Soil Drainage: Looking at the Landscape from the Bottom Up

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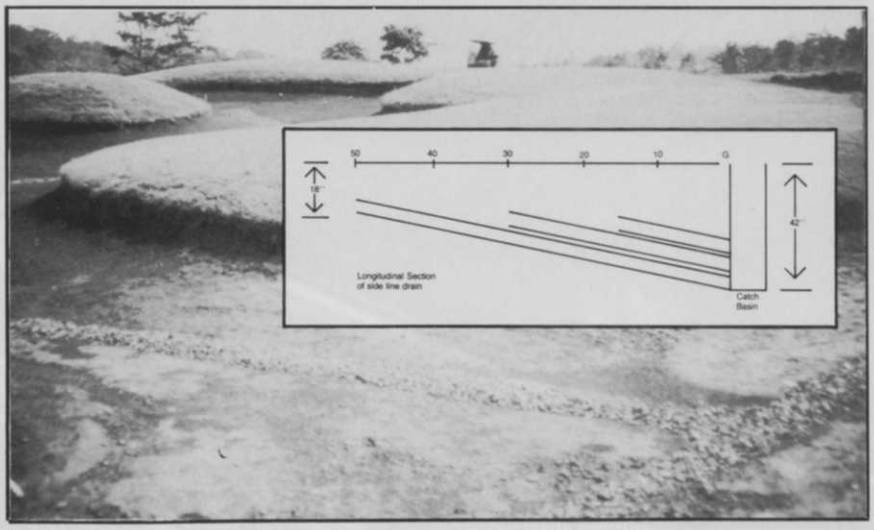

Golf bunkers *become catch basins without correct drainage. Proper slope of drain tile is necessary to move solids. (See inset).*

Drainage and soil texture are live or die matters to the greenhouse operator, yet they are treated almost incidentally by the landscape maintenance industry.

Rather than improving drainage many try to cover up the symptoms; such as disease, chlorosis, and malnutrition. They overfertilize and overtreat with fungicides. They even renovate to tolerant plant material instead of fixing the primary problem, drainage.

During a recent major National Football League playoff, helicopters were flown over the field to dry it off before the game. The copters, costing the stadium $300 per hour, would have been unnecessary had the field been properly drained.

Installation contractors will sometimes choose to ignore a drainage problem rather than lose a bid by adding the dollars necessary to do the job right. Landscape subcontractors are often forced to cut corners to get a job done on time and on budget, making up for the time and money mistakes of others.

Let's face it, all landscapes can't be built to USGA Green specifications. The plants cared for by the landscape industry are not in greenhouses where everything can be controlled. Drainage correction is also disruptive and on the expensive side compared to regular maintenance.

But, let's also admit it's easier to treat the symptoms than understand concepts like infiltration rate, percolation rate, particle size, runoff, and soil type. These concepts are all factors in landscape drainage.

Books such as *Turf Manager's Handbook* by W. H. Daniel and *Turfgrass Science and Culture* by James Beard have sections on drainage. Learn the basics even if you intend to hire a drainage consultant. Consultants have been known to disagree.

Drainage is a combination of surface runoff and movement of water through the soil. Turf areas should have a slope of no less than one percent (1 ft. drop for each 100 ft. distance), two percent for sports fields. Interruptions to surface water flow, such as plant beds. should be designed to either channel water around the obstruction or underneath by subsurface drainage.

Where surface drainage is not practical, more emphasis needs to be placed on subsurface drainage.

Soil will allow a limited amount of water to pass through it. Infiltration is the rate water enters the soil through the surface. Percolation is the rate water passes through the soil after it has entered. Both are dependent upon the soil texture and content. Infiltration rates are highest for sandy soils and lowest for compacted clay loam soils. Clay and clay loam soils also hold more water than sandy soils.

To overcome limitations with soils the landscape manager can amend the soil to increase infiltration or install drainage tile or tubing spaced 10-30 ft. apart. Daniel recommends placing the tile 3-5 ft. deep in clay and western soils and 1-2 ft. deep in sandy soils.

Tile should slope .5 to 1 percent. Tile size depends upon length. Lines under 2,000 ft. in length can be 4-in. in diameter. Six-inch tile is needed from 2,000 to 3,000 ft.; eight-inch for up to 3,500 ft.; and ten-inch for 4,500 ft.

Landscape managers have found that wrapping the tile, or tile and gravel backfill, with geotextile has provided silt protection. The tile should be elevated slightly from the bottom of the trench with pea gravel for the same reason.

Not all trenches require drain tile. Narrow trenches filled with sand or gravel also provide improved drainage. Even aerifying compacted soils is considered a drainage improvement technique.

The ultimate in drainage combines controlled soil textures with drain tile, such as United States Golf Association or Prescription Athletic Turf systems. Increased use of natural turf fields for sports has made these controlled systems popular. One sports field contractor uses USGA Green specifications for the baseball infields. Sand systems, including PAT, are used by both European and U.S. sports facilities.

The most critical problem with sand fields is the sand itself. Sands that are too small seal up like silty clay. The sand particles have to be in the range of .25 to 1.0 millimeters and not less than .1 mm.

Field managers are also incorporating more organic material into previously all-sand fields.

The average turf or landscape may not require the same drainage as an athletic field, but better drainage does contribute to overall plant vigor. The result is more efficient use of nutrients, less disease, and deeper roots for increased drought tolerance. These benefits make drainage improvements justifiable to any landscape manager. **WT&T**