COMPACTION - PART 3

SOILLESS GREENS MEAN LESS COMPACTION AND BETTER TURFGRASS

By RON FREAM

No amount *of maintenance can correct severe compaction problems. Redesign and rebuilding may be necessary.*

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 "topsoil", 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-

tenance funds.

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 longterm 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 the putting surfaces for mowers and other equipment is vital. Bunkers or other hazards must be positioned with this fact in mind. Tight convolutions of the green surface shape can encourage wheel compaction by triplex greens mowers. Poorly considered contour changes which are too abrupt can contribute to scalping.

Seedbed Components

Longterm greensite seedbed mixture components should be carefully considered and carefully specified.

Mixing of a coarse aggregate-organic humus, a medium aggregate-sand and a fine aggregate-soil together approximates the recipe for concrete. The very last thing a putting green needs is a compactable seedbed. Every putting green needs a deep, well-drained seedbed.

A golf course architect knowledgeable in soil science should be able to prepare a precise, concise set of specifications which will direct the preparation of a well-drained, water-retaining, compaction resisting seedbed.

Subsurface drainage within the putting surface area is unnecessary only when constructing a greensite on a pure sand natural site. The total volume of drainage pipes within the area of the putting surface would vary as subgrade conditions and local climatic factors determine. In general, 350 feet (110 linear meters) or more of four inch (10cm) diameter perforated drainage line is perhaps "average" for a greensite. Discharge of subsurface drainage lines and surface flow, as well, should be directed away from primary golfer entry or exit paths. Drainage line outlet points should be well away from the fairway area. Yet, all too often, the putting surfaces only slope to midcenter front, directly into the fairway approach and traffic area. Subsurface drainage lines, if used, frequently discharge a short distance in front of the putting surface, again in the fairway approach. Is it any wonder that soggy areas develop just where all the golfers converge and the maintenance equipment makes it turns when such a procedure is followed?

Any green should look good when weather is nice and play is slow.

The type of gravel for encasement of perforated drainage lines and the gravel layer beneath the seedbed mixture (for teeing surfaces and for putting greens) should be carefully selected. A uniform particle size distribution is recommended. Fine gravel, pea-gravel or similar, is recommended. A gravel having a particle size distribution between 6mm (0.25 inch) and 18mm (0.75 inch) is quite ideal. Large diameter gravels, in excess of 25mm (1 inch) generally have interspaces which will permit a filtering down of the finer textured particles from above or the native soil adjacent. The filtering-in can, in time, result in clogging of the drainage passages. Crushed gravel is as usable as natural "river-run" rounded particles so long as the size distribution range is within the desired tolerances.

If only very coarse gravel is available, an intermediate layer of coarse sand or polyester filter cloth 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,

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 size providing 80 to 90 percent passing a 6mm (0.25 inch) screen is generally sufficient and usually available.

The porportions 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 inplace thickness.

The seedbed mixture must be completely, thorougly and totally 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 layerage, 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. WTT