

# Golf Design for Maintainability

*Even as new course development slows in our area, reconstruction and renovation of existing layouts continues at a steady clip. Whether it's new construction or complete remodeling, applying the principles of designing for maintainability during the planning phase can have long-term implications for the maintenance budget AND the challenges faced by the superintendent.*

First impressions endure. A firm handshake, shiny shoes, a freshly painted front door and for golfers, the condition of the first tee and fairway at a golf course they are about to play for the first time. Golf is undoubtedly a game played on the ground, but even more so in the mind, and the golfer's first impression can mean the difference between a walk in the park and a good walk spoiled.

Golfers routinely judge the quality of a golf course by the color of its grass. The greener the turf, the better the course. Due in large part to tremendous media coverage of professional golf events, even the casual golfer has come to expect manicured tees, fairways and putting greens, not to mention roughs. Fair or not, a golfer's initial perceptions are often based on what he or she sees. Over the next four-and-a-half hours, this impression will impact the golf experience and the perceived value of the greens fee. Even with a winning design, if the golfer's first impression is negative, great service, playability and strategy may not make up for perceived flaws in course conditioning.

In the early days of golf, courses required relatively little or no maintenance when compared to the "round the clock" attention given to today's courses. Today, maintenance costs typically account for the single largest annual expenditure in a golf course operating budget. As labor, insurance, supplies and equipment costs continue to rise, superintendents are being asked to do more with less. In the current economy, many superintendents are being asked to trim maintenance budgets and to further stretch already

thin maintenance dollars. Forward-thinking golf course developers are increasingly mindful of the long-term maintenance costs and frequently look for ways to reduce these costs during the design phase. Proactive owners of existing golf courses are seeking ways to make their courses more maintenance-friendly without sacrificing the golf experience

Golf course construction is a one-time expense usually amortized over several years until the loan is paid off. Maintenance, on the other hand, goes on in perpetuity. As long as the golf course is open for play, it must be maintained in some fashion. It is the golf architect's challenge to design courses that can be maintained efficiently and cost-effectively while offering an enjoyable golf experience to a broad player profile. Strategic challenge, aesthetics and playability need not be sacrificed to make golf courses maintenance-friendly. Gentler slopes that don't require hand-mowing, integration of natural drainage patterns, use of indigenous grasses and less-manicured turf often

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*Sand bunkers with capes and bays that are mowable or planted with low-growing native grasses tend to require less hand-work than those where the sand is flashed high on the capes.*

result in reduced maintenance costs. In addition, these courses are usually more environmentally sensitive.

Paying attention to the design details to ensure a course can be cost-effectively maintained can pay dividends in the long term. Every effort should be made while the plans are on the drawing board to identify areas that may pose maintenance challenges. It is far more economical to revise a drawing than to rectify the situation during or after construction.



*Native grasses are used in out-of-play areas to conserve water and to reduce mown turf area.*

### Design Considerations

The most intensively maintained areas of a golf course are the tees, fairways, sand bunkers and putting greens. Paying attention to some basic design guidelines will ensure that these areas can be maintained in a cost-efficient manner.

### Tees

The teeing area is perhaps the most intensively used area on a golf course. Day in and day out, golfers of every shape and size compact the soils, tear turf and literally remove the turf from the tee surface. Teeing areas insufficient in size to allow the superintendent to distribute wear results in bare ground, increased disease problems and less-than-optimal playing conditions. Through routine maintenance, divots are filled with seed mix and the turf regenerates. However, if the usable tee area is so small that the turf never gets a chance to heal properly, the superintendent must use labor and budget resources to sod and level the tee. Sizing tees to han-

dle the anticipated level of play can reduce this maintenance outlay. As a guideline, usable tee area on a par 3 should range from 10,000 – 12,500 square feet, and from 7,500 – 8,500 square feet on par 4s and par 5s.

### Fairways

Collectively, fairways comprise the largest area of intensively maintained turf on a golf course. Fairway design is largely dependent upon the location of hazards, landforms and

the direction of play. The area where the majority of golfers are expected to hit their tee shots, referred to as the landing zone, is usually wider than the rest of the fairway. Judiciously narrowing fairway in front of tees and between the landing area and the green is one way of significantly reducing the total area of maintained turf. This approach reduces mowing, irrigation, spraying and fertilizing costs, which can result in substantial savings over several years.

Positive fairway surface and subsurface drainage is essential to the maintenance and playability of the golf course. Poor drainage results in turf that cannot be mowed, is prone to disease and impedes play. When a course must be closed after a heavy rain, it is usually because the fairways do not drain properly, resulting in lost revenue and increased maintenance costs to mitigate disease problems.

### Roughs

Native grasses integrated amongst the golf course landscape in

out-of-play areas can provide tremendous wildlife habitat while reducing the area of maintained and irrigated turf. Aesthetically, native grasses can frame a golf hole, providing a striking visual contrast between emerald green fairways and large swaths of naturalized area. Native grasses can also be planted on the back sides of mounds and bunkers to add character and visual contrast. Planting large areas with native grasses reduces the amount of intensively maintained area and over the long term can reduce maintenance costs significantly. But it is very important to emphasize that these areas should remain in out-of-play areas. Most golfers look at native grasses that encroach upon the course too closely as a hazard where many golf balls may be lost or found during their round, resulting in slow play.

### Sand Bunkers

Sand bunkers are widely considered one of the most controversial, yet humbling features on a golf course. Perhaps only putting green contouring and green speeds garner more attention; however, neither as an architectural feature defends par quite as well as a well-positioned sand bunker. Sand bunkers are also one of the most labor-intensive features on a golf course. Golf architects and superintendents are frequently at odds as they banter the aesthetic and creative elements of bunker design with maintainability.

Sand bunkers have always contributed to the strategic and aesthetic character of golf courses. Most often used in a penal, heroic or strategic fashion to protect par, sand bunkers are also used to direct and contain play and for purely aesthetic reasons.



*Surface runoff into a bunker and poor internal drainage are evident by washed-out sand and "the pond."*

From a maintenance perspective, bunkers can pose several challenges due in large part to their design. The shape and severity of some bunkers requires routine maintenance by hand-raking while others can be maintained with a motorized rake. Hand-raking is labor-intensive and thus less cost-efficient. Bunkers designed to be mechanically raked should be sized to allow the operator to turn the bunker rake and to enter and exit the bunker from different locations to avoid wear patterns.

Good drainage is fundamental to maintaining sand bunkers. Water enters a sand bunker either from precipitation or from the surrounding ground area. It is important to understand the drainage patterns surrounding a bunker and how maintenance will be impacted. Limiting the amount of surface drainage that enters a bunker is essential. This can be accomplished by creating land-

forms that divert water away from the bunker edges, and by the use of hollows and drain inlets that intercept surface water within close proximity to the bunker itself. It is nearly impossible to catch all of the surface water before it reaches a bunker. Bunkers with steep capes require more hand-work after a rain event as sand washes off the face into the bottom of the bunker. Few tasks are more labor-intensive than shoveling sand back on to a steep cape of a bunker after a thunderstorm. Grass-faced bunkers with mowable capes and bays tend to require less hand-work than those where the sand is flashed high on the capes.



*Native grasses provide a dramatic backdrop and visual separation between the 16th and 17th holes at Hawks View Golf Club, Lake Geneva, WI.*

The maintainability of sand bunkers is largely a factor of the physical makeup of sand and how it is maintained. From a golfer's perspective, how a golf ball comes to rest in the sand after landing in a bunker is perhaps the most important criterion of sand quality. The golf course superintendent's criteria may lie in more scientific characteristics including particle size, particle shape and penetrometer value, crusting potential, chemical reaction (pH) and hardness, and infiltration rate. These characteristics have a tremendous impact on how the superintendent maintains the bunkers as well as playing quality. It is most common and usually cost-effective to use locally available sand, if it is suitable. As a general rule, it is always prudent to have sand tested by a USGA-recommended or A2LA physical soil testing laboratory. There are two distinct parts to the bunker sand evaluation process: the particle size analysis and the bunker evaluation test series.

The particle size analysis is per-

formed to evaluate the impact bunker sand may have on the agronomics of an adjacent putting green as well as its propensity to produce fried-egg lies. Typically, sharp angular-shaped sands have more favorable ball-lie characteristics than round-shaped sands. During the course of play, sand is displaced from a bunker to the putting surface during a recovery shot. Surprisingly, a considerable amount of sand is broadcast on the putting green with each shot, which over time builds up, producing a distinct layer that can impact play, maintenance and agronomic characteristics. If the sand is too coarse, the larger particles will remain on the putting surface and can deflect a golf ball from its line or damage mowing equipment. Sand with too many fine particles may contribute to poor drainage through the

root zone, resulting in unhealthy turf prone to disease. Therefore, in the case of greenside bunkers, the particle size distribution of the bunker sand should approximate that of the sand used in the construction of the putting green.

The bunker evaluation test series judges a particular sand on several factors that contribute to the playability of the sand. These factors include the sand's crusting potential, chemical reaction (pH) and hardness, infiltration rate and color, which combined with the findings from the particle size and shape analysis results in the sand's overall playing quality.

## Putting Greens

Similar to tees, putting greens receive a tremendous amount of wear per square foot of area. Putting greens designed with multiple pinning or flagstick locations tend to allow the distribution of play, resulting in healthier turf and fewer maintenance challenges. Surface drainage should flow off the green at several points into adjacent hollows and not into greenside sand bunkers. The width between the green and greenside bunkers and hollows should be sufficient and gently sloping to allow operators to safely turn a mower. The surface of the putting green should flow gently with no sharp ridges or depressional areas that could result in scalping or uneven mow patterns.

Design and maintenance are interrelated; however, there is a fine line between designing a dramatic, visually exciting golf course that will tantalize the golfer and designing for cost-efficient maintenance. It is paramount that the designer consider the maintenance budget during the design process and be willing to be flexible during construction to modify the design to ensure that the course can be efficiently maintained. Vigilance to maintainability during the design process will yield dividends and substantial return on maintenance dollars.



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