



The narrow sand-filled trenches extended across the entire field. In less than a month, the new drainage system was hidden under spreading Kentucky bluegrass.

# Milwaukee Stadium Drainage and

**W**hen you're in charge of the turf at a big-city multi-use stadium, you may find yourself thinking forbidden thoughts. For instance...

You may wind up hoping that the baseball games don't go into extra innings—that the tractors in the tractor pull run out of gas—that the Rolling Stones don't do any encores—and maybe, just maybe, you may half-wish that Billy Graham won't have too many converts coming forward over your beaten and battered grass.

Of course, Harry Gill harbors no such thoughts, we're certain.

Gill is director of grounds and maintenance for Wisconsin's Milwaukee Brewers baseball club. The object of his concern and his tender, loving care is the field's lush emerald outfield and finely manicured infield.

Until 1985, the field at Milwaukee County Stadium—which is also used for four home games by the Green Bay Packers—was not a consistent champion. It had seen better



Harry Gill

days, better seasons, better years, and better decades.

Gill explains, "The stadium has been used since 1953, and there's been a myriad of events held here—not only baseball and football, but everything from rock concerts to Billy Graham meetings to tractor pulls. We were watering the field with hoses and sprinkler heads, and compaction had set in."

As Gill tells it, he could have resodded as he has for many years after football and special events have done their damage. But, 30 years of events had compacted the topsoil and rendered the old drainage system virtually useless. The choice narrowed down to a complete renovation of the field or—the course that was finally decided upon—a sand-slit drainage system and a new irrigation system."

The new systems are the result of careful notetaking by Gill for several years prior to its installation; detailed planning in collaboration with the general contractor; and





The sand groover, designed and used frequently in Europe, cuts and injects sand into two trenches at the same time.

# Sports New Irrigation Systems

a final design based on their mutual input. That design utilized Gill's own detailed history of the field and its problems—and his decisions on how to solve them.

"I've been working on what is built into it for seven or eight years," says Gill of the new irrigation system. "Every time I had a problem, I'd mark it down. So when the system was designed, they took into consideration all the problems we'd had over those eight years. That eliminated a lot of guesswork, because we had pretty good records of what had gone wrong in the past."

Gill also kept a loose-leaf folder containing a transparency of each event in the stadium, in the form of a diagram of the field. He drew areas of X's representing each critical wear area involved in that event.

For example, in football the space between the two 35-yard lines was a critical wear area. For a rock concert, it was the area where the audience stood. In baseball, it was the short stop-second base area,



Pipes and wires were pulled into the outfield soil by a vibratory plow to keep disruption of the playing surface to a minimum.

because that was the site of a return-ball screen where players gathered during practice.

"When I had all my critical areas showing, you'd be surprised how many of those areas of X's wound up in the same place," he says. Those were the areas of greatest concern regarding compaction, wear and tear, new sodding and overseeding. They showed him where the worst areas on the field were.

When it came time to convince Milwaukee County, owner of the stadium, that new irrigation and drainage systems were needed, the transparencies offered compelling visual evidence of the need for a change. Although the new systems cost over \$80,000, the Brewers' landlord agreed without argument.

What helped make Gill's case even more persuasive was the fact that the Brewers had won the league pennant in 1982. This

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The irrigation contractors installed pipe and wires on one side of the field while the drainage contractor was sand-slitting on the other.

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in turn had led to an increased attendance totaling 2,300,000 in 1983. With box office receipts up, the time was propitious for committing to improvements. Then it was a matter of waiting a couple of years for the promised funds to become available before work began.

Thanks to Gill's years of notetaking and planning, the final system was economical and carefully focused.

The general contractor on the project was Reinders Irrigation Supply of Milwaukee. Gill has been discussing the needed changes for years with Tom Emmerick from the company. Since there was less than two weeks to complete the work, two irrigation contractors were hired, Milwaukee Lawn Sprinkler Corporation and Wisconsin Sprinkler Company, based in Kenosha.

David Heiss of Turf Services, Inc., Spring Lake, MI, one of only three sand-slitting contractors in the country was the drainage contractor. For more than five years, Heiss has collaborated with G. W. Davison of Luton, England, learning European techniques for improving drainage of sports fields. A sand injection machine patented by Davison enables sports field contractors to restore drainage to compacted fields with minimal disturbance of the playing surface. All drainage work had to be coordinated closely with the installation of the irrigation system.

The installation was not free of problems and delays.

Michael Todd, owner of Milwaukee Lawn Sprinkler Corporation, explains, "Since the original time of construction was supposed to be during an away trip for the Brewers in August, 1985, it had to be done in a very

timely manner." Todd called Bud Leanna at Wisconsin Sprinkler Company and asked him if he would consider a joint venture. He agreed that it would make sense, because they could pool their resources.

Unfortunately, it didn't work out that simply—or that soon.

### *The management decided sand-slit drainage would be appropriate for Milwaukee Stadium.*

There were only two bidders on the project originally, says Todd. When a problem came up with the other bidder, his firm had the only qualified bid. That wasn't enough, according to the county rules. There had to be at least two. "So, it was rebid and we finally got it. By that time, however, August had come and gone. In fact, we missed the Brewers' season completely, and we were into the Green Bay Packers' schedule." They play four home games in two home stands in Milwaukee and the system had to go in between them.

Weather during the Packers' schedule can be miserable, says Todd—cold, with rain and snow. "The possibilities were endless!" he sighs. "We moved in with eight people and two large trencher-pipe pullers, a smaller trencher and a smaller pipe puller. We al-

so had a little bucket loader, a dump truck, a wire trailer, a gas generator, and compacting equipment—ground pounders. Plus a lot of sharp shovels."

Fortunately, the weather turned out to be beautiful.

They began digging, working their way along the perimeter, starting on the first-base side. They were digging up an existing three-inch water main that circled the field and attaching isolation valves to it. In addition to the valves, they also attached sprinkler heads to the three-inch main with saddle clamps.

As Todd points out, this is strictly a hybrid system—one of a kind. Part-circle heads are needed on the perimeter to throw water toward the playing field.

The isolation valves on the mainline feed lateral pipes that crisscross the field. Attached to these lateral pipes are additional heads. Each head is a zone on the clock. "We had a maze of wires leading back to a central IBM computer that regulates each head individually," says Todd.

The sprinkler heads were installed slightly below grade—an inch or so beneath the sod. Each has a stainless-steel nozzle. There is no need for any type of plug atop the head, even when changing to football, because the small, recessed heads stay out of the players' way.

Todd recalls that the final work they did was dragging in the pipe and plowing in the wire. Then the heads were attached to the pipe, and the whole wiring schematic was put together. All of the heads and valves were wired.

The irrigation system consists of 57 Toro 640-02 Series sprinkler heads. Underneath

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The first test of the infield irrigation was a success. The system lets Gill irrigate only the portions of the field that need water.

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each head is a one-inch, 216 Series 24-volt electric valve. Each valve is controlled by a station on one of five satellite controllers. The satellites are mounted in an enclosure and attached to a wall of the bleachers. More than 35,000 feet of wire connects the system's components together.

Today Gill exercises complete control over the irrigation system through the VT-3 video central irrigation controller in his office, which is an IBM personal computer with irrigation software.

In addition, there is a three-by-three-foot visual display panel in a nicely finished wood cabinet mounted on the wall above the controller. The panel consists of a one-to-20 scale diagram of the field in an overhead view. There is an LED at each sprinkler head location. When a head is in operation, its LED light is lit.

Whenever he runs the computer to irrigate the field, says Gill, "the lights will show me which sprinklers are active. That gives us complete control of any watering we need for dry spots, wet areas, resodded areas, or any other areas of concern. I can direct the water where it's needed right away.

"For instance, we have a problem with the grass when it's real hot and dry. If it doesn't get enough water, it starts to turn black and dies." This can even happen with the new, improved system. Gill explains that it is caused by "hot spots" in the turf, which "melt out." Fortunately, Gill is much better equipped now to fight it wherever it occurs, because from 12 to 15 heads can be worked at once.

He is running about 15 minutes per head on infield grass, about 20 to 25 minutes in

the outfield, and 15 minutes on the track heads. However, there is no calendar schedule for irrigation. The frequency depends on how much rain Mother Nature delivers.

Drainage work actually started with repair of the old drain pipe. Gill explains, "In the original installation they put in a lot of corrugated pipe about two feet down. It's on 25-foot centers and most of it is six- to ten-inch pipe. Through the years, that became clogged.

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### ***Thanks to Gill's years of notetaking and planning, the final system was economical and carefully focused.***

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"So we dug up critical areas and got the Roto Rooter people in with their high-pressure hoses. They cleaned up about 70 percent of it. But even with the pipes working, we had a tremendous amount of compaction in the 24 inches between the old pipes and the surface, as a result of all that rain and all those events."

So Gill had the new pipes put in at the 15-inch point. Trenches were dug down to that level during installation. They broke the compacted ground, says Gill, which let water pass down through those areas to the lower pipes. Then, on the top, he planned to have the sand slits.

"The combination of the old and the new drainage gives our field pretty good percolation," boasts Gill. We've had several storms here, and the water's been draining quite well. I'm very pleased with the field."

As soon as the irrigation contractors finished one portion of the field, Heiss would move in with his sand-slitting equipment. Heiss says that initially the Brewers were considering a Prescription Athletic Turf (PAT) System, which involves a sand-based root zone with sub-irrigation and elaborate drainage. However, that meant shutting the field down for a minimum of six weeks—the length of time it would take to remove the soil and build the PAT System.

The basic need was to improve drainage, Heiss observes. He says it was decided by management that the system used in European sports turf areas had been proven and would be appropriate. Called sand-slit drainage, it had been used in this country at Comiskey Park in Chicago. Roger Bos-sard, who is in charge of the Comiskey field, told Gill he was pleased with the results of sand-slitting his field.

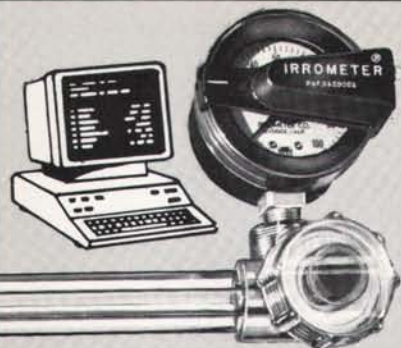
Requiring special equipment that is made in England, sand-slit drainage places narrow columns of sand, five-eighths to three-quarters of an inch wide and up to nine inches deep, on a 20-inch spacing throughout the entire field.

Since it can be installed on an existing field, it is very cost-effective, says Heiss—a compromise drainage system that does not require the field to be taken out of play.

The sand used is tested in a laboratory to guarantee absolute particle-size uniformity. It is also tested for water infiltration to ensure that proper drainage takes place.

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Surface damage was kept to a minimum while installing heads and valves since the field would be used by the Green Bay Packers in less than ten days.

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The sand used at Milwaukee County Stadium was about 1/4 mm in diameter—a very uniform sand, pre-engineered to meet certain standards.

The narrow columns of sand that are used in sand-slit drainage act with a wicking action that actually pulls the water down with gravitational force. Because the columns are narrow, they eliminate any overdrainage of the soil. If they were too wide, they would drain but would be too dry, and grass would not grow in them, says Heiss.

Like any baseball field manager, Gill is very picky about the infield and base paths. Gill says his job is made easier by a material called TerraGreen, a calcined clay from Oil-Dri Company, which he uses on the infield quite extensively. "It keeps the infield loose and playable at all times. It keeps it dryer during wet periods and moister during dry periods, because it holds water."

The only provision made for the yearly changeover to football is to take out the pitcher's mound and put sod over the skinned areas. All of the diamond lies within the perimeter of the football field, which barely fits into the stadium, according to Gary Vandenberg, assistant superintendent of grounds and maintenance for the Brewers. Nor is there any special watering schedule when the football season begins, the weather generally being foul and wintry by then.

During the baseball season, Vandenberg times irrigation dependent upon whether the team has a day game or a night game. If it's a day game, they don't irrigate at all. If it's a night game, they irrigate for about ten minutes.

"Basically we're still watering the skinned area mostly by hand when the team is here," Vandenberg reveals. "That's because each player wants it watered differently. So it's easier to do it by hand and not worry about whether it will puddle or not, and whether the wind's going to catch it."

Just what are the players' preferences as far as watering the skinned area? Vandenberg confides, "Some players like it a little harder than the others—but Jim Gantner, our second baseman, likes it real wet. Ernie Riles, the shortstop, likes to have moisture there, but not as much as Jim. Cecil Cooper, at first base, is not real fussy either way. He likes to have it pretty moist right in front of him, but otherwise he's not real particular."

There are no sensors on the field, because it is a closely watched field, and the conditions are always known to the people in charge. Despite this, Vandenberg reveals that sensors are being considered as a future possibility.

Gill reacts to his new irrigation system with all the zest and delight of a youngster with a new toy. "My track is completely watered," he points out. "If it's a dusty day, I can water the track individually. Around the infield I have five heads that water from



the edge of the infield to the outfield grass... and I have about five heads that will water the infield skinned area. I also have four of them that water the infield grass. So I can water the infield and outfield grass—all the grass areas—without touching the skinned, or I can turn around and just water the skinned."

The computer has a printer that enables Gill to print out whatever programs he's running, allowing him to keep an accurate record as the field is being watered. "So I know every day what I've done. I can also indicate weather, temperature, the condition of the field and what I'm doing to correct it. I keep the printed records."

Gabe Paul Jr., vice president of operations for the Milwaukee Brewers and Milwaukee Stadium, says appreciatively, "Harry Gill is the best groundskeeper in baseball." With his work earning that kind of praise, it's not surprising that Gill's influence has been spreading through the ranks of sports turf professionals all over the country.

One of his proudest achievements is his work with the Sports Turf Managers Association (STMA). "I started STMA years ago," he recalls. "When I got into this business, only a few teams who were near each other had a dialogue going in which they transmitted ideas about sports turf. A lot of managers were individualists who thought their way was the only way. So I organized STMA by myself."

"I got a bit of dialogue going between ma-

ny different clubs. Then Dr. Bill Daniels, the inventor of the PAT system, allowed me to have a room and speakers at Purdue University in conjunction with his spring turf seminar. He was professor of soils and crops there, but is retired now.

"We spent two years there," Gill continues. "Then we tied on with the parks and grounds maintenance department of Appleton, WI. They gave us an opportunity to test equipment and materials. They also provided us with a vehicle for the transmission of ideas in the form of a magazine. That enabled us to form an organization, and now we're becoming a rather large influence on the maintenance of athletic turf."

"From Appleton we moved to Ontario, CA, where we have our own office, I definitely believe that sports turf managers should organize," Gill says.

Joining the organization Gill founded provides a valuable benefit not afforded by other groups: access to the innovative ideas of the founder. These in turn are abundantly evident at Milwaukee County Stadium, which is still the focus of his day-to-day activities.

All of his thoughts are directed toward protecting and enhancing the field. Protection ranges from the standard tarpaulin that covers the entire infield when it rains to the net he spreads from foul line to foul line at pre-game time, when hitters practice by using the fungo—smashing the ball into the carefully landscaped ground.

Most importantly, he hasn't missed a detail

in redesigning the field's irrigation and drainage systems. The fact that the field is mainly used by a baseball team is reflected in the drainage system's design. "We put the sand slits in with baseball in mind," Gill confirms. Rather than going cross-field, they laid all the slits in the direction the ball would play, so that the batters wouldn't be hitting the ball across them. That would have made it bounce erratically across the slits.

"We've got to get the ball to play as perfectly as possible," Gill reminds you.

His work at Milwaukee was rewarded this past spring when the Brewers management asked Gill to construct three new fields and a clubhouse at the team's new spring training facility in Chandler, AZ. Gill found himself dealing with warm-season turfgrasses for a change. "It was a thrilling and educational experience for me," says Gill. "We had to rush to get the fields in play before camp started. On top of that, a natural gas explosion gutted the clubhouse just days before the team was to arrive."

"I never stop learning," Gill states. "Managers, coaches, players and fans have taught me many of the things that make a sports turf manager valuable to the team. It's time for sports turf managers to get together and share their knowledge so everyone can benefit, including field maintenance people at colleges, parks and schools. We all can make ourselves more valuable and more professional by sharing our experiences."

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