



ROUGHTON INTERNATIONAL

In association with
THE UNIVERSITY OF BIRMINGHAM
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THE UNIVERSITY OF NOTTINGHAM



GUIDELINES ON WRITING A MAINTENANCE MANUAL





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Department for International Development Knowledge and Research (KaR) Programme	
<i>Project Title:</i>	Appropriate and Efficient Maintenance of Low Cost Rural Roads
<i>DFID Project Reference:</i>	R6852
<i>Subsector:</i>	Transport
<i>Theme:</i>	T2
Element A:	Guidelines on Writing a Maintenance Manual
<i>Date:</i>	February 2000

This document is an output from a project funded by the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID

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ACKNOWLEDGEMENTS

This manual was prepared by Ms K Adams (University of Birmingham). Formatting and graphic design was undertaken by Mrs L Bailey and Mr J Charter (Roughton International Ltd).

The helpful comments of Professor K Madelin, Dr B. Obika and Dr R.J. Freer-Hewish and those people who contributed to the main report are gratefully acknowledged.

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**GUIDELINES ON WRITING
A MAINTENANCE MANUAL**



The maintenance manual should always be suitable for the audience. Account should be taken of potential differences in educational background. Photograph from Papua New Guinea, Department of Works, Road Maintenance Field Manual.

The proposed audience of a maintenance manual should always be stated. This will help both with the style of writing and the level of information. Also getting the manual to the person it is intended to help is an important issue, which will be helped by having a clear idea from the start about the



This maintenance manual is written in two languages - English on the right and Pidgin on the left. Thus ensuring it is suitable for the user. (Papua New Guinea, Department of Works, Road Maintenance

WHAT TO CONSIDER WHEN WRITING A MAINTENANCE MANUAL

- When writing a maintenance manual there are various issues that need to be considered. The aim of this guidance document is to offer advice on the type of issues that must be tackled. The advice is based on work undertaken to establish what makes manuals effective.



Audience

- The proposed user of the maintenance manual should have clear guidance on the exact purpose and status of the manual. Who is the audience? Different levels of staff which a manual could be aimed at (in the maintenance scenario) can be thought of as follows (obviously different titles and structures will be present in different countries), but generally:

- ◆ Chief Engineer at Headquarters
- ◆ Regional Maintenance Engineer
- ◆ Road Maintenance Engineer
- ◆ Road Maintenance Supervisor
- ◆ Road Maintenance Foreman



- A maintenance manual containing information for all levels of staff would be a large document and would not really be practical. Staff at different levels, who are from differing educational backgrounds, require different types and levels of information. With this issue in mind, loose-leaf systems and topic manuals belonging to a larger set can be used to good effect. In general the information required by those staff at the top of the hierarchy will not contain the level of detail as would be required by the member of staff implementing the maintenance on the ground. It is unlikely that each level will require a separate maintenance manual and so the audience can be grouped eg supervisors and foremen.

Language

- If the maintenance manual were to be used in a country where more than one language is spoken it would be advisable to write the manual in the relevant languages. Alternatively, a good selection of diagrams should be provided to ensure those people who are not able to speak the language in which the maintenance manual is written are still able to use it. Relevant forms and bullet points could also be written in more than one language. The method of using one language on the left page and the second language on the right, can be effective.

- It is probably reasonable to assume that those people working at the lower levels of an organisation may not have received such an extensive education as those who work higher up within an organisation. Therefore this fact must be considered when writing the maintenance manual and if it is aimed at staff with a lower level of education, then the language in which the manual is written should be their first language (not necessarily the language of the author or the higher level staff).

Text

Serifed fonts such as **'Times New Roman'** are effective for sentences and paragraphs as they guide the eye from word to word. Whereas a sans serifed font such as **'Arial'** is useful for bullet points and items that the reader is required to dwell on or take in and remember. The size of font and whether or not bold type should be used should be considered. Probably the less text there is, the bigger it can be, and using bold type for emphasis can be effective. Pages of small densely packed text can be off putting for the reader. Obviously it is important to get the message of the maintenance manual across and it is more likely to be read if the reader is not greeted with pages of unbroken densely packed text.

Maintenance manuals do not have to be typed at all and can be **hand written** if desired to keep costs down. One might however speculate that a hand written manual is less likely to be viewed by the users as informative, simply due to the presentation, but this is obviously a perception problem.

Visual Aids



The aim of a maintenance manual is to instruct and demonstrate, define and aid, clarify and inform. Visual aids can be very useful when they are used to demonstrate a point being made, they also effectively break up the text and add interest: *"a picture is worth a thousand words"*. Visual aids can take the form of diagrams, sketches, graphs, charts, tables and photographs. For example: the description of a pavement defect that utilises a photograph is much more likely to be effective than a description that relies on text alone. Obviously it depends again on the audience. It is fair to say that documents aimed at higher level staff are likely to contain less visual aids than those aimed at staff from lower down in the hierarchy.

Size of Maintenance Manual



The size of the maintenance manual should be determined by its use and the user. If there are going to be many users, then a loose-leaf system or a manual that appears in a set, is the best option. It keeps down the size of the individual sections and allows the users to obtain only the information they require. Maintenance manuals that are intended for use in the field should be portable and if possible 'pocket' sized. The size of a maintenance manual which is intended for use in the office, is perhaps less important. If intended for field use, hard-wearing, waterproof covers should be provided.

Structure



Placing 'like' subjects together in a sensible way will help the reader to locate the relevant sections. Careful thought should be given to the purpose of the maintenance manual and with this in mind a contents list should be formed. Grouping like items together makes it easier for the user. Ideally, the information should be structured in an easy to follow way (as indicated).



Contents with page numbers

Introduction

Chapters or sections that are numbered

Glossary of terms or definitions

Index – (preferred, but not essential)

List of figures and diagrams – (preferred, but not essential)

List of references

A supply of blank forms which can be copied

The decision on what to include and what not to include is likely to be a difficult one. For example, if it is decided to provide advice on grading a road, is it necessary to include information on different types and makes of grader? What should be included and what can be left out depends on what other documents are actually available in the country.



A lorry too heavy for the poorly maintained bridge.

Contents



- It can be difficult to decide on the contents of the maintenance manual. A useful method is to start with a checklist and speak to different people within the organisation to gain their input.
- Once this task has been completed, the checklist can form the first draft of the contents list. However, there may be very clear reasons for producing the manual, in which case the task is easier.
- For guidance only, the following list of contents could be considered for a maintenance manual and those sections that are felt to be inappropriate should be ignored.



An Introduction for the Reader

- The purpose and status of the maintenance manual must be explained and the proposed audience should be specified. How the maintenance manual is intended to be used, and whether or not policy exists to back up the use of the manual should be established.

Maintenance (Including Construction and Emergencies)

- The need for maintenance should be explained, as should choices of technology and methods (labour/ equipment), where maintenance should be undertaken, when should it be undertaken, how it should be carried out, supervision, monitoring and reporting. The definitions of different types of maintenance need to be specified in the context of the organisation, such as: Routine, Periodic and Emergency.
- Maintenance refers to maintaining of a certain level of condition, but a manual could also include improvement, and rehabilitation and in turn, the improvement may require some construction work to be undertaken.

Maintenance of paved roads	Maintenance of unpaved roads	Drainage, Bridges and structures	Concrete technology	Masonry
Tack-coat, prime coat and seal coat	Patching and reshaping	Maintenance of Mitre drains	Materials	Mortar
Premix – what is it and how to use it.	Grass cutting/vegetation clearance	Maintenance of Scour checks	Manufacturing concrete	Types of stones and concrete blocks
Patching and filling materials	Camber improvement	Maintenance of catch water drain	Placing concrete	Manufacturing of mortar
The patching of potholes	Shoulders	Maintenance of Culverts	Compacting of concrete	Concrete block walls
Edge repair techniques	Grading	Maintenance of Drifts	Curing of concrete	Stonework
Spot sealing techniques	Regravelling	Bridge types and maintenance	Quality of concrete	Quality of mortar
Crack sealing techniques	Resealing	Road furniture and maintenance	Concrete mixer	Maintenance of mortar

Table 1 Technical Maintenance Issues which should be Considered in a Maintenance Manual

Materials

The selection of materials, use of borrow pits, borrow pit management, basic soil mechanics, testing procedures, specifications, interpretation, reporting and monitoring.

Environmental Issues

Affects of undertaking work on local area and mitigation. Risks of polluting watercourses and damage to the environment.

Safety Issues



Temporary and permanent traffic management – (signs, layouts, methods). Standard signs to be used, the principles of traffic management and temporary signing should be covered. The safe use of materials and equipment. Personal safety and the protection of road users.

Inventory, Condition Surveys, Planning, MMS and Budgeting

- ◆ Defects – the mechanisms of deterioration, a description and reference to possible treatments, with how to undertake a survey. Should also include necessary blank forms.
- ◆ Assessment of maintenance requirements, setting of maintenance priorities, calculating the required budget.
- ◆ The assessment of resource requirements and the preparation of maintenance work plans.
- ◆ The implementation and undertaking of the maintenance work and the necessary supervision tasks.
- ◆ The frequency of the operations and the required resultant level of serviceability achieved.
- ◆ An insight into which roads should be considered for rehabilitation and upgrading.

Staff, Responsibility & Duties of Staff, Employment Issues

It may be desirable to include issues relating to maintenance staff in the manual. To enable the user to have appreciation of what areas need consideration and whether certain rules and regulations need to be provided. The provision of such information obviously depends on the intended user and the purpose of the maintenance manual. It may be intended for the manual to be a handbook for staff. Generally, the following issues relating to staff should be considered:



Stores keeping	Personnel matters	Administrative matters
◆ Stores general	◆ Staff motivation	◆ Forms
◆ Preservation of stores	◆ Staff training	◆ Pay
◆ Security of stores	◆ Staff discipline	◆ Recruitment
◆ Handing over of stores	◆ Job descriptions	◆ Sick pay/ pensions
◆ Stores documents	◆ Rules and Remuneration	◆ Record keeping



● **Task Rates, Performance Standards, Equipment, Activity Specifications**



- Plant operating and maintenance of plant, tools required for activities, performance expected from staff and equipment for each of the activities.

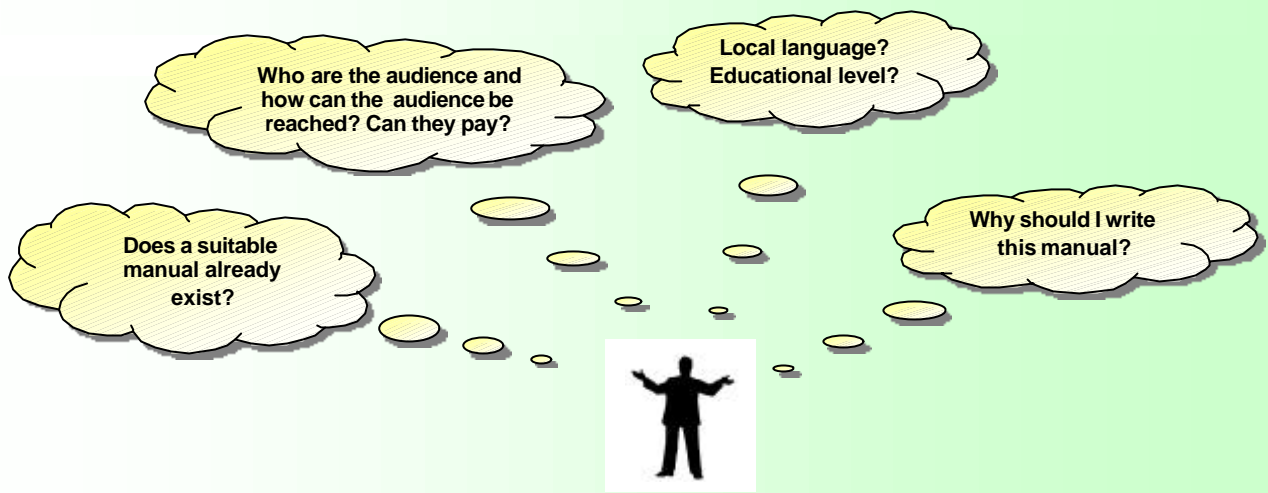
● **Contract Procedures**

- The packaging of work, engagement of contractors (who the contract will be signed between and the required forms), the supervision requirements, measurement of the work and a list of obligations for the contractor, advice on how the mode of payment should be dealt with, monitoring – a list of which members of staff of required to make what type of report and when. Also examples of contract documentation.

● **Summary**

- The following general checklist of headings should be used as a starting point in developing the contents of the maintenance manual:

- ✓ Management and Administration
- ✓ Financial issues
- ✓ Management systems
- ✓ Staff issues
- ✓ Standards
- ✓ Calculations
- ✓ Costing exercises
- ✓ Surveying and inventories
- ✓ Defects (cause and effect)
- ✓ Organisation of work
- ✓ Supervision of work
- ✓ Maintenance techniques
- ✓ Materials
- ✓ Equipment
- ✓ Planning of work
- ✓ Programming of work
- ✓ Training
- ✓ Safety issues
- ✓ Monitoring, reporting and record keeping



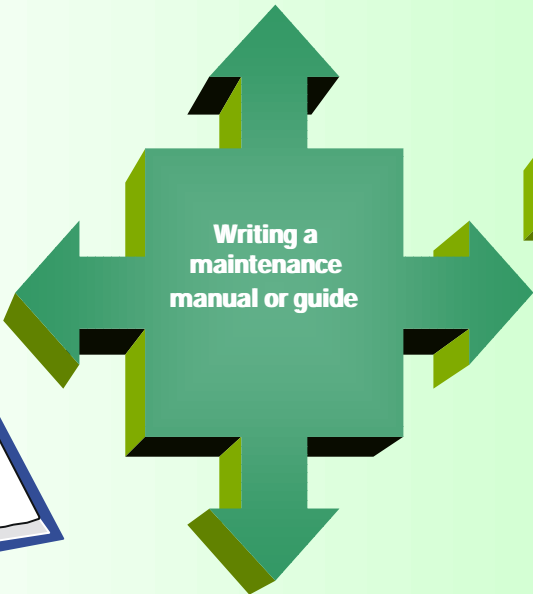
Identify audience

Consider structure



Consider aesthetics

- ✓ Visual Aids
- ✓ Text
- ✓ Style
- ✓ Complexity
- ✓ Size



Scope of manual/ guidelines etc.

WHAT IS THE PURPOSE OF THE MANUAL?

WHAT DO I NEED TO INCLUDE & WHY?

SUPPORT SYSTEMS

- ✓ FINANCIAL INPUT
- ✓ DATA
- ✓ COMPUTERS
- ✓ RECORDS
- ✓ STAFF

MAINTENANCE

- ✓ METHODS
- ✓ MANPOWER
- ✓ MACHINES
- ✓ MONEY

MAINTENANCE

- ✓ WHY TO DO IT?
- ✓ WHEN TO DO IT?
- ✓ WHERE TO DO IT?
- ✓ HOW TO DO IT?

¹ MILES, D., Towards guidelines for labour based contracting, A framework document edited by Derek Miles, MART working paper No 1 1996, p22.