



# Delaware Back on Solid Ground



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.

By Richard Valentine

**R**ain 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

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.

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**Delaware Back**

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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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