1964

John Traynor
H. E. Frenette
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See next page for additional authors

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STOCKBRIDGE SCHOOL

TURF CLIPPINGS

CONFERENCE PROCEEDINGS

1964
Jerry McCarthy, a senior, being awarded the Most Valuable Player Award in Basketball.

James Rocha, a senior, being awarded a trophy for the best marksmanship on the Rifle Team.
G.C.S.A.A. SCHOLARSHIP AWARDS

Donald Daigle (left), a two-year student, and Joseph Coheen (right), a four-year student, are shown receiving their G.C.S.A.A. Scholarships from Mr. Sherwood Moore, a past president of the national association. Absent from the picture is John Martin.
TURF CLIPPINGS

Published By

The Stockbridge Turf Management Club
of the University of Massachusetts

To form a bond of common interest between the Turf Management Club, the alumni of the Stockbridge and Winter School Turf Majors and all interested friends of the University of Massachusetts Turf program.

Vol. 1 No. 9 Turf Management Club
Agronomy Department
University of Mass.
Amherst, Massachusetts

Editors
David Discenza
Robert Coffey
Joseph Keohane
Advisor
Joseph Troll

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Picture - G.C.S.A. Scholarship Awards
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TURF MANAGEMENT CLUB

John Traynor

The objective of the Turf Management Club is to promote a better understanding of the fundamentals of Agrostology, and to recognize the position of the Golf Course Superintendent. It also serves as a bond of interest between the freshmen and the seniors of the two-year school, the alumni of the Stockbridge Turf Major, and the Winter School.

The Turf Management Club, under the direction of Professor Joseph Troll, is a fine example of the interest in the turf profession. During 1964, with the enrollment of the Winter School, the Turf Club passed the 100 mark in membership. This interest is displayed by our members, and their work in such ways as the Turf Clippings, the Turf Conference Proceedings, our Annual Turf Management Golf Tournament, and our trip to the National Golf Course Superintendents' Convention in Philadelphia.

Meetings are held twice a month at which time persons from different fields speak in the turf profession. As a result of this sharing of knowledge, many students leave Stockbridge School of Agriculture to become an important part of the turf world with a good background in turf management behind them.

The 1963-64 Officers are:

President Fred Scheyhing
Vice President Jim Cole
Secretary Jerry Peters
Treasurer John Boldebook
Program Chairman John P. Traynor
Advisor Joseph Troll

WHO IS THE SUPERINTENDENT HERE?

H. E. Frenette

The Golf Course Superintendents Association of America recently published a leaflet entitled "An Introduction." The purpose of the leaflet was to acquaint the individual club member with the job duties and responsibilities of the Superintendent. Club members were invited to become acquainted with their Course Superintendent. It goes without saying that the Superintendent should also become acquainted with the membership. We can readily see that this is no mean task. The average club may have between 350 and 500 members. How do we approach the problem?

Aside from providing good playing conditions, there are many areas that allow the Superintendent to give the members that something extra that gives them a feeling of pride when they invite a guest to play their course. The something extra that attracts the transients to the public
course. Some golfers may be impressed by what they see at first sight. Others are inclined to build up a like or dislike for any particular course. Do your best to please them all.

Looking at things from the player's viewpoint (what other point is there?), consider these extras that could boost your rating:

1. ACCESS ROAD - Keep the roadways and drives neat at all times. Fill chuck holes and smooth out ruts and corrugations. Trim any trees that may border the road or path. Keep the grass, shrubs, and hedges trimmed. This is always a good area for ornamentals.

2. PARKING AREA - Above all, clean it up. Keep the guide lines painted. Here again is an excellent area for ornamentals.

3. ACCESS TO THE CLUBHOUSE - Where is the Pro Shop, Locker Room, Ladies' Lounge, Bar? If they are hidden, use direction signs. Use plenty of plantings in this area. Keep it quiet-looking. Give them some cart parking area, and a bag rack close to the pro shop. This keeps the carts and bags off the lawns and walks.

4. TEE AREAS - Here is where we can really make points:

   (a) Ball Washers - Does the golfer have to cross the tee to wash his ball or walk 75 yds to find the thing out of water? Place the washer adjacent to the markers every time they are moved. Don't use soap in the washer. Nothing worse than pulling out a slippery, sticky mess. Use the washer tablet or a non-sudsing detergent. It's less trouble to handle too. Change the water regularly, at least once a week, and preferably twice. Change the towels once a week, or as needed.

   (b) Markers -- Always keep your teeing ground neat, markers in good condition, and moved regularly. Please, line them up with the line of play.

   (c) Benches -- Does the golfer have to walk a block to rest? Keep the benches repaired and painted, 5 to 10 yds from the markers, and if stationary, trim around them.

   (d) Trash receptacles -- Does the golfer have a place to discard trash? Keep a receptacle close to the washer or bench and empty it daily.

   (e) Spike Brush -- Keep it clean and pick up the scrapings.

   (f) Stationary Equipment -- Trim around all permanently mounted tee equipment.

5. FAIRWAYS AND ROUGHS --Are they neat and free of all unnecessary impediments? Remove trash, dead branches of trees, smooth out mole casts, mark repaired and unplayable area in the fairways.

6. BUNKERS --Keep sand bunkers free of grass and weeds. Trim the edges frequently to maintain their size and shape. Bunkers have a nasty
habit of Growing Smaller. To speed mowing operations, keep those
direction signs in the bunker, not on the turf.

7. HAZARDS—Are they clearly defined? Keep hazard and Out of
Bounds markers in good condition, and standing straight.

8. GREENS—Nothing detracts more from a well-maintained green
than a lopsided flagstick. Keep your cup straight. Replace loose cups
and flagsticks. Another eyesore that takes only a minute to correct.
Tie the flags securely to the stick when they loosen. A word about
ball marks. Many Superintendents feel that repairing ball marks is the
responsibility of the members and often ignore them. If they are there,
they should be repaired. Five minutes added to the mowing time on each
green will pay big dividends.

9. PUMPHOUSE AND REST ROOMS—Keep your buildings on the course
looking neat. A coat of paint, some ornamentals and trimming really
dress things up. If necessary, hire someone to keep the rest rooms
convenient at all times. Watch the insects. Keep all screens repaired.

10. DRINKING FOUNTAINS—Check them daily. Clean out debris, gum,
and trash.

11. CAR AND CART PATHS—Watch for those ruts on the side. They
could tip a car over. Keep them trimmed.

These things we have mentioned may seem like so much extra work.
Surprise yourself and try it. Applied regularly, these extras are well
worth the effort. Particularly when the new member you are meeting for
the first time says, "The course is in great shape." You have just
introduced yourself.

GOOD TURF CAN RESULT FROM GOOD SODDING

Good turf is the final reward for having kept a lawn fresh, green
and reasonably free from weeds.

Such a reward is the finest possible source of sod for repairing
lawns, laying along the edges of roads or paths, for steep banks, injured
areas, or just for making minor sections more attractive.

Cutting sod is an art in itself. The sod should be cut about 12
inches wide and 15 inches long. It should be used at once, or stacked
face to face in the shade. In no case should it be kept stacked for more
than two days, or the grass will become yellow or white, and if left too
long it will die completely.

In laying turf there are basically two important things to remember:

1. Prepare the soil where the turf is being placed just as
carefully as if seeding down a lawn; but enough below finished
grade to take care of the thickness of the sod (2-3 ins).

2. In laying the sod see that the edges touch as closely as possible and if there are broken corners fill in with topsoil, after which the sod should be thoroughly tamped or rolled. Merely patting it with the tamper is not enough. It must be firmly packed down on the fresh soil, and then well watered.

If the sodding is on a very steep bank, the sod should be pegged down until its roots have gotten firm hold. Fresh sod on steep banks may be very easily washed away by a downpour.

When large areas are to be sodded which, of course, is the quickest way to provide a quick cover and good playing turf, the freshly laid sod, instead of being rammed, may be thoroughly sprinkled and then rolled with a heavy roller.

This is only one of many means to improve our nature's turf.

GOLF COURSE SUPERINTENDENT

Edward Wiacek

Superb is the condition of his course.

Unselfishly gives his time, and effort toward its betterment.

Painstakingly sees that everything is perfect.

Endlessly seeks out new and better methods.

Requires knowledge to keep the course in shape.

Imparts this knowledge to those in his employ.

Never does anything by guesswork.

Tolerates the adversities of Nature.

Enhances the beauty of the grounds.

Numerous are his duties.

Dogmatically adheres to his principles.

Eliminates anything detrimental to the course.

Notable in his field.

These are some of the qualities of a Golf Course Superintendent.
St. Andrews is located on the East Coast, in the County of Fife, which is bounded by the Firth of Tay to the North and the Firth of Forth to the South. It has a population of 10,000, a castle, ruins of a cathedral, the Byre Theatre and one of the oldest universities in the country. It has four golf courses, where most of the residents spend their leisure time for $6.00 per season.

The four courses at St. Andrews, The Old, New, Eden & Jubilee cover an area of 500 acres. In addition, there are four acres of practice putting greens, a bowling green and playing fields, all under the capable hands of J. K. Campbell, Superintendent.

The Old Course is the "famous" or infamous of the four courses, is known throughout the golfing world. Originally, there were only nine holes on the Old Course, stretching out to the mouth of the River Eden. Golfers would play out to the ninth then turn around, and play the same holes on the way in. The greens were gradually extended to the large double greens we know today, and the fairways have been widened. Golfers play out on the right side, and in on the left side.

Plans are being made to make the Old Course one of the greatest golf arenas in the world. They have had more success controlling large crowds during championships than most golf courses. This is due to the layout. The whole perimeter of the course is fenced off and spectators move around the sides. This allows only the golfers, caddies and officials on the fairways. Preparations for the 1964 "Open" started in 1962. Vantage points have been built around greens and tees in the shape of artificial mounds and hillocks to afford a better view for spectators. This is being done to blend in with the natural layout of the course.

Basically, golf course maintenance at St. Andrews is the same as in America. The weatherman is the greenskeeper who counts, as the saying goes here. Steady warm rains make the course beautiful. Dry spells and high winds dry up the course until the only green grass is on the greens. However, it quickly recovers when given the right conditions.

Mowing greens is one of the biggest operations. Six Overgreens (3 unit mowers) are on hand. Usually, four of these machines are out mowing every day from 8:00 a.m. until 4:30 p.m., cutting two courses per day. Mowing two double greens is a good mornings work on the Old Course, particularly Hole O' the Cross, 5th and 13th, which measures 80 yards across, just short of one acre in area. Operators on these machines make their own mechanical adjustments, height of cut and bed knife adjustments.

Disease problems are practically nonexistent at St. Andrews. Only slight traces of Fusarium and Cortisum during the cool fall weather are evident. Snow doesn't lie on the ground long due to the salt winds from the North Sea.
"Golfers" from far and wide come to play on the Old Course. Some of these golfers are the world's best but many more are the world's worst. Filling in divot holes with top dressing is a major operation on the four courses. This is a complete job from tee to green.

Such fertilizers as Dried Blood, Steamed Bone Meal, Hoof & Horn, Sulphate of Amonia, etc., are the main nutrients used at St. Andrews, and the Scottish maxim is "A little at a time, and often." (Incidentally latest reports from the Turf Research Station, Bingley, Yorkshire, show they are not completely sold on Urea-Formaldehyde. Test plots alongside plots receiving Sulphate of Ammonia in small doses showed much smaller yields.)

The Beardies, Cottage Bunker, Principal's Nose, Ginger Beer, Hill Bunker, etc. are typical names of some of the bunkers on the Old Course, St. Andrews. Any student of golf course maintenance starting his career here will soon be told in a broad Scottish dialect to "Rake the Auld Coorse Bunkers" and to get acquainted with them. If he also plays golf and his ball lands in some of these deep chasms, he might well call them some "fancier" names.

During a Pro-Am Tournament (Mostly American) held here in the fall of 1962, I overheard one of the tall Americans say at the 17th tee in obvious disgust--"If the sea covered over this Old Course it would be no great loss, I've never seen so many good shots go to waste!" The great Bobby Jones was equally incensed by the same course when he first played here. Now, Bobby says if he was sentenced to play on one course for the rest of his life he would choose the Old Course, St. Andrews.

Be sure to visit the Old Course, & Mr. Campbell, Superintendent, should you ever be over there.

-----------------------------------------------------------------------------

ANALOGY OF A TURF MANAGER

James B. Cole

It occurs to me that the title turf manager is one bestowed on some, claimed by others, exposed to, associated with or involved in the business of growing turf grasses and grossly misunderstood by the rest who are not concerned. This would at least lend some understanding as to why your grandmother asks why it is necessary to go to college to learn how to cut grass.

The question What is a turf manager? It can be answered in several ways. Simply by someone who has better things to think about, as a guy who manages turf, or we can divide it into its separate parts and take Mr. Webster's cryptic urbage regarding a manager as "a person who manages" at face value and draw our own conclusions as to its application when modified by the noun turf, or we can be inquisitive, unsophisticated and old fashioned and tear it apart and ask what does he really do? What and how does he actually manage?
To thoroughly understand the true meaning of something, the implications and involvements of the term an association or an analogy with something familiar and understood is oftentimes resorted to. In predominately male groups, males being traditionally a sporting lot, indoors and out, athletic games with which they are generally familiar are used, for example, during instruction in military tactics a forward pass may become a vertical envelopment, an off tackle slant, a probing action or Sam Huff will occupy a blocking (or stopping) position to limit penetrations. So with the term turf manager in mind lets use baseball, O.K.?

If you were to ask the average Joe Dooks what does Casey Stengal, Ralph Houk or Johnny Pesky do as baseball managers without being factitious, he would give such answers as:

He plans the game strategy and picks the players.
He studies the batting averages, won and lost records, and the weaknesses and strong points of his own players and the other teams.
He makes adjustments in the lineup during games as the situation changes.
He prescribes training rules, diet, etc., to keep his players in top physical shape.
He anticipates the other teams strength and tries to defend against it, like putting faster fielders in left field against long ball hitters to left, and so on and so on.

When we consider the players to be cultural practices, water, fertilizers, fungicides, etc., and the opponents to the various environmental, climatic and natural influences which are trying to beat him at the game of growing turf, isn't this exactly what the turf manager does?

Although the objective may be different in one case a pennant and the other a satisfied membership, the managing process is exactly the same. To illustrate with a few for instances:

From studying the opponents statistics and from experiences (maybe sad) he knows when Bobby Brownpatch, Danny Dollarspot and Mickey Melting Out will hit there midseason form and are likely to hit the long ball so he brings off the bench (the storeroom) a trio of fleet outfielders. Pete PMA, Carl Captam and Tommy Theram and puts em in his lineup to defense against these guys.

He prescribed and feeds a balanced diet at the training table (spring training) so his players (the grasses) can stand the golfers and not become predisposed to Frank Funguses' fast ball.

He knows that weeds like base stealers and are space stealers and that his best defense is a vigorous fast moving infield (of grass that is).

He knows better than to pitch Paul PMA (Pete's borther) against the crabs in Marion Park, because they don't like him over there and to use a less toxic pitcher such as Don Dortal or Relufer DSMA and we could go on and on.

-7-
As with baseball managers the smaller the budget (class B daily league) the more managing and more managerial ability is required. He may have to let his pitchers cavort in the outfield on off days (no specialists). If he can't afford a protective spray program he may have to make his line up changes on the spot or when Brown patch is on deck (or indicated on the green) and it maybe necessary to be a playing manager and do a little work around the course himself.

Both managers must be constantly alert to recognize variants. Ball clubs make trades during the winter, call up players from the minors, pitchers and hitters verulence changes by gaining better control and batting practice so changes are continually being made as so the opposing temperatures, humidity, rainfall, nutrient levels, etc. Each game as each day presents different problems and must be played one at a time. There is no recipe for victory. This is why IBM (imitation brains management) will never replace ITM (informed turf managers).

So be it baseball or turf the manager must be a planner, a strategist, an adjustor, a manipulator of his resources, his tools of the trade to achieve a desired result be it a pennant or a putting green.

To direct these forces he must know them, all of them, thoroughly and be able to apply the scientific fact tempered with generous portions of experience and good judgment to produce healthy, playable golf turf.

When you can do this you will have graduated from the ranks of turf managers to that of a turf manager, a step in which you can be justly proud.

---------------------------------------------------------------

FISH TROUBLE

Peter A. Langelier
Dennis P. Leger

There is in Central Massachusetts, a prominent golf course which is unique in itself in that the common maintenance practices of watering, fertilizing, and mowing, give way to a fish problem during the hot summer months.

This fish problem came about during the 1962 season, an extremely hot one for those of you who don't recall. It seemed that this summer became so hot and dry that it was necessary to water every day during this hot spell. Naturally, all this use of water, as well as direct evaporation of the water from the ponds themselves led to an acute shortage of water.

With this shortage of water the fish also suffered in that their once abundant aquarium became exceedingly abated. Eventually, the fish had no control over this matter, and began to lose resistance and would get sucked in by the water pumps which were acting like huge vacuum cleaners.

The result was a fish problem from the first to the eighteenth green.
These little fellows were only two to three inches long, but they still managed to mess up, as well as smell up one hundred and forty acres of turf area.

From now on during the hot summer months instead of despairing when you have maintenance problems, just be thankful you don't have a fish problem.

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SQUARE RINGS

Robert P. McGuire

It was approaching three a.m. and I was just about ready to water the ninth green, when the sounds of drums and flutes came from behind the mounds of the greens. Dropping the hose, I crawled to the top of the closest mound, and what I saw still amazes me today!

There, about twenty-five strong, was what looked like the "Free Irish Fairies Marching Band." That's right, about twenty-five little fairies marching to the music of drums and flutes.

Figuring that they might try and escape, I sprang for their apparent leader. It was a beautifully executed tackle, and it pinned him quickly to the ground. Picking him up, I asked him one question that was really bothering me, "Why the Square Fairy Ring?"

After he calmed down, he began to relate his story to me. He started off by telling me that he and his band had just arrived from Ireland. They had recently escaped from the Ireland State Hospital for retarded fairies. He informed me that he had been placed there because of his rebellion to make "round fairy rings." Questioning him further, I found out that he became ill from marching around in circles. Knowing that he was capable of making some form of "fairy rings", he found that making his radical "square fairy rings" did not get him sick, so he formed a band to show them. The elders of his tribe, not knowing about his illness, had him and his band locked up for safe keeping. Escaping and fleeing to this country, he felt that he would have the freedom to make his "square fairy rings."

Remembering I had more greens to water, I let him go, having him promise not to make his square fairy rings on my course. Saying goodbye, I went back to water the ninth green.

Just the other day, I heard that there had been an outbreak of "Square fairy rings" and that it had the U.S.G.A. in quite a maze of bewilderment.

-----------------------------------------
A DIFFERENT TYPE OF COURSE

Robert Hall

I have had the pleasure of living in a foreign country for eight years of my life. My old home was in the country of Venezuela, in South America. There are many stories about my life down there, but the story that might interest you a little bit more is about our golf course.

You must first realize that in Venezuela there is very little, if any, rain, and the temperatures range from the high eighties to the low hundreds. So it would be very illogical to have a course like those here in the United States.

The men who planned the course sought a place sheltered from the wind and near the cool water. They found such a place, and designed a nine hole, par 36, golf course. On the first hole you had a choice of shooting over a hill in one, or going around in two. The second was a straight, par four. Now the third is difficult to explain. As on the first you could shoot over a hill, or go around which made only a difference of maybe 50 yards. After the first shot you had about a five hundred yard dog leg to the right. This was a par 6, a very long hole. On the fourth hole you came back on a straight par 5. The 5th and 6th were fairly short par 3's. Number 7 was a par 4. The eighth hole was rather different. To get to the tee you would have to go up on the side of a hill and hit down on the green. It was a par 3. The 9th was a par 4 slight dog leg to the left. So ended what seemed to me a very challenging course.

The fairways were made of nothing but the hard, and I mean hard, ground. It contained many big rocks and small stones, one being as bad as the other. The rough was rough— not high grass, but gullies usually on one side, and the mountain side on the other.

The greens were unbelievable. The designers thought of an ingenious way to construct them. Due to the fact that they had access to as much crude oil as they (the American fathers who worked in an oil refinery, for the Standard Oil Company of New Jersey) needed, they used it. They took three parts sand, and mixed it with one part crude oil. This kept the sand from blowing away. The way the putting surface was prepared, was very unique. After the sand was put on, a heavy wide toothed rake-like instrument was used. It was dragged around the green. This made it look like a target. Then they used the top of a 3 foot wide rake and made an "X" type path across the green. This was the putting surface. According to the rules, you were allowed to move your ball along the depression, that the heavy rake made, to the putting path, and putt out. The greens were flat, but you'd be surprised how hard it was to putt on that surface. The green was easy to spot because the crude oil gave the sand a darker appearance than the terrain around it.

As I said before there was little rain, but when it rained, it would really rain. We would get a deluge all day, flooding everything,
along with the golf course. The water drained into the gullies that were sporadically made around the course. These were natural hazards that you prayed you wouldn't get caught in.

Another natural hazard was the natural animals that inhabited the region. Animals like Rattlesnakes, Coral Snakes, non-poisonous but fierce-looking lizards, ranging from 3 feet to 5 inches. Cactus patches were favorite places for balls to land amongst. Large boulders were nice places to have to hit from behind. All these items lent spice to your golf game.

So the next time you run into a little difficulty with your next game of golf, remember the Amuary Bay Golf Course.

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LITERATURE
Pierre Coste
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Each year the many manufacturers in the field of turf equipment and supplies usually produce new and improved products. The items are for the most part the results of intensive research and development by the companies themselves, and from research by many colleges and universities all over the country.

After product development and thorough testing, the items are given to the marketing departments to go ahead with sales and advertising. Under advertising budgets come the catalogs, and other media used to attract your attention to the features of these new products.

A superintendent who gathers all literature for a given year will probably have a stack of paper almost a foot high. The question is what to do with it, and, of what value is it to you?

The value of any printed matter depends on how it is used. If you have the space in your file you might try filing under the broad titles of fertilizer, fungicides, insecticides, mowing equipment, and the many other categories.

Now, when a question arises concerning a piece of equipment or a chemical, the advertised facts are at your fingertips.

Another media is the material sent to you which has a practical use, such as the familiar calendar, charts of various sorts, and such things as pocket data books. These publications with companies names on them can be useful.

All of these things collectively are for your benefit, and if you find just one good idea for better maintenance by reading for hours, and studying everything that comes your way in the mail or by salesman, then you have gained something, and it is worth while.

TURF MANAGEMENT FRESHMEN
Top row: Prof. J. Troll, Mr. D. Waddington, E. Reilly, Dr. L. Michelson, J. Robinson, J. Demyan
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Picture -Massachusetts Turf and Lawngrass Council Awards
WEEDS IN GOLF COURSE TURF AND THEIR CONTROL

John F. Cornman
Cornell University

Golf course superintendents and other professional turfgrass men are so experienced in using chemicals, and new chemicals for weed control appear so frequently, that we must constantly remind ourselves that chemicals are not the fundamental answer to weed control. Certainly much fine turf has been grown without selective chemicals. Good turf management to include planting the right grasses at the correct season plus adequate fertilization, sensible watering, and the protection against disease and insects are still the keys to good turf. Without these good practices chemical weed control can bring no long-term benefit. On the other hand, in many situations good turf management practices alone do not yield as good turf as is required for the situation. Here selective chemicals are worth while.

Broad-leaved Weeds

For the control of broad-leaved perennial weeds, 2,4-D has been the outstanding selective material ever since World War II. Like other hormone-type compounds, it must be used with discretion so far as other plants are concerned, but for the most part it is very effective against most of our conspicuous weeds and is ridiculously inexpensive. 2,4-D does a wonderful job on dandelions, plantains, and the like but it does not give good control of clover or chickweeds. While several hormone-type sprays are fairly effective against these smaller leaved kinds, Silvex (2,4,5-TP) has gained the widest acceptance. For small jobs and for use by amateurs a combination of 2,4-D and Silvex provides a good solution for most broad-leaved weed problems.

Even though it is most effective against clover when it is properly used, Silvex is not an unmixed blessing on golf courses. Where there is much bent as in irrigated fairways, Silvex may cause serious turf injury. We are not yet sure that there is a complete answer to clover and chickweed control in bentgrass under all circumstances but the new compound MCPP or Mecoprop may be just the thing to fill this gap. For several years Canadians have reported their success with MCPP (under the name Compitox) in removing clover and chickweed from both fairway and putting green bentgrass sod without injury to the grass. MCPP is being marketed this year to turfgrass professionals by several U.S. firms, so no doubt there will be much experimentation with the material both by Experiment Station personnel and by eager turfgrass professionals. On the basis of such independent work as has been done thus far it appears that MCPP promises to find a place in weed control in bentgrass. There are also good indications that turf can be injured with it. Golf course superintendents are hereby warned that experimentation behind the barn, rather than on entire fairways, should be the choice for a prudent person who wishes to remain prosperous.

Knotweed, the little broad-leaved pest that plagues thin turf in summer, has resisted most chemical treatments unless they are made very
early in the spring when the weeds are tiny. 2,4-D is reasonably effective at this time and quite safe to use. Many golf course superintendents use repeated light doses of sodium arsenite at that time. No one can deny that sodium arsenite does a good job on knotweed and on many other weeds when it is in careful, experienced hands. Sodium arsenite is extremely toxic to both people and plants and is certainly nothing for a novice to risk on valuable turf. A new material, available to turfgrass professionals only and for the first time this year is dicamba. This dicamba, perhaps better known under the brand name of Banvel D, shows great promise for the control of knotweed even in midsummer. Required dosages are very low and cost of material on an acreage basis is modest. We are warned not to use the material near trees and shrubs, so a prudent person would restrict any trials to athletic fields and similar open areas. As for a general recommendation we cannot yet recommend dicamba except for modest trials discretely placed on expendable areas.

Control of Annual Grasses

Control of annual grasses, particularly crabgrass, has been the most talked about subject in weed control for a number of years because of great interest on the part of homeowners and others who are well prepared to pay for the treatments involved. Chemicals come out almost faster than we can test them. Some reach the market before their merits and demerits are fully known.

Post-emergence control, involving a series of three or more chemical treatments begun in late spring or early summer as the first crabgrass develops, is still effective. The method is laborious and exacting but accurate treatments produce good results. The methyl arsonates (DMA,AMA) have the widest range of usefulness for post-emergence crabgrass control. Consistently good results (90% or better crabgrass control) may be expected if treatments are properly made. One of the methyl arsenates is the logical choice for Kentucky bluegrass and for ordinary mixed turf. For bentgrass fairways and putting greens the phenyl mercuries are to be preferred. The phenyl mercuries damage Merion Kentucky bluegrass and do not control as many kinds of annual grasses as do the arsonates. They do a good job of controlling crabgrass, they are valuable fungicides, and they will not damage bentgrass if directions are followed carefully. The phenyl mercuries are less effective late in the season when the crabgrass plants have begun to root at the joints.

Pre-emergence Crabgrass Control

In recent years a pre-emergence treatment has become the most popular method for chemical crabgrass control. A single broadcast treatment in the spring is all that is required. If the treatment is made accurately and the chemical functions properly, the turf should be free of crabgrass for the entire season.

None of the chemicals available to homeowners in 1964 will provide top-quality crabgrass control under all circumstances, but from those now on the market some help is available for any reasonably dense turf.

-A-2
Dacthal and Zytron lead the field so far as consistency and excellence of crabgrass control are concerned. They offer little hazard to the user. They rarely injure Kentucky bluegrass but sometimes discolor bent and thin out fescue. Either should give excellent results on lawns that are all or mostly Kentucky bluegrass.

Calcium arsenate often gives good crabgrass control, though not so consistently nor so completely as Dacthal or Zytron. Crabgrass dosages also provide grub control. Calcium arsenate is a poisonous product and must be handled and stored with care. Arsenicals may be destructive to annual bluegrass. Where annual bluegrass makes up a major part of the turf, as it does on many of the most carefully tended lawns, complete turf collapse in mid-summer may result.

Bandane and chlordane are much less toxic to humans and animals than the arsenicals. They also provide grub control (grub control rates are much too low for crabgrass control). Bandane and chlordane are moderately effective in controlling crabgrass, though usually not so good as the materials listed above. They are less likely to injure turf.

Diphenatrile is apparently now losing favor. While it is one of the safer materials, crabgrass results have been erratic. Trifluralin, usually sold as a mixture with Diphenatrile, is apparently effective in controlling crabgrass but turf is sometimes injured.

Two new pre-emergence chemicals Azar (Hercules) and Betasan (Stauffer) will be available in quantities suitable for professional and commercial applications this year but time has not permitted their preparation in packages for homeowners. If these materials continue to give top-quality control without injury to any desirable turf grasses, Azar and Betasan will no doubt be available for home use next year.

Thus far it appears that any current chemical that is really effective for pre-emergence crabgrass control will also destroy much of any perennial grass seed that might be planted on the treated area during the spring season. According to industry chemists an improvement in this respect may be available in the near future.

In summary, chemicals now available can be a great aid when properly used to control weeds. Chemicals, alone, without good turf management, can solve few weed problems.

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THE USE OF LIQUID FERTILIZERS

Anthony B. Longo
Mamlon Company

Liquid fertilization like any other method of applying fertilizers, has its advantages and disadvantages. Before proceeding with a discussion of liquid fertilization it may be advisable to pause a moment to clarify just what is meant by liquid fertilization to avoid any misunderstanding or misconception of this term.
The concept of trade expansion is often linked to an increase in economic growth and welfare. To achieve this, countries must engage in international trade, which involves the exchange of goods and services across national borders. This exchange can lead to the specialization and division of labor, allowing countries to produce goods in which they have a comparative advantage. As a result, the overall efficiency of production increases, and consumers benefit from a wider variety of products at lower prices.

However, trade expansion is not without its challenges. One of the most significant issues is the potential for job displacement. When a country becomes more open to trade, it may lose jobs to foreign competitors who can produce goods more cheaply. This can lead to economic distress for workers and communities. To mitigate these effects, governments may implement policies such as retraining programs and unemployment benefits.

Another challenge is the impact on domestic industries. When a country permits free trade, domestic firms may face competition from foreign companies. This can lead to a decline in domestic production and a loss of jobs in certain sectors. To address this, governments may impose tariffs or other trade barriers to protect domestic industries.

In summary, while trade expansion can lead to economic growth and welfare, it also presents challenges that need to be addressed. Governments must find a balance between promoting trade and protecting domestic industries and jobs.
What are some of the advantages and disadvantages of FEEDING?

ADVANTAGES

1. Rapid assimilation of plant foods by the plant.
2. Better availability of plant foods by avoiding the "tie-up" chemical reactions in the soil. This is especially true in the case of phosphorus availability.

DISADVANTAGES

1. The amount of plant food that can be applied at one time is limited by the amount of solution that will remain on the leaf surface and the amount of plant food that can be safely used in the solution: i.e., concentration of solution.

What are the economic advantages and disadvantages of LIQUID FEEDING?

ADVANTAGES

1. Time and labor saving, when applied with sprayers in conjunction with pesticides.
2. Time and labor saving when applied thru irrigation systems.
3. Getting better growth results during periods of low temperatures, with foliage feeding.
4. As a method of feeding and controlling growth of putting green growth during summer months.

Many golf course superintendents find that they can control the growth of putting green turf with greater accuracy and simplicity during summer months with liquid feeding. This is accomplished with light and frequent applications of fertilizer with power sprayers in conjunction with their disease preventive spray program.

Some superintendents prefer the use of insoluble fertilizers for this purpose, applied either dry with spreaders or applying powdered insoluble fertilizers with power sprayers.

Some superintendents use a combination of soluble and insoluble fertilizers for this purpose. Each superintendent can ascertain which method works best in his particular case. The practice of liquid feeding putting greens during summer has been on the increase for the past fifteen years. Another practice that has been on the increase in the past few years, is liquid feeding for better growth response during periods of cold weather in spring.

DISADVANTAGES

1. The main disadvantage is the large amounts of water needed to apply fertilizer to growing plants, such as turf. This disadvantage is overcome when a fertilizer is applied thru irrigation systems.

Fertilizer for liquid applications may be purchased in dry water
soluble form or in liquid form. When purchasing fertilizers in liquid form it is wise to bear in mind that WEIGHT is the only practical official method of measuring a fertilizer. The gallon is not a practical method of measuring a fertilizer. If the price of a fertilizer is quoted by the gallon, the gallon must be converted to weight in order to calculate the cost of the actual plant foods in the fertilizer. A gallon of a 20 to 30 unit fertilizer, such as 12-6-6, 15-10-5, etc. weighs a little over 10 lbs. So a gallon of 12-6-6 fertilizer is the equivalent of 10 lbs of 12-6-6 fertilizer.

The numerous types of fertilizers available offers the turf manager a great opportunity to select and use the type best fitted for his particular use. Liquid fertilizers have a place in turf management. A combination of both liquid and dry feeding may be better than using one or the other exclusively. To what extent each should be used is something each turf manager must decide for himself. He alone can best determine which will give him the best results under his own conditions.

FERTILIZING A GOLF COURSE THROUGH AN IRRIGATION SYSTEM

Herbert E. Berg, Supt.
Pleasant Valley C.C.

I welcome the privilege and opportunity of being able to share the experiences that we have had at Pleasant Valley Country Club in the fertilization of a golf course through an irrigation system. Perhaps the title of the talk should be "The Constant Fertilization of a Golf Course Through an Irrigation System", as the method I am about to describe is a method of constantly injecting fertilizer materials in fairly minute quantities for steady growth of turf grasses. This "constant fertilizer system", whereby fertilizer is at all times being injected into the irrigation system, can be used on all courses, whether only greens and tees are irrigated, or for a completely irrigated course.

I might say at this time that while it will perhaps be necessary for me to use some brand or trade names through this presentation, I am certainly not using them with the intent to recommend one company over another. There are several companies that manufacture injectors, and the final selection of the fertilizer elements needed on the course, is up to you - the superintendent.

Perhaps many of you are wondering if this idea of fertilizer injecting is just another "fad" or whether the equipment necessary will justify the cost. Let us briefly review a few basic facts that have been taught to us by the agronomists. Fertilizer should be available in small, steady amounts for the best growth of turf. Too large amounts at any time, particularly of nitrogen, can cause burning or a lush growth that could contribute to disease in fine turf. Nitrogen is the most costly of the elements needed in fertilizing fine turf and yet, the least expensive way to purchase nitrogen, figured on a cost of actual nitrogen per pound, is usually in
the selection of various chemical forms that have nitrogen fairly readily available for plant growth. However, if these forms were to be used in the usual fertilizer program, the problems of applying in small amounts and the fact that application must be made at such frequent intervals, the savings in material cost would more than be lost because of the increased labor costs.

Through the years many superintendents have used organic materials and, of course, in the last few years, chemical companies have been making Ureaform, coated and pelletized fertilizers, to try to give us fertilizer that will perform as we would like to have them perform. These materials are more expensive to manufacture and of course add to the cost of a fertilizer program. The grass plant can only use nitrogen in the nitrate form and, therefore, the "poor little blades of grass" care not whether the fertilizer is "gold plated" or applied from the least expensive materials that may be purchased, as long as a continuous supply is available for steady growth. While we all realize that other factors must be kept in mind, time will not allow us to go into them, but now let us determine if Injectors will help to grow finer turf at a lower cost on your own golf course.

Can Fertilizer Injectors be made to pay their way on your golf course?

I believe that they have a place in every irrigation and fertilizer program. There is equipment available that can handle a minimum rate of water flow of 1.5 gallons per minute. One important point is that Injectors in themselves will not necessarily change your irrigation practices or add to the total amounts of actual nitrogen, phosphorus, potash or any other elements that you are now using on your course. Sometimes, because of the constant feeding principle, one is apt to feel that "luxury" or very heavy feeding will result from the system. This need not be the case. Let me explain how I established the merits of using constant fertilizer injection through our irrigation system and the possible cash savings thereof.

First, based on the reports of agronomists, the amounts of nitrogen, phosphorus, and potash used by turf grass per year are 6 pounds of actual nitrogen, 1 pound of actual phosphorus and between 2 to 3 pounds actual potash (based on analyzed clippings). We also use information from other agronomists in regard to the types of grasses on the course and the amounts of actual nitrogen per 1000 square feet recommended.

At Pleasant Valley Country Club our greens are all Penncross; our tees 65% Merion Bluegrass and 30% Pennlawn Fescue; our fairways are 45% Merion Bluegrass, 40% Pennlawn Fescue and 10% Kentucky Bluegrass; our roughs are 43% Kentucky Bluegrass, 38% Creeping Red Fescue and 10% Red Top. Using the recommendations some have made for specific grasses, of 10 pounds actual nitrogen per 1000 square feet per year for Penncross greens, 8 pounds actual nitrogen for Merion tees, 6 pounds actual nitrogen for Merion-Pennlawn fairways and 3 pounds actual nitrogen for roughs and, determining our area to be 4.5 acres of greens, 5 acres of tees (including the driving range tee), 80 acres of fairways and 25 acres of rough, we
determine that our greens should have 8.15 ton of 12-4-8, our tees 7.24 ton, our fairways 87 ton, our roughs 13.6 ton, for a total of 116 ton at a total cost of $12,249.60 for material per year. We have been using 12-4-8 throughout the course at Pleasant Valley because our soil tests have shown potash to be fairly low. Perhaps this total amount of fertilizer might seem high to some of you, but this is what would be needed for optimum growth. Now we have to begin to think of what might be substituted through the irrigation system. I realized that it would not pay to do all of our fertilizing through the irrigation system, at least to begin with, the main reason being our irrigation system does not give us 100% coverage of the course. Also, under New England growing conditions, rainfall variables would create some application problems, but I feel that these could be overcome. I realized that according to the 6 pounds of nitrogen, 1 pound of phosphorous and 2 to 3 pounds of potash of the analyzed clippings, we were applying more phosphorous and potash than was perhaps necessary. When using materials through an injector, one must use water soluble materials and the cost of a complete fertilizer in water soluble form is rather expensive because of the cost of the water soluble phosphorus that must be used in its manufacture. I therefore decided to apply my minimum amounts of phosphorous and potash from a 12-4-8 mix. Based on the 1 pound of phosphorous per 1000 square feet from a 12-4-8 mix, I would also be applying 3 pounds of nitrogen and 2 pounds of potash. This would give me all of the nitrogen, phosphorous and potash needed for the roughs, all of the phosphorous and potash for greens, tees and fairways and from one-half to one-third of the nitrogen needed in these areas. Thereby I would need only to use straight nitrogen through the irrigation system to furnish the balance of nitrogen needed. There are many nitrogenous materials that would meet the requirements of being soluble so that the material selected for use would depend on the cost of actual nitrogen per pound in the material selected.

In checking various materials, a salesman suggested the use of Uran 30, a non pressure nitrogen solution that may be applied through irrigation water without any loss of nitrogen. I will not take the time to go into the properties of this material except to say that 1 gallon of Uran 30 contains 3.25 pounds of actual nitrogen. Working from the amounts of fertilizer that we had determined would be needed for our turf, I found that 66.25 ton of 12-4-8 would supply all the phosphorous and potash needed. I would therefore need to apply 4000 gallons of Uran 30 through irrigation to complete the picture. In theory then, I felt we should be able to reduce the cost of fertilizer materials from the cost of 116 ton of 12-4-8 which would be $12,249.60, to the cost of 66.25 ton of 12-4-8, $6,996.00, plus 4000 gallons of Uran 30, $1800.00, or a total cost of $8,796.00, the saving between the two plans amounting to $3,453.60 per year. This would be a slightly over 25% saving in cost of materials.

What actually happened during the 1963 growing season? Sometimes the best plans and theory might not work out in practice. First, let me say that I personally feel that growth was generally excellent, a steady growth, good color, no flush of growth. This was also the feeling of the owners of the course and the members. Comparing our 1962 fertilizer material costs and our 1963 material costs, the following savings were realized. During the 1962 season we applied only 87 ton of 12-4-8 to
the course at a cost of $9,187.20. During the 1963 season we applied 50 ton of 12-4-8 at a cost of $5,280.00, 3072 gallons of Uran 30 at a cost of $1,382.40, or a total cost of $6,662.40. This is a savings of $2,524.80 in materials, or approximately a 27½% saving. In addition, there is a substantial saving in labor due to the fact that we handled 37 ton less material in 1963 compared to 1962.

Some other comparisons should be made at this time. Compared to the fertilizer applied in 1962, on a per 1000 square foot basis of actual elements applied, it works out as follows: Total nitrogen-20880 pounds in 1962, 22984 pounds in 1963; phosphorus -6960 pounds in 1962, 4000 pounds in 1963; potash - 13920 pounds in 1962, 8000 pounds in 1963. The estimates in our planning for 1963 had been to use 66.25 ton of 12-4-8 - we actually used only 50 ton, and 4000 gallons of Uran 30 - we used 3072 gallons. Notice from these comparisons that even though we applied less material than we had planned, the turf received 2104 more pounds of actual nitrogen than the previous year and at a much lower cost. Observe, however, that we did not apply the total amounts of fertilizer during the 1962 or 1963 seasons that are recommended for our varieties of grass. I realize that many courses would perhaps not have the fertilizer budget that we have; however the percent of savings can be fairly accurately determined according to the amount of material you are now using, or you could apply more actual elements by using the injectors with the same amount being spent for materials as in previous years.

Let us now discuss the equipment used and also how to use the equipment. The selection of equipment will depend on the maximum number of gallons of water per minute that can be applied to your course by your irrigation. At Pleasant Valley we selected the Smith Measuremix Liquid Fertilizer Injectors. The purpose of these machines is to inject liquid fertilizer solutions into irrigation lines at a proportion that will not vary more than 2% to 5% regardless of changes in water flow rate or water pressure within certain limits. These limits vary with each model size and need not concern us in this talk. The "Measuremix" is designed to operate in a "fail safe" manner, that is, no matter whatever happens to the machine, it will always inject less fertilizer - never more. This fail safe feature protects plants and turf from burning. The Smith Measuremix consists of a water motor directly driving to injector pumps. All the water used is passed through the water motor which is very accurately built on the same principle as most water meters. Thus the water motor meters the water. The two injector pumps handle the liquid fertilizer. These pumps are of the piston type and are very positive in their action. Thus the pumps meter the liquid fertilizer injected. With both the water and the liquid accurately metered, it follows that the overall proportion of the Measuremix is maintained accurately. There is a fairly wide proportion range available. At Pleasant Valley we decided on a proportion of 1 to 1000. This means that our equipment is manufactured to inject one part of fertilizer to one thousand parts of water. There are no dials on the Measuremix. Therefore, the strongest our fertilizer can be applied to the course is one part per one thousand parts of water. By using a mixing tank we may change our proportions to make them weaker if desired. This means that we determine the amount of nutrients that we would like to apply per week and mix our "stock solution" in the mixing tank accordingly. For example, if we wish to apply 1/4 pound of actual nitrogen per week, and we usually water our greens twice a week,
we would determine the approximate number of gallons of water being applied from the sprinkler, the area a sprinkler covers, the amount of actual fertilizer in the material to be used and proceed accordingly. Here is how it works at Pleasant Valley: Our sprinkler discharges approximately 33 gallons of water per minute at 70 pounds nozzle pressure. Operating them for about one half hour, a sprinkler head will deliver 990 gallons of water. We run our sprinklers full circle. Therefore, this 1000 gallons is distributed over approximately a 17641 square foot area, or 57 gallons of water would be applied per 1000 square feet each watering, or 114 gallons with two waterings anticipated per week. Using Uran 30 as our fertilizer, which has 3 1/4 pounds of actual nitrogen per gallon of material, and equipment that we know will inject one part per one thousand parts, we determine that our stock solution in the mixing tank would have to be mixed three quarts of Uran with one quart of water. The Measuremix would now be injecting one gallon of our stock solution mix to one thousand gallons of water, or approximately 1/4 pound of nitrogen to 100 gallons of water, about the number of gallons we expect to apply weekly. The nozzles used on our fairways deliver about 61 gallons and our tee sprinklers about 63 gallons of water respectively per 1000 square feet. Therefore, there is no significant difference in the amount of fertilizer being applied to the various areas by the different sprinklers. However, the fact that greens are watered more often than tees, and tees more often than fairways, means that yearly totals of fertilizer applied would work out somewhat in the planned proportions. The above is simply an example of what might be done. The more often you water, the weaker you make the stock solution in the mixing tank. At Pleasant Valley we have not as yet made a stock solution as strong as the example I have just used. The strongest stock solution we have used has been two quarts of Uran to two quarts of water, which means that we have been applying approximately 1 1/4 ounces of actual nitrogen per 1000 square feet each time we irrigated for thirty minutes. Watering three times a week gave us approximately 4 ounces of actual nitrogen per week. This mix was started into our irrigation system about mid May and stopped the end of September. Our dry fertilizers were applied at rates to provide approximately 2 pounds of actual nitrogen during the Spring months and 1 pound of nitrogen during the Fall. Time will not allow citing examples of how other nutrients, including trace elements or iron sulphate, would be applied, but you would figure the requirements similar to the example given for nitrogen.

Although we have not had experience, as yet, in applying materials other than fertilizer through the irrigation system, I feel that many possibilities exist. For example, Chlordane or other insecticides might be applied; water soluble fungicides such as Morton's Soil Drench C could be included at regular intervals; perhaps even herbicides might be injected. One of several points to consider, however, is that no attempt should be made to inject insecticides, fungicides or herbicides if your drinking water is part of your irrigation system.

I feel that perhaps the two most important facets of golf course management, or in the growing of any plants, is the proper use of water and fertilizer. The use of fertilizer injectors will certainly not eliminate all of your problems, but they can help you to perfect the art of growing turf.
Let us consider this injector machine as a musician would consider his instrument. The finest Stradivarius violin will not produce music without the artist to play it. The musician must have a knowledge of music and his instrument, and I am sure that you have all seen the finest musicians constantly making adjustments or tuning his instrument as the temperature or humidity of the concert hall changed. So we, as superintendents, must have basic knowledge of the requirements of our turf, knowledge of our equipment and machines and, by varying our practices and making adjustments according to the temperatures, humidity and other variables of the "great hall of nature", we might continue our "art" of encouraging good turf to grow.

The Extent of Winter Injury on Golf Courses

James L. Holmes
Mid-Western Agronomist
USGA Green Section

Winter damage is and always has been a factor of serious consequence in the northern part of the United States. There is considerable material in the literature with regard to this malady and the authors of such material regularly give their opinions as to causes and corrective measures. Oddly enough, there is a dearth of actual scientific facts as to just what does take place in much of this winter damage syndrome, especially that related to ice cover.

Specifically, winter damage can be divided into the following categories:

1. Diseases, primarily resulting from the activity of fungi.
2. Dessication.
3. Associated ice sheet damage.
4. Damage resulting from activity of Homo sapiens.

There is good, reasonable, scientific data available which pertains to points 1, 2 and 4. I am sure you did not bring me all the way from Chicago to quote excerpts from the literature in relation to these well covered points, but rather to expound upon and add my particular theories as to just what happens to turf when it has been subject to an extensive ice cover.

To start with, let's explore the various points I have heard, read about and personally considered in regard to this malady.

1. *Poa annua* is more severely damaged than is any other type of turfgrass normally found on northern golf courses. According to my observations, this is absolutely true.

2. Damage is always, but always - more severe on soils which do not drain well and which tend to compact. (Conversely,
sandy soils which drain well, inherently contain a large percentage of air and do not tend to compact, support turf under continued ice cover.) I fully agree.

3. A solid sheet of ice must be in place for a period to exceed 21 days. It would seem that at the end of 21 days death to Poa annua is a reality. However, observations indicate that bentgrass will subsist considerably longer. The ice cover must be complete, that is solid ice without air passageways and the ice sheet must be continuous from the soil level or slightly below to include the entire plant. This is absolutely correct according to all I have seen.

4. Vigorous aeration in late fall seems to be helpful. I am not too sure.

5. Removal of ice was suitable in stopping kill. Repeatedly proven.

6. Succulent turf experienced the greatest damage. Who goes into winter with succulent turf anymore?

7. Apparently, toxic gases and by-products of incomplete respiration are present under continued ice sheet conditions. During the '61 - '62 winter season in Chicago, ice which had been in place for over 100 days melted rapidly. (At this time turf was green and healthy appearing although in retrospect the green color was kind of "funny"). This was followed by two days of unseasonably warm weather in conjunction with fairly strong - dry - warm southwesterly winds. About the middle of the second day, all the demons broke loose. Such an odor! -- By the morning of the third day (which, by the way, commenced a period of cool weather), it was obvious that large expanses - mostly greens - of turf were indeed dead. No doubt that horrendous odor must have been products of incomplete respiration. However, there is nothing which proves that toxic gases did indeed exist and if so, that they would cause complete death to turf. Also, the violent odor could be the result of fungus activity. Some good current research indicates that "vapors" which are toxic to live turf tissues can result from fungal activity. Wouldn't it be something if it were finally proven that dollar spot was the primary cause for all this trouble?

8. Dessication is a factor. Hallelujah! The dry, fairly hard winds could have, and I believe were in fact, actually responsible for the severe death of turf. It was established that roots were severely reduced -- by the way, are not roots severely reduced every winter?? Watering systems were not operating -- mat and surface soil dried even though adequate moisture was within 1/2 to 1/4 inch of the surface. Consequently, weakened turf died.

Sure we can go on and on theorizing about accumulation of toxic gases -- cold kill -- ice crystal formation, etc. so I theorize dessication was the actual killer.
Anything which tends to weaken turf (at any season of the year, not only winter) will predispose the grass to damage from anything which can be harmful. Therefore, let's discuss for a few minutes steps which can be taken in an effort to avoid such drastic troubles in the future.

1. Discourage *Poa annua*.

2. If the problem at your particular course is a perpetual one or one which takes place every year or at least every other year, I would suggest that you seriously consider rebuilding greens. Be sure to keep in mind that soils which drain well rarely show ice sheet damage. Also, on soils which drain, dessication damage is not a serious problem as one might expect.

3. If ice sheet cover is only a rare occurrence, be absolutely certain that ice does not stay in place longer than 21 days. Remove with any means at your disposal, even if a certain amount of turf is damaged.

4. After ice has thawed and water has drained, it is vitally important to keep the surface (turf and mat) areas constantly moist until roots have developed to a minimum depth of 1/2 inch. I firmly believe that unless this weakened turf is kept moist, there is no chance of survival. Even germination from nodes will expire. Methods of doing this are with large water tanks or by operating the watering system during the day, draining it in the evening if necessary.

5. If areas of grass die, the area should be sodded if small. If too large for sodding, aerate and overseed with a desirable bentgrass. Naturally maintenance practices following overseeding should be proper for the establishment of a putting area. Nonetheless, it may be necessary to overseed numerous times.

6. Aerate, but aerate sufficiently early so that *Poa annua* is not encouraged at the expense of bentgrass. Also, aerator holes should be healed-over before dormancy.

If all the above fails -- you had best hurry off to church.

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**THE PROBLEM OF WINTER INJURY**

James B. Beard

Michigan State University

With the advent of fall weather, gradual cooling of the earth's atmosphere and soil occurs. This cooler environment results in a slowing down of plant metabolic reactions and growth. During this period from late fall to spring when soil temperatures are below 40°F, there are a number different...
causes of turf stress which can result in winterkill.

Winterkill is a term encompassing a large number of types and causes of injury. It is used loosely to include any type of injury that occurs during the fall, winter and spring period. These general types include the following:

A. **Dessication.** This is a condition in which water loss from leaves exceeds water uptake from the roots. This is most common during periods when the soil water is frozen but the above ground portions of the plant are thawed and actively transpiring. Injury of this type is more prominent during open, mild winters and especially on elevated, exposed sites.

B. **Heaving.** It is not a severe problem in turf compared to field crops. However, it can produce significant injury to newly planted areas where the grass passes through the winter in the seedling stage. In this situation the grass crowns are elevated above the soil and exposed to drying conditions.

C. **Disease.** The most common winter diseases of turfgrasses are pink and gray snow mold. They can cause severe injury to turf but are easily prevented by following a wise fungicide program.

D. **Direct Low Temperature Injury.** In this situation either extracellular or intracellular freezing processes occur which result in fatal injury to the plant cells. This type of injury is common in annual rye-grass and perennial ryegrass in the midwest.

E. **Injury Associated with Ice Sheets.** Winterkill associated with ice coverings is common in areas where sleet storms predominate and in poorly drained locations. It has been of major concern in the north central and north eastern United States.

Consequently the major portion of this paper will be devoted to this aspect. A number of possible causes of injury occurring in association with ice sheets have been postulated. These can be divided into two major groupings.

Type I. The grass is dead at the time of spring thaw.

Type II. Grass appears alive and healthy at the time of spring thaw but subsequently dies.

The possible causes of Type I injury include:

1. **Oxygen Suffocation Under The Ice Sheet:** The respiring plant requires oxygen for maintenance of plant tissue even at extremely low temperatures. The ice sheet could impair oxygen diffusion to the extent, that, in time, it might become limiting.

2. **Toxic Accumulations Under The Ice Sheet:** Carbon dioxide is a by-product of plant respiration processes. Even at below-freezing temperatures a minimum respiration rate exists. Thus, it is possible, in time, for
killing concentrations of carbon dioxide or for some similar toxic break-
down product to accumulate. Injury of this type has been reported in
Wisconsin on alfalfa.

3. Outward Leaching of Vital Cellular Constituents While Submerged
In Water During Thawing: On sunshiny days light rays will be transmitted
through the ice and be absorbed by the opaque grass surface. It is possible
that these absorbed light rays could heat the grass sufficiently to melt
the ice surrounding them. This would result in a condition in which the
leaves are incased in water with a heavy ice sheet still existing around
them. This condition would be favorable for severe leaching to occur, and
has been observed in small grains.

4. Outward Diffusion of Water From Leaves Incased In Ice: When
leaves are incased in ice the relative concentrations of solutes is higher
outside the leaf than internally, due to water existing in the solid phase.
This could result in outward diffusion of water from the leaf in an attempt
to attain equilibrium. If sufficient water is removed from the leaf,
dessication could occur. However, when the vapor pressures of water and
ice are compared it appears that, at equilibrium, sufficient water would
not be removed to cause plant dessication.

5. Direct Low Temperature Injury By Freezing Processes To The Cell
Protoplasrn: This is a mechanical injury to the brittle protoplasm caused
by the formation of large ice crystals. This type of injury will be less
in plants that are permitted to properly harden through dehydration or
reduction in water content. If plants are improperly managed through over-
watering, fertilization or any process which stimulates growth in the late
fall, then the chance of direct kill by low temperature is much greater.

Possible Causes of Type II Injury Include:

6. Direct Low Temperature Injury By Freezing Processes To Plants
Which Are In An Nonhardened State Due To Premature Spring Initiation Of
Growth: The grass may survive the winter in excellent condition. Subse-
quently, the weather may turn extremely warm for three or four days,
resulting in a premature loss of hardiness due to an increase in hydration
within the plant. If this is followed immediately by a severe drop to
below-freezing temperatures, direct low temperature injury may occur. The
chance of this type injury occurring can be reduced by avoiding any practices
which encourage premature early spring growth.

7. Injury To Vital Crown and Root Tissues Of The Plant From Mechanical
Injury By Ice Crystals: The original cause of injury is destruction of
the cellular protoplasm in the lower crown tissue due to ice crystal
formation. This in turn results in death of the root system and lower
crown while the above-ground leaves and shoots appear normal. Cross-section
of the grass crown show a browning of the lower crown and roots. With the
advent of spring thaws the grass plant will appear on the surface to be
normal. However, warmer temperatures will result in growth and transpiration
of the above ground tissue. Plants with severely injured crowns may not
be capable of producing a new root system fast enough to meet the water
uptake requirements of transpiration. Under these conditions the plant will
die of dessication resulting from the severe crown injury.
CHARACTERIZING THE INJURY

In the spring of 1962 detailed studies of injured turfs in Michigan showed most injury occurred to *Poa annua* with a minimum of injury observed on the creeping bentgrasses or Kentucky bluegrasses. Type II injury was the most common since the grass appeared healthy and green at the time of spring thaw but with the advent of higher growing temperatures severe injury to the turf areas occurred.

Microscopic examinations of individual plants showed severe injury to the lower portions of *Poa annua* crowns. The original cause of this injury was destruction of the cellular protoplasm particularly in the vascular bundles of the lower crown tissue due to ice crystal formation. This severe injury resulted in death of the root system and lower crown while the above ground leaves and shoots appeared normal.

With the advent of spring thaws growth and transpiration of the above ground plant parts was initiated. Plants with severely injured crowns and roots were not capable of producing a new root system fast enough to meet the water uptake requirements resulting from transpiration of above ground parts. Under this condition, death of the plant occurred by dessication. This type of injury has been well documented at Michigan State University and was the major type occurring in the Detroit area in 1962 on *Poa annua*.

CAUSAL STUDIES

In the fall of 1962 studies were initiated at Michigan State University to determine the actual cause or causes of winter injury associated with ice sheets. Three species were utilized in the experiment, common Kentucky bluegrass, Toronto creeping bentgrass and *Poa annua*. All three species were permitted to harden naturally in the field. On November 26, 1962, four inch plugs were collected and placed in wax coated cartons. Seven treatments were applied to these three species.

a. Flooding followed by freezing. The treatment was designed to simulate conditions of a heavy rain and the accompanying flooding which was followed by immediate freezing. The resulting ice cover was 1/2 inch thick.

b. Freezing then layering with ice. This represented conditions of a freezing sleet storm which gradually produced a 1/2 inch thick ice layer over the frozen turf and soil.

c. Freezing and layering with ice over snow. One-third inch of snow was applied to the frozen plug followed by 1/2 inch of ice.

d. Freezing in an ice block. The vegetation was sealed in an ice block by completely submerging the carton containing the grass plug in a gallon container of water and freezing.

e. Submerged in water. The carton containing the grass plug was submerged in one gallon of water and held at 35°F rather than freezing as in the above treatment.

The first four treatments were held in a 25°F cold chamber for the
duration of the experiments while treatment 5 was held at 35°F. At fifteen day intervals replicated samples from each variety and treatment were removed from the chamber, thawed, placed in a 75°F growth chamber, and evaluated for injury. The experiment was conducted for a period of ninety days.

Results of this study showed Toronto creeping bentgrass to be highly resistant to the three types of ice cover for the 90 day duration of the experiment (Table 1). A significant amount of injury was produced by ice sheets on annual bluegrass and Kentucky bluegrass from the 75th to 90th days, but exceeded 50% in only one instance (Tables 2 and 3). Where injury has occurred in the field in association with ice sheets complete kill has usually resulted, while in this study complete kill was not even approached by the various types of ice coverings during the 90 day period. The increasing injury from the 75th to 90 days to Kentucky bluegrass and annual bluegrass indicates that oxygen suffocation or toxic accumulation may produce more severe injury from periods of ice coverage longer than 90 days. However, under field conditions ice coverings in excess of 60 days are rare.

In addition, no significant injury was produced from submergence in water, indicating that outward leaching of cellular constituents into the water was of no importance at near freezing temperatures.

**TABLE 1**

PERCENT SURVIVAL OF HARDENED TORONTO CREEPING BENTGRASS AFTER HAVING BEEN SUBJECTED TO VARIOUS TREATMENTS FOR INTERVALS UP TO 90 DAYS

<table>
<thead>
<tr>
<th>Treatment Interval (Days)</th>
<th>Flood Then Freeze (25°F)</th>
<th>Freeze Then Layer With Ice (25°F)</th>
<th>Freeze Then Layer With Ice Over Snow (25°F)</th>
<th>Freeze In Ice Block (25°F)</th>
<th>Submerge In Water (35°F)</th>
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Significant kill was produced where the grass plugs were frozen in an ice block. The block freezing in ice was different from the three ice layering treatments in that the plants were held in water for 10 days during complete freezing with the resultant increase in tissue hydration. In addition, the type of ice formation exerted hydrostatic pressures on the plant. These results suggest that certain combinations of freezing and thawing especially in association with high tissue moisture contents during...
the thawing of ice covers may be of more importance in winter injury of turfgrasses than the more direct effects of ice sheets such as oxygen suffocation or toxic accumulations.

### TABLE 2
PERCENT SURVIVAL OF HARDENED COMMON KENTUCKY BLUEGRASS AFTER HAVING BEEN SUBJECTED TO VARIOUS TREATMENTS

<table>
<thead>
<tr>
<th>Treatment Interval (Days)</th>
<th>Flood Then Freeze (25°F)</th>
<th>Freeze Then Layer With Ice (25°F)</th>
<th>Freeze Then Layer With Ice Over Snow (25°F)</th>
<th>Freeze In Ice Block (25°F)</th>
<th>Submerge In Water (35°F)</th>
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### TABLE 3
PERCENT SURVIVAL OF HARDENED POA ANNUA AFTER HAVING BEEN SUBJECTED TO VARIOUS TREATMENTS

<table>
<thead>
<tr>
<th>Treatment Interval (Days)</th>
<th>Flood Then Freeze (25°F)</th>
<th>Freeze Then Layer With Ice (25°F)</th>
<th>Freeze Then Layer With Ice Over Snow (25°F)</th>
<th>Freeze In Ice Block (25°F)</th>
<th>Submerge In Water (35°F)</th>
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### FACTORS IN FREEZING INJURY

Under field conditions the grass plant can survive winter conditions as long as the vital meristematic tissue of the crown is not injured. Severe injury can occur to the leaf tissue but it is of no great consequence. The crown tissue of the grass plant is located in the soil where temperatures normally do not go much below 10°F. Much kill occurs during periods of
freezing and thawing when the grass plant is in a reduced state of hardiness. It is caused by destructive freezing processes within the plant. Six factors control the frost killing temperature in grasses.

1. Degree of plant hardiness. A hardy plant is one which is in a reduced state of hydration or water content and is best capable of surviving lower temperatures. Any environmental factor or management practice which stimulates growth will reduce winter hardiness. The processes occurring within the plant during hardening include a reduction in growth, a conversion of insoluble carbohydrates to soluble sugars, an alteration of the proteins, and a subsequent reduction in the water content.

2. Rate of freezing. Killing may occur at a higher temperature if freezing is rapid than if it is gradual.

3. Rate of thawing. Greater kill occurs if thawing is rapid than if it is gradual.

4. Length of time frozen. Greater kill may occur after long continued freezing than after short freezing periods at the same temperature.

5. Number of times frozen. Kill may occur after two or more freezings at a temperature which fails to produce injury after one freezing. However, repeated freezing and thawing does not always cause injury.

6. Post-thawing treatment. Kill may increase after thawing if the plant is exposed to unfavorable conditions. Death may not occur until days or even weeks after thawing.

MANAGEMENT FACTORS IN FREEZING INJURY

There are a number of management and soil conditions which will increase the chance of winter crown injury. The most apparent factor is that turf areas which are free of Poa annua are less likely to be injured. Bentgrasses can survive temperatures 5 to 10°F lower than Poa annua. In addition, they are more resistant to injury from ice covers. Other factors which increase the chance of injury include:

1. Poor surface drainage. It has been observed that where concentrations of water occur kill is greater. Whenever grass crowns are submerged in water the hydration or water content of that tissue is increased thus greatly increasing the chance of kill. Also, removal of ice sheets from putting greens has reduced kill. In this case the removal of ice may function as a method of insuring proper removal of water from the area since many times the thawing of ice sheets occurs from beneath thus subjecting the crowns to submergence in water for extended periods of time.

2. Poor internal soil drainage. It has been noted that kill is greatly reduced where the cups were most recently changed and on newly constructed putting greens. Kill was most frequent on the heavily compacted areas. Here again poor internal soil drainage impairs removal of water from the immediate area of the plant crown, thus, increasing the hydration level and the chance of kill. Good internal soil drainage is particularly important in water removal under the condition described above where thawing occurs from beneath the ice sheet itself.
3. Excessive thatch. Thatch, where excessive, elevates the vital plant crown above the soil. In this condition the plant crown is subjected to much lower temperatures than if it were in the soil. This of course will increase the chance of kill.

4. Potassium deficiency. It has been reported on a number of crops that potassium increases the winter hardening characteristics including the grasses. This is probably a factor in turfgrasses as well.

5. Close mowing in late fall. Individuals who permitted their fairway turfs to grow during late fall noted less injury. This practice may aid proper hardening of the grass plant through accumulation of carbohydrates as well as serving as a protective mulch.

6. Late fall nitrogen fertilization. Late fall fertilization at temperatures which permit grass growth will stimulate vegetative production and in turf reduce the level of hardiness through increases in the plant water content. This higher level of hydration will increase the chance of kill.

7. Premature spring nitrogen fertilization. Applications of nitrogen fertilizer too early in the spring will stimulate vegetative production; thus, increasing the chance of kill should a severe freeze occur. It will also adversely affect the plant's survival should its root system be severely injured by earlier freezing processes.

8. Excessive late fall watering. The plant should be permitted to harden naturally during the fall period under adequate but not excessive soil moisture.

9. Any other management practice which stimulates growth.

Recent investigations have contributed much to our knowledge regarding causes of winter injury to turfgrasses. There is no doubt that a high percentage of the kill has occurred to Poa annua and the evidence indicates that this kill has been caused by certain combinations of freezing and thawing during the late winter or early spring period. However, it has been documented that some injury has occurred to the creeping bentgrasses. All studies to date have proven unsuccessful in producing injury on these bentgrasses.

Additional research is needed to clarify the conditions which do produce injury to bentgrasses and thus assist in completing our understanding of winterkill causes in turfgrasses.

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ESTABLISHING, MAINTAINING, AND SELLING SOD FOR TURF AREAS IN NEW ENGLAND

George F. Stewart

Karandrew Turf Farms

In New England, the sod business is a relative infant. Until three years ago, very little sod was produced and sold in this area. This was
due primarily to the fact that what sod was grown was not offered for sale at an economical price. This, however, was understandable due to the limited volume of sod grown.

Karandrew Turf Farms has been in business since 1957. An original planting of one and one-half acres of Merion bluegrass has grown to over one hundred producing acres on two farms. Until 1961, the business was only a part-time venture. In 1961, the price of sod was substantially reduced thus creating additional sales volume. It is now felt that the sod business is a business in New England that should continue to expand. Karandrew Turf Farms is making every effort to produce highest quality sod, as it is our belief that only good quality sod will be accepted in the marketplace.

Based on our experiences, I will now attempt to describe the sod business as we know it.

Soil selection is important. Land should be as nearly level as possible. Soils preferred are stone-free and well drained. The depth of top soil is important also. The fields should be graded as fine (level) as possible. The better graded the fields, the better efficiency can be expected in maintaining and harvesting the sod. Equipment plays an extremely important role in land preparation. There is no substitute for good equipment used properly. We use a one-way, two bottom plow for initial turning of the soil. A nine foot hydraulic harrow is used for preliminary grading and a twelve foot springtooth harrow for final grading. All seeding is done in late August and early September. All seed used is blue-tag certified seed purchased on strict specification. No nurse or temporary grass seed is used. Seeding rates vary, but an effort is made to seed enough to give good coverage but not at too excessive a rate as to weaken the plant population. We believe in a low plant population that will give strong plants at maturity. All seeding is done with a ten foot Brillioon seeder. Again proper equipment is important to the efficiency of the operation.

Before planting, the soils are tested and lime and fertilizers applied accordingly. A pH of 5.8 to 6.5 is desirable. All phosphorus and potassium is applied at planting. Nitrogen is applied periodically through out the growing season. All soils are also treated with a pesticide to insure against injurious insects. Chlordane, deldrin, and heptachlor have been used. No soil sterilant or weed control chemicals are used at planting. Weed control is a maintenance practice not an establishment problem. After seeding, the fields are irrigated if rainfall is not adequate enough to assure good germination. 1962 and 1963 proved the merit in irrigation. An adequate water supply is also a must.

Once the seed has germinated, we consider the next steps in production in the category of maintenance. Mowing begins as soon as some leaf area can be removed, be this grass or weed growth. The fields are cut every five days at one and one-quarter inches. (The only exception is the bentgrass fields which are cut every other day at three-eighths inches.) In the spring, once one hundred percent ground coverage has been achieved, again be this desirable grass growth or weed growth - weed control is started. We use a mixture of 2,4-D and 2,4,5-T (propionic) along with one other
chemical not labeled for use on grass, so its name as such will not be mentioned in this text. Its purpose is to control grasses other than the grass strain desired, e.g. ryegrass, timothy, orchard grass, witch grass, etc. Usually two applications are made at two week intervals at the rate of one and one-half quarts of the chemical in five gallons of water to the acre. Care must be exercised not to overdo this practice. Considerable turf damage can result from poorly planned and executed weed control programs. Again proper equipment is important.

Mowing, irrigation, and fertilization are then followed until sod is mature and ready for harvest. Merion bluegrass sod cannot be considered marketable until a good rhizome growth has been developed. Depending upon growing conditions, sod can be marketable in as short a time as nine months or may take up to twelve or fourteen months. Growing conditions determine the length of time necessary to produce quality sod, not time in the field. Frequency of mowing is proportional to turf density. Good mowers with a high frequency of cut in good condition are a must. Proper mowing management is the most important phase in turf-for-sod maintenance.

Cutting and loading the sod for shipment is another phase of the operation. Most all deliveries are made before eight a.m. in the morning. The sod is cut and loaded the afternoon before the delivery. Only enough sod is cut at any one time to fill specific orders. None is cut or loaded in advance. All sod is cut in pieces one foot by two feet, and stacked grass to grass on pallets. Five hundred square feet are loaded to each pallet. These are placed on a semi-trailer truck with a fork lift and shipped to destination.

In 1963, we introduced an unloading system. This is a boom type fork mounted on the truck bed. When the truck arrives, the pallets are unloaded on the job. This has proven to be most worthwhile and certainly speeds in handling and laying of the sod. Unloading is a customer service that has been a real advancement in the sod business. In 1964, we will have two unloading devices. We feel that pallet loading and unloading is as important to the business as is the sod itself.

Selling sod in New England should prove to be no different than in other areas of the United States. The markets are certainly similar. However, education is needed at the consumer level, be the consumer a homeowner, an industrial plant, a school system, golf course, cemetery, or athletic field. High quality sod is the answer, offered at an economical price at the consumer level.

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PROBLEMS OF MAINTAINING TURF AROUND INDUSTRIAL GROUNDS

George Moore

Massachusetts Mutual Life Insurance Co.

When friends saw the title of my talk they said that I shouldn't have any problems, insurance companies are "loaded". True, the company that I work for is wealthy, it is the seventh largest in the industry, but we are a mutual concern and are owned by our policy holders and governed by directors.
not affiliated with the insurance industry. The company policies are conservative and the standards are high and if money is spent it must be spent wisely. However, the company is proud of its home office building and grounds and when well thought out plans to beautify or increase efficiency of operations are submitted, even though it may mean spending money, they are usually approved.

The type of grounds maintenance employed by any company, park department, municipality, private estate, golf course, or what have you, depends on what is demanded by its policy makers. It may be to just get by - (have green grass most of the year - shrub beds weeded before they over run the shrubs), or have everything tip top shape all the time. Ours is the latter. There is no excuse for brown lawn areas when water, adequate fertilizer, chemicals and labor are available; however, Mother Nature has other ideas and we have our share of problems and they usually occur at the time the grounds are being aerial photographed for advertising purposes or a large policy holder arrives for a tour of the building and grounds.

Some of the maintenance practices I will talk about may be applied to your situation no matter what type of grounds work it may be. I would like to show a few slides to show you the atmosphere of the company.

Our grounds consist of ninety acres of ball fields, picnic areas, tennis courts, recreation areas, parking lots, shrub beds, putting green and twenty acres of fine lawns. It is maintained by a year round crew of eight.

The twenty thousand square feet of putting green is used noon times for employees pleasure. It is Penncross bent planted three years ago. One half pound of seed per thousand was used. It has an automatic watering system installed prior to its construction. Maintenance has been normal until last spring when seventy five percent of the grass did not come up. After much telephoning and consultations with the University staff, it was decided that the ice sheet of that winter had smothered the grass. The green was aerated and overseeded with Penncross and by mid-July the entire area was filled nicely. The company putting greens are always in the way of building expansion. In eight years it has been moved three times. The majority of lawn areas are limed spring and fall at the rate of thirty pounds per thousand. Using this program the average pH of the lawns has risen in eight years from 4.8 to 6.4.

An 8-6-4 40% natural organic fertilizer is used at fifteen pounds per thousand spring and fall. In mid-summer a pure natural organic is applied at eighteen pounds per thousand. On Merion areas and ball field and heavily watered places more fertilizer is used.

The watering system consists of various types, most of them installed by our own labor force. We have rotating gear driven pop-ups, small fine spray pop-ups and large rotating pop-ups. Five large pop-ups were installed on a soft ball field one weekend without interrupting the playing schedule.

Most old lawn areas are predominately bentgrass which we have been trying to eliminate without much success. We tried cutting short, cutting
long, withholding water, using chemicals, and by plain old wilt. I think the only remedy is to put in new lawns - but first sterilize to destroy the bent stolons. We use U.R.I. one mix on all new lawns. Until two years ago our crabgrass control was with phenol mercury sprays, put on with tractor drawn spray tank and booms. This was giving us fairly good control but was very time consuming so two years ago we used a commercial product with diphenatrol and got very good control with one operation. Our Merion areas are cut at one inch while the majority of the lawns are one and one quarter inch.

Last season our ball field posed a problem as the players reported the home run average per game was too high. The only answer was to move the fence back. But this had to be done without interfering with the playing schedule. Behind the existing fence was a forty foot drop which first had to be filled in and loamed. Next it was leveled to meet the existing grade and turf from our nursery was laid. Then the fence was moved back sixty feet and play was resumed - all in one weekend.

On most new lawns we have had good luck by using Vapam as a soil sterilant. The area is first scraped of all sod, rototilled, sprayed to a four inch depth with the Vapam mix - kept moist for ten to fifteen days then rototilled to release the gasses. We have seen no injury even when seeded ten days after the application.

On our matted and thatched old lawns we use a verticut as early as possible in the spring and try to do at least two or three acres a year but this is difficult to do with the small machine.

We do very little rolling of lawns except where badly heaved in the spring, or when sodding.

All areas are aerated at least twice a year using both tractor drawn aerators and small motor powered ones.

Lawns are cut with Tri-plex mowers of the popular manufacturer's except for the rough areas which are cut with a flail mower. With increasing lawn areas to be fine cut, we will shortly have to go into gang mowers.

One of our most time consuming jobs has been almost eliminated with the purchase of a mulch-vac for picking up our leaves. We pull this tandem style with a pick-up truck equipped with high wooden sides. The material is picked up, shredded and blown into the pick-up where it is later easily unloaded.

Another job where the man hours used to be considerable was on weeding shrub beds. We now use Simazine weed killer and have all but eliminated this chore.

Our turf nursery has proven invaluable in patching jobs alone. After a winter of snow plowing walks (and grass), it takes no time to heal the ugly scars left by a misguided plow. We have not seen much damage to our lawns from the use of ice melting salts, although it seems to be a topic of discussion lately.

It is believed by the company officials that an attractive lawn, well groomed trees and shrubs and flowers is of great value in keeping moral high and making a pleasant environment for efficient business operations.
LANDSCAPING INDUSTRIAL SITES

A. W. Boicourt

University of Massachusetts

Introduction

The purpose of this short lecture demonstration is to encourage you to promote, wherever possible, better landscape planting of industrial buildings and grounds. Good landscaping is good business. It leads to happy acceptance in the eyes of employees, customers and the community.

Good landscaping will:

1. Lend dignity
2. Stimulate employee pride;
   More and better work
   Improve employee and human relations.
3. Improve community relations
4. Reduce noise, wind and dirt
5. Increase the real estate value. A feeling of prosperity before you enter the door.

Good landscape planting is not a "cure-all" for poor architecture or for poor site planning. However, every property can be improved by the wise choice and use of plant materials and obviously good turf is the basis or the foundation for the overall picture.

The entrance to any industrial building should be pretentious and clearly visible. If the building is attractive there is little need for mass planting of trees and shrubs along the highway because privacy is not the objective. First, wide comfortable walks and driveway are needed. Secondly, the turf should be as good as fairways and uncluttered by spotty planting of shrubs, evergreens or flowers. High branched trees will not reduce the apparent size of the property but will lend a three dimensional aspect to the entrance view. Also, the trees may screen unsightly views or architecture and will focus attention on the entrance.

Most of you can recall attractive industrial sites that you have visited. Frequently the use of evergreens, shrubs and trees are commendable, but there is a severity of planting - a cold unresponsive feeling is cast by all too perfect evergreen foundation planting. The individual plants change little from day to day or spring to fall.

More Flowers Needed!

Annual flowers such as petunias, French marigolds and zinnias, planted in bold groups as part of the foundation planting or by the main entrance, will add a touch of sorely needed color and a friendly note. A good example
of what flowers can do is illustrated here at the University of Massachusetts. With rapid construction and upheaval of existing plantings, we frequently feel that something has been lost. We all hope that this is just a temporary retrenchment. However, there are a few spots of seasonal enjoyment. The Rhododendron Garden is beautiful but enjoyed by relatively few as compared to the plantings around the Student Union, where thousands of students pass one or more times daily. The Student Union plantings have an interesting combination of narrow and broadleaf evergreens, trees, shrubs and flowers. The annual flowers are planted in bold rectangular beds, which are part of the south paved terrace. The season can be extended by planting spring flowering bulbs, followed by annual flowers.

Another illustration of the value of flowers was demonstrated around the new School of Education Building last summer. Entrances to our campus can be improved, as you will agree. The grounds at the School of Education at the north entrance to our campus, were the only place that might not be disturbed by earth moving equipment for steam, water, or sewer lines. Also, several large conferences were being held in this building during the centennial year. Annual flowers were planted at the main entrance in one large four-foot by 50 foot bed in front of the large paved terrace. Three smaller beds were planted to complete the design around the entrance. In addition, another large flower bed was planted just outside the lobby picture window. The flowers were clearly visible from the road and the nearby resident housing development. The staff seemed to take pride in reporting the first flowers to bloom, in picking off old flowers and informing me when Japanese beetles arrived, or when the soil needed water. Whether they were staff members, students or visitors, they tended to at least hesitate and many to linger longer over each variety before entering. Secretaries, particularly, were very helpful in removing old flowers and in cutting off flowers for ornamenting their offices. Unless the plants are pruned back periodically, they may mature too early in the season. Even with the help of secretaries and staff, it was necessary to use a sharp sickle three times.

Ease of Maintenance

Surprisingly, flower beds that have just been described, are relatively easy to maintain after they are planted and the soil mulched with peatmoss. A mulch will retard weed growth and will hold moisture in the soil. The new planting required 20 man hours to rototill and plant; another nine man hours to apply the mulch. Thereafter, only two hours per week was spent in watering, weeding and picking old flowers. Another hour per week was spent in answering questions.

Since you may be asked to do the same or better still, encourage others to use flowers, here's a list of desirable flowers for industrial plantings:

A-26
Foolproof Annual Flowers

Alyssum (Lobularia maritima var. compacta)

Blue Floss Flower (Ageratum Houstonianum). 6 to 10 in. Front-line plant. Does well in sun or half shade.

African Daisy (Arctotis grandis) 2-3 feet. Daisy-like flower of silvery white with deep blue eye. Used as a mid-border plant and also as cut flower. Sunny situation.

Cosmos (Cosmos bipinnatus) 4 feet. A good back-line plant in the border. White and various shades of pink. Sun or half shade.

Calendula (Calendula officinalis) 15 to 24 in. Mid-border plant. Sunny situation.

Strawflower (Helichrysum bracteatum) 2½ feet. Mid to back-line plant. Sunny situation.

Flowering Flax (Linum grandiflorum) 15 to 20 in. Showy flowers with very fine texture foliage. Front-line to mid-border plant. Sun or half shade.

Petunia (Petunia hybrida) 1-2 ft. One of the best plants for all summer and fall bloom. Many varieties of dwarf and tall, single and double, ruffled and non-ruffled petunias. Grows well in sun or half shade and may exist in full shade. Pick off old flowers weekly.

Blue Salvia or Blue Sage - Mealy-cup Sage (Salvia farinacea) 3-4 feet. Blooms all summer and fall. A blue flowering plant for borders, beds, and as a cut-flower. Mid to back-line plant. Sunny or medium shade.

Salvia patens - similar in growth to Mealy-cup Sage but has larger flowers and grows to 2½ feet.

French and African Marigolds (Tagetes patula and T. erecta) A good fall flowering annual. Be sure to select varieties of pleasing colors. Sunny situation.

Verbena (Verbena hybrida) 6 in. to 1 foot. Wide variety of colors for border and edging. Easy to grow. Sun or medium shade.

Zinnia - Youth and Old Age (Zinnia elegans) 1 to 4 feet. Select varieties which will combine easily with other annuals in color, size of flower and height. Sunny situations.

Excellent Bedding Plants

Coles
Geraniums
Everblooming Begonias
Easy to Grow Perennial Flowers

Chrysanthemums
Candytuft (Iberis sempervirens)
Coralbells (Heuchera)
Daylilies
Iris
Peonies

"Good landscaping is good business" and be sure to add that extra personal touch - flowers - for greater enjoyment.

INTRODUCTION TO THE PANEL DISCUSSION ON GRASSES FOR TEES AND THEIR MANAGEMENT

Alexander M. Radko
Eastern Director
USGA Green Section

Every day of play is a new experience to the golfer. It matters not whether it is the first time that he has played any one course, every time he steps up to the first tee an indelible impression is made which will reflect to some degree his over-all attitude and behavior on the course. If the teeing areas are sloppy and unkept, the golfer will feel little obligation to do his part in course care. He will not bother to replace divots, he will be more likely to litter the course, he will not be careful about taking extra swings and extra divots on tees and fairways, he will not pay particular attention to smoothing footprints in traps, he will in other words tend to do little or nothing of his share as a player to insure better course care.

In the early 30's when golf was known as "The Rich Man's Game", tees were small, elevated steeply and almost square in shape. With the increase in play since World War II, tees have taken on new importance. They have become larger, they have gently sloped sides, and are constructed for ease of maintenance. The history of tee development perhaps best coincides with the history of increased use of golf course and increased play.

Foot for foot, tees are more subject to injury than any other area in play on the course. Golfers tee off from an area defined by a set of markers and this area usually is well worn at the end of a day's play. Adequate recovery time together with renovation techniques restore the area. If the tee is small it will suffer far more injury than a large one. Tees have become a matter of intense maintenance and a sizeable budget item at most courses today. Tee management has become an important phase of the over-all maintenance picture and our panel discussion attempts to cover all major construction, grass establishment, maintenance and management factors that superintendents are faced with in golf today.
BUILDING A GOLF TEE

Phil Cassidy, Supt.

Weston Golf Club

In building a golf tee, soil placement and modification is a vital but flexible basis for trouble free future maintenance.

In many instances a tee may be constructed with very little effort from existing soils at the site. It is possible to build a tee in a low pocketed area by the use of drainage tile or by building a base of coarse clean bank gravel of sufficient depth to break the capillary action of a high water table.

I have one tee in particular which was built in such a location. We already had a surface catch basin and drain piped away from the area but the tee that had been built there in 1918 was very small, shaded and always moist from a high water table. A heavy rain in the heat of summer usually dealt a lethal blow. It seems that all tees built during that period on par 4 or par 5 holes were 20 feet wide and 30 feet long.

We bulldozed the old tee on the site and levelled the immediate area; we then spread clean bank gravel to a depth of two feet, coarse sand to a depth of 6 inches and topped this off with 8 inches of loam of the same texture we use in top-dressing our greens. We use line levels and stakes for our grades for each material. This tee is 3,500 sq.ft. in size.

We do when necessary, add coarse sand to soils used for seeding or sodding. We have also used successfully some of the calsined materials as a conditioner.

Although it is slow we do all our grading of top soil by hand. We roll with a hand operated power-driven roller. In the top soil we add a complete fertilizer and lime when necessary. I say when necessary because our tees are sodded and the nursery area is given the full treatment before reseeding. If our new foundation is in good physical condition, little additional lime or fertilizer is necessary.

It is obvious from the heavy play all courses are experiencing that tees are never too large.

Although each golf club member is aware of the good and bad points of his particular course, he seems entirely oblivious to the fact that his playing of a shot can help maintain his course. I can recall when all short holes had signs stating "balls from this tee must be teed-up." We used to be able to figure which golfer was responsible for taking those 6" divots. Now it seems a golfer is just a hacker unless he does take a divot.

I feel it is unnecessary to take a divot from a tee and that a golfer should become so skilled in hitting any tee shot that a divot would cause him embarrassment instead of a sense of accomplishment.
The size of a tee depends on the length of the hole, the landing area and the area available to place the tee in a strategic position.

I favor a large flat tee easy to maintain and easy for the golfer to reach from the preceding hole. Obviously irregularly shaped tees are often necessary to fit into existing terrain to give the required yardage to the hole. They can also add to the beauty of the area by terracing and landscaping.

I feel that surface drainage, assuming the foundation is properly constructed, should be sufficient to maintain moisture control.

In many instances a tee grade can vary from front to back as much as two feet in 100 without affecting or being obvious to the golfer on his drive. Certainly ample surface drainage.

I have tried several combinations of turf on tees and have settled on straight Merion as meeting our present requirements. We sod our tees from a nursery of approximately 30,000 sq.ft. The Merion seems to take the traffic and has the best recovery. Our tees are cut a minimum of 3 times weekly at a height of 3/4 of an inch. We cut by hand and use a catcher for the clippings.

I have been asked how much and when I feed my Merion tees and I know my answer was thought to be evasive. My answer was that I feed them when they are hungry and that I wouldn't know how much until the end of the season, as truthful an answer as I could give. However, this is my approximate schedule: I start them off in the Spring with a complete fertilizer, usually a 10-6-4 with 50% organic nitrogen; three weeks later they receive an application of straight organic and each 10 days receive another application of organic supplemented by an additional application of a complete fertilizer the last week in May, the last week in August and the second week in October.

My best estimate for the amount of Nitrogen used per 1000 sq.ft. for the season is 10 pounds. I do not hesitate to deviate from the schedule if I feel it necessary. We normally lime in the dormant season and keep the pH above 6. All tees are watered in conjunction with the greens. Some elevated or exposed tees need additional watering time.

I have not found it necessary to syringe Merion tees during the day but when this does not interfere with play and some greens are being syringed, I do not hesitate to put out a few tee heads.

I have not had any thatch problems with the Merion and feel that the removal of the clippings plus the heavy play will keep this from becoming a problem.

We have aerated when we felt that we were not getting penetration of water due to compaction.

I have not formed a definite opinion on when tees should be resodded except that it should be done when wear is objectionable.
On our present tees we use a mixture of greens topdress material and seed to fill the divots every Monday and Friday and oftener if possible. I have used a mixture of red top and domestic ryegrass in the worse divots on small tees for early recovery but am convinced that once my tees are all of 3500 sq.ft. or more that a mixture of loam and straight Merion seed will be the mixture to use.

Straight loam helps heal the shallow divot on Merion sod.

Markers are normally moved daily but during the weekend or a several day tournament, the players really lower the boom.

Each section worker is required to attend the moving of markers (and each filling of divots) but the assistant superintendent and the one in charge of cups supervise the pattern they are moved in.

It seems that each time you have a special placement reserved for the final round of a tournament, someone has to take a few wedge type shots from the area.

I sincerely believe that golf should be played on the course and not in it.

GRASSES FOR TEES AND THEIR MANAGEMENT

Wm. Dest, Supt.
Wethersfield C.C.

Because of the hard use that tees receive and the compaction that results thereof, we should be selective in the choice of the topsoil we use in rebuilding. Some of us are not fortunate enough to have topsoil on our own course of the texture we feel is necessary in the construction of new tees. Therefore, it is necessary to either modify our soils with some additive or to buy the topsoil from some outside source that will meet our specifications. We feel the teeing area should be as firm as possible yet soft enough to insert a tee. The soil we use at Wethersfield is:

1. Moderately coarse textured with approximately 70% sand.
2. Rapidly permeable.
3. Moderate water holding capacity.

At the time of rebuilding, we add 50 to 100 lbs. of lime (amount depending upon the pH factor and prior use) and 30 lbs. of superphosphate to the soil. This is then rototilled in before the fine finish grading begins.

The finish grading, which is done by hand labor, of the teeing ground is given as much attention as would be given to the greens. This is a very important facet in tee construction for we must insure that the golfer be allowed a near level stance on addressing the ball. A minimum of 1% to a maximum of 1½% grade is strived for and the slope of the tee is developed into the natural lay of the land to offer an illusion of flatness.
There probably has been less emphasis on selection of grass strains for tees for the specialized use they must be adapted for than any other area on the golf course. A few of the more important qualities that we look for in the selection of a strain are:

1. Ability to grow vigorously under close clipping.
2. Withstand frequent mowing.
3. Ability to recover rapidly from injury.
4. Wearing quality (persistence)

In our long range plan for rebuilding tees at Wethersfield, we plan to use a strain of Bent grass, testing and evaluating various strains until we find the one we feel best meets our conditions. At present we are testing a few of the vegetative strains of Bent along with some of the seeded strains.

In the past four years we have planted some Merion Bluegrass tees but find because of heavy play, recovery is not sufficiently fast enough and gradual decline in the Merion population has resulted with severe encroachment of poa annua. Under our conditions at Wethersfield, heavy traffic seems to be the limiting factor in the use of Merion for the teeing area.

GOLF COURSE TEE MAINTENANCE

Jim Fulwider, Supt.
Century C.C.

I. Importance of Good Tee Maintenance on the Modern Golf Course

1. General trend is toward better maintenance.
2. Trend is to care for tees much in the same manner as greens.
3. Architects realize modern courses need modern tees and are providing for this in new courses.
4. Adds beauty to the course.

II. Governing Factors

1. Size in relation to play.
2. Basic foundations.
3. General contour.
4. Grass species present.
5. Tree problem.
6. Availability of time and monies.

III. General Conditions present at Century

1. Tees fairly large. Average 4200 sq.ft.
2. Soil and soil drainage good.
3. Average tree root problem.
4. Grass species mostly "native bent" and Poa annua. Two tees are Penncross and a few are Seaside.
5. Budget provides for adequate tee maintenance.
6. Tees constructed in various sizes and shapes.
IV. Tee Maintenance Program at Century

1. Tees mowed 3 times per week at 1/2" with greensmowers.
2. Fungicides applied on practically the same schedule as for greens.
   (a) Rates should be as much or more than for greens.
3. Mixed fertilizer applied in spring and fall. Light applications of organics applied during the growing season.
4. Watering done as conservatively as possible. An attempt is made to avoid having the tee wet when in use.
5. Tees or areas of tees topdressed once or twice a year as needed.
6. Aerified an average of twice yearly.
7. Each tee is overseeded each year in conjunction with aerothatch operation.

V. Golf Course Tee Neatness

1. The one point I would like to stress is tee neatness. Several practices account for this, but a low height of cut and removal of clippings are chiefly responsible. Even if many other practices are neglected, they can be "covered up" if the tee is neat.

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TEES

F. Thompson, Supt.
Agawam C. C.

When building tees we mix one-half sand with existing topsoil. Original tees were leveled with a bulldozer, then raked and finished with a scraper board. Natural organic lime and 10-10-10 fertilizer are added.

I like forty (40) by one hundred (100) foot tee at one level, long dimension toward green because it cuts down on banks and is easy to maintain. Members cannot complain because markers are not on lower level.

We do not drain tees. Due to the demand for close cutting, even though a mixture was seeded, the bent has taken over. We mow two or three times a week as is necessary at five-eights (5/8) of an inch. Clippings are cleaned up if they accumulate.

We fertilize when needed and irrigate when necessary, which is very seldom. The thatch is removed once in the spring and tees are aerified in the spring and fall. We do not topdress but only return soil from aerifier plugs.

We have no regular tee renovation program because the tees are large enough to heal before markers must be moved back to scarred areas. Markers are moved nearly every day by man who changes cups, or by men who pole the greens on days that greens are not mowed.

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The economic life of this nation and indeed of much of the world owes its existence to the fact that promises which men make to each other are kept. The essential part of law that we deal with today is based on the long accepted principle that rights created by contracts are protected. Each party to a contract must observe its terms and generally government cannot impair obligation of a contract. We, each of us, rely on the assurance that agreements once made are binding.

We have various definitions of a contract, one is "A contract is a promise or a set of promises for the breach of which the law gives a remedy or the performance of which the law in some way recognizes as a duty." Contracts arise out of agreements, hence a contract is often described as "An agreement creating an obligation."

Usually a contract is an exchange of promises or assents by two or more persons, resulting in an obligation to do or to refrain from doing a particular act, which obligation is recognized or enforced by law.

When a promise is made by one person in exchange for the act or the refraining from doing the act by another a contract may result.

Legally enforceable duties or obligations are created by mutual agreement or assent that did not exist before.

A contract must meet six tests or have six qualities to be enforceable.

(1) an agreement
(2) based on genuine assent of the parties
(3) Supported by consideration
(4) Made for a lawful object
(5) between competent parties
(6) in the form required by law

Without going into the matter in detail I would point out that all of these tests with the exception of the first one have considerable variation depending on the kind of contract and the circumstances surrounding it. Contracts may be oral or written or partly oral and partly written, may be completed by filling in blank spaces on a previously prepared form, may be between groups of people or between two individuals only, and so on.

With respect to employment contracts or the law of employment the relationship of an employer to his employee has become subject to a large body of statute generally described as labor legislation.

The law recognizes the relationship of an employer and an employee when pursuant to an express or implied agreement of the parties, one person, the employee, undertakes to perform services or to do work under the
direction and control of another, the employer.

An employee is hired to do work under the control of the employer, which is in contrast with (1) an agent who is to make contracts with third persons on behalf of and under control of the principal, and (2) an independent contractor who is to perform a contract independent of, or free from control by the other party.

The relationship of employer and employee can arise only with the consent of both parties. One cannot be required to work against his will, nor if the employer does not consent, become an employee.

When the employer accepts services which, as a reasonable man, he knows are performed with the expectation of receiving pay the contract of employment may be implied.

The parties of an employment contract are basically free to make it on any terms they wish. It must be lawful and some limitations are placed on it by statute such as age of employee, kind of labor, minimum wages and hours and the like.

Wages were for a long time the sole reward of labor. Today many contracts provide varying kinds of "fringe benefits" and statutes may provide such additional benefits as social security, unemployment insurance and workmen's compensation insurance.

A contract of employment may come to an end by the expiration of the term listed in it, by notice by either party, if for an indefinite term or, by mutual agreement at any time. Death or inability to perform will terminate the contract on the employees part and unless the contract is of such a nature that some representative of the deceased employer can carry on, by the employers death as well. If the contract stipulates a specific notice the parties must comply with it. If the contract provides for termination if the employer is not satisfied he must act in good faith in so doing.

If there is no contract or statutory provision to the contrary an employee can be discharged for any reason or for no reason. If the employment may not be terminated at will, the employer will be liable for discharging the employee without justification.

1. The employer is justified in discharging an employee who refuses to carry out his part of the contract.

2. The employer may discharge the employee when the relationship has been established by means of fraud on the latters part.

3. Willful disobedience of any proper order entitles the employer to discharge the employee in most states.

4. An employee who performs acts inconsistent with the interests of his employer may be dismissed.

5. Wrongful misconduct which harms the employer or his property or interferes with the continual and peaceful operation of the business is grounds for dismissal.
6. An employee who is unable to perform the duties for which he was employed may be dismissed.

An employee who has been wrongfully discharged may bring an action for wages, breach of contract or value of services already rendered. In some instances an action for specific performance of the contract or proceedings under a federal or labor relations statute may be used.

Generally the employee may sue to recover wages for services actually rendered and may need also to sue under breach of contract for the unexpired term.

An employee may bring an action for breach of contract but if the contract expressly gives the employer the right to terminate by giving notice the employees recovery may be limited to the wages he would have received during the notice period.

If the employee is discharged wrongfully after having performed services he may treat the contract as rescinded and recover the reasonable value of his services.

In a few circumstances an employee may obtain specific performance although usually he may be limited to a suit for wages, damages for breach of contract, or the value of services rendered by him.

The general rule is that an employee may not be compelled to perform his contract of employment.

He may abandon the relationship for non-payment of wages, wrongful assault, services not contemplated, services not permitted, and injurious conditions.

If the employer suffers damages as a result of the wrongful abandonment of an employee, he may bring an action for breach of contract, in some rare instances against a third party for inducing a breach of contract maliciously.

The title of your program is, I think, a bit misleading if you read it, that I was to undertake to give you specific instructions on the basis of a series of steps to be taken and the end result to be a contract of employment.

If you plan to write your own contract of employment my advice is don't. An employment contract like drawing you will is not a "do it yourself project."

If you want something more than an oral agreement with your employer which might mean that he could discharge you at any time without a reason then by all means discuss the matter of a written employment contract with him. When you have discussed the important points such as wages, fringe benefits, duties to be performed, hours or days to be worked, annual leave, sick leave, insurance and so on and have reached some sort of an understanding then consult an attorney and ask him to draft an employment contract. If he doesn't feel that he can do this, ask him to recommend a fellow attorney who can. Be sure to tell him all that you can about the proposed
He will prepare a contract that will meet the tests of being a valid contract and will be glad to explain why the working and provisions are as they are to meet your desires and the requirements of statute and law.

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MY CONTRACT

Lucien E. Duval
Supt.

Chestnut Hill C.C.

I believe everyone here has a copy of a sample contract. I would like to read this to you and stop after each article to explain in my way why it was put into the contract.

AGREEMENT made this eighteenth day of December, 1963, by and between the Spring Brook Country Club Inc., a corporation duly organized by law with an usual place of business at 90 Spring Rd., New York City, and doing business as "Walnut Hill Country Club" hereinafter referred to as the "EMPLOYER"; and JOHN H. DOE of New York City, hereinafter referred to as the "EMPLOYEE."

WHEREAS, the Employer is desirous of having the services of the Employee as Golf Course Superintendent, and the Employee is desirous of furnishing said services to the Employer, it is hereby agreed as follows:

1. The Employee shall supervise the maintenance of the golf course and golf course equipment in accordance with generally accepted standards and practices in the Greater New York Area.

This first point would depend largely on the type of Course such as size, condition that it is in and whether or not the members want a "top notch" golf course which most members want but are not willing to spend the necessary money on.

2. The Employee shall be employed for a period of one (1) year from the date of commencement of his work, which shall be on or about January 1, 1964.

The term of a contract would be up to the individual. Some may prefer a three to five year one. I was offered a two year contract this year but felt that I would rather keep a one year term because if a better position cam along I wouldn't be tied down to this position for such a long period of time.

3. The Employee shall receive, during this term, a vacation period of two (2) weeks with pay, which vacation shall be taken at such times as designated by the Employer.
I don't believe that any Superintendent has much of a problem on this point. Most superintendents take from 3 to 6 weeks off in the Winter without pay.

4. During the term of this employment agreement, the Employee shall devote his best efforts and entire time to advance the interest of the Employer and he shall not, directly or indirectly, be engaged in any other activity.

In the past I have been employed on a 9 hole golf course and had a good assistant. My employer refused to spend money on improvements so general routine maintenance was all that was required. I had time, with my employers approval, to spend time on outside activities which included supervising the building of a 9 hole course, helping construct a Par 3 course, and putting in a practice green for a private party. My present employer does not approve of "outside activities" and this is the reason the Board of Directors had this clause put into my contract.

5. The Employee shall, during the term of this Agreement, have the authority to purchase on behalf of the Employer, at any one time, such materials, machinery and equipment as shall be necessary for the proper operation of the golf course and its equipment not in excess of One Hundred (100.00) Dollars. Any purchases beyond this sum shall require the approval of a properly authorized officer of employee of the Employer. The Employee shall also have the privilege of making these purchases from dealers of his choice, provided the prices paid are competitive and not in excess of prices charged by other dealers.

When purchasing materials such as fertilizer and material the Company purchased from is left entirely up to my choice. My Chairman's signature is required on all purchase orders which is a Must on all purchases. If he isn't at the Club he ok's the purchase via telephone and signs the order on his next trip to the Club. My Chairman is a member of the Board of Directors which also makes him an Authorized officer of the Club. This pertains only to items in the amount over $100.00.

6. Any dispute, claim or controversy arising out of or relating to this Agreement, or breach thereof, shall be settled by arbitration in accordance with the Rules of the American Arbitration Association, and judgment upon the award rendered may be entered in any Court having jurisdiction thereof.

With reference to the American Arbitration clause, it is to avoid personality conflicts. In many cases where there is a dispute, the Club has shopped around for a new Supt. without his knowledge and a new man hired and arrangements made before the Supt. knows what is wrong. If all the facts are brought out in the open and presented to the Board of Directors most problems could be straightened out before it becomes a big issue with both sides presenting their version of the situation.

7. As compensation for his services to the Employer during the term of this Agreement, the Employee shall receive a salary as follows: The sum of Three Hundred Forty Five and 50/100 (345.50) for fifty two weeks, commencing on the first week of his actual employment.

As further compensation the Employee shall receive the sum of Fifteen ($15.00) Dollars each and every week as a traveling allowance.
8. The Employee shall also receive, during the term of this Agreement, a further sum not to exceed Five Hundred ($500.00) Dollars which shall be used by the Employee to attend duly called and held local and national Turf-Grass Conferences, which he shall be allowed to do without any loss of salary. Said total sum of Five Hundred ($500.00) Dollars shall include all the Employee's costs and dues to the said organizations and any insurance premiums that are necessary for him as a member of the Turf-Grass Conference Organization and similar organizations. All sums above said Five Hundred ($500.00) Dollars shall be borne by the Employee.

7 & 8
Clearly explained in articles. These two clauses are entirely up to each individual Superintendent.

9. The Employee shall, with the approval of the Officer or employee of the Employer, so appointed as his superior, set the salaries and number of employees to be hired and fired in order to properly take care of the golf course and golf course equipment in accordance with generally accepted practices and in the best interest of the Employer, and it shall be his duty to direct the activities of all the personnel under his control.

According to this item, it is the Club's responsibility to allow a sufficient amount of money for labor so the Superintendent can fulfill this part of the Contract. If the Club does not give him enough money to operate according to general accepted practices it is next to impossible to direct his activities as he should.

10. The Employee shall also operate within the budget set up by the Budget Committee of the Employer.

In my case the Greens Chairman has to sell the budget to the Budget Committee. I am very fortunate to have at this time a good Greens Chairman and committee. After it has gone to the Budget Committee the Chairman has to present the item to the Board of Directors. This is where good salesmanship comes in handy.

11. The Employee shall be extended the privileges of the golf course and Club House facilities which shall include guests of the Employee with the approval of the Employer.

Many clubs give their Superintendent this privilege. It seems necessary in the Contract because as you know Chairmen change from time to time and it could prove embarrassing to the Supt if this privilege were forgotten and questions asked of his being present at dinner or his presence on the Course.

12. The Employee shall at all times conduct himself in a manner which shall not discredit or reflect on the Employer and shall perform his duties in accordance with the generally accepted standards of his occupation.

I believe every man here lives up to this without any question.

13. The Employee, until further notice, shall be written to, pursuant to the provision of this Agreement at 56 Water St., in Springdale New York, and the Employer shall be written to, pursuant to the provisions of this Agreement
at 90 Spring Rd., New York City. Any notice shall be registered mail by either party to the other in order to be effective and binding.

This item is for the protection of the Superintendent as well as the Club. This also clarifies what procedures are to be followed in case of disagreement between both parties.

14. The Employee and the designated Officer or employee of the Employer as his supervisor, will have the responsibility of policing the electric golf carts on the club grounds and golf course and the maintenance of same.

Policing of golf carts has become a problem on golf courses where I have worked. At our Club the Superintendent has complete charge of golf carts; when they go out, where allowed on the course, what time of day they go out and are taken in. Our course is very hilly and carts are dangerous after a rain storm. Usually carts are left inside for a day or two or until grounds are dry.

15. The Employer shall designate a person or persons who shall be known as the Employee's superior, to whom all the Employee's work orders and reports shall be given and to whom the Employee shall be directly responsible. Said Employee may also be under the direction, from time to time of a designated Golf and Greens Committee Chairman.

In the event that the Employee is in doubt as to just who is or shall be his superior as said terms is used in the paragraph, final determination of same shall be made by the duly authorized Officers of the Employer.

INWITNESS WHEREOF, the parties hereto have their set their hands and seals all on the date first above written.

SPRING BROOK COUNTRY CLUB INC.

by ______________________, Pres.

"Employer"

__________________________

"Employee"

Witnesses:

__________________________

I am directly responsible to the Greens Chairman and no one else. My weekly reports are to him and my orders come from him in writing. If the Greens Chairman cannot be reached and an important matter comes up the decisions are made by a Club Official such as the President or someone on the Board of Directors as they are the only members that can make decisions.

TO SUMMARIZE;
I have discussed contract with other Superintendents and their feelings seem to be "A contract is OK but if the Club doesn't like me or my work I don't want to work for them." To me, having a contract is not a matter of a guarantee of a job as much as it is of having a complete understanding with the Club officials as to what my duties are and what their responsi-
ilities are to me. As you know chairmen and Club directors are changed frequently and new officers simply have to read their copy of the contract to know just what is expected. This makes for a healthier relationship between the Superintendent and the Club Officials. Most positions that are being vacated today are caused by misunderstandings from verbal agreements from year previous that seem to be remembered by the Superintendent only. I have worked in the past without contracts and after the past year I am convinced that this way is best with a solid, written contract.

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THE GOLF CAR PROBLEM

Geoffrey S. Cornish
Golf Course Architect

Whatever our personal opinions are in regard to golf cars we are certain of one thing. They are here to stay. Therefore, it is important to adopt a positive outlook towards them.

Introduction of golf cars has indeed brought many blessings. Certainly they have made the game more enjoyable for some people and they enable others to get in more than a single round in a limited period. Furthermore people who would not be allowed to play on medical grounds are now permitted to continue the game in later life. Hilly layouts are more enjoyable, while at courses where caddies are not available the golf car in part overcomes this problem.

It is important to realize too that the revenue from golf cars is helping innumerable private clubs to balance their budgets. Cars are also increasing profits on fee type courses.

Regardless of published statements to the contrary, golf cars do cause wear and tear on the turf. This is the problem superintendents and architects have to face, and Professor Joseph Troll has arranged for this panel of agronomists, architects and superintendents to discuss this subject this afternoon.

Before introducing the speakers I would like to further introduce the subject by showing several slides relative to the problem. The lessons to be learned from these slides is twofold -

(a) We must educate the players.
(b) We must plan for golf cars.

Planning for golf cars is partly the planning of paths. Macadam appears to be the most practical surface for the latter, although it is true that the golfer who walks may complain that the macadam loosens his spikes. In planning paths flaring of the ends is helpful, and an adequate width of 6 feet or more is essential. Most important of all, paths must be planned to be in the right places, and everything possible must be done to have the car drivers use them. Much more will be heard about planning and player education and the agronomic aspects from the speakers.

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Traffic on the golf course is already a major problem and with a better than 20% increase in population in the next 10 years we can expect more than 30% increase in the number of golf courses and better than 50% increase in the number of active golfers.

These figures point to a particularly acute problem because the majority of our courses were built in the 1920's or before and were only designed for 250 to 300 rounds of golf per week. Today, many of our courses are averaging well over 200 rounds per day.

We were fast reaching the saturation point for play during daylight hours and now we are beginning to play at night under lights. How much traffic can the grass withstand? We can't say exactly because of the variables involved but under our present technology we are fast approaching the point where the answer will be brought home all too clearly in many instances in the form of bare ground.

Motorized carts in all forms and fashions have created one of the hottest controversies on golf courses in the last few years.

Of motorized carts Senator Ribicoff of Connecticut had this to say at a P.G.A. meeting in Florida, "Please, oh, please keep golf a walking game. Don't let our fairways turn into highways. I want to be sure a good drive always means a good shot - not a fast tour in a motorized cart."

But carts are here to stay. They mean too much in player comfort, club profit, and faster play ever to be discarded. We may even attribute some of the boom in the golf business to the introduction and use of carts. Our problem is not how to get rid of them, but how best to live with them. Whether this can be done by careful regulation, driver education or by remedial measures made possible by increased budgets or by some other means, remains to be seen.

Considerable research has been conducted on golf car tires with the ultimate goal being a tire that will not damage the turf. So far, such a tire has not been found, but real progress has been made since the first carts with narrow 4 inch tires were manufactured.

Now, let us look at some of the effects from an agronomic point of view. Traffic damage is usually apparent to the casual observer as worn spots in turf, as discolored turf, and as bare soil showing through sparse, run-down vegetation. A closer examination will reveal the cause of these conditions.

The most common damage to turf by golf car traffic is simple bruising. Frequently the leaf blade dies after such injury because of the damage...
done to the structural elements of the plant, but this type of damage is usually only superficial to the plant and given a rest will recuperate quickly.

Turf under moisture stress is more likely to be severely injured than turf well supplied with water, because turgid cells are much more able to support weight than cells which are flaccid and limp. Please do not mistake this as an appeal to water when none is needed because more damage is caused from too much water than is caused by not enough.

Another type of damage is indirect. Golf car traffic may bruise the plant at a critical time and predispose it to disease injury. You may wonder why golf car traffic would have anything to do with disease, but it bruises the leaves and makes a ready point of entry for fungus. It further presses the healthy leaf down into the mat where disease organisms may be living or simply biding their time for a chance to take over than it would otherwise have.

Another type of injury comes from the action of golf car traffic on the soil. The soil must anchor the plant, be a storehouse of nutrients and provide pore space for air and water. Heavy cart traffic on most soils breaks down the soil structure, reduces pore space and renders the soil virtually impermeable to penetration of roots, air or water. This damaging action is only speeded up during wet weather because the moisture lubricates the soil particles and makes them easier to compact. Some soils under conditions of heavy cart traffic may even attain a density greater than that of hardened concrete. How then can we expect a grass plant to grow in an environment such as this.

Even the strongest and best managed grass can only withstand so much traffic and when it becomes apparent that this point has been reached, we have only two choices (1) we can reduce the traffic over the area by distribution to other areas, or (2) we can provide a non-turf surface for the traffic which will withstand the wear.

Where cart traffic is light and can be distributed, this is the best answer, but in many areas such as around tees and bridges this is impossible. There is much to be said for and against hard surface paths on the golf course ... certainly, no one can argue that it doesn't look better than the bare spots and ruts left in an indiscriminate pattern by golf carts.

As the old saying goes, "the best maintenance is preventive maintenance" and this certainly holds true for turf. A little extra attention to the turf before damage occurs can pay big dividends in fewer complaints and better grass.

The superintendent's work is cut out for him and we can only hope that as cart traffic increases, so will our know-how to cope with it.
Whether we like it or not, golf cars are here to stay. Many courses already show the wear from their use. Many golf course Superintendents, Greens Chairmen and Public Course Owners are trying to find the solution to golf car wear.

From the Architect's viewpoint, today's golf courses must be designed to facilitate golf car movement about the course. It is obvious that solid paths must be incorporated in the design from green to the next tee to get the golfers safely from one hole to another. In areas of loose material where considerable wash and rutting will take place, some sort of soil binder or asphalt topping must be used.

This is not the real subject of concern, but rather the concentrated wear areas next to a tee, one side or the other of an approach to a green and, if the next tee is in back of the green, a worn area completely around the green. Where possible the tee for the next hole should be along side of the green, thus eliminating long worn paths around the green which is usually in the playing area.

Looking at the subject logically and thinking back to other wear problems, I remember the over-green mower and how, if planning did not take place, several areas on the green would wear out. Once this wear was distributed, the worn out areas were eliminated. I remember the single-power mower wearing out the perimeter of the green from turning. Once several trips of the green were made and the turning wear distributed, the worn out areas disappeared. Then came the pull-cart. These carts being small in size were pulled up unto the collars of the green and literally wore ruts onto the greens and off of the greens. In my own particular case these worn areas were sodded with Merion Bluegrass and, to my amazement, they withstood the wear and, where the sodding stopped the bents and fescues continued to wear.

The Florida golf courses during cool periods when the Bermuda grass has become dormant will show wear in a matter of days. During the high temperature and moisture periods when the Bermuda grass is growing vigorous very little wear shows up as well as areas of wear reviving themselves.

At Newark Airport we installed a night golf course with small greens, small tees and under very heavy traffic conditions. I felt there would be an annual large replacement of turf due to these conditions. To my amazement, the greens and tees seemed little effected by wear. In analyzing the situation, I believe at night the grass was bruised and damaged from wear but before the hot sun and daylight came, the blades heeled themselves and the effect was no greater than an ordinary mowing. It seems to me that this matter of wear is the ability of the grass to quickly replace itself through growth before the next damage of the next day hits it. Even a door mat or a rug in a house which is dry hard material will wear out. It is
logical to believe that grass, a soft lush material will wear out rapidly unless it is growing sufficiently to overcome the damage of wear.

I believe that if the bankings of greens and tees were constructed to allow safe maneuvering of golf cars, the grass was growing vigorously, and the golf course management had the nerve, golf cars with wide tires traveling throughout the golf course unrestricted, would eliminate the concentration of wear and most of the concern of golf cars would be eliminated. Of course, the approach to the green would necessarily be wider to spread wear. The collars of the green in northern areas would be Merion Bluegrass. To create the Architect's desire of trapping, one trap would be installed close to the center line to create the effect that two traps would do with a narrow approach. On the tee end, the movement of carts onto the tee would be moved about as the tee markers move about and the necessity for paving and prepared golf paths would be mostly in the concentrated area between holes.

**Fundamentals of Design**

1. Clear solid, safe paths between holes.
2. Long drawn-out banks of tees and greens for safe manipulating golf cars.
3. Wide collars, sodded with Merion Bluegrass for maximum golf car travel.
4. Single trapping to effect to the applicable shot, resulting in a wide approach to the green. A single traps relationship to the center line of the hole will effect the golfing impact.
5. Good growth of the turf to combat the effects of wear.
6. The use of wide tires on golf cars for minimum of weight per square inch.
7. Perhaps the adaption of hydraulic drive golf cars to eliminate accelerated starts and stops.

These recommendations may seem harsh, but in my opinion far less concern than the use of Aerofiers, Verticuts, fertilizer spreaders, power mowers, power sweepers, fairway tractors for mechanical treatment of greens, as well as the use of many caustic materials that slow down the health and welfare of the green, and also rippled sole shoes.

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**GOLF CARS AND THE ESTABLISHED COURSE**

Sherwood Moore, Supt.

Winged Foot Golf Club

The golf car question is still a controversial subject -- even after ten to twelve years of use on the golf courses in the Metropolitan New York area. In an article written in the October 1954 issue of "Golfdom" it was mentioned then about the debates, the discussion and arguments that golf cars are causing at Board of Governors meetings, committee meetings, or whenever the subject of golf cars became a question. Golf cars are becoming like Poa annua -- there is always the question or debate as
to whether it is a friend or foe. There are differences of opinion among superintendents in regards to damage done by golf cars on the course; there are differences of opinion among the caddy-masters in regards to effect golf cars have on the future of caddies; there are differences of opinion among the professionals in regards to whether golf cars increase the speed of play; there are the differences of opinion among club officials in regards to costs of modifying courses to facilitate the use of golf cars or the costs of adequately storing the golf cars. And even today, after several years use, we still have several questions unanswered and just as many differences of opinion in regards to the golf cars as back there in 1954. In re-examining the 1960 booklet "Golf Car Usage and Control in the Metropolitan New York Area" you will still observe conflicting reports and opinions and hardly any two clubs or persons will agree 100% when it comes to golf cars.

I am not going to claim to be an authority on this subject. I am only going to give you my own personal experience in working with golf cars for the past nine years -- six at Winged Foot where we now have a total of approximately 65 cars and three years at Hollywood Golf Club in Deal, N.J. where we started with a few golf cars for the "Physically disabled" and increased to sixteen cars within two years; plus information obtained from any number of articles written on this subject; plus the knowledge gained from visiting golf courses and talking to their superintendents or anyone who wanted to talk cars.

The title of my subject is "Golf cars and the established course" but I no doubt will be straying somewhat from this subject; and unquestionably there will be some repetition for with six persons on a panel discussing "The Golf Car Problem" we are bound to overlap. If you will bear with us though, I will try to be concise and brief in giving you my concept of the golf cars and the established course, to be followed with a few slides pertaining to golf cars, then will give you my summary and conclusions in regards to this matter.

I do not know of a golf course in the Metropolitan New York area that does not have golf cars -- some might only have a few cars, but they are there. It has been said before, the golf car is here, it is going to stay; it has already become a part of the game of golf. "Like the ladie's, golf cars will win their rightful place on American fairways."

Let's talk about some of the various problems or conditions that arise when golf cars are part of the golfing picture. These include: the decision to have golf cars at your club; proper and adequate housing; maintenance of the golf cars; construction required to facilitate the use of golf cars on your course; the damage done to the golf course by cars; costs of operating your golf car fleet; rules and regulations; and the golf car itself.

What brings in these golf cars to your club? It could be from many sources or for many reasons. Perhaps some elderly member desires to have a golf car so as to enable him to resume his game of golf or to play more than a few holes of golf. It could be brought about by the professional who desires a fleet of golf cars, believing it would increase the activity at the club plus an added income for himself; or for the same reason a group or committee of members might believe that this would be one source
of additional income to help defray the club's expenses; or it might even be brought by the high pressure campaign of various golf car manufacturers that are bombarding the members of your board.

So the golf cars arrive for one reason or another and it seems useless in this talk to discuss the advantages and disadvantages of them, for those who are strongly opinionated one way or the other will always have a counter argument. Those in favor of golf cars will even refute the statement that the comradeship with other players and caddies is an important relationship that is missed when they hustle about in golf cars. Just as recently as the Golf Writers dinner held in New York City this past January, Senator Ribbencoff of Connecticut, the principal speaker for the evening, denounced golf cars by saying the only thing gained was inches around the midriff. I am sure though that we will see just as many golf cars, if not more, this season than last.

If and when your club has decided in favor of golf cars, I hope that you are ready to take the lead in this new venture and be an important part of that activity of your club. It is one of your responsibilities. In fact you should be in on the initial discussion to acquaint the board or committee with the many problems that must be solved even before the golf cars arrive.

And the foremost among these is proper and adequate housing. So many times the decision to have golf cars is made with no thought given to this aspect. This happened at Hollywood! (Explain). This happened at Winged Foot! (Explain). and it is happening to many established courses where provisions were not made to properly store all maintenance equipment to say nothing of the added problem of the necessity of finding room for golf cars. This will be a problem at every club that does not take the matter into consideration at the very outset. What's happening now when new courses and clubhouses are being built? Along with the question "Where is the men's locker room?", they are asking "Where is the golf car garage?" And now these courses that did not have adequate space are finding it necessary to construct buildings to house these golf cars. And how many years have you been arguing for a new maintenance building?

The design and size and shape of the building is a subject in itself, for so much depends on location, such as nearness to clubhouse, space available, etc., but several articles have been written on this subject and architects and contractors certainly should be able to assist you with this problem. The most modern and efficient golf car garages are designed so that the machines can always move forward and without any fancy maneuvering. In any event, make sure that it is large enough to accommodate all golf cars anticipated and it would be wise and smart to make provision for expansion. You will need it. Once ten or fifteen cars arrive you can expect more to follow. Even those clubs who required medical certificates to prove the member needed a golf car have succumbed to the pressure of all healthy males. The clubs who are restricting the number of golf cars to three or four are rare indeed.

And before we leave this subject of proper housing, be sure the electrical wiring for golf cars is adequate to carry the load of all of the battery chargers in the fleet operating at one time. And like this building, provision for possible expansion should be made.
And, along with the housing of golf cars, will come the problem of maintenance of these cars. I can tell you from bitter experience not to take on the job yourself of maintaining these golf cars. Yes, they are your responsibility but not the maintenance of them. Your position requires you to be on the job seven days a week, 24 hours a day, but if you undertake this task, you will have to be there eight days a week! Hire a good man, not a boy, for this job, and see that he performs his job well. Naturally he will need some tools to perform this work efficiently.

Do not forget to inform your committee that golf cars will necessitate some physical changes in the golf course. Unless you have a newly constructed golf course designed for golf cars, then you are going to have to spend some money, make some changes on that course. Naturally, these will vary with every course depending on terrain and design. At both Hollywood Golf Club, which is a comparatively flat course, and Winged Foot, which is rolling terrain, the cost for physical changes were very minor. But there is always something to do -- a bridge to be built, widen, or strengthen; a ramp to be built; a road to be cut out of a bank or through the woods; traps to be moved; asphalt parking areas and paths to be put in; etc., etc. Take the case of Don Likes, Supt. at the Hyde Park Golf and Country Club, Cincinnati, Ohio. Don wrote me and said, "On our 18 hole golf course it was necessary for us to build 14 ramps at a cost of $25,000.00. We were the last course in town to install power golf carts." I can understand why. He also said, "We had 7 long high wooden foot bridges to replace with dirt ramps. Also, we had 5 or 6 steep hills that were impossible to climb with any vehicle." So if you have any topography like that, be prepared. In any event, be prepared!

Be prepared to inform your committee of the damage these golf cars will do to your golf course. And do not let anyone tell you that they do not do any damage. You know full well that just about every operation you do on a golf course is a compaction process. And golf carts are no exception. All you need to have is a bottle-neck area and you will soon see the results. Besides soil compaction, you will have grass damage in heavily travelled areas, tire ruts in wet soil; tearing of the turf by short or quick turning; quick starting and stopping will spin the wheels and damage the turf. So be prepared to request additional money in your budget to repair these damaged areas, and to do additional aerification and fertilizing to overcome some of these problems caused by carts. And don't forget asphalt paths cost money -- and you will need some. All you have to do is to visit the courses out west and you can see the extent that they have into with asphalt paths. I predict that in five or six years we will be close behind them. Last year we spent around $1,700.00 on a few car paths in bottle-neck areas at Winged Foot and this year we are to put in three more long paths in worn areas around tees, plus a service road and we have budgeted $7,500.00 for this project. Elmwood C.C. in our area has done more with car paths than any other club in the vicinity as they have feet of asphalt. And the members love them and so does the superintendent, Maurice Cameron. They can criticize how asphalt paths mar the landscape but to me they are not half as ugly as dirt roads that are mud holes in wet weather and dust bowls in dry.

We all know that everything today takes money and golf cars are no
exception. I am not going to get too involved in this for it is a subject in itself, but just remember, you need money for the golf car building; the maintenance man and his assistant need to be paid; any physical changes on the golf course will be costly; it will take money to repair damage to the golf course; insurance will be required; and repairs and replacements will be necessary. And where is all of this money coming from? Those who want the privilege of riding in golf cars should pay the price of this luxury.

Do not forget that when golf cars appear upon the scene then rules and regulations will also appear. It seems to be the consensus of opinion though to keep these rules as simple as possible. Do not make rules such as the following: "Cars may not be driven on the southwest patch of the new fairway within 26 feet of the fourth tee on days preceded by three-fourths of an inch or more of rain with two people whose combined weight is 371 pounds or more. With one person aboard it's OK except if the rainfall the day before exceeded six-tenths of an inch."

There must be some basic rules such as:

The superintendent determines when the course is to be closed to golf cars due to inclement weather.

Cars must be driven and parked not closer than 30 feet away from tees, greens, traps, bunkers, and water holes.

Accentuate the positive in your rules and avoid such words as "don't" and "forbidden."

Help your members learn and understand the rules and keep repeating them the same as "replace divots", "rake traps", and "repair ball marks."

If the course is closed for day, keep it closed. Members who walked in the morning will be mad if they see cars out in the afternoon.

Allowing the cars to go out on wet days providing they stay in rough does not work, for as soon as they are out of sight they will cheat.

Avoid too many signs around the golf course --nobody sees them anyway.

The superintendent should not get involved in enforcing the rules. Ward Cornwell of Detroit says, "I never scold any member for a rule violation because he might be the boss or the president next year."

This is where the superintendent who has a strong golf car committee with a chairman who means business is fortunate. We are lax in this regard at Winged Foot. Our members are spoiled. So in many cases to make the golf cars go where I want them to go or to keep them off a certain areas I revert to shrubs and plants. (Explain)

I just wanted to say a few words about the golf car itself as it proves to be interesting. And this is from Mr. Freund's talk at Toronto in 1960 and still applies today.
"Approximately 26 different golf car manufacturers will offer approximately 60 different types of golf cars to your members this coming summer.

These models will be from two-wheeled gasoline powered scooters, either with or without out-rigger stabilizing wheels capable of carrying one or two passengers and their golf bags at speeds up to 35 miles an hour across your fairways, to super luxurious four-wheel machines offered at premium prices to those who desire its super novelty.

Models will be offered that carry one passenger on three lawn mower wheels, models that carry one or two golf bags under battery power, while the golfer walks, models that will be powered by gasoline, by electricity and perhaps even by a combination of gasoline and electricity."

Now for a few slides and to summarize some of these points of interest.

Observations and Conclusions:

The cars are in the cards for the future -- if not already present, you will soon see golf cars gliding down your fairways.

Preparing for golf cars comes in two phases. First, the superintendent must prepare himself mentally; second, there are several physical changes that may have to be incorporated into the course.

The golf car question is still a controversial subject, and will require a lot of sound thinking and judgment on your part to present an unbiased opinion.

When golf cars do come to your club, you can take the leadership of the situation.

Car operation requires careful planning and watchful management. It is a service rather than a profit producer, but it must pay its own way.

Good planning facilitates smooth administration. Concentrated authority is most efficient.

In the case of the elderly and physically and medically handicapped for whom cost is secondary, the golf car is a blessing. All clubs view these situations with sympathy.

Be sure that proper and adequate housing is provided -- You are already too crowded in your maintenance building.

Recommend adoption of only one type of car to ease maintenance and storage problems.

Engage a competent man to maintain these cars and have him factory trained if necessary.

The use of golf cars will necessitate some physical changes in the golf course.
Actually there is no end to where you can put blacktop. If you keep putting it down, you will wind up with a road.

The beauty of a golf course adds immensely to the pleasure of playing the course. Certainly blacktop roads, paths, worn out areas, etc. detract from the beauty, and club members will have to make a choice between convenience and beauty.

Without a doubt, golf cars will do some damage to your golf course. As your number of cars increase, so will the damage on the golf course increase.

Golf cars with large tires do the least damage.

For less damage, cars should have the free run of the golf course, except tees, greens and hazards.

All operations on a golf course cost money and golf cars are no exceptions. Additional funds are required and they must be set up in the budget according to a pattern most suited to the club and its requirements.

There is no true indication that a large fleet of cars will return a profit and a small fleet, a loss, so a survey shows.

The price of the cars and the charge for their maintenance add considerably to the cost of a round, an expense most men will not consider sensible. Rentals for a regular player are substantial.

According to its need and local situations, each club must set up its regulations and define its rules.

Wherever cars are used, rules are made. Whenever rules are made, they are broken. Whenever they are broken they are both enforced and changed. Keep rules broad and simple.

The greatest single need is for an intelligent program of golf car driver education and training.

Once again, it is agreed, the most important point in successful operation of golf cars is education of the drivers.

The Metropolitan Golf Assn., 40 East 38th St., N.Y. 16, N.Y. Price $1.00. "Golf Car Usage and Control in Metropolitan New York Area". Chicago District Golf Assn. also have a survey of the subject "Golf Cars" but I do not know if it is available.
In the last few years, a great deal has been written and spoken concerning the merits and demerits of the golf car. Let us, for a moment examine some of these statements and make a few comments regarding same.

In the February 1961 issue of the Golf Course Reporter, a manufacturer of golf cars made a number of unusual statements. To quote his first one, "Players who used to play for exercise now play for fresh air and fun." The implication is that all these years prior to the advent of the golf car these individuals were out on a golf course merely for exercise; and if any enjoyment resulted, it could just be considered as extra bonus. This is just plain "bunk." Golf grew and became popular before the golf car and will continue to grow with or without the golf car. The intrinsic values of golf as a sport are primarily responsible for its growth -- exercise, enjoyment, socialbility, fresh air, etc. are additional benefits derived from the game.

A tremendous part of the growth in golf in recent years has been due to the woman golfer; and if you think that most of them are out on the golf course for their exercise, you just don't know women golfers. As a rule, they are much more serious about the game than men; and those of you who have anything to do with women's golf tournaments know that they're "out for blood" and not for exercise. They have become intrigued with the game, and they don't hesitate to use every rule in the book to win.

Another statement made by this same individual, "Players approve and even demand golf cars for tournament play." No doubt this is true of a small percentage of golfers, but this is not true amongst the vast majority of amateur golfers here in New England who play at many club and inter-club events. Generally, in important four-ball events in this area, you will find definite rules against using a car.

To continue along with this article, this same individual makes the following statement, "You will do well to recognize that the player is the payer." To continue further on, "It is a natural fact that the viewpoint of the fellow who pays the bills usually prevails." A similar statement to this was made by, of all people, a former president of the U.S.G.A. in an article in the May 1963 edition of the Green Section Record. He stated as follows, "We must recognize that the golfer is our customer and that we should do our best to give him what he wants." I wish this were true in my dealings with light and telephone companies and with other people that I do business with. Certainly the manufacturer of golf clubs would like to see the 14-club rule repealed and a number of pro golfers would also like the same. The U.S.G.A., in order to keep the character of the game intact, has controlled rather rigidly the implements of the game along with other controls.

Going back to this same manufacturer, he makes the statement that I
can partially agree with, "Golf cars are no longer a novelty that they were several years ago, they have become a necessity." I agree with the first part of this statement that they are no longer a novelty, but I cannot agree that they have become a necessity. I ask, "A necessity for whom, for the greater majority of golfers or for a select few including the manufacturer?"

Another statement made by a member of the U.S.G.A., Green Section, in the Green Section Record dated May 1963 was as follows, "Golf cars are a part of golf." I am sure that this must come as a surprise to the officials of the U.S.G.A. I can find nothing in the rules regarding golf cars as being an integral part of the game. Therefore, it would appear from the foregoing that the growth of golf cars will continue at a rapid rate and that every golfer in America will be riding in golf cars, that the golf cars for the first time in the history of economics will repeal the law of diminishing returns, that nothing can stop its growth, and that we best adjust to the inevitability of seeing our courses turn into a "mecca" for golf cars rather than golfers. I can't accept this line of thinking.

A few years ago, people like George May were predicting the end of caddies with the advent of the caddy cart; however, after World War II, the caddies made a gradual comeback. At many clubs they are used in preference to the caddy cart. I know that I prefer a caddy to a cart when I can afford one. With the advent of the caddy cart, we didn't see the demise of the caddy. I believe that the golf car can be compared in some respects to the caddy cart. The caddy cart, at first, met an unchallenged need, particularly to those golfers that couldn't afford caddies, and at those clubs during the war period when there was a scarcity of caddies. We will find in our own area that the growth of the caddy cart is still increasing in number particularly at the fee courses and municipal courses. At the same time, we will find that the golf car growth at these same courses has not been spectacular. One basic reason is that the public course golfer cannot afford the expense of a golf car, either the rental or purchase of same. This factor alone will be, for some time, a limiting one in golf car growth; and at private clubs, the growth of a caddy force will be another limiting factor.

Now, of course, golf cars have had a tremendous growth and will continue to have a rapid growth until the need has been met. In 1953 there were 1,000 golf cars in use; now, there are approximately 70,000. In 1965, it is estimated there will be over 100,000 in use. In spite of this, I find that this need has its limitations, the same as the caddy cart; and, therefore, we shouldn't be frightened by this "bogey-man" into redesigning our golf courses for something that won't occur.

I acknowledge the fact that golf cars have been a benefit to a number of golfers. If I were to classify them, I would put them into the following groups:

1. Those golfers, because of certain infirmities such as varicose veins, heart conditions, old age, etc., who use the cars to play the game they love.

2. Those golfers who must cut down on their playing time;
that is, where time is of the essence. For example, the
golf pro on a playing lesson or a golfer at a resort golf
course where he has other forms of enjoyment to use up
his limited time. However, the innovation of the well-
built par 3 will reduce the time factor and will act as
a brake on golf car growth.

3. The superintendent will find proper use for golf cars
and similar vehicles in the administration of his duties.

4. Needless to say, another group that would benefit from
golf cars is the manufacturer, and the course operator
where golf cars are a major source of income. This has
been the situation in many of the resort courses in Florida,
the Southwest and West. In the Northeast, and more
particularly in New England, we do not find that either at
our private courses or the public courses many situations
where the golf car is a major source of income.

Now, why all this concern about golf cars? What is the opposition
to them? Well, let me first say that I don't believe golf cars used
moderately at most clubs cause as much damage as they are blamed for. You
see, I am not completely anti-golf car. I believe that they have their
place but not as the dominant factor in the game of golf. The golfer
with a caddy cart traveling over the same path, particularly on green
aprons, causes some damage. Also, some blame can be placed on maintenance
equipment such as the power greens mower which causes some apron damage.

The suggestion has been made by some that the aprons be narrowed
so as to prevent their use by the caddy carts or the golf cars; but they
still should be wide enough to allow for an ample turning area for the
greens mower at the edge of the putting surface and this width would, of
course, be wide enough for the golf cars and caddy carts; and, therefore,
this does not help our problem at all. As I have said before, as far as
golf cars are concerned, I don't believe that compaction and turf damage
around the green areas are particularly the fault or significantly the
fault of golf cars; and, therefore, our designs should not be altered for
this reason alone on our golf courses in the Northeast.

However, there are places where design should take into con-
sideration the use of golf cars. Some of these might be as follows:

1. Where golf cars are used often by older golfers, it
is necessary to provide for the safety of the golfer.
Where there is danger of erosion or where paths would
have steep slopes, there could be difficulty in handling
a golf car; and, therefore, it would be necessary to
build rather sturdy paths usually with a black top or hot
top surface. In this same regard, bridges should be
constructed to provide ample room for the golf car and
should be of sufficient strength to carry the load. The
ramps approaching these bridges should be gradual to
allow for easy access to the bridge itself.

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2. Paths can be provided adjacent to the teeing areas, running from the tee some distance out toward the fairway and ending in the rough before the start of the fairway. This has been done at a number of courses and I feel is usually justified. These paths should be flush with the ground so as not to impede maintenance equipment. They should be of hot top construction--gravel paths or the like material would be too expensive to maintain; however, I don't think this should be done at the initial construction of a new course. I would advise playing the course for a while to find out where these paths are really needed. The cost of construction at a later date will not be significantly greater and I can conceive where they may be less expensive. I do not approve of these continuous highways from the tee area to the green. These paths generally run through the rough. A hot top path 150-250 yd. out in the rough area provides a poor landing area for a golf ball. A ball lands on this spot and goes "God knows where." I don't like marking up this rough any more than is necessary. For many of us golfers, we find ourselves in the rough quite frequently and would not appreciate this highway down the middle to our playing area; namely, the rough.

3. Golf car paths around greens should be avoided in most cases except where absolutely necessary and then preferably at least 75 ft. from the green. Now, this statement is in opposition to one made by Richard Tufts, former president of the U.S.G.A. He says, "Paths for electric carts should be built around tees and greens. These paths should be well marked with signs." In spite of the opinion of Mr. Tufts, I don't believe that golf car paths should be installed around every green and tee on a blanket basis; but where they are necessary and where these paths are exposed, they should consist of a fine gravel path, well constructed and well drained so that they may have a firm surface even in wet weather. The path should resist rutting by tire action and thereby prevent future maintenance costs of levelling same. Remember, a road is not an obstruction; and, therefore, under the rules, we get no relief from this situation. So, if your ball lands on the road or next to it, you have to play it. If this road happened to be a hard surface and the unfortunate golfer who happened to be this far off-line in his approach to the green hits this path, then the ball may bound almost any place--generally, as luck would have it, not toward the green. His badly played shot is enough of a penalty at this stage without the road adding "insult to injury." If the green is surrounded by wooded areas and the path can be placed through these wooded areas, then a hard-surface road might be justified in this instance.

4. By using multiple tees, we can divert the flow of traffic so that the concentration on any one area is diminished on
the various paths from the green to the next tee. From a golfing standpoint, I believe that the use of multiple tees of sufficient size for proper maintenance is often a better solution than a single long and extremely long tee.

5. There may be certain, subtle devices such as the molding of the bunker and bunker mounds and the use of grass traps to divert traffic away from the green areas; but in order to discourage golf cars, this contouring would have to be rather abrupt and sharp which would, at the same time, create a maintenance problem by preventing the use of powered, mowing equipment and would also give us awkward elevations.

It is true that our golf courses today are getting too much traffic and ways must be found to rectify the damage caused by the traffic and, also, to provide means of preventing or minimizing the damage. Part of this problem is in design, of course, some of it is up to the superintendent, and a share of it must be charged to the administration of the golf course. Course officials must control the amount of golf on their golf courses. Using some figures published by the National Golf Foundation, I have calculated that in 1946 we had one golf course for every 500 golfers. In 1963 we had one golf course for every 1,000 golfers. Based on the 1946 figures, we should have 15,000 golf courses today instead of 7,500. With the increased amount of play, the use of the caddy cart, the powered maintenance equipment and the golf car--all of these factors have greatly increased our problems of compaction and turf damage. These problems resulting from traffic will be with us for some time, and the golf car is only a facet of a much larger problem.

INTRODUCTION OF CARS TO THE NEW COURSE

M. Ovian, Supt.

Ellington Ridge C.C.

The first nine holes of the Ellington Ridge Country Club in Ellington, Connecticut opened May 30, 1959 and the second nine, two years later. The golf course was built on a potato and tobacco farm consisting of a well drained fine sandy loam. The 180 acres are mostly clear of trees with rolling terrain and no abrupt hills.

1962 was the year golf cars were introduced to Ellington Ridge, where the Golf Professional is in charge of operations. The first year we had nine gasoline cars and in 1963 the Professional went to electric and increased the number to thirteen cars. We also have three members with cars for health reasons. Next year we will have a total of 22 cars, because the members are demanding more and the cars are being used every day.

There has not been any noticeable damage to the golf course by the
cars in two seasons of operation. I would say we have two built-in factors here, one is, we have gentle rolling land with no hills and the other, very good drainage.

I have not set up any unusual rules for these cars like some other courses have done. With the large, built-up tees we have the cars do not run on them. Most of our tees are in open areas and this allows for more parking space. Leaving the tee we have no restriction on the fairways and roughs until they come to the green area. Here we have small cart signs shaped like an arrow to direct cars to the rear of the green and in line with the next tee. In most cases these signs are put before a trap that borders a green.

Now as many other golf courses we do have some members who disobey signs and run up onto the apron or between traps and greens. I will give them a warning in a polite manner and if it continues to happen I report it to my Greens Chairman and the responsibility is on the Green Committee. Never have I raised my voice to a member breaking any rule on the golf course. This is not the Superintendent's problem.

To help eliminate some of the compaction the cars are causing on the fairways, if any, fairways, tees, and aprons are aerated twice a year, spring and fall.

One method in use of keeping cars away from greens that has met with great success is at Tumblebrook Country Club in West Hartford, Connecticut where Andrew Lentine has a strip of Merion Bluegrass running the width of the fairway in front of each green and cars are not allowed beyond this point. Andy has had about 30 to 40 cars now for the past five years.

This is the plan I would like to put into effect if we start to show any signs of wear around the green area.

The Woodbridge Country Club, in Woodbridge, Connecticut, where Tony Longo was Greens Superintendent for many years before retiring, and now Robert Grant holds down that position has a very fine rule for cars on fairways. Cars must ride in the rough and go in to your ball on the fairway from the side. You cannot turn but after hitting ball must continue on across fairway to rough and go on up the rough and back on to the fairway to your ball.

I play quite a few rounds of golf in a season, while I prefer a caddie and walking, if one is not available I enjoy taking a golf car. I would say in not too many years, every course will have between 25 and 40 golf cars.

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CONFERENCE HIGHLIGHTS

In recognition of outstanding work performed in behalf of the Massachusetts Turf and Lawn Grass Council, Orville Clapper, upper left shown receiving plaque from ex-President Robert Grant. The award was presented in token of appreciation from all the matters of the Council for all the past work and time contributed to the Turf Council by Orville Clapper. Upper right, Eliot Rogers, (right) receiving gavel from Secretary-Treasurer Leon V. St. Pierre in recognition of past presidency of the Turf Council. Lower right, Joseph Beasley, (left) now President receives gavel of authority from retiring President Robert Grant. Lower left, Robert Grant, (right) receiving inscribed gavel from Secretary-Treasurer St. Pierre as a reminder of his past position. Not pictured, but also presented a gavel for past achievements in the Turf Council, Al Allen, who could not attend because of sickness.