A Publication on
Turf Management by the
United States Golf Association

July/August 1980

USGA Green Section RECORD

Tree Placement On the Golf Course

USGA

Green Section RECORD

Vol. 18, No. 4
JULY/AUGUST 1980

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Cover Photo:
This beautifully shaped sour gum tree shows off its brilliant fall color near the 11th tee, Rutgers University Golf Course, Piscataway, New Jersey.

GREEN SECTION RECORD (ISSN 0041-5502) is published six times a year in January, March, May, July, September and November by the UNITED STATES GOLF ASSOCIATION, Golf House, Far Hills, N.J. 07931. Subscriptions and address changes should be sent to the above address. Articles, photographs, and correspondence relevant to published material should be addressed to: United States Golf Association Green Section, Golf House, Far Hills, N.J. 07931. Second class postage paid at Far Hills, N.J., and other locations. Office of Publication, Golf House, Far Hills, N.J. 07931. **Subscriptions $3 a year.**

The remains of a Monterey cypress tree create a striking silhouette and enframe the clubhouse from the 17th fairway at the Cypress Point Club, California.

A Guide to Using Trees On the Golf Course

by JAMES T. SNOW
Northeastern Agronomist, USGA Green Section

THE ROLE OF turfgrass on golf courses clearly is to provide a playing surface for the game itself and a beautiful base for the aesthetic appeal of the course. Beauty and function are also characteristic of the roles played by trees on golf courses. With but a few exceptions, trees are a vital part of the landscape on most courses in the United States. On many courses, they are the third dimension in landscape, just as walls in a room. Trees create a feeling of privacy and provide continuity from one part of the course to the next.

Trees, too, are unique features of courses because they change dramatically with time. Even though a club may try to maintain specific standards with respect to other factors of playability, such as green speed, fairway width, cutting height, etc., the trees will continue to grow and change. From the time they are planted until the time they are removed, trees will continually alter the appearance and playability of that golf course.

Considering the longevity of many species and their long-term effects on the course, the importance of developing a long-range tree-planning, planting and maintenance program should be quite apparent. Unfortunately, too few clubs take their tree programs far enough to obtain the best results. A complete analysis should be made of the golf course and decisions made as to where the trees are needed. The tree species should be selected based on the conditions of the site and the function they are to serve. Finally, after they are planted, the trees should receive routine maintenance on an annual basis,

depending on their need. These three basic phases — deciding where to locate trees, selecting the appropriate species, and long-term care and maintenance — are all equally important to the success of the program. The remainder of this article will deal with the first phase, determining where trees should be placed on the golf course.

As with any important project, it is advisable to seek the advice of experts when developing a tree-planting program. This is particularly critical considering the long-term effects of trees on the course and the cost of their initial installation and subsequent maintenance. Any experienced golf course superintendent will tell you that removing any living trees will take an Act of Congress if the golfers have anything to say about it. That's why it is so important to do the job correctly from the beginning. Good results can best be ensured by consulting with a golf course architect or a landscape architect with experience in golf course planting. They are educated in the principles of good landscaping design, and they can bring out the best the course layout has to offer. The cost of their services is very small indeed when it is averaged over the lifetime of the plantings they recommend.

If a golf club can't afford to pay for landscaping services, it might do well to contact the state university. State colleges often have personnel who will offer sound advice in landscape design, and some may even send representatives to the course for on-site recommendations. Golf course superintendents at many clubs have done excellent landscape development work, especially those with training and experience. The GCSAA offers several seminars in landscape design recommended for superintendents interested in developing their talents in this area. Any superintendent who is about to embark on a tree-planting program would be well-advised to visit several of the great golf courses to see how trees are used. Following are a few guidelines to keep in mind as plans for placing trees on the course are developed.

SOME GENERAL PRINCIPLES

To begin with, consider that a golf course is a massive landscape and that tree plantings must be kept in scale to obtain the proper effect. In other words, what may be an appropriate planting in someone's backyard would appear out of proportion on a 150-acre golf course.

The American elm (left) had a dominant effect, which was changed dramatically (right) when the tree had to be removed because of disease. The 18th hole at the Round Hill Club, Connecticut.

It may take dozens of trees to do what only a few can do on a small property. Consider also that trees should complement the course layout, not detract from it. As a golfer plays a hole, the trees should create a special atmosphere without distraction to the real object of his attention — the green. The trees may enframe the hole, protect a dogleg, direct play, screen surrounding areas or outline the green, but they should not draw attention to themselves. What this means is that most golf course plantings should be neutral in appearance. Normal or familiar trees, such as maples, oaks, pines, etc., should predominate in most areas. Trees like the spruce, Lombardy poplar, Sunburst honey locust, and Crimson King maple are examples of exclamation points in the landscape. They draw attention to themselves and should be used carefully and in moderation. Any tree with unusual color, shape, size or texture will fall into this category.

Golfers in metropolitan areas often say they enjoy the game because it gives them an opportunity for recreation in a natural environment — a country setting in the midst of the city. If this type of setting is to be preserved, then golf course tree plantings must reflect nature's hand in their composition. Avoid a straight-line effect at all costs. Even where space is limited, such as along a property border or between a green and the next tee, individual trees within a row can usually be offset somewhat so that a straight line can be prevented. In nature, groups or clumps of the same kind of trees may be found together in larger groups. On the golf course, group trees in uneven numbers and space the plants at unequal distances apart, increasing (but not regularly so) as the plants get further from the real center of the group. The best trees to use on golf courses are often the ones native to the area or species that appear to be native trees. This gives the golfer a feeling of continuity, as opposed to being bombarded by a number of strange-looking ornamental plants. Groups of trees with different shapes, sizes, colors or textures can be used in various parts of the course, but use only two or three different types within a single viewing area. Masses are much more effective than mixtures.

Though trees may serve many functions as plantings on a golf course, three particular types deserve special attention: boundary plantings, partition plantings, and background or enframement, plantings.

BOUNDARY PLANTINGS

The area along the border of its property or along the border of play, is one of the first parts of the course that should be developed, especially where unsightly views or other distractions interfere with the golfers' concentration, enjoyment, or comfort. Nearby streets, busy industrial or business sections, or other golf course facilities are a few of the areas which should be screened from view. If space is available along the border, an effective planting of deciduous and evergreen trees and shrubs can be developed, with occasional groups of flowering trees planted for seasonal beauty. On courses which receive year-round use, evergreen plants should predominate. Where space is limited, more densely growing trees or shrubs will have to be used in a narrow type of planting. Again, avoid a straight row of plants if at all possible. Try to make the planting appear as natural as possible within the parameters dictated by the situation. The actual plant materials selected for a border planting will depend on a number of factors, including the nature of the distraction, the possible need for a fast-developing screen, space limitations, and environmental factors such as sun, shade, moisture, wind, soils, etc. On golf courses blessed with beautiful surroundings, plantings which block views should be avoided.

PARTITION PLANTINGS

Trees planted near the sides of fairways along the line of play are called partition plantings and serve several functions. They keep errant shots from crossing into adjacent fairways, they affect play as a physical obstruction and as a means of blocking or creating wind effects, and they contribute to the aesthetic appeal and privacy of the golf course.

Again, straight lines or rows of trees should be avoided. It's worth sacrificing a little fairway width in order to provide some depth to the tree planting along the side. Partition plantings should generally not create a solid mass of trunks, branches and leaves unless it is also being used as a screen. Interesting views and scenes should be left open, adding depth to the natural beauty of the course. One way to achieve this effect is to plant groupings of trees along the line of play. Groups planted near the end of a shot can serve as a direction guide and as a measure for the distance of play. They also provide shady spots which may be restful along the way. As a rule, plantings or individual trees should be placed in the fairway only on the advice of a golf course architect. As discussed previously, groupings should contain uneven numbers of plants, spread at unequal distances apart. Each group should be individualistic, though each should have a center of interest, just as any other composition. When using the same tree species, mass two to three plants close together near the center to make that part seem larger and denser. Scatter the others more widely and irregularly. (As a practical matter, minimum spacing should still allow maintenance equipment to pass between.) Another approach is to make the dominant plant or plants in the grouping a different type than the others, either larger growing or different in shape, color and texture. Thus the secondary plants may be larger in number but smaller in size or more quiet in appearance. The dominant plants provide the accent while the secondary plants should be neutral material.

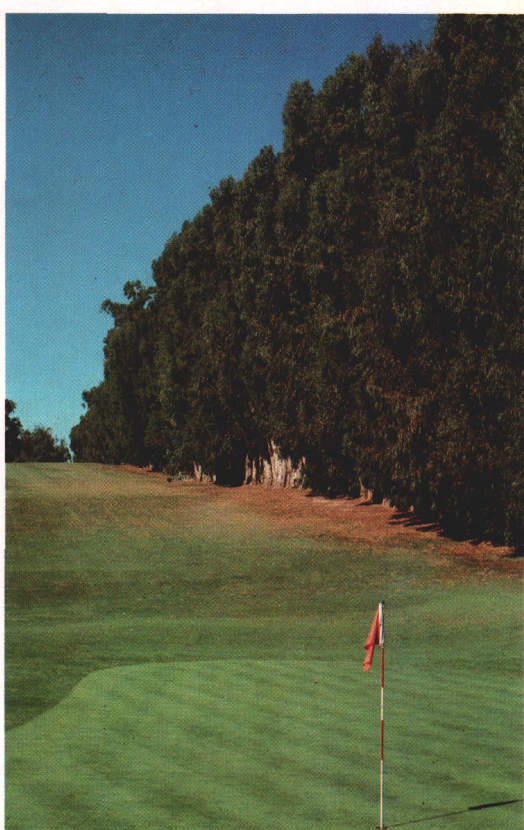
Tree groupings can be worked nicely into fairway contour mowing patterns, providing relief from the "football field" approach to fairway maintenance. Trees can be used effectively, and in fact are almost a necessity on the corners of dogleg holes. One large tree, used either by itself or in conjunction with smaller species, is usually more effective on the corner of a dogleg than a simple grouping of smaller trees.

Finally, if trees or shrubs must be used as 150-yard markers, select species which fit naturally into the surroundings and locate them as far into the rough as possible. Above all, *do not* purchase low-growing shrubs and plant them right next to the edge of the fairway. This not only creates an unfair obstruction to the golfer unfortunate enough to land behind it, but it is also distracting to the eye and way out of scale with the rest of the landscape!

BACKGROUND AND FRAMEWORK PLANTINGS

Background and framework plantings provide neutral settings for objects of interest and increase their visibility. Views from tee and green areas can be emphasized with the proper use of trees. Much can be done to influence the appearance of a golf hole, depending on the development of the framework planting. For example, planting low-growing trees can make the hole look more expansive. Conversely, it can be made to appear smaller by planting tall trees. Topography can be accented by planting tall trees on high areas and smaller trees in low areas, or negated with tall trees in low areas and short trees on the hillsides.

Plantings behind and to the sides of a green contribute greatly to the appearance and playability of the area. They provide a beautiful setting and background, giving direction to the line of play and a definite perspective to judge the distance of the approach shot, especially on blind holes. As the golfer approaches a green, the plantings should give the illusion of an enclosure or a dead end. Up close it should resemble a funnel, with the spout leading off to the next tee. The use of low-growing or fine-textured trees behind a green may make the hole appear longer, while the use of large or coarse-textured plantings may make the hole seem shorter. One good approach to greenside planting is to place smaller trees (perhaps flowering trees) behind the green as the first tier and back them up with larger evergreen or shade trees. However, be sure to avoid planting rows of small and large trees. Stagger the plants irregularly or use groupings of trees for a more natural look. For the most part, plantings behind greens should be neutral in appearance, drawing attention to the green and not to themselves. In practical terms, trees should be kept far away from the green in order to avoid shade, root competition, litter, and air circulation problems.



(Opposite page) Although it is not usually recommended, straight row planting here protects nearby houses from errant shots. Green Valley Golf Club, California.

(Top) The clumping and irregular spacing of palm trees creates a natural appearance along the border of the Lost Tree Club, Florida.

(Above) Grouping of Austrian pines (center) provides background direction and perspective for this "blind" green. The 18th hole, Onondaga Country Club, New York.

A pleasant atmosphere can be created in the vicinity of the tee through the use of trees, which may provide shade, screen unpleasant views, block errant shots, or act as a windbreak. Trees placed near the tee should be closer to the edges toward the back of the tee and farther from the sides in front, to allow adequate clearance for a golf shot played from the rear of the tee. Consider the ultimate size of the trees and avoid those that might some day encroach on the clearance needed for the tee shot. Again, care must be taken in tree selection and placement so that adequate sunlight and air circulation are ensured.

Deciding on where to place trees on the golf course and selecting the tree species to be used go hand in hand. The best way to approach this dilemma is to completely review the area in question and analyze it in the abstract without thinking of any particular plants at all. Use the principles outlined above to aid in the analysis work. Then consult with a plant materials expert, whether he be the golf course superintendent, a trusted nurseryman, or a landscape specialist, to determine the best plants for the job. Above all, tree selection and placement should always be part of a comprehensive tree program which also includes a sound care and maintenance schedule.

Top view of the rhizotron and grasses growing in observation boxes.

Spring Root Dieback of Warm-Season Turfgrasses

by J.M. DiPAOLA and J.B. BEARD

TURFGRASS MANAGERS seek to establish and maintain healthy and actively growing turfgrass plants. The health and vigor of the entire plant is essential for superior turf performance under such conditions as heavy traffic, environment stress (heat, cold, water, etc.), and pest infestations. While the turfgrass shoot is the visible portion of the turf, both the shoot and root must be properly managed for optimum turfgrass utility.

The turfgrass root system serves several key functions in the life processes of the plant. Water intake and transfer, nutrient absorption and transfer, and soil anchorage are important functions of the turf's roots. Turfgrass management directed towards the development of deep, vigorous root systems is contingent on an understanding of the seasonal behavior of the turfgrass root.

Investigations concerning the seasonal rooting behavior of Tifgreen

1. Assistant Professor, N.C. State University and Professor, Texas A&M University, respectively.

bermudagrass and Floratam St. Augustinegrass were initiated in the Texas A&M turfgrass rhizotron* in August, 1976. Turfs were established from sod in washed sand and received annual applications of phosphorous at a rate of three pounds per 1,000 square feet. Weekly applications of nitrogen and potassium were made at a rate of one pound of actual nutrient per 1,000 square feet per growing month.

Distinct seasonal patterns in root growth and activity were evident after the first three years of investigation. Summer root growth rates averaged one inch per day. This rate is some five

Editor's note: A rhizotron is a walk-in subterranean chamber that permits the researcher to observe, study and record root growth of grasses grown above in specially constructed observation boxes.

(Right) Subterranean view of the root observation boxes of the rhizotron. The doors and insulation of the root observation boxes are removed for root data collection . . . but are only partially removed above.

(Below) Appearance of St. Augustinegrass roots during the fall of 1978, showing their white to light tan color. Roots have a similar appearance during the winter. Bermudagrass roots are similar in color at this time, but have a smaller diameter.

(Below, right) St. Augustinegrass roots after root dieback showing the brown color of the entire root system (spring 1979).

times the growth rate reported for cool season turfs, such as creeping bentgrass. Declining soil temperature during the fall was accompanied by equivalent reductions in the turfgrass root growth rate. Continued reductions in the soil temperature during the fall to 50 degrees Fahrenheit or below resulted in shoot dormancy. Limited root growth was observed for approximately two to four weeks following shoot dormancy (loss of shoot green color).

During the winter dormancy period, the roots of these two warm season turfgrasses maintained the white-light tan color present during the summer and fall, and thus appeared alive. However, the root systems of these turfs turned brown about one week after the appearance of new green leaves in the spring (spring green-up). This root browning was followed by a delay in new root initiation, growth and replacement. Delayed new root initiation and growth following spring green-up was accompanied by significant new shoot development. This imbalance shoot: root ratio predisposes these turfs to injury and possible death due to low temperature stress (late spring frosts), desiccating winds, excess traffic, disease, pesticide phytotoxicity, and insect pests. Loss of turf from such causes often results in expensive re-establishment procedures and increased weed problems from summer annuals such as crabgrass and goosegrass.

These research findings raise a host of new questions concerning turfgrass management, particularly during the early spring. The many cultural practices that are known to influence root growth and development markedly must now be more closely evaluated with respect to spring root dieback of the warm season turfgrasses. Cultural practices of particular importance include: a) mowing frequency and height; b) fertilization timing, rate, and nutrient ratio; c) verticutting timing, frequency and intensity; d) soil coring depth (and core diameter), frequency, and timing; e) pesticide applications, particularly pre-emergence herbicides; and f) irrigation.

Current turfgrass agronomics outline the general turf responses to these various cultural procedures. Mowing removes some of the green photosynthetic tissue of the turf and thus reduces the amount of leaf area present to intercept sunlight and produce food for the entire plant. When faced with limited carbohydrate production and reserves, the shoot will use available carbohydrates at the expense of the root system. Therefore, the typical result of increasing mowing frequency and/or decreasing the cutting height is a restriction in the depth of the turfgrass root system.

FERTILIZATION timing and rates of application dramatically influence the performance of a turf. Nitrogen is important for many plant functions, including photosynthesis, and must be present in adequate amounts. However, excess nitrogen fertilization promotes shoot growth at the expense of the roots. Such a response may be of critical importance in relation to root dieback during the early spring. Above adequate levels of nitrogen have also been demonstrated to increase the susceptibility of a turf to many diseases, low temperature stress, and water stress. Additional potassium fertilization has been shown to increase root dry matter production of many turfgrasses. A balance in the ratio of nitrogen to potassium of fertilizer sources is also of critical importance.

Pre-emergence-type herbicides are commonly used during the spring for control of goosegrass and crabgrass. Most of these herbicides also restrict root growth of many turfgrasses. Applications of such chemicals so as to avoid the spring root dieback period, yet provide adequate weed control, may be important for optimum spring turf quality. Many growth retardants will also restrict root growth. Typically, root growth is restricted long after shoot growth inhibition has passed.

Root growth and distribution within the soil is affected by irrigation practices. Frequent and light applications of water will result in a turf with a shallow root system. On the other hand, more infrequent and deep irrigation will help promote a more vigorous and deep root system.

Winter overseeding of warm season turfs is a cultural practice which may have dramatic impact on the root sys-

tems of these grasses. Many of the fall establishment procedures utilized in winter overseeding, such as verticutting, close mowing, and late nitrogen fertilization, can reduce the winter survival of these turfs. These procedures are essential however, for the adequate performance of the winter overseeded turfs. Cultural practices conducted during the spring transition for the removal of the overseeded grasses will also influence the root systems of the permanent warm season turfs. While soil coring during spring root dieback period may prove beneficial, verticutting during this period is likely to be placing an additional stress on the permanent turf. It is important to note that new spring growth of warm season turfs that have been over-seeded will typically occur two to four weeks later than those areas that have not been overseeded.

MANY QUESTIONS concerning spring root dieback of warm season turfgrasses remain to be answered. What is the cause of this root loss? Is it hormonal, and/or related to carbohydrate supply? Does spring root dieback occur on all warm-season turfgrasses? Is spring root dieback observed throughout all of the southern United States? How is root dieback influenced by the environment, particularly late frosts or early warm weather? Is there any variation in spring root dieback from year to year? What is the optimum timing of the various cultural practices which may help reduce root loss during the early spring? The answers to these and other questions concerning spring root dieback of warm season turfgrasses are currently being sought in research programs at both Texas A&M and North Carolina State University.

ACKNOWLEDGEMENT

This research has been supported in part by funds from the O.J. Noer Turfgrass Research Foundation.

(Top) Stolon of St. Augustinegrass sampled after the beginning of spring root dieback in 1979. New leaf growth is evident, while the roots on either side of the pencil have turned brown.

(Left) Drs. James B. Beard (left) and Joseph M. DiPaola (right) with the soil and air temperature recording equipment used in the rhizotron. Both the continuous recording (in shelter) and thermocouple devices are shown.

Water Quality and Drainage

by JAMES A. McPHILOMY, Golf Course Superintendent,
Valley Country Club, Denver, Colorado

OUR CLUB IS located 20 miles southeast of Denver, Colorado. Original construction of the golf course began in 1956. Like most of the golf courses built in this area at that time, drainage was not considered to be a problem since the average rainfall here is less than 15 inches per year.

Prior to 1965, water availability problems were encountered in our shallow wells. These four wells, 50 feet deep, normally produce sufficient water of acceptable quality to irrigate 145 acres of turf. In June of 1965, the entire back nine holes were flooded, and silt one to three inches deep was deposited over all turf areas, including greens. In subsequent cleanup, we removed as much of the silt as we could. It was impossible to remove all of it, however, and silt layering continued to cause problems for a long time. The flood did solve the water availability problems for us, however, and our wells produced at a peak capacity of 2,250 gallons per minute for the next nine years.

In May of 1973 the second "100-year flood" in eight years again struck the Valley Country Club. After cleaning the flood damage, we regretfully noted a rapid deterioration in the quality of our irrigation water.

The spring of 1974 was the beginning of a prolonged drought period. The decrease in the static water table was accompanied by a severe increase in the total dissolved solids (TDS) in the water. In November of 1976 the total soluble salts reading was 960 parts per million (ppm) with an adjusted sodium absorption ratio (SAR) of 10.3. Soil scientists say that 650 to 700 ppm is reaching the high side of turf tolerance. To compound the poor water quality problem, we encountered a hardpan layering effect at a depth of two and a half to four inches under all of the greens. This hardpan layer ranged from three quarters of an inch to an inch and a half in thickness. Subsequent tests indicated less than half an inch per hour water infiltration rate on 50 percent of the greens with the best greens infiltrating only an inch and a quarter per hour. Soil testing indicated up to 1,800 ppm sodium accumulations on the poorer greens which are extremely high readings. Our inability to leach the accumulated salts from the rootzone was the cause of the problem. Our solution may be of interest to anyone having poor drainage or poor water quality problems. The following methods immediately increased the infiltration rate to three and a half inches per hour and dropped the sodium content of the greens to 250 ppm in 18 months.

Green 12 — This green was chosen first because it was the least damaged of the three worst greens we planned to recondition. On Monday, November 8th, we began to install drainage under this green. After consulting with Carl Schwartzkopf, our USGA Green Section Regional Director, we decided to install one center main line trench and lateral lines on 8-inch centers using a trencher. Our trencher's effective digging width is six to seven inches. After installing our drain pipe and gravel, the trenches were filled with plaster-quality bunker sand and resodded. Results were satisfactory. However, some problems were encountered and modifications were planned when the second green was to be done.

Green 13 — June 3, 1977. Work proceeded on this green. In the attempt to improve on our work with No. 12 green, we decided that in addition to the main line and laterals, we would add smaller (2½-inch wide) trenches between laterals to provide drainage on 4-foot centers. We also changed from plaster sand to topdressing quality sand with particle sizes ranging from 25 to 50 mm. These results were superior to results achieved on No. 12 green and led to this final method which we recommend highly. It has given us excellent results.

THE FOLLOWING step by step procedure was used to do our final green — No. 15 green. We used a staggered 10-man crew, six men worked from 6:00 A.M. until 2:30 P.M. and four men worked from 11:00 A.M. until 7:00 P.M.

Monday, June 13, 1977 — We established the center line for this green. We cut and preserved the sod on the sand in a greenside bunker, then began digging the main drainage line trench, followed by soil cleanup. We dug the main line trench to a depth of 15-inch minimum and 36-inch maximum and continued to a point approximately 70 feet into the rough where we installed a gravel-filled sump, providing a five-foot fall from main and laterals. We smoothed and graded the bottom of the main line trench and installed gravel. The gravel was packed two inches under the drain line, and we then installed a 3-inch perforated flex drain line and gravel was packed two inches over the drain. Next we measured and installed the lateral lines on 4-foot centers. We cut and laid the sod in the bunker sand and started lateral line trenching and soil cleanup. The lateral trench depth varied from a minimum of 12 inches to a maximum depth of 18 inches. All lateral lines were dug with a 2½-inch wide trencher.

Tuesday, June 14th — We completed the lateral line trenching and cleanup. We graded and gravel-packed the lateral trenches, then installed 1½-inch drains which we made by punching holes in the regular irrigation line polythylene pipe. Gravel was packed over the lateral lines. We then filled all trenches with 25-50 millimeters topdressing-quality sand which was hand-tamped and water-packed in the trenches.

We also stripped additional weak turf areas in preparation for resodding.

Wednesday, June 15th — We continued tamping and water-packing trenches, then relaid the original sod over trenches and the bad spots. Some extra sod from the nursery was needed to replace unusable sod. We then hand-tamped and hand-watered all sod.

Thursday, June 16th — We continued our work of replacing sod, hand-tamping, topdressing by hand and hand-watering.

Friday, June 17th — 11:00 A.M. Completed construction and cleanup. Elapsed time four and a half days — 270 man-hours.

Green was opened for play at 1:00 P.M. on June 17 through June 19.

Monday, June 20th — 6:00 A.M. We closed the green for aerifying and top-dressing the green and collar. We removed plugs and then applied 700 pounds granulated gypsum. We spread 5,000 pounds of topdressing sand and then dragged and brushed the sand and gypsum into the aerification holes and turf. We then watered, fertilized and hand mowed the next morning and reopened the green for good at 7:30 A.M., Tuesday, June 21.

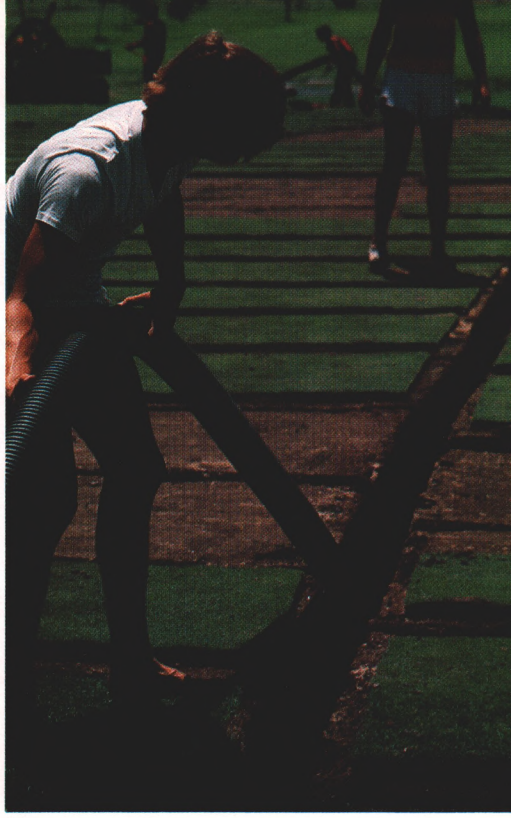
Fall aerification and all subsequent aerifications have included gypsum, magnesium sulphate and elemental sulfur applications as needed along with 5,000 pounds of high quality top-dressing sand per application to continue to build away from our troublesome soil problems.

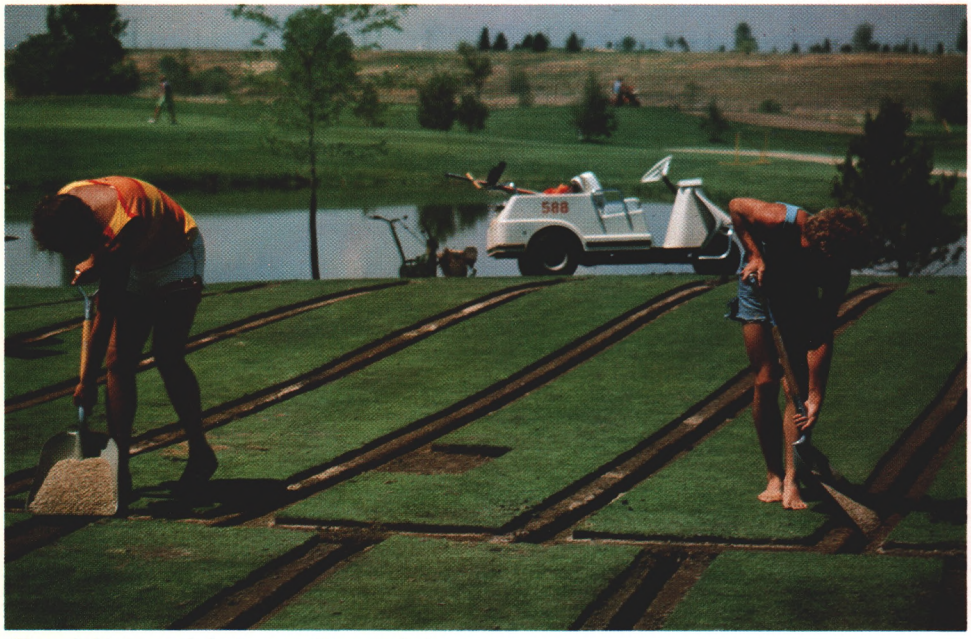
(Left) Sod is stripped where main drain is to be installed.

(Below) Preserving the stripped sod by placing it on sand in greenside bunker.

(Left) Trenching for the main line.

(Above) Measuring and marking for lateral drains.





(Top, left) Lateral drain trenching and clean-up.

(Top, right) Installing main drain — perforated continuous plastic pipe (tubing).

(Above) Placing gravel in trenches.

(Right) Placing sand over gravel.

A LISTING OF the equipment and tools used follows: one sod cutter; one 4-inch trencher (effective width six to seven inches; effective depth up to 36″; one 2½-inch trencher (effective width two-and-a-half inches; effective depth up to 18 inches); one cart or dolly to remove sod; a utility truck or trailer to remove soil. Hand tools include trench levelers — scoops for placing gravel and sand; survey instruments for shooting grades; square point shovels for clean up; hand sod tools for stripping and replacing sod and sod tampers to firm up replaced sod.

Materials used for a 6,500 square feet green —

Approximately 10 tons of ⅛-inch gravel.

Approximately 25 tons of 25-50 mm sand for filling trenches and topdressing. 150 feet of 3-inch perforated flexible drain line.

1,200 feet of 1½-inch slotted polyethylene tubing.

700 pounds granulated gypsum.

5,000 pounds topdressing sand (after aerification).

Fertilizer and additional nutrients as needed.

Summary Notes:

Total surface area 6,500 square feet — 1977 cost including labor and material, $1,500.00.

During the period of construction we cut a temporary green and placed an 8-inch hole in this area for play.

Although this work may be done during a dormant period, superior results will be obtained during the active growing season because of the faster recovery of the playing surface.

It is important to clean up all loose material each day so that normal watering of the green area during construction can continue.

We are continuing an overseeding program of three quarters of a pound per 1,000 square feet of seaside bentgrass on all greens after aerification and topdressing. We selected seaside bentgrass because of its better tolerance to salt.

The Valley Country Club, after consultations with the USGA staff agronomist, golf course architects and soil and water engineers had to select from three proposed solutions.

First Alternative — Locate a source of more acceptable quality water. This was economically unfeasible.

Second Alternative — Completely rebuild the greens and provide adequate internal drainage to leach poor quality water through the soil profile. Rejected also because of cost.

Third Alternative — Attempt to install an internal drainage system on present greens that would flush accumulated toxic salts out of the zone of the turfgrass plants. This program has proven to be extremely successful, and it has provided results exceeding our expectations. We feel this may prove to be a viable alternative to major reconstruction of some poorly-drained greens.

(Far left) Hand tamping of the sand.

(Left) Water-packing to further compact the sand.

(Below, left) Replacing sod.

(Below) View of green 14 days after completion.

USGA GREEN SECTION RECORD
JULY/AUGUST 1980

TURF TWISTERS

THREE S's THAT MAKE SUMMER SENSE

SPIKE

Question: I am considering a spiking program for my greens. Is it a good practice, and if so, when is the best time to spike? (Virginia)

Answer: Spiking greens on a regular schedule in your state and in states of similar climate is of pronounced benefit to bentgrass putting greens. The best program is to begin spiking in late spring and to continue to spike weekly through to the end of the summer season. The spike tines break through the thatch, keeping channels open for water movement into the soil. Spiking weekly is of special benefit to thatchy greens and greens on heavily played courses.

SYRINGE

Question: Would you define what is meant by syringing? (New Jersey)

Answer: A syringe is a fine mist showering of cool-season grasses during periods of wilt stress which frequently occur from noon to 2 P.M. in summer. Syringing cools the turf, provides some moisture, perks up the turf and slows down its rate of respiration. Syringing is not a watering, it's a refresher, and a Green Section agronomist once described it as wetting the blades of grass without wetting the soil. On grasses mowed continuously from 5/32 to 1/4 inch . . . that takes the touch of a safecracker!

SPRAY . . . THIS AIN'T JIMINY!

Question: Mole crickets are about to turn our fairways into a plowed field, but we are unsure of an effective control. Is it true that a thorough nematode program will also control mole crickets? (Florida)

Answer: Very definitely nematicides control mole crickets, and courses inflicted with this insect pest are better able to justify expensive nematode treatment because of the extra bonus of mole cricket control. These insects can also be controlled with Baygon or Dursban Bait, materials which should be applied in late afternoon to "set the table" for their most active feeding time.