The football field at Arizona State University, which is also used by the Arizona Cardinals, utilizes an underground heating system to extend the season for the bermudagrass.

"Last year we turned it on when it started getting cold in October, and we were able to keep the frost out until we were done, so it worked much better."

Mark Razum, who supervises the grounds crew at Coors Field in Denver for the Rockies, operates an electric heating system for the baseball field right out of his office. "There are three zones that control the entire field, and I have the control right in my office," says Razum. "Each zone has it's own thermostat set eight inches below the surface." Razum keeps the controls set at 58 degrees, but he can override the system with a flip of a switch if he feels the field is getting too much heat or not enough. "I can turn it to manual and go out with a temperature probe if I felt that 58 degrees wasn't enough."

Razum will maintain the soil temperature at 58 degrees for the remainder of the baseball season and through any playoff games the Rockies might play. "After the season I'll set it to 48 or 50, then work the temperature up gradually," he relates. Razum expects to use the system for initial greenup in the spring. Last year he started warming up the field in mid-February to around 50-52 degrees, and with mild temperatures for the preseason replacement games, he was able to back the system off gradually until it was turned off entirely in late March.

The electric heating system at Coors Field features roughly 45 miles of cable buried beneath the surface. "It has a resistance copper wire in the center and a PVC around it, then a braided wire and a PVC coating," explains Razum. He also must be careful about taking heavy equipment on the field because the electric heating system is sensitive to the weight placed on the field. "It's pretty fragile — any extra weight on the surface can break the wire," says Razum.

Indiana-based Easy Heat, Inc., designed the heating system for Coors Field.

"What we installed was about seven watts per square foot of heating cable six inches below the surface," explains John Zollman, national sales manager for Easy Heat. The company has also worked on heating systems for Busch Stadium in St. Louis, MO, Sullivan Stadium in Foxboro, MA, the Air Force Academy in Colorado Springs and Mile High Stadium in Denver. "It is something that has been proven to work," says Zollman. "It is really designed to fool the grass into believing that it's the growing season." In many cases, sports turf managers can keep turf green and growing even when air temperatures dip to freezing or below by keeping the roots at a constant temperature. "The daylight is a factor," admits Zollman, "but in many cases there is enough daylight to sustain growth."

Coors Field in Denver, home of the Colorado Rockies, has 45 miles of underground heating cables installed in the rootzone. Photo courtesy: Randall & Blake, Inc.

Hot-Water Systems

Razum's NFL counterpart in Denver is Thomas Lujan, who manages turf maintenance operations at Mile High Stadium for the Denver Broncos. "We used to have electric heat, but now we've installed a water system," says Lujan. "I haven't used it yet," he admits, but with the constantly changing weather conditions in Denver, he can expect to use the system often during the season.

While electric heating systems using wires or cables have been in use for many years, hot-water systems have become popular in recent years. The Chicago Bears do not have a heating system at Soldier Field, but they have experimented with a heating system on one of their practice fields. "We've used it for two years just on the side of the practice field," says Ken Mrock, who maintains the practice fields for the Bears. The hot-water radiant-heat system was installed at eight-, ten- and twelve-inch depths. "We found the ten-inch depth is best because it doesn't affect your cultural practices." The Bears are planning to install a hot-water system at the new 37-acre practice facility they are building in Lake Forest, IL.

Heating systems have been in use for years at cold-weather venues such as Denver, Green Bay and New England, but they can also be used to extend the season for bermudagrass fields at warm-weather venues. Don Follett, manager of stadium grounds at Arizona State University, has developed a unique application for the hot-water heating system at Sun Devil Stadium, which is shared by the Arizona State football team and the Arizona Cardinals of the NFL. "I take steam heat from the campus boilers and store it in a 500-gallon tank in the end zone," he explains. Follett uses heat sensors to determine the temperature of the soil, and when that temperature drops to a certain, predetermined level, the heating system is automatically activated. "I usually keep it right around 72 degrees," says Follett. The German-designed system was installed approximately seven inches below the surface of the field at Sun Devil Stadium.

BioTherm Hydronic Inc. of Petaluma, CA, has developed a soil-temperature control system called TurfTemp that has been installed at several golf courses, including

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Heating Soil

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Palos Verdes Country Club near Los Angeles and Pebble Beach Golf Links, to combat problems with soil temperatures on sensitive greens. Jim Rearden, president of BioTherm Hydronic, Inc., says the trend is spreading toward athletic fields. "We actually have proposals out to several athletic fields," he relates. "It's done in Europe all the time." Rearden admits that the company markets heavily toward golf courses, but he sees plenty of room for expansion into the sports-turf market.

Drawbacks of Heating Systems

Not all soil-temperature control systems are unqualified success stories. George Toma, the NFL's leading turf expert, has worked on several fields with heating systems and says he's seen his share of problems. "I haven't seen one that really worked well," he notes. Toma specifically recalls problems with the underground heating system at RFK Stadium in Washington, DC, when he was preparing that field for an NFL playoff game several years ago. "At RFK when the system worked, the field was muddy, and when it didn't work, it was frozen," says Toma.

Tony Burnett, head groundskeeper at RFK Stadium, admits that the heating system doesn't get much use because Washington lies in the transition zone and doesn't usually get that cold until after the end of the season. "It's a luxury to have, but we barely use it," says Burnett. He notes that maintenance of the system is very expensive and claims that he can achieve good results from the turf by simply practicing sound turf-management techniques.

Few sports turf managers below the professional level are likely to have the financial resources needed to install sophisticated soil-heating systems to keep their turf green and healthy through the cold winter. Sometimes a little creativity can go a long way, though. Just ask Vince Patterozzi, head groundskeeper for the Cleveland Browns. Patterozzi doesn't have a soil-heating system at Municipal Stadium in Cleveland, but he makes use of the resources at his disposal. "We blow propane-fueled heat into our drainage system," he explains. "That's somewhat successful, but not to the extent that [the systems at] Mile High or Coors Field have been." Patterozzi urges sports turf managers to use common sense and to be cautious if they try to implement this idea or something similar at their facilities. For example, blowing hot air through a plastic pipe system is not practical and may damage the system.

Solid sports-turf-management techniques are still the best method for keeping turf green and growing as long as possible. However, soil-heating systems are a useful tool for those that can afford them. These systems can be used to promote turf growth and green color well into the coldest months of the year. ❑

Sports Turf Managers Association

CHAPTER NEWS

Florida Chapter: It's official! Florida Chapter #1 of the Sports Turf Managers Association has completed the formalities of joining forces with National. Welcome aboard!

This chapter has been, and continues to be, very active on the Florida scene. On October 17, the chapter will hold a meeting at Pompano Stadium. The meeting focus will be football field maintenance.

For more information on these events, the Florida Chapter, and other pending activities, contact: John Mascaro, (305) 938-7477.

Colorado Chapter: CCSTMA has scheduled an October 19 combination business meeting and golf tournament. The site, times and other details will be announced shortly. Please RSVP your plans to attend to the 24-Hour CCSTMA Hotline/FAX: (303) 438-9645.

For more information on this event, the Colorado Chapter or other upcoming activities contact: Ross Kurcab, Denver Broncos, at (303) 649-9000.

Southern California Chapter: Southern California is the host chapter for the National Sports Turf Managers Association Conference, January 24-28, 1996. This will be a super event, with educational sessions, great tours and a top-notch trade show.

This Conference offers all sports turf managers the opportunity to see some of the best fields in the world — and to talk with those who maintain them.

For those close by in California, Arizona and surrounding states, consider the advantages of "car pooling" to and from the conference with groups of your peers. You'll not only save a bit on transportation costs, you'll gain that networking/feedback/interaction on the trip.

For information on the Southern California Chapter and upcoming activities, contact: Chris Bunnell at (619) 432-2421. Anyone interested in lending a hand prior to, or during, the conference is invited to contact Chapter Coordinator, Steve Guise at phone/fax: (714) 578-0215.

Midwest Chapter: For information on the Midwest Chapter or upcoming events, call the Chapter Hotline (708) 439-4727.

The baseball strike offered a window of opportunity for the conversion of Kauffman Stadium from artificial to natural turf. Photo courtesy: Kansas City Royals.

Kauffman Stadium Goes Green

By Richard Yach

The baseball strike was both good and bad news for the Kansas City Royals. The premature end of the 1994 season was a difficult blow, but in the Royals' case, the strike presented a window of opportunity for the conversion of Kauffman Stadium from an artificial surface to natural turf.

When the average sports fan reads about a professional sports team changing from an artificial surface to natural turf, the last thing that comes to mind is how it was accomplished and what was involved in making the transition. Certainly, the fans at a ballgame don't know or perhaps even care why the grass got to be as green as it is or why, during a rain-soaked game, the field doesn't accumulate puddles in theoutfield.

When the Kansas City Royals baseball club wanted to make the changeover, they wanted their players to have the best field in the league, free from imperfections. They wanted the new field to be perfect from the elevation of the subgrade to the tiniest blade of grass. S.W. Franks Company of Cleveland, OH — the company contracted for the project — has spent the past 12 years specializing in sports facility and general site development for commercial properties. Among many others, the company built Jacobs Field, home of the Cleveland Indians, from the subgrade up and installed the new natural turf field for the Kansas City Chiefs at Arrowhead Stadium. This specialization earned the company a national reputation gained by thorough planning and the surgical-like care given to the irrigation and drainage layouts and to the grass surface.

The Kauffman Stadium renovation job began the day after the baseball strike was announced, September 14, 1994. The next day at 7 a.m. Ken Natterer, project manager for S.W. Franks, had his crew on site to begin the work. "First, we had to tear up and dispose of almost 120,000 square feet of the artificial surface and the asphalt base underneath it," he says. "Since we had done the same thing to Arrowhead Stadium next door during the summer, we had a good idea of what was in store for us."

The general scope of the job included the disposal of the old surface and installation of a drainage system consisting of lateral drains under the playing field that would tie into collection drains emptying into existing storm sewers. The job also required setting up an entire irrigation layout that would contain an automatic sprinkler head system, and installation of underground steel conduits that would carry communication, television and electrical wire from the dugouts to the bullpens. It also included new drains under the first row of seats that would collect and drain runoff water from the stands. Along with these steps, S.W. Franks regraded the entire

playing field, constructed a new warning track, put down pea gravel and a special rootzone base for the sod, set the sod and finally built the basepaths and the pitcher's mound with three different kinds of dirt.

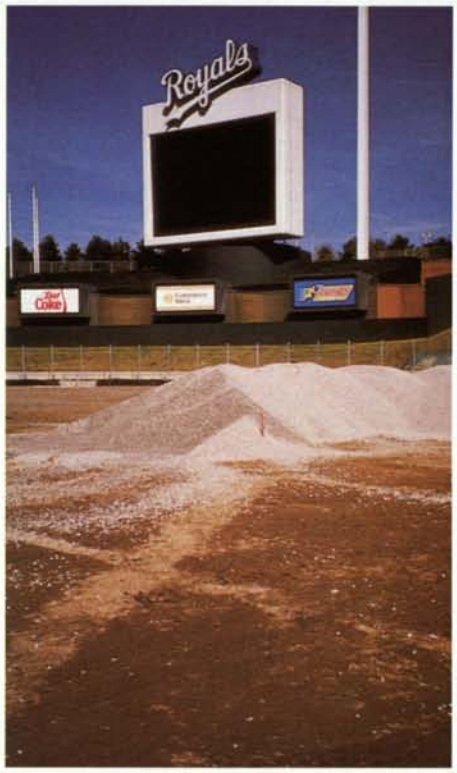
Special Regrading

The ballclub and the players in particular requested a special regrading of the playing field. The old field rose to a crown located near second base. The slope dropped off toward the outfield with a drop of almost three feet at its farthest point in the outfield. The players not only felt as if they were throwing uphill when they threw into the infield, but if they were playing deep, they couldn't see the ball leave the bat. The new grading called for raising the entire level of the outfield 15 inches.

Most of this work had to be completed before the second week of December. Natterer explains the almost frantic pace of the construction project. "By the end of the first week in December, I have to have sod down, because the grass-root systems need some time to develop. If that doesn't happen, according to the specs, I can't sod until the third week of March, and that's too late to be ready for opening day April 7."

After the field was stripped of the artificial surface and asphalt, some of the S.W. Franks crew started cutting trenches for the collection drains. The drains started behind home plate at the edge of the backstop wall and jutted out into three directions. One drain went down the right field foul line, one down the left and one straight up the field toward the pitcher's mound. These slotted 12- and 18-inch-diameter polypropylene drains were set at a depth of three feet at their farthest point to five-and-a-half feet deep at the home plate storm sewer collection area.

The two-and-a-half miles of four- and six-inch-diameter lateral drain pipe were set in trenches cut with a Vermeer T-455. This 115-hp track trencher was set up with a ditcher boom to cut a trench up to five feet deep and 12 inches wide, a crumber with a crumber shoe, and outfitted with a laser system so the ditcher and crumber could maintain proper grade for the drainage. Natterer notes, "We knew we needed a unit like this that would allow us to efficiently get this much drain pipe in the ground and give us clean, smooth trenches."



Pea gravel was spread four inches thick over the entire playing field except for the basepaths, home plate and the pitcher's mound. Photo courtesy: Vermeer Manufacturing Co.

Half of the lateral drains from the middle of center field drained toward the right field foul line collection drain, and the other half drained to the left field foul line collection drain. Both sides of the infield drain toward the collection drain aligned underneath the pitcher's mound. Each of these lateral drains plus the laterals that run from the stands toward the foul line collection drains on both sides of the field had anywhere from a half percent to a full one-percent decline overrun.

The accuracy of this trench pitch is crucial to fast drainage of the ballfield, especially during a game if a cloudburst happens to open up. Nobody — not the owners, players or the fans — likes washouts.

Laser Accuracy

The accuracy of the trench grades was accomplished by clamping a laser receiver to a mast mounted to the trencher's crumber. This receiver accepted a signal from a laser light stationed perpendicular to the trench, and the receiver sent a signal to a light on the operator's panel. If the laser was set for the proper one-percent grade, the light on the panel would tell the operator when to raise or lower the crumber to maintain the predetermined grade.

The laterals were cut 24 inches down, and with the aid of the conveyor and dirt drags on the T-455, the soil was moved away from the trench to produce a cleaner cut. "We had to have clean trenches for perfect drainage," Natterer explains, "We don't want any dirt getting into the clean pea gravel that will cover the polypropylene drains. We spent a lot of time and effort keeping the pea gravel clean and didn't want any dirt compromising its drainage efficiency."

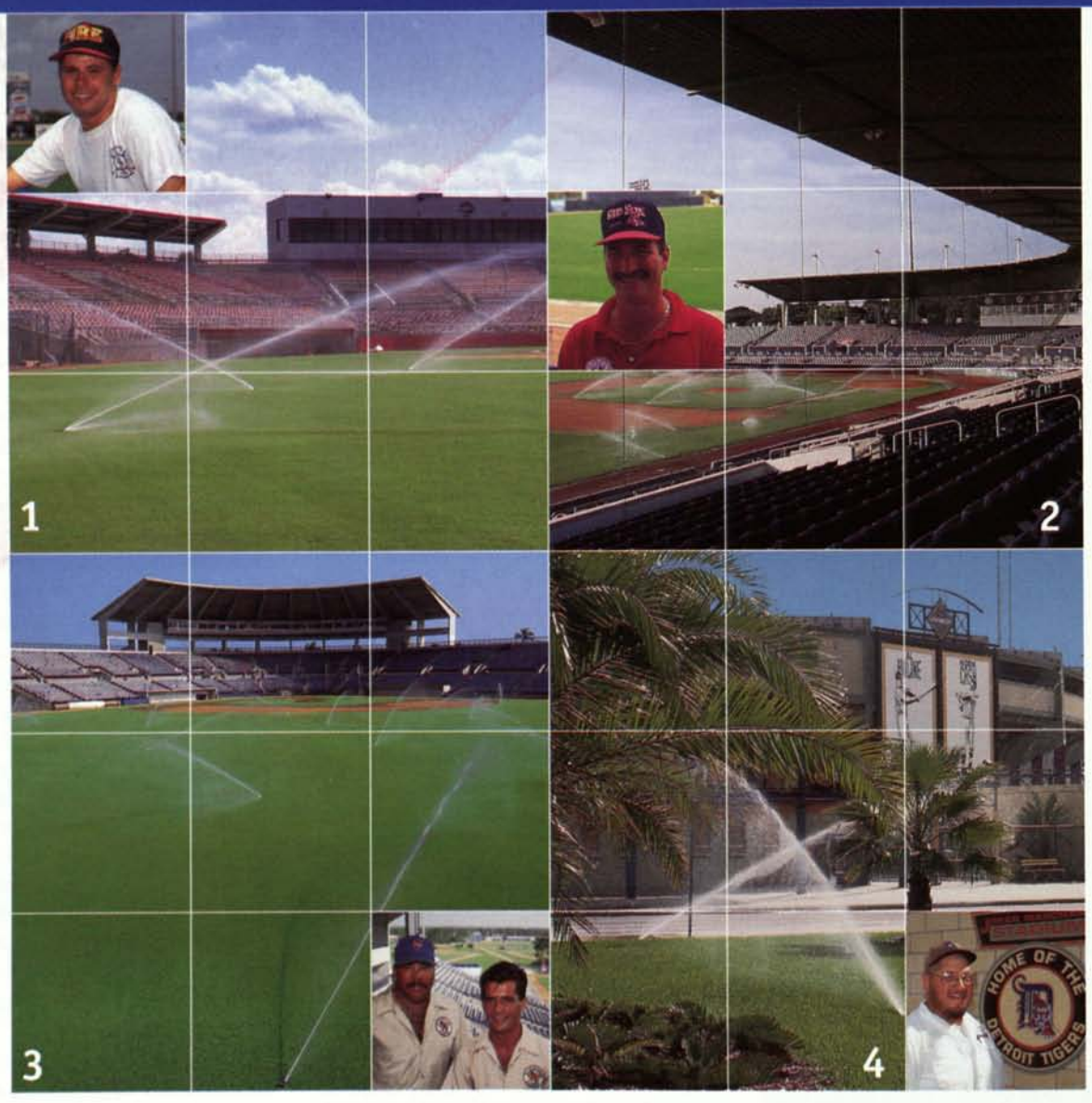
After the trenches were cut, felt cloth was placed under the drains, and four inches of pea gravel was placed over the entire field except for the basepaths, home plate and the pitcher's mound. Installation of the irrigation system followed. The irrigation laterals fed off the four-inch diameter water main that runs around the perimeter of the field. Placed inside the pea gravel, the irrigation laterals feed water to 53 pressure-activated sprinkler heads throughout the field.

With the irrigation system in place, the field was layered with a 14-inch base of a special rootzone mix for the sod. Consisting of 86-percent fine sand and 14-percent peat moss, 7,000 tons of this sterile mix was tested and retested for purity to avoid contamination prior to installation.

Natterer describes the care his crews went to when they put down the sod base. "We went through each machine and examined them for any leaks, because they couldn't leak any fluid, and we brushed off the machine tracks to avoid extraneous dirt or other grasses falling in the mix," he explains. "It's a very tight spec for cleanliness, but then again, the end result is what we're looking for. This grass field should be perfect."

All this behind-the-scenes planning and work were the key to having Kauffman Stadium ready for opening day. The players in Kansas City, returned from their long work stoppage to enjoy playing on the new, natural-turf surface, and the special regrading makes life a little easier in the Kansas City outfield. Now the Royals have a surface that truly fits their name. ❑

Richard Yach is a technical writer based in Des Moines, IA.



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2. Boston Red Sox, City of Palms Park, Ft. Myers.
Dwight Popovic, Head Grounds Keeper.

3. New York Mets, St. Lucie County Sports Complex, Port St. Lucie.
Burt Saleeby and John Barbieri, Grounds Keepers.

4. Detroit Tigers, Marchant Stadium, Lakeland.
Billy Hutto, Grounds Superintendent.

Showcase for Hunter Rotors

5. Texas Rangers, Charlotte County Stadium, Port Charlotte.
Tom Burns, Field Superintendent.

6. Cleveland Indians, Chain-O-Lakes Stadium, Winter Haven.
Richard Hutto, Stadium Maintenance.

7. Los Angeles Dodgers, Holman Stadium, Vero Beach.
John Yencho, Field Supervisor, and Steve Carlsward,
Assistant Sports Complex Supervisor.

8. Pittsburgh Pirates, McKechnie Field, Bradenton.
Mike Hurd, Grounds Superintendent.

9. Chicago White Sox, Ed Smith Stadium, Sarasota.
Larry Hallaert, Grounds Superintendent.

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Erosion Control for Athletic Fields

Hydro-applications are a practical solution for large areas of bare ground and for remote or limited access sites. Photo courtesy: Reinco, Inc.

By Steve and Suz Trusty

Erosion is seldom an athletic field problem, but it's frequently a problem for the sports turf-manager. Although the prime consideration is the playing field, the area surrounding the field and facility usually are under his or her care. At many universities, city school systems and parks and recreation departments, the athletic fields may be a small portion of the "area" of responsibility.

Analysis is the first step in erosion control. Identify the potential for an erosion problem, decide whether this is a short-term or long-term situation, determine the probable extent of damage from uncontrolled erosion, and weigh the advantages and disadvantages of possible solutions.

Evaluating Site Solutions

That bare strip edging a parking lot may be the planned site of ornamental shrubs once construction is completed. If facility use will be minimal during construction, the exposed area is relatively flat, and anticipated weather conditions are moderate, little or no corrective measures may be necessary. If facility use is at normal or high levels, the bare section is sloped, or seasonal wind or rainfall pose risks, a temporary solution, such as covering with a landscape fabric, will be required.

Such long-term problems as that steep slope behind the stadium call for long-term solutions. Is the degree of slope too severe to allow mowing? Is there a possibility future construction would eliminate the slope or alter its severity? Would a series of terraces convert the slope to usable space, or make it mowable? Is wind or precipitation erosion the biggest factor? Does irrigation runoff impact parking areas, walkways or other highly used sections of the facility? What is the actual, and the perceived, environmental impact of the erosion?

Well-established turf is the most effective method of erosion control, as well as one of the most aesthetically-pleasing choices. Extensive studies document the effectiveness of turf in filtering water, eliminating runoff, and controlling sediment loss.

However, the safety of the mower operator must be the prime concern. Turf should not be used on a slope so steep it poses a risk to operator safety. Generally, with ride-on equipment, if operators feel a need to shift their weight on the mower seat to compensate for the mower's angle on a slope, or if they feel uncomfortable or apprehensive about mowing a slope, it's too steep for turf.

Consider alternative plantings for such sites. For the stadium hillside, ornamental trees and decorative boulders, interspersed among ground-hugging evergreen shrubs, could be a solution. A combination of native grasses and wildflowers might provide adequate erosion control along with a seasonal-changing splash of color.

What are the real and perceived consequences of uncontrolled erosion? Is this an actual problem for the integrity of the site or for the surrounding environment? Does a temporary erosion problem create blowing dust and debris that adversely affects facility users or those at neighboring facilities? Does precipitation runoff create wet or muddy conditions that hamper facility use, irritate people, or raise environmental concerns? Do erosion situations create a perception of a lack of environmental concern on the part of the facility? The greater the real or perceived consequences of erosion, the greater the need for immediate and highly effective action.

Explore the possibilities. Consider the immediate and long-term effectiveness of each usable erosion control method. Assess the practical and aesthetic impact of each option. Compare the immediate and long-term costs, including those of follow-up care and extended maintenance.

A Quick and Effective Solution

Sodding is the quickest and most effective method of erosion control. The results of a 1991 study conducted at the University of Maryland and presented by Dr. Mark J. Carroll of the University's Department of Agronomy at the 1992 Midwinter Conference of the American Sod Producers Association

(now Turfgrass Producers International) offered supporting data for this statement.

Controlled studies of sediment losses from the disturbed soil of an eight to ten percent hillside slope compared four different man-made materials with sodded, straw covered and bare soil areas during natural and simulated rainfall conditions. With a simulated 3.8 inch per hour rainstorm, for a period necessary to cause runoff plus an additional 35 minutes, sediment loss from sodded areas was from eight to 15 times *less* than that for the man-made materials and *ten* times less than that of the straw-covered areas. Additionally, the amount of time needed for observable runoff was 28 to 46 times longer for the sodded area than for any of the other erosion control sites.

Obviously, in practical applications, there will be variations in sod erosion control effectiveness based on the pre-installation preparation of the site, the type of turf and the soil profile in which it is grown, the form of the sod (thin cut, thick cut, processed or washed, slabs, standard rolls or big rolls), the method of installation, degree of follow-up care, and the amount of knitting that has occurred.

Initial costs of sod can be high in comparison to the initial costs of other alternatives. Proper site preparation is necessary. Manual installation is labor-intensive. Machine installation of big roll sod is faster and requires less labor, but costs more. Irrigation must be monitored closely until the sod is firmly established. However, except under extreme circumstances, erosion control begins as soon as the sod is in place.

Hydroseeding and Hydromulching

Hydroseeding and hydromulching both refer to a method of planting which uses a "wet slurry" of material, generally issued from a tank with internal agitation through a hose and nozzle or a "spray canon" to the planting site. In hydroseeding, the seed and nutrients and/or other appropriate materials are applied. In hydromulching, a suitable mulching material is included in the "slurry" mixture to provide protective coverage for the seed.

Because of the added element of protection, hydromulching is preferred for slopes and areas subject to runoff from precipitation or irrigation, as well as spots where post-planting maintenance may be less than desired. Hydroseeding or hydromulching also may be chosen for level areas with irregular, rocky or wet soils that make drill seeding impractical.

The seed used may be turfgrasses, groundcover materials such as crown vetch, a combination of native grasses and wildflowers, or any other plants that can be successfully started by seed with minimal follow-up care.

Ideally, the deterioration of the selected mulching material will coincide properly with the seed's germination and establishment. Hydroseeding may be followed by an application of straw mulch, perhaps enhanced with a tackifier.

Hydro-applications are a practical solution for large areas of bare ground and for remote or limited-access sites. Because the seed is placed on top of, rather than into, the soil, follow-up irrigation is required, especially during the most critical stages of germination and seedling development. Timing hydro-applications to coincide with traditional spring or fall rainfall and moderate temperatures may reduce post-application irrigation needs.

Because hydro-applications frequently are used on highly exposed sites with great erosion potential, such weather extremes as high winds or heavy rains can remove the seed or reduce the percentage of coverage, forcing additional applications. Some degree of erosion control is achieved by the mulch-covered seed. As in all seeding situations, best control is achieved only after the plants become well established and surface coverage is complete.

Plugging Away

Another acceptable form of cover establishment is plugging. Because there is minimal root loss within the plugs, they take hold quickly. Any type turf and many forms of groundcover can be established from plugs. Zoysiagrass and bermudagrass are two turf varieties frequently started as plugs.

Obviously, the closer together the plugs are placed, the faster the establishment of cover capable of erosion control. The speed of coverage also depends on the rooting and spreading characteristics of the plants chosen and the compatibility of the plants with the site and weather conditions.

For faster control, the plugs may be planted through holes cut in a degradable mulching fabric or some form of mulching material may be spread around the plugs once they are in place.

Because plugging is labor-intensive, this method is generally used for small areas where quick results are desired, but sodding costs are deemed prohibitive. Post-planting irrigation is required, at least until the plugs are established. Costs will vary with the plant materials chosen, site preparation requirements, mulching materials used and degree of follow-up care required.

Landscaping Alternatives

Long-term erosion control can be achieved with a combination of woody, long-lived plants, including evergreen and deciduous trees and shrubs. These plants can provide deep, extensive root systems for years of soil-holding power. Plant types and varieties can be selected for year-round uniformity or for seasonally-changing color and appearance. Spreading, needled evergreens can be mixed with small, upright, deciduous trees and shrubs, or with 'pockets' of colorful herbaceous perennials, wildflowers or ornamental grasses.

Plants should be chosen for their growth characteristics, hardiness, minimal maintenance requirements, and site compatibility, as well as aesthetic appeal. For faster, more complete, erosion control, these plantings can be surrounded by mulch or inserted through slits in an overall covering of landscape fabric that has been anchored with spikes or held in place by boulders.

Initial costs will be high and will vary depending on the types and sizes of the plant materials chosen, the support materials used and the degree of difficulty involved in installation. Irrigation will be required until the plants are well established. Long-term results should be factored in when considering this alternative. If these plantings are well-planned and planted properly, they can provide effective erosion control for decades. The best erosion control methods match site needs, provide the desired aesthetic appeal, fall within budgeting parameters, and have minimal and easily managed maintenance requirements. ❑

Mid-Season Sodding:

Big-roll sod is preferred over slabs and small rolls because there are fewer pieces involved and fewer edges. Photo courtesy: West Coast Turf.

Planning for the Pitfalls

By Steve and Suz Trusty

Sports turf managers strive for athletic field turf that withstands the rigors of play throughout the season, whatever the sport. But sometimes circumstances combine to weaken turf to the point that mid-season replacement is necessary. In northern regions, it's frequently the wear of constant soccer play and the turf-tearing combat of football that are hardest on the cool-season grasses entering, or already into, the dormant condition.

Mid-season sodding can be a quick solution to damaged turf, but the weather extremes that stress turf most — summer heat and winter cold — also make sod installation and establishment more difficult.

Dr. Henry Indyk of Turfcon in Somerset, NJ, offers these basics on sod installation. "Any sod being used on athletic fields should have compatibility of the soil on which the sod is grown and where the sod will be placed. For a high-sand-profile field, high-sand content or processed or washed sod should be used and time built in to allow rooting before play.

"Rooting time varies according to site, sod and weather conditions and the site preparation, installation practices and follow-up maintenance," Indyk continues. "Normally, thin-cut sod can be adequately rooted within a month and capable of supporting play. Hot summer or cold winter weather naturally will slow the rooting process."

No matter what sod form is used, or when the sodding is done, proper site preparation is essential. Sodding success rates are lowered by attempting to sod directly over an area where seeding has failed by merely scalping the existing turf. A certain amount of tillage is necessary to get rid of compaction and the hard surface, making it easier for the turf to root. Those who think they can minimize costs and labor by skimping on preparation will end up paying later.

"Before sodding, consider what's in the soil," Indyk advises. "Test for pH and nutrient levels and make any necessary adjustments prior to installing the sod."

Making the Grade

Indyk also urges sports turf managers to make sure the soil grade is established correctly, leveled and firm, with no hard or soft spots. "Today's soft spots become tomorrow's depressions," he explains. "Using post-installation corrective measures — rolling to lower high spots, or topdressing to raise low spots — aren't as successful as doing it right in the first place."

When replacing only portions of the field turf, make sure the sod conforms exactly to the level of the remaining portion of the field. Fit sod sections precisely, with tight seams. Avoid any voids between pieces. Stipulate the 'shelf life' of sod according to weather conditions. For example, with temperatures in the 80-degree range, a six-hour window from harvest to delivery, combined with a six-hour window from delivery to installation, can curtail the heating process that is detrimental to sod quality. With more moderate temperatures, or vacuum-cooled sod, these windows can be extended.

At Camden Yards, the sod nursery offers mid-season insurance. Photo courtesy: Trusty & Associates.