ANNEXES

ANNEX 7

SECOND FIELD SURVEY

ANNEX 7 SECOND FIELD SURVEY

A7.1 Introduction

The Study Team implemented second field survey to collect data and information that will be used the study report. Data and information required for the Study was obtained from Government departments at the headquarters and also from the districts. Substantial information and data has been collected. Copies of data sheets, documents and records are compiled in this report.

This survey also includes the design and running of a road maintenance model for Kajiado district and the development of a financial model for Kenya which were both based on HDM4 Model. One of the tasks to be performed included the determination of the cost of maintenance of a typical district road network using the HDM4 Model. Kajiado district road network was chosen because of its proximity to Nairobi, availability of all classes of roads and pavement types and availability of data on important parameters such as traffic and records of recent funding to the district. The task also involved a summary of ride quality for two levels of service, Do-Minimum and Desirable maintenance and summary of ride quality in terms of IRI for a 15-year life cycle for both maintenance strategies.

Further, the survey for assistance in development of a finance model for Kenya was implemented. The model would provide the total road maintenance requirements for the country based on two levels of service, Do-Minimum and Desirable maintenance. The model would also provide a summary of ride quality in terms of IRI for a 15-year life cycle for both maintenance strategies for the Kenya road network.

A7.2 Collection and Compilation of Information and Data

(1) Road Maintenance/Management Systems

At the onset of the survey, contacts were made with KRB/ MORPW officials and a section included in the field questionnaire to assist in obtaining information on the following:

- Progress of Kenya Roads Board
- Work Programs for Short, Medium and Long term period
- Maintenance work prioritisation methodology

Information on Kenya Roads Board's activities in the districts, work programs and work prioritization has been obtained.

(2) Routine Maintenance, Periodic Maintenance and Special Maintenance

1) Inspection Method

Inspections in the field for purposes of identifying, quantifying and prioritising road maintenance needs are carried out by District Roads Engineers, District Road Officers, Inspectors, Overseers and Materials officers in the MORPW and by Municipal Engineers, Works Superintendents and Inspectors in the MOLG. In KWS inspections are carried out by Works Superintendents in Parks and Reserves where these are available otherwise Park Wardens are responsible for inspections. Wardens are trained in basic road maintenance. In a few occasions, Consultants have been engaged on MORPW and MOLG projects.

The frequency seems to vary from district to district. Some districts carrying out inspections every 3 months others every 6 months and the rest annually. Ad hoc inspections are also carried out to determine urgent maintenance interventions.

From our interviews, it appears that the inspections are carried out when there is a possibility of funding. In all cases however, an inspection is carried out before the beginning of each financial year to determine annual funds allocation to the operational area.

It should be noted that the MORPW has adopted the Roads 2000 Road Maintenance concept in most districts and prepared a document in which comprehensive inspection forms are included.

KWS has also developed guidelines and standards for road construction and maintenance in protected areas.

As will be noted from the responses, standardised inspection sheets and methods are not in use. In some of the cases, inspection reports are recorded in field notebooks only. The MOLG has engaged a Consultant to look in to the planning of maintenance works. One of their tasks was to develop standard inspection sheets for the Councils. Some of these are in use.

From the information received, inspections are carried out through visual observations, equipment is rarely used except where the integrity of the pavement requires to be determined.

2) Evaluation

Based on the information obtained from the headquarters of MORPW and Ministry of Local Government, we have been informed that both ministries have inspectorate units at their headquarters whose role is to monitor use of funds disbursed to the operational areas. The units evaluate the quality and quantities of work done against agreed programs and recommend corrective action where these are required.

The road inspectorate unit in the MORPW falls under the Permanent Secretary in the Ministry while that in the MOLG falls under the project management unit, KUTIP, which is under the Director of Urban Planning. The MORPW has divided its operations in to two areas, East and West of Rift Valley which cover districts in Nyanza, Western and North Rift Valley districts and Central, Eastern, North Eastern, Coast and South Rift Valley districts respectively. The MOLG inspectorate has divided its operations into 5 zones covering 26 councils/districts that fall within the ongoing KUTIP project. The other MOLG councils do not have technical based inspection/audit units. However, financial audit is carried out if and when required. KWS does not have a unit responsible for inspectorate per se but the head office technical personnel periodically monitor and verify works executed against agreed programs.

In all the three sectors, no standard manuals are currently in use for evaluation. The MOLG Consultant is involved in developing one while MORPW is working on one in house.

3) Repair Work Methods

Some of the responses from the questionnaires give brief descriptions of how repair works are carried out for the paved and unpaved roads.

We were not able to obtain a standard roads repair document from all three Agencies. KWS though has developed a document for this purpose. However, it should be noted that training on methods used for repair is provided by the MORPW training school.

(3) Condition Survey

Condition survey was carried out in Kajiado where comprehensive data and information was to be collected to run the road maintenance model for the district. The detail of survey is presented in ANNEX 9.

(4) Maintenance Level/Targets

From interviews and responses to the questionnaire, we were able to establish that maintenance activities in roads under all 3 Agencies are not planned to achieve a pre-determined level of service. It would appear that the main problem as described in the report for phase one study is that the roads are generally in a very poor state in most cases and the main maintenance efforts are geared towards making bad sections just passable. We have farther established that the Short, Medium and Long term strategies are as summarized in Table A7.1

Table A7.1 The Strategy for Road Maintenance Activity by Period

Period	Activities
Short Term 1-3yr	• Provide motorability in the district network • Carry out periodic maintenance on peri-urban roads • Grade and carry out routine maintenance
Medium Term 3-5yr	• Make trunk roads all weather • Carry out periodic maintenance on rural roads eg. Re-gravel at least 40 km per year of Class D,E and RAR roads, Reseal at least 20 km of paved roads. • Total and partial rehabilitation of the network
Long Term 5-10yr	• Provide all weather roads in all the network • Provide basic access to all public institutions • Increase the motorable road network by up to 33% • Rehabilitate/Upgrade identified roads • Tarmacking identified roads in the network.

The criteria for determining which maintenance works/road receive priority also vary. The main reasons are summarised below:

- Economic and administrative importance of the road
- Funding ceilings
- Extent of damage/road condition
- Traffic intensity on the road relative to the rest of the network
- Regional balancing/distribution and opinion of the users of the roads
- Terrain, amount of rainfall

We have also established that the allocation of funds for road maintenance from the ministerial headquarters is currently not based on a pre-determined criteria but rather on the work programs produced by the districts, need for equitable distribution and the overall funding level.

(5) Contract Out

1) Pre-qualification Documents

(a) Consultants

A two-stage process is used for identification of Consultants. Stage one involves inviting prospective Consultants to express their interest in performing the assignment that the ministry proposes to do. The invitation could be through letters or an advertisement in the press. During this stage, information on the legal status, location and the basic capability of the firm is often required. This assists the ministry in drawing upa short list of Consultants to be invited to make technical and financial proposals in the second stage.

During the second stage, a TOR for the proposed assignment and an invitation to make a bid is issued to short-listed Consultants. The Consultants are required to submit a technical proposal in which they explain in detail how they propose to execute the assignment and their staff who will be responsible for carrying out of the various tasks. They also submit their financial proposal in which they detail their costs for executing the assignment.

Since this is a competitive process, rules and the criteria for evaluation of the Consultant's proposals are communicated in the letter of invitation. Normally the technical and financial proposals are weighted based on how the ministry views the assignment. For example in a complicated project requiring high calibre technical inputs, the technical proposal will

normally be given a high weighting while in a straight forward assignment the financial and technical weighting may be almost the same. As a general rule, however, the technical proposal normally has higher weighting.

The above procedure is based on Government procurement rules and is applicable to Ministries and Parastatals.

(b) Contractors

Large number of Contractors are registered for various categories of works. The Government rules encourage competition amongst the registered Contractors. The schedule of registered Contractors is attached in Appendix 3.7.1.

The Pre-qualification process in which Contractors are invited to express their interest after which, a shortlist is drawn amongst applicants has been discouraged due to abuse and instead a post qualification process is in use. In the post qualification process, the eligibility criteria are spelt out in the bid documents. The criteria are designed to enable the Ministry determine whether the Contractor has the necessary resources, experience and capability to execute the tendered works before considering their tender price.

2) Actual Results

The process that has been adopted in the ministry has evolved over the years. Its objective is to encourage competition and fair play in the Industry. From our discussions with Ministry Officials and experience in Kenya, there has been many incidents where accusations of lack of transparency has been directed at Offices responsible for the process. On the other hand, where the process is strictly followed, there has been little complaint.

(6) Present Standards and Manuals

A collection of standards and manuals that are currently in use within the various Agencies is in the Study teams library and includes the following amongst others:

- Roads 2000 road maintenance manual
- Standard specifications for Roads and Bridges
- Road Design Manual Part III: Materials and Pavement Design for new Roads
- KWS Roads Maintenance and Standards Manual
- Road Design Manual, Part I: Geometric Design for Rural Roads

- Standard bridges design manual

The MORPW does not appear to have developed a standard road maintenance manual that is used in all its district operations. The MOLG is currently working on this as part of its enhancement of maintenance management in the Councils. KWS has developed a Manual as listed above.

(7) Data on CESS, Local Authority Transfer Fund (LATF) and the Fuel Levy

1) Data on CESS Collections

Local Authorities in Kenya collect CESS from various agricultural produce as part of their revenue. Commodities from which CESS is collected usually comprise the main cash crops, including coffee, tea, pyrethrum, sugar, wheat and sisal. The tax is collected for the local authorities by factories processing the produce or by statutory boards, where such parastatals still operate, e.g. the Coffee Board and the Pyrethrum Board.

Table A7.2 shows the total CESS disbursements to local authorities (municipalities, town councils and county councils) during fiscal years 1992/93-2000/01. As the Table illustrates, revenues from CESS increased steadily from K.Sh.185.4 million in fiscal year (fy) 1992/93 to Ksh. 434.7 million in fy 1996/97 after which they fell steadily to only Ksh. 282.2 million in fy 1998/99. They have been rising again more recently, however, from that level to Ksh. 416.0 million during the current fy 2000/01.

Table A7.2 CESS Disbursements to Local Authorities (fy1992/93 – 2000/01)

(unit: Ksh. million)

Fiscal Year	Municipalities	Towns&County Councils	Total Cess
1992/93	86.08	99.33	185.41
1993/94	65.83	188.68	254.51
1994/95	90.72	213.28	304
1995/96	168.32	245.34	413.66
1996/97	168.15	196.54	434.69
1997/98	154.71	159.91	314.62
1998/99	134.75	147.47	282.22
1999/00	125.74	265.09	390.83
2000/01	141.93	274.11	416.04

Source: Central Bureau of Statistics

The apparent instability in the CESS revenue reflects the poor performance of the Kenyan agricultural sector of the economy during the period under review. In particular, the overall growth rate for the sector's real gross product has been very low, averaging only 1.15% per annum while prices and quantities of marketed production of major crops such as coffee, pyrethrum, maize and wheat have been similarly fluctuating. The data also indicate that most of the CESS revenues are received by towns and county councils whereas municipalities receive less. A breakdown of the CESS collections by various commodities is not available at the Central Bureau of Statistics.

Data on CESS expenditure by each local authority on various services, including road maintenance and development is currently not available.

2) Disbursement of Local Authority Transfer Fund

The Local Authority Transfer Fund (LATF) was introduced by the Government in the fy 2000/2001. It is paid from the Consolidated Fund annually to each local authority based on set criteria, which include the population of the local authority, among others. According to the public notice issued by the Permanent Secretary, Ministry of Local Government, drawing attention of the public to the disbursement in September 2000, allocations from this fund are intended to be used for "improving service delivery to the public, …improving financial management … and eliminating local debt."

To be eligible for the allocation, each local authority has to submit a budget estimate for the current financial year. They also have to submit a statement of receipts, expenditures, cash and bank balances, a statement of its debtors and creditors, an abstract of accounts for the preceding financial year, a revenue enhancement plan and a local authority-annual service delivery plan for the next two years.

Table A7.3 shows total disbursements of LATF to local authorities by province and districts. Total disbursements have increased from Ksh. 2.3 billion in fy 2000/2001 to Ksh. 2.9 billion in fy 2001/2002, a 26% increase. Rift Valley Province has received the highest allocation amounting to 20% and 21% of the total disbursements during the two fys, respectively. It is followed by Nairobi (21% and 16%), Central (15% and 11%) Nyanza (13% and 14%) and Coast Province (10% and 11%). North Eastern Province received the lowest allocation amounting to only 3% of the total disbursements during each of the two fys, apparently because it is sparsely populated and has few major local authorities.

Table A7.3 Disbursement of Local Authority Transfer Fund (LATF) by Province and District (fy2000/01)

(unit: Ksh. 1,000)

	Province / Distrtict	2000/2001	2001/2002
1	**Nairobi**	**485,324**	**456,821**
2	**Coast Province**		
	Kilifi District	33,676	42,511
	Kwale District	27,438	32,728
	Lamu District	5,064	5,801
	Malindi District	9,616	25,959
	Mombasa District	108,075	161,780
	Taita District	23,563	25,199
	Tana River District	10,433	12,281
	Total	**217,865**	**306,259**
3	**North Eastern Province**		
	Garissa District	26,201	36,597
	Mandera District	17,592	23,821
	Wajir District	17,170	20,411
	Total	**60,963**	**80,829**
4	**Eastern Province**		
	Embu District	21,063	22,717
	Isiolo District	6,430	7,450
	Kitui District	29,061	35,557
	Makueni District	42,480	51,058
	Marsabit District	7,456	8,687
	Machakos District	66,742	192,024
	Mbeere District	9,945	11,692
	Meru District	34,978	51,771
	Moyale District	4,136	4,681
	Mwingi District	18,129	21,713
	Nyambene District	32,948	39,340
	Tharaka District	6,430	7,450
	Nithii District	11,901	18,321
	Total	**291,699**	**472,461**
5	**Central Province**		
	Kiambu District	47,906	58,761
	Kirinyaga District	27,448	40,184
	Maragwa District	25,329	34,287
	Muranga District	24,986	33,730
	Nyandarua District	25,971	34,533
	Nyeri District		
	Nyeri District	52,259	55,759
	Thika District	49,392	68,305
	Total	**253,291**	**325,559**

Cont'd

6	Province	2000/2001	2001/2002
	Western Province		
	Bungoma District	57,135	73,418
	Busia District	29,233	38,597
	Kakamega District	38,397	50,973
	Lugari District	12,093	14,284
	Butere District	28,634	13,415
	Mumias District		13,613
	Mount Elgon District	19,706	9,453
	Teso District	0	5,354
	Lugari District	-	
	Vihiga District	30,691	17,870
	Total	**215,889**	**236,977**
7	**Rift Valley Province**		
	Baringo District	16,542	20,157
	Bomet District	24,048	27,906
	Bureti District	18,539	21,838
	Keiyo District	10,197	12,137
	Kericho District	33,688	45,661
	Koibatek District	10,132	12,137
	Laikipia District	28,196	36,525
	Marakwet District	5,033	9,806
	Nakuru District	81,520	127,433
	Nandi District	34,785	41,953
	Narok District	22,029	27,696
	Trans Nzoia District	36,072	49,638
	Kajiado District	23,183	27,918
	West Pokot District	20,188	24,244
	Samburu District	10,805	13,592
	Trans Mara District	9,896	11,633
	Turkana District	25,985	32,303
	Uasin Gishu District	48,417	71,512
	Total	**459,255**	**614,089**
8	**Nyanza Province**		
	Gucha District	31,540	38,379
	Kisii District	34,886	45,014
	Homa Bay District	20,044	26,112
	Kuria District	9,105	10,927
	Kisumu District	46,918	72,755
	Migori	33,835	43,084
	Nyando District	20,007	24,486
	District		
	Nyamira District	30,445	37,878
	Rachuonyo District	20,190	24,314
	Siaya District	33,009	41,078
	Bondo District	14,825	17,482
	Suba District	11,558	14,596
	Total*	**306,362**	**396,105**
	Grand Total	**2,290,648**	**2,889,100**

Source: Ministry of Local Government: Schedule of disbursement published in the DAILY NATION, 5th September 2000 and 7th June 2001

Table A7.3 shows that among the local authorities, the large established authorities have received larger allocations than smaller and/or newer ones, with municipalities and major townships receiving the bulk of the funds, apparently because of their high concentration of population. In the Coast Province, for instance, Mombasa received the highest allocation in the province. In the Rift Valley, Nakuru District received Ksh. 82 million in fy 2000/2001 and KSh.73 million during the two fys compared to Marakwet District which received only Ksh.5 million and 10 million, respectively. In Western Province Bungoma District was allocated Ksh. 57 million and 73 million in fys 2000/2001, respectively, compared to the three newly established Districts, Teso, Lugari and Mumias Districts whose local authorities either did not receive any allocation, or received under K.Sh.12 million. Similarly, total disbursement to local authorities in the newly created Kuria District in Nyanza received only Ksh. 11 million compared to Kisumu District whose local authorities received a total of Ksh. 72 million.

While the rising trend in the total LATF disbursement is encouraging, considering the large number of districts (70 districts and more local authorities) the Government's budgetary constraints, the high cost of road maintenance in Kenya and the management weaknesses in most local authorities, this source of revenue is not likely to contribute substantially to the solution of the road maintenance problems currently facing the majority of the local authorities. It is, however, a very important source of revenue, especially for the small and/or newly established districts in the remote rural areas with mostly unpaved roads and simple road infrastructure.

As in the case of the CESS, data on a breakdown of LATF expenditure for each local authority by categories of services, e.g. roads, health, water and sanitation, etc., is not readily available. Similarly, meaningful projections of disbursements of LATF cannot be made since this source of revenue has been in existence for only two financial years.

3) Road Maintenance Fuel Levy and the Road Transit Tolls

Table A7.4 shows the amounts of funds collected from the fuel levy on petrol and automotive diesel and from road transit tolls since both road user charges were introduced (in 1994/95) to fy 2000/2001. Revenue from the fuel levy rose rapidly from Ksh.1.3 billion in 1994/95 to Ksh. 4.2 billion in fy 1995/96. It kept growing though less rapidly, reaching Ksh.5.3 billion in fy 1997/98. Collections then fell in fy 1998/99 to only Ksh.5.1 billion .The revenues have been fluctuating since then to only Ksh.6.1 billion and K.sh.5.1 billion during fys1999/00 and 2000/01, respectively.

Collections of transit tolls have been fluctuating most of the time since fy 1994/95. The data in Table A7.4 indicate that after rapidly rising from Ksh.134 million in fy 1994/95 to Ksh. 200 million in 1995/96, collections fluctuated to only Ksh.107 million in 1998/99 and to a mere Ksh.17 million in 2000/02. Although the quantity of dry cargo handled at the port of Mombasa (commonly carried by transit vehicles) also shows a steady downward trend from 6.7 million tonnes in 1997 to 5.2 million tones in 2000, this decline is so small that it is unlikely to be the cause of the decline in the total revenue from transit tolls. There is a need therefore to strengthen the administration of these tolls to ensure that they continue to generate more revenue to supplement the fuel levy.

Table A7.4 Fuel Levy and Transit Toll Collections (fy1994/95 - /2000/01)

(unit: Ksh.)

Year	Fuel Levy	Transit Tolls
1994/95	1,300,000,000	134,363,105
1995/96	4,200,000,000	200,837,399
1996/97	4,600,000,000	196,015,813
1997/98	5,300,000,000	200,000,000
1998/99	5,086,000,000	
1999/2000	6,100,000,000	106,971,998
2000/2001	5,600,000,000	16,571,025

Source: Ministry of Roads and Public Works

Note: Data on transit toll collections for the year 1998/99, when the Kenya Revenue Authority took over collection from the Ministry of Roads and Public Works is not available.

Table A7.5 indicates the rates of fuel levy charged on petrol and automotive diesel between 1994/95 and 2001/02. It may be noted that although the rates charged on both fuels have been rising almost every financial year, net domestic sales of petroleum fuels, particularly sales to retail pump outlets and road transport have only fluctuated from 1.1 million tonnes in 1996 to 1.2 million tonnes in the year 2000 (Economic Survey, 2001, Table 10.5). Nevertheless, the rate of fuel consumption appears sluggish, apparently due to the static rate of motorization, rather than the high rates of fuel levy. The rates of fuel levy have risen from Ksh. 1.50 and Ksh. 1.00 per litre of petrol and automotive diesel, respectively in 1994/95 to Ksh. 4.20 and Ksh.3.70 per litre respectively, in 1999/00.

Table A7.5 Rates Charged on Fuel Levy (fy1994/95-2001/02)

Year	Type of Fuel	Rate, Ksh./litre
1994/95	Petrol	1.5
	Automotive diesel	1
1995/96	Petrol	2
	Automotive diesel	1.5
1996/97	Petrol	2.7
	Automotive diesel	2.2
1997/98	Petrol	3.2
	Automotive diesel	2.7
1998/99	Petrol	Data not available
	Automotive diesel	Data not available
1999/00	Petrol	4.2
	Automotive diesel	3.7
2000/01	Petrol	Data not available
	Automotive diesel	Data not available
2001/02	No change in fuel levy rate. But excise duty on petrol raised by Ksh.2.00 to be absorbed by oil companies. Level from where it was raised is not available.	

Source: Budget speeches read in Parliament by Minister for Finance and Planning

ANNEX 8
CALCULATION OF FUTURE TRAFFIC VOLUMES

ANNEX 8 CALCULATION OF FUTURE TRAFFIC VOLUMES

A8.1 Introduction

The purpose of forecasting traffic volumes in this Study is to provide input for the HDM-4 model for calculating the life-cycle costs of road maintenance using different road maintenance profiles. In order to do this, it is necessary to forecast traffic for the different road classes and road surface types as representative sections of the road network in Kenya. This was accomplished using the Traffic Census Database of the Kenyan Ministry of Roads and Public Works (MORPW). The database contains traffic volume data for 8 vehicle classes (i.e., passenger cars, light goods (pick-ups), matatus (similar to minibuses), medium goods vehicles, medium tankers, heavy goods vehicles, heavy tankers, and buses) from 1952 to 1997 for the road links of all the classified roads (i.e., Class A to Class E roads). As for unclassified roads, no traffic volume data was available. However, since the unclassified road network is very similar to Class D and E roads in design and function, it was assumed that the traffic volumes for these roads would be approximately the same.

A8.2 Annual Traffic Growth by Road Class

Road class is defined here as Trunk (Class A & B), Primary (Class C), and Secondary & Minor (Class D, E, and Unclassified) roads. It was decided for this Study that trend curves based on historical data would be used forecaste future traffic volumes. Figures A8.1 to A8.5 below show the trend in traffic growth over the past 44 to 45 years (i.e., 1952 to 1996 or 1997).

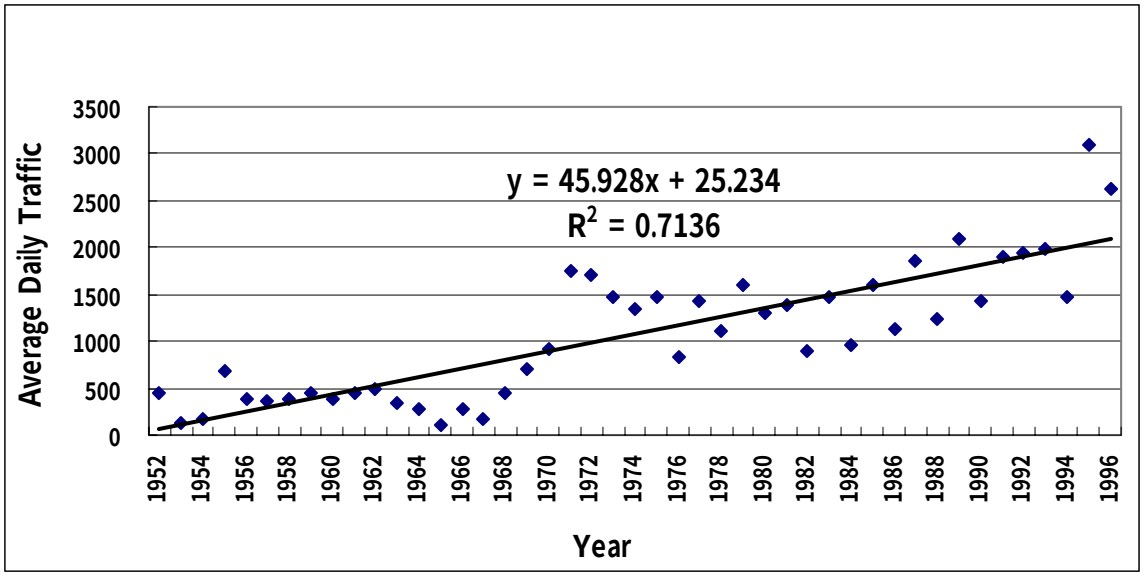

Figure A8.1 Trends in Traffic for "International" Trunk Roads (Class A Roads)

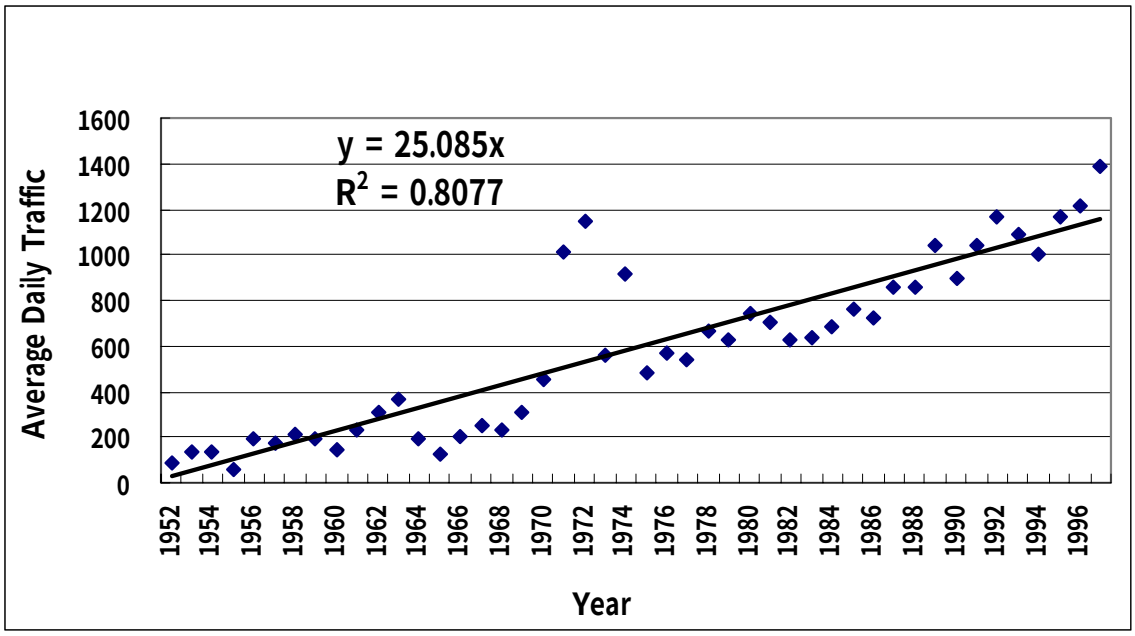

Figure A8.2 Trends in Traffic for "National" Trunk Roads (Class B Roads)

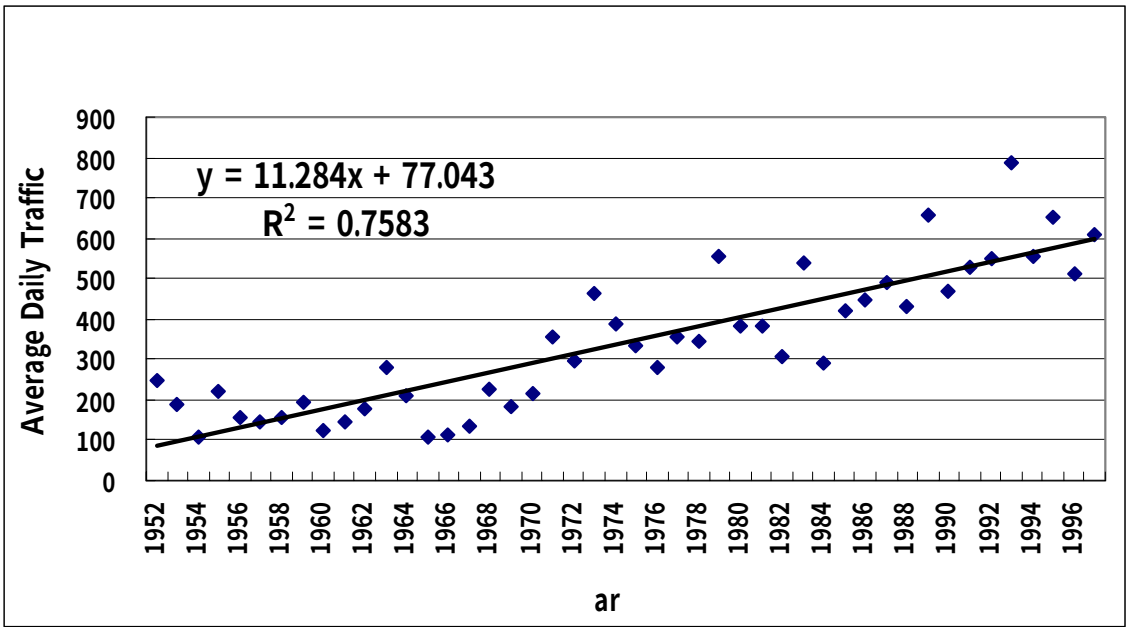

Figure A8.3 Trends in Traffic for Primary Roads (Class C Roads)

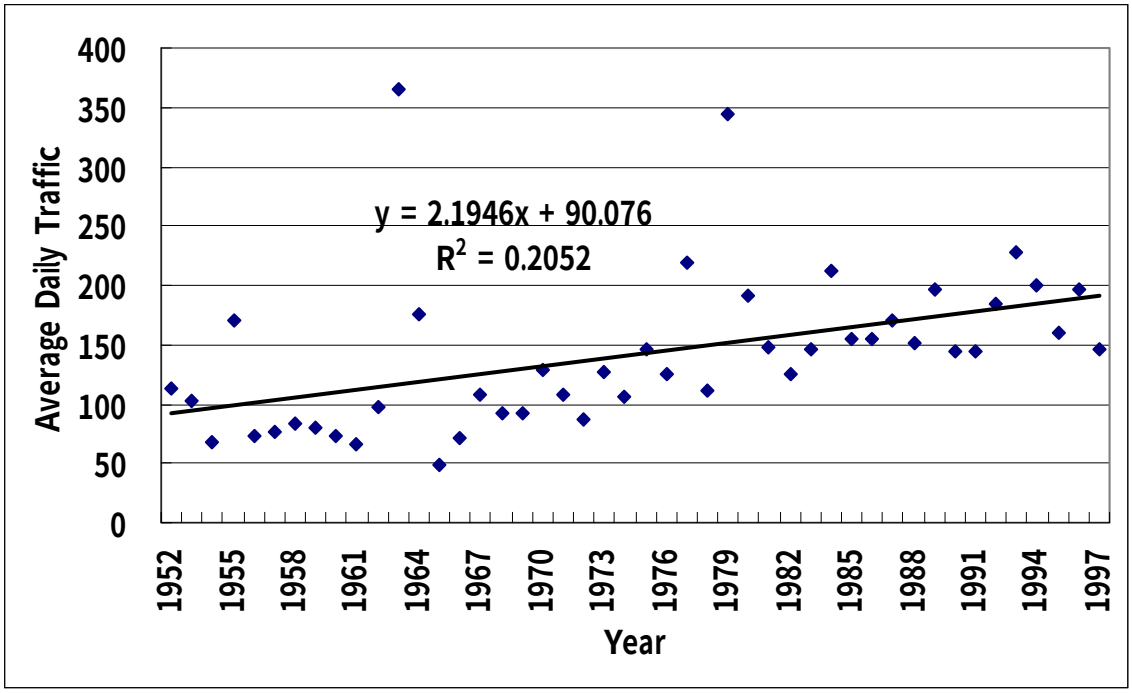

Figure A8.4 Trends in Traffic for Secondary Roads (Class D Roads)

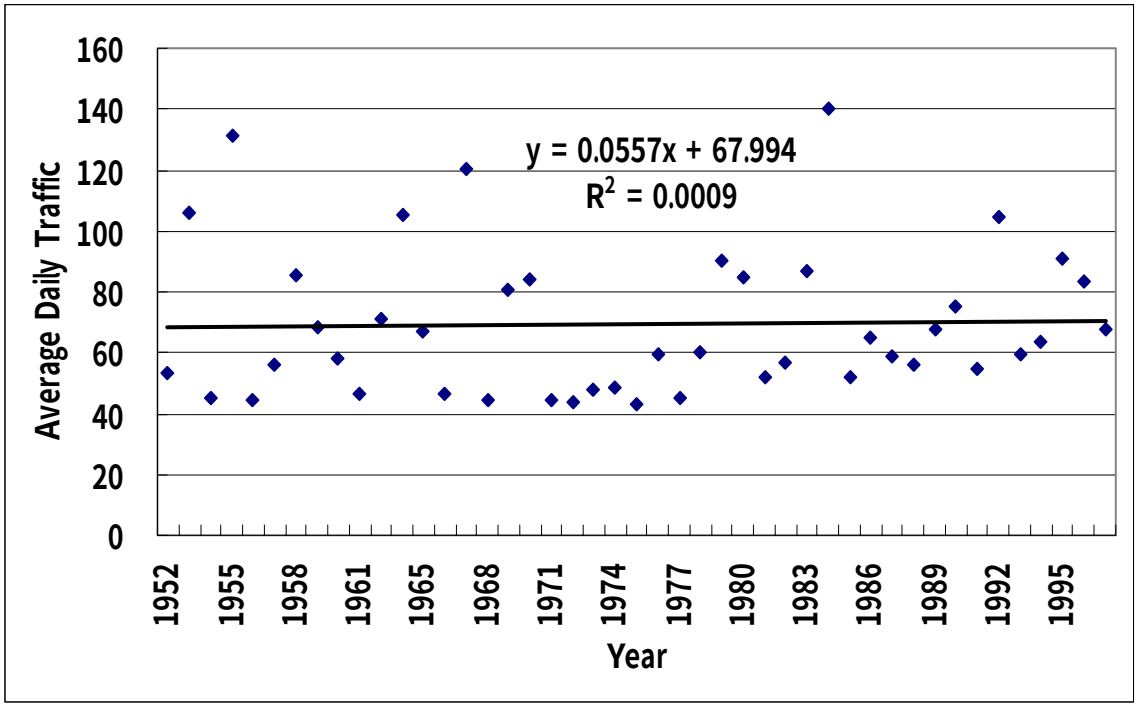

Figure A8.5 Trends in Traffic for Minor Roads (Class E Roads)

After examining the above trend curves, as well as taking into consideration the continuing poor economic situation in Kenya, which shows no immediate signs of improving, annual av-

erage traffic growth for the next 15 years was derived to be as listed below for the different road types.

- Trunk Roads: 5.0%
- Primary Roads: 2.0
- Secondary & Minor Roads: 1.0%

A8.3 Average Daily Traffic by Road Surface Type

Traffic census data does not contain information that relates road surface type with traffic volume measurements. In order to derive this data for the HDM-4 model, it was decided to use the cumulative curves of traffic volume data for 1997 for the different road classes and relate this to the total length of the different road surface types that make up the network of each road class. For example, in the case of trunk roads, 63%, 12%, and 25% of the roads are paved, gravel, and earth, respectively. It was assumed that traffic volume data roughly corresponds to these ratios and that paved, gravel, and earth roads, in that order, occupy areas on the cumulative curve from high to low equivalent to those percentages. That is, for trunk roads, the paved roads would occupy that section of the curve that extends from the 100th to the 37th percentile, earth roads would occupy the area from zero to the 25th percentile, and gravel roads would occupy the area between these two sections (see Figure A8.6). The average values for the number of vehicles represented by these areas are then taken to be representative of their respective road surface type, with high and low traffic volumes derived by applying the statistical concept of confidence limits using the equation below. The same process was repeated for the other road classes too (see Figure A8.7 and A8.8).

$$x = \mu \pm 1.96\,\sigma / \sqrt{n}$$

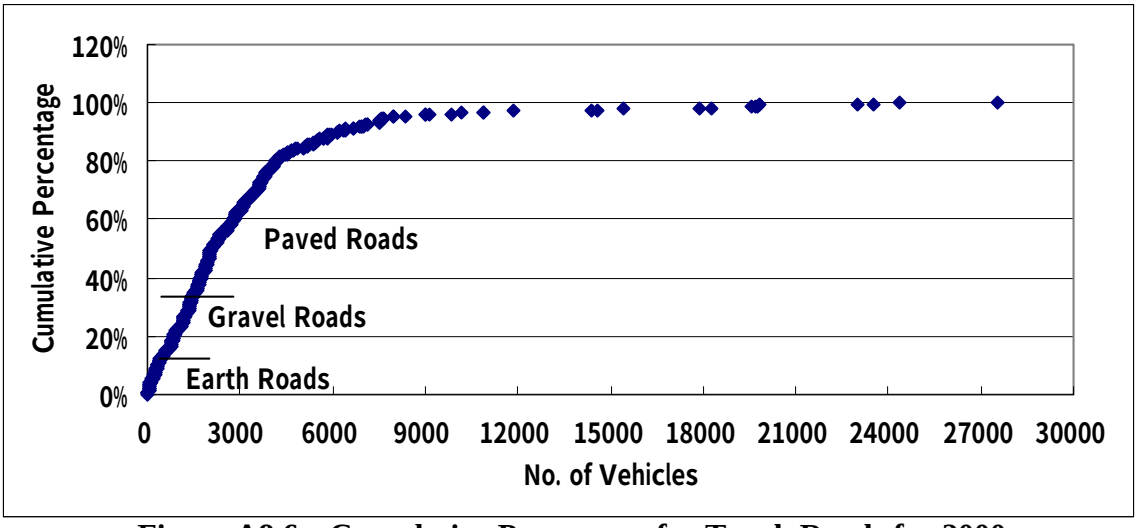

Figure A8.6 Cumulative Percentage for Trunk Roads for 2000

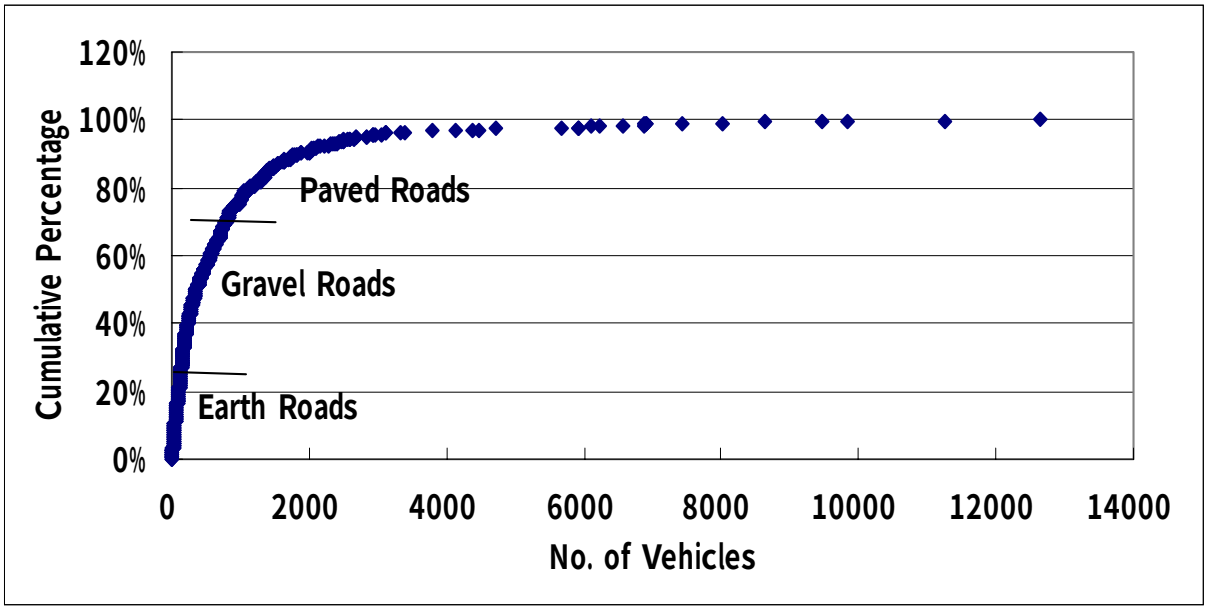

Figure A8.7 Cumulative Percentage for Primary Roads for 2000

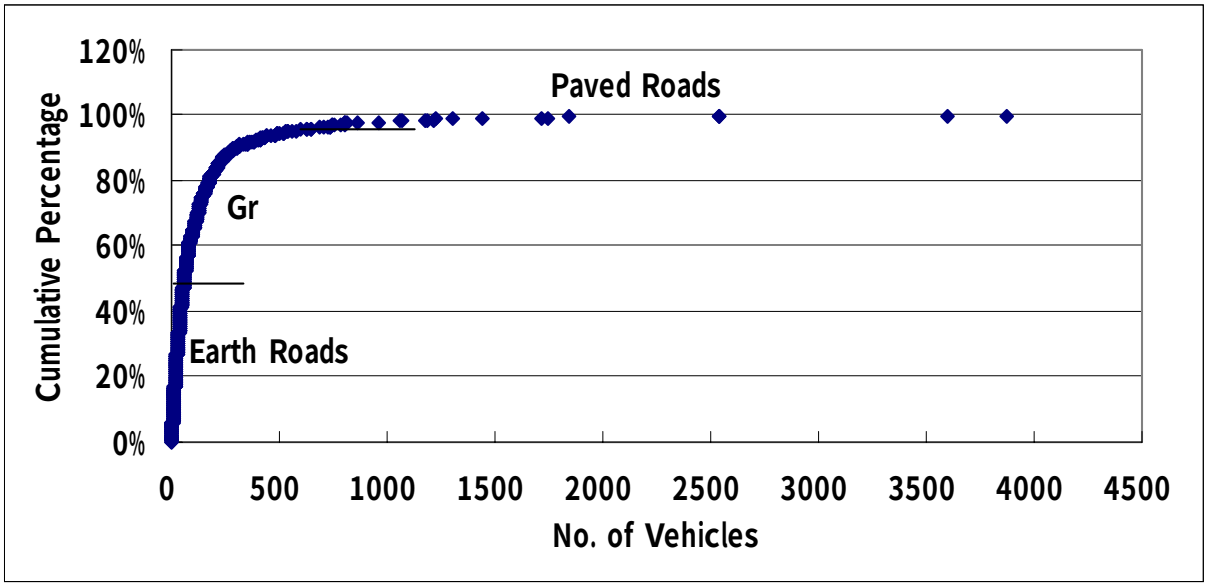

Figure A8.8 Cumulative Percentage for Secondary & Minor Roads for 2000

A8.4 Traffic Volume Composition

Traffic volume composition by road class was derived for 1997 for each of the road types using the MORPW's Traffic Census database. It was assumed that the composition would be the same over road surface type. The results are shown in Figure A8.9 and Table A8.1.

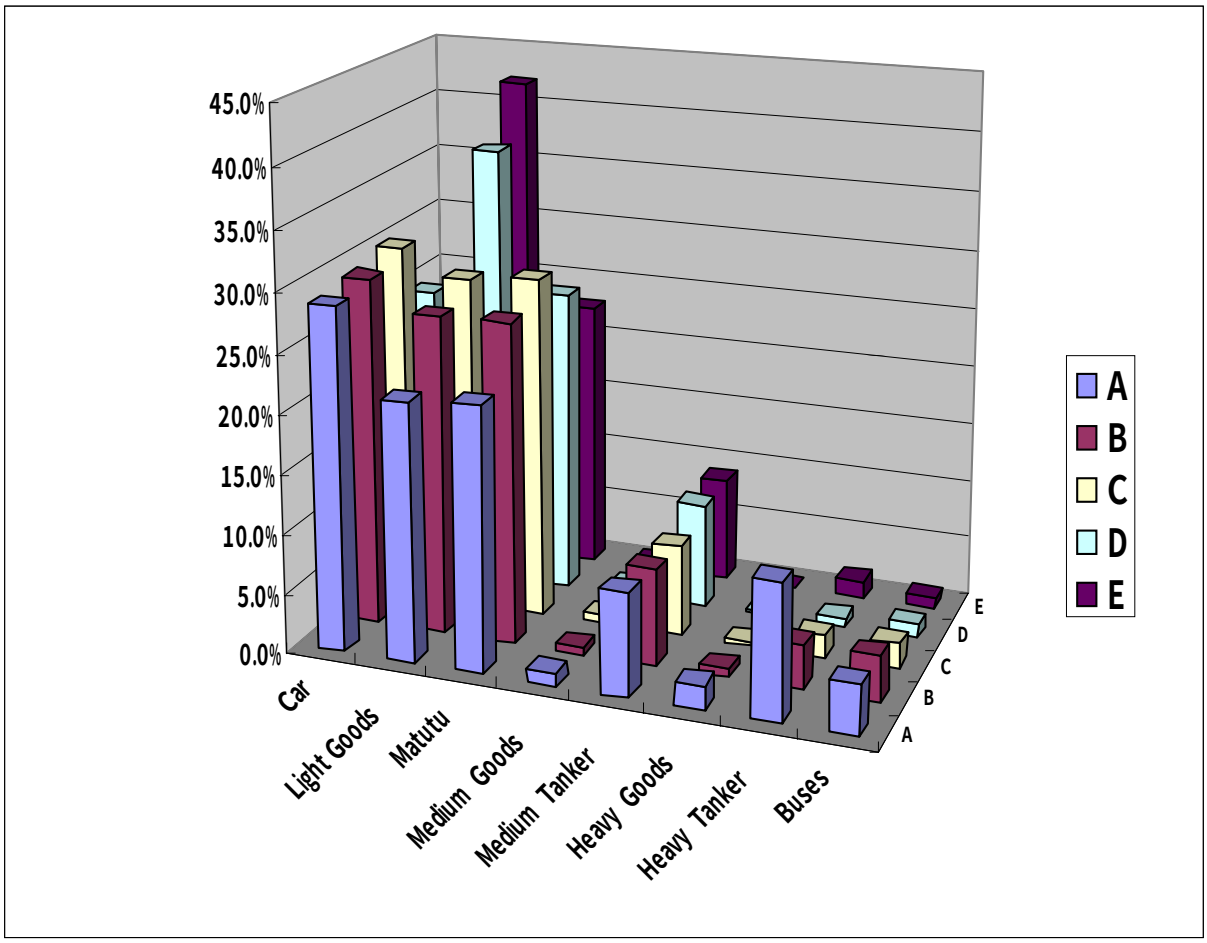

Figure A8.9 Daily Traffic Composition by Road Class

Table A8.1 Daily Traffic Composition by Road Class

Road Class	Car	Light Goods	Matatu	Medium Goods	Medium Tanker	Heavy Goods	Heavy Tanker	Buses
A	28.7%	21.7%	22.2%	1.1%	8.6%	2.1%	11.4%	4.1%
B	29.3%	26.8%	27.0%	0.6%	8.1%	0.7%	3.7%	3.7%
C	30.3%	28.2%	28.8%	0.7%	7.6%	0.3%	1.9%	2.1%
D	24.7%	37.6%	25.8%	0.8%	8.9%	0.3%	0.8%	1.2%
E	23.0%	42.0%	22.9%	0.7%	8.9%	0.1%	1.5%	0.9%

Finally, based on the analysis carried out in Section A8.1 to A8.4, the traffic inputs by road class and road surface type shown in Table A8.2 were used for inclusion as inputs in the HDM-4 model.

Table A8.2 Traffic Flows and Growth by Road Class & Surface Type

Road Class	Surface Type	Traffic Composition						Traffic Volume			Annual Traffic Growth
		Car	Pickup	Bus	Matatu	Med Truck	Heavy Truck	High	Medium	Low	
Trunk	Paved	0.29	0.23	0.04	0.24	0.09	0.11	5800	3400	2100	5.00%
	Gravel							700	550	325	
	Earth							290	200	70	
Primary	Paved	0.30	0.28	0.02	0.29	0.09	0.02	2550	1360	900	2.00%
	Gravel							550	325	190	
	Earth							100	60	25	
Secondary & Minor	Paved	0.24	0.39	0.01	0.25	0.10	0.01	2200	960	740	1.00%
	Gravel							230	130	80	
	Earth							40	20	10	

ANNEX 9
KAJIADO PILOT STUDY

ANNEX 9 KAJIADO PILOT STUDY

A9.1 Introduction

The JICA Study Team, with the assistance of the local consultant GIBB, implemented a pilot study conducted in Kajiado District whose objectives were to determine the following:

1. The road maintenance requirements for the district.
2. The overall intervention levels required for the district road network and for various road links in the district.
3. The level of funding required to bring roads to a particular level of service.

Kajiado was chosen as the sample district for the following reasons:

- Its proximity to Nairobi.
- Information on costs and road inventory was readily available saving on time.
- The district's road network provides a comprehensive representation of the various road classes under the Kenyan road classification system (i.e., primary, secondary and minor roads).
- Uniform geometry (bendy and generally level), which reduced the matrix size (HDM-4).
- Fairly uniform geographical conditions

Data on the road network was collected through field visits to a selected sample of representative roads to be applied to the World Bank HDM-4 model for financial/economic evaluation of highway projects. This annex is a summary of the pilot study.

A9.2 Kajiado District Road Network

A complete inventory of Kajiado's roads was obtained from the DWO and is as shown in Table A9.1 below.

Table A9.1 Road Inventory Data

Road Code	Description	Length (km)	Surface Type				ADT (1989)	
			Surface Dress	Premix	Gravel	Earth	Total	Heavy
A104	NB Tanz.Namanga/DB Mac Athi Rv	131.5	131.5				710	150
C58	DB Nai Mbagathi Rv / Magadi	97.6	97.6				110	12
C60	DB Nai Bulbul / D523 Ngong	4.9		4.9			1670	277
C102	A109 Emali / NB Tanzania	125.4			125.4		150	35
C103	A104 Namanga/DB T/T Chyulu Gt	148.0				148.0	90	5
D523	A104 Nr Kajiado / DB Nakuru	87.4	12.5		74.9		120	16
D524	A104 Kajiado / C102 Isala	111.5			111.5		90	35
D526	D523 Kenuka / C58 Olepolos Mrkt	16.0			16.0		8	2
D529	DB Machakos Kiu / D524	11.0			11.0		29	6
D536	DB T / T Njukini / C102 Lasset	44.0			44.0		31	11
E391	E406 Nr. Toroka / Olioserri	48.0			38.0	10.0	9	2
E392	A104 Enkuoni Pass / Meto	50.0			50.0		11	5
E393	A104 Ngatataik / E394	19.6			11.6	8.0	13	2
E394	A104 Ilbisi / E395 Mailwa	35.5			35.5		0	0
E395	A104 Ndialangoi / E396	42.0				42.0	0	0
E396	C103 Amboseli / D524 Selengei	57.0			36.0	21.0	0	0
E397	NPB Amboseli / C102	20.3			20.3		6	1
E398	E395 Olosingaran / E396	28.8				28.8	0	0
E399	C102 Emugoi / D524	30.0			30.0		0	0
E400	C102 Osilala / E705 Merueshi	16.6			8.6	8.0	14	4
E401	D524 Kepass / A109 Sultan Hamud	18.8			10.8	8.0	17	6
E402	D524 Nkama / A109 Sultan Hamud	27.2			25.2	2.0	160	120
E405	A104 / E406 Kenya Marble Quarry	11.1			11.1		35	18
E406	C58 Mulinya / A104 Kajiado	68.1			18.1	50.0	36	13
E407	A104 Kajiado / Oloyiangalini	19.6			19.6		11	0
E408	D524 / Enkorika	7.9				7.9	21	6
E413	E410 Kiu / D524 Kajiado	71.2			71.2		19	13
E414	D526 Ngong Hills / Pump House	15.0			15.0		0	0
E418	C58 Game Dept. / D523 Ngong	14.0	1.0		13.0		113	7
E702	C58 Ongata Rongai / C60 Bulbul	13.4			9.4	4.0	58	6
E703	C102 Lasset / C103	7.5			7.5		18	0
E704	C103 Tsavo Park / C102 Makutano	97.0			17.0	80.0	2	0
E705	A109 Simba / C102 Makutano	53.4			53.4		1	0
E1490	D523 Ewaso Kedong / DB Narok	46.0				46.0	0	0
E1491	D523 / S.T.D. Training Centre	1.0	1.0				0	0
E1492	C60 Ngong / E702 Ololua	6.0				6.0	0	0
E1493	D523 Katathia / E702 Ololua	6.3				6.3	0	0
E1494	C58 No 1 Chora / E1493	11.0				11.0	0	0
E1495	C58 Ongata Rongai / Masia Lodge	6.4			6.4		0	0
E1496	C58 Moi School / Ongata Rongai	10.0			10.0		0	0
E1497	C58 Magadi / Kalema	41.0			41.0		0	0
E1498	C58 Ngong Hills / Kipeto	20.0			15.0	5.0	0	0
E1822	A104 Ngaitatek / E392 Ilbartim	11.0			11.0		0	0
E1823	C103 Airstrip / Ngararambuni	18.0			18.0		0	0
E1824	C102 Oloitoktok / Endonet	20.0				20.0	0	0
G1	A104 / Kajiado District Hospital	3.0	3.0				0	0
G2	DC's Office / DC's House	0.5				0.5	0	0
G3	A104 / MOTC Offices Kajiado	0.3			0.3		0	0
G7104	C102 / Adm Offices	1.0			1.0		0	0
G7104	C102 / Adm Offices	1.0			1.0		0	0
	All Roads	1751.8	246.6	4.9	987.8	512.5		

Based on the above information provided by the DWO in Kajiado, the district road network is 1,751.8 km in length and is comprised of the following surface types:

- Paved roads: 251.5 km.
- Gravel roads: 987.8 km.
- Earth roads: 512.5 km.

Applying the road classification shown in Table A9.2 below, the number of road links was calculated to be 50.

Table A9.2 Kajiado District Roads

Category	Class	Number of links	Total length, km	Percentage length
Trunk	A	1	131.5	7.5%
	B	0	0	0.0%
Primary roads	C	4	375.9	21.5%
	D	5	269.9	15.4%
Secondary & Minor roads	E	35	968.7	55.3%
	Others (G)*	5	5.8	0.3%

* Government Access roads - G

A9.3 Data Collection

Sampling

In order to collect representative data, a program detailing the roads to be visited was carefully designed to ensure that all road classes were covered. This selection also took into account surface types and the need for complete coverage of the district.

The district road network for the field study was split into three groups, each with approximately 12 roads. The roads branched off 3 arterial roads, which identified the boundaries of the respective groups as follows:

- Group 1 - Ngong, along the C58 road,
- Group 2 - Central, along the A104, and
- Group 3 - Oloitokitok along the C102.

Thirty-seven representative links were sampled for the field study as shown in Table A9.3 below.

Table A9.3 Roads Sampled for Field Survey

Road No	Road Name	Surface Type	Length (km)	Alignment Soils
	Group 1: Along C58 as Main Link			
C58	O/Rongai-Kisirian	Bitumen	12.4	B/Cotton
C58	Kiserian-Magadi	Bitumen	75.0	B/Cotton
D523	Ngong-Kiserian	Bitumen	10.0	Red
D523	D526-Ngong	Unpaved	9.0	Red
D523	Kibiko-Kisamis	Unpaved	41.0	Red
D526	Kemuka-Olepolos	Unpaved	16.0	
E406	Kajiado-C58 Mulinya	Unpaved	68.1	
E413	Kajiado-Konza	Unpaved	71.2	Cotton/Sandy
E414	D356 Ngong Hills-P House	Unpaved	15.0	Cotton
E1497	Magandi-Nguruman	Unpaved	41.0	
E1498	Kona Baridi-Kipeto-Enkasiti	Unpaved	45.0	B/Cotton
E418	Kiserian-Ngong	Unpaved	14.0	Red
	Group 2: Along A104 as Main Link			
A104	Athi River-Namanga	Bitumen	131.5	Black/Clay
G1	Access-DC's/Dist Hospital	Bitumen	3.0	Sandy/Cotton
C103	Namanga-Ol Tukai-C102	Bitumen	121.0	Volcanic
D524	Kajiado-Isala	Unpaved	111.5	Cotton/Sandy
E392	Enkuoni Pass/Meto	Unpaved	50.0	Cotton
E393	Ngatatek-E394	Unpaved	19.6	B/Cotton
E394	Bissil-Maliwa	Unpaved	35.5	B/Cotton
E395	Nialangoi-E396	Unpaved	42.0	
E396	C103 Amboseli-Selenkei	Unpaved	57.0	B/Cotton
E406	Kajiado-C58 Mulinya	Unpaved	68.1	
E407	Kajiado-Kipeto	Unpaved	40.0	Sandy/Soil
E413	Kajiado-Konza	Unpaved	71.2	Cotton/Sandy
	Group 3: Along C102 as Main Link			
C103	Namanga-Ol Tukai-C102	Bitumen	121.0	Volcanic
C103a	C102-Kilanguni	Bitumen	50.0	Volcanic
C102	Emali-Loitokitok-TZ Border	Unpaved	125.0	Cotton/Sand/Volcanic
D524	Kajiado-Isala	Unpaved	111.5	Cotton/Sandy
E397	Amboseli-C102	Unpaved	20.3	B/Cotton
E399	Emugoi-D524	Unpaved	30.0	Sandy/Cotton
E400	Olsilale-Merueshi	Unpaved	16.6	Sandy/Clay
E401	S/Hamud-Isara	Unpaved	20.0	Sandy/Cotton
E402	Nkama-S/Hamud	Unpaved	27.2	Cotton
E704	C103-Tsavo Park Makuta	Unpaved	97.0	Sandy/Cotton
E705	A108-Simba-Makutano	Unpaved	53.4	Cotton/Sandy
D536	IIIasit-Njukini	Unpaved	44.0	B/Cotton/ Volcanic
E1824	Loitokitok-Endonet	Unpaved	20.0	Volcanic

Data Collection

Three engineers and enumerators from GIBB were dispatched to the groups of roads described in the table above. They were accompanied in the field by road inspectors from the Kajiado District Engineer's office of the MORPW, who had detailed knowledge of the roads and guided the engineers to the sample links. The District Engineer's office provided the road inventory data and budgets for road rehabilitation and maintenance as well.

As for the enumerators, they were instructed to avoid biased reporting of only bad (or good) sections of road links visited. Since it was difficult to cover the entirety of all the links within the allotted time, the following general guidelines were issued to the enumerators:

- Cover at least 50% to 75% of a designated link depending on its length, with the former percentage applied to links longer than 50km.
- Roads are to be divided into sections of reasonable length, say 10km, within which at least one observation is made so as to ensure a balance between bad and good sections reported
- Enumerator location on any particular link was recorded in relation to the origin of that link.

While recording information on road conditions, features that assisted in making a more accurate description of the road were also recorded and included details such as carriageway and shoulder width, drainage conditions (e.g., shallow, overgrown, lined, etc), and special features such as the locations of market centers and economic activities along the routes covered.

Road Condition Survey

One of the most important pieces of road data was that on ride quality and surface condition. Supplementary information included shoulders and side drain condition. The parameters measured in the data collection exercise are summarised in Table A9.4 below.

Table A9.4 Data Collected in Field Study

Surface Type	Data Collected
Paved Roads	Carriageway: Ride quality on the basis of IRI, Rutting, Potholing, Cracking, Edge Break Off carriageway: Shoulder and side drain condition
Unpaved Roads	Carriageway: Ride quality on the basis of IRI, Gravel thickness for gravel roads Off carriageway: Side drain condition, sub-grade soil type

Note: IRI means international roughness index

The ride quality was quantified according to guidelines issued by the World Bank on the assessment of road roughness as follows:

Table A9.5 World Bank 5 Point Scale for Road Roughness Measurement (IRI: m/km)

Quantitative Evaluation	Paved	Unpaved
Smooth	2	4
Reasonably Smooth	4	8
Medium Rough	6	12
Rough	8	15
Very Rough	10	20

Source: World Bank, Estimating Vehicle Operating Costs, Technical Paper 234, 1994.

Road Maintenance Operations

There were two sources of data on road maintenance operations including:

- The District Works Officer (DWO) who provided data on budgets
- Field visits where ongoing or recent maintenance work was noted.

Traffic Counts & ADT

Due to the nature of this pilot survey, its duration and the information required, it was not practical to mount a comprehensive traffic survey for the district. Instead, 15-minute traffic counts were carried out on sampled sections. The counts, although not conducted according to standard procedures for traffic counts, provided information for deriving the following:

- A rough estimate of current ADT (average daily traffic)
- Traffic composition including non-motorized traffic

As for converting the traffic counts of road links into ADT, this was done by assuming that the calculated hourly traffic, which was derived by multiplying the 15-minute traffic counts by four, would remain relatively constant for half the day for secondary and minor roads and for two-thirds of the day for trunk roads (see

formulas below). After that, it is assumed that the traffic volumes would decrease to insignificant levels. This seems reasonable given that Kajiado is predominantly a rural setting with only one trunk road (A104) to Tanzania. Except for A104, the rest of the network mainly consists of local access roads to the primary network, markets, schools and health facilities. Given this, little fluctuation in traffic during the day and low levels of traffic during the night can be expected. Because Kajiado is predominantly dependent on agriculture, the major fluctuations in traffic are mainly seasonal in nature.

- Trunk roads: ADT = (15 min Counts x 4) x 16 hours
- Other roads: ADT = (15 min. Counts x 4) x 12 hours

The validity of the resulting ADT data was crosschecked with the DWO's traffic data contained in the road inventory data This data was then compared with the general traffic volumes provided for different road categories for Kenya based on historical traffic data for the whole network and grouped as low, medium and high for each road category. More details on this are contained in Section A9.4.

A.9.4 Kajiado Road Network Matrix for Economic Analysis

Twenty-three road links, using the criteria below, were identified as input for the road network matrix for the economic analysis of the HDM-4 model.

- Road Class (Trunk, Primary, Secondary & Minor roads)
- Surface type (Paved, Earth, Gravel)
- Traffic Volume (High, Medium, Low)

Details of the road network matrix are as shown in Table A9.6.

Table A9.6 Kajiado Road Network Matrix for Economic Analysis

Road Class	Surface Type	Traffic	Surface Condition	Length
Trunk	Paved	Low	Fair	21
	Paved	Low	Good	61.5
	Paved	Medium	Fair	20
	Paved	Medium	Good	29
Primary	Paved	High	Fair	4.9
	Paved	Low	Fair	97.6
	Paved	Medium	Fair	43.6
	Paved	Medium	Good	9.25
	Paved	Medium	Poor	12.4
	Gravel	Low	Fair	94
	Gravel	Low	Poor	213.5
	Gravel	Medium	Fair	4.2
	Gravel	Medium	Poor	143.3
	Earth	Low	Poor	23
Secondary & Minor	Paved	Low	Good	3
	Paved	Low	Poor	2
	Gravel	Low	Fair	68.4
	Gravel	Low	Good	23.1
	Gravel	Low	Poor	468.6
	Gravel	Medium	Poor	17.4
	Earth	Low	Fair	14.9
	Earth	Low	Poor	375.1
	Earth	Medium	Poor	2
All Roads				1751.75

The traffic volumes for the above 23 link types, which are grouped into low, medium and high, are shown in Table A9.7 and are based on the comprehensive analysis of historical traffic data for all roads in Kenya in Annex 8.

Table A9.7 Traffic Volume Bands by Road Class & Surface Type (unit: vpd)

Road Class	Surface Type	Traffic Volume		
		High	Medium	Low
Trunk	Paved	5800	3400	2100
	Gravel	1390	1150	700
	Earth	290	200	70
Primary	Paved	2550	1360	900
	Gravel	550	325	190
	Earth	100	60	25
Secondary & Minor	Paved	2200	960	740
	Gravel	230	130	80
	Earth/Unclassified	40	20	10

A9.5 Road Maintenance Intervention Criteria

Three levels of intervention were defined for road maintenance, i.e., a Base Case, Do-Minimum Case, and a Desirable Case. Maintenance costs are calculated based on the maintenance work criteria contained in these intervention levels. The maintenance work criteria associated with the intervention levels are defined in Table A9.8 below.

Table A9.8 Intervention Criteria by Road Surface Type for Economic Analysis

Alternative	Associated Intervention
Paved Roads	
Base Case:	Routine maintenance, Patch, Crack sealing
Do-Minimum Case	Routine maintenance, Patch, Crack sealing, Surface Reseal at 25% cracking Overlay at 6.0 IRI Pavement Reconstruction at 8.0 IRI
Desirable Case	Routine maintenance, Patch, Crack sealing Surface Reseal at 15% cracking Overlay at 4.5 IRI Pavement Reconstruction at 6.0 IRI
Gravel Roads	
Base Case:	Routine maintenance, drainage, grading, spot regravel;
Do-Minimum Case	Routine maintenance, drainage, grading 2/year, spot regravel at gravel thickness<75mm; Regravel when gravel thickness<50mm
Desirable Case	Routine maintenance, drainage, grading 2/year, spot regravel at gravel thickness<100mm; Regravel when gravel thickness<75mm
Earth Road	
Base Case:	Routine maintenance, drainage, grading 1/year
Do-Minimum Case	Routine maintenance, drainage, grading 2/year,
Desirable Case	Routine maintenance, drainage, grading 2/year, Regravel when AADT>400

A9.6 Financial & Economic Evaluation

As Table A9.9 indicates, the total undiscounted cost for maintaining all roads in Kajiado District for the period from 2001 to 2015 is about Ksh 6,603 million and Ksh 8,783, respectively, for the Do-Minimum and Desirable Cases. On average, this comes to Ksh 440 million and Ksh 585 million per year. On the other hand, the

budget for fiscal year 2001 for road maintenance in Kajiado is Ksh 107.38 million, which is about. 4.1 and 5.4 times, respectively, too small for the Do-Minimum and Desirable Cases. Given this disparity in funding, it may be necessary to consider the implementation of cost-reduction measures such as those described in Chapter 6 of the main text. It is interesting to note that Kajiado District requested Ksh 548.47 million for road maintenance for 2001. The Base Case is not evaluated here, since this would result in further deterioration of the road network, which in unacceptable.

Table A9.9 Summary of Undiscounted Costs by Road Type for 2001-2015 (Ksh millions)

Road Type	Do-Minimum Maintenance			Desirable Maintenance		
	Periodic	Routine	Total	Periodic	Routine	Total
Trunk Roads	1,283.91	420.76	1,704.67	1,773.63	440.80	2,214.43
Primary Roads	2,334.70	484.74	2,819.44	3,606.48	625.21	4,231.69
Secondary & Minor Roads	1,251.21	827.45	2,078.66	1,256.25	1,080.71	2,336.96
Grand Total			6,602.77			8,783.08

Finally, as Table A9.10 and A9.11 indicate, the return on investment for roads of the Roads Department (i.e., Trunk/Primary roads) is much greater. In fact, the NPV (net present value) for Secondary & Minor roads is negative, meaning that a reduction in the size of this network might be warranted. This is also indicated by negative economic internal rates of return (EIRR) for Secondary & Minor roads. However, before making any final decision on this, basic access needs to be taken into consideration.

Table A9.10 Summary of NPV by Road Agency (Ksh millions)

Road Type	Do-Minimum Maintenance	Desirable Maintenance
Roads Dept (Trunk & Primary Roads)	2,411.91	1,030.92
DRCs (Secondary & Minor Roads)	-390.51	-463.31

Table A9.11 Summary of EIRR by Road Agency

Road Type	Do-Minimum Maintenance	Desirable Maintenance
Roads Dept (Trunk & Primary Roads)	42.6%	19.5%
DRCs (Secondary & Minor Roads)	-11.6%	-18.8%

Given the above, the budget that Kajiado receives for road maintenance is too small to meet its needs. However, given the negative returns on investment in Secondary & Minor roads, consideration should be given perhaps to maintaining a smaller network that is more cost-effective.

ANNEX 10
MONITORING AND EVALUATION RESULTS

ANNEX 10 MONITORING AND EVALUATION RESULTS

A10.1 INTRODUCTION

As part of a year long extension of "The Study on Road Maintenance System under the Framework of the Kenya Roads Board" requested by the Government of Kenya, a three-member JICA Study Team began arriving in Nairobi on 23 May 2002 for a month-and-a-half period to monitor and evaluate the progress of said Study. The goals of the monitoring and evaluation are as follows:

- To provide advice and guidance to assist with the full and effective implementation of the Kenya Roads Board (KRB) system.
- To provide advice and guidance to assist with the sustained and effective use of the road maintenance manuals developed by the JICA Study Team.

To achieve the above-mentioned goals, the KRB, the district roads committees (DRCs), district roads engineers (DREs)/municipal engineers, and provincial roads engineers (PREs) are either interviewed or made to fill out a questionnaire specifically design for each of their positions (see AN11.4 for details). The job titles and number of interviewees/respondents surveyed are shown in the table below. In addition to this, workshops are held throughout Kenya to exchange information and opinions regarding the use of the road maintenance manuals in the field.

Number and Type of Respondent

Job Title of Interviewees/Respondents	Number of Interviewees/Respondents
Provincial Roads Engineer	8
District Roads Engineer	48
Member of District Roads Committee (excl. DRE)	7
Total	63

Based on the above work, the results of the monitoring are collated and described in A10.2. Note that the Study Team tried to obtain as representative a sample as possible when carrying out its monitoring work. Remember that the results represent for the most part the perceptions of personnel in the field, which may not always mesh with the perceptions of staff at the head offices, and are therefore not intended to assess blame but to achieve a common understanding. In A10.3, these results are evaluated and recommendations made to achieve the goals previously mentioned. It is the hope of the JICA Study Team that the recommendations contained in this document will be implemented as quickly as possible in order to realize a more efficient and effective KRB system.

Finally, the JICA Study Team will be returning to Kenya in November 2002 for its second and last visit of the year long Study extension. At that time, final feedback will be obtained from the various stakeholders of the KRB over the period of a month and final recommendations, together with final versions of the road maintenance manuals, will be presented in January 2003 to the JICA Study Team's counterpart agency the Ministry of

Roads and Public Works (MORPW), who will then distribute them to the relevant stakeholders of the KRB system.

A10.2 MONITORING RESULTS

The results from the monitoring carried out by the JICA Study Team are categorized into 7 items and are described in detail below.

(1) Funding

Under the KRB Act, 57%, 40%, 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 DRCs, and to the KRB for administrative costs, respectively. Although money for road maintenance is now reaching the constituencies of all the 70 districts in Kenya, something that rarely if ever occurred previously, there are still problems and they are as follows:

- The above-mentioned 57% and 3% of KRB money is being distributed as originally intended under the KRB Act. On the other, the 40% that is supposed to be distributed to the DRCs is not being allocated as intended. That is, 24% of that 40%, which is supposed to be distributed equitably to the districts, is going to the RD to pay for a backlog of projects. In addition, no deadline has been given at present by the KRB for when this 24% will be returned to the DRCs.
- As for the 16% of the 40% that is to be distributed equally to all of the 210 constituencies in Kenya, this is being carried out as originally intended.
- On the other hand, even though the constituencies are receiving their 16%, the payments are irregular and in small chunks that make it difficult to carry out work efficiently. For example, the first payment of the 2001 fiscal year, which begins in July, was not disbursed until November. During these 5 months no work was being done. In addition, untimely disbursements affect areas with large seasonal changes, meaning that the lost time could even be greater.
- The Kenya Wildlife Service (KWS), since it is not eligible to directly receive funds under the KRB Act, has resulted in the KWS receiving no monies for the classified roads in its parks and for the classified roads that provide access to these parks.
- The towns and cities under the Ministry of Local Government (MOLG), which is not considered as roads agency under the KRB Act, have received very little or no money under the current KRB system. This is because the members of parliament are more interested in repairing roads in the residential areas of their constituencies where their voters are, resulting in the roads in inner cities and towns being neglected.

(2) Organizational Structure & Staffing

The KRB system, due to its newness, still faces a number of problems in terms of organization and staffing and are as follows:

- Due to lack of staff in the KRB secretariat, no auditing or follow-up of work has been carried out regarding the monies distributed by the KRB.
- On the other hand, although the KRB Act was passed into law approximately 2 years ago, the executive director of the secretariat was just appointed last November.

Furthermore, KRB's secretariat will only be fully staffed starting from 1 July 2002. Therefore, the real test of whether or not the KRB system is a success will be this coming fiscal year of 2002/2003. It should be noted that even with these staffing restrictions, the KRB has carried out its work quite well.

- At the district level, almost none of the DRCs have offices of their own and many are using MORPW facilities. This can partly be attributed perhaps to a lack of consciousness of DRC members regarding the KRB concept, which encourages the DRCs to be an independent body.
- Almost none of the DRCs have hired any support staff, meaning that MORPW staff is being used to carry out DRC work. This presents problems in that the administrative costs for DRCs and the MORPW are difficult to separate, and there are cases where DRC money is being used to pay for unrelated MORPW overhead costs.
- Excluding the DREs, some DRC members are not aware of the operational details of the DRCs, indicating that the number of meetings for DRCs is insufficient (at present meetings are held quarterly), or that there is insufficient communication between DRC members.

(3) Maintenance Manuals

The JICA Study Team submitted 500 sets of road maintenance manuals, which consist of an Execution Manual, Inspection Manual, and Evaluation Manual, in February 2002 to the MORPW for distribution to PREs, DREs, and other KRB stakeholders. The problems that have been detected in the Team's monitoring work regarding the manuals are as follows:

- The manuals have rarely been used due to a lack of communication between the man in the field and the agencies in Nairobi (i.e., MORPW and KRB).
- Many DREs have also stated a lack of funding for using the manuals. For example, it was mentioned that the frequency of inspection for certain maintenance activities is impossible due to a lack of vehicles and monies for their repair and operation.
- Also, from the Kenyan perspective, inspections seem meaningless since even if you carry them out you will not receive the necessary money to execute the required maintenance activities.
- Although DREs have attended workshops on the use of the maintenance manual, technicians have not received training and are therefore unable or reluctant to use the JICA manuals in the field.

(4) Work Programs

Under the KRB Act, work programs have to be submitted to the KRB in order for road agencies to receive funding. The problems that have been detected regarding these work programs are as follows:

- In the case of the DRCs, DREs draw up work programs that are transparent and reliable, due to the KRB giving a definitive budget. However, it has been also mentioned that the priorities for these work programs are sometimes influenced by politics too much as a result of the members of parliament (MPs) sitting on the DRCs.
- On the other hand, it has been mentioned by site staff that work programs for Class A, B, and C roads are not useful because they are not based on any clear budget. That is, the RD does not seem to provide in advance a budget for planning, resulting in some

provinces/districts making unreasonable requests. Even when the work programs are reasonable, it is rare that the budget requested is received. This is acceptable if the reasons for receiving less are clear, but according to some people in the field, the RD does not or seems it cannot provide these reasons.

- The unit rates and description of maintenance activities are not standardized. This is important in order that everybody knows what is being referred to as well as whether or not the rates are reasonable.
- Most of the DREs said that they used no formulae in calculating the costs of maintenance activities, and usually based their figures on quotations from the private market.

(5) Data

Having the correct data, as well as the systems and software to store, analyse, and evaluate it, are crucial for the success of the KRB system. Some of the problems detected in respect to this are as follows:

- Almost all of the DREs had computers available to them. On the other hand, according to the DREs, the vast majority do not collect road condition data on a regular basis due to a lack of funds, and none of them collect traffic data.
- Furthermore, no database program has been made available (either from the KRB or the MORPW) to the DREs.
- Presently, there seems to be no system for collecting and sending data from the field to KRB or the road agencies, making it impossible for the KRB or the road agencies to know the needs of provinces/districts. In addition, there is of course no plan of action for updating data should it be collected.

(6) Work Execution & Auditing

The work execution method and auditing work in progress or completed is vital to ensure that the KRB system function as intended. The problems detected in respect to this are as follows:

- Because of a lack of KRB staff, there has been no technical or financial auditing by the KRB for this past fiscal year, meaning that this has been no follow up to ensure that road agencies are performing as intended. This however should be remedied with the KRB having its full staff in place for the start of the new fiscal year on July 1st.
- DRC work is sometimes being executed using MORPW staff and resources. This is not ideal in that DRC monies are sometimes being diverted to pay for unrelated MORPW overhead costs.
- The untimely flow of cash, as well as the small disbursements, results in no work being done for months, adversely affecting the performance of the DRCs.
- Due to the inability of the Mechanical and Transport Depart to keep equipment operating or to replace obsolete equipment, makes it is necessary for DREs and PREs to contract out to private firms. This is expensive since the private construction market in Kenya as a whole is still underdeveloped.

(7) Performance

Respondents and interviewees of the JICA questionnaire were asked to evaluate the performance of the KRB system, as it is important that the related agencies in Nairobi (i.e., KRB and MORPW) be aware of how they are considered by the man in the field so they can make the necessary changes for improvement.

- Most of the DREs and members of the DRCs gave the KRB a rating of 7 or higher for its work over the past year. Stakeholders are satisfied overall that the KRB has been able to ensure that funding (i.e., the 16% of the 40% due DRCs) is actually reaching all of the people in Kenya in a transparent manner.
- On the other hand, the above good rating is dependent on the KRB making further progress in fiscal year 2002 on resolving issues of importance, such as when the remaining 24% can be expected and ensuring that cash flows are regular.
- As for the RD of MORPW, some people in the field were dissatisfied with its seeming lack of transparency regarding how money is being spent on Class A, B, and C roads and when its backlog of previous projects will be cleared up.

A10.3 EVALUATION AND RECOMMENDATIONS

The evaluation and recommendations listed below, which address the problems discussed in A10.2 and are a result of the Study Team's monitoring work, are categorized into Funding, Organization, Education, Facilities/Equipment, Data, and Communication.

(1) Funding

- The success in having 16% of the RMLF distributed in a transparent manner to all of the 70 districts in Kenya is an excellent first step for the KRB towards operating as originally intended. However, the KBR should try to set up a system that does not require going though the permanent secretary of the MORPW for the disbursement of monies to the DRCs or any other non-MORPW entities, since this just slows down the process unnecessarily. As a transition step this is perhaps okay, but it is recommended that the KRB try to remedy this problem by the end of fiscal year 2002.
- 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. It is also recommended that the RD backlog of projects that the KRB agrees to finance exclude any cost variations (i.e., increases).
- It is recommended that KRB draw up the necessary criteria and methodologies for disbursing the above-mentioned 24% as quickly as possible, 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. Should the 24% become available before the development of disbursement criteria, it is recommended that the 24% be distributed equally to the districts, as is the case for the 16%, until said criteria is put into place.
- Under the previous system, promised monies were sometimes never distributed. With the KRB system, the monies due to roads agencies are clear and the mechanism for disbursement relatively reliable, so this should present no problem. Based on this, it is recommended that consideration be given to allowing road agencies to proceed with

their work when KRB funds disbursement is late so that maintenance 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 from the KRB beginning in fiscal year 2003/2004.
- 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.

(2) 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 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 Final 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 autonomous entity. The above is crucial for assisting in the creation of a more competitive market in Kenya for the contracting out of maintenance equipment.
- 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.

(3) Education

- *It is recommended that the Kisii Training Center design and carry out a training program, which will include on-site testing, for the JICA road maintenance manuals at the beginning of August 2002, and that the feedback from this training be sent to the JICA Study Team by the end of September 2002 so that the manuals may be finalized.*
- *It is requested that the MORPW, as well as perhaps the KRB, fund the Kisii Training Center for the above-mentioned work so that a "standard" road maintenance manual be available for use throughout Kenya by January 2003.*
- It is recommended then that all road agencies send their engineers and technicians to the Kisii Training Center in the future to be trained in the use of the JICA road maintenance manuals, and that they provide feedback to Kisii one year after finishing to ensure that they are performing as intended.
- It is recommended that the cover of the road maintenance manuals contain the KRB name and logo, instead of that of the MORPW, so that it will be understood by all stakeholders that the JICA manuals are intended for all road agencies.
- In addition to the above, 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. *The KRB should also, for example, send out a memo informing all stakeholders that the JICA road maintenance manuals are "ready for use".*

(4) 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 the KRB link up with all districts via e-mail so that data and information can be reliably exchanged.

(5) 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 kilometre markers as well (to be installed if necessary) in order to carry out planning.

(6) 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.
- *It is suggested that the KRB consider a system for updating and revising the road maintenance manuals to be submitted by the JICA Study Team in January 2003, so that important and timely changes can be made to the manuals as required.*

A10.4 MONITORING SHEETS FOR CURRENT STATUS OF KRB SYSTEM

The monitoring sheets used to assess the current status of the KRB system are as shown below.

Monitoring Sheet for Current Status of KRB System
(Subject of Monitoring: KRB)

Respondent(s): **Job Title(s):** **Date:**	
Questions	**Answers**
<u>Staffing & Infrastructure Issues</u> 1. Is the number of staff sufficient to carry out KRB's prescribed duties? If not, how much more and what type of staff do you think are necessary?	
2. Is there a system for hiring staff at KRB to ensure that the best qualified personnel are employed? For example, are remuneration packages competitive with the private sector?	
3. Are the current offices for KRB sufficiently large enough to carry out its duties unhindered?	
4. Is the number of computers and computer peripherals sufficient for KRB staff to carry out their duties? If not, what is the amount and type of equipment you need?	
5. Is the amount and performance of telecommunications and networking equipment (such as telephones, faxes, LAN	

servers, etc.) sufficient?	
Computer Software & Data Issues 6. Has the necessary road condition and traffic data for prioritizing road maintenance works been collected? If not, when will this be carried out?	
7. Has a computer system been developed to store and analyze road condition and traffic data?	
8. Is there a plan for the systematic updating of the above-mentioned data?	
Standardization Issues 9. Has the format for **work plans** been standardized? If not, when will this be done?	

10. Are the methods for the calculation of budgets for the work plans standardized? If not, when will this be done?	
11. Have road design standards been established?	
12. Are the contractual documents for hiring private contractors by road executing agencies standardized? If not, when will this be done?	
Financial Issues 13. At present only the 16% of the RMLF to be equally allocated to constituencies is being distributed? When will the remaining 24% be available for distribution?	
14. When the remaining 24% becomes available, does KRB have a system for the equitable distribution of these funds to the districts? If so, what is it?	
15. At present, funds for RD and the DRCs go into the same account. Are there any plans to put these into separate accounts? Is so, when? If not, why?	

16. When will it be possible to have KRB funds deposited into a private account instead of the Central Bank so interest can be earned on said funds?	
17. Is it possible for KRB to prevent the funding of ongoing rehabilitation projects signed up by the MORPW?	
18. Cannot representatives from MOLG and the city councils sit on the DRCs in order to have their financial interests adequately represented?	
Performance Issues 19. Are technical audits being carried out? If so, have any problems been encountered? If not, what is the reason?	
20. Are financial audits being carried out? If so, have any problems been encountered? If not, what is the reason?	

21. Are there any structural aspects of the current KRB system that needs urgent fixing in order for the KRB to function in the businesslike manner as originally intended?	
22. If you were to rate the present performance of the districts in the execution of their duties on a scale of 1 to 10, with 10 being the best score, how would you rate them on average?	
23. If you were to rate the present performance of the KRB in the execution of its duties on a scale of 1 to 10, with 10 being the best score, how would you rate it?	

Legal Issues 24. When will the legal status of the DRCs be settled so that they can receive funds directly from KRB?	
25. Is it possible to have MOLG transfer a portion of their LATF funds intended for roads in exchange for a role in the KRB system?	
26. When and how will the legal status of KWS in regards to receiving KRB monies be solved?	

Monitoring Sheet for Current Status of KRB System
(Subject of Monitoring: District Roads Committee)

Interviewee(s): **Job Title(s):** **Location:** **Date:**	
Questions	**Answers**
<u>Funding Issues</u> 1. What does the DRC think about the 24% due to DRCs but that is being held back by the MORPW to pay for a backlog of MORPW work?	
2. Is the remaining 16% of the 40% of KRB funds due to DRCs being distributed without any problems?	
3. What is your opinion on DRC and RD monies being deposited into the same bank account?	
4. Is the money for DRC overhead sufficient? If not, how do you think it should be calculated?	

Staffing & Facility Issues 5. How are the 2 co-opted members from the local community chosen by the DRC?	
6. Has the DRC hired/obtained all the staff as recommended under the KRB framework (i.e., 1 DRE, 1 DRE assistant, 1 road inspector, 2 secretaries, 2 accountants, and 4 support staff)?	
7. Is there any plan to incorporate the DRE of MORPW as a DRC engineer in the near future? If not, why?	
8. Are committee members of the DRC paid for their work? If so, What is the payment scheme?	
9. Are there facilities for the DRC to operate? If so, are they sufficient?	

Sub-agency Issues 10. Is the DRC considering the use or creation of a sub-agency instead of relying on the MORPW and/or city council to execute maintenance work?	
11. If the answer to Question 7 is yes, when and how does the DRC intend to do this?	
Work Prioritization 12. Is there a method for prioritizing road maintenance work rationally? If so, what is it? If not, why and are there any plans to implement such a method?	
Performance Issues 13. If you were to rate the present performance of your DRC in the execution of its duties (which covers the drawing up of sound road maintenance plans) on a scale of 1 to 10, with 10 being the best score, how would you rate it on average?	

14. If you were to rate the present performance of the KRB in the execution of its duties on a scale of 1 to 10, with 10 being the best score, how would you rate it?	
15. Do you think that the KRB system will result in your roads being better maintained as compared to the situation before its creation? If so, why?	

Monitoring Sheet for Current Status of KRB System
(Subject of Monitoring: District Works Office of MORPW/City Council)

Interviewee(s): **Job Title(s):** **Location:** **Date:**	
Questions	**Answers**
<u>Issues Regarding Role of DREs</u> 1. Is the DRE's role regarding the maintenance of roads under the KRB clear to you? If not, what is unclear to you?	
2. What role is the DRE currently playing in regards to road maintenance under the KRB?	
3. What do you think the DRE's role ideally should be in maintaining roads under the KRB?	
<u>Maintenance Manual Issues</u> 4. Has the district works office been instructed to use the road maintenance manuals developed by JICA? If so, by whom and when?	
5. If the answer to Question 4 is yes, is the district works office using the road maintenance manuals in the field?	

6. If the answer to Question 4 is yes, are there any major aspects of the road maintenance manuals that the district works office are unhappy with?	
7. Are maintenance works being inspected in a timely manner to ensure that they are in accordance with specifications? If so, who is carrying out the inspections?	
Work Plan Issues 8. When drawing up work plans, does the DRE use pre-determined formula to calculate costs for maintenance activities?	

9. Are the descriptions and unit rates for work plans standardized?	

10. When drawing up work plans, is the DRE aware of the budget that is available to him/her? If so, does the DRE draw up plans within the budget allotted?	
11. Is there a method for prioritizing road maintenance work rationally? If so, what is it? If not, why and are there any plans to implement such a method?	
Data Issues 12. Does the DRE collect road condition and traffic data on a regular basis?	

13. Does the DRE have a computer system to store road condition and traffic data? If so, is this data passed onto the MORPW's headquarters and to whom?	
14. Is there a plan for the systematic updating of the above-mentioned data?	
Work Execution & Auditing Issues 15. Under the framework of the KRB, DRCs are only responsible for D and E Class roads, as well as for special purpose roads and unclassified roads. Is the DRE adhering to this? If not, why?	
16. Does the DRE receive his orders from the DRCs or the MORPW when executing his work for DRC roads?	
17. Are the DREs having any problems in the execution of their work due to working for two different organizations (i.e., the DRCs and MORPW)?	

18. Are DREs using private contractors to carry out any of their maintenance works? If so, are they using standardized contract forms?	
19. Does the district works office use a set of standards to execute design/construction work? If so, where are they from?	
20. Have financial and technical audits been carried out by the KRB? If not, who is carrying out your financial and technical audits and when were the last ones?	
21. In regards to execution, what aspects of the current road maintenance system do you think need the most urgent attention?	

Performance Issues 22. Is the district works office satisfied with the performance of the mechanical and transport workshop? If not, what do you think should be done?	
23. If you were to rate the present performance of your district works office in the execution of its duties on a scale of 1 to 10, with 10 being the best score, how would you rate it on average?	
24. If you were to rate the present performance of the KRB in the execution of its duties on a scale of 1 to 10, with 10 being the best score, how would you rate it?	

Monitoring Sheet for Current Status of KRB System
(Subject of Monitoring: Provincial Works Office of MORPW)

Interviewee(s): **Job Title(s):** **Location:** **Date:**	
Questions	**Answers**
Issues Regarding Role of PRE 1. Is the PRE role regarding the maintenance of roads under the KRB clear to you? If not, what is unclear to you?	
2. What role is the PRE currently playing in regards to road maintenance under the KRB?	
3. What do you think the PRE role ideally should be in maintaining roads under the KRB?	
Maintenance Manual Issues 4. Has the provincial works office been instructed to use the road maintenance manuals developed by JICA? If so, by whom and when?	
5. If the answer to Question 4 is yes, is the provincial works office checking to make sure that the road maintenance manuals are being used in the field?	

6. If the answer to Question 4 is yes, are there any major aspects of the road maintenance manuals that the provincial works office is unhappy with?	
7. Are maintenance works being inspected in a timely manner to ensure that they are in accordance with specifications? If so, who is carrying out the inspections?	
Work Plan Issues 8. When drawing up work plans, does the PRE use pre-determined formula to calculate costs for maintenance activities?	
9. Are the descriptions and unit rates for work plans standardized?	
10. When drawing up work plans, is the PRE aware of the budget that is available to him/her? If so, does the PRE draw up plans within the budget allotted?	

11. Is there a method for prioritizing road maintenance work rationally? If so, what is it? If not, why and are there any plans to implement such a method?	
Data Issues 12. Does the PRE collect road condition and traffic data on a regular basis?	
13. Does the PRE have a computer system to store road condition and traffic data? If so, is this data passed on to MORPW's headquarters and to whom?	

14. Is there a plan for the systematic updating of the above-mentioned data?	
Work Execution & Auditing Issues 15. Under the framework of the KRB, the PRE is supposed to be responsible for A, B, and C Class Roads. Is the PRE adhering to this? If not, why?	
16. How does the PRE handle directives from the KRB?	
17. Is the provincial works office using private contractors to carry out any maintenance works? If so, are standardized contract forms being used?	
18. Does the provincial works office use a set of standards to execute design/construction work? If so, where are they from?	

19. Have financial and technical audits been carried out by the KRB? If not, who is carrying out your financial and technical audits and when were the last ones?	
20. In regards to execution, what aspects of the current road maintenance system do you think need the most urgent attention?	
Performance Issues 21. Is the provincial works office satisfied with the performance of the mechanical and transport workshop? If not, what do you think should be done?	

22. If you were to rate the present performance of your provincial office in the execution of its duties on a scale of 1 to 10, with 10 being the best score, how would you rate it on average?	

23. If you were to rate the present performance of the KRB in the execution of its duties on a scale of 1 to 10, with 10 being the best score, how would you rate it?	