

Subject | Ian Tittershill

The science of bunker drainage

Ever noticed how vehemently two golfers can disagree on what makes for a good course? But then, golf design is subjective and what is 'great' to one person may not be so for another. The fundamental rules of golf course construction are, however, rather less subjective. The first lesson I learned in golf construction—which is just as true today—is that drainage is key. This is never more important than in the design and construction of bunkers.

The lack of good drainage in bunkers on some of the most famous golf courses in the world remains a mystery to me. The use of bunkers as catch basins is not uncommon: the look in the superintendent's eyes when I explain that the bunker and surrounding area was designed this way is something I never get used to!

I recently visited a prestigious golf course in Brazil, Fazenda da Grama. It is one of the most beautiful courses I have seen and is maintained in a detailed and sympathetic manner. However, the greatest challenge the greenkeeper has is bunker maintenance. In the rainy season, the course will be hit with rain every day—between two and four inches each day for over two months. Every single rain event will washout and contaminate all 90 bunkers.

Simple drainage schemes have long been used in bunker construction. A drain consisting of perforated pipe with gravel overlaid has been considered adequate (or just the only solution). The additional use of bunker liners has, in some

cases, helped keep sand on slopes and eradicated an element of contamination between the bunker sand and indigenous soils. However, the fundamental drainage principles within bunkers need to be challenged if superintendents are to be provided with a product that can be efficiently maintained.

Water moves through sand under gravity. As rain (or irrigation water) saturates the sand, the water seeks to migrate from the slopes or faces downwards to the base of the bunker. This water movement causes washout or sand movement from the slopes. As the sand is moved, the water erodes the faces and causes contamination. When the greens staff return the sand to the faces, they actually place a mix of sand and indigenous soils. This creates further problems of sand quality and reduced drainage capacity next time it rains. The water has now moved to the base of the bunker—so, ironically, the area which is the preferred place for playing bunker shots is the wettest part!

As noted earlier, standard drainage in a bunker usually consists of a pipe overlaid with drainage. The problem with this is that the moisture will only transfer from the sand (small voids) to the gravel (large voids) under gravity. A slow dripping process ensues and the bunker will eventually become drier. Clearly we need to look at the physics of water movement and develop a strategy to enhance the evacuation of water from the sand in a more efficient manner than simple gravity. The traditional



Ian Tittershill

Ian Tittershill is managing director of Sportcrete, which provides bunker lining systems to golf clubs worldwide.

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drain effectively creates a perched water table in the base of the bunker, and while this is what we want on the green to develop root growth, in a bunker it causes a soggy mess.

Imagine having bunkers that are consistent throughout. No matter how much rain falls, the faces are the same as the base, and the sand remains on the faces. When discussing bunker construction with Stephen Byrne, course manager at the Wisley club in England, he indicated that consistency was his priority.

Bunker construction and lining is extremely important in both construction and maintenance. Bunkers account for less than two per cent of the playing area on a typical golf course yet account for over 25 per cent of maintenance costs. It would be fair to say that more money is spent on bunker maintenance than green maintenance on a modern golf course.

The challenge is to have bunkers designed, constructed and lined to enable maintenance and work with natural conditions and environment. It is impossible to keep sand on 90 degree slopes, so bunkers should be designed with maintenance in mind.

Our Sportcrete lining system is one product available which has been specifically developed to enhance the drainage of bunkers. Sportcrete is a system that works with the natural movement of water within sand and encourages the movement rather than fights it. At Sherwood Country Club in California, for example, where our system was installed as part of a bunker renovation led by Nicklaus



Sherwood CC in California has Sportcrete bunkers

Design in 2009, director of agronomy Sean Dyer reckons he is saving 175 man hours of labour—and around 30-40 tons of fresh bunker sand—every time there is a storm. “As long as the piped drainage works, there seems to be no limit to how much rain the bunkers can take,” Sean told me.

Systems like Sportcrete may add to upfront costs, but long-term savings can be significant. We all look for bunkers that are maintainable and in the truest sense of the most used word in the industry these days, sustainable. Now, there’s a thought: sustainable bunkers. ●