# Golf Course Architecture

*in*

# The Chicago District

*By*

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1915

# PREFACE

A close acquaintanceship with golf courses in the country generally has shown me that much could be done in the matter of pointing out to Greens Committees salient features necessary to the proper upkeep of their courses. Many committees, willing workers though they may be, have no time to devote to the study of soils, etc., and with this in view I contributed to the Chicago Evening Post a series of articles which is herein reprinted.

I

# Problems In Golf Course Architecture Presented by the Chicago District

## The Utilization of Natural Features

MUCH has been written about the construction, design and maintenance of the famous British seaside links, but a perusal of this literature gives but little useful information to those who have the upkeep of Chicago courses in their charge. If we follow blindly the directions of these seaside greenkeepers in the care and design of our inland American courses built on heavy clay soil and subjected to our hot, dry summer, we shall not only fail to get good results but in many cases will get no results at all.

The soil on our Chicago links varies to some extent, and as the character of the soil varies so must its treatment, not only with regards to the establishment and maintenance of a thick, even, healthy turf, but also with regard equally to the design and construction of the course itself, the length of the holes and the placing and design of hazards.

The designers of golf courses in the Chicago district have as a rule the following main difficulties with which to contend:

1. **The absence of natural hazards due to the generally level character of the country.**

2. **The effect of midsummer heat and drought on the heavy clay soil. Wet or dry weather under such course conditions would make a good driver vary his tee shots from 180 to 300 yards. Accurate pitching on sun-baked grounds is almost impossible.**

3. **The difficulty of obtaining proper drainage on account of the level character of the ground and the imperviousness of the heavy clay soil.**

The solution of any one of these difficulties can only be reached by due consideration of the other two. For instance, the absence of natural hazards makes necessary the construction of numerous artificial hazards, the proper placing of which is made difficult by the varying length of possible play which the widely changing character of the soil brings about. In addition, the drainage difficulty obviously limits the depth to which we can excavate our bunkers, thereby affecting their design.

The topography of Chicago golf courses varies from the dead level of Maywood and Harlem to the rolling prairie land of Hinsdale and Chicago Golf Club. As variants we have those links which are intersected by some stream such as the courses at Glen View and Flossmoor.

The natural features of the Chicago district are in the main gently rolling ground, small ridges, old furrow marks, trees and thickets, small brooks, occasional clay and gravel pits, marshland, and here and there a small pond.

The fewer natural features a tract of land possesses the more artificial hazards must we construct to adapt it to the purposes of a golf course, and consequently the more money must we spend. Of course, in the case of a tract of land extremely swampy or heavily wooded, the items for clearing, draining and filling may be so heavy that the natural features will cease to be classed as assets and become liabilities.

A course properly designed will utilize to the greatest possible extent the natural features of the tract of land on which it is built, natural hazards having a much better appearance than artificial ones, with the additional desirability of being much cheaper. Such a course will also call for a minimum amount of clearing and swamp reclamation, both expensive details of golf course construction.

However much the natural resources are utilized, it will still be necessary to resort very largely to artificial hazards in order to have fair and scientific golf, especially on a hard, fast course where all players are for the time being long drivers.

Artificial hazards should be built as naturally as possible, so that they can blend into the landscape and by appearing to be a part of it add a pleasing variety to the appearance of the links. Such a result can only be obtained by a careful and appreciative study of the natural features of the adjacent countryside and the erection of hazards which conform to and are imitations of their surroundings.

It does not follow that because a yawning sand pit is a naturally pleasing and effective hazard on barren seaside links that the same feature will be as pleasing in appearance on the fertile prairies of northern Illinois, effective though it might be.

As the natural features in this locality consist of rolling ground, ridges, brooks, small ponds and abandoned clay and gravel pits, so should our artificial Chicago hazards endeavor to be, as far as possible, imitations of these familiar and omnipresent features.

I do not wish to infer that the sand pit and cop bunker are out of place or should be abandoned, but these necessary features should be built conformably to the natural scenery and so disguised as to appear an integral part of it.

II

# The Bunkering of Courses Which Become Very Hard and Fast In Midsummer

MIDSUMMER heat and drought on the heavy soil of Chicago's golf courses naturally make them very hard and fast. This results in greatly lengthening all shots, especialy those which are topped or half-topped, and in making it very difficult, almost impossible, to lay dead one's pitch shots to the green.

The great difference in distance obtainable on a course under fast or slow conditions makes it impossible to build hazards extending entirely across the course at right angles to the line of play, which will be fair under all circumstances. On the other hand, the great distance which can be obtained by topped and half-topped shots and low balls with short carry makes it necessary to devise some means by which the long driver may obtain the advantage to which his superior ability entitles him.

This can be done by designing all but short one-shot holes so that they offer two avenues of play from tee to green, the one calling for no long carries, but demanding greater accuracy, the other necessitating long carries and rewarding him who successfully negotiates them by a saved stroke or an easier approach.

Thus to open up two or more avenues of play on a hole we must build our cross bunkers en échelon (step formation) or diagonally across the course, and must allow bunkers built at right angles to the line of play to extend only partially across the course, leaving room to play around them at one or both ends.

It must not be supposed, however, that the man whose only golfing asset is his ability to drive a long ball is to have things his own way. He is to be taken care of by side hazards which will demand of him as fine control of his long shots as is demanded of the shorter driver, before he can obtain the full benefit of his extra distances.

Finally we must effectively guard our greens. A course which demands a pitched approach to every green cannot be said to have its greens well guarded, for the pitch is only one of many methods of approaching, and a course which calls for this shot to the exclusion of all others does not provide that diversity of play which a good course should offer. In the Chicago

district pitched shots to the greens are especially difficult and untrustworthy in midsummer on account of the long and erratic bounds such shots take on the hard ground.

Most Chicago greens should therefore be left partially unguarded in front so as to give the player skillful enough to put his ball in the correct position a chance to run up to the hole. By means of flanking hazards in front of the green we can open up one side or the center of the green for the running approach and by varying the position of these hazards with reference to the slope of the ground give infinite variety to the short game and reward the man who has taken the bolder or more correct avenue of play from the tee.

## III

# The Drainage of Heavy, Impervious, Clay Soils

DRAINAGE troubles in the Chicago district arise from two causes—the generally level character of the country and the imperviousness of the heavy clay soil. Lack of proper drainage makes a course an unplayable quagmire in the spring, prohibits the construction of deep pit bunkers, and results in sour ground, which will support only a sparse growth of weeds and poor grass and which becomes badly cracked during the dry season. Good drainage makes the ground warmer and more friable, encourages and aids plant growth and diminishes the cracking evil.

Nothing is so great an aid in the solution of the drainage problem, or in fact of a great many other problems of golf course architecture, as a good topographic map, and it is my opinion that all golf and country clubs should have such maps of their grounds on which they could keep handy, permanent and plain records of all work done. By the aid of these the solution of problems of drainage, irrigation, seeding, fertilization, bunkering, etc., would be greatly simplified. I shall hope to take up this question of record-keeping and mapping in detail in a subsequent article.

The first thing to locate in a drainage system is the point to which you are to drain. It is that point which will give the maximum fall and call for the least number of feet of tile leading to it. It often happens that the links are divided by ridges into two or more drainage districts, each of which is treated as an individual unit and has its own drainage outlet.

The main drains, which are of 4-inch to 12-inch tile, according to the grade and the maximum amount of water to be carried, should in general follow the natural waterways which carry the surface run off, but they should

be designed to be as short and straight as possible, with no sharp turns which will slow up the velocity of flow in them.

The sub-drains, which are of 3-inch to 6-inch tile, should be laid herring-bone fashion, not straight down, but quartering across the slope, and, to avoid checking the velocity of the water in the main drains, should enter them at an acute angle with the line of flow.

Drains in heavy, impervious clay soil should not be laid too deep, for if they are, very little water will percolate down to them, and they will do little or no good. It is good practice on such soil to lay the main drains no deeper than two feet and the sub-drains no deeper than one and one-half feet.

The trenches in which the drains are laid should not be filled with the impervious soil taken from them, but with crushed stone, broken brick, gravel or clinkers, topped off with a few inches of light soil and sodded, the whole tamped down sufficiently to prevent any subsequent shrinkage, resulting in depression of the surface.

All tees should be underlaid with a pervious layer of clinkers or gravel, and, as high tees often enable half-topped shots to escape punishment, no tees should be built any higher than is absolutely necessary, say a couple of inches. To insure perfect drainage, greens in impervious soil may be underlaid with a pervious stratum, but as a herring-bone arrangement of parallel tile drains, about fifteen feet apart, properly laid, will drain effectively, the construction of a pervious foundation to such greens is not really necessary.

Open drainage ditches can be used in connection with a system of tile drains if they are only used where they will not interfere with play. Spots hard to drain can frequently be converted into water hazards and used in connection with the irrigation and bunkering systems. Shaft drains can also be used with fair success, and, if the geological formation is favorable, drainage by boring can be resorted to; but both methods are of minor importance and doubtful economy.

## IV

# The Art of Building Natural Looking Bunkers

MY first three articles have given a more or less general outline of some of the problems of golf course architecture presented by the Chicago district. In this and following articles I shall endeavor to deal more in detail with those problems.

Artificial hazards should be copies of the natural features of the adjacent countryside. The country around Chicago is either almost dead level or

gently rolling land relieved here and there by small creeks, stretches of marsh, occasional small ponds, clumps of brush and timber. Artificial hazards here should therefore conform to the landscape and should not be given the barren aspect of seaside sand dunes.

The only advice that can be given in regard to the natural construction of ordinary sand pits and cop bunkers is to build them in as irregular and apparently haphazard a manner as possible. Each individual bunker is a separate problem, its proportions being determined by the type of shot it is intended to stop, and by local conditions, such as the topography of the ground in its immediate vicinity, the character of the soil, the difficulty of drainage, etc.

In order to facilitate drainage and to make them appear part and parcel of the country, bunkers hereabouts should, whenever possible, be built on some slight swell which can be emphasized by stripping off the sod for quite a distance back of and to each side of the proposed hazard. The ground so stripped should be built up at a gentle gradient to the required height with the earth taken from the pit, and the sod replaced. The bunker will then have the appearance of having been cut out of a natural ridge.

**The type of hazard best suited to the Chicago district is that known as "hump and hollow." These vary from sharp ridges, mounds and pockets covered with a shaggy coat of rough grass to gentle swells and depressions on the fair green.**

We can by skillful construction imperceptibly blend the undulating surface of the putting green into the rolls and swells of the fairway and the banks of the hazard. The undulations should become more and more severe as we get into forbidden ground, finally breaking into that degree of ruggedness which makes them formidable hazards.

The construction of these artificial surface variations gives the effect of hilliness to a naturally flat course, makes it a much better test of golf and adds immensely to its beauty. An undulating surface adds to the difficulties of judging distance, gives infinite variety to the short game and accustoms one to playing the ball from all distances. Humps along the side of the fair green, if sufficiently high, give a delightful sense of individuality to each hole. This type of hazard is easily drained and cheaply maintained.

The appearance of artificiality is often given by cutting the fair and putting greens in the form of rectangles. As a matter of fact, the maximum amount of play occurs at one or two spots along a hole and is not evenly distributed throughout its length. It can therefore be seen that the practice of cutting out fair greens of uniform width is not only unsightly, but unnecessary. Long grass, not so long that you are in danger of losing your ball if you get into it, is a most natural, cheap and effective hazard, and I cannot too strongly recommend the use of it under proper limitations. By narrowing the fair green at the proper points or even letting the rough extend entirely

across it in places we can make good use of this natural hazard, and by turfing a portion of the bunker pits which we commonly fill with sand, can save money and add greatly to the appearance without lessening the efficiency of our hazards.

V

# Economy In Golf Course Design Construction and Maintenance

THE cost of constructing and maintaining golf and country club grounds is usually a great deal higher than necessary. The more usual reasons for this excessive expense are:

1. **Faulty design.**
2. **Inefficient, unsystematic construction work.**
3. **The failure to keep records of work done and results obtained.**
4. **The experimentation of inexperienced but well-meaning greens committees and individuals.**
5. **The constantly changing personnel of greens committees, which prevents the adoption of any regular systematic treatment of the course.**
6. **Parsimony.**

Golf course construction and maintenance work, to be done economically and successfully, must be carried out systematically, according to definite prearranged plans. There must necessarily be a certain amount of experimentation in the beginning to determine what treatment any course needs, but if careful account is kept of all work done and all results obtained, a settled policy can soon be adopted which will always give good results.

A course properly designed and built should never have to be materially changed in any respect unless improved playing implements should radically affect the game itself, or additional property be secured which would admit of a more advantageous layout than the possibilities of the original tract of land afforded. It is therefore obvious that the most economical plan any club can adopt is to engage a competent architect to design its links.

If it is possible to secure his services, the architect who has designed the course should be retained to superintend its construction, and, after its completion, act as a permanent added member of the club's greens committee in the capacity of adviser on all questions of grounds maintenance. The poorer a club the farther must it make its money go and the less it can afford to do its work incorrectly.

Enormous waste is attendant on the building of an improperly designed course, for much of the work will necessarily have to be undone, sometimes

at great cost. A course may, however, be designed to be an excellent test of golf, and yet be laid out in such a manner that the cost of construction will be greater than it would be if some other equally effective design were adopted. A course effectively and economically designed may, by inefficient construction work, be made needlessly expensive.

In the following paragraphs I will give a few suggestions for economical design, construction and maintenance:

General Design—Should utilize natural features as much as possible, thereby reducing the number of artificial features to be constructed. Should call for the least amount of timber and brush clearing and swamp reclamation possible. Stables and pumping station should be given a central position.

General Construction Work—Work should be planned so as to call for shortest haul from places of excess excavation to places of excess fill. Debris collected in clearing ground can be used in cores of cops and mounds. There should be as little rehandling of material as possible. Bunkering system should be built when course is constructed, not afterward. Labor-saving machinery can be economically used if the magnitude of the work warrants.

Design and Construction of Hazards—In each hazard, whenever possible, the amount of cut should equal the amount of fill. Bunkers should be designed with an eye to ease of drainage. Where sand is scarce and expensive, bunkers which call for the least amount of sand should be built. All mounds and cops of loose earth should be well tamped down before they are sodded, or they will shrink and the sods will peel off. Spots hard to drain can frequently be converted into water hazards and used in connection with the irrigation system, the water pumped from them being softer and warmer than well water.

Drainage and Irrigation Systems—In the Chicago district especially complete drainage and irrigation systems are a prime necessity and economical. The main drainage and irrigation pipe lines should be as short and direct as possible.

Seeding, Weeding and Fertilization—Use the best seed and fertilizers obtainable. Seed thickly so as to establish thick, weed-resisting turf as quickly as possible. Don't let the weeds get a start; get after them energetically in the beginning and the turf once formed will need but little assistance later on. Fertilize liberally, but not to excess. Systematic experimentation will show what fertilizers are best. Each course is a separate problem in this respect.

## VI

# The Construction of Artificial Hazards

I HAVE already written at some length in preceding articles in this series on the construction of bunkers along natural, artistic lines. In following articles I shall write on placing hazards so that they will be conducive to fair,

interesting and scientific golf. This article will deal with the construction of artificial hazards so that they will do their whole duty—be fair and efficient.

A good hazard must stop every ball hit into it, be wide enough to preclude the possibility of balls jumping it, and yet must not unduly cripple the player who is so unfortunate as to be trapped. It should contain no unplayable nooks or pockets, should have no badly drained hollows, no dangerous timber or stone faces. Balls lying in all parts of it should be equally difficult to extricate.

Bunkers built at different places along a hole have different types of shots to stop, different duties to perform, and therefore vary in character according to the work they have to do. A bunker placed to stop a hard-hit full shot must necessarily be much larger than one intended to catch too strong an approach. A hazard constructed on a down slope will have a longer bounding ball to deal with than one built on an up slope, and so ad infinitum.

It is good practice to build bunkers about four times as wide as they are deep or high. A bunker which is less than four times as wide as it is deep is apt to be a pretty unplayable trench, while one much wider than this ratio demands is usually very easy to recover from. Where it is necessary to build a bunker very wide and natural conditions prohibit deep excavation, cartage expense can be saved by constructing a wide shallow excavation broken up by low irregular turf ridges which will be high enough to make each sand patch conform to the required ratio.

Balls which just trickle into bunkers frequently can only be extricated by playing them back. This condition can be avoided by sloping the floor of the sand pit gently up until it is flush with the fair green, or by digging the pit so deep that a ball which has life enough to roll in it will gain sufficient velocity in falling to roll well forward and clear of the back of the bunker. The face of a bunker should be nearly perpendicular at the top, but quite sloped at the bottom unless the cop or mound is very big, in which case it need not be very steep anywhere. As blind approaches are not conducive to accurate pitching and demand too much local knowledge, mounds and cops in front of greens should never be high enough to hide the hole.

The length of shot by which a green should be reached and the speed and slope of the ground determine its size and the distance at which guarding bunkers should be placed from it. A green reached by a long shot should be large and not too closely guarded, one reached by a short approach or a chip shot should be small and very severely trapped. It is advisable to make greens reached by long shots concave, so that they will help fine long approaches by drawing the ball closer to the hole, and greens reached by short shots convex, so that they will reward accurate play. Unfortunately the usual practice is to build the punch-bowl greens at pitch-shot holes and the hill-top greens where they are reached by brassey or long iron shots.

VII

# The Length of Holes and of Courses

THE length of a course should depend on three things—the climate, the speed of the ground, and its topography. In a tropical or semi-tropical climate a very long course is too exhausting; likewise, a long course in very hilly country is a mistake, demanding too much physical endurance. While hard, fast ground will necessitate increased playing length, loose, sandy, slow soil will cause a proportionate shortening of the holes.

It must be borne in mind that 200 yards uphill is quite different to 200 yards downhill. This fact and the varying distance obtainable on fast and slow courses and on the same course at different seasons makes it very difficult to formulate a system of measurements on which to base a par by which all courses can be fairly compared. For the same reasons it is impossible to lay out any schedule of distances and say "a course of this length, with holes at these distances, will be ideal under all conditions."

These difficulties can be surmounted by adopting an arbitrary schedule of par distances based on air-line measurements, devising a fair grade factor table and giving each course a course factor which will vary with the season. For instance, say the following schedule of par distances is adopted:

**220 yards and under.....par 3**
**221 to 430 yards.....par 4**
**431 to 630 yards.....par 5**
**631 yards to 821 yards.....par 6**

Then employ a grade table, the following being a fragment from such a table for use in computing par on a 5 per cent grade. (The figures are merely explanatory, not calculated with exactness):

**FIVE PER CENT GRADE.**

| Distance from tee. | Grade factor. Uphill. | Grade factor. Downhill. |
|---|---|---|
| 125 yards | 1.01 | 0.99 |
| 150 yards | 1.02 | 0.97 |
| 175 yards | 1.04 | 0.95 |
| * * * * * * * * | | |
| 300 yards | 1.00 | 1.00 |
| * * * * * * * * | | |
| 400 yards | 1.04 | 0.95 |
| etc. | etc. | etc. |

Now let the course be the "A" Country Club, with the following course factor:

| | |
|---|---|
| From November to May, inclusive | 1.04 |
| For June and October | 1.00 |
| For July, August and September | 0.96 |

For the sake of argument, let us take a hole, say, 420 yards long, air line. The length on which par would be based at different periods, neglecting grade:

| | | |
|---|---|---|
| From November to May | 420×1.04=436.8 yards; | par 5 |
| For June and October | 420×1.00=420.0 yards; | par 4 |
| For July, August and September | 420×0.96=403.2 yards; | par 4 |

If the grade were uniformly 8 per cent uphill, we would refer to the grade table and perhaps find that it directed us to add twenty yards to the length of the hole. Then par for the hole at different seasons would be:

| | | |
|---|---|---|
| From November to May | 436.8+20=456.8 yards; | par 5 |
| For June and October | 420.0+20=440.0 yards; | par 5 |
| For July, August and September | 403.2+20=423.2 yards; | par 4 |

While, as I have said, it is impossible to say just what length holes all good courses should have, there are general principles which should be adhered to. The first two holes should be two-shotters to get the crowd away and prevent congestion, and should not be too difficult or they may spoil a man's score before he gets warmed up to his game, and, in spite of their length, slow up play. There should be four one-shot holes of, say, 110, 150, 190 and 230 yards length and two good three-shot holes. The remaining holes should be from 350 to 450 yards long, two of them calling for brassie approaches. Holes of 240 to 320 yards length should be avoided, as they give too great a chance of recovery from a bad tee shot. The last four holes, especially the sixteenth, ought to be very difficult in order to provide good fighting ground for the finish of a hotly contested match.

No two consecutive holes should be of the same length unless natural conditions make them otherwise totally dissimilar. The repetition of any prominent feature such as a series of downhill drives, long uphill approaches or holes with the same side slope should be avoided. A course should be designed, above all things, to afford differently sloping ground for each approach to land on.

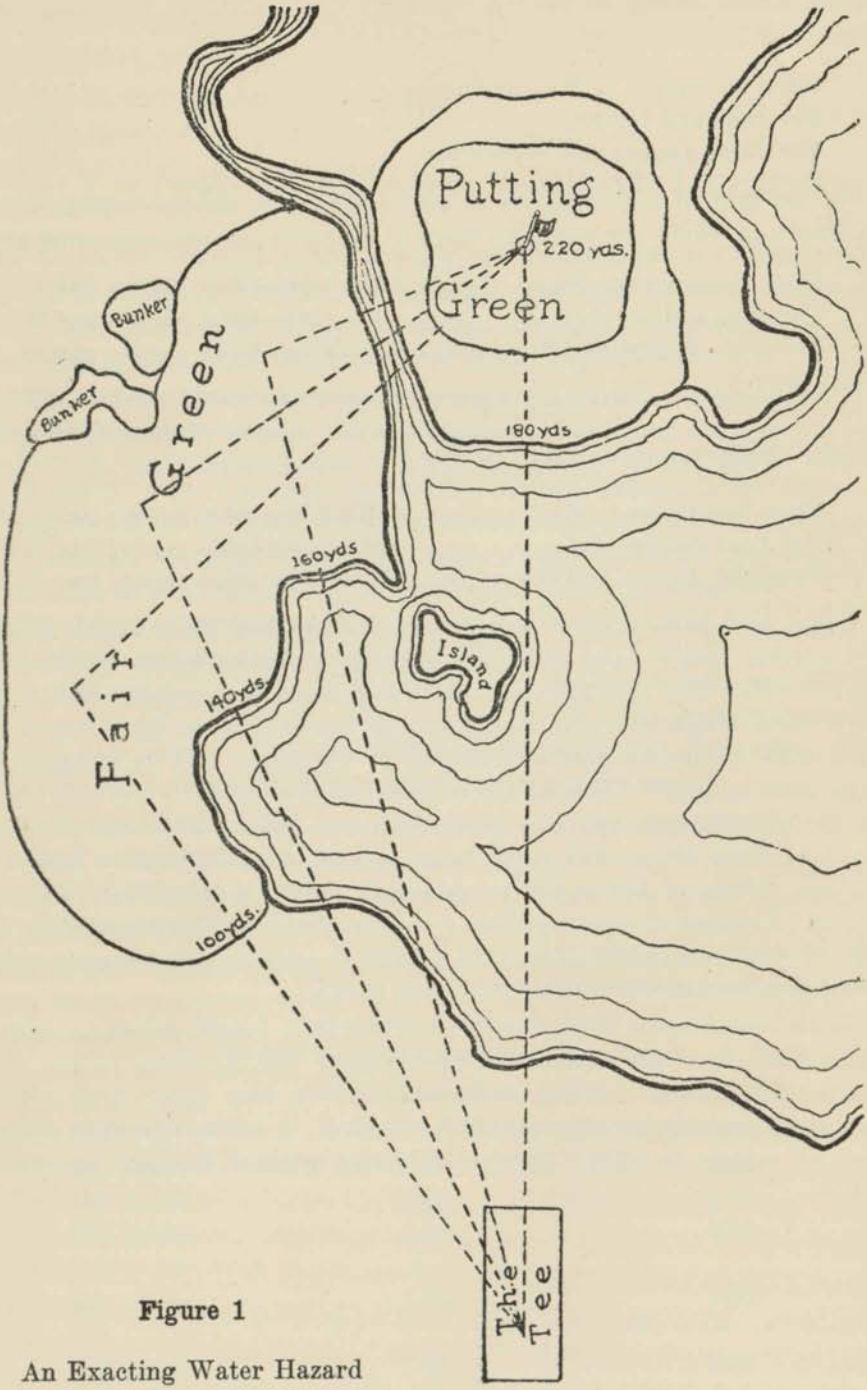


**Figure 1**

An Exacting Water Hazard

VIII

# Placing Hazards

HAZARDS should not be built solely with the idea of penalizing bad play, but with the object of encouraging thoughtful golf and of rewarding the player who possesses the ability to play a variety of strokes with each club. John L. Low has said that no hazard is unfair wherever placed, and while this is true, a hazard is obviously the wrong place to play one's shot, yet the proper placing of hazards will bring about very much more interesting golf than a haphazard arrangement of them is apt to do.

Topographical features may arbitrarily determine the location of hazards on a hole, and if the ground is at all rolling, will certainly influence the bunkering system to a large extent. As the number of topographical combinations is infinite, so is the possible arrangement of hazards on holes of any given length. The only general statement that can be made is this: Hazards should be placed so that any player can avoid them if he gauges his ability correctly, so that they will make every man's game more interesting, no matter what class player he is, and offer a reward commensurate with the player's ability.

The accompanying sketches are attempts to show hazards arranged according to this principle. The dotted lines show the course taken by the ball.

Figure 1 shows water hazard, exacting but fair to all players. Figure 2 shows five ways of playing the same hole, at least one of which is well within the ability of any golfer. The échelon arrangement of bunkers for the tee shot allows three carries of widely varying length. The second shot bunkers are placed so as to offer a reward proportionate to the risk taken at the tee. Figure 3 shows a hole with two avenues of play, one for the short driver, one for the long. He who chooses the short carry from the tee is confronted with a very difficult second to the green; he who successfully negotiates the long carry is rewarded by an open approach. Figure 4 depicts a bottle-neck hole demanding extreme accuracy.

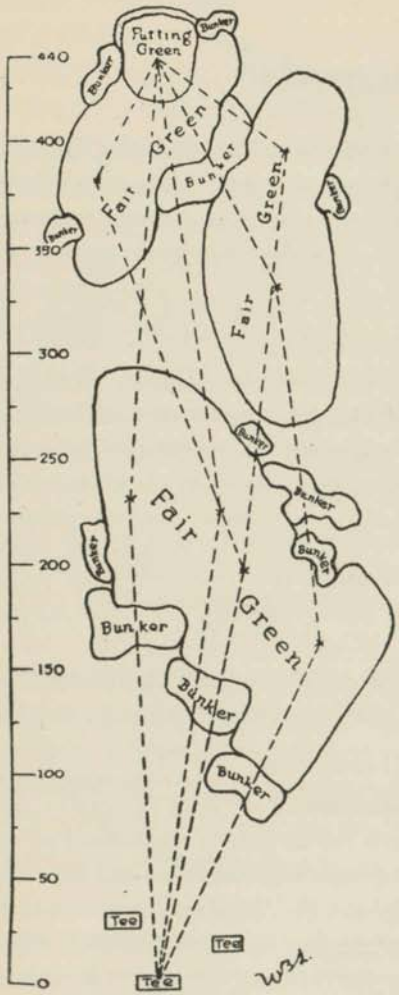


**Figure 2**

Showing Five Ways of Playing the Same Hole

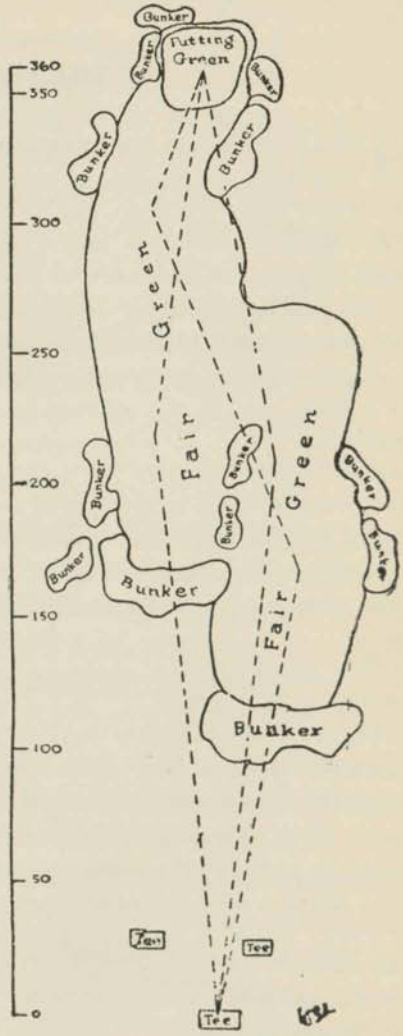


**Figure 3**

This Sketch Shows a Hole with Two Avenues of Play

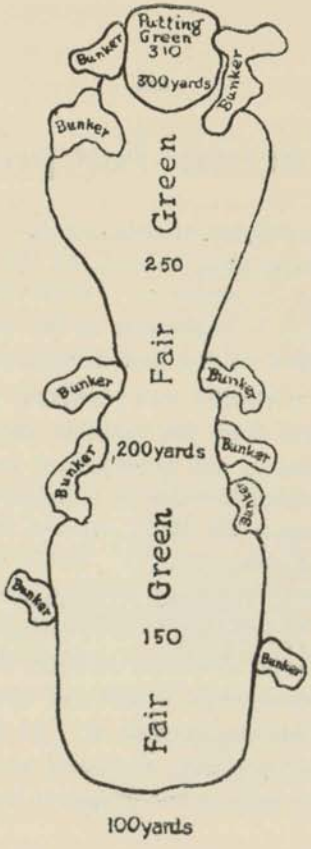


**Figure 4**

A Bottle-Neck Hole That Requires Accuracy

IX

# Record Keeping

RECORD keeping is the subject of this, my last article of the series. It is probably the most important, as well as the most neglected, phase of green keeping and course construction. Without proper records of work done and results obtained it is impossible to lay plans for the betterment of the course and the reduction of the cost of upkeep.

Records must be kept faithfully and regularly to be complete, continuous and of full value, and must show the greatest amount of detail possible. A printed form to be filled out by the greenkeeper each day is the best form of record. Then when the season's work is completed, the committee can meet during the winter, summarize the daily reports, draw their conclusions and plan their work for the ensuing year.

Records should be kept of drainage, irrigation, fertilization, seeding, bunkering, and of all general upkeep and construction work. They should show the costs and kinds of material used; the amount, kind and cost of labor done; the number of men employed, their wages and their time; the methods used, results obtained and conclusions arrived at. As the accomplishment of this will require hard work and constant attention, no man should accept a position on a greens committee who is not prepared to devote a great deal of his time to it.

Topographical maps are a great aid to the keeping of all data, especially of that pertaining to seeding and fertilization. The different areas of distinct soil conditions should first be platted on these maps and over them the areas treated by each kind of fertilizer or seed; then, when results are obtained, a glance at the map will often show to what combination of elevation and soil each kind of fertilizer or seed used is best suited.

Mr. William B. Langford has devoted much time and study to the proper laying out of golf courses in harmony with their surroundings and in relation to their soils and natural drainage facilities. He is prepared to consult with Greens Committees at any time and to suggest improvements along any lines, for which his experience has fully equipped him. He will be pleased to answer all inquiries or questions which may be sent him by mail addressed to

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