WEARY

spaded and turned over, six inches deeper. The excavation was filled with soil matching the PAT profile.

New sod was put in place, but not rolled. Sod and soil were allowed to settle naturally. The objective behind this was to have plenty of loose soil under the new sod, so that the roots could grow deeply. After a week or so, the area was rolled to make it even with the rest of the field.

The remainder of the field was still covered with ryegrass, which shaded the bermudagrass and made it difficult for it to grow. Overseeding with the ryegrass, almost 6,000 pregerminated pounds of it, had provided a thick, lush carpet for the Super Bowl. The field was lightly aerated to help the bermudagrass and reduce compaction, and was then lined for the first two international soccer games.

Installing the infield for preseason baseball exhibitions.

Preparation for the monster trucks and motorcycles was more critical to the survival of the turf. Many tons of mud and clay were hauled into the stadium by tractors with 20-foot trailers, and spread by bulldozers to create the tracks. To keep this dirt from contaminating the PAT system, the entire field was first covered with a geotextile, which in turn was covered by plywood. For six days, dirt rested atop this protective layer.

After the events, the dirt was removed and the plywood and geotextile were taken up. Morris and his nine-man crew expected the worst. The turf didn't look great. In fact, everyone involved initially thought the entire field would have to be resodded. But much to their surprise, the bermuda's root system, although shallow and living off of its reserves, was still very much alive. As expected, much of the ryegrass was smothered and the painted areas were quite thin.

More than 200 gallons of white and colored latex paint had been used to create brilliant logos and lines for the Super Bowl, and it had to be removed. Rather than resodding, the crew used a Verti-Groove machine, invented by Mascaro, which removes a thin slice of soil to a depth of six inches, to aerify and remove as much of the paint as possible. The machine, with its 1/2-inch spacing of the cutting blades, one foot apart, was set for full depth.

"The Verti-Groover has been a big contributing factor in the health of our root system," said Morris. "It removes more soil than a regular aerator. It moves more soil, more quickly."

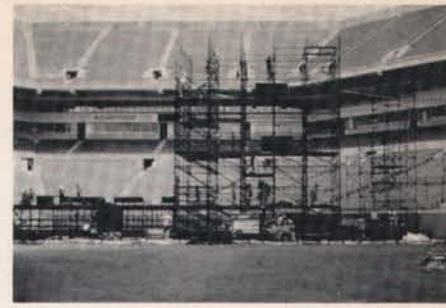
Instead of scattering the paint-laden soil with a dragmat, vacuum, or sweeper, it was picked up using flat shovels. Several members of the stadium cleaning crew were enlisted to remove the soil and haul it away.

After the verti-grooving was finished and the soil was removed, the field was topdressed with the same material as the field profile. Two weeks later, the operation was repeated. Although not all the paint was removed, it was hoped that the remainder would degrade over time.

Using 2,000 pounds of ryegrass seed, Morris and his crew overseeded the field after the motocross and monster truck events. It was the first time the field had been overseeded since the Super Bowl, and it has not been overseeded since. "We had a warm winter which played havoc with the overseeding process," added Morris. "We had to pregerminate the seed."

The turf responded quickly to overseeding, fertilization, irrigation, and deep aerification. Within three weeks it was ready for a professional baseball exhibition series, which included the Boston Red Sox and Baltimore Orioles. To prepare for the games, sod had to be removed for the basepaths and pitcher's mound. An outside contractor, experienced in this type of operation, was hired for the job.

Once again, the geotextile was used. It was laid down where the sod had been removed, so that the clay placed on the skinned areas would not contaminate the PAT system profile. A nursery was established with the removed sod on the far side of the parking lot for emergency use.



Erecting stage for rock concert.

After the baseball exhibition, the geotextile and the clay that topped it were removed. The soil was deeply tilled and new sod was installed. It was placed on the loosened soil, and was not rolled until the roots had firmly anchored the sod. This rooting took place quickly. Then the sod was rolled to bring it down to field level.

One week later, the field was lined for more soccer. The 419 bermudagrass was in great shape. The rock concert followed. For this event, the turf was again covered with a geotextile. A stage was erected, and 10,000 chairs were placed on the field. The concert, featuring the rock group The Who, was a sellout.

Using Verti-Groove to aerify and remove paint.

As soon as the concert finished and the audience left the stadium, the crew began the work of clearing the field and taking up the geotextile. Another soccer game was scheduled to be played within a week, and this one was going to be videotaped for broadcast to the United Kingdom. But 10,000 chairs, each with four legs, left 40,000 small impressions in the field, and it had to be aerified again. The turf would soon be "aerified" once more, but not by Morris and his crew. The cleats of the Dolphins and the Bears would do the job. The NFL preseason was beginning.

Technology has of course contributed to the success of Joe Robbie Stadium's natural turf. But without the team effort and planning of the people involved, it couldn't have happened.

Hosting one of the most exhilarating Super Bowls in history is a tough act to follow, but quarterback Dan Marino, with his ballistic arm, and the Miami Dolphins should keep things exciting for their fans and opponents. As for the natural field at Joe Robbie Stadium, it's already a winner.

CEDAR CREEK NEARS COMPLETION

Cedar Creek Country Club, in Onalaska, WI, is nearing completion. According to Bob Lohmann, president of Lohmann Golf Designs, nine holes opened in July of this year. Construction and seeding for second nine was completed in May. The 18-hole layout is scheduled to open in late spring, 1990.

Designed by Lohman, the course is being built by Midwest Golf Development—a subsidiary of Lohmann Golf Designs. "Being the designer, architect and builder for Cedar Creek is a real benefit," said Lohmann, whose credits include the Foxhills Golf Course in Mishicot, WI, and the reconstruction of greens on holes one, 15 and 16 at the famed Medinah #3 course. "We're able to work more efficiently, more like a team."

The Cedar Creek golf course will challenge both high and low handicappers. With multiple tees, the course length will range from 5,305 yards to 6,805 yards. Water will come into play on six holes and grass mounds and bunkers will define fairways and greens.

"The course looks great, commented Terry Clemons of Cedar Creek. "Lohmann has done a super job. We're on schedule and on budget. He Lohmann is really and up and coming golf course architect."

Currently, Lohmann is also working with Fuzzy Zoeller on the new Boulder Ridge Course, in Lake in the Hills, IL.

TOURNAMENT BENEFITS ENDOWMENT FUND

The inaugural Robert Trent Jones Invitational, a golf event benefiting the Golf Course Superintendents Association of America's (GCSAA) endowment fund named for the legendary architect, raised $27,000 to support university scholarships.

The tournament was held at Metedeconk National Golf Club, Jackson, NJ, which is Jones' most recent design. Teams made up of club superintendents, officials, and members, representing 15 selected golf clubs from the Northeast, contributed $1,500 each to support the Jones Endowment Fund. Metedeconk members made additional contributions to bring the total to $27,000—the largest contribution to date to GCSAA's scholarship efforts by a single club.

Stephen G. Cadenelli, CGCS, secretary-treasurer for the GCSAA, was Metedeconk's coordinator for the event. He described the Jones Invitational as "a very meaningful way in which to recognize the unique relationship between the golf course architect and the golf course superintendent, as well as an excellent opportunity to support the development of future golf course managers and the game of golf while enjoying a great day of golf and camaraderie."

Richard Sambol, who along with his son Herbert conceived and developed Metedeconk National, expressed optimism that the event would have a prosperous future.

T.I. INTERNATIONAL OPENS ALABAMA FACILITY

T.I. International, Inc., has announced that its Andalusia, AL, manufacturing plant is now operational and producing a line of mower-reel replacement parts, such as reels, bed knives, and grinding machines. The 30,000-square-foot facility is located 90 miles south of Montgomery, AL, and currently employs 25 people.

T.I. International has developed a forging, heat-treating, steel-tempering and manufacturing system which strengthens steel for use in lawn-cutting environments, such as golf courses and municipal parks. The company manufactures replacement reels for a variety of mowers. Mowing Machines, Grinders and Reels, Inc., of Andalusia, AL, is the primary U.S. distributor of the company's products, which are sold on a wholesale basis.

State Teachers' College Constructs Model Outdoor Classroom

The Willamette Valley in western Oregon is known worldwide for its ideal climate for growing turfgrass. Hundreds of thousands of acres of the valley are sown with bentgrass, ryegrass, tall fescue and fine fescue. These fields produce millions of pounds of seed each year for golf courses, parks, schools, highways, home lawns and stadiums.

Rich soil and steady winter rains make Oregon perfect for growing seed. But when those same turfgrasses are exposed to football in the fall, the result is often a muddy disaster.

Western Oregon State University in Monmouth is a state teachers' college with an enrollment of 3,900 located in the heart of the Willamette Valley. Each year hundreds of aspiring physical education instructors attend the university and participate in sports. To these students, the fields and stadium are more than places to exercise. They are the classrooms on which they base their knowledge of how sports programs should be managed. The standards for field conditions they encounter in college will follow the instructors throughout their teaching careers.

In 1986, the stadium playing surface had deteriorated to the point where it was necessary to limit the number of college football games that could be played on it each fall. This was further complicated and compounded by the university's longstanding agreement with the community to allow the local school district to use the field as well. After football season, the field was all but useless for other field sports and special events. Ongoing maintenance costs were high, and increasing every year.

Poor drainage and design could not be overcome through maintenance practices. The administration, determined to strengthen the university's position in teacher education, was equally set on improving the quality of its athletic facilities. Development of new technology in field construction provided a solution. Maintaining a natural field under high-rainfall, high-use conditions was achievable. The question remained, however: Was it affordable?

It was estimated that by using traditional resources, approximately three to five years would be required to complete the renovation project. It should be noted that in Oregon general fund money cannot be used to pay for athletic programs and facilities. When the detailed costs of the project were being reviewed by William D. Neifert, the dean of administration, and Peter Courtney, assistant to the president, the concept of combining this project with the replacement of the cinder track began to grow. In the fall of 1986, a decision was made to combine both projects.

The configuration for the new track required moving the existing stadium football field and its drainage system. This provided the catalyst which made the project cohesive—to make it one coordinated project.

The vision was complete. The next step was funding. Dean Neifert and Courtney began to work in the community, looking for any available donations. They also hired Ron Davies, a consultant with Arena Sports and Recreation in Vancouver, British Columbia, to design the complex.

A creative plan was reached. The college would fund a portion of the track/football field complex, lower some construction and installation costs by using in-house labor, and act as general contractor. The Athletic Department would provide volunteer labor. The Oregon State National Guard, Unit COB-1249, agreed to perform the surveying, heavy earth moving, grading, and light-pole removal portions of the project.

Once the funding had been arranged, Steve Miller, physical plant engineer, was selected as project manager. Excavation began in December, 1986, and continued through the winter under exceedingly inclement conditions. The project progressed, and by the spring of 1987 the site was beginning to take shape.

Davies' plan was based upon his experience in equally rainy British Columbia. The former 1,500-meter runner and track coach started designing all-weather track complexes in the 1970s. He could not understand why a sports facility would invest a significant amount of money in a track without also improving the condition of the infield. This heightened his interest in construction of rugby, soccer, and football fields.

He sought further information from personal contacts made during his track and field career. Through numerous letters and discussions with friends in Europe and the United States, Davies discovered that only a sand root zone could drain water from the surface fast enough to prevent damage

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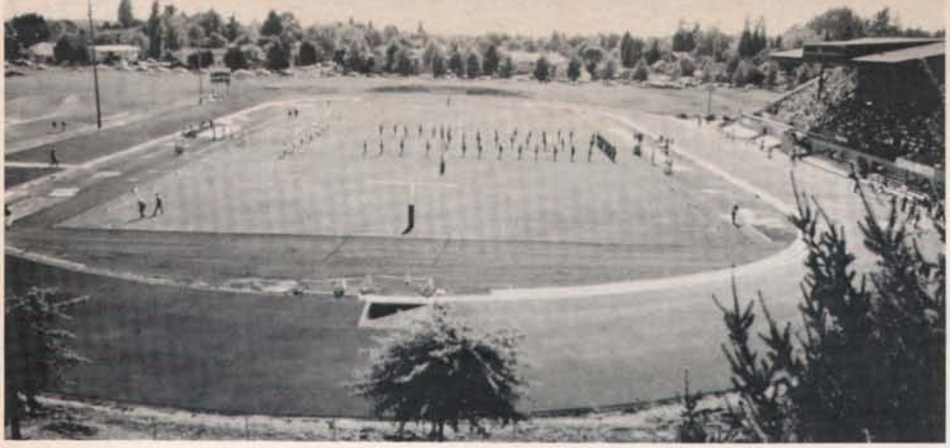
Sand is carefully laid over drainage/subirrigation network.



Stadium field and track following renovation.

Outdoor Classroom

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caused by wear and compaction.

The problem with sand is that it does not retain enough moisture for turf root growth unless water is trapped by a subsurface barrier. The key, he felt, lay in properly regulating the level of water below the surface. These were the principles Davies applied at Western Oregon, as he had many times before with fields on numerous continents.

The construction progressed in stages. First, the site was surveyed by the National Guard personnel. The engineering battalion brought in heavy earth-moving equipment. The operators, who were trained in building roads and bridges, excavated the old football field and cinder track. More than 18 inches of spoils were removed and spread on another field on campus.

After grading the subsoil, a gravel berm was installed around the perimeter of the football field. The berm serves a dual function. It is the outer wall for the sand basin and an interceptor for subsurface water outside the field. It does not extend above the surface. A loop of four-inch perforated drainpipe was installed at the base of the berm to carry water caught by the gravel out of the stadium.

The berm and flat subgrade were then lined with black plastic. Later two plastic partitions would be added to divide the basin into three sections from end to end. The drainage and subirrigation for each section could then be controlled separately.

Catch basins and manholes were constructed to connect the three drainage sectors of the field and interceptor system to the storm sewers. This was followed by installation of the main drain lines, electrical conduits, lines for the moisture sensors, the track timer control system, field phone plugins, and potable water outlets.

With all the utilities in place, the focus shifted to the field drainage and subirrigation system. A network of perforated drainpipe was laid in each of the three sections. The network consisted of a main line down the center of each section with drainpipe branching off in two directions every five feet. Each main was linked to the manholes on the side of the field.

After checking every joint in the drainage/subirrigation lines, the massive task of carefully covering the field with 18 inches of specially graded sand began. Starting in one endzone, they filled each section of the basin with sand, graded it, and hooked up the main to valves in the manholes.

Moisture sensors were placed at assigned depths in the sand and connected to the wires placed earlier. The sensors send an electrical signal to the valves at the water inlets, automatically opening or closing them based upon the level of water in the basin.

The subirrigation and drainage system came to life one section at a time. As the light brown sand turned dark with moisture from below, the university crew was anxious to start sowing the Futura Plus perennial ryegrass.

The controller was wired to the sensors in each of the three sectors of the field. During the irrigation season, the controller keeps the water level in the soil profile at the normal mark, which is determined by weather conditions. It is critical for the entire field profile not to become saturated. Otherwise the roots of the ryegrass would not grow deep enough.

If a sudden shower dumps too much water on the field, the controller automatically opens the drain valves, and the field drains to a normal level. During the winter months, the system is closed down and the drain valves are left in the open position.

Miller describes the field as "a bathtub with 18 inches of sand," in which the bottom two to six inches are kept saturated by either turning on the water or opening the drain plug. In the field, the plastic liner acts as the bathtub. The gridwork of perforated pipe either brings water into the field, or drains it as directed by the controller.

The field was seeded in early May 1987. This is where grounds superintendent Ron Cooper took over. Davies instructed Cooper on the special needs of his sand-based field. Cooper also consulted with Dr. Tom Cook at Oregon State University in Corvallis regarding fertilization. In September, the first game was played on the field. The track was completed later that fall.

To date, the field at Western Oregon State University has successfully withstood one complete and one partial football season. In the fall of 1988, approximately 27 games were played on the field without mudding up, slick surfaces, or appreciable wear. All in all, it has performed very well for Cooper and stadium groundskeeper Dave Bell.

The field is aerated and topdressed with sand in the late fall and late winter. At the end of spring semester, it is closed down and extensively renovated. This process consists of aeration (all plugs removed), dethatching, topdressing with sand, and overseeding.

Overseeding rates are 7-10 pounds per 1,000 square feet of turf-type perennial ryegrass. This year, Fiesta II will be used. Soil samples are taken once a year, and lime is added if needed. Calpril is used at a rate of 500 pounds per acre if called for.

The field is fertilized six times a year with 25-5-5 with micronutrients. Fifty percent of the formulation is sulphur-coated urea. It is mowed weekly, or twice weekly, with a Jacobsen HF-5 five-gang reel mower. The clippings are bagged with a Toro 217-D when needed, for aesthetic reasons.

In addition, a drainage and irrigation system for two full-sized practice fields is being completed. Four-inch perforated ADS drain tile was installed on 50-foot centers with rows of Toro 640 sprinklers over the top. A third, slightly smaller field has Hunter I-20s. This field was constructed on top of the spoils pile, and serves as an area for football sleds and machines. The entire complex can also be served with field pipe and irrigation guns when necessary. The facility is safe, high-quality, and aesthetically pleasing.

The single most important aspect of this project was the refusal of those involved to give up because of the initial cost. The innovative spirit that had been growing at Western brought about a planning team consisting of representatives not generally found in college projects. Members included academics, physical plant personnel, National Guard, Police Academy staff, architects, consultants, and a private supplier. Each representative had a need which was met and, collectively, $207,910 was saved by the institution on the construction phase of the project.

The annual maintenance costs on the completed project are projected to be $6,500 less than those prior to renovtion. In addition to these direct savings, it is anticipated that the facility will have a positive impact on student enrollment and booking of special events.

There are no athletic scholarships to attract students to Western Oregon State University. They make their decision on what college to attend based upon the quality of the curriculum and teaching facilities. Today this unique university has assured the growth and reputation of its athletic program, not by ticket sales, but by providing students with an appropriate learning environment. It's a refreshing change from the past. And it places the emphasis where it belongs, on teaching.

CHALKBOARD

TIPS FROM THE PROS

MAKING IRRIGATION SYSTEMS WEATHER CONSCIOUS

Recently Hurricane Hugo drenched the Atlantic Coast... seven inches of rain fell in two days in Atlanta... New Jersey experienced its wettest summer in decades. Who could have predicted such a huge swing in rainfall after three consecutive years of drought?

Just a few months ago, many golf course superintendents shut down irrigation to their roughs and fairways so they would have enough water for their greens and tees. Groundskeepers calculated their turf losses from last year's drought and purchased seed in record volumes to renovate parched fields. Sports turf managers across the country watched helplessly as their wells and reservoirs dropped lower than they ever had in memory.

The futility of maintaining safe, durable turf without an irrigation system finally sank in. The idea that irrigation and conservation go hand in hand is gaining acceptance.

The very nature of institutional irrigation systems installed at golf courses, parks, stadiums, and schools reduces the potential for water waste. As Keith Shepersky, product manager in the Turf Division of Rain Bird, in Glendora, CA, explains, the precipitation rate of small residential or commercial pop-up sprinkler heads is up to four times greater than that of institutional impact or rotary heads. Many small heads with a throw of 15 feet or less apply four inches of water per hour. The heads typically used by sports complexes that reach 50 feet or further apply from 1/3 inch to 3/4 inch per hour. That difference alone decreases the potential for water waste.

The greatest savings are possible by adjusting irrigation cycles according to the needs of your particular turfgrass. Those needs obviously vary according to the weather in your area. They are greatest during the summer, when high temperature, low humidity, wind, and decreasing cloud cover combine to raise the water requirement of plants.

In the past, good groundskeepers discovered that by changing cycle times and watching the condition of the turf they could determine what seasonal adjustments were necessary. Shepersky recommends that such adjustments be made at least four times a year.

Even the most basic irrigation systems can conserve water automatically if they include rain switches and/or moisture sensors, explains Wade Terry, director of marketing for Toro Irrigation, Riverside, CA. A rain switch is like a rain gauge. It collects precipitation in either a cup or absorbent disks. When the amount of rainfall reaches a certain point, a microswitch interrupts the flow of electricity in the common wire, causing the valves to close. The program in the controller continues to run normally.

Power is not restored to the valves until the rain switch is reset or the water collected evaporates. The turf manager can adjust the amount of rainfall required to activate the switch. This prevents a brief shower from stopping irrigation.

Moisture sensors detect the amount of moisture in the soil where they are located. Buried in the root zone, a sensor uses electrical, chemical, or physical means to determine when soil moisture reaches a predetermined level. At this point, the sensor signals a control module which can interrupt the power to valves. When moisture drops below this level, normal operation is restored.

"Moisture sensors allow the irrigation to run only when needed," states Terry. "They also take into account the field capacity of the soil." Field capacity is the maximum amount of moisture soil particles will hold. Beyond this point, water rather than air begins to occupy the pore spaces in the soil. The result is poor aeration and loss of water through the soil profile by gravity.

Moisture sensors can be installed to shut down all the valves on a controller or individual valves. By using sensors on slopes, low spots, shaded sites, and sandy

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Modified Average Midsummer Daily E.T. Rates

Data gathered by the Soil Conservation Service and Modified by Rain Bird Sales

State/City	*ET*
Alabama	
Montgomery	.21
Mobile	.20
Alaska	
Anchorage	.16
Fairbanks	.20
Arizona	
Flagstaff	.23
Phoenix	.30
Tucson	.27
Arkansas	
Little Rock	.20
California	
Bakersfield	.25
Fresno	.25
Los Angeles	.20
Palm Springs	.37
Sacramento	.20
San Francisco	.15
Colorado	
Denver	.18
Pueblo	.20
Connecticut	
Hartford	.20
New Haven	.20
Delaware	
Wilmington	.20
Florida	
Fort Myers	.24
Jacksonville	.25
Tampa	.26
Georgia	
Atlanta	.23
Augusta	.24
Savannah	.24
Hawaii	
Hilo	.17
Honolulu	.20
Idaho	
Boise	.24
Pocatello	.22
Illinois	
Chicago	.19
Springfield	.21
Indiana	
Evansville	.21
Indianapolis	.21
Iowa	
Des Moines	.21
Sioux City	.20
Kansas	
Topeka	.25
Wichita	.26
Kentucky	
Louisville	.20
Louisiana	
Baton Rouge	.20
New Orleans	.20
Maine	
Portland	.16
Maryland	
Baltimore	.16
Massachusetts	
Boston	.20
Pittsfield	.19
Michigan	
Detroit	.20
Muskegon	.17
Minnesota	
Duluth	.15
Minneapolis	.20
Mississippi	
Biloxi	.19
Vicksburg	.21
Missouri	
Kansas City	.21
St. Louis	.20
Montana	
Billings	.24
Helena	.20
Nebraska	
Norfolk	.20
Omaha	.23
Valentine	.25
Nevada	
Las Vegas	.30
Reno	.23
New Hampshire	
Concord	.13
New Jersey	
Atlantic City	.19
Newark	.17
Trenton	.19
New Mexico	
Albuquerque	.30
Las Cruces	.33
New York	
Albany	.16
Buffalo	.15
New York	.19
Syracuse	.15
North Carolina	
Charlotte	.19
Raleigh	.19
North Dakota	
Bismark	.20
Ohio	
Cleveland	.21
Columbus	.23
Oklahoma	
Oklahoma City	.30
Tulsa	.28
Oregon	
Portland	.18
Pennsylvania	
Harrisburg	.17
Philadelphia	.20
Pittsburgh	.18
Rhode Island	
Providence	.19
South Carolina	
Charleston	.19
Columbia	.20
South Dakota	
Sioux Falls	.24
Tennessee	
Nashville	.19
Memphis	.17
Texas	
El Paso	.29
Fort Worth	.28
Houston	.27
Utah	
Salt Lake City	.21
Moab	.33
Vermont	
Burlington	.17
Virginia	
Norfolk	.19
Richmond	.19
Washington	
Seattle	.15
Spokane	.19
West Virginia	
Charleston	.16
Wisconsin	
Madison	.20
Milwaukee	.18
Wyoming	
Cheyenne	.19
Jackson	.20
New Castle	.22

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soils, you won't have to overapply water to one area to meet the needs of another.

A third device which can lead to water savings is the flow meter. By installing flow meters at the pump station or water source, you know how much water you use on a daily basis. Any change in use alerts you to leaks and malfunctions in system operation. Flow meters installed on key mains can help you pinpoint localized irregularities. Useful information can also be derived from pressure gauges.

Shepersky calls the above devices "water-saving hardware." He makes this distinction because computers are playing a larger role in the sports turf industry. Computers, ranging from small solid-state controllers or satellites to sophisticated central controllers, have a flexibility not available from mechanical clocks. By adding software to these microprocessors, irrigation manufacturers have expanded the range of water-saving features.

One of the first advances in software was water budgeting. This allows the irrigation manager to reduce or increase all cycle times on a controller by a percentage. Instead of changing all the times for each station and program, you simply enter the percentage that you want all the times to change. This feature is available on most satellites and central controllers.

Water-budgeting software has been refined further to include a more precise adjustment for weather conditions, called evapotranspiration (ET). This is an estimation of the amount of water used by turf or lost to the atmosphere during a given period of time, usually one day. To arrive at this number, state or local water agencies use a formula which includes temperature, humidity, solar radiation, wind speed, and rainfall. The result is the amount of water in inches that needs to be replaced by irrigation.

The Soil Conservation Service (SCS) has published a list of average midsummer daily ET rates for many cities across the country. Shepersky points out that the SCS rates were geared to pasture and forage-type grasses, but they are close enough to turfgrasses to be valuable.

For example, on an average summer day in Illinois or Indiana, a turf manager would need to replace about two-tenths (0.2) inch of water through irrigation. In most cities in Florida, the daily ET would average one-quarter (0.25) inch, while in Seattle, WA, the rate would be 0.15 inch. The highest ETs listed are 0.37 inch for Palm Springs, CA, 0.33 inch for Moab, UT, and .30 for Laredo, TX, and Phoenix, AZ. On a weekly basis, turf managers in these areas should be applying anywhere from one to two-and-one-half inches of water during the summer.

When you compare ET to the precipitation rate of your sprinkler heads, you get an approximate idea of the cycle time you should be using during the summer. Let's say a golf course superintendent in Seattle and one in Phoenix both have sprinkler heads that apply one-half inch of water per hour. The Seattle superintendent would be running his stations for 18 minutes, while the one in Phoenix would be running his twice that long.

Although many newspapers and some state water agencies publish ET rates for cities, variations within an area are likely. For example, in Phoenix ET differs depending upon the elevation. Large water users, such as golf courses and parks, can conserve by installing a weather station on site.

Weather stations provide localized data which many central irrigation computers can convert to ET. Superintendents can use this information to adjust their irrigation schedules with water-budgeting programs, or the computer can change the run times automatically.

Sports turf managers today have the ability to make their irrigation systems "weather conscious." By adding hardware and software, they can conserve water more effectively than other turf managers. You can predict weather within certain limitations, or you can react precisely to rain, heat, wind and sun by making your irrigation system weather conscious.

ROOKIES

PRODUCT UPDATE

SPRAYER CONTROL SYSTEM

The Raven SCS 440 sprayer control automatically maintains your preset spray application rate, regardless of vehicle speed or terrain, on every acre to be sprayed.

The unit is easily installed on any sprayer, including specially designed rigs. It is also very effective in controlling anhydrous ammonia incorporation with the addition of the Accu-Flow attachment.

Along with the tip monitor feature, which informs the user immediately of plugged tips and their locations, the SCS 440 provides instant access to: volume left in tank; total area worked (cumulative); total volume applied (cumulative); field area (subplot); vehicle speed; distance traveled (feet); area worked per hour; and gallons per minute. Two different application rates can be programmed. The unit can also be switched to "manual" for spot spraying.

RAVEN INDUSTRIES, INC.

Circle **268** on Postage Free Card

FOUR-WHEEL-DRIVE MOWER

On-demand four-wheel drive and a 49-hp diesel engine enable Jacobsen's HM-11 mower to take on tough slopes or wet grass without turf damage or tire slippage. Wide-track stance, rear-wheel steering, and compact design provide the mower with maneuverability and stability on hills, while large turf tires reduce soil compaction and tire marking.

The HM-11 has a productive 11-foot mowing width. Its five out-front, hydraulically powered reels give a consistent, high-quality cut without streaking. Six- or ten-blade reels are available for the unit. For ease of cross-cutting fairways, a foot-operated control pedal lifts and lowers all five reels at once.

JACOBSEN DIVISION OF TEXTRON, INC.

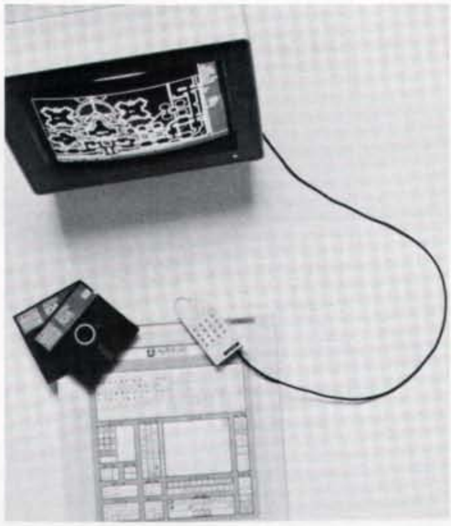
Circle **162** on Postage Free Card

Circle **122** on Postage Free Card

ROOKIES

PRODUCT UPDATE

IRRIGATION DESIGN SOFTWARE



Created exclusively for irrigation designers, Irrigation Design Assist (IDA) is a software package from Rain Bird. Working in conjunction with AutoCAD, a leading computer-aided design software program, IDA can handle sprinkler layout, pipe sizing, and other time-consuming irrigation design tasks.

Once the designer defines the area boundaries, selects the irrigation products, and inputs spacing criteria, IDA's computer-aided sprinkler layout program automatically places sprinklers in rectangular or triangular patterns to provide uniform water coverage, even for irregularly shaped areas. The designer can also modify the plan or experiment with different products or spacing.

The computer-aided pipe sizing program uses hydraulic formulas to perform accurate pipe sizing calculations. The designer chooses the pipe type and class, then IDA calculates the flow rate and provides the correct pipe and valve sizes.

A detailed database relates each product symbol in IDA's menu of Rain Bird irrigation equipment to product and performance specifications. As the design develops, IDA automatically keeps an ongoing inventory of the products used, which allows the designer to request a take-off at any point.

RAIN BIRD

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VERTICUTTER/OVERSEEDER

One-step seeding and/or verticutting can be accomplished by the Turf Slicer, from Classen Mfg. The unit has a front-mounted seed box which operates by friction from the drive wheels. Rotating slicer blades, spaced two inches apart, slice the sod to a predetermined depth down to 1½ inches. Depth is adjustable with fingertip screws.

The Turf Slicer is self-propelled by an eight-hp, Honda OHV four-cycle engine with centrifugal clutch. Moving at 2.27 mph, its 21-inch-wide swath can cover 21,000 square feet per hour. The unit has front-wheel drive by V-belt and chain with a 31:1 reducer and locked axle. Its double, V-belt drive has 1/8-inch, case-hardened blades.

Compact, simple design and a low center of gravity are Turf Slicer features. Without the seed box, the 33-x-48-x-44-inch unit weighs 250 lbs.

CLASSEN MFG., INC.

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SPRAY VEHICLE

The Spraystar 1600 Dedicated Spray Vehicle from Smithco can be used on golf courses, athletic fields, and other fine turf landscaping.

Features of the vehicle include a low-profile, 160-gallon fiberglass tank, a rugged 20-foot boom, and a choice of sprayer pumps and clutch system. Front-wheel suspension and an easy-to-operate ground speed control make the Spraystar 1600 easy and comfortable to operate. Operator safety is provided by an automatic clutch system.

Four large tires, which apply slightly more pressure than a man's foot, protect the turf. The Spraystar 1600 can be converted to a dry spreader or topdresser in a few minutes.

SMITHCO

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