

No.



MINISTRY OF ROADS AND PUBLIC WORKS(MORPW)
REPUBLIC OF KENYA



JAPAN INTERNATIONAL
COOPERATION AGENCY(JICA)

**THE STUDY
ON ROAD MAINTENANCE SYSTEM
UNDER THE FRAMEWORK
OF THE KENYA ROADS BOARD**



**FINAL REPORT
VOLUME 2 OF 3**



MAIN TEXT

FEBRUARY 2003



 **Oriental Consultants Company Limited**
in association with
 **Japan Overseas Consultants Company Limited**

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PREFACE

In response to a request from the Government of the Republic of Kenya, the Government of Japan decided to conduct The Study on Road Maintenance System under the Framework of the Kenya Roads Board and entrusted to study to the Japan International Cooperation Agency (JICA).

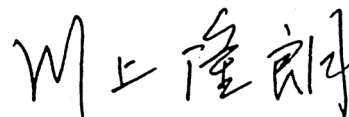
JICA selected and dispatched a study team headed by Mr. Masami FUKUDA of Oriental Consultants Co., Ltd. and consist of Oriental Consultants Co., Ltd. and Japan Overseas Consultants Co., Ltd. to Kenya, six times between November 2000 and January 2003. In addition, JICA set up an advisory committee headed by Mr. Nobuhiro KOYAMA, Senior Advisor, Institute for International Cooperation, Japan International Cooperation Agency between November 2000 and January 2003, which examined the study from specialist and technical points of view.

The team held discussions with the officials concerned of the Government of Kenya and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Kenya for their close cooperation extended to the study.

February 2003



Takao KAWAKAMI

President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

January 2003

Mr. Takao KAWAKAMI
President
Japan International Cooperation Agency
Tokyo, Japan

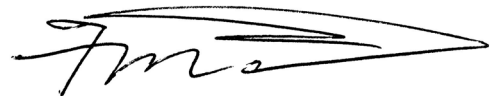
We are pleased to submit to you the final report of The Study on Road Maintenance System under the Framework of the Kenya Roads Board.

This study was conducted by Oriental Consultants Co., Ltd. and Japan Overseas Consultants Co., Ltd., under a contract to JICA, during the period from November 2000 to January 2003. In conducting the study, we have examined the feasibility and rationale of the study with due consideration to the present situation of Kenya and formulated the most appropriate proposal.

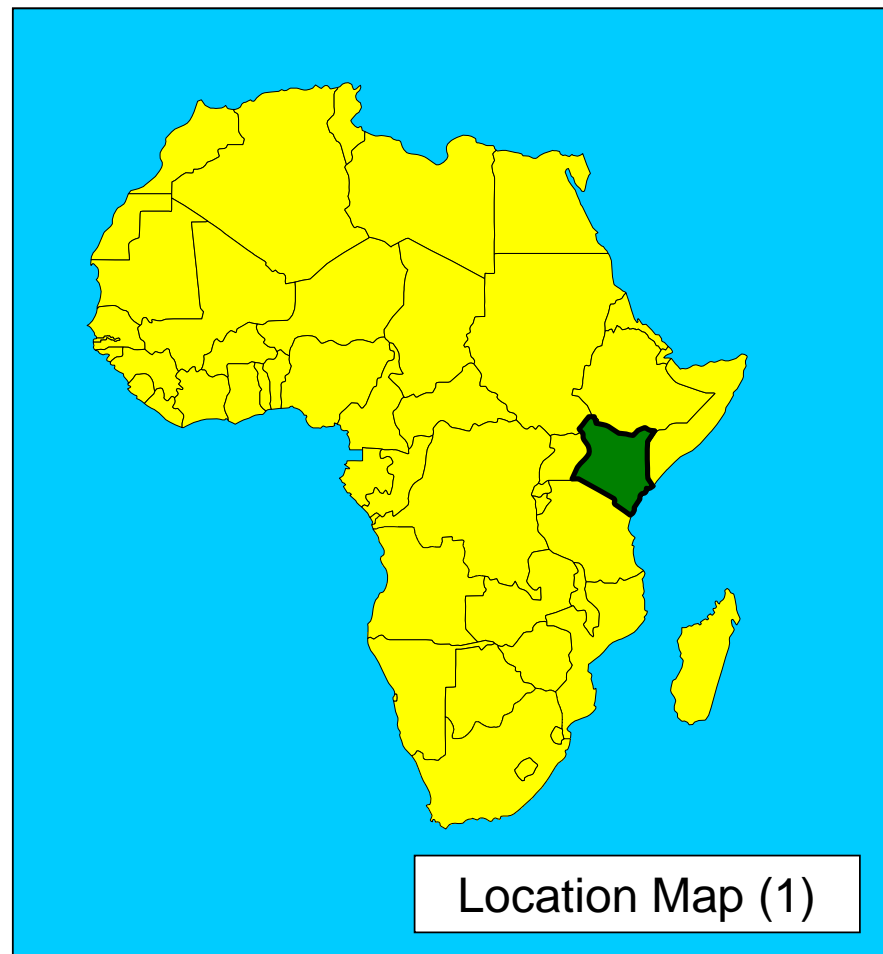
We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs, Ministry of Land, Infrastructure and Transport, Japan Highway Public Cooperation, the Ministry of Roads and Public Works, the JICA Kenya Office and the Embassy of Japan in Kenya for their cooperation and assistance throughout field survey.

Finally, we hope that this report will contribute to further promotion of the project.

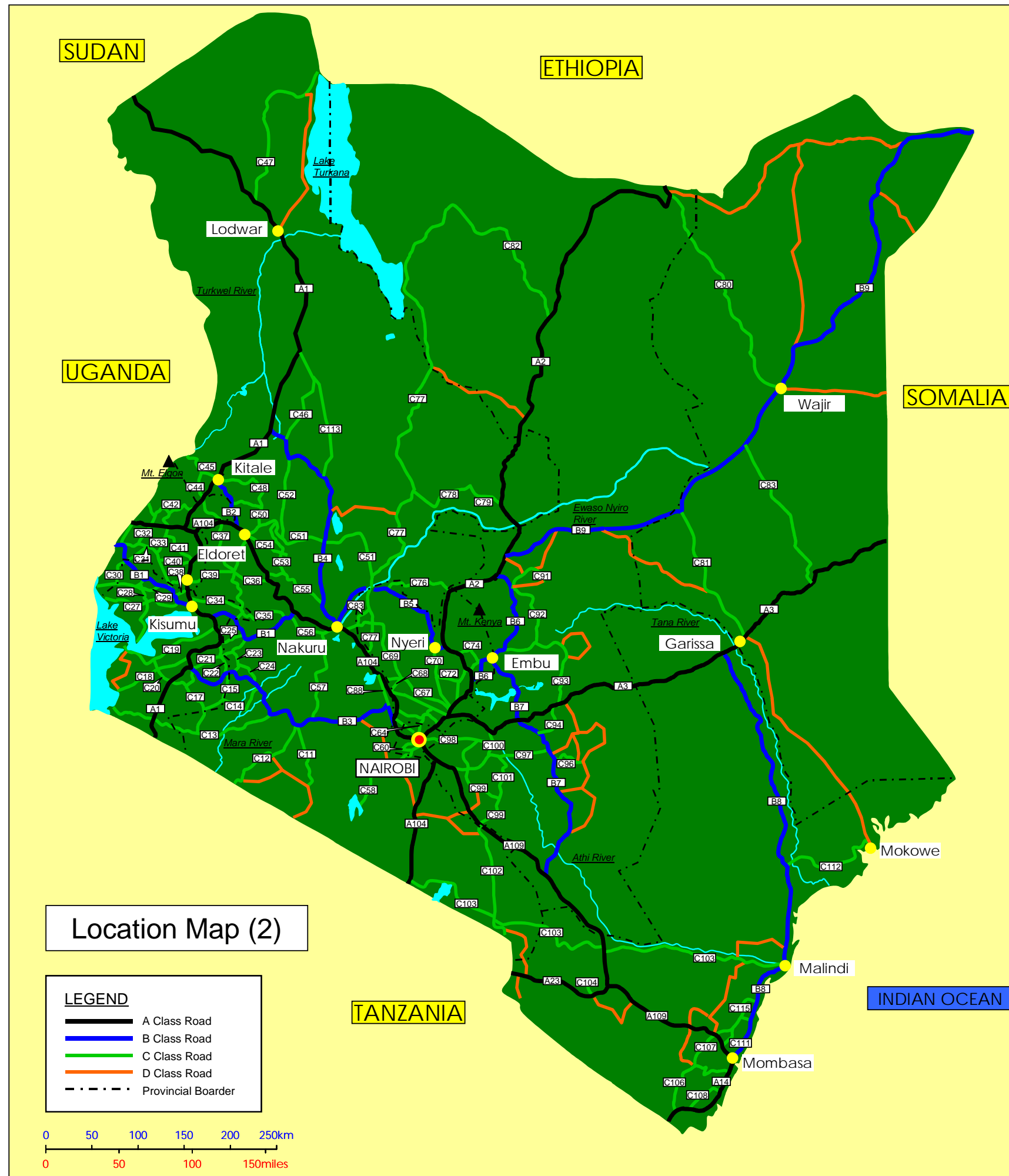
Very truly yours,



Masami FUKUDA
Team Leader,
Study Team on Road Maintenance
System under the Framework of the
Kenya Roads Board,
Oriental Consultants Co., Ltd.



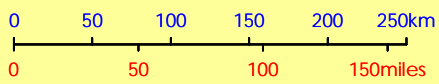
Location Map (1)



Location Map (2)

LEGEND

- A Class Road
- B Class Road
- C Class Road
- D Class Road
- - - - Provincial Boarder



PROJECT SUMMARY

1. COUNTRY	Republic of Kenya
2. NAME OF STUDY	The Study on Road Maintenance System under the Framework of Kenya of the Kenya Roads Board
3. COUNTERPART AGENCY	Ministry of Roads & Public Works (MORPW)
4. OBJECTIVE OF STUDY	Proposals to Improve Effectiveness of Road Maintenance System

<p>1. STUDY AREA: Road Network of Entire Country</p>
<p>2. SCOPE OF STUDY</p> <p style="text-align: center;"><u>Phase I</u></p> <ol style="list-style-type: none"> 1) Review of the road maintenance system for all road types 2) Analysis of the new Kenya Roads Board (KRB) and road agencies framework (Roads Department (RD), District Road Committees (DRCs) and Kenya Wildlife Service (KWS)) to manage road maintenance 3) Analysis of future maintenance scenarios for all road types 4) Proposal of a road maintenance management system for all road types 5) Proposal of a road maintenance training and capacity building program 6) Development of a maintenance manual (3 volumes) for capacity building of road maintenance <p style="text-align: center;"><u>Phase II</u></p> <ol style="list-style-type: none"> 7) Advice and guidance for the implementation and operation of the KRB road maintenance system 8) Practical guidance for the application of road maintenance manuals
<p>3. COMPARISON OF FUNDING & COST-REDUCTION SCENARIOS</p> <p>Based on the Study's examination of existing and future possible funding sources, there are sufficient monies for maintaining a core road network consisting of Class A, B, and C roads. On the other hand, granted even that Class A, B, and C roads are economically the most important part of the network, they still only account for approximately 9% of the total. Therefore, the Study carried out a comparative scenario analysis of cost-reduction and funding measures to determine the size of the funding gap and the amount of road that would have to be financed outside of the KRB system regarding the rest of the road network.</p> <p>The Study's analysis indicates that even in a best-case scenario about 29,300 km of secondary and minor road would have to be financed outside of the KRB system (e.g., paid for by local communities) or dropped from the network. If the status quo prevails, about 80,400 km of road would have to be paid for by local communities or retired. This clarifies the scale of the funding gap (i.e., between 23% to 63% of secondary and minor roads will be unable to receive money from KRB) and indicates that the aggressive pursuit of new funding sources and implementation of cost-reduction measures are crucial to ensure the overall health of the road network.</p>
<p>4. DEVELOPMENT OF ROAD MAINTENANCE MANUAL</p> <p>All roads under the KRB should be maintained in accordance with the road maintenance manuals developed by the Study.</p> <p>The manuals consist of the following three booklets:</p> <p style="padding-left: 40px;">Part I: Inspection Manual Part II: Evaluation Manual Part III: Execution Manual</p>
<p>5. RECOMMENDATIONS:</p> <ol style="list-style-type: none"> 1) Road inventory data should be updated and maintenance records/data retained on a computer database. 2) The legal and institutional setup for road maintenance should consider financial, managerial, and technical issues. 3) A national system of guidance for the preparation of Work Plans should be introduced. 4) Standard simplified contract documents for Labor-Based Equipment-Supported work should be introduced. 5) Rationalization and commercialization of MTD should be carried out immediately. 6) Training can be managed, executed and monitored by Kisii Training Center (KTC), but reliable sources of revenue (including donor aid) should be developed. It is suggested that KTC draw up and implement a plan to become a semi-autonomous agency to facilitate this process. 7) Promotion of private sector capacity building should be carried out by improving access to resources and providing an enabling environment for contracting.

ABBREVIATIONS & ACRONYMS

1. AASHTO: American Association of State Highway and Transportation Officials
2. ADB: African Development Bank
3. B/C: Benefit / Cost Ratio
4. BS: British Standards
5. CBR: California Bearing Ratio
6. DANIDA: Danish International Agency
7. DFID: Department for International Development
8. DRCs: District Roads Committees
9. EIA: Environmental Impact Assessment
10. EIRR: Economic Internal Rate of Return
11. EU: European Union
12. HDM: Highway Development Management
13. IEE: Initial Environmental Evaluation
14. IRI: International Roughness Index
15. ISC: Interim Steering Committee
16. JICA: Japan International Cooperation Agency
17. KIHBT: Kenya Institute of Highways and Building Technology
18. KRB: Kenya Roads Board
19. KTC: Kisii Training Center
20. KUTIP: Kenya Urban Transport Infrastructure Project
21. KWS: Kenya Wildlife Service
22. LBES: Labor-Based Equipment-Supported
23. MTD: Mechanical and Transport Department
24. MOENR: Ministry of Environment and Natural Resources
25. MOF: Ministry of Finance
26. MOLG: Ministry of Local Government
27. MORPW: Ministry of Roads and Public Works
28. MRP: Minor Road Program
29. MTEF: Medium Term Expenditure Framework
30. NPV: Net Present Value
31. OD: Origin-Destination (matrix)
32. PCU: Passenger-Car Unit
33. PIARC: Permanent International Association of Road Congresses
34. PRSP: Poverty Reduction Strategy Paper
35. PRTA: Public Road Toll Act
36. RARP: Rural Access Roads Program
37. RMI: Road Maintenance Initiative
38. RMLF: Road Maintenance Levy Fund
39. SDC: Swiss Agency for Development and Cooperation
40. SIDA: Swedish International Development Agency
41. SSATP: Sub-Saharan Africa Transport Policy Program
42. UK: United Kingdom
43. WB: The World Bank

SUMMARY OF THE STUDY

1. Background & Objective

One of the important features of post independence development in Kenya is the massive expansion of the road network to approximately 197,000 kilometers. However, inadequate maintenance over the last 30 years has resulted in about 40% of this road network being “lost”, which in turn has produced higher vehicle operating costs and longer travel times for road users that are having a negative effect on the national economy. In addition, traffic demand has been increasing very rapidly over the past decade, which is putting even a greater strain on road maintenance services.

Given this background, the Government of Kenya (GoK) has decided to develop an appropriate system of road maintenance and the GoK has requested the Government of Japan (GoJ) for technical cooperation for its implementation.

Therefore, the objective of the Study is to develop and enhance the road maintenance management capabilities of the public and private sector under the new Kenya Roads Board (KRB), which is an autonomous body responsible for managing and allocating roads funding to finance the necessary road works and/or services to be carried out by road administration agencies.

2. Scope

The scope of the Study consists of the work items listed below and is for both the classified and unclassified roads of the entire territory of the Republic of Kenya.

- 1) Review of the road maintenance system for all road types to clarify major issues and constraints of routine and periodic road maintenance.
- 2) Analysis of the new KRB and road agencies (Roads Department (RD), District Road Committees (DRCs) and Kenya Wildlife Services (KWS)) to manage and execute road maintenance.
- 3) Analysis of future maintenance scenarios for all road types, including force account versus contracting out as well as labor-based versus equipment-based methods, that focus on funding and cost-reduction for road maintenance.
- 4) Proposal of a rational and efficient road maintenance management system for all roads under the framework of KRB, via the clarification of major issues and constraints of routine and periodic road maintenance.
- 5) Development of a program for road maintenance training and capacity building to increase private sector involvement in road maintenance.

- 6) Assistance with the strengthening of the planning, management, and monitoring capabilities of road implementation agencies engaged in routine and periodic road maintenance works with an emphasis on contracting out.
- 7) Development of a set of maintenance manuals for routine and periodic road maintenance for capacity building purposes for road maintenance.

The execution of the above-mentioned scope is carried out in two phases. The timing of these phases and their work content are as follows:

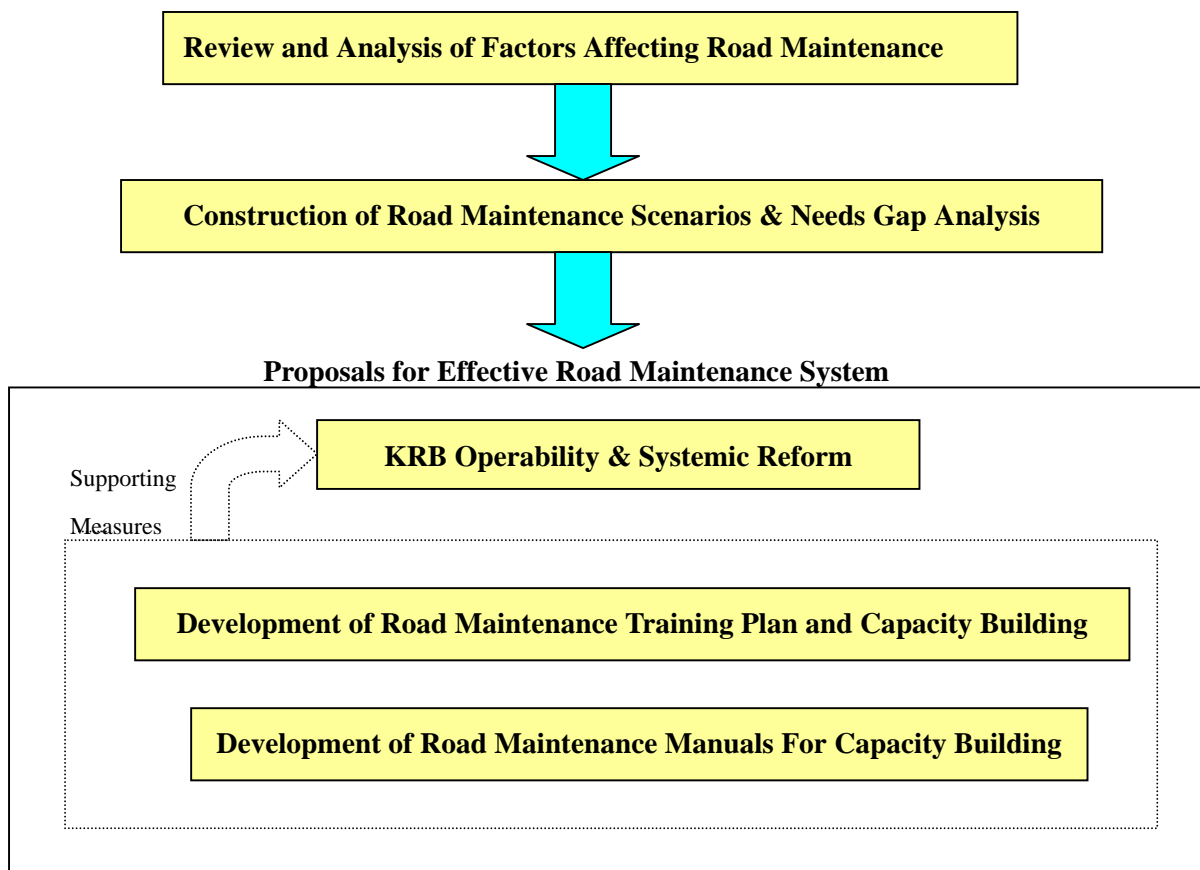
- Phase 1 (November 2000 – January 2002): To examine the current road maintenance system and to make recommendations to increase its overall effectiveness as part of the new KRB system.
- Phase 2 (May 2002 – January 2003): To provide advice and guidance regarding the implementation of the recommendations made in Phase 1 via on-site monitoring.

3. Approach to Realize an Effective Road Maintenance System and Impacting Factors

(1) Approach

To realize an effective road maintenance system, it is first necessary to determine the gap between the needs and resources of road maintenance, and then second to implement the appropriate measures to deal with this “needs gap”.

To accomplish this, the Study Team first reviewed and analyzed factors affecting the costs of road maintenance. These factors were then incorporated into the construction of plausible road maintenance scenarios to assess the existence and size of the above-mentioned needs gap. After determining the needs gap, the Study Team drew up proposals to eliminate it. The proposals consist of KRB operability and systemic reform, development of road maintenance training and capacity building, and the development of a road maintenance manual for capacity building. The proposals are both comprehensive and holistic in nature in order to integrate the relevant road maintenance components and thereby realize the most effective road maintenance system possible. The workflow for this approach is shown below.



Approach for Drawing Up Proposals for an Effective Road Maintenance System

As the above workflow indicates, before road maintenance scenarios can be constructed and proposals drawn up, the factors that have an impact on the costs of road maintenance must be defined. This is taken up in the next section of this chapter.

(2) Impacting Factors

There are a number of key factors impacting upon road maintenance costs and these can be split into **physical** and **non-physical**. Key **physical** factors that affect road maintenance, which taken together represent interactions between levels of use, the natural environment, and the deterioration of road materials, are defined by the Study Team to be as follows:

- Road surface type
- Traffic flows and composition
- Road surface condition
- Climate
- Terrain

Data on these factors for Kenya were carefully reviewed and incorporated into the World Bank’s HDM-4 model, which also included data on maintenance frequency and unit costs as well as on vehicle operating costs. The model was then calibrated and used to derive the required costs (funding) for different road maintenance scenarios.

As for the **non-physical** factors that affect road maintenance cost, which are more complex than the **physical** factors due to their intangible nature, these are defined by the Study Team to consist basically of the following:

- KRB operability
- Capacity building
- Interactions between personnel/organizations of both the private and public sector.

The non-physical factors are for the most part management-related in that their effect on road maintenance costs are dependent on the efficient use and allocation of organizational resources. This means the greatest leeway for satisfying any needs gap lies here, since the effects from physical factors for a given level of service and technology are basically fixed (i.e., costs can not be reduced).

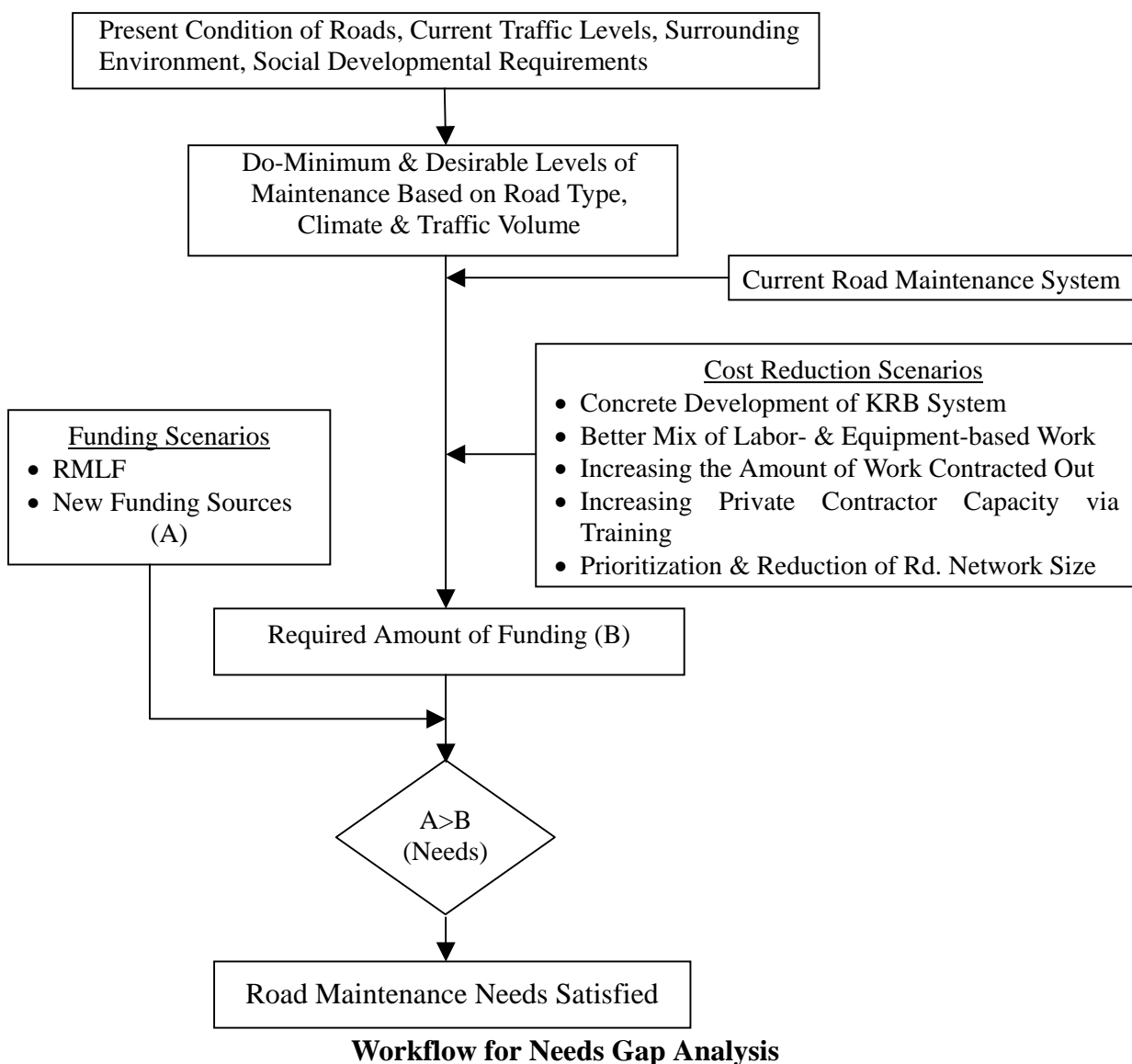
4. Construction of Road Maintenance Scenarios & Needs Gap Analysis

Applying the above **physical** and **non-physical** factors, the methodology shown below is adopted by the Study Team to determine the (funding) needs of Kenya’s road network and the possible scenarios to satisfy those needs. Note that **physical** factors determine the costs required to maintain the Kenyan road network at a minimum and ideal level of condition, while the **non-physical** factors represent cost-reduction measures to match costs with funds. Note, however, that even with current and new funding sources there would still be a significant shortfall in funding to maintain the entire road network even at a minimum level of service. For these reasons, cost-reduction measures, which include the development of the KRB, capacity building of the road sector, contracting out, etc., are all important and form the crux of the proposals contained in the next chapter.

On the other hand, the Study Team has determined that despite the implementation of the proposals described in this text, together with new funding sources, approximately 30,000 km of secondary/minor road would still have to be retired, as compared to 80,000 km if the status quo continues as is. Therefore, it is important that local authorities decide on what roads to retire and/or have local residents pay for. In order to do this, it is recommended that a separate study be executed to determine those roads of the secondary & minor road network that should receive funding. This would, however, require that the following be carried out:

- Execution of a road inventory survey
- Execution of a road condition survey
- Definition of a core road network

Given the above lack of funds, RMLF should only be used for the maintainable road network and any road rehabilitation should be financed by other sources including the donor community. The Study Team would like to note that, if the Kenyan Government draws up a plan detailing its core network and possible scenarios for funding it, together with better management via the full operation of the KRB system, there should be no problems in obtaining outside funding to rehabilitate roads the Government considers important.



5. Proposals to Realize an Effective Road Maintenance System

Below, proposals to increase the effectiveness of road maintenance and thereby eventually reduce its costs are described. Note that the KRB is to be the linchpin of the Kenyan road maintenance system and its success in becoming fully operational and the systemic reform necessary to achieve that will determine whether or not an effective road maintenance system can be realized. As for other proposals contained in this chapter, although important, they are supporting measures for the KRB and the road maintenance system as whole.

(1) KRB Operability & Systemic Reform

Although the Kenyan Parliament passed the KRB Act in 1999, the KRB itself was not fully staffed and outfitted until July 2002, and has only been in partial operation since November 2001. Even though only a short time has passed since becoming partially operational, the KRB's activities have resulted in monies being distributed to the constituencies of all 70 districts in Kenya for road maintenance, something that rarely if ever occurred previously, resulting in the KRB being highly evaluated.

Despite this initial good start, the KRB is still not fully operational and this next year will determine whether or not the reform of the road maintenance system is a success. Based on analyses of surveys carried out by the Study Team, it is recommended that the actions described in the 5 items below, which will result in the necessary systemic reform to make the KRB fully operational, be carried out.

Funding

Under the KRB Act, 57%, 40% (16% and 24% to be distributed equally and equitably, respectively), and 3% of the money collected from the Road Maintenance Levy Fund (RMLF) is supposed to go to the Roads Department (RD) of the Ministry of Roads and Public Works (MORPW), the District Road Committees (DRCs), and the KRB. Although the above-mentioned 16% for road maintenance is now reaching the constituencies of the 70 districts in Kenya, the following should be carried out to resolve remaining problems regarding funding:

- The KRB should try to set up a system that does not require going through the permanent secretary of the MORPW for the disbursement of monies to the DRCs or any other non-MORPW entities, since this is just an extra administrative step that slows down the process unnecessarily.
- It is recommended that KRB clearly define when the DRCs are going to be receiving their remaining 24% of the 40% of the RMLF due to them during the fiscal year of 2002/2003, which is being used by MORPW to pay off previous commitments.

- It is recommended that KRB apply the criteria it has developed (see 6.6 of Chapter 6) for disbursing the above-mentioned 24% once it is made available, which is needed by the DRCs to carry out important maintenance work that can not be addressed by the current 16% of the RMLF that they are receiving now. However, it should be recognized that the system for allocating money equitably may need fine tuning in order strike a balance between fairness and ease of understanding.
- It is recommended that consideration be given to making the budgets for road maintenance rolling budgets so that monies left over from the previous year, due either to late or irregular disbursements or work flow problems, can be applied in the next fiscal year immediately so that work can be carried out efficiently.
- It is recommended that the KRB and MORPW, as well as any other related agencies, closely examine the proposal submitted by the KWS regarding classified roads that should be entrusted to it for maintenance so that the KWS can receive monies directly from the KRB.
- It is recommended that the DRCs designate urban and town roads for the Ministry of Local Government (MOLG) to be responsible for under the KRB system so that the MOLG can receive the money it needs to maintain these roads, which are being neglected by the DRCs.

Organization

- It is recommended that the DRCs and MORPW effectively utilize existing organizations with sufficient capacity to act as sub-agencies to carry out maintenance work on their behalf. Examples of such organizations include the Kenya Wildlife Service (KWS), the city councils of Nairobi, Mombasa, Kisumu, El Doret, and Nakuru, and perhaps local producers of agricultural products such as coffee, tea, etc.
- It is recommended that the Mechanical and Transport Department (MTD) carry out its planned rationalization as quickly as possible by referring to the rationalization plan contained in the JICA Study Team's Main Report. It should be noted that the longer the MTD waits the less attractive it will become as an organization and the more difficult it will be to become an autonomous entity. The World Bank's intention to execute and complete a feasibility study on rationalization by the end of 2002 will be useful in spurring on this process.

The above is crucial for assisting in the creation of a more competitive market in Kenya for the contracting out of maintenance equipment. Concretely, the following goals for the next 3 years should be kept in mind as a reference:

- (i) Retrenchment of current equipment stock from 3325 pieces to 500 pieces.
- (ii) Sales of surplus equipment items: Ksh. 646,530,000 is expected.

- (iii) Rationalization of staff: Staff and administration costs should be cut by 50 %, or from Ksh. 277,603,234 (FY2000) to Ksh. 138,801,617
- (iv) Establishment of Regional/Sub-regional Mechanical Workshops
Eight to 10 Regional Mechanical Workshops and 16 to 20 Sub-Regional Mechanical Workshops.
- (v) Development of new revenue sources: Such as the commencement of a leasing system, the provision of inspection services for the registration of imported and other vehicles, etc.
- With the termination of Swiss assistance, the Kisii Training Center is starting to experience financial difficulties. It is recommended that the Kisii Training Center draw up and implement a plan to become an autonomous entity so that it can deal with this problem in a proactive manner.

KRB Facilities/Equipment

- It is recommended that the DRCs obtain their own facilities by the end of the 2002/2003 fiscal year, so that they may become more independent as originally intended under the KRB Act. This will require that the DRCs consider the staffing of these facilities. It is recommended that the KRB and the MORPW discuss staffing at the district level so there is no unnecessary overlapping. Ideally, this should result in a slimmer MORPW.
- It is recommended that all of the DRCs, each of which received a computer from KRB, link up with KRB and with each other via e-mail so that data and information can be reliably exchanged.

Data

- It is recommended that road condition and traffic data be obtained from all districts and sent to the KRB for planning purposes via a rapid condition survey. This is necessary since it seems that the current World Bank road condition survey will still take some time to complete. In addition, the World Bank survey is only for classified roads, which are less than half of the total road network. Data for the unclassified network is also necessary for proper planning.
- It is recommended that the KRB obtain information not only on road conditions and road traffic, but on road re-classification and kilometer markers as well (to be installed if necessary) in order to carry out planning.

Communication

- Communication between the KRB and the road agencies still has much to be desired and it is therefore recommended that a reporting system be set up. For example, it is suggested that the minutes of meetings of working committees (or at least a summary) be sent to all road agencies and their staff so that they understand what is going on and

to create a common understanding.

- It is recommended that a system for collecting, sending, and updating data be established between the KRB and the road agencies so that allocation of monies can be carried out accurately. According to KRB, the Swedish International Development Cooperation Agency (SIDA) will be providing funding for the implementation of a reporting and road maintenance work plan system.
- It is suggested that the KRB consider a system for updating and revising the road maintenance manual to be submitted by the JICA Study Team in January 2003, so that important and timely changes can be made to the manual as required.
- It should be emphasized that the concept of the KRB is still not correctly understood by some of the road agencies and their staff. It is recommended that the KRB send out a memo clarifying and explaining its mission, vision, and strategy to all stakeholders, as well as hold regular meetings.

(2) Development of Road Maintenance Training Plan & Capacity Building

Training

The Training Plan can be managed, executed and monitored by the Kisii Training Center (KTC), under the umbrella of the Kenya Institute of Highways and Building Technology (KIHBT). Furthermore, the road maintenance manual developed by the JICA Study Team will serve as the standard for road maintenance training at Kisii.

KTC's core clients for training during the transition period will be:

- Labor-based small-scale contractors
- LBES medium-scale contractors
- Roads Department (RD) staff at province level.
- KWS staff.
- RD staff at district level.
- Local Authority (LA) Level – LA staff.
- Persons participating in community-based road maintenance projects in rural areas and in urban low-income settlements.
- Mechanical and Transport Department (MTD) staff – with a focus on equipment-based technology for selected periodic maintenance activities (e.g., surface works on paved roads) and routine maintenance works in sparsely populated areas (lack of labor) and in security risk areas where an equipment-based approach would result in quicker execution of works.

Private Sector Capacity Building

Private sector capacity building consists of the following items:

- Access to Credit
- Access to Tools, Equipment and Spare Parts
- Access to Materials
- Access to Works

The matter of access to works (particularly the first-term contract) is absolutely vital. Otherwise training is just wasted, as has been the case with the currently dormant Roads 2000 projects (excluding Danida). In other words, the process for realizing “access to works” needs to be institutionalized between KTC and KRB/road agencies.

(3) Development of Road Maintenance Manual for Capacity Building

KRB is responsible for the maintenance of all public roads in Kenya. Therefore, to achieve some consistency in the field of road maintenance, all roads under KRB should be maintained in accordance with the manual developed jointly by the Study Team and Kenyan engineers/road agencies. The KRB should send out a memo informing all stakeholders that the JICA road maintenance manual is “ready for use”. The road maintenance manual consists of the following three parts:

- Part I: Inspection Manual
- Part II: Evaluation Manual
- Part III: Execution Manual

It is recommended moreover that the Kisii Training Center (KTC) design and carry out training, which will include on-site practice, using the JICA road maintenance manual as a standard. It is also recommended that all road agencies send their engineers and technicians to KTC to be trained in the use of the JICA road maintenance manual, and that they provide feedback to Kisii one year after finishing to ensure that they are performing as intended.

Finally, the road maintenance manual should be updated periodically (see the main text of the Executive Summary) to reflect changes in the field of road maintenance or to make necessary modifications, revisions, or corrections. It is recommended that the Kenya Roads Board be responsible for keeping digital copies of the three manuals at its office in Nairobi and for distributing **official** versions of these manuals as required.

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