By Steve Bush, CSFM and Jared Aubrey

Turf fields: a drainage solution for under $250,000

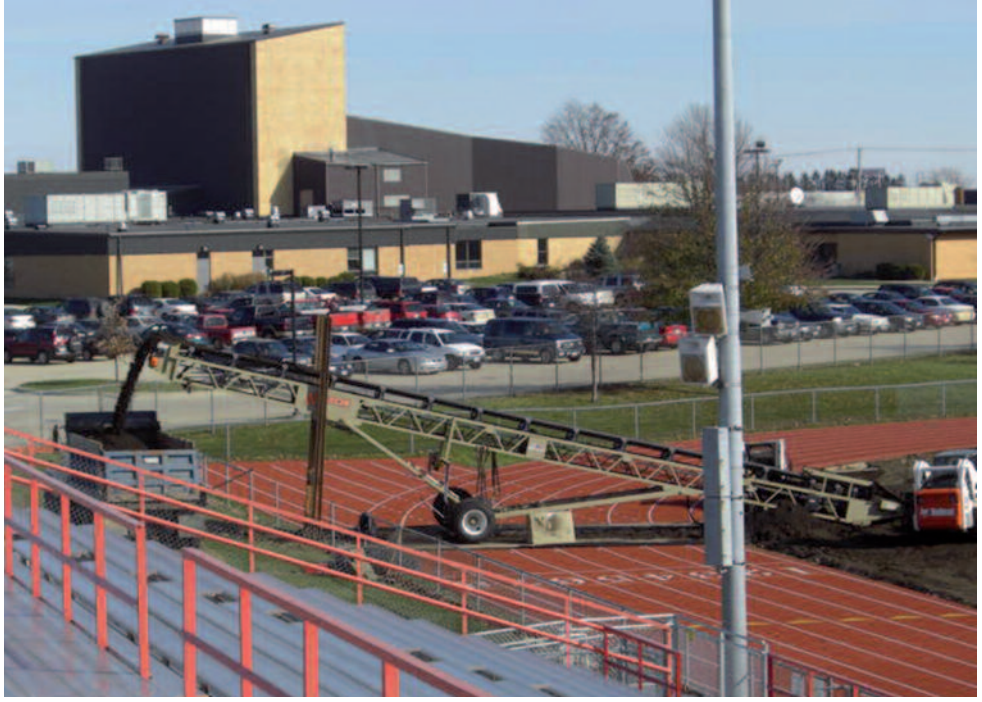
WHEN IT COMES TO SPORTS FIELDS LATELY, turf managers are absolutely swamped. This holds true literally and figuratively, as this year's rainfall has left many a muddy field needing work. Some Midwestern areas are currently a whopping 12 inches above normal for annual rainfall totals. This kind of excessive precipitation causes a multitude of problems for school districts, whose athletic fields are in constant use. The wear and tear from team practices, middle and high school games, community events, band practice, summer leagues and camps only gets worse.

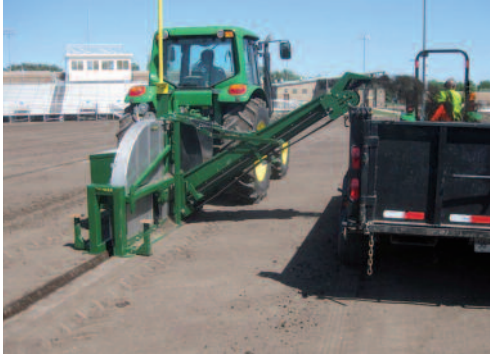
Using fields too soon after inclement weather can cause major damage mainly to native soil fields, which often do not have adequate drainage or irrigation. In response, many communities are pushing schools to install at least one artificial turf field on site. Often they are convinced that this is the only option available to keep fields playable. However, therein lays a difficult dilemma: most small towns and school districts do not have the $600,000-$1,000,000+ needed to build such a field. Although sand-based fields are a great alternative, even those can cost $400,000-$600,000.

With the economy starting to recover, and most communities working on a tighter budget, there has been a renewed interest in the construction of sand-capped fields to counter challenging weather conditions. A sand-capped system is put in place by applying 4-6 inches of sand directly on top of a graded native soil subsurface. A subsurface drain tile system also is installed. Believe it or not, these fields are actually less expensive than artificial turf and sand-based options. In addition, they can be built for as little as $200,000-$300,000.

The important thing in building sand-capped fields is the availability of quality sand that is both adequately permeable, and that the Coefficient of uniformity meets the proper criteria. Have the sands tested by a reputable lab that does testing for the turf industry. The Coefficient of uniformity (Cu) is a formula used to determine how tightly the sand's particles will pack together, and can therefore be used as an indirect estimate of how stable the rootzone will be. This is important for constructability and how the field will perform with athletes' traffic. An ideal Cu range is between 2.5 and 3.5. Anything less than 2.5 indicates a greater likelihood of instability. If you do decide to use sand with a Cu less than 2.5, adding organic material such as peat may decrease the chance of having an unstable field. Peat will also hold moisture and increase overall firmness. Using sod instead of seeding the field also will add stability to the playing surface. Finally make sure that the sand has a percolation rate that falls within an acceptable range of 6 to 15 inches per hour.

One concern for the communities that are looking into a sand-capped field is that the field must be taken out of play for a longer time period than if you were to install an artificial field. In reality, if the field is sodded during optimal growing season, it can be ready to play on as early as 2 months from the start of construction. One of the fields we worked on was a high school football field. Construction





for the field took place during late fall and early spring. It was seeded in late April, and grew in over the summer so it would be ready for the fall sports season. Another field was a city soccer complex used by a NCAA Division I university. This field had a 3-week construction schedule. After sod was installed it was ready for use a mere 1 month after completion.

So the time frame for a sand-capped field is either similar to or shorter than that of tearing out an existing field, applying the gravel base, and pouring the concrete curbing for an artificial surface.

Below are outlined construction schedules for two different fields. These provide an example of how the sand-capped field construction process will work in its given time frame. As you read, you'll understand how construction may not take as long as you had previously thought.

North Scott School District, Eldridge, IA, had decided to redo their track and football stadium. The project was planned to be done in two phases, in order to avoid losing play time due to construction. Phase one was the track, which was built during the summer of 2008. The football field was phase two, with construction due to commence at the finish of the football season. However, North Scott ended up making the playoffs, which delayed the construction start date from mid-October to November 5.

Tricky maneuvers

Another challenge was that 2300 cubic yards of soil from the existing field needed to be removed. With the new track in place, we needed to devise a way to get the soil over the track without applying any pressure to the track surface, which might

Simple cost breakdown

These projects came in at just over $200,000 and $250,000 respectively, and were completed at a high-school level and municipal-level with minimal loss of field use:

As the table demonstrates, $210,000-$250,000 is a major price difference from the $600,000-$1,000,000 that artificial turf would have cost. The money saved by installing a sand-capped field can then be used to pay for field maintenance general upkeep, and other projects. In addition, while an artificial turf field would cost $300,000-$400,000 to replace after 10 years of wear and tear; a sand-capped field can be replaced for $30,000-$75,000.

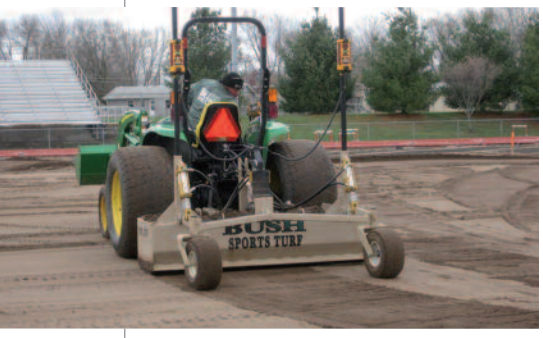
Overall, sand-capped fields are an economical, ecological and aesthetically attractive alternative to artificial turf. With proper drainage and maintenance these fields will perform and meet the demands of most field situations. And with a sand-capped field, a little rain won't stop the game.

Cost Analysis of Sand-Capped Field Seed or Sod

Item	Seeded/Sprigged Field	Sodded Field
Existing Turf Removal	$ 10,000.00	$ 10,000.00
Soil Removal	$ 15,000.00	$ 15,000.00
Grading	$ 10,000.00	$ 10,000.00
Sand	$ 100,000.00	$ 100,000.00
Irrigation	$ 25,000.00	$ 25,000.00
Drainage	$ 40,000.00	$ 40,000.00
Seed/Sod	$ 10,000.00	$ 50,000.00
Total	$ 210,000.00	$ 250,000.00

damage it. To accomplish this, a conveyor and a small stand on the inside of the track were built to hold the hopper and on the outside of the track. An industrial shelving unit was used so the conveyor could hang over the track without touching the ground. This way, trucks also were able to drive directly under the conveyor to load the excess material quickly and efficiently. Once the excess material was placed across the street to level a pre-existing recreation field, the conveyor was then turned around to bring other material (i.e. gravel for collector, pea gravel for drainage trenches, and later, rootzone) onto the field.

Over the next few weeks, the field was stripped, the subsurface was laser-graded, a perimeter collector was installed around the entire inside of the track, and half of the mainline irrigation was installed. However, the crew was snowed out on December 3. This pushed the completion date to spring, during which time the weather can be very challenging, and often pushes seeding times out of the optimal window.



In mid-March, the field was finally clear of snow, and the ground was firm enough to finish trenching the irrigation system. Due to a very wet spring season, there were several days before the subsurface drainage after the irrigation system was complete. The system consisted of 2-inch tile on 15-foot centers, in a herringbone pattern across the entire playing surface.

Drainage/irrigation installation

• The three-inch-wide by 10-inch-deep trenches were backfilled with bridging pea gravel. After the drainage was installed, sand was conveyed over the track and onto the field. The 4-inch rootzone was an 85/15 mixture of USGA sand and Dakota Peat.

• As the sand was conveyed, a small dozer and two skid loaders pushed the sand on the field, preventing any cross-contamination of sand and soil.

• Grading was completed, and the field was smoothed out using a drag mat.

The irrigation system was run for two days to bring the field to saturation level so the sand would be moist and firm for the seeding.

• The field was seeded with a 100% Kentucky bluegrass blend on April 24. This seed was applied in two directions, at a rate of 80 pounds-per-acre. This gave 132 growing days to John Netwal and his staff at North Scott before the field was set to be used for a home football game on September 4.

Netwal and his staff hit the field with nitrogen weekly in order to really push the growth in their limited time frame. They were under tremendous pressure from the community, which was doubtful the field would be ready in time for the season. Thanks to an incredibly cool and wet summer, and great managing by the staff at North Scott, the field was finished impeccably. It is currently being used by the high school, middle school and youth leagues. Netwal and his staff are planning to topdress the field over the next few years to build up the rootzone to an 8-inch depth, and to increase the water holding capacity.

Another field using the sand-capped system is Field 9 at the Cownie Soccer Complex, Des Moines, IA. This field is home to the Drake University soccer teams, and is also the championship field for the many tournaments held at the complex each year. The former native soil field had been severely damaged by the floods of 2008. Drainage upgrades throughout the entire complex were the major reason for the renovations. The city of Des Moines was seeking an option that would set this field above the rest, but at a lower cost than a full sand-based system.

The previous field was removed, and after installing a perimeter collector and lowering some of the existing irrigation lines, we began flattening the field from the existing 1.5%+ crown.

Drainage/irrigation installation

• Once the field had been brought to a crown of approximately 0.75%, 2-inch drain tiles were installed on 15-foot centers diagonally across the field. These emptied into a perimeter collector on each side. This cross slope pattern works just as well as a herringbone, and also reduces the number of fittings used when installing the drainage.

• Once again a bridging pea gravel was used to backfill the 2 inch tile trenches. The rootzone was then hauled in, this time with a 90/10 sand/peat mix.

• After hauling in the rootzone and grading to final grade, sand-based sod (a low-mow bluegrass blend grown on USGA sand) arrived over the next 2 days. During this time, the field was sodded. The sod was cut in big rolls 42 inches wide. This greatly reduces the number of seams on the field. The reason for the use of sod on this field was that the first game was to be played one month after the completion of the project.

• Weather once again proved to be a factor, and the crew was rained out for five of the first 10 working days. However, once the sand had arrived and was being pushed across the field, weather was no longer an issue and the field was completed in 15 working days.

Joe Grandstaff and his crew that oversees the Cownie complex did a great job in preparing the field for play, and opened a three-game home match on September 1.■

Steve Bush, CSFM, is an agronomist and owner of Bush Sports Turf. Jared Aubrey is sports field construction manager for Bush Sports Turf.

By Joshua Bertrand

Colorado turf manager deals with flash flood

DURING THE LAST WEEK OF JUNE, major rain storms hit the Denver area, bringing 2-inches of driving rain and hail within 30 minutes and the streets swelled with water.

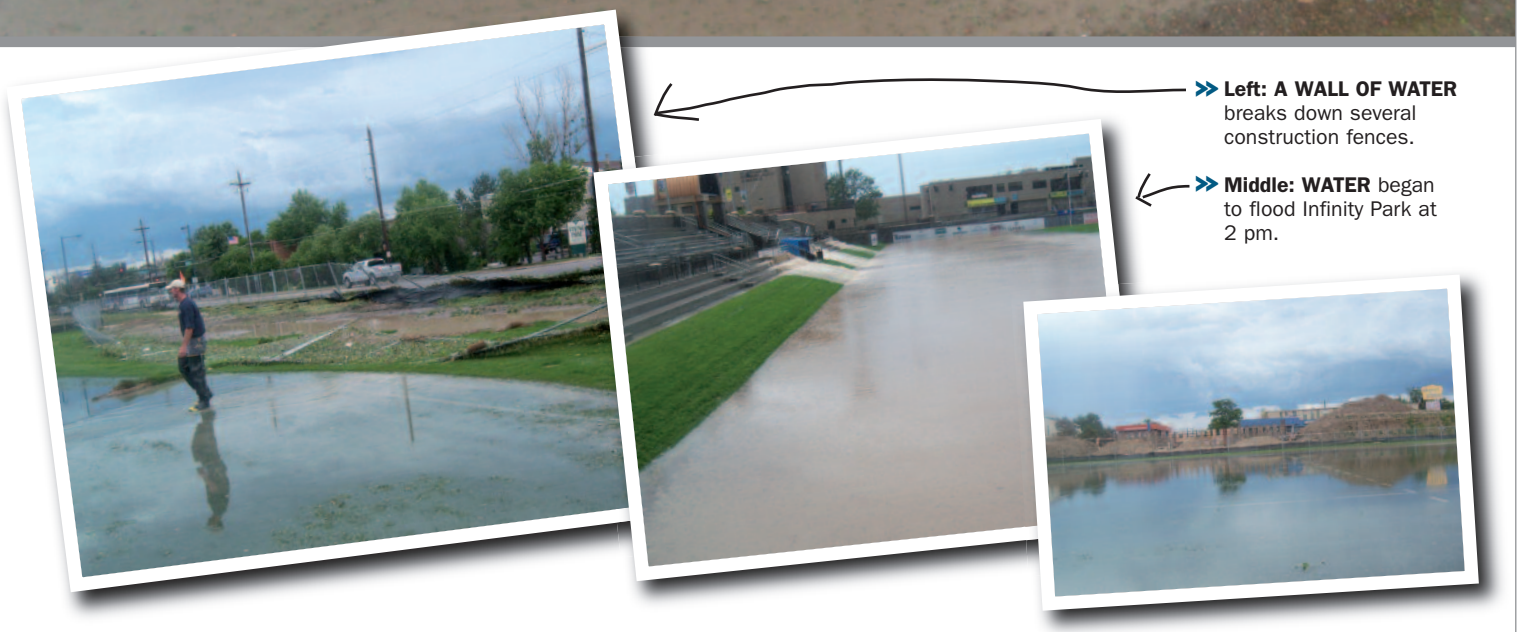
Here in the suburb of Glendale we are currently building a new park and practice field adjacent and uphill from our stadium, called Infinity Park. Because of all our construction, we had been required to put filters over all of the storm drains and put up both a silt fence and a chain link fence around the construction area. The covered drains couldn't handle the storm water and it built up behind the fencing, reaching a level of nearly three acre feet of water. Then it broke through, sending a flash flood over our synthetic field and onto the lowest point—our stadium field.

At 2:14 pm, more than 2 feet of water covered the stadium pitch. We have cleanouts at all four corners, positioned off the pitch surface. They tie into 8-inch drainpipe that then joins into the city's main 12-inch drain line. We pulled the cleanout covers and used push brooms to try to keep the silt agitated in the water to keep it off the field surface. The water was coming on the field faster than those drains could handle it, so we had to keep clearing clogs there to keep it flowing. By 6 pm we were down to 2 inches of water on the perimeter of the field.

The next step, when the surface was dry enough, was sweeping the field to clear away the sticks, pop cans, leaves and assorted debris the water had deposited. Then we used a solid tine aerator to break up the silt layer and get the oxygen to the roots. We're left with about a 1/8-inch layer of silt on top of our sand surface.

We'll continue solid tine aeration as we can work it in and plan to top-dress with straight sand to help break up more of the silt, hoping to gradually move it through the profile and out of the field. ■

Joshua Bertrand is manager of turf operations for the City of Glendale, CO.



» **Left: A WALL OF WATER** breaks down several construction fences.

» **Middle: WATER** began to flood Infinity Park at 2 pm.