THE WORLD OF DRAINS

Roland Taylor explores the underground world of the drain

At the time of writing this the temperature, had for a number of weeks, been well up in the 20s and the landscape was beginning to take on the look of those dry, dusty prairies that were often part of old cowboy films.

Drainage was probably the last thing most readers would have had on their minds as they struggled to keep their greens alive. By the time you read this, things could have drastically altered and areas around the course, which had resembled a dried up 'billabong', may now either be very wet or under water. Nature usually has a way of quickly redressing the situation.

Having the right drainage in place is a key factor in modern turf management. With our present climatic conditions it is very easy to get caught out.

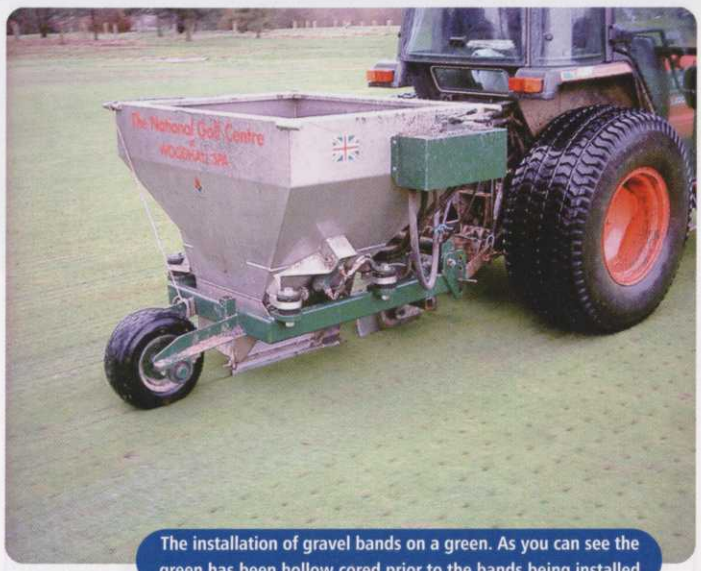
Some courses have natural drainage, but these are likely to be relatively rare and even then there may be odd areas which present a problem. While visiting a course last year, the greenkeeper explained they had had a drainage system installed in a fairway because a spring had suddenly become established where previously there was not one.

WHY DRAIN?

At this point it is worth considering the benefits of efficient drainage:

- The most obvious is to establish a surface that dries out quickly. This is important for two reasons; it maintains playing levels and enables course maintenance schedules to be carried out.
- The turf is more healthy and durable. Imagine, if you were the grass plant, what it would be like to stand in the middle of a fairway barefooted in a bowl of water. In hot weather it might be pleasant for short time, but eventually your feet will resemble prunes. It certainly would not be the same in cold or icy conditions. Grass plants have no choice; they suffer if the drainage is poor.
- The soil structure is improved if there is free movement of water through it and nutrients can more easily reach the areas where they will be of most benefit, the root system.
- Water can do a lot of damage in the form of soil erosion if it is lies on the surface too long.

A trench being cut on a green prior to the installation of a 60mm pipe. Note the turf has been removed along the line of the drain. Bands running at 90 degrees to the pipe are 25mm trenches cut with a wheel trencher and filled with Lytag



The installation of gravel bands on a green. As you can see the green has been hollow cored prior to the bands being installed

As part of understanding the need for drainage, it is necessary to look at the behaviour of water within the soil structure.

Through absorption and capillary action water moves through the soil in all directions including upwards. On entry, water is immediately attracted to the dry particles of soil, which they then proceed to soak through the process of absorption. The molecules then move on, seeking out any dry surfaces to hang onto, and in doing so pull more droplets behind them. As the droplets are joined together, capillary forces are created. From this, it can be seen that providing there are dry soil particles all around, the water droplets can virtually move in any direction. At the point when all the particles have become saturated, the soil will then be holding a large water mass and the only places for the remaining droplets to go are in the air spaces. These then fill up and as there is nowhere else available the excess water either floods to the surfaces or enters the drainage system, if one is available. The amount retained in the soil particles acts a reservoir for the plants.

The soils profile is another important factor. Compared to sand and gravel the flow is much slower on heavy clays or where there is compaction.

There are two basic forms of drainage, primary and secondary. On new courses a primary system, in all probability, was installed at the time of construction. Whether it is sufficient or satisfactory is another question. An older course may also have had one laid originally, but depending on how deep it was put may have a bearing on its present day functionality. As pointed out previously in the case of the spring, situations can change, these then require alternative systems to be installed that will alleviate the problem. The primary system forms the main infrastructure for removing excess soil water, through pipes, to an outflow.

A wheel trencher cutting a narrow trench to install 60mm pipe. Compaction is minimised with low ground pressure turf tyres fitted to the tractor and a 4 wheel in line trailer to carry away arisings

The secondary system is for dealing with surface water and channelling it down to the primary system. This is usually achieved by slit drainage which relies on the water flowing freely through a course material which has pores big enough not to restrict its movement. The slits or narrow trenches are directly linked to the underground system, so the run off is not slowed down in the soil profile. A small diameter flexible drainage pipe, which is perforated, can be installed in the bottom of the slit and this is connected to larger outflow one. The slit is then filled to just below the surface with a course free draining aggregate.

These days virtually all machinery for laying drains is laser guided. A guidance beam controls the depth of the machine's cutting wheel through a hydraulic system. This means that the pipes are laid on a preset slope to ensure the water will flow away. These units can install drainage efficiently and with minimal surface disturbance.

Banding is another form of drainage, which is often used, especially on greens, to remove surface water as soon as possible. A series of thin trenches are cut from 40 cm up to 100 cm apart. These connect to the lateral drain system. They are then filled with either gravel sand or another aggregate, that has now become popular - Lytag. This is a by-product of the coal burning power stations and consists of pulverised fuel ash (PFA) which is made into rounded pellets by heating at very high temperatures. The result is a very light material, that does not degrade and it is said that because of its rounded shape and grading, excellent hydraulic conductivity is achieved. Because of its light weight it can also be transported over relatively soft surfaces, with less damage, than if it was gravel.

There is machinery now on the market capable of producing microbands. The main advantage of these, is said to be that play can resume almost immediately after the work has been carried out. They are designed to work on the three-point-linkage of a compact tractor and consist of a coulter disc which cuts the turf. This is followed closely by a vibrating stainless steel trench opener. A vibrating hopper is mounted above the unit and this feeds a permeable infill into the narrow trench that has been created. The infill is either brought to the surface or settled down by means of a depth adjuster. At the rear of the unit is a presser wheel that flattens the turf, ready for play to recommence.

Good soil drainage does not just rely on a series of underground systems. These can all be in place, but it is only working a relatively low level of efficiency due to compaction. Aeration and vertidraining also play an important role in moving water through the soil profile and they need to be a major part of every turf management programme.

There is now an alternative method of removing water from playing surfaces. These pedestrian operated machines act like giant sponges, soaking up the water in the turf. They are said to be able to remove approximately 3,410 litres (750 imperial gallons) of water per hour, so play can commence very quickly after a downpour.

Drainage is a highly specialised operation and requires specialist knowledge as it can be both highly expensive to install, and if wrong, to rectify.

For this reason it recommended that experts are called in, immediately the subject of replacing or improving an existent system is raised. This action can save a lot of problems and possible expense at a later stage. There are plenty of highly experienced drainage companies available and the best source of tracking down one of these is through the Land Drainage Contractors Association, who is based at NAC Stoneleigh Park, Kenilworth, Warks, CV8 2LG. Members are from all sectors of the drainage industry.

For readers who would like to find out more about the latest developments, the Association is staging a seminar and demonstration on Thursday, November 13, at the Sport England National Sports Centre at Bisham Abbey, Berkshire.

The programme will include papers by the leading figures in the industry and will cover the principles of sports turf drainage; contract management; drainage design and construction systems; turf establishment and aftercare.

There will also be working demonstrations of the latest machinery for pipe installation, gravel banding and sand slitting, plus vertidraining and spoil conveying and back filling.

BIGGA members who attend this course will qualify for three CPD credits.

The cost is £111.62 per delegate and booking a place can be done either by telephoning 01327 263264, or emailing; secretary@ldca.org alternatively go to the website www.ldca.org.

Incidentally, as this article was being completed it had started raining regularly. No doubt drainage systems throughout the country will soon be working at full bore, so now is a good time to check that the outfalls are clear and working, otherwise where is the water going to go to?