The Soil Foundation of a Putting Green

Address Delivered by Frank B. Barrett, Hollywood Golf Club, Before the Annual Meeting of the Green Section, January 4, 1924.

Mr. Chairman and gentlemen: By reason of some remarks made by me at the meeting of the Green Section in Chicago in 1921 I was accused at that time of being a comedian. Now, whoever heard of a recognized chairman of a green committee being called a comedian, especially by his fellow club-members? In my opinion he is usually called some choice names you have heard which would classify him in a tragedy.

Now, because I breezed along in windy Chicago two years ago, I see no reason why the Green Section should expect the same results here in old New York and order me to talk on the subject of construction of putting greens. Certainly there are many here better qualified than I to discuss that subject, but since I have been staged as a small part of the show I will endeavor to tell you how we get the best results in our part of New Jersey.

As our soil is chiefly sandy loam, we are able to do construction work in a different method from that which would be followed if the soil were heavy clay or gumbo. Usually we construct with a regular soil fill, then about 15 yards of manure well disked in, then 24 to 18 inches of top soil, evenly distributed. Drain-tiles of 3½ and 4 inches are then placed in herringbone fashion and the soil replaced for the working of disk-harrow, spike-harrow, and smoothing-harrow. A reasonable amount of hand-raking is always necessary, whether seed or turf is used to cover.

Of course, in heavy soil sand is very necessary to disk into the soil, and should be used with considerable manure. For holding moisture in very sandy soils, a 4 to 6-inch layer of humus and well-rotted leaf-mold 12 to 18 inches beneath the surface is advantageous.

In my opinion, the most advantageous feature, also the most imperative, is that of drainage, both surface and tile, and one is as necessary as the other; yet we find that most of the time drain-tile is not installed except where the green happens to be placed in a wet spot. I do not think we can be too emphatic as to the necessity for using drain tile; whether a green be in a wet spot or on a hill, the use of it makes wonderful returns when turf growing is considered. It is an item of probably $250 to a green, which is but a small item added to the cost of construction. To drain the average green, needing 800 to 900 feet of drain-tile, plus labor, should bring the amount well inside the price quoted. Do not understand me to mean that tile will take care of pockets on the surface of the green, for it does so only to some degree, and certainly it is of no use in winter, as winter-killing will occur in these defective surface depressions.

I was visiting a course last fall near New York City where they were building some new greens, and I was asked my opinion about them, and I said they were very wonderful. We try to be polite at times, although we are frank. I said, "Where is your drain-tile?" They said, "We don't put any in." I said, "How much is the first green going to cost you?" They said, "We don't know." I said, "Why? What is your reason?" They said, "Well, we don't know." Then they said, "We only have two or three greens that have any drain-tile in them, and they are not any better than those that have none, so, with these, we are going to omit the tile." I insisted that I was right; and they afterwards in-

stalled tile in the new greens they were putting in, and I do not think they will ever regret it.

I might give you another instance. A few weeks ago I was visiting a city in the upper part of this state, about 300 or 400 miles from here, and, being there on business and having a little time at my disposal, I rode about the city, and of course when I saw a golf course I started to look it over. They were constructing a new green rather near the clubhouse, and the greenkeeper came over and wanted to know what I wanted. I said I was just a visitor in the city, was from New York, and was interested in golf courses. He said, "What do you think of it?" I said, "I don't think much of it." He said, "Well, who are you?" I said, "Oh, I am nobody." He said, "Well, you must know something about it." I said, "May be. Why do you build it that way?" He said, "Well, that is the way the chairman of the green committee wants it." I asked, "Do you approve of it?" He said, "No; I don't think much of it." I asked, "Why don't you put in some drain-tile to help it work?" He said, "We can not afford to use drain-tile." I asked, "How much is it going to cost you to build it?" He said, "I don't know, but it will cost a good deal; we had to cart all this dirt up here, and I was about three weeks building it with four men." I said, "You can not afford to spend the money for drain-tile?" He said, "No; we don't use that." I said, "Are you a member of the Green Section of the United States Golf Association?" He said, "Oh, yes; you mean that little pamphlet? That is the finest thing in the world. That bulletin is worth twice as much money as they ask for it, because that is the only place I can find anything worth while knowing." I said, "Well, if you will give me a copy of that bulletin I will show you my name;" and I showed him, and then he was very polite. I said to him, "Who is the chairman of your green committee?" and he gave me his name. I said, "Is he in town?" He said, "No; he is away now." I said, "Here is my card; tell him that this gentleman disapproves of his work and thinks he will regret it; he is spending a lot of money, and the thing is badly shaped and constructed to begin with. Who ever heard of a hollow on top of a hill? If you want quick results, first take the front part off of it, and let the water run out."

I hope I did some good. Now, those are the little things that all of us, I believe, can do—men who are sincerely interested in improving golf courses. I do not believe people's feelings are hurt if you tell them the truth. They may be offended for a moment or two, but afterward they will think you are a wonderful fellow.

There is another matter which should be of great interest to you and your club, both as to the construction cost and maintenance. I refer to the unnecessary types and sizes of putting greens; and the whole matter is wonderfully handled in an article of this month's[1] BULLETIN by Prof. Piper, which is the first and only article on the subject which has come to my notice; and the matter has been for several years a noticeable item of abuse in new construction. Prof. Piper's article on "The Size of the Putting Sward" I beg of you not only to read, but to study and to give it your serious consideration. You may be able to apply thoughts to your own course and cheapen your maintenance account.

I can bring out a few thoughts for you when I tell you of an incident

[1] December, 1923.

similar to the one I related just a moment ago. Over a year ago (I will not say where it was, but it is between here and Chicago) I was at a certain place. I had been there a couple of days at meetings of a board of directors on a business matter, and they invited me out to play golf and loaned me clothes and golf clubs; but they took my money just the same. I met a man who happened to know me, and he went to some of the men there and said, "Get his opinion."

Now, here is the story. It is a large city, a city of 50,000 or 75,000 inhabitants, with a lot of wonderfully good sports, fine men, manufacturers chiefly; and they had played on a 9-hole course for about 12 years, and then they wanted to get the real thing. Well, they sent for someone who ought to know about soil conditions and topography and all those things, and started in to lay out an 18-hole course. They retained a first-class architect, and he appointed a superintendent, and they began the work. They took me out to see it and asked my opinion of it. They said, "How much do you think you could build a course like this for over your way?" I said, "I don't know, but probably for $50,000 or $75,000." They said, "Do you mean complete, ready to play golf on?" I said that I did. They said, "Well, we have spent over $100,000 on this piece of property already, and we can not play on it yet." I said, "I can not believe you have spent any such sum of money, provided the money has not been wasted." They said, "No; it has been properly spent." I said, "Then, if it has been properly expended, I do not care to believe it." They said, "What is the argument?" I said, "Well, you did not get your money's worth." I succeeded in interesting them with the few remarks I made, and they took me to the accounting office and showed me bills of $103,000 for labor, seed, fertilizer, and a few implements. The prices were all right; they had been paying at the rate of 40 cents an hour, and had paid the superintendent the proper fee. Where did it all go? They did not know. The course was to have been ready last May, but they have not been able to play on it all this season, because it was not fit. I said, "This is very sad; you are certainly good sports; you have put up your money." And one of them said, "Yes; and the worst part of it is that $25,000 of that money was to go toward a new club-house, and I guess that will have to wait for another year." I said, "There is something wrong somewhere." They said, "What is it? What can we do to remedy it?" I said, "I am in no position to help you." They said, "Well, will you criticize, please?" I said, "Yes. Who did the work?" They told me, and the man who did the work had been retained as greenkeeper. Well, I always fight open and above board, and I said I would like to have them call a meeting and have that man there. They made arrangements to have him there, and they became so interested that they had nearly all of the Board of Governors at the session the next morning. Well, we walked around the course a bit where the club-house was to be, and I said that I would like to see the course. We traveled over two or three holes, and I looked at the greens, and they had no bent on them. I said to the greenkeeper, "Why did you build a green like this?" He said, "It is a beautiful green, is it not?" I said, "It certainly is; but why did you build it?" He said, "Because it is a beautiful green." I said, "Fine; but this is your third hole and you have a hole here of about 275 to 325 yards. How long is it?" He said, "This hole is about 375 yards." I said, "Not with me." He said, "Oh, yes; it

must be 375 yards." I said, "Well, we will measure it." So we measured it by strides, and it figured exactly 290 yards. I said, "Well, there you have a green for a 290-yard hole with an area in excess of 10,000 square feet." He said, "Yes; I guess so. I don't know." I said, "It looks to me in excess of 100 feet wide and a little bit longer." He said, "I think so." I measured it, and it measured about 115 feet across and 120 feet deep. One of that committee was a man who is state champion of the game, and several others were very good players—men who play a fine game—and I said to them, "Do you call this a good green?" They said, "Yes; it is a beautiful green." I said, "It certainly is; but why do you want to have a green of this type and size?" They said, "Well, what is the matter with it?" I said, "There is a whole lot the matter with it. To begin with, you have 6 or 7 feet of fill on this side and 4 or 5 feet on that side, and the part that you would make the real green to this hole you did not need to fill at all; so this green has cost you three or four times what it should have cost you. Do you think that is a fair hole to play, for instance, for an ordinary player like myself?" They thought a bit, and then they said that it would not be a fair hole. I said, "What is the idea of building it that way?" They said they wanted to make it beautiful. I said, "Yes; but don't you understand that here you have a green with an area of nearly 12,000 square feet to be used for a mashie pitch of a 290-yard hole? Just think what it will cost to maintain that green for a period of 21 years; just think what it means to water that green alone; just think what it means to keep the grass growing on it, for beauty alone." They said, "Yes, there is certainly something in that." Then we took the next hole, and that hole was 150 yards, an iron shot. They built the green on a knob, likewise with a considerable fill. For that 150-yard hole they had something again in excess of 10,000 square feet of green, with a 30-foot pitch down hill. I said, "Gentlemen, I think I have had enough. This is where your money has gone. I can see that you have spent nearly $110,000, when you should have spent only about $60,000 or $70,000." We walked down the course, and I said to the man, "What are you doing with your greens anyway?" He said, "What do you mean?" I said, "Just look at this." He had a gang of men working there cleaning up along the side rough. I said, "Why don't you work on your greens?" It was the 1st of November. "Why don't you get your greens in shape?" He said, "I can not do anything else than what I am doing." I said, "Oh, yes; you can." We got down to the 11th hole, and I said, "What is that over there?" He said, "That is an old celery field." I said, "What are you doing with it, plowing it?" He said, "Yes." I said, "Why don't you use it—make some use of it as it is?" He said, "What is your idea?" I said, "My dear fellow, that is the stuff over there that will make your greens. You can cart that out merely for the price of the cartage. That is the kind of stuff that we pay $16 to $20 a ton for in New York. It is called humus. Here you can get it for nothing." I said, "Why don't you put it on your greens and fairways? They need it badly enough." Previously to that I had found some brownish-red stuff on the ground, discolored by the soil, and I said, "What is that?" He said, "That is lime." I said, "How much did you put on?" He said, "We put a lot on—a lot of lime." I said, "Well, why don't you wash some of it off? Then it will do more good."

Well, I just went from one thing to another. But what I want to

bring out is this, that all you men who know this game and who are interested in it can find an opportunity to plant the seeds of efficiency where needed. There are a lot of people spending their money in places doing things because they do not know, because they do not think; and we fellows just walk around and permit them to do it. Now, are we really sincerely interested in the good game of golf if we permit men to do that sort of thing? You may make yourselves unpopular for a moment or so, but when it is all over you will feel much better, and so will the other fellow. I am speaking along these lines, because that is the work of the Green Section. Whether you have your names on the front page or whether you are a high private in the rear rank, I say that we all have our opportunities, and should make the best of them.

Now, gentlemen of the green committees, yours is a business proposition, absolutely without sentiment, "with or without a budget," and, as such, efficiency is the only item your boards of governors can not control. So you must bring it forth with your work and use plenty of energy to put it over. Consult with your greenkeeper and help him to think out his problems and troubles. Your team work must bring more satisfactory results, for greenkeeping parallels the saying, "Life is one damned thing after another."

(Mr. Barrett's address was followed by a general discussion with regard to what is the proper depth for good, rich soil on the top of a new putting green. Widely divergent opinions were expressed on the subject, whereupon Dr. Piper took occasion to make the following remarks:)

Dr. Piper. Mr. Barrett has opened up a very complex question and one which I was hoping would come up in the course of this discussion. It happens to be a subject which we have been investigating a good deal, and I am sure that we are not yet ready to say the last word in regard to it.

Some years ago there was a putting green at the Columbia Country Club which was built on a surface of natural soil, which is a fairly heavy clay soil—not so heavy but what the water percolates through it fairly well; so it is well drained. A new green was built close to it, and 18 inches of very rich soil was put on top of it. The turf of the old green, which was very superb bent turf, was removed and put on the new green. That was three years ago, but the turf has never seemed to be as good on the new green as it was on the old green, although it is absolutely the same turf. Apparently the explanation is that where we have 18 inches of very rich soil we can not control the fertilizing of the grass. On relatively poor soil you can control it from the top, but on the very rich soil you no longer have that control. That seems to me to be part of the answer, at any rate.

Now, another point. Mr. Barrett's greens are superb; there are no better greens in the country than his—that is, among seeded greens. He has a sandy loam soil which drains perfectly. That is quite a different story from a soil where an inch or two below the surface you have a very stiff, heavy clay, which is very commonly the case. The subsoil will then become wet and waterlogged, and you will have more or less trouble from that condition.

It is our present belief that 4 inches of good loam top soil is sufficient. We think that will give you the resiliency of soil needed, and ample feeding for the grass roots.

Now, as to the depth of grass roots, we have a very extensive series of experiments going on, and the results have not yet been published. But this fact stands out, that the depth of the roots is in exact proportion to the height to which you let the grass grow. If you keep the grass short, your roots will be short—certainly so with creeping bent. We never have found those roots over 2 inches long under putting-green conditions; that is, their feeding is practically all done from the surface soil. Now if that is poor soil and you do not feed it much, the roots will go deeper. The exact details of those experiments will come out in an article one of these days; but our opinion is that 4 inches of good loam top soil is enough. It will do no harm to have more, provided you do not put so much manure and stuff in there that you can not control the growth of the grass. There are scattered all over this country putting greens that were built simply by mowing the natural grass on them, seeding with creeping bent, and then fertilizing; and although that type of putting green is becoming rare, very fine turf was grown on them.

I want to emphasize again that what we consider the main thing in regard to the depth of the soil is the nature of the subsoil. If your subsoil is good, permeable soil, such as Mr. Barrett has, you are not likely to have any difficulty; but where you have a still, heavy subsoil and only 1 inch of soil on top, your soil is altogether too thin. These are our present views.

Tile-Drainage for Golf Courses

By WENDELL P. MILLER, *Agricultural Engineering Department, Ohio State University*[1]

Tile-drains are a necessity on the average golf course for two reasons. The daily golfer readily observes that tile-drains are needed to remove surface water which accumulates during periods of excessive rainfall so as to obviate the necessity for fishing for golf balls in natural depressions and artificial traps. The second and real reason for tile-drains, and the one which I want to discuss, is the necessity for the removal of excess ground water.

Those of you who read THE BULLETIN from cover to cover know of the countless failures and difficulties in golf course management which have been charged to faulty underdrainage conditions. Practically every ill from which a course may suffer has at some time been blamed upon the thing which we call excess ground water. But have you ever heard anybody say that he had proof of damage from too much tile-underdrainage? While tile-drainage is not a cure for all the ills of the golf course, it is a factor which merits more careful consideration than it has received at the hands of architects, contractors, and greenkeepers. Those responsible for our golf courses can not be blamed for their sins of omission, because there has been and still is a great lack of fundamental drainage information and engineering data. A large part of the information which I employ when designing a drainage system, is the result of personal experience gained since my father first sent me out as a boy with a hoe to clean out the clogged tile outlets of our farm drainage system.

The following are the most important and undisputed benefits to be derived from tile-drainage:

1. By removing the excess ground water, tile-drainage firms the soil

[1] In this article Prof. Miller presents the substance of his address on this subject delivered at the annual meeting of the Green Section, January 4, 1924.