

## Review

### Foresters Engineering Handbook.

By E. R. HUGGARD, B.A.I., A.M.I.C.E.

(Cambridge, W. Heffer & Sons Ltd. 18s.)

THIS is a most useful book for foresters. It must be emphasised, however, that it is merely a handbook and not a substitute for technical advice by engineers in the field. It is, however, an excellent guide to foresters on many technical problems and the author has avoided involved engineering calculations.

The necessity for layout of the entire road system before planting is well covered. "To ensure access to the maximum of timber with the minimum of roads" aptly sums up the layout problem. The author's approach to the question of road density is a practical one, although it might, perhaps, be argued that there will be some difficulty in valuing a crop before it is planted! His handling of the subject certainly highlights the necessity for some form of calculation to ensure that there will eventually be a worthwhile credit balance on the sale of a particular crop over the years.

His figure of 1 in 6 for maximum road gradients is too steep. On layout of approximately 150 miles of forest road generally over the most difficult terrain in this country the maximum gradient which surveys proved necessary was 1 in 8 *and this was very seldom used*. 1 in 10 is the normal maximum.

Very useful data is given on the requirements of road curves to take heavy haulage traffic. This is a very important aspect of the work as mistakes in setting out such curves will be costly to remedy later.

The protection of road sites from water damage is fully described. In this connection, it is not necessary to construct a special roadside drain ("water table") where the road foundation has been properly cambered, as the foundation camber in itself will afford the necessary drainage.

I wholeheartedly agree with his advice on the caution which should be exercised in using formulae to calculate water run-off from known areas of catchment basins. Such a formula is essential for a guide but alternative site checks must be made, for information on highest flood measurements. For small streams not marked on the ordnance survey sheets it is often very difficult to ascertain catchment areas in grown timber.

The recommended use of cement mortar or concrete for jointing and setting of concrete pipe culverts is usually unnecessary, where

- (1) pipes are made to Irish Standard Specification,
- (2) have a cover greater than the pipes external diameter, and
- (3) are properly surrounded with well-packed fine clay or gravel.

Concrete "sealing" walls may sometimes be required at both ends.

In his treatment of fords, he has not mentioned what is probably the cheapest type of construction, i.e. corduroy surfacing with thinning poles anchored with wire to heavier timbers buried in the stream bed.

"Gravel" road construction gets very little space. However, this is a most difficult subject to write about and any attempt at giving a general specification would be dangerous. The limit of 4" depth for *all gravel roads* set by Mr. Huggard has been disproved on many of our Irish forest roads in the recent past. Depths depend on the bearing capacity of the subsoil and a very common depth of gravel is 8" to 12" without any heavy soling but with small stones raked into the ruts. Depths up to 2' may be required on bog.

The author emphasises the necessity for sufficient supervision of heavy machinery by pointing out that the output from a D.7 type dozer is equivalent to that of seventy men. His recommendation as to the most suitable size of bulldozer for forestry work is borne out by our experience here.

The method of determining the necessary depth of the surfacing material by noting failures under construction vehicles is the only practically economical system. This ensures that the *minimum of material is used and costs are, therefore, kept as low as possible*. Construction traffic normally causes more wear than any subsequent timber traffic because it is more concentrated and the road site is not well consolidated until after construction.

There is a very useful chapter on bulldozers. Figures are given for output of the various types under ideal conditions and costings per hour are provided. This data is a help toward estimating cost of construction work.

Useful hints are given on the general use of bulldozers. The versatility of the excavator is well illustrated, though the author does not mention the advantages of this machine for levelling road sites on sloping ground where either the soil is too soft or there is too much rock to permit bulldozing; neither does he mention its use for excavation of roadside drains through soft bog. Light towed graders and towed rollers have proved very satisfactory for maintenance of gravel road surfaces here and in his comparison of towed with powered machines Mr. Huggard does not mention the fact that because of their low initial cost and absence of maintenance costs, the towed machines can better afford to be idle for long periods. Neither is a problem created in finding alternative work for an operator in the case of the towed machine.

Special detachable grader blades which can be rigidly attached to the ordinary wheeled tractor are not mentioned but these may not yet be in common use.

Some very useful figures are given for the dimensions of beams required for simple short span bridges. Simple construction details are also given for beams and decking. Supporting walls cannot be satisfactorily dealt with because these have to be designed specially to suit

the particular circumstances e.g. they may or may not be retaining walls as well as supports; heights will vary, foundations differ, etc.

Calculations for light suspension bridges are given in simple form. This type of bridge is suitable for deep ravines with very steep faces. Blasting is dealt with briefly but quite a lot of useful information is given. The output of rock given per lb. of gelignite is very high for normal quarrying. Output will depend on conditions, average depth of holes, spacing, etc.

Brief notes are given on the construction of one type of retaining wall with coefficients to allow for varying dimensions and materials.

There are very good graphic illustrations of the use of reducing gear for lifting heavy loads in the field.

The various methods of timber extraction are discussed and extraction economies are well described. He indicates that the aerial ropeway is not an economic method except in the more inaccessible places. An important argument against the aerial ropeway not mentioned, is the difficulty in getting merchants to buy *standing* timber in a property where extraction must be by this method.

Incidentally, figure 26 illustrating tractor and sulky appears to be missing.

Some good general notes are given on map reading and surveying. He points out that a practised map-reader can obtain a general mental three-dimensional picture from a contoured map. This is essential for successful economic road planning, reading of catchment areas etc., and it is surprising the number of people who use maps regularly but cannot see the third dimension *automatically*. The book is completed by an interesting chapter on aerial photography for survey purposes. Wonderful developments have been made in this type of surveying in England since the war and contours at one foot intervals can now be plotted from aerial photographs by commercial companies. The author concerns himself chiefly with the principle of the system and the method of interpreting from the photographs. He gives a lucid description of a highly technical subject.

Priced at 18 shillings, this book is very good value. Every forester, estate agent and timber merchant should have a copy.

K. F. MCGARRY, B.E.