sub-angular sands had the best combination of compaction resistance and strength.

Layers in Golf Green Construction

Sports Turf Research Institute

Dr. Stephen Baker

Start Date: 1996
Number of Years: 2
Total Funding: $28,778

Objectives:

1. *To examine particle migration from the rootzone layer into underlying gravels of increasing size in situations where no intermediate layer is present.*
2. *To assess the effects of different intermediate and drainage layers on moisture retention in the rootzone layer.*
3. *To review the particle size criteria for the selection of intermediate layer and drainage layer materials.*

Particle Migration is being examined for two contrasting rootzone materials placed directly over ten drainage layer gravels of varying sizes. The two rootzones are an 85:15 mix of medium sand and sphagnum peat and a 70:30 mix of medium-coarse sand and peat. Five of the gravels are rounded and the other five are angular. The D_{15} size values range from 2.2 mm to 5.6 mm. Gravel sizes were selected so that, in theory, no migration would occur from the rootzone into the gravel for the finer gravels but the risk of particle migration into the coarser gravels was high. Each profile is receiving 3000 mm of simulated rainfall before particle migration is examined.

A technique was developed to examine whether migration has occurred at the interface of the rootzone layer and the gravel (Figure 3). The profile is stabilized using plaster of Paris. This is then impregnated with an araldite resin containing fluorescent dye. When the resin has hardened, the profile can be sectioned and photographed under ultra-violet light. This will enable examination of pore-space blockage within the gravel due to particle migration from the rootzone.

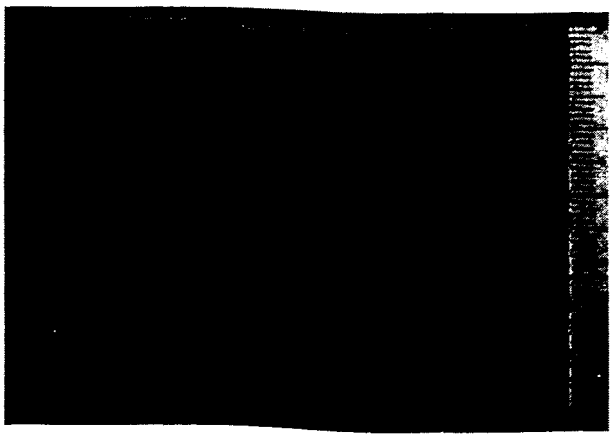

Figure 3. Cross section of intermediate sand layer above the gravel layer observed under UV light.

Moisture Profiles. The vertical distribution of moisture within the profiles discussed above is being measured after 48 hours of gravitational drainage to examine whether variations in the in type of gravel influence moisture retention in the profile.

In a separate study, the influence of particle size of the intermediate layers on moisture retention within an 80:20 sand/peat rootzone has been examined. The underlying gravel was predominantly a 6 to 9 mm material while the intermediate layer was based on 1 to 4 mm grit but with increasing proportions of medium (0.25-0.5 mm) and coarse sand (0.5-1.0 mm). Moisture profiles were assessed after saturation followed by 48 hours gravitational drainage.

Increasing proportions of coarse and medium-coarse sand had significant effects on the moisture content of the intermediate layer. For example volumetric moisture content increased from 7.5 percent when the 1 to 4 mm. grit included no sand to 18.4 percent when 50 percent coarse sand was added to the grit. However, no strong relationships were found between the composition of the intermediate layer and moisture retention with the rootzone. These data suggest that it should be possible to increase the proportion of material between 0.25 mm and 1 mm in the intermediate layer without a significant reduction of water retention in the rootzone. However, the work on moisture profiles directly over a gravel base must be completed before firm recommendations are made.

Understanding the Hydrology of Modern Putting Green Construction Methods

The Ohio State University - OARDC

Dr. Edward McCoy

Start Date: 1996
Number of Years: 5
Total Funding: $100,000 (co-funded with the GCSAA)

Objectives:

1. *Examine the effects of rootzone composition and putting green construction method on water drainage and redistribution within the profile.*
2. *Examine the effects of rootzone compostition, soil depth and degree of water perching on turf water use and irrigation management.*
3. *Examine long-term changes in physical, biochemical and microbiological properties of the rootzone; and relate these changes to the long-term hydrologic behavior of modern putting green designs.*