PROCEEDINGS

SEVENTEENTH ANNUAL

SOUTHEASTERN TURFGRASS CONFERENCE

GEORGIA COASTAL PLAIN EXPERIMENT STATION

and

ABRAHAM BALDWIN AGRICULTURAL COLLEGE
COOPERATING

TIFTON, GEORGIA

APRIL 8 – 10, 1963

P R O C E E D I N G S

Seventeenth Annual

Southeastern Turfgrass Conference

Tifton, Georgia

April 8-10, 1963

Sponsored By

UNIVERSITY OF GEORGIA COASTAL PLAIN EXPERIMENT STATION

In Cooperation With

ABRAHAM BALDWIN AGRICULTURAL COLLEGE

UNITED STATES GOLF ASSOCIATION GREEN SECTION

and

SOUTHERN GOLF ASSOCIATION

F O R E W O R D

This station is indebted to many people and many organizations for their generous support in connection with our turf work over the years. The 1963 Turf Conference again indicated your interest, and your support has been a continual source of inspiration which has meant a great deal in the success of our turf program. Certainly, it has meant much in strengthening our desire to conduct a turf research program second to none in the South.

We feel that we are making progress in the development of better turf grasses and in the handling of the many problems which are inherent in the production of fine turf. Over the past few years we have built a back-log of experience which will enable us to make further progress in the development of better turf. Your continued interest and support will be appreciated and will be an important factor in our progress.

The Seventeenth Annual Southeastern Turf Conference was, we feel, an outstanding success. We hope that those of you whose primary interest is growing better turf feel that your participation in the conference was very worthwhile.

Frank P. King
Director

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THE TRAFFIC PROBLEM AND SOME THOUGHTS ABOUT TRAFFIC CONTROL

W. R. Thompson, Jr., Member
USGA Green Section Committee

To quote Professor Musser from Turf Management, "Unfortunately, there are many points at which the demands of the game and results of play are directly contrary to what is best for the grass." This is true in other sports using grassed areas as well as in golf.

Traffic in turf is important, for without it, then what purpose are we serving by growing grass? Therefore, we must accept traffic and traffic problems as a trade hazard. We can, by proper management, design, and use, bring damages from traffic to an acceptable level.

What can we expect from traffic? Much damage is caused by traffic because it occurs in improper areas. At Mississippi State, we have this on our campus. Not only foot traffic across our grassed areas of the campus, but autos using restricted areas. Football fields receive concentrated traffic in certain seasons and in certain areas of the field. The players on athletic fields are limited by rules to certain areas. Also, the bands and other organizations use the field for practice, etc.

On golf courses we should manage our courses to prohibit traffic during times when play should be limited. During very wet periods or when the grass is frosted, serious injury can be done to the grass and to the soil structure. There are some damages caused by normal play, such as spike damage and ball pock marks. Education of the players will help in reducing these problems.

Improper design of golf courses can cause serious damage from traffic by concentrating traffic. Such factors as tight approaches to greens,

improper layout of tees and greens, bridges, steps, small tees or greens are some examples of improper design which can cause trouble. Of course, the biggest problem of golf course traffic today is being caused by golf carts. The carts cause damage just by their use, but improper use increases this damage and causes it in places where it is hard to correct. Cart damage can be reduced by use of directional signs, barriers, lime lines, traffic dispersion barriers, and the most expensive method--golf cart paths.

If our aim is to grow good grass we want it to be used and to be used properly, but we must have traffic. To reduce injury to grass and soils, the users of our turf areas must be educated, our management program must be on a high level, and we must use proper design and construction techniques.

THE NEED FOR PLANNING FOR TRAFFIC CONTROL

Marvin H. Ferguson
Mid-Continent Director and
National Research Coordinator
USGA Green Section

In the title of this discussion we need to emphasize the word planning. We might compare our problem to that of the planners who are faced with the task of devising a transportation system for our nation's vehicles. It has not been enough to build wider streets and install more traffic lights. The ingenuity of the planners is shown in the installation of clover leafs and other types of interchanges which do not hinder the movement of traffic.

Planning is involved in golf course design and construction but also in day-to-day operation.

When a golf course has been built, any rearrangement of major features is difficult. Therefore, thoughtful advance planning is required. This is a good argument against the "do-it-yourself" type of architecture.

There are traffic controls, however, that the superintendent can employ. The most effective controls are those which can be exercised below the level of consciousness of the golf course user. Vistas which reveal a path to the next tee or subtle obstructions which will cause a slight detour are much more effective than printed signs. In driving an automobile most of us are influenced more by the lane dividers where traffic merges than we are by the signs which say "MERGING TRAFFIC."

As we progress around the golf course mentally, we can think of many places where the planner as well as the superintendent can exercise traffic control.

On the tee -

1. Placement of ball washers. There is an argument for portability.
2. Size of tees will influence the number of tee marker locations.
3. Shape of tees. Long narrow tees invite traffic over the entire length. Perhaps tees of different shapes (crescent, diagonal, etc.) would help solve some problems.
4. Placement of markers. Frequent changes are needed. Relation of placement of the ball washer. Relation of placement to location of flag on the last green.
5. Use of guard chains, ropes or other restraints. If these are used, they should be decorative and as inconspicuous as possible.
6. Locations of cart paths or parking areas.
7. Slopes around tees influence traffic. Easy slopes should be used in the directions of traffic flow. This will require careful planning to fit tees and slopes into existing terrain.

In fairways, there are relatively few problems; but even here there are some things to think about -

1. Cart paths should be wide enough. Edges must be protected to prevent erosion or "raveling." Paths should be wider at curves and there should be no sharp corners. The ends of paths should be flaired so that leaving traffic will not wear out turf completely. Leaving traffic may be diverted with small attractive saw horses or other similar devices.
2. An attempt should be made to vary mowing patterns. The approaches to greens suffer especially from this kind of traffic.

3. Eliminate steep grades where possible.

4. Eliminate poorly drained spots.

Approaches to greens -

1. Encourage carts to leave fairway before getting to the green, by placement of bunkers, by planting of trees, by vistas and paths to the next tees, and by location of the next tee.

2. If carts must come up alongside greens, make a more attractive path farther from the green.

3. Create parking areas.

On the green -

1. Numerous pin positions.

2. Location of the pin to best advantage -

In relation to approach

In relation to the next tee

In relation to areas most susceptible to wear

Around the green -

1. Location of traps affects mowing pattern.

2. Location of traps affects flow of traffic moving onto and off the green.

Perhaps these remarks will stimulate you to think of questions and solutions to problems. These may be brought up and discussed in panel sessions to follow.

ROADS ON THE GOLF COURSE

Panel Discussion

Moderator: Mr. James B. Moncrief, Agronomist
USGA Green Section

Panel members: Mr. Charles Danner, Member
USGA Green Section

Dr. M. H. Ferguson, Mid-Continent
Director and National Research
Coordinator, USGA Green Section

Material Used for Construction of Cart Paths and Maintenance Roads--James B. Moncrief:

Many of our country clubs throughout the United States have the advantage of being built on soils that make excellent cart paths without too much change in the natural soil series. The clubs with the sandy type soils have the advantage over the golf courses built on clay soils. This is especially so when rainy weather prevails and the "no cart" sign goes up. The golf course with sand and clay mixtures makes excellent cart paths when rolled. In most cases these two ingredients are not found in the proportions that make ideal cart paths. Usually the addition of sand or clay is needed to make a firm cart path or road.

Rock, gravel, or crushed rock seem to be the base material in most cases where clay soils are present for the building of paths or roads on golf courses. There are various sizes of aggregate ranging from dust to large rock. It is desirable to have a mixture of various aggregate sizes so voids will not cause depressions later. Dust by-product of rock crushing makes an excellent base for roads or cart paths. One of the advantages of the small aggregate is the built-in safety factor of less damage to your mowers, and at the same time,

it lessens the danger of players being injured by rocks being slung by the mowers. The larger aggregate can be used on maintenance roads or cart paths where the hazard of slinging rocks is not a factor and where a heavy base is necessary to uphold the traffic.

The larger aggregate makes excellent bases for roads and should be firmed in place before any other material is placed on top or should be retained in place if no smooth surface is being planned to cover the rock. It is advisable to cover the large aggregate with a small aggregate before paving or applying asphalt.

Rarely are cart paths on golf courses finished with anything other than asphalt. Since asphalt is used so much, the following information is from The Asphalt Handbook, published by the Asphalt Institute.

"Skeletons of prehistoric animals were found preserved intact to present day in surface deposits of asphalt in La Brea pit, Los Angeles, Calif.

"Recent archaeological excavations show extensive use of asphalt in Mesopotamia and Indus Valley as cement for masonry and highway construction and as waterproofing layer for temple baths and water tanks. Asphalt was used in 300 B.C. extensively for mummification in Egypt.

"Asphalt is a natural constituent of most petroleum in which it exists in solution. The crude petroleum is refined to separate the various fractions and recover the asphalt. Natural deposits in which asphalt occurs within a porous rock structure are known as rock asphalts. Asphalt is a strong cement, readily adhesive, highly waterproof, and durable. It is a plastic substance which imparts controllable flexibility to mixtures of

mineral aggregates with which it is usually combined. It is moreover highly resistant to the action of most acids, alkalies and salts.

"Almost all asphalt produced and used in the United States is refined from petroleum. The semi-solid form known as asphalt cement is the basic material.

"The principal uses of asphalt are paving asphalts and liquid asphalts. The liquid asphalts are known as rapid curing, medium curing, slow curing and emulsified. There can be various grades of each of the above. This information should indicate just how important asphalt has been throughout the centuries."

It is best that asphalt be well sealed when rolling and usually a heavy roller of 2000 pounds or more is advisable. Lighter rollers may be used as long as the surface is well sealed. Otherwise the asphalt will erode faster and repairs will be necessary sooner than where heavier equipment is used.

The tennis court rollers may be used and many of these are pulled by hand. The Athens Country Club, Athens, Georgia, used their tennis court roller and so far the results have been very satisfactory.

In most cases where hard surface is used, asphalt is used for cart and maintenance road paths. But, in some instances, concrete is used. Other materials that have been utilized for either temporary or permanent cart paths or roads have been sea shells, coal cinders, straw, pecan hulls, rubber waste, and other local materials that prevent rutting and slipping of the equipment.

About five colors are available in asphalt. White asphalt is being experimented with at the present time, but due to the cost, it is not

available for construction now. There are various blends of asphalt for rapid cure, medium cure, for winter use, and summer use. This material would be available from local companies handling asphalt.

It is rather hard to say where paths begin and end, but due to the use by traffic and from weathering, you can distinguish the old from the new in most cases. Where it will eventually stop will depend on the future traffic.

A steep grade is sometimes dangerous. With modern equipment, in most cases, this does not seem to be a hazard on good, hard-surfaced cart paths. Most individuals do not walk on the asphalt cart path, but on the turf. Many players have the feeling that asphalt wears out their spikes faster than sandy soils. Asphalt is much better to walk on with spikes than concrete.

Where the cart paths are steep, erosion can be a problem. Turf on either side of the cart paths will be thinned out unless the water is diverted by using asphalt or soil. Also, golfers walking at the side of the asphalt roads encourage erosion.

The reason for so much emphasis on materials and construction is the increased uses of motorized equipment.

We are building golf cart roads similar to our modern highways. We already have stations on our golf courses with telephone, sandwiches, rest rooms, golf ball machines, and at the same time, they serve as a shelter during electrical storms.

With all the modern speed of transportation on golf courses, we are beginning to observe signs to control traffic. Since our people are used

to seeing highway markings, some are being used on the golf courses to a great advantage. It is very easy to paint directional indicators on the asphalt roads in strategic spots. On some courses there have been traffic golf course patrolmen for several years, regulating the flow of traffic. It would not be surprising at all to see traffic lights on the golf course one day.

Discussion: Roads on the Golf Course--
Charles Danner

Since golf carts made their debut our thinking on damage done to the golf course by cart traffic has undergone some radical changes. We are sure of one thing--they are here to stay and our maintenance practices, greens and tee construction, and paths where needed must be given consideration.

At first we thought that carts would damage the golf course considerably and had reason for this belief. The first carts had narrow tires which would cut the turf, poor brakes which would lock and skid tearing the turf in the process of stopping, and the wheels would spin in starting further tearing the turf. Today's carts are much improved as to tires, brakes, starting and stopping and do very little damage to turf except during extremely wet conditions.

We now believe that if cart traffic is scattered out the carts do very little damage to fairway areas and areas around greens. Our regular maintenance, such as aerifying, fertilizing, watering, and weed control, seems to overcome any cart damage in these areas where cart traffic is scattered. However, we find most damage from cart traffic is in areas

approaching or leaving tees and bridges where traffic is concentrated. Most tees are elevated or placed on hilltops that make it necessary for carts to use the same route approaching and leaving tees. This concentrated traffic has resulted in badly worn areas or paths. Ground cover is worn off and compaction makes it almost impossible to grow grass.

At first we ignored this condition around the tees, but then came to realize that these worn areas and paths created conditions ready-made for accidents. With the ground cover lost, erosion had set in making the path rough and uneven and creating conditions extremely hazardous to cart users. Last year one man was killed in Atlanta when a cart overturned, and at Capital City Country Club two persons were hurt in separate accidents--fortunately not seriously.

At Capital City we started a program of paving paths approaching and leaving tees and now have a number of these paths paved where the tee is elevated and the route is steep. We feel this is necessary as a safety measure. Also, we have widened bridges, built safety railings where needed, and paved the bridges.

At Capital City we have a golf course modernization program with nine holes finished and the back nine scheduled for construction this coming summer. Every green so far has been built with cart traffic in mind to keep carts from using the shoulders and borders of the greens for traffic. Subtle barriers in placement of sand traps and, in some cases, steep slopes were built in. This was done with the thought that in the future cart traffic is bound to increase. Happily so far we have not noticed any wear

from carts on the shoulders and borders of the greens. However, we have seen golf courses with paths worn around the greens from cart traffic. Maybe subtle barriers, such as sand traps or steep slopes, is the answer. We feel that maintenance costs have risen as a result of cart traffic with cart paths, wider bridges with safety railings accounting for most of the increased cost. We believe cart users, being in a minority of all golfers using the golf course, should be made to pay the increased costs. The club should be the sole owner and operator of golf carts and a portion of the revenue from rentals should be earmarked for golf course maintenance, cart paths, and bridge maintenance. Too often, fleet owners leasing carts with a percentage going to the golf pro, golf pros owning carts for rental to members, or members owning private carts leaves the club holding the bag and having to pay increased costs of golf course maintenance, along with electricity and housing for carts. The club should have full control of all revenue from golf carts.

We, along with many clubs, bar carts from the golf course during extremely wet conditions. We feel that carts should be barred when conditions are very wet but feel that carts don't do any damage when the ground is slightly moist. We believe carts do more damage to turf when turf is at the wilting point.

Golfers want to use carts every day regardless of conditions and, being anxious to please these golfers, we experimented with carts equipped with various sized tires. We found that carts equipped with tires 5.5 or 6.0 tended to mark the turf when the ground was moist. We thought we had the answer in the smooth Terra tire but found this tire to be dangerous to

use in wet weather as the cart would skid when the brakes were applied on hillsides, causing the driver to lose all control of the cart. We found the treaded Terra tire would damage the turf some during extremely wet weather, but found it to be much safer than the smooth Terra tire. We feel that both the smooth and treaded Terra tire do more damage to turf when turf is at the wilting point. We have settled on carts equipped with 8.0 front tires and 9.5 rear tires. We still bar carts during extremely wet weather but let them go when the ground is slightly moist.

Building cart paths. Our cart paths are paved with hot mix asphalt six feet wide where they are used only for carts and eight feet wide where the path follows a road used by golf course equipment. Where the paths end, they are widened and fanned out to 12 feet to minimize damage where carts leave the path. Paths should be cut out to a depth of six inches. This assures removing the bermuda roots so that the bermuda will not grow back through the asphalt, and at this depth damage from freezing and thawing is not anticipated. This depth is all right in the Atlanta area, but farther north the depth may have to be deeper to stand the more severe freezes and thaws. We do not use boards or metal strips along the edges, as the paths are paved flush with the ground and the bermudagrass will keep the edge from breaking off. One problem is the bermudagrass creeping onto the path. This can be controlled with sodium arsenite or Dowpon. By paving flush with the ground, mowing over the path is no problem. Construction is started by using a Rotavator to loosen the soil. This soil is removed by a front end loader where this machine can be used and shovels to finish and true up the excavated path. After the path is

excavated to a depth of six inches, Crusher Run, a material graduated in size from ½ inch down to dust, is spread to a depth of three inches and packed by rolling before paving with asphalt. Before starting paving, it is well to have a 5-gallon container filled with kerosene to keep the tools used to spread the asphalt and the roller clean. The tools can be dipped in the container and a large brush used to apply kerosene to the roller to keep the asphalt from sticking to the roller. Hot mix asphalt is dumped in the path and spread by shovels and rakes, smoothed with a board paddle, and after cooling is rolled. For rolling, we used a Ryan Power Roller weighing 500 pounds. This roller does a good job, but we believe a roller weighing nearer 1000 pounds would be better. The paths are peaked toward the middle to prevent a golf ball from stopping on the path. After rolling, the asphalt is allowed to set overnight before being used for traffic.

OUTLINE OF PRESENTATION
On
EFFECTS OF TRAFFIC ON SOIL

W. Wayne Allen
Agronomist, USGA Green Section
Southwestern Office

The superintendent who said, "If it were not for all this traffic, I would be able to do thus and so," has missed the point, at least in part.

A systematic or scientific approach toward studying a problem such as compaction has at least two phases basically: (1) cause, which in this case is limited to traffic and (2) effect. Obviously, the desired results of such a study are practical applications which are derived from the study. Those applications or principles should aid in the connection of the problem.

Compaction is the main effect resulting from traffic on soils. Therefore, we shall consider some of the basic problems which accompany compaction.

In most agricultural situations the soil can be cultivated to the extent of completely turning it. However, this is not possible in the case of special-purpose turfgrass. We must rely on special methods of cultivation such as mechanical aerifiers.

Slides showing several points of emphasis included the following:

1. "Textbook" description of ideal soil. This type can nearly be maintained through conventional cultivation practices. Without cultivation, however, it changes radically.

2. What is the soil made of?

Particles - single pieces.

Aggregates - clusters of particles; the range in size from almost microscopic to extremely large clods. Proper aggregation is extremely desirable.

3. Effect of structure on permeability - Whether the initial structure is "blocky," "columnar," or "platy," after compaction the "blocky" and "columnar" tend to become "platy" thus reducing permeability.

The above was for review mainly as the information has been known for a long time.

Several years ago it was realized that much needed to be done in an effort to overcome compaction in special-purpose turf. Basic research was initiated at several locations, one of which was at the Texas Agricultural Experiment Station. The following slides are from one of the studies at the Texas Station. It must be remembered that the results obtained from the various ratios of mixtures in that study are from one soil type. It was Houston clay, which is one of the gummiest known.

4. Soils possess many differences. From a physical standpoint, particle size is important. This slide shows the various particle sizes of sand.

Several mixtures were made and studied.

5. Bulk density shown here proves it is not a suitable criterion for determining suitability of any given mixture for putting green use. It is often helpful for total evaluation but not as the only measurement.

6. Yield - Prior to Compaction. (Yield of dry matter is one measurement used in turf studies.) Very little difference (not significant) between any of the mixtures.

7. Yield - After Compaction. Several differences noted. Where soil content was high, yield was down. Both size of sand particles and sand content were influential.

8. Total Porosity - Prior to Compaction vs. After Compaction. Very little difference. Total porosity was misleading for a long time. Sandy loams did well in other field conditions (pastures, etc.) but did not necessarily do well in putting greens. Porosity after compaction is therefore very important.

9. Pore Space Distribution. Large pores and small (capillary) pores should be about equally distributed in the ideal soil mixture.

In summary:

The data presented here were from one soil (Houston clay) which is one of the gummiest of all; therefore, the exact mixture ratios may or may not hold true for any other given soil.

Separate physical analyses must be conducted for each mixture when the source of either the sand or soil is changed.

EFFECTS OF TRAFFIC ON TURF

Glenn W. Burton, Principal Geneticist,
Georgia Coastal Plain Experiment Station
and Member, USGA Green Section Committee

Footpaths where people follow each other across lawns have long demonstrated the adverse effect of traffic on turf. "Keep Off The Grass" signs, fences and other barriers, and paved strips where foot traffic flows are a few of the methods developed to limit such wear. The advent of the golf cart and its near universal use on the golf course has greatly increased the damage to turf by traffic. In addition to the usual traffic deterrents, tire manufacturers have tried to help solve the problem by altering tire design.

In the early spring of 1962, a research grant from the Goodyear Tire and Rubber Company, a golf cart supplied by the Toro Manufacturing Corporation, and additional support from the U. S. Golf Association Green Section permitted the development of an experiment to study the traffic problem on turf.

Three different tires (700-16, 950 x 8, and 16 x 12 x 6) were mounted on the three wheels on the Toro golf cart, and the cart was weighted with bags of rocks so the weight on each tire would be the same and would approximate the weight of two men and their golf clubs. Duplicate 36- x 42-foot plots of five bermudagrass strains (common, Tiflawn, Tifgreen, No. 1, and Tifway) established in 1959 on a Tifton loamy sand were selected to study the wear resistance of different varieties. Across each of these plots were placed three variables: (1) light and heavy fertilization, (2) ½- and 1-inch cutting heights, and (3) water and no water when the grass began to show signs of wilting.

Beginning June 19, four frequencies of passing the cart across each treatment on each grass were begun. Until July 31, these were 5, 10, 20, and 40 passes each day except Sunday. These passes were carefully made with the aid of a string to begin with so that each tire traveled in the same path it occupied previously. From July 31 through September 3, the number of passes per day were increased to 8, 16, 32, and 64.

Once each week, a rating was made of the injury to the turf by each tire on each treatment plot of each grass. These ratings ranged from 1.0 for no visual damage to 10.0 for severe damage. Clarence Lance, agronomy major from the University of Georgia who will use this material for a thesis problem, made all of the ratings. A total of 960 ratings was made each time. Traffic was discontinued on September 4, and on September 10 and October 20 ratings were made on the recovery made in each treatment.

All data were analyzed statistically by the IBM computer at the Department of Experimental Statistics in Athens, Georgia.

A study of the data collected from this study to date permits the following conclusions:

1. The 700-16 tire inflicted significantly more wear than the 950 x 8 or the 16 x 12 x 6 tires. The latter two tires did not inflict noticeably different amounts of wear.

2. The five bermudagrasses showed very significant differences in wear tolerance. Tiflawn was the most wear resistant and common bermudagrass was the least resistant to wear. From most to least wear resistance they ranked: Tiflawn, Tifway, Tifgreen, No. 1, and common. In rate of recovery after traffic was discontinued, they ranked from best to poorest: Tiflawn, Tifgreen, Tifway, No. 1, and common.

3. Cutting the grass at a height of 1 inch improved wear resistance over the ½-inch cutting height for only the first few days. After that the traffic kept the grass from growing above the cutting height and cutting height usually had little effect on wear resistance. In the last few weeks of the test, cutting at a height of 1 inch under heavy traffic seemed to give better turf than cutting at ½ inch.

4. Watering the turf during dry periods greatly improved its wear resistance rating. This was probably not due to making the grass tissue more resistant, but rather due to the stimulation of new growth to replace that damaged by traffic.

5. Increasing the annual fertilization from 100 to 200 pounds of nitrogen per acre per year tended to increase traffic tolerance at certain seasons of the year and at no time affected it adversely. Receovery after traffic was discontinued was much better on the heavier fertilized plots.

In addition to injuring the turf above ground, traffic may injure the turf by compacting the soil. Such compaction reduces the infiltration of water allowing rain to run off rather than penetrating the soil where it is needed. It also may restrict root development by reducing the movement into the soil of the oxygen so essential for root development. It is hoped that the effects of these treatments on soil compaction can be studied in 1963.

MAINTENANCE PRACTICES WHICH WILL MINIMIZE OR OVERCOME HARMFUL EFFECTS OF TRAFFIC

Summary of Panel Discussion

Moderator: Mr. A. M. Radko, Eastern Director
USGA Green Section

Panel members: Mr. Palmer Maples, Superintendent
Charlotte Country Club, Charlotte, N. C.

Mr. Harry Wright, Superintendent
Peachtree Country Club, Atlanta, Ga.

Golf today is a most popular sport, and the use of the course is ever on the increase. The direction of management today is toward toughness in turf--utilizing every aspect of management to get the most out of every blade of grass on the golf course. At many courses today the "course closed" sign is tucked away in mothballs--and the course is open every day for play--and so the increase in play causes for more management problems than we ever before encountered.

Management today therefore requires that every good practice be utilized to point to toughness and to minimize injury, and these include:

1. Proper fertilizing - amounts, types of fertilizers, and timing are all important. We strive for a hard tough turf, not a soft lush growth. With today's play, we can't afford to be soft or lush for even one day.

2. Drainage and irrigation go hand in hand in tough turf management. All weak areas that require drainage are trouble areas--for weeds, poor turf, bad lies, and so these must be corrected. Irrigation of turfgrasses is one of the very important aspects of management, and we attempt here to grow hard turf--strong deep-rooted turf through deep but infrequent irrigation.

3. Disease and insect control programs are never ending - these play an important part in keeping turf healthy and each is a preventative program--you can't afford to take chances of the turf weakening or being attacked by either.

4. Thatch and grain removal are also important to the health and welfare of grasses, and these, too, are a never-ending process of aeration, vertical mowing, topdressing, and close and frequent mowing.

5. The program of greens transition - the conversion of grasses from cool season to warm season and vice versa. These programs, too, require constant study by keeping up with new research in this field and utilizing those past practices that have proved successful for you. Here again, treatment or preparation of greens to promote smoother transition--whether it be mechanical or chemical--is important to success.

6. Proper mowing techniques.

7. Correct grass selections, soils selection or modification and use.

The heavier use of the course, the higher requirements of golfers, the improvements in management practices, the fruits of research, the rising standards of all connected with the management field, and numerous other factors enter into the picture, but the ultimate goal is tough turf of excellent quality for better golf.

CARE AND HANDLING OF GOLF CARTS

Panel Discussion

Moderator: Mr. Jimmy Dudley, Member
USGA Green Section Committee

Panel members: Mr. T. M. Baumgardner, Member
USGA Green Section Committee

Mr. Ted Booterbaugh, Member
USGA Green Section Committee

Talk by Mr. Dudley:

Our part of the program on the care and handling of golf carts will be presented in three phases. I will attempt to show how we handled our problem in a 500-member club with our pro deriving part of his income from golf carts. Mr. Baumgardner will show his side of the picture at Sea Island, a 27-hole resort course, and Ted Booterbaugh will give us a run down on the maintenance features as experienced at the Druid Hills Club in Atlanta, Georgia.

How we have attempted to solve our golf cart problem at the Athens Country Club:

During the year 1959 the greens committee could see that our golf cart problem was becoming more difficult in regard to maintenance, and more one-sided as to the financial rewards. Our committee was given the task of working out an equitable solution with our golf pro, who had pioneered the original investment in golf carts and had increased his fleet from 2 carts, when they were first developed, to 20 carts at the end of 1960.

Our committee made a survey of the problems encountered by the clubs in the surrounding area, and with the assistance of the Augusta

Country Club, decided on a 50-50 plan with our club professional. We followed this procedure because we wanted to recognize that the professional was the one who took the original financial risk, and yet the problems involved were becoming more and more a financial burden on the club.

Our main difficulties were the ones all of us are experiencing today and why our program this year is set up the way it is; namely, cart traffic, storage, and the financial aspects having to do with cart problems.

The following slides that I will go through hurriedly indicate how our club, which is a 500-member club charging $21 per month dues, handled our problem. We feel that it has been equitable and a source of revenue to both the club and the professional. In fact, it was largely responsible for our being able to purchase a fairway irrigation system this past fall which was the dream of all of us for the past 10 years.

1. Club house from ninth green.
2. Outside of cart shed, $5,000 investment for 200 carts at the end of club storage building; 1,500 sq. ft., $3.50 per ft.
3. Inside of cart storage shed.
4. Cart path construction up ninth fairway.
5. Same on wear area at No. 10.
6. Cart path at No. 7 green.
7. Cart path construction at No. 6--some with our own labor and tennis court roller.
8. Cart path, same area finished--note bridge construction.
9. Hill that required black top.
10. Financial break down.

	Total	Income or expenses absorbed as paid by	
		Club	Pro
Income			
(20 carts x 150 times per year x $6 each)	$18,000		
Costs			
Cart depreciation (20 carts x $15.50 per cart per month x 12 mos.)	3,720		$3,720
Labor (1/2 employe)	1,820	$1,820	
Building Depreciation (based on 10 yrs.)	500	500	
Maintenance (Spare parts, etc.)	800		800
Power (12¢ per battery charge)	360	360	
Taxes	150		150
Total Costs	$ 7,350	$2,680	$4,670
Cost per Usage	2.45	.89	1.56
Profit - Total	$10,650		
- Per Usage	3.55	1.77	1.78
Total Receipt per Usage	$6.00	$2.66	$3.34

I might say in ending that our problem has been handled to the mutual satisfaction of both the professional and the club. At the present time our fleet has been increased to 30 carts--all the same kind and all the same color. Our maintenance problem on parts and service is negligible due to one type only. We are indeed fortunate in having foresight enough to allow no members the privilege of owning their own carts.

Golf Car "Traffic"--T. M. Baumgardner

The disadvantage of being a member of the last panel is that all my original words of wisdom have already been said. I will have to fall back on a few facts and figures regarding operation of golf carts at Sea Island. Speaking of words of wisdom, I think two remarks by the last panelists were real gems: Palmer Maples' remark, "The ones that play are the ones that pay," and Harry Wright's remark, "When you're in trouble you've got to make a move, you can't just sit."

Outline of Sea Island Golf Car Operation:

Thirty-eight cars on twenty-seven holes - owned by Sea Island Company. Pros given commission on net profits. One full-time mechanic-caretaker with some help from caddies. Operating results for 1962 when we had only 28 cars: Traveled 155,000 registered holes equivalent of 8,500 18-hole rounds. Gross revenue $61,000 or $2,200 per car grossed for year.

Cost of maintenance including labor, parts (depreciation figured on 4-year life), but not including electricity or housing - $15,500.

Net profit for year on 28 carts - $45,000, or $1,600 per car.

1. It is obvious that it is best for club to own cars because of such a lucrative operation and to provide funds for course repair, maintenance, and construction of car paths, etc.

2. Superintendent only man qualified to control use of cars and properly judge course conditions.

3. As to the handling of carts on course to minimize traffic wear, start with player education; mainly up to club officials being able to instill sense of pride and responsibility in membership. With fee courses,

job is more difficult - here adequate signs, bulletin board notices, and traffic channeling methods more important. Asphalt or other hard-surfaced paths where traffic is concentrated.

Other helps: Wet weather directional signs and roping.

Mowing wider paths from tee to fairway.

Providing adequate parking areas beside tees. Curb boards solved some of our problems. Players seldom will over-ride 2' to 3' curbs.

Frequent aerification of areas where traffic is concentrated; low pressure tires; improve drainage conditions wherever possible.

In conclusion - whether we like it or not, I think we all agree that golf cars are here to stay and that their use will probably greatly increase rather than decrease. So, it is up to the golf course superintendent to increase his status by accepting responsibility for the maintenance and operation of the carts without complaint and endeavor to have golf cart revenues channeled back to maintenance budget to aid in keeping up with increased maintenance costs inevitably caused by heavy cart use.

Maintenance and Handling of Golf Carts--
Ted Booterbaugh

Golf carts are provided by your club for the pleasure and convenience of its members. There must be a proper understanding between the members and club if the interests of both parties are to be properly protected.

The club, therefore, must provide reasonable rules for the operation of carts to properly protect

1. Pleasure and safety of its members, and
2. The golf course.

Club members have certain responsibilities they must assume:

1. Drive carts carefully to protect the safety of club members.
2. Prevent damage to the golf course and carts.

The following rules or regulations have been established and must be followed if the members are to continue to enjoy the privilege of using carts and maintain and develop Druid Hills Golf Course as a beautiful course.

1. Golf carts will be assigned on "First come - First get" basis.
2. Reservations for carts may be made with the understanding that members will be charged $6 for carts if not used or reservation not cancelled before noon.
3. The golf course superintendent will release carts on the basis of 36-hole carts to be first out. Carts will not be reserved by number.
4. Drivers of carts will be responsible for safe driving and abiding by rules of club.
5. Golfers using carts shall have no special privileges over "walking" golfers. Regular rules and etiquette apply.
6. Guests, before given carts to drive, will be given club rules by the superintendent.
7. Carts will follow direction and parking signs where placed.
8. Carts may not be driven closer than 20 feet from the front, sides, or rear of any green.
9. Carts may not be driven to the sides (between green and rough or traps) of any green.

10. Carts may not be driven in the woods.

11. Carts may not be driven to the front of greens on holes 8, 14, 15, and 16.

12. Carts may not be driven to the rear of greens on holes 4, 7, 9, 13, 16, and 18.

13. Carts must be driven on cart paths as indicated.

14. Carts may not be driven on any tee.

15. Drivers of carts should avoid sharp turning, sudden stops, and any mud or water holes whenever possible.

It is felt that the above rules are reasonable and will not place any hardship on any member. Should any member be guilty of violating these rules, the following penalties will be enforced.

First Offense - Warning

Second Offense - Suspension using carts for 1 month

Third Offense - Appropriate action by Directors

These rules and regulations will be policed by the golf course superintendent and his staff, directors, and the Golf Committee. The cooperation of all members to report violations shall be appreciated. Forms for reporting and place to file them will be found at entrance to locker room. The cooperation of all members using carts shall be very much appreciated.

Every club should formulate a set of rules to control cart traffic to meet the driving conditions on their course.

Druid Hills Golf Club owns 25 golf carts, 10 of which are 2½ years old, and are in excellent running condition with the original batteries giving satisfactory service. This proves that proper maintenance on carts and batteries can double their life of usefulness.

At Druid Hills, the golf course superintendent is in complete charge of the carts, which includes maintenance as well as control. The following program on cart maintenance is giving good results at our club.

1. Wash carts and batteries with plain water every Monday. Be sure excess water is removed from top of batteries after washing. Batteries are filled with water at time of washing, and by applying a small amount of grease to terminals, we find that corrosion on terminals is eliminated. It is best to keep water a little below level mark on batteries so they will not boil over during daily charging period. Never charge batteries over 20 amps. The slower the rate of charge, the longer the battery will last. Never install a new battery with your old batteries. Always buy a complete set and use old batteries to replace worn out batteries in other carts.

2. Check belts, brakes, steering, and starting mechanism daily. This is good insurance against accidents.

3. Grease carts thoroughly one time per month. This is also scheduled on Mondays because most members have to work on this day, which cuts down on play.

4. Air tires every other Monday with several pounds more air than tire manufacturer recommends.

5. Check grease in rear end every 6 months.

6. Check condition of body and tops each day before carts are rented, and charge members for any damage done to carts during their round of golf.

7. Make a sound and practical cart replacement program, similar to your golf course equipment program. Our club plans to trade in five carts

per year on new ones. By doing this we will be able to eliminate the "trouble making carts" without too large of a financial burden on the club in any one year.

8. A good program to follow, in order to help you keep up with damage on carts, is to repair and paint dents and scratches as soon as possible. By doing this, you can easily detect the new damage and place the responsibility on the proper operator.

In regards to the ownership of carts, I believe the golf club should buy the carts and receive 100% of the revenue with no commissions paid to any employee of the club. I also believe that all money received from the rental of carts should be credited to the golf course budget to help build cart paths and repair damage to turf caused by the cart traffic. Members should never be allowed to purchase their own carts to be used on their golf course.

The golf course superintendent should have complete charge of all carts, including maintenance, and should receive proper compensation for this additional responsibility and effort.

Use of golf carts will continue to increase, creating many more problems for the superintendent. The revenue from carts has taken the place of the "old one-armed bandits" and the good thing about this revenue is that it is legal. Golf clubs can look forward to a net profit of from $20,000 to $60,000 from cart rental. Personally, I hate the things, but we need the money derived from their use. So, we may as well try to live with them.

MEETING THE GOLF CART PROBLEM

Tom Mascaro, President
West Point Products Corporation

So far as we know, we have to give the Texans credit for starting the golf cart problem. They started by converting jeeps to carry a foursome with all their equipment.

Everything being as big as it is in Texas, we suppose they had justifications to ride after their golf balls. The idea caught on, and we began to see "Arthritis Specials" appearing in other states. A cry went up from both golfers and superintendents, objecting to this lazy way of playing golf. The battle was on!

Some clubs demanded doctor's certificates to justify the use of a golf cart. We will bet that heart conditions, real and imaginative, skyrocketed. All you had to do was limp into the locker room, fortify yourself with two or three double scotch-on-the-rocks, show your doctor's certificate, and presto--you were playing golf with a motorized cart. Funny thing, the healthy guys liked to climb aboard on the back nine.

Anyway, 10 or 12 years have passed, and who has won the battle?

Why, the man who pays the bills. After all, it is his golf course--he pays the bill and he wants golf carts.

Since the advent of the golf cart, turfgrass problems and, in turn, the problem of the superintendents have increased tremendously. The problems created were created so rapidly that methods to cope with them were, for the most part, stop-gap methods.

Today, after many meetings, discussions and clinics, we can begin to draw some conclusions from the experiences of many superintendents.

Let's list the problems and discuss some solutions.

The Problem:

1. Soil compaction
2. Turfgrass wear
3. Routing of carts
4. Golf cart paths
5. Bridges
6. Closing the course to carts
7. Cart maintenance, service and storage
8. Insurance
9. Budget increases
10. Budget funds from golf carts

Opinion and Solutions:

1. Soil Compaction. Compaction of the soil from golf carts is perhaps the most serious problem they have created. The weight of the carts, the golfer and his equipment, plus the pounding and thrust of the wheels, destroy soil structure. The width, size, pressure, and design of the tires is almost irrelevant. When soils are wet they puddle. Puddling is compaction in its severest form.

Puddling of soil means the almost complete breakdown of soil structure. And without good structure soil cannot take in water, air, or nutrients. They cannot exhaust carbon dioxide from the root zone. Turfgrass cannot survive under these conditions.

A program of aerification must be initiated to keep up with compaction as it forms. If severe compaction exists, intensive aerification

must be done and then followed with an aerification management program that will stay ahead of cart compaction as it forms. Additional fertilizer must also be used to stimulate aggressive growth.

2. Turfgrass Wear. Turfgrass can take just so much wear. Cell reproduction must keep up or exceed cell destruction. Golf cart wheels produce a thrust for propulsion or stopping. This force can be transposed to abrasive action. On turfgrasses, weight is more of a minor factor. Thrust or abrasion causes the cell walls to rupture, resulting in the dying back of the grass blade.

Each golf hole must be analyzed from the standpoint of golf cart traffic. It must be remembered that people usually follow the least line of resistance.

Provisions must be made for convenient cart use, but still disperse wear over as large an area as possible.

3. Routing of Golf Carts. Should carts be allowed to run wild over the golf course or should they be restricted to edges of fairways or the rough? There are many points of debate here. However, generally speaking, it is best not to restrict carts in open areas, but only in restricted places, such as tee and green areas. It has been said many times that the middle of the fairways gets the least amount of traffic. Many devices have and are being tried, such as fences, rope barriers, and painted stakes. Devices such as these, although effective, distract from the beauty of the natural surroundings. Other devices include signs and instructions on the cart itself, score card instruction, and signs in the turf. Anything that is effective, without marring the beauty of the course, should be used.

The most popular system seems to be a combination of all these things. It takes intensive education to the members--instructions displayed wherever possible, attractive signs, and whatever other gimmick man can dream up.

4. Cart Paths. Golf cart paths can be a blessing or a curse. An over-all plan carefully executed should be drawn before money is spent. Emergency patches of cart roads can ruin the appearance of the course. An unplanned network of cart paths can make the golfers feel as though they were playing golf down Hollywood Boulevard. Cart paths should blend with the landscape. They should be used only where absolutely necessary.

Path building materials are many and varied--concrete, asphalt, wood, fine stone or gravel, sand, tan bark, pine needles, etc., are some of the materials. Whatever is used, it should withstand the traffic and require little or no maintenance.

5. Bridges. Golf carts need bridges. This has become one of the costlier items with the advent of golf carts. Here again, the choice of materials ranges from concrete, wood, steel, etc. Pre-fab concrete slabs have been used very effectively. They are flat, heavy enough to stay put during floods, and blend in well with the landscape. Whatever is used, bridges should be wide enough, strong enough, and permanent enough, with real consideration to future maintenance.

6. Closing the Course to Golf Carts. Who should be vested with the authority to close the course to golf carts?

Unquestionably, it should be the golf course superintendent. A qualified superintendent knows the soil, drainage, and the damages that the carts will do.

If the superintendent is overruled, then the club should be prepared to supply funds to repair the damage that is inevitable.

The superintendent, in turn, should use good judgment in closing the course to golf carts. This should be done only where it is absolutely necessary. It is awfully hard for the member who comes out to the course on Thursday morning to understand why the course is closed for his golf cart.

An over-all plan should be made to surface drain wet areas, intercept seepage water, and install a drainage system to keep the course open at all times if possible.

7. Maintenance, Service and Storage. The maintenance, servicing and storage of golf carts has become a monster. No longer do we see two or three carts. The total carts can be 200. This has become a major operation. This responsibility logically should come under the jurisdiction of the golf course superintendent. He is best qualified to handle the mechanical problem and supervise maintenance.

However, the superintendent should not be asked to assume this responsibility unless the club is prepared to provide him with funds to cover these additional costs. Throwing these costs into an already over taxed budget can be disastrous. The over-all golf course and maintenance budget will suffer. Observations of many clubs show that there is a trend in this direction, and every effort should be made to prevent it.

Funds must be provided for car storage, service, and qualified personnel to handle the job. Golf cart servicing and storage is a full-time job, and somewhat specialized.

Therefore, all facts must be considered before asking the superintendent to assume these responsibilities.

8. Insurance. The club organization must and should carry insurance against possible suit.

If the brakes fail on a golf cart and the user runs into a tree or stone wall--or, as in one case, a woman golfer ran off a bridge (which had no guard rails) into a creek, who pays the bill? Insurance companies will take a closer look at safety devices as the use of carts increases.

9. Budget Increases. Analyzing all these problems, it can readily be seen that each problem presented indicates that costs will increase.

Reviewing them in their proper order, we find that:

a. Compaction means cost of aerifying equipment and manpower to operate it. It also means an increase in the fertilizer budget.

b. Wear means that some reconstruction must be done to disperse cart traffic.

c. Routing of carts means that signs must be purchased, and printing must be done to educate the members.

d. Cart paths are costly, and whether contracted for or done by your own crew, this can involve the expenditures of additional funds.

e. Bridges in their cheapest form are expensive.

f. Closing the course to minimize this problem, reconstruction for surface drainage, elevating areas, tile drains and sumps represent increased costs.

g. Car maintenance, servicing and storage means increased costs in buildings, manpower and supervision.

So, that next time you hear someone say, "We ought to have more golf carts around here," ask him if he has considered all these problems and additional costs, which he as a member must pay for.

10. Budget Funds for Golf Carts. The picture painted so far sounds pretty discouraging, but facts are facts and we must face up to them.

Actually, golf carts on a golf course can be profitable. Income from the use, storage and maintenance can be used to cover this cost and show enough profit to cover the very problem they have created.

Income from golf carts can go as high at $185,000--a figure reported by one club.

It is only fair to state that those members who wish to use carts should be willing to stand the added expense to offset the added costs.

Since additional costs and the number of golf carts in use would vary widely from club to club, it is doubtful that a logical pattern could be established. For instance, drainage at one club might be severe while at another club it would be minor or non-existent.

Therefore, each club should analyze its own conditions to establish an over-all plan. Such a plan should be drawn up in such a way so that new committee members could carry it out on a continuing basis. If this is done, the golf course superintendent (who must be considered a permanent employee) would not be faced with radical changes each time the committee changed.

The Future of Golf Carts. There is no question but that the golf cart is here to stay. Many golfers sit at their jobs every day, and on the one or two days they play golf, the exertion of walking a full 18 holes is too much for them. The club can enable these people to enjoy their game and still get the needed exercise.

In future years, we are bound to see the use of the carts increase. If this is true, we will probably see more and more golf course architects planning the original layout to overcome many of the problems which now exist on present day golf courses.

ATTENDANCE ROSTER

Name	Affiliation	City
ALABAMA		
Berdeaux, C. G.	Box 500, Montevallo Road, S. W.	Birmingham
Bergmann, Charles	U. S. Air Force	Maxwell AFB
Brooks, Fate	The American Agric. Chemical Co.	Opp
Carnes, Robert H.	Birmingham Parks & Recreation	Birmingham 6
Dawson, Tom, Jr.	Country Club of Birmingham	Birmingham
Hartwig, Lester H.	Amchem Products, Inc.	Union Springs
Kennedy, W. T.	Montgomery Country Club	Montgomery
Lawrence, Doyle	Maxwell Golf Course	Montgomery
Morey, Virgil E.	Riverside Country Club	Lanett
Nordan, William W.	Nordan Grass Farms	Abbeville
Rumore, Ross	Birmingham Parks	Birmingham
Sampson, Ernie	Eufaula Country Club	Eufaula
Sasser, Lomax	Dothan Country Club	Dothan
Soutar, W. R.	Woodley Golf and Country Club	Montgomery
Sturkie, D. G.	Auburn University	Auburn
Wilson, Clarence M.	U. S. Steel Corporation	Fairfield
FLORIDA		
Allen, Paul E.	Paul E. Allen Company	Palm Harbor
Allen, Richard B.	Paul E. Allen Company	Palm Harbor
Allen, Thomas M.	Paul E. Allen Company	Palm Harbor
Arey, Phil	U. S. Rubber Company	Montverde
Berckemeyer, A. H.	Palmetto Country Club	Perrine
Connell, James R.	Chemagro Corporation	Winter Park
Dawson, Tom, Sr.	Palm Beach Country Club	West Palm Beach
Derzypolski, Marion S.	Capital City Country Club	Tallahassee
Dilsaver, Carl E.	Miami Shores Golf Course	Miami 38
Edge, Ross	Eglin Air Force Base	Niceville
Godwin, George E.	Ft. Walton Beach Municipal Golf Course	Ft. Walton Beach
Linderman, Harvey	Mountain Lake Corporation	Lake Wales
Lyerly, W. A., Jr.	AGRICO	Pierce
Mascaro, Charles G.	Hector Turf and Garden Supply	Miami 47
McNair, Fred W.	Wilson & Toomer Fertilizer Company	Jacksonville
Ousley, J. E., Sr.	Ousley Sod Company	Pompano Beach
Phelps, George W.	P. O. Box 35	Davenport
Rigdon, Charles H., Jr.	U. S. Air Force	Ft. Walton Beach
Russell, Henry H.	Porter-Wagor-Russell, Inc.	Miami 57
Schmeisser, Hans	Oak Ridge Country Club	Dania
Schmeisser, Otto	Gulf Stream Golf Club	Delray Beach
Sprogell, Frank T.	Paul E. Allen Company	Palm Harbor
Todd, Leamon W.	Sebring Country Club	Sebring

Name	Affiliation	City
FLORIDA (Cont.)		
White, Ralph	Ousley Sod Company	Pompano Beach
Williams, H. E., Sr.	Daytona Beach Country Club	Daytona Beach
Wilson, John R.	Wilson Supply Co., Inc.	Jupiter
Yeilding, O. B.	Standard Sand and Silica Co.	Davenport
Yuzzi, Joseph G.	Biltmore & Granada Golf Course	Coral Gables
GEORGIA		
Almond, Sherrill	Morton Chemical Company	Albany
Barnette, Ralph E.	Ft. McPherson Golf Club	Atlanta
Barnhart, George E.	Cherokee Town and Country Club	Atlanta 5
Baumgardner, T. M.	Sea Island Company	Sea Island
Beck, E. W.	Ga. Coastal Plain Experiment Station	Tifton
Bishop, Charles W.	Kiwanis Golf Club	Reynolds
Booterbaugh, E. E.	Druid Hills Golf Club	Decatur
Brasington, Charles E.	Town and Country Club	Blakely
Burton, Glenn W.	Ga. Coastal Plain Experiment Station	Tifton
Carter, R. L.	Ga. Coastal Plain Experiment Station	Tifton
Cartledge, Ronald E.	Cracker Village Golf Club	Augusta
Childs, Johnny, Jr.	Misty Waters Country Club	Decatur
Clements, Lee	Ga. Coastal Plain Experiment Station	Tifton
Cooper, Raymond B.	University of Georgia	Athens
Cordell, Tom M.	Abraham Baldwin Agricultural College	Tifton
Cottle, Donald H.	Dixie Turf Farms	Ty Ty
Crady, M. N.	DuPont Company	Atlanta 8
Danner, Charlie	Capital City Country Club	Atlanta
Dembnicki, Edward	Green Hills Country Club	Athens
Cash, Edgar L.	Turner AFB Golf Course	Albany
Dickenson, Hull	Columbus Country Club	Columbus
Dougles, Reid	Augusta Golf Club	Augusta
Dudley, J. W.	Athens Country Club	Athens
Evans, Rufus	Dixie Turf Farms	Ty Ty
Evans, Thurlow, Jr.	Stovall and Company	Atlanta 18
Gibson, Turner	Southern Turf Nurseries	Tifton
Goforth, Harry B.	U. S. Army	Fort Benning
Goldthwaite, Howard	Cowan Supply Company	Atlanta
Good, J. M.	Ga. Coastal Plain Experiment Station	Tifton
Goodwin, Wayne	Cowan Supply Company	Atlanta
Green, C. M. "Doc"	Okefenokee Country Club	Waycross
Griffin, Bruce C.	American Agricultural Chemical Co.	Savannah
Hart, Richard H.	Ga. Coastal Plain Experiment Station	Tifton
Haskins, Fred	Country Club of Columbus	Columbus
Holden, Preston L., III	Vineland Chemical Sales Corp.	Smyrna
Jackson, James E.	Southern Turf Nurseries	Tifton
Jensen, E. Ray	Southern Turf Nurseries	Tifton

Name	Affiliation	City
GEORGIA (Cont.)		
Johnson, Dewey W.	Evans Implement Company	Atlanta
Johnson, Marion L.	Cracker Village Golf Club	Augusta
Kincaid, E. E.	Evans Implement Company	Tifton
King, Frank P.	Ga. Coastal Plain Experiment Station	Tifton
King, George H.	Univ. of Ga. Agric. Experiment Stations	Athens
Kraft, Art	Forest Heights Country Club	Statesboro
Lambert, Jimmy	Evans Implement Company	Atlanta 2
Lambert, Paul W.	Stovall and Company	Atlanta
Land, Sam A.	Stovall and Company	Atlanta
Lawrence, Lester	Ft. Benning Officers Club	Ft. Benning
Madden, Loyd	Sunset Hills Country Club	Carrollton
Magee, George E.	Chokee Fertilizer Company	DeSoto
Moncrief, James B.	USGA Green Section	Athens
McGee, Bobby D.	Lin-Valley Country Club	Lindale
McGee, R. W.	Coosa Country Club	Rome
McKendree, Marion	Sea Island Golf Club	Sea Island
Neese, Jack	Country Club of Columbus	Columbus
Newton, J. P.	Georgia Experiment Station	Experiment
Nichols, Tom H.	Zonolite Company	Atlanta 19
Parker, Ed M.	Columbia Nitrogen Corporation	Augusta
Rhodes, R. L.	Augusta Golf Club	Augusta
Roquemore, W. A.	Patten Seed and Turfgrsss Co.	Lakeland
Savage, Hurley	Augusta Country Club	Augusta
Shields, E. A.	Standard Club	Atlanta 19
Smith, Joe W.	Evans Implement Company	Atlanta
Stephenson, C. P.	Stephenson Chemical Co., Inc.	College Park
Thompson, A. A.	Ansley Golf Club	Atlanta
Thurman, Patrick C.	Abraham Baldwin Agricultural College	Tifton
Wells, Homer D.	Ga. Coastal Plain Experiment Station	Tifgon
Werner, M. A.	Appling Country Club	Baxley
White, Donald D.	Southern Turf Nurseries	Tifton
Willige, Larry	Pinecrest Country Club	Pelham
Wright, Harry	Peachtree Golf Club	Atlanta 19
Zink, Harold L.	Armed Forces Golf Course	Augusta
ILLINOIS		
Walling, Robert	Roseman Mower Corporation	Glenview
INDIANA		
Riddell, Homer	Eli Lilly Company	Indianapolis

Name	Affiliation	City
MISSISSIPPI		
Downing, Paul S., Jr.	Atlas Fertilizer & Chemical Co.	Meridian
Thompson, W. R., Jr.	Mississippi State University	State College
NEW JERSEY		
Radko, A. M.	USGA Green Section	Highland Park
NEW YORK		
Brogan, D. A.	American Agricultural Chemical Co.	New York 7
NORTH CAROLINA		
Campbell, Don B.	Cherry Point Golf Course	New Bern
Helm, Marshall S.	American Agricultural Chemical Co.	Greensboro
Lineberger, Abel R.	Gaston Country Club	Gastonia
Mann, W. E.	Camp Lejeune Marine Base Golf Course	Midway Park
Maples, Palmer	Charlotte Country Club	Charlotte
Sloop, Farrell B.	E. J. Smith and Sons Co.	Charlotte
Smith, Wayne B., Jr.	E. J. Smith and Sons Co.	Charlotte
PENNSYLVANIA		
Mascaro, Tom	West Point Products Corporation	West Point
SOUTH CAROLINA		
Boatwright, Bennie L.	Persimmon Hill Country Club	Saluda
Ready, E. L.	American Agricultural Chemical Co.	Johnston
Shirley, G. Holly	Fairfield Country Club	Winnsboro
Shirley, Jim	Oconee Country Club	Seneca
Wise, A. E.	Zonolite Company	Travelers Rest
TEXAS		
Allen, W. Wayne	USGA Green Section	College Station
Ferguson, Marvin H.	USGA Green Section	College Station
WISCONSIN		
Latham, J. M.	Milwaukee Sewerage Commission	Milwaukee 1
BAHAMAS		
Kirby, Ron	Arawak Golf Club	Nassau

SEVENTEENTH ANNUAL
SOUTHEASTERN TURFGRASS CONFERENCE

Tifton, Georgia
April 8-10, 1963

TOTAL REPRESENTATION FROM EACH STATE:

Alabama	16
Florida	28
Georgia	71
Illinois	1
Indiana	1
Mississippi	2
New Jersey	1
New York	1
North Carolina	7
Pennsylvania	1
South Carolina	5
Texas	2
Wisconsin	1
Bahamas	1
TOTAL	138