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THE BRITISH GOLF

GREENKEEPER

HON. EDITOR: F. W. HAWTREE

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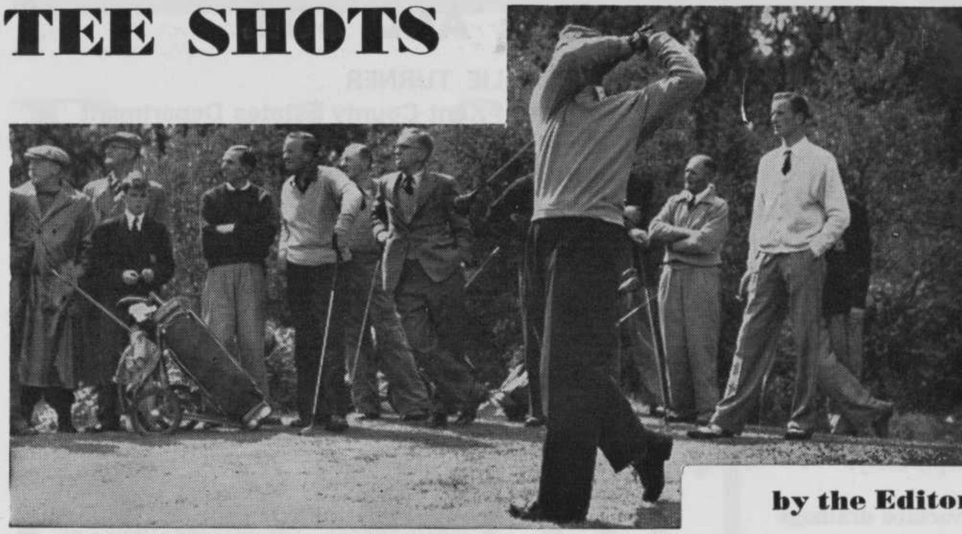

by the Editor

Yelverton Golf Club on Dartmoor is puzzled by the trail of deep hoof marks appearing across their fairways and greens. The free-roaming Dartmoor ponies are not shod and do relatively little damage by comparison. At Tavistock, another moorland course, there was damage to fairways and greens recently but this was after a hunt meeting. Regular huntsmen were as annoyed as regular golfers that some of their followers should be so careless.

* * * *

Mr Kenneth Male, Cheshire County Planning Officer, estimated that about 30 new golf clubs with about 500 members each will be needed in his county in the next 20 years. The problem for his department is the area which these courses will require which will make up a total of nearly five square miles. Cheshire had 22,000 golf club members last year and there are 8,000 more who do not belong to clubs. These figures could add up to nearly 45,000 by 1987.

* * * *

Vigilante night patrols are being considered by the Teignmouth Golf Club because of damage on the course from tyre tracks. The course is on moorland with plenty of hares and nocturnal hunters catch them in their headlights prior to pulling the trigger.

* * * *

Work on extending the Llanymynech Golf Club had to be stopped when a bulldozer uncovered part of earth works on the site of the ancient Blodwel Camp. Until the Ministry of Works is able to decide whether the involuntary excavations are of historical value the new 9 holes have to steer round this area.

DRAINAGE AND SOIL

by A. LESLIE TURNER
Principal Assistant (Landscape), Kent County Estates Department

PART 1

THE landscape designer is faced with two fairly distinct problems:

(i) those relating to surface drainage and

(ii) those relating to sub-surface, or subsoil, or under-drainage, of the interior of the soil.

I propose to deal with these separately.

Surface drainage

Consideration must be given to this in so far as it is possible and necessary to prevent excess water from arriving at, or gathering on the land, and the means of removing it.

Here we must consider:

(a) water from higher ground arriving over the surface or below ground;

(b) means to prevent erosion and damage to new works — especially banks;

(c) means to prevent damage by discharge from the land, especially during works of construction;

(d) means of carrying away the outflow of springs; this may equally be a subsoil drainage problem;

(e) means of draining ponds, diverting ditches and water-courses, and draining off low spots.

Some useful recommendations as to these matters is readily available in British Standard Codes of Practice[1] especially 2003/1959 entitled "Earthworks" para 3.04 et seq. This deals with "drainage of cuttings, slopes and interception of surface water," and under para 4.03 "Drainage of embankments, piping of springs, and treatment of ponds."

Reference is also made by BS Code of Practice 2001/57 para 835[2] to ground water levels and the need for intercepting drains.

Methods of dealing with these problems are generally, in landscape work, very similar to those adopted by engineers and architects for earth works, and normal specification applies to the construction of open ditches and piped drains. Some special consideration, however, is often needed when it is required to have both at once in the form of a piped open ditch, called a "french drain", and these are more frequently used in landscape work to catch the run-off of large open areas, especially sports fields. There are often contradictory recommendations as to the pipes and filling — as it is essential to keep the whole structure open to receive water at any point along its length, it is necessary to ensure that the pipes, which act as sinks, have a sufficient rate of infiltration and capacity to deal with the whole catchment area. When agricultural tiles are used the gaps must be adequate, and the grade self cleansing at least 2.5 ft. per sec.; when porous or permeable wall pipes are used the rate of infiltration must be checked with the makers. Gravel envelopes are essential for french drains — some engineers have used well graded material with the result that packing ensues and blocking occurs and water does not get down to the drain. My experience indicates that gravel, pebble, broken stone of $2\frac{1}{2}$ in. to $1\frac{1}{2}$ in. size ensures long term porosity. Sizes of pipes must be calculated by formulae appropriate to surfacewater sewers.

Special problems in respect of surface drainage arise on lands which are extremely flat, that is from zero gradient to 1 in 1,000 or thereabouts, and where such land is underlain with impermeable soil strata. It is sometimes possible to improve such land by land forming techniques which are common in the Midlands for agricultural land where ridge and furrow drainage is practised. Land forming for this pur-

(*contd. on p.* 6)

(*contd. from p.* 4)
pose involves giving slopes to areas of the land towards an outlet or ditch.[4] Such work must be done with precision — there is an excellent description of the techniques in "Drainage of Agricultural Lands" by Luthin[3] and in "Soil and Water Conservation Engineering" by Frevett[9] and others where it is described as "bedding." The use and relevance of these techniques to landscape work lies almost entirely in the realms of sports fields constructed on flat alluvial areas where it is sometimes practicable to creat a crowned field, that is to construct it to the shape of a low elipse across the field, and catch the run-off in shallow side ditches.

Sub-surface or subsoil drainage

Our second division under this main heading is in respect of drainage below the surface — subsoil or under-drainage, or sub-surface drainage. This is concerned with the removal of water from within the soil itself and will need detailed consideration by the landscape designer. Some of the problems are:

(a) reduction of water tables;
(b) special difficulties with silt soils;
(c) top-water in clays.

In the case of the first of these, water tables only occur and can be substantially influenced by drainage techniques, in soils which exhibit some degree of permeability. Code of Practice 2001[2] on page 119 says "from clay to gravel, permeability may vary a hundred thousand million times." "Techniques of Landscape Architecture"[4] quotes a table which from "coarse sandy" soil type with a permeability of 18.7 in./hour to "clay" with 0.006 in./hour a range of 3,000 times. Tables which are proposed for the new British Standard for Landscape Operations give ranges of 10,000 times, in in./hour. Obviously a solution for a soil with a permeability approaching the "excellent" class of 1.0 to 2.5 in./hour has little relevance to soils having a permeability below 0.01 in./hour which is considered too slow for artificial drainage to be effective.

It may be considered therefore that soils which exhibit features such as a permeability of 0.10 in./hour and lower must be considered in separate classes — such soils are silts and clays.

Clays in the range just mentioned for all practical purposes do not have a water table[8] — only the vegetable soil is endowed with any degree of permeability — "the undisturbed subsoil plays no part in conducting water from the surface to the drain — rain penetrates the cultivated surface soil until it reaches the boundary between this and the subsoil, then flows along this boundary, down the direction of greatest slope, until it arrives at a position vertically above a drain where the drain trench" has an artificial degree of permeability many thousands of times better than the adjacent subsoil. Drainage then of such soils is concerned with, in effect, cutting intercepting drains across the contours, and trapping water as it travels along the boundary with the subsoil. Depth is not important in this context.

Where water tables do occur in soils of a sandy, or gravelly, or loamel char-

(*contd. on p.* 10)

CORRESPONDENCE

22 Cranham Gardens,
Cranham,
Nr. Upminster,
Essex.

Dear Sir,

When visiting other Golf Courses around Essex, I have always taken note of the state of the winter greens. A lot of them are not very good.

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I can find no good excuse for not finding the time to get winter greens in good playing order. There is a tremendous amount of work to do on any golf course especially when one is short staffed, but there is no good cause to neglect this important aspect, now that so much more golf is played during the winter months.

Quoting any head greenkeeper I dread to think what golf courses will be like in another ten years. There are so many lazy golfers today, hacking the course to bits. The people who do it are the very first to complain when the course is not as good as it should be.

I have watched many golfers take out a divot about eight inches long and walk away without putting it back. I see red.

Yours faithfully,

Ron Simmonds.

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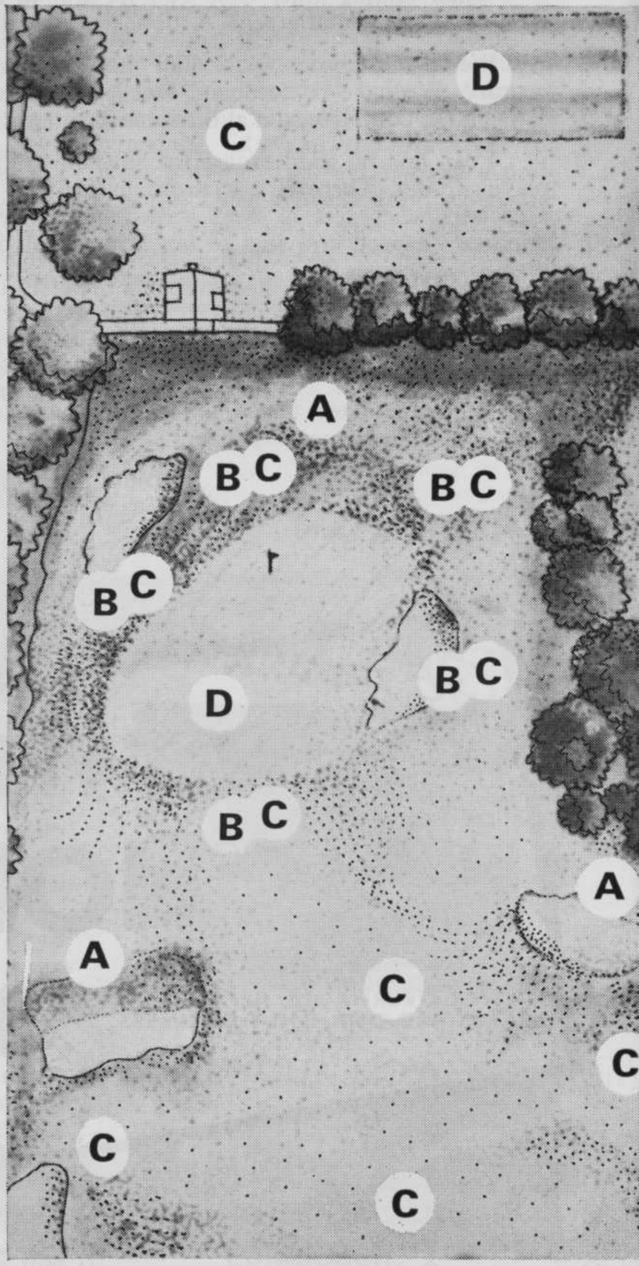

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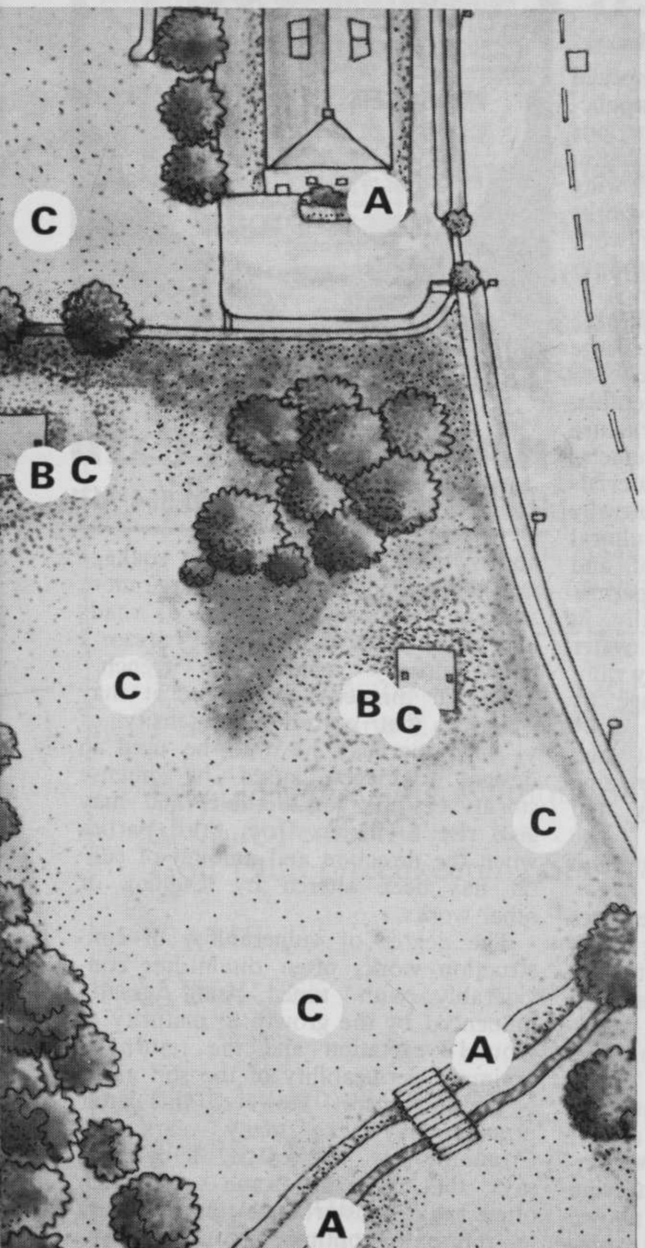

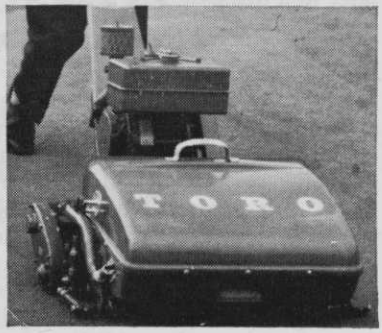

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(*contd. from p.* 6)

acter with higher levels of permeability it is of course possible to influence the level of the table where it exists by piped drainage and the depths at which such pipes are put *is* critical.

In many silts soils there are special problems and I shall devote much more later to a discussion of them.

Drainage during construction works

It is necessary for me to make special reference to the considerations applicable to drainage works during periods of construction works, (and including in this the period immediately following up to 2 or 3 years) where special works are often essential to enable the work to be performed economically and to prevent damage to or by the works.

Periods of construction including the first few years of establishment in large landscape operations are periods when the works are particularly vulnerable. The radical disturbance of soil structure by compaction during earth movement, by cultivations and by moving materials and machinery about the job, generally much in excess of normal agricultural operations, cause a diminution of, and a very slow return to, optimum permeable soil conditions. Additionally in silts in particular which are water unstable, top crusts are formed by rainfall, which gives rise to damage by quick sheet run-off, causing gully erosion and damage to adjacent land and property. There is some interesting discussion in this in "Biology and Engineering"[5] under the title "The effect of vegetation on Drainage and Floods."

Remedial and preventative measures include ripping and subsoiling with special tines and great care as to soil conditions when machines operate, to prevent compaction.

Other measures are as mentioned above under "surface drainage" and include cut-off drains to protect, and catch run-off. The design of cut-off drains in these conditions must be considered on the basis of the engineering formulae already referred to above, than on normal field drainage principles, because the reduction in permeability may well prevent any soakage into the soil and cause a discharge more akin to hardened areas such as roads and roofs than to "natural" areas. I have already mentioned "french" drains in this connection and it may well be that a rainfall intensity of $1\frac{1}{2}$ in./hour may have to be used in design. Damage caused by intense storms can be considerable, and may give rise to claims from third parties when the direction and amount of run-off has been altered by levelling or other works.

The degree of vulnerability of construction works often diminishes considerably with time, being greatly influenced by the growth to maturity of ground vegetation and the return to optimum permeability of the soil aided by natural agents. However, this latter process may take many years and Crompton of Newcastle University, says[6] that there are some soils which often radical disturbance take 50 years to return to optimum conditions —

(*contd. on p.* 14)