

For those clubs limited in financial resources, other green profiles are available and successfully used. **Figures 4 and 5** offer two such examples of alternative green profiles. The profile outlined in **Figure 4** is recommended over **Figure 5**. It consists of a 12 to 14-inch root zone profile over a 4-inch gravel layer with tile lines embedded within the gravel. This profile is identical to **Figure 3** but lacks the 2 to 4-inch choker sand layer. Although the basis of the choker layer is theoretically sound in that it provides a perched water table, in practice this principle is used very little. The choker layer's absence can be overcome by selecting the proper sized gravel in relation to the root zone.

For those golf courses with limited resources but wish to have improved greens, **Figure 5** offers a profile with the minimum construction requirements for golf greens in Florida. It consists of 12 to 14-inches of root zone. Tile lines underneath are trenched into the subgrade and filled with gravel. Unlike the previous mentioned profiles, the 4-inch gravel layer is deleted as is the 2 to 4-inch choker sand layer associated with the USGA profile. The planning committee should consider all three green profiles and weigh the benefits of each against their negative points. Generally, better results can be expected from those greens constructed in **Figures 3 and 4** but due to financial restraints, **Figure 5** may be a suitable alternative.

Construction

Successful golf green construction is dependent upon the quality of the planning phase and person(s) responsible for implementing the plan. Usually green construction is the most time-consuming and costly procedure when building a golf course because of extensive excavation and restructuring of the area. After the design of the greens has been agreed upon by the planning committee, construction steps involve: (1) professional surveying and staking of the green area; (2) shaping and compacting the sub-grade and grading the surrounding area; (3) installing subsurface drainage; (4) placement of the gravel layer; (5) off-site mixing of root zone mix and its subsequent placement; (6) irrigation system installation; (7) soil sterilization; and, (8) settling and finish grading prior to planting. Cutting corners and time in green construction usually results in long-term disenchantment by the club members and increased long-term maintenance for the superintendent.

Surveying and initial staking

The architect provides a detailed plan drawn to scale on how the intended green is to be sloped and shaped. A competent, licensed surveyor usually is responsible for ensuring that this work is in accordance to the architect's wishes. A permanent bench mark (permanent elevation point) must first be established from which all elevation adjustments are made. Bench marks are usually centered in the golf course construction site. However, uneven terrain or unavoidable obstacles may necessitate several bench marks to be used throughout the course. Once the bench mark is established and identified, the perimeter of the putting green is staked at intervals of every 15 to 25 feet using the fairways centerline reference stake plus the elevation difference from the bench mark. The purpose of the perimeter stakes are to identify the outline of the green's shape and provide initial surface contours according to the architect's drawings. These stakes should be properly coded (e.g. colored) and identifiable in order to facilitate the operations with minimum chance of errors.

Subgrade

Contours

A key to good green construction is a properly planned and constructed subgrade. Internal drainage follows the contours of the subgrade as well as the final surface grade since it is identical to the subgrade. When deciding on the green's configuration, it is advised that under normal circumstances, contours should not be sloped towards the front of the green since this is the point of entrance and exit of much of the traffic. A wet front exposed to concentrated foot traffic normally results in thin, worn areas. It is better to have the green's slopes draining away from high traffic areas and from any side that faces the cart path's entrance and exit.

Depending on the design of the green and elevation of the site, the subgrade will be built into the existing grade or cut into the subsoil. If the grade is to be cut into the subsoil, topsoil that is stripped may be stockpiled for future building of adjacent elevations (such as mounds) or distributed over the fairway or rough. Usually, greens built into the existing grade are elevated, requiring outside fill material for the subgrade. Heavier soils, such as clays, are desirable for a subgrade since these are easily compacted to form a firm base that does not readily shift or settle. In either case, the subgrade fill material must be compacted to prevent future