
ORGANISATION AND FUNCTION OF A FARM DRAINAGE SERVICE

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Over the last 7 years a farm drainage service which has been in increasing and outstanding demand from farmers throughout the Wellington Province and Hawkes Bay has been in operation from Massey Agricultural College.

Briefly it is the kind of service the staff of which goes out to the farm, discusses the problems of wet land on the spot, carries out the necessary survey, and makes positive recommendations to the farmer, who, if he wishes, may have the work carried out with speed and precision by modern machinery made available as a part of the service.

The knowledge gained from the development of techniques appropriate to the design of farm drainage schemes for a variety of wet land problems, the considerable experience of the organisation of the service, together with the operation of its machines could well be drawn on to guide the establishment of a similar organisation in Northland, or in any other part of New Zealand where wet soil conditions are a serious limitation to progressive and efficient farming.

HOW SERVICE FUNCTIONS

The College Extension Service makes no demand on the taxpayer, being financially self-supporting and run with the smallest margin of profit consistent with sound maintenance of plant. Its income is derived from the operation of trenching equipment available to farmers for work on schemes planned and supervised by the field officers.

Requests for drainage work received from any farmers who wish to avail themselves of this service are grouped according to district. The field officers survey the areas concerned and prepare reports, making recommendations appropriate to the problem involved. Plans and specifications are drawn up and

the cost of installing the system is estimated well in advance of the work being done. At this stage it is explained in the clearest terms to the farmer that he is not obliged to continue, but should the survey report be accepted, the project is written into a machine work schedule and the job is carried out, usually with others in the district to save travelling expenses.

The machines cut the trenches to grade and back-fill the system, but certain tasks, principally the laying of tiles and making of junctions, must be done by hand. The provision of labour assistance for this work is the responsibility of the farmer, and although the jobs involved require care, they are certainly not arduous.

On completion of a scheme a scale plan is prepared as a permanent record of the installation and this is forwarded to the farmer; accompanied by a report on various aspects of maintenance and field management which will influence the effectiveness of the work.

ORGANISATION

Staff: There is a staff of 6 in this service:-Two advisory officers, two field assistants, and two machine operators.

The advisory officers carry out the survey work, prepare reports, plans, and specifications for projects, and are responsible for organisation and administration.

The field assistants, in company with one machine operator, form the crew of a rotary digger unit. Their duties include the setting of pegs to grade and the conduct of field operations generally, but they also assist with survey work during the winter when conditions are too wet for the efficient working of machines.

It is the first concern of the machine operators to cut the trenches to grade by closely following the levelling equipment set out for them. In the off season maintenance of machines and vehicles is their main activity.

TRENCHING MACHINES AND EQUIPMENT

An itinerant organisation such as this demands mobility in its equipment and yet sufficient ruggedness to cope with the wide variety of trenching jobs requested.

A rotary type of digger' has been found most suitable for the rapid and accurate cutting to grade of tile trenches up to 3ft. 6in. in depth. Operated by a competent driver, such a machine can cut up to 40 chains of graded trench line per day on prepared schemes, although, including travelling and shifting; a good average is 20 to 25 chains. The digger is towed between farms on a trailer drawn by a 4-wheel drive truck. The latter also acts as a mobile workshop and, when fitted with an angledozerblade, can backfill the trench lines neatly and efficiently. The crew of this machine use a light van as their daily transport.

A trenching machine of the hydraulic back-acter type is used in conjunction with the rotary digger whenever a scheme includes deep trench lines over 3ft. 6in. and up to 9ft. The farmer's tractor is used to power it and the machine is towed between farms by a Land Rover, which also serves as the daily transport of the operator. This machine is also capable of digging in soils containing stones, indeed it appears to be the only economical answer to wet land problems of this kind.

Other machines such as mole ploughs, bulldozers, road graders, and farm cultivating equipment are used on drainage schemes, but these are available from private sources.

SCOPE OF OPERATIONS

Operations are carried out under a variety of conditions such as may be found between the flat-land silt soils of the Kairanga Plains and the rolling clay country of the northern Manawatu. An increasing demand has developed for work on isolated flats on hill country stations. The importance of these flats for air strips, cropping; and so on is extremely great in relation to the area involved and, if properly drained, they contribute very materially to the more successful farming of the hills.

Now that the hydraulic back-acter provides the means of trenching in stony, wet soils, work on this class of country is building up to an extent which clearly indicates that this machine could be occupied full time in this class of work.

A special service inaugurated some 18 months ago provides for the comprehensive planning of drainage system covering whole farms. The report on such

a plan details the order of drainage work in relation to improvements and normal farm activities such as cropping, regrassing, subdivision, and increasing stock numbers. The costs of the scheme and tile requirements are also given. The plan is arranged to provide for completion of work over as many years as the farmer himself decides upon. Accordingly, each operation can be planned in relation to the normal farm budget.

Where a farm is all wet and particularly if it is very flat, such a plan can be of fundamental importance to the working of that farm.

The preparation of such a plan obviates the possibility of the costly duplication of tiles, the use of wrong gauges, and unnecessary work, particularly in respect of open drains, that so often mark the efforts of those who must carry out this work without the advantages of a proper plan.

A WORD ABOUT COSTS

In the days when either hand labour or the more simple machines were the only means of trenching, most farmers preferred to express their costs on a per chain basis. Under present conditions, with machines digging at varying depths and speeds according to the specifications of a scheme, this method of costing is unsatisfactory. Accordingly a project charge has been formulated which takes into consideration such factors as duration of operations, size of the scheme, travelling expenses, and type of soil being cut, besides, of course, the usual basic charges.

Usually it is not possible even to quote a per acre charge unless the specifications of the scheme are known. Accordingly estimates are given only as the result of a survey. However, the following examples will serve to demonstrate how reasonably these schemes can be carried out with machines run under this organisation.

Project 1.— Machine hydraulic back-acter

Function of installation :

Outlet main as part of comprehensive scheme.
Soil—silt loam.

Specifications :

Length of trench lines-35 chains.
Tile numbers and gauges-1300ft. of 6in., 1000ft. of 4in.

Average depth of trench lines—lift. 3in. (max. 9ft.)
Gradient-1 :500.

Project Charge :

Machine time 59 hours.
Charge £103.

This figure charged includes all survey work, travelling, and supervision, but to this must be added the cost of tiles. The tractor was supplied by the farmer to power the hydraulic back-acter.

Project Z.-Machine rotary digger unit

Function of installation:

Tile system to be used in conjunction with moles.
Soil-heavy clay.

Specifications :

Length of trench lines-42 chains.
Tile numbers and gauges-2000ft. of 4in., 800ft. of 3in.
Average depth—2ft. 3in.
Gradient-1 : 300.

Project Charge :

Duration of digging operations-10 hours.
Charge—£72.

Again this charge includes survey work and supervision. The work was carried out 90 miles from the college, but travelling expenses were shared between three stations.

If charges for the technical side of the service including travelling could be separated from those connected with the operation of machines, these would amount to about 30 per cent of the figures shown above. However, this is probably no guide to the price a private contractor may have to charge.

Special surveys, as for instance those connected with comprehensive plans, are carried out at a nominal charge, provided the farmer continues with at least some part of the trenching work. If the report proves unacceptable, a charge is made in accordance with the actual time and expenses involved in the survey. This varies between 53 and £5 per 10 acres, depending on size of farm and travelling involved.

APPLICATION OF SERVICE TO LOCAL
CONDITIONS

It has been shown that a staff of 6 is necessary for a complete unit of 2 trenching machines of the

kind described and. associated equipment. However, it would be undesirable to start off with an organisation fully staffed and equipped.

It must first be clearly shown by practical examples in several districts that this work achieves results; in other words the demand must be created. This is best done by starting in a modest way with one rotary machine, a driver and one advisory officer who has been specially trained in this work. Schemes could be carried out on a small scale in various districts to demonstrate the effectiveness of the work. There would be no doubt about the response from farmers. As the demand rose the staff of the rotary unit could be built up to a full complement of 3 with the advisory officer now engaged in planning and organisation.

Finally, in the sequence of expansion, by reason of the amount of equipment operated, travelling expenses would become a big factor, work could no longer be selected for the range of the rotary digger alone, and the operation of a hydraulic back-acter to open up schemes with deep trenching specifications would become a necessity. This machine would of course be available for other work specially suited for the digger.

The supply of tiles would be a further factor which would limit the initial establishment to the proportions suggested and these would have to be assured;

It is not likely that even a small unit with one machine could pay its way for at least the first year.

Many of the problems encountered in southern districts may also be found in abundance in Northland and this justifies the establishment of a small unit. These are problems also, peculiar to the locality, for which no standard technique is available to justify the preparation of plans and specifications for drainage operations. The gumlands are, of course, a good example.

This point provides an opportunity to stress the need for carefully conducted trials on special problems, for it is only in this way that the most effective answers to them will be found.

A thorough investigation into the manner of draining certain soils in Northland would undoubtedly avoid disappointment and needless expenditure; indeed it is a prerequisite to the use of machines on a large scale.

Finally it cannot, be too strongly emphasised that

to achieve a high standard of work, the direction of machinery and field work generally must at all times be subject to control of field officers specially trained for the job. This has been the experience of the College Drainage Extension Service and there is ample evidence that it is fundamental to the success of such an organisation.