Gravel and coarse sand layers

After tile installation is completed, the subgrade bed should ideally be covered with 4 inches of gravel (Figs. 3 and 4). This gravel layer serves several purposes: (1) it is the transport medium from which infiltrating water can move vertically to tile lines; (2) it is a buffer between the moist root zone medium and dry subgrade soil which prevents the dry subgrade soil from extracting water from the root zone; (3) it prevents salt movement from the subsoil into the root zone (Near the coast, where the water table may have salt intrusion, these salts can move to the soil surface through the process of evaporation during periods of hot, dry weather.); (4) the gravel along with the tile, helps prevent excessively wet root zone due to a rising water table; and, (5) depending on the soil mix above it, the gravel may provide the abrupt change in particle size from the finer texture root zone mix that is needed to provide the perched water table which increases water holding capacity of the root zone mix.

Alternative green construction has been successfully achieved by eliminating the 4-inch pea gravel layer but not the need to fill the drainage ditches with gravel (Fig. 5). If this profile is chosen, the parent subgrade soil must be compacted and/or a 6-mil plastic layer used to separate the root zone medium from the subsoil. It is recommended that golf clubs with adequate financial resources not eliminate this 4-inch gravel layer since it ensures a greater probability of success.

One question that needs to be addressed early in the planning stage is the type of root zone mix that is going to be used as this will affect the type of gravel used. If the main objective is to remove water as quickly as possible from the root zone, then a predominately coarse-textured sand should be used and the gravel should be no larger than 1/4 inch (6 millimeters), e.g., "pea gravel." If the objective of the root zone mix is not to remove water as quickly as possible but rather encourage water and nutrient retention, then gravel sized up to 0.4 inch (10 millimeters) may be used. In theory, if the change in size from the overlying root zone is no greater than 6 to 7 times the diameter of the gravel used, then the smaller sand and soil particles from the overlying material will not wash into the gravel and reduce drainage. For example, if 1/4-inch (6 millimeters) pea gravel is used, then the majority of the overlying material should be equal to or greater than approximately 1/24 inch (1 millimeter). If the majority of the soil mix is less than 1 mm, then clogging of the larger gravel drainage pores may result. If coarse stone (>1 inch) is used to fill the drainage trench, then a level of pea gravel would be needed to bring the subgrade up to 4 inches to prevent movement of smaller particles from the overlying layer into the underlying larger stone.

Superintendents should also be careful in the gravel source they choose. Granite gravel is best since it is rigid and less likely to be crushed. Softer gravel sources such as calcium carbonate rock may break down over time due to the weight of the overlying soil and to chemical reaction with acidic water.

If 1/4-inch pea gravel is not available, then on top of the gravel layer is placed an evenly distributed two to four inch coarse sand layer (≥0.5 mm). This coarse sand layer is commonly referred as the "choker" layer (Fig. 3). The "choker" layer acts as a barrier to prevent soil particles from the root zone mix from migrating downward into the gravel. It also creates a perched water table. If pea gravel is available and the root zone particle size conforms to those limits discussed above, then this layer of coarse sand is not necessary (Fig. 4). Normally, it is cheaper and easier to use correct-sized pea gravel alone compared to using a "choker" layer since this layer must by evenly spread by hand labor instead of a machine. The operator of a tractor or bulldozer will have difficulty uniformly spreading this two to four inch layer of sand and there is a chance this heavier equipment may crush the underlying drainage tile.

A topic which is currently receiving much attention is the possible substitution of the coarse sand "choker" layer with a non-biodegradable woven filter fabric. There is considerable debate between soil scientists as to whether or not this man-made fabric is a viable option. In the past, especially with earlier attempts, fabric clogging commonly resulted within a year or two of installation. However, as newer and improved materials are developed, this clogging problem may be eliminated, especially if the silt and clay content of the root zone mix is less than 5 percent. Until scientifically tested and proven results are available (preferably several times at several universities), a recommendation cannot be made.

Root zone mix selection

Above the gravel or coarse sand layer is placed 12 to 14 inches of laboratory tested root zone mix. In earlier days the most used method of green