

lems with such greens can be determined or anticipated. Certainly we are aware that the absolutely perfect green has not been devised, and because of the characteristics of Nature and golfers, no such green will ever be built.

Simply, we are striving to reduce as many ills and satisfy as many golfers as possible. Even though this is a significant breakthrough in green construction, we hope for additions or improvements in the future.

Problems to anticipate are:

1. Specification greens must be built exactly — **with no variations**. This makes them relatively difficult to build.
2. The topsoil must be uniformly and homogeneously mixed off site. This can be expensive, but certainly no more so than some architects charge for non-specification greens.
3. Often it is difficult to locate the most suitable sand. A medium grade or mason sand with less than 10 per cent fines or silt is necessary. Silica sand is superior to calcium carbonate.
4. Seeded or stolonized putting surfaces must be **kept moist constantly** until roots have penetrated to a depth of at least one inch.
5. More plant nutrients are needed for the first few years.

6. Specification greens **must** be topdressed with material **exactly** identical to the soil mix used in construction. Exacting methods of construction and topdressing must be followed at all times — this can be a problem for the sloppy builder and the careless superintendent.

Certainly, we are not naive enough to suppose that all future greens will be built according to specifications, or that most greens constructed in the past even come close to meeting these specifications. Further, many old greens have supported excellent putting surfaces for decades. Other methods of building are largely left up to the builder or contractor, and every conceivable type of soil mix is used.

It seems that a one-part soil, one-part sand, one-part peat conglomeration has performed quite satisfactorily, even though rarely does anyone make any effort to define or determine just what sand, soil and peat actually are. Further, many greens made from strictly native (on the site) soil have performed adequately, as long as rapid and sufficient surface drainage is afforded.

With increasing and excessive demand, both from traffic and for putting qualities, improved building procedures are becoming essential. The specification for putting green construction as developed by the USGA Green Section is a giant step in this direction.

# Soil Physics and Green Construction

by HOLMAN M. GRIFFIN, Northeastern Agronomist, USGA Green Section

It appears that we of the Northeastern Green Section Staff must do more to convince anyone building a golf course that the Green Section specifications for the construction of putting greens must be followed EXACTLY.

Many greens have been started with the idea of making them exactly according to the Green Section specifications, but, most often, some charges were made, and at present there are only 18 of these greens in the area east of Ohio and north of the Carolinas.

Some common reasons offered for not follow-

ing through with the specifications are:

- (1) We didn't have time for a soil analysis.
- (2) We made some changes to cut expenses.
- (3) We had to sod with whatever was available to get the green in play. And so on ad infinitum.

Well, we get pretty tired of hearing things like, "These greens are built exactly according to USGA specifications except for . . .," and then comes the clincher about leaving out the sand layer or modifying the soil mix or some other such thing which completely changes the

whole order of things. Unless the greens were constructed **exactly** according to specifications, soil analysis and all, we really don't care to share in the responsibility for their success or failure.

Now, let's ask the question, "How do you build a golf green?" There are USGA specifications and there are other specifications; many right ways and an infinite number of wrong ways. It just seems most logical to me that you would start out building a golf green in the same way you would construct anything else—you must first have a plan.

Almost anyone starting out to build something gathers facts which he arranges in a logical order. The more that is known about the construction materials, the better you can visualize the finished product and its durability. In the case of a golf green, the construction materials are basically soil, sand, peat and gravel. We need information on their physical nature, as well as some idea of how they should be shaped together in order to do the job properly.

The final shape of the materials or topographical information will affect maintenance, play and surface drainage. However, regardless of contour the green will not be a good one unless it is built with adequate internal drainage, the potential to sustain good turf under proper management, and a resilient surface.

Previous trial and error has shown that a green should drain in more than one direction, preferably not to the front, and that a slope in excess of one per cent is required for adequate surface drainage. With this information, a bulldozer, and enough money for grass seed, you can build a golf green. This not only **can** be done but is being done every day all over the United States.

The old method of using native soil in a hit-or-miss combination with sand and organic matter has given us many excellent greens in the past, but it simply is not adequate for green construction in this age of maximum traffic. To stand up under the onslaught of today's traffic, a green must be smooth, resilient, well-drained, possess adequate hole location areas and be of interesting design. Basically there are two ways to build a good golf green such as the one just described. One way is to keep mixing and rebuilding until you get what you want. The other is to use soil physical data as a basis for construction. The first method of construction is akin to Russian roulette, except the odds aren't as good. The second method—the proper use of

physical analysis—is practically a certain success every time.

Since the Green Section developed and released a method of physical analysis of soil mixtures for putting greens in 1960, and combined this with a practical method of green construction, there has been little need for guess work in the construction of greens. We readily recognize that this is not the only method for properly constructing a green, but in my opinion every other method introduced thus far is a very poor second.

Some very logical questions might follow here such as:

"How can a laboratory analysis from Texas tell me what I need to build a golf green in New England?" Or!

"Soils are different, climate is different, and my Green Committee is different, so how can I use the same specifications as everyone else?"

The answer to both questions is that, although there are major differences in all factors, we are dealing with constant values, or tolerances, by which we measure the soil, sand, and organic matter to determine how it will be used. Actually, we are dealing with laws of physics, and soil physics in particular.

The physical data determined in laboratory analysis determines the acceptability of a soil mix, and common sense and good judgement based on previous experience determines the desirability of an acceptable mixture. What the Green Section has developed is a yardstick to measure soil mixtures and a method of building a green so that the components complement each other. Without a yardstick and a method or plan to follow, we can only guess what the result might be.

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#### CORRECTION

A portion of the article "An Eviction Notice for *Poa Annua* on Fairways" that appeared in the January issue of the USGA GREEN SECTION RECORD was in error. The article incorrectly read "During the first week of August all fairways were sprayed for broadleaf weeds, including knotweed, with a combination of 16 pounds Dicamba and eight ounces of a MCPP formulation per acre." The Dicamba content should be 16 ounces, not 16 pounds. The GREEN SECTION RECORD regrets the error.