

east to west as guide lines:

- I-40 and south September 15 to October 1
- I-20 and south October 1 to October 15
- I-10 and south October 15 to November 15
- I-4 and south November 15 to January 1 or no overseeding.

Many golf courses in extreme south Florida and south Texas do not overseed every year. Many golf courses in the upper south use temporary greens during the winter months, mulch the permanent greens with straw or cover them with black plastic to reduce winter kill.

HELPFUL CHEMICALS

Many fungicides are available to protect seedlings while they are becoming established and to assure a good putting surface. Throughout the winter

season, stay on a preventive program to keep disease from becoming a problem. There should be enough material for at least two sprayings on inventory all the time.

There will be greater root development if the first mowing is from 5/16- to 3/8-inch. As soon as possible thereafter, begin to lower the height of cut to minimize irregular roll of the ball. The fine leaf grasses reduce variation of roll of the ball.

The dreaded Pythium and damping off diseases should not be a major problem if fungicides are applied at the proper time. Other diseases may also be a problem but with broad spectrum fungicides they should be kept under control. Ideal conditions for diseases to develop are created by the management requirements of greens.

During the first 10 to 15 days, management of water is very important. Seed should be kept damp by syringing four to five times a day to assure proper

Maintaining and

by **STANLEY J. ZONTEK**, Northeastern Director, USGA Green Section

In today's modern golf course operation, simple economics have forced mechanization of just about every possible maintenance operation. The triplex putting green mower, mechanical sand trap rake, large hydraulic fairway cutting equipment illustrate the point. The quest is for ease, speed and efficiency. Why then discuss a maintenance operation that almost totally requires time-consuming and expensive hand labor; i.e., maintaining and defining a hazard? Well, it is because one should not lose sight of the fact that a golf course is not a sod farm! A golf course will ALWAYS require hand labor and has built into it features that are only maintainable by hand. One of the situations that require periodic hand maintenance for good looks and hazard definition is the care and repair of ever-eroding sand bunker faces and lips.

GENERAL TYPES OF BUNKERS

Many of the golf courses in this country have

bunkers of the type depicted in Figure 1. They are basically of the design that have essentially flat sand with grass-covered mounts extending down to the sand. This picture from Colonia Country Club, Colonia, N.J., shows the new construction of several of these older but effective and aesthetically pleasing bunker types. As with any new construction, maintenance problems arising from eroding edges are some years away.

Such is not the case on many of the older courses in the country that have had bunkers of this type for many years and eroding banks and lips are indeed a problem that can only be dealt with by renovation or reconstruction.

Figure 2 illustrates the problem. Figure 3 shows what has been done at the Garden City Golf Club, Garden City, N.Y. The grass mound facing (Figure 2) shows the extent of the breakdown and erosion problem. The bunker in Figure 3 has been renovated. Needless to say, a big improvement in the appearance and playability has been made (how would

Figure 1. Old style sand bunkers under construction.



sprouting.

Over a period of years, pre-emergent chemicals have been used 45 to 60 days prior to overseeding to control weeds, mainly *Poa annua*, but some companies do not recommend their chemical for such practices. Perennial ryegrasses seem to tolerate the pre-emergent treatment better than bent, fine leaf fescue, or bluegrass.

Courses with greens overseeded from October through July 1 should consider renovating greens and using bent. Some resort courses are open for their season from December to May 1 and are on standby maintenance the remainder of the year. The program of overseeding will vary for those clubs open for 12 months of play. There are many variables that must be considered in bermudagrass overseeding. But the one goal of the superintendent to provide championship putting surfaces for the winter months never changes.



Figure 2. Deteriorated face of old style bunker, a problem on many golf courses.

Defining A Hazard

you like your ball resting between one of those tufts on the non-renovated mound?).

Problems of this sort may be found on many golf courses. How is the renovation work best accomplished? In this case, the bank was first stripped, removing the thin vegetation and any sand accumulation. Soil was added back to the desired grade and the area resodded. Depending on how the sod is laid, pegging it down may or may not be necessary.

This procedure sounds easy, but in reality it requires much hand labor to keep the areas good looking, playable and maintainable.

Figure 4 is an example of the second basic type of bunker construction... sand extending up a face. Although aesthetically pleasing when well-maintained, this type of construction is expensive to sustain especially in areas prone to heavy rains. Rains will frequently wash out the steep sand faces, usually dirtying the sand, and require much hand labor to shovel or re-throw the sand back onto the face again. This style of bunker is also expensive in terms of raking. It does not adapt well to the mechanical sand rake. It requires more hand raking on the slopes than the flatter types.

The solution to the washing problem is not easy. It usually requires reconstruction or recontouring of the subsoil so the slope is less severe, or to reconstruct to reduce the actual sand face surface. Other than this, golf courses having this type of bunker, and liking it, must accept the higher maintenance required by this design.



Figure 3. Renovation of the old style bunker grass slopes. Certainly an improvement over Figure 2.

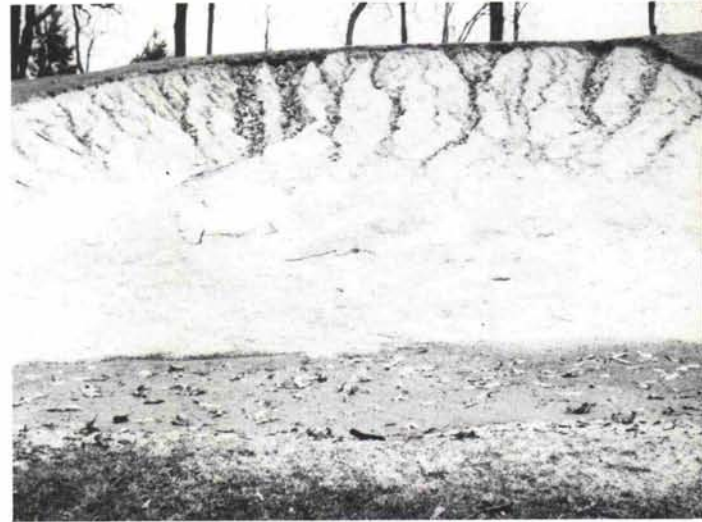


Figure 4. New design sand bunker, with soil erosion problems.

MORE PROBLEMS

Figure 5 illustrates a problem common to all sand bunker types . . . that of sand accumulation on the collar resulting from years of bunker shots. As is usually the case, the collars suffer due to the sand build-up and low water-holding capacity. As is usually the case, the solution to this bunker maintenance problem is not quick, easy or economical. It requires hand-digging and removal of accumulated matter back to the original soil and resodding with new turfgrass. Because this type of problem requires years to develop, corrective measures are only infrequently needed. However, when they are needed, they are in fact and indeed needed.

DEFINING A HAZARD

So far, this article has shown several differing types of sand bunker design and how they may be renovated when deterioration sets in. We are not attempting to judge design but rather to stress the need for continued maintenance of these important play areas. Good looking and playing sand bunkers

of whatever design are an asset to any modern golf course.

This final point should be stressed. Sand bunkers are hazards. By definition, a "hazard" is any bunker or water hazard. A sand bunker is an area of bare ground, often a depression, which is usually covered with sand. Grass covered ground bordering or within a bunker is not part of the hazard. (Definition 14a.) A problem can arise if there is no clear boundary to a sand bunker (see Figure 2). If a ball is clearly in a hazard, certain Rules of Golf pertain . . . non-grounding of a club, etc. There is a question then, "Is the ball in a hazard or is it not in a hazard?" Keeping lips and margins well defined will reduce or eliminate such questions in the mind of the golfer.

Unfortunately, in today's overall golf course maintenance operations, hand labor of the type needed for good sand bunker upkeep is usually at a minimum. Every type of bunker on a golf course requires maintenance and/or major renovations at some time or another. It is essential that this work be done so that sand hazards will play well, be well defined, and be good looking.

Figure 5. Sand build-up from exploded bunker shots. A problem with any bunker design.



Turfgrass Wear¹

by DR. JAMES B. BEARD

Department of Soil and Crop Sciences, Texas A&M University

Turf located on public areas such as parks, golf courses, and sport fields will be subjected to increasing traffic in the coming years. These open green areas near urban centers will be used more frequently and intensively than ever before by indi-

viduals whose mobility has been restricted by the increased cost of energy for travel to more distant outdoor recreational areas. Discretionary time available for leisure activities is expected to amount to at least as much or possibly more than in the past, thus providing substantial amounts of time for outdoor recreational activities. These increasing traffic pressures on recreational and sport facilities will re-

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