1. INTRODUCTION

Purpose and scope

1.1 This Note is a practical guide to the management of maintenance operations. It outlines a rational approach that will help maintenance engineers organize and control the activities for which they are responsible, so as to improve efficiency and make more productive use of maintenance resources.

1.2 The maintenance operations discussed here are those required to keep roads in good condition and repair. The Note does not deal with any form of road improvement works, pavement strengthening or reconstruction, even where these activities are undertaken by an organization responsible also for normal maintenance.

1.3 The Note offers advice on techniques basic to good maintenance practice, but it does not set out to define 'model' systems that should be copied generally or to describe all the management procedures an ideal maintenance organization would follow. This is because in any location the best management system will be one which is matched closely to the technical skills, human resources and equipment available to the individual maintenance organization; and the most effective procedures will be those that are appropriate to the experience and capabilities of its staff. Using this Note, engineers will be able to assess the range of management techniques applicable to road maintenance and so identify methods they can usefully put into practice within the context of their own organizations.

Structure of the Note

1.4 Following this introduction, Section 2 summarizes the responsibilities of the maintenance engineer and comments on the approach he should adopt to key management tasks. Section 3 sets out a classification of maintenance activities, and Section 4 defines the sequence of management tasks which the engineer has to fulfil. These tasks are the subject of Sections 5 to 11, which explain each stage of the management process in turn. Appendices A to D provide details of technical procedures and illustrate standard forms and worksheets. Appendix E illustrates typical defects found on roads.

2. THE ROLE OF THE MAINTENANCE ENGINEER

2.1 Roads are expensive to build. They repay their initial investment only by means of long-term care and maintenance. A road system that is well maintained brings important social and economic benefits:
- the transport links on which development depends are kept in good working order
- roads have a longer lifetime of service because their surfaces do not deteriorate so rapidly
- vehicle operating costs are reduced because traffic is able to run smoothly
- transport operations are safer and more reliable

2.2 The maintenance engineer responsible for operations at regional or district level has a key role to play in achieving these benefits. His success depends largely on the way he approaches the task of management.

Management responsibilities

2.3 This task normally involves five main responsibilities:
- planning the annual programme of maintenance work for his area, assessing the resources needed and preparing an appropriate budget estimate
- arranging that funds are allocated fairly to the various parts of the road network, and deciding on priorities if the funds available do not allow him to undertake the full programme
- authorising and scheduling work
- making sure that his staff know how to carry out the work methodically and efficiently
- monitoring the quality and effectiveness of maintenance activities.

2.4 Each of these responsibilities forms a major step in the sequence of maintenance management explained in Sections 5 to 11 of this Note.

Involvement on site

2.5 In performing his management role, the maintenance engineer will, of course, have many hours of office work on matters such as planning and administration. But it is essential that he also gets out into the field as much as possible. The simple procedure of seeing things for themselves would help maintenance engineers overcome many of the problems that at present affect their operations.

2.6 There are several reasons why site visits are important:
they enable the maintenance engineer to become thoroughly familiar with road conditions in the area, and so recognize trouble spots and other places where difficulties are likely to occur

- he can gain first-hand knowledge of the extent and quality of the maintenance that has actually been carried out, instead of having to rely on what he reads in reports
- he can use this knowledge to assess maintenance priorities much more confidently
- his presence on the spot means that he can advise on problems as they arise
- seeing him regularly on site should boost the morale of road gangs and improve their standard of work and their output. His attitude will have more influence on their performance than any other factor, and site visits are the most effective way of demonstrating his commitment to getting the job done successfully.

Delegation

2.7 The maintenance engineer should use his knowledge of road conditions to decide which operations need his personal supervision and which he can safely delegate to staff. On lengths of road where maintenance is straightforward and easy to specify in advance, it should be possible to leave day-to-day work in the hands of suitably trained foremen or contractor's staff. On other roads where there are problems requiring complicated treatment and on-the-spot judgment, the maintenance engineer will have to become personally involved in determining what needs to be done and supervising the work. His key point is that he should not let his time be taken up by simple operations which less qualified staff are able to manage.

Training

2.8 Delegation will only succeed if staff have the knowledge and competence to fulfil the duties they are given. The maintenance engineer has to make sure that supervisors, foremen and other personnel receive the necessary training, and that there are enough trained staff to carry out his instructions. This means that training is an important part of his responsibilities.

2.9 Though training methods are outside the scope of this document, there are some basic points to remember. First, every member of staff should have appropriate training. Secondly, this training should be built into the work programme and include practical on-the-job experience as well as more formal courses. Thirdly, training should be an on-going feature of employment in the maintenance organization, so that competent staff are available to take over when more experienced personnel are promoted or transferred to other duties.

Using microcomputers

2.10 Now that 'micros' are becoming widely available, their application to maintenance management is a subject where staff training may be particularly useful. A growing range of specialised software is available to help process data and analyze problems, and using a micro can save considerable time beside freeing the maintenance engineer for inspection and monitoring on site. But expenditure on computers can prove an expensive mistake if the system is not chosen with care and if suitable personnel are not available to make the best use of it. Maintenance can be managed efficiently without a micro; and even if there is one in the office, it does not lessen the need for regular and accurate data collection in the field.

Implementation

2.11 For most organizations, the management approach recommended in this Note will take some time to implement - perhaps a period of several years. The maintenance engineer should not try to put everything into practice at once. It is better to introduce new methods and procedures gradually, starting with straightforward measures that will produce early and positive results. Proceed step by step, and wait until one stage is working reasonably well before moving to the next. Concentrate first on the sections of road that carry the largest volumes of traffic and ensure these are adequately maintained before dealing with less busy roads.