Greensites receive more turf management attention in response to compaction than do tees. Successful consideration of greensite design should provide for playability, challenge and variety, beauty, proper subsurface drainage, the correct seedbed mixture, environmentally adapted turfgrass varieties, and efficient long-term maintenance.

One profound misconception about greens is grass cannot grow without “soil” or “topsoil”. In fact, the less soil in a putting surface seedbed, the better. It has been the word of various august authorities that soil must be part of the putting green seedbed mixture. Practical, in-the-field results have just as vigorously demonstrated that less soil equals better turfgrass.

Where custom, habit or misconception have encouraged the construction of putting greens entirely of locally available “soil” or “top-soil”, greens of varying degrees of playability - from outstanding to miserable - are the result. Certainly, at various times of the year, even clay-based greens can appear healthy and vigorous. Outstanding examples of fine old soil greens can be pointed to, generally at courses where the climate is mild and golfer traffic is light.

Any putting green should look good when climatic conditions are at their optimum and play is at a minimum. It is what happens after an extended rainy period or when the temperature shoots rapidly upward to bake the putting surface or when 225 rounds of play per day occur for long, continuous periods that the problems become apparent.

Design

Before seedbed materials are either specified or delivered to the jobsite, the design of the greensite should be carefully considered. The majority of greens in the world are round or nearly so. Attractive putting greensites with individual appearance and character are not prohibited in the rules of golf. It only seems that way when so many greens offer no diversity, drain only to the front and are framed by two cashew or almond shaped sand traps.

The design of the greensite must allow for reasonable access by golfers and maintenance equipment. When the sand bunkers block or restrict access to limited or narrow areas, compaction problems are sure to follow. Greens with only one limited route of access will have severe compaction problems no matter how intense the maintenance effort to counteract the traffic.

Sand bunkers, lakes or other hazards are a natural and normal feature around many greensites. Their presence is both necessary and desirable. However, when designing the greensite and its associated protective or challenging hazards, an awareness of the potential problems of inadequate access or insufficient equipment turning area must be considered.

Providing a diverse greensite shape, with varying adjacent hazard placements, will permit the turfgrass manager to change pin positions frequently - daily with heavy play - to assist in moderating the impact of golfer traffic on any particular portion of the putting surface. Changing of pin positions also assists in dispersing traffic on the putting surfaces.

Although putting surfaces must be large enough to offer several distinct pin placements, excessively large putting surfaces can be wasteful of construction and main-
Exaggerated putting surface contours, which restrict usable pin positions can contribute to excessive traffic over limited areas of a seemingly large greensite. Subtle to dramatic contours have their place and position. The individual approach shot to each greensite should basically define the surface contours desired and the arrangement and use of hazards.

Surfaces with several drainage flow outlets help to minimize future compaction problems. Frontal drainage into the approach area must be avoided whenever possible. Putting surfaces of around 4000 square feet (380 square meters) to 8000 square feet (750 square meters) are a generally logical size range.

The designer’s impact upon long-term greensite maintenance is very real and very lasting. There is more to consider in the design of a greensite than just how the 4 iron should be hit into the green. Maintenance can be directly affected by greensite design. Turning space off should be hit into the green. Maintenance equipment makes it impossible, an intermediate gravel is available, an intermediate layer of coarse sand or organic humus may be necessary to separate the sand-humus layer above from the gravel below.

Well-washed gravel, free from silt and clay particles, is important. Gravel contaminated with silt and clay will soon inhibit proper water flow. The gravel layer should extend fully beneath each putting green seedbed mixture to the limits of the putting surface. A uniform layer, four inches (10cm) in thickness, is to be considered the minimum depth.

The lack of drainage lines and gravel layer beneath the seedbed will result in soggy and puffy drainage areas both at the putting surface edge and into the apron area - a sure invitation to compaction. It is not a wise economy move to dispense with subsurface drainage lines within the putting surface. Poor drainage induces compaction more rapidly than any other causative agent.

It has been noted that soil in any form is not recommended for inclusion within the putting green seedbed mixture. The sought after mixture should be one which is comprised of only select sand and organic humus. What is select sand? The generally recommended particle size range for putting green seedbed purposes would be a sand which provided more than 80 percent by volume between 0.20mm and 1.20mm particle size range. From 1.20mm to 1.60mm and from 0.20mm to 0.10mm can comprise another 5 to 10 percent each. Less than 5 percent in total should consist of combined silt and clay particles and very fine sand (those particles smaller than 0.10mm). The “ideal” sand would be one with a uniformity of particle diameter around the 0.50mm size range. The more consistent and uniform the particle size, the more resistant it will be to compaction problems. The major determining factor must be the combined clay and silt content. It is these fine textured materials which will plug up the coarser materials and assist directly in helping to induce the compaction problems. Insist on water washed, washed gravel.

*Any green should look good when weather is nice and play is slow.*
clean sand, as free as possible of silt and clay.

If given a choice, a more coarse sand should be preferred over a finer one. Ordering sand by a type or local-use name is not advised. What is "plaster sand" and acceptable in one locality may be called "plaster sand" in another area but consist of 20 percent unacceptable fines, as an example. Select the sands using mechanical sieve analysis to insure proper sizing and particle distribution. In some situations, even a chemical analysis of the proposed sand should be undertaken before the final selection is made to screen for salts or other contaminants.

The organic humus component of seedbed mixture can be quite diverse in origin. The humus material is included primarily to act as a "softening" agent to provide resiliency and to prevent the sand from being too hard in the first year or two of play and to act as a water retaining medium. Once the turfgrass is established, the normal root system regeneration will provide adequate humus.

Peat moss, ground pine or fir tree bark, rice husks, composted animal manure, grape and olive pomace, cocopeat, bagasse and similar sources of organic humus have been successfully used. Whatever organic material is locally available, so long as its chemical analysis is favorable, may provide the organic portion of the seedbed mixture. Particle size range is not as critical as for sand. A particle providing 80 to 90 percent passing a 6mm (0.25 inch) screen is generally sufficient and usually available.

The proportions of sand to humus will vary depending upon the sand particle size distribution, type of humus, local climatic conditions (primarily rainfall) and organic material accessibility. In general, a ratio of 70:30 to 85:15, sand:humus has been proven to be quite successful. The seedbed mixture should be thick enough to provide ample waterholding capacity and deep root growth. A thickness of 12 inches (30cm) would be recommended as a minimum in place thickness.

The seedbed mixture must be pre-mixed before placement on the individual green or tee surface. Only under rare conditions and specific situations should in-place, on site mixing of the sand and humus be permitted. Inadequate mixing will lead to problems of lay erage, poor water movement and potential soggy problems.

Always select and use the finest quality seed or vegetative stolons available. Weed-free, certified clean seed of the latest crop is essential. Cheap seed is never a bargain. Vegetative stolons should be obtained from reputable sources with assured varietal quality.

Once the greensites have been constructed, do not make the common mistake of topdressing the turf surfaces with a mixture containing soil. If the seedbeds were constructed properly; that is, without any soil in the mixture, then using soil in the topdressing will only induce and promote the very problems the soil-free seedbed mixture was designed to prevent or counteract.

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