

## CORRECTION OF SURFACE DRAINAGE

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Good morning. I would like to welcome you to the 46th Annual Turfgrass Conference. The topic I am assigned to talk on is the correction of surface drainage.

Good drainage is essential for the maintenance and health of turfgrass on a golf course. A great number of the problems we encounter on golf courses, either directly or indirectly, involve drainage.

Three things can happen to water which falls on a turfgrass area:

- I. It can move across the surface and runoff.
- II. It can infiltrate into the soil.
- III. It can remain on the surface until it evaporates.

Surface drainage is imperative for removal of excess moisture during a heavy rain so that we are not dependent on the soil subdrainage system or soil pores to remove large volumes of water at one time. Good surface drainage is one good tool in being able to maintain a uniform stand of turf on any heavily used turf area.

Good surface drainage in Northern regions can also prevent the loss of turf, which often results when surface moisture collects and freezes in close proximity to the crown of the grass plant.

Standing water left from a heavy downpour or from over watering can weaken turf, make it more susceptible to disease and even cause death by scalding if the sun heats the water to high enough temperatures.

Excess water can also interfere with the golfer trying to play golf as well as with the maintenance crew trying to maintain the turf.

Who hasn't closed the course on a rainy day to have it stop raining and the sun come out and your members are stacked up at the starting booth waiting for you to open the course and you can't because of standing water on greens, tees and fairways possibly due to poor surface drainage.

The use of drainage tile lines in the soil can be an effective method of removing excess gravitational water, which will provide for improved air circulation within the root zone. The main purpose of the drainage lines is to lower the water table, so they should be placed at least two (2) to three (3) feet deep in the soil. It must be remembered that the presence of a drainage line at 2 to 3 feet will not improve the infiltration at the surface if the pores in the soil are compacted and will not conduct the water to the drainage lines. Some reasons for this might be: compaction, thatch or an impermeable layer of soil in the soil profile. Therefore, for quick infiltration and removal of surface water, drainage tile is not always the best answer, unless they are connected to the surface with vertical catches or a vertical trench filled with fine gravel to the surface.

Areas where most of our surface drainage problems occur are: Greens, Tees, and Fairways.

Fortunately, today most courses are built by specifications and one of the primary concerns of these specifications is assurance of rapid and adequate surface and subsurface drainage and also built-in guarantees of sufficient moisture retention and available air. This shows that we have realized that in earlier construction we might not have considered surface drainage as a primary factor.

Unfortunately, a lot of superintendents have courses to live with, that haven't been built with much concern with surface drainage, whether with construction of the course or with maintenance of the course over the years.

Some suggestions for solving existing problems of surface drainage are:

French Drains: These are trenches backfilled with anything that conducts water faster than the surrounding soil - usually peat gravel. Then you can, if you choose, cover the last two inches of the trench with a calcined clay product. This prevents club faces from being damaged during play. The turf grows over or covers calcined clay somewhat faster than it does gravel. The reason for leaving the gravel filled slit trenches open to the surface of the soil is really quite simple: if any amount of soil is placed over gravel, not only do the smaller soil particles fill or seal the pores of the gravel, but they also act as a blotter or sponge above the gravel and quite effectively keep water from entering as rapidly as necessary. These types of trenches are usually dug with self-propelled trenchers. Examples of these would be a Davis trencher or a Ditch-Witch. Now, this type of French Drain is good for tees and fairways but for greens we usually scale down the operation because of the putting surface and the size of the trenches to heal over.

For greens, we can use a chain saw for slit trenches. We do this to relieve local flooding on greens. We use an 18" chainsaw with an old chain. You cut into the green approximately 14" deep using a back and forth sawing motion. The cut is usually 3/8" wide. We, then, backfill the trench with a calcined clay product. It takes about two weeks to heal over in good growing conditions and doesn't interfere greatly with play. You can use whatever pattern you like or just cut directly through the low spot. Areas where water used to stand for hours now will dry up in minutes.

Dry Wells: They are sometimes used as outlets where special water problems occur. They are large diameter holes bored down to a water conducting strata and filled with peat gravel. Drainage water is allowed to run into this hole and to be carried away by the lower strata. These holes are usually dug by the use of a power take-off driven posthole digger. Dry wells work fairly well at first, but silt and grass clippings may seal pores in the conducting strata. The dry wells tend to fail after a relatively short time - two to three years.

Sumps: Sumps are used to collect water from drain lines and surface drainage. The water is then pumped away from the problem area. This type of installation is required where the discharge water must be raised into a higher level drain line. The sump is constructed by excavating a hole deep enough so several concrete pipes - four (4) to eight (8) feet in diameter - can be placed on end to develop a tank. Tile lines enter the sump below the ground surface at whatever depth is necessary and also surface water through the top. A small pump and motor is installed with a switch activated by a float. The controls are so regulated that the extremes of water levels between alternate fillings and pumpings are from the bottom of the inflowing tile lines down to the lowest level that will not break suction in the pump. The water collected in the sump is then pumped into the higher level discharge area.

In many cases, the only remedy for poor drainage on established greens and tees is reconstruction. Generally, reconstruction is the answer where existing soil has poor texture and structure or the area lacks surface drainage. Minor depressions or low areas that hold surface water can be eliminated by stripping off the sod, filling and grading the area and replacing the sod.

Sandy areas and steep banks around greens and tees tend to dry excessively and require frequent supplemental moisture to maintain satisfactory growth. Aeration and soil conditioners have been effective in reducing runoff and conserving moisture in these areas.

Other tools which are available to superintendents that are helpful in improving surface drainage are:

A. Making sure that all existing tile lines on your course are working to full capacity and their outlet areas are clear. This check on your drainage lines should be done on a regular basis.

B. Making sure you have an up-to-date map of all the drainage lines and systems on your course and that you keep this up to date including any new drainage systems you may install.

C. Another good tool which is nice to have is a topographic map of your golf course and surrounding area. This comes in handy during any new construction.

D. It is also good to have a transit and level in your shop so that you can check the level and pitch of any new construction on your course. Remember when you eye it in, it is never thoroughly right and may cause future problems.

E. It is important to remember that irrigation lines and drainage lines need to be planned together or you will apply water that might not be able to drain fast enough in wet weather or during extended heavy watering schedules.

F. A good tool that most superintendents forget about using when trying to improve a drainage problem on his course is outside agents: other superintendents in the area, the U.S. Soil Conservation Service or your county drain commission. These are all available to you on your request.

G. Finally, one of our major problems on courses today is that either during construction or during reconstruction, we change our final grading so that it won't drain water into the mains or laterals of our drainage systems. This is not done on purpose but by anxiety to finish a project on the course on the part of the superintendent or green's committee with the final results costing more time in reconstruction or an area of poor drainage which will eventually cost your club lost playing time and real maintenance headaches. Take your time to get an overall picture of the finished product.