evaluated for its water needs, except for a two-acre hillside on the northern edge of the property.

Although a significant distance from the track, the hill sits right in the middle of the view spectators have of the San Gabriel Mountains. Live Oak and magnolia trees dot the slope covered with native grasses. Without irrigation, the tall hillside turf was green only during the winter rainy season.



Emitters are barely visible in the tall native grass, especially when viewed from across the race track.

When the November Breeders' Cup was initiated, Granath had to figure out a way to turn the native grasses green months before the winter rains. He didn't want to spend thousands of dollars on a permanent irrigation system for the hillside which would be used only four months each year. He explored several options including renting a surface irrigation system from September through December.

Granath had three concerns—erosion of the fragile slope, the volume of water and pressure a surface system would require and the appearance of a temporary system to the spectators. He managed to solve all three problems at half the cost of a rented system.

Provine was familiar with low-volume sprinklers since he had special irrigation requirements for the vast assortment of plants at the Arboretum. Provine put Granath in touch with Efraim Donitz of Efco, an importer of low-volume systems from Israel. A network of 650 tiny spray heads, each applying approximately ten gallons per hour in a 30-foot-diameter area, elevated on two-foot high metal rods was recommended by Donitz for installation by Santa Anita crew on the two-acre slope. Small spaghetti tubes branching off two one-inch main lines supply the midi-sprinklers. Each main has a filter at the source.

"The crew installed the system, which for the most part just snaps together in less than a day," Granath stated. Each midi-sprinkler sprays a distance of more than 35 feet with drops larger than a mist but smaller than conventional sprinklers.

Television viewers and spectators at this year's Breeders' Cup could see the wild green hillside turf wave with each breeze



Clint Granath lifts one of the PVC mainlines hidden beneath the turf.

in the background. The small sprinklers were invisible to the television cameras as they panned the mountains.

The rainy season, during which Santa Anita receives virtually all of its 12 to 14 inches of annual rainfall, has begun. "The midi-sprinklers have performed to our expectations," says Granath. "We can easily remove the system and store it until this August."

Granath, a former city engineer for Pasadena, likes to solve each problem effectively, so he can concentrate on the many other physical plant concerns of the historic race track. "It took a variety of irrigation systems to meet our needs," he reflects. "We have come a long way since quick couplers and letting the turf go dormant all summer. Now we have a reliable, manageable irrigation system for the entire park."