



AFCAP



Preparatory Activities for Transformation of the MTRD into a Transport Research Centre / MTRD Strategic Plan for Building Research Capacity to support Transport and Infrastructure Development and Maintenance PART A

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Launched in June 2008 and managed by Crown Agents, the five year-long, UK government (DFID) funded project, supports research and knowledge sharing between participating countries to enhance the uptake of low cost, proven solutions for rural access that maximise the use of local resources.

The programme is currently active in Ethiopia, Kenya, Ghana, Malawi, Mozambique, Tanzania, Zambia, South Africa, Democratic Republic of Congo and South Sudan and is developing relationships with a number of other countries and regional organisations across Africa.

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List of Abbreviations

AFCAP African Community Access Programme
AfDB African Development Bank
AFD Agence Française de Développement
CB Capacity Building
CER Chief Engineer Roads
DANIDA Danish International Development Assistance
DG Director General
DP Development Partner
EC European Commission
EDF European Development Fund
EDMS Electronic document Management System
EIA Environmental Impact Assessment
Eoi Expression of Interest
ERB Engineers Registration Board
EU/EUD European Union/European Union Delegation
GDP Gross Domestic Product
GIS Geographic Information System
GoK Government of Kenya
HDM4 Highway Development and Management Version 4
HMMS Highway Maintenance Management System
ICBTRS Institutional Capacity Building to the Transport/Road Sector in Kenya
ICT Information and Communication Technology
IDA International Development Association
ILO International Labour Organisation
INTP Integrated National Transport Policy
iRAP International Road Assessment Programme
JICA Japan International Cooperation Agency
KeNHA Kenya National Highways Authority
KeRRA Kenya Rural Roads Authority
KfW Kreditanstalt für Wiederaufbau, German Development Bank
KIHBT Kenya Institute of Highways and Buildings Technology
KRB/KRBF Kenya Roads Board/Kenya Roads Board Fund
KRC Kenya Railways Corporation
KSh Kenya Shillings
KURA Kenya Urban Roads Authority
LVSR Low Volume Sealed Roads
MIS Management Information System
MoF Ministry of Finance
MoLG Ministry of Local Government
MOTI Ministry of Transport and Infrastructure
MoRPW Ministry of Roads and Public Works
MTD Mechanical and Transport Department
MTRD Materials Testing and Research Department
NCA National Construction Authority
NEMA National Environment Management Authority
NRSAP National Road Safety Action Plan

NRSC National Road Safety Council
NTSA National Transport Safety Authority
NUTRIP Nairobi Urban Transport Improvement Project
PPP Public Private Partnership
PS Principal Secretary
QA Quality Assurance
QC Quality Control
RACECA Road and Civil Engineers Contractors Association
RFP Request for Proposals
RICS Road Inventory and Condition Survey
RMI Road Maintenance Initiative
RMLF Road Maintenance Levy Fund
RMMS Road Maintenance Management System
RNMS Road Network Management System
R2000 Roads 2000
RSIP Road Sector Investment Programme
SAGA Semi-Autonomous Government Agency
SIDA Swedish International Development Agency
TA Technical Assistance
ToR Terms of Reference

1. INTRODUCTION

The Materials Testing and Research Department (MTRD) of the newly-formed Transport and Infrastructure Ministry is developing a framework for their **transformation to a Transport Research Centre**; and priority activities based on their mandate and the Strategic Plan (AFCAP Report on Development of Low Volume Roads Research Capacity in Kenya, March 2013), prepared under AFCAP/KEN/089G activities. This project is **an extension** to that work and is referred to as PHASE 1. It is funded by the Africa Community Access Programme (AFCAP) a research programme funded by the UK government's Department for International Development (DFID).

1.1 Background and objective

To underpin Kenya's expected growth an efficient road and transport network is required for improved access to support all key sectors of the economy. It is recognised that research is required both to **inform and develop policy** and also has a critical role in the development and efficient management of transport infrastructure.

The Kenyan Government Coalition's Manifesto for Transforming Kenya (2013 – 2017) sets out an agenda for *Transport & Infrastructure – A 21st Century Transport & Infrastructure System*. The challenge set is to deal with an aging road and rail network in order to improve accessibility, trade activities, freight and safety. The solutions identified include:

- Reforms of the road Authorities and Departments
- Devolution of management of rural roads to the Counties
- Programme of upgrades to the major road network
- Strengthen trans-national corridors
- Improvements rail, marine, inland water and aviation transport

Under current reforms, it is proposed to establish a **National Transport Research Institute** which would support the following modes:-

- Road transport
- Rail transport
- Maritime and inland water transport
- Air transport, and
- Non-Motorised and Intermediate Means of Transport (NMIMTs).

In addition to developing research strategies to address requirements of the Manifesto, MTRD would address research strategies in support of the Integrated National Transport Policy (2009). *'Transport research is required to inform not only policy formulation, but also in monitoring and evaluation of the various intervention strategies. It is therefore necessary to undertake research on the outcomes of the intervention strategies, the impact of transport on the economy and environment, transport safety and security, land use and transport, people attitudes and behaviour patterns in relation to transport, industry and transport, transport logistics, modernization of public transport amongst other issues. In Kenya, there is lack of a focal point to facilitate such research. In addition, there is need for dissemination of research findings to the relevant stakeholders'* (INTP 2009).

The principal Agencies, Departments and Authorities comprise:

Roads

- KeRRA
- KURA
- KeNHA
- Kenya Roads Board
- KIHBT
- Mechanical and Transport Department
- Roads Department

Air

- Air Transport Department
- Kenya Airports Authority
- Kenya Civil Aviation Authority
- Air Accident Investigation Department

Marine and Inland Waterways

- Kenya Ports Authority
- Kenya Ferry Services
- Kenya Maritime Authority
- Kenya National Shipping Line
- Maritime and Shipping Department

Rail

- Kenya Railways Corporation
- Railway Development authority

Others

- National Transport & Safety Authority
- Ministry of Finance

MTRD intends to strengthen its core skills and research delivery and to evolve into a transport institute that will be recognized internationally as a centre of excellence. The long term outcomes of implementation of research findings is expected to **deliver more durable roads and transport, lower transport operating costs, shorter travel times, lower accident and fatality levels, improved designs and standards for construction and maintenance, and more efficient and cost effective operations.**

Report Objective

Review and update MTRD's strategic plan for Research Capacity to support transport and infrastructure development and maintenance (produced in AFCAP Report on Development of Low Volume Roads Research Capacity in Kenya, March 2013, prepared under AFCAP/KEN/089G activities).

2. APPROACH AND METHODOLOGY

2.1 Approach

The approach of this Technical Assistance programme is to bring specific experience from other government programmes and from national research institutes to inform the process and to incorporate priorities emerging from the Government Manifesto *Transforming Kenya (2013 – 2017)*.

2.2 Methodology and Scope

The main theme is the Development of MTRD strategy for Transport Research Capacity and comprises the following activities:

ID	RESULT AREA / ACTIVITY
1	Development of MTRD strategy for Transport Research Capacity
1.1	Review and update MTRD's strategic plan for research capacity building to support transport and infrastructure development and maintenance in the light emerging policies and priorities from MOTI, AFCAP 2 and also in relation to the EU TA programme which is currently supporting MTRD on the following: <ul style="list-style-type: none">• Review of Design Manuals• Low volume seals pavement design manuals• Urban design guidelines• Economic appraisal• Research database
1.2	Identify funding option components, actions and programme for implementation MTRD plan to approach a number of funders for the institutional components, for specific projects, for capacity building and training and for equipment/facilities. In addition, MOTI will be directly funding its own programme. A broad roadmap of current funding arrangements is needed so that a plan of action can be developed in Phase 2.

3 STRATEGIC PLANNING FOR RESEARCH TO INFORM POLICY

3.1 Context

Kenya Vision 2030 sets out the country's aims to become a newly industrialised country providing a high quality life for all citizens. The country's GDP is expected to grow at an annual rate of 7 to 10%. To underpin this growth an efficient transport network is required for improved access to support the key sectors of the economy. The percentage share of Transport

Sector contributed by road sub-sector has averaged 64% over the four years to 2010. Air transport is the only other dominant mode at close to 20%. Rail is the main competitor for overland freight transportation, but its average share does not usually exceed 1% due to cumulative under-investment. Transport Services accounts for about 10%. Road transport accounts for about 93% of all freight and passenger traffic in Kenya. Roads are key enablers for economic, social and political development.

It has been recognised that research has an increased role in the development and management of the infrastructure. It is expected that more focussed activities will provide the basis for improving the long term capacity to undertake relevant, high quality, research that will assist Government develop evidence-based policy and programmes and also assist in the process of evaluation and monitoring to provide continual improvement in the transport sector.

The long term outcomes of implementation of research findings is expected to deliver more durable infrastructure, lower vehicle and stock operating costs, shorter travel times, lower accident and fatality levels, improved designs and standards for construction and maintenance, and more efficient and cost effective operations.

3.2 Assisting Development of Transport Policy

The Integrated National Transport Policy (INTP, 2009) sets out the agreed roadmap of policy development of the different transport modes which is being used to inform policy formulation.

Relevant Strategic Theme priorities comprise:

- A. Develop and manage transport infrastructure to facilitate efficient movement of goods and people whilst ensuring environmental sustainability
- B. Research and development for an efficient transportation system
- C. Develop and enforce regulations and standards for safe, secure and efficient transport systems
- D. Mobilise resources and capacity building.

The INTP sets out critical issues and policy for Transport Research and Development, as follows:

- **Critical Issues**

Transport research is required to inform not only policy formulation, but also in monitoring and evaluation of the various intervention strategies. It is therefore necessary to undertake research on the outcomes of the intervention strategies, the impact of transport on the economy and environment, transport safety and security, land use and transport, people attitudes and behaviour patterns in relation to transport, industry and transport, transport logistics, modernization of public transport amongst other issues. In Kenya, there is lack of a focal point to facilitate such research. In addition, there is need for dissemination of research findings to the relevant stakeholders.

- **Policy**

The GoK will establish a National Transport Research Institute to undertake research into aspects of transport and encompass all modes and will further provide appropriate incentives for the private sector to invest in transport research and development.

The critical issues for the various modes are identified as:

RAIL TRANSPORT

To achieve safe and effective rail service delivery, there is need to undertake research to support the development of a sustainable rail transport system. Railways currently do not have research facilities the materials, equipment and operations and for studying human behaviour.

MARITIME TRANSPORT

Development of the maritime transport industry in Kenya has been hampered by lack of research and development systems. Research and development is an important component of any modern maritime transport industry and further complements the preservation of the marine environment.

INLAND WATERWAYS TRANSPORT

Inland waterways transport system requires research on appropriate infrastructure and operational systems. Research is also required to undertake hydrographic and survey studies to develop charts that can be used for operations on a lake.

AVIATION

Effective operation and management of the aviation industry, including the formulation of policy requires adequate statistical data and information which is currently lacking.

3.3 Institutional Setting and Reform

The current institutional framework of the roads subsector is under review. Three existing Authorities - representing Rural Roads, Highways and Urban Roads; and a Roads Board are responsible for the management and development of the various road classes, reporting to the Principle Secretary (Infrastructure).

Four functional Departments and an Institute perform complimentary activities, as follows:

- Materials Testing and Research Department (MTRD)
- Roads Department
- Quality Assurance Department (QAD)
- Mechanical and Transport Department (MTD)
- Kenya Institute of Highways and Buildings Technology (KIHBT)

Reforms under consideration are transformation of MTRD, KIBHT and MTD into Semi-Autonomous Government Owned Entities (GOE's) in order to efficiently provide services to a Roads Authority and to the private sector.

3.4 Research to Support Government Road Targets

Specifically, in relation to roads, the Government targets are:

- Increase the paved network from the current 11,000km (7%) to 24,000 (15%) including 8,000km of LV roads, in five years using modern development instruments such as concessions, PPP, BOT and toll and maintenance arrangements

- Develop the necessary policies to ensure safety of all transportation systems with an emphasis on road safety
- Rehabilitate existing roads and open up new areas
- Upgrade unpaved road networks to make them accessible to motor vehicles.

The transport research centre will need to implement research to address these specific requirements.

3.5 Regional Research Hub

Significant changes are taking place throughout Africa in how research is carried out and implemented. Government research Institutes or units are currently under development in Ethiopia, Mozambique, and South Sudan as well as South Africa; and are being considered for Uganda, Tanzania and Ghana.

As part of a regional research initiative, plans are being considered to establish regional research hubs and Kenya is extremely well placed to take on that role for East Africa.

3.6 Vision and Mandate of MTRD Relating to Roads

The current vision of MTRD is ***“To be a world class institution for testing and research on roads and other infrastructure”*** while the mission is ***“To facilitate development of quality roads and other infrastructure through testing, research and advise on construction materials, methods and delivery options”***. It is responsible to the Principal Secretary (Infrastructure), MOTI.

The current MTRD Strategic Plan (2011/2012 – 2015/2016) has been developed in line with Kenya’s Vision 2030, Millennium Development Goals, and the Strategic Plans of the previous Ministry of Roads. The implementation of this strategic plan is based on the philosophy of customer and stakeholder participation, good governance and a professional approach to doing business. It provides oversight and regulatory role to all road Agencies and players in the Roads subsector and to some extent the broader infrastructure sector.

Three Authorities currently have a legal mandate to manage, develop, rehabilitate and maintain the road network in Kenya as follows:

a. Kenya National Highways Authority (KeNHA) responsible for the national road network (Class A, B and C roads) with a total length of about 14,000 km
b. Kenya Rural Roads Authority (KeRRA) responsible for the rural road networks (Class D, E and unclassified roads) totalling about 136,375 km.
c. Kenya Urban Roads Authority (KURA) responsible for road networks in cities and municipalities (Class UA, UC and UL), with a total length of about 15,000km.

The MTRD is charged with the responsibility of research and testing materials for quality and standard compliance both for Government and Private sector construction and Industry. Specifically, MTRD’s mandate is testing and research on roads and building construction materials, road pavement design and construction specifications, construction quality control and assurance, and post construction evaluation of roads and other infrastructure. The mandate of the Department is delivered through the following core functions:

- a) Provision of laboratory and testing facilities for:
 - (i) Geological and geotechnical investigations;
 - (ii) Geospatial surveys;
 - (iii) Hydrological surveys and hydraulic studies;
 - (iv) Traffic surveys and studies;
 - (v) Prospecting, examination and testing of construction materials;
 - (vi) Construction quality control; and
 - (vii) Post-construction monitoring and evaluation of roads, bridges, buildings and other connected civil works including Non-Destructive Testing;
- b) Testing, calibration, and verification of precision instruments, gauges, scientific apparatus, and other laboratory and field measurement equipment to ensure compliance with the provisions of both the Standards Act and the Weights and Measures Act;
- c) Certifying civil engineering laboratory technicians;
- d) Vetting of pavement designs for road upgrading, reconstruction, rehabilitation and strengthening works by roads authorities;
- e) Construction quality control oversight on public roads including post construction evaluation of completed works;
- f) Monitoring functional and structural performance of road pavements including axle load and pavement condition surveys on all public roads to facilitate preparation of public investment and annual works programmes by other road agencies;
- g) Maintenance of pavement construction and maintenance data base for public roads;
- h) Research on road development, maintenance, and operations including research on new construction materials, construction methods and road safety studies;
- i) Undertake collaborative research activities in liaison with other local and international organizations;
- j) Disseminate research undertakings and findings;
- k) Development and review of materials testing standards, road design manuals and standard specifications for construction and maintenance of roads in conjunction with other roads authorities and stakeholders;
- l) Provide materials testing and consultancy services at nominal charges to other government Departments, roads authorities and the public; and
- m) Advise the government on road construction, maintenance and operation standards, on physical, chemical and engineering characteristics of materials and on materials usage.

Its strategic goals are:

- 1 Quality Assurance
- 2 Research and Consultancy
- 3 Institutional Capacity
- 4 Financial Sustainability

Its strategic objectives are:

- Ensure prolonged road pavement life
- Ensure compliance with Structural integrity of buildings and bridges
- Enforce value for money in construction of roads and bridges
- Identify areas of research and innovations methods
- Establish a resource centre for technical knowledge.
- Provide consultancy services to the building and construction industry
- Expand and upgrade material testing facilities
- Expand and upgrade ICT systems
- Attain and retain optimum HR levels
- Transform the Department into SAGA
- Establish Materials Testing and Research Fund
- Establish resource mobilization mechanisms

The MTRD is to become a semi-autonomous Agency as part of the government transformation proposals and has a draft Legal Notice to this effect.

The following research and testing functions are considered to be constituent parts to build capacity:

Provide modern and comprehensive materials laboratory for the testing of materials used in road works
Provide in-house capacity for comprehensive materials investigations and geotechnical investigations required for road works, road condition investigations and analysis of pavement and surfacing failures
<p>Become a leading institution dedicated to research on matters related to roads in Kenya, including road policy, road transport, road asset management, road design, construction, maintenance and operation. Such research will be carried out in a number of ways, including:</p> <ul style="list-style-type: none"> ➤ Outsourced to academic institutions ➤ Through local and international consultants ➤ In collaboration with other national, regional and international research centres ➤ In-house
Provide services for quality control of construction projects
Undertake independent Technical Audits of selected road projects where quality is suspected to have been compromised
Develop and verify new design and operational standards for the use of materials, maintenance systems, road transport sector regulations etc.

MTRD is a functioning Department providing many of the services set out above. Its has a particular focus on Low Volume roads for all the road sectors because the vast majority fall into this category. MRTD is being asked to respond to a very ambitious road building and rehabilitation programme and wishes to research new methods of design, construction and maintenance.

3.7 Existing Road Challenges and Priorities

Kenya has a public road network of 160,886 km of which 61,946km is currently classified while 98,940 km is unclassified. The Second Medium Term Plans (2013 – 2018) sets out substantial step change targets for construction, rehabilitation and maintenance compared with the First Medium Term Plan. The funds currently available for development and maintenance of roads are inadequate; therefore a substantial part of the road network is not sufficiently attended to, resulting in a huge maintenance backlog.

Other challenges to accelerated road and related economic development are:

- **Capacity Challenges:** Currently, there are capacity challenges relating to institutions, technical know-how within the sub-sector and contractors.
- **Axle Load Control:** The mechanism for controlling axle load is weak, leading to damage to the roads.
- **Road Reserves:** Encroachment on road reserves and drainage way leaves interferes with the development and maintenance of roads.
- **Land acquisition for road construction:** The cost of land is too high in comparison with the cost of the road construction.
- **Legal Framework for Private Sector Participation:** The legal framework for private sector participation in the roads subsector is inadequate.
- **Roads Construction Plant and Equipment:** The plant and equipment currently available for hire by contractors and roads agencies are inadequate, hence delays in road construction and maintenance.

Priorities, therefore, to achieve the above policies and programmes are:

- **To reduce transport costs and travel time** by improving the condition of national trunk roads and county roads;
- **To optimize use of available resources** by the devolved government in the development, rehabilitation and maintenance of roads
- **To enhance capacity** for local contractors
- **To find new ways to construct and maintain roads** at significantly reduced rates
- **To maximise effective use of existing natural material resources**
- **To build research capacity** and speed up implementation of research outputs.

The concept of **green economy** is addressing climate change, natural resource depletion, loss of bio-diversity and inequalities. Various international development agencies including UNEP, UNDP, UN DESA, World Bank and OECD are articulating and advocating for a transition to a green economy. Kenya is a signatory and a party to many multilateral environmental agreements (MEAs) that support aspects of green economy including the Kyoto Protocol, United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and the UN Convention to Combat Desertification (UNCCD). Kenya is also implementing other international development commitments like Agenda 21 and the MDGs that support environmental protection and sustainable development. Kenya has developed a national climate change response strategy and seeks to embrace a low-carbon development pathway that is inclusive and equitable, and contributes to Kenya's global competitiveness. Two key Climate Change themes are relevant to Kenya roads:

- **Adaptation** – of road infrastructure to extreme weather events and affects

- Mitigation – move to more sustainable transport options, particularly public transport



Extreme climate events are causing damage to infrastructure

Climate Change in the Transport Sector is not well understood and the associated actions not well known. There are reasonably well developed international adaptation and mitigation practices that can be applied to improve the situation. These include:

- Creation of awareness, understanding and knowledge
- Improved integration of climate data and projections into transport and road planning
- Need for modelling impacts leading to cost-benefit analysis
- Need for risk assessments and vulnerability maps
- Implementation of emergency response programmes for extreme events
- Develop adaptation frameworks
- Produce guidance on mitigation measures
- Cover sustainable transport and mobility
- Modify institutional setting to accommodate climate issues
- Performance, monitoring and evaluation

4 STRATEGIC RESEARCH NEEDS FOR ROAD STAKEHOLDERS

Consultations with relevant stakeholders reported in the AFCAP LV Roads Research Report (March 2013) and the EU ICBTRS Inception Report (May 2013) give a consistent set of R & D needs across all Departments, Boards, Authorities and others. A list of those consulted is given as Appendix 1. Priorities identified from both the AFCAP and ICBTRS projects are set out below. For the most part, needs are aligned with current and emerging policies and priorities for MOTI. MTRD derives its priorities from MOTI requirements but takes into account the specific needs of the Road Authorities.

The following is a summary of R & D stakeholder needs from the EU and AFCAP reviews:

4.1 KeRRA

KeRRA's mandate is rural LV roads, however, all the Road Authorities have a significant proportion of LV roads under their control. By and large, all the main Road Authorities research needs are reflected in KeRRA's research priorities.

KeRRA's Board and senior management set out its Research Policy (2010) ranked in priority research topics as follows:

Research Topic	Priority Ranking	Possible Sources of Research Expertise and Funding
Construction Research		
Labour-based technology	1 st priority	ILO, SIDA, KIHBT
Alternative Surfacing and low cost seals	2 nd priority	CSIR, AFD, AFCAP, MT&RD, JKUAT, UoN
Use and field testing of local materials	3 rd priority	EU, SIDA, AFD, MT&RD, JKUAT, UoN
Chemical treatments	4 th priority	CSIR, MT&RD, JKUAT, UoN
Maintenance Research		
Road Maintenance Management System (RMMS) development	1 st priority	SIDA, EU, WB, KRB, SSATP
Maintenance for basic access	2 nd priority	WB, AFCAP, SSATP
Earth road maintenance	3 rd priority	SIDA, EU, WB, KRB, SSATP
Management Research		
Management of contracts	1 st priority	EU, SIDA, WB, SSATP
Accessibility planning	2 nd priority	ILO, AFCAP
Project management	3 rd priority	EU, SIDA, WB, SSATP
Contracting procedures	4 th priority	EU, SIDA, WB, SSATP
Human Resource development	5 th priority	EU, KIHBT
Socio-economic Development Research		
Non-motorised intermediate means of transport	1 st priority	AFCAP, IFRTD, M&TD
Socio-economic impacts	2 nd equal priority	AFD, EU, KfW, AfDB, WB
Interaction between transport and health	2 nd equal priority	DPs, NACC, AFCAP
Environmentally friendly rural road works (including climate change)	2 nd equal priority	SIDA, NEMA
Road safety	3 rd priority ¹	NRSC, IPAR, KIPPRRA, DFID
Planning and Design Research		
Geographical Information Systems	1 st priority	CSIR, SIDA, AFCAP, JKUAT, UoN
Modelling (including data and management systems and design guides)	2 nd priority	CSIR, SIDA, AFCAP, JKUAT, UoN, WB
Socially Sensitive Alignment	3 rd priority	SIDA, AFCAP, JKUAT, UoN, SSATP
Drainage	4 th priority	SIDA, AFCAP, JKUAT, UoN

Those priorities highlighted in yellow are considered to be highest priorities currently.

KeRRA's Strategic implementation Plan contains the following relevant Objectives and Strategies to achieve its goals:

OBJECTIVE 2: Planning for design, Construction, Maintenance and Management of the Rural Road Network for sustainable, socio-economic development

Prepare a rural road assets and condition survey

Establish a Traffic Data Base

Mapping and Demarcation of Road reserves

Development of new roads construction technologies to conserve natural construction materials

Develop and implement axle load management regulations

Road safety

OBJECTIVE 3: Design, Construct and Rehabilitate Rural Roads to reduce transport cost and journey time for faster socio-economic development

Design of prioritised roads

Construct new roads (upgraded to bitumen)

Reconstruct/Rehabilitate dilapidated roads

Design & Construction of Bridges and other Drainage Structures

Research and development

OBJECTIVE 4: Maintenance of entire Rural Road Network to support accessibility to all production, market and social centres for enhanced economic growth

Routine and Periodic Maintenance of the roads network

Implement the Roads 2000 Strategy

Its R & D priorities therefore include:

Low Cost Seals for LV Roads and for Periodic Maintenance

- Continue to develop new low-cost seals approaches and to build experience through a range of trials.

DCP Pavement Design Manual - Implementation activities

- Establish a programme of implementation activities around the DCP Pavement Design Manual including intensive training and development of related documents (standard bidding documents, specifications, etc)

Cold Mix Periodic Maintenance Research and Design Actions

- These actions support the Strategic Target of periodic maintenance for 1,000km
- A programme of funded research projects is required to adapt the Kenyan DCP Design Manual to be used for LV sealed roads using cold mix principles for periodic maintenance
- Production of resultant manuals and guides for periodic maintenance
- Trials and case studies
- Adoption by Government and training of staff, consultants and contractors

Prioritise Research Budgets for Regional Programme

- Engaging with Funders and Donors to implement research activities, capacity building and implementation of outcomes (AFCAP, KRB, WB, EuroAid, EDF 10, ROADS 2000, KFW, Finland)
- Training and capacity building for Counties
- Seek to establish rollout of LVR Research programme outputs for:
 - Western Kenya
 - Different soils
 - Counties

Labour-Based Technologies

To pioneer and to optimise improvements in labour-based technologies using international best practice approaches.

Databases

To develop more comprehensive and representative data and to collaborate with MTRD on its collection, maintenance, modelling and evaluation.

Materials Databases

To collaborate with MRTD to build and maintain a national inventory of materials resources and data.

Road Asset Management System

The system will require systematic regular data collection on the road network's pavement condition, traffic, extent, location etc. It will also require a computerised pavement management system (e.g. based on HDM-4) that allows analysis several years ahead. Such a system will be used by MOTI, MTRD, KRB and Authorities each drawing information from it to aid its decisions and feeding back into it

Assess need for Climate Change Adaptation Strategies

Kenya's road infrastructure is vulnerable to flooding, erosion, landslips and other associated phenomena. Risk assessment and mitigation strategies are commonplace internationally and should be studied for relevance and prioritisation for Kenya. Typical activities comprise:

- Education and awareness training
- Vulnerability assessment of critical infrastructure
- Risk Assessment and Mitigation
- Emergency Response

4.2 KURA

KURA requirements are a mix of research (improved data, guidelines); and operational support (procurement, contracts):

Urban Network Planning and Management

A Road Asset Management System is urgently needed across all RAs. It is a pre-requisite for effective management of the urban road network. There are complex processes that determine

whether urban roads are fulfilling their role in the network. These include land-use changes especially at the periphery of towns and cities, trip decisions, the traffic capacity of existing roads, traffic management, optimisation of signalisation and the coverage of the network. Improved planning tools and traffic information are needed.

Urban Road Design and Environmental Guidelines

There are several Guidelines currently in use by all three Road Authorities. MOTI is updating these and extending the topics and issues covered. There is no specific set of Guidelines that addresses urban road planning, design and provision specifically. Urban roads have specific requirements in terms of geometric design, intersection designs, capacity and safety standards. Network efficiency covers a wider-range of issues and this needs to be captured in dedicated Guidelines and Manuals.

Traffic Management and Signalisation

Traffic management requires effective signal operations situated at appropriate locations. They need to work in a synchronised and predictable manner on the basis of a traffic management plan.

Road Safety

National Transport and Safety Authority (NTSA) has been recently set up and will need to work closely with MTRD, all RAs and any other agencies whose mandate includes the improvement of road safety.

Procurement and Costing

There is a multiplicity of costing methodologies and systems in use which need rationalisation. With regard to urban maintenance and development projects, there are environmental and social safeguards that need to be costed as well as the costs of mitigating traffic disruption, movement etc.

Contracts

Maintenance and improvement contracts currently disrupt traffic, the environment and mobility. Safeguards and standards need to be more rigorous and Contractors need to be encouraged to achieve speedy completion and quality. These aspects are not adequately captured in existing procedures.

4.3 KeNHA

Their requirements tend to focus on improved management, contract and procurement:

Asset Management

- National Road Directory Preparation
- Strategic and Business Planning
- Maintenance Planning and Programming, including Emergency Works
- Reducing Road Accidents and Fatalities

Road Contract options

- Public – Private Partnership model
- Performance - based Contract model
- Model Contract Documents, including MoM, BoQ for FIDIC ‘Method’

Contracts

Management Systems

- Road Maintenance Management System [RMMS] Development
- Road Management System [RMS] Development
- Structures Surveys and Databases
- Construction Materials Directories and Databases

Contract Procurement and Management

- Design Contract Management, including Feasibility Studies
- Standards, Manuals and Specifications Production and Use
- Environment, Social and Gender Impact Studies and Mitigation
- Construction Supervision Management
- Construction Technical Auditing

Quality monitoring and Control

- Construction Quality Monitoring and Measurement
- Quality Assurance, ISO 9001
- Performance Monitoring and Indicator Development

4.4 Key Documents, Reports and Programmes

A description of key relevant documents, policies, plans, guidelines, manuals and projects from Government, MDA's, MTRD, national and International documents that inform and help to prioritise research programmes is set out in Appendix 2.

Road Asset Management Programme

A Road Inventory and Condition Survey (RICS) was carried out of the Class A, B and C roads in 2001 using Geographical Positioning Systems (GPS). The RICS study led to the establishment of a database for classified roads with location data. A road inventory and condition survey for the hitherto unclassified component of the road network and the previously surveyed roads was carried out in 2006 by Kenya Roads Board (KRB). The surveys were undertaken on a district by district basis between May 2007 and April 2009. The surveys included detailed physical road and bridge and other structure data (including pavement surface type, carriageway width, culvert length retaining wall height etc.) and visual condition surveys (classified as excellent, good, fair, poor and very poor). It was shown to consist of 160,886 km of roads. Of these 61,936 km are 'Classified' (A, B, C, D,E, etc.) roads and 98,941 km are 'Unclassified'.

Road condition surveys have been carried out with the categorisation in terms of 'Good', 'Fair', and 'Poor'. Condition within each road class varies greatly with higher class roads having an overall bigger proportion of 'Good' roads than roads in lower functional classes. International Trunk Roads (Class A) appear to be in the best condition and consist of 48% 'Good', 33% 'Fair' and 18% 'Poor'. Thereafter the proportion of road length classified as 'Good' declines fairly consistently for every lower road class - 30% Good for B and C, 12% for E and F and just 6% for Unclassified roads. The average condition of the entire network is 11% 'Good', 33% 'Fair', and 56% 'Poor'. This unsatisfactory situation is mainly due to the fact that the survey includes a large number of unpaved unclassified roads.

The condition of the network is currently now out of date. Each Road Authority (RA) will have up to date information for some roads under its care, however there is concerted effort to capture this data. The KRB GIS system is also not easily accessed by each RA, and is a standalone facility at present housed at KRB.

A new road network condition survey is to be carried out, funded by the WB and managed by KRB. The new survey will update the condition of the already inventoried network (all roads with a RoW greater than 9 m). The survey will also inventory road with a RoW of between 6m and 9m.

5 EXISTING STRATEGIC RESEARCH PLANS AND PROGRAMMES

The current Strategic Plan (2011/12 – 2015/16) sets out the following Goals and associated objectives and actions to respond to Vision 2030 and to achieve its plans:

Goal 1: Quality Assurance

OBJECTIVE 1: Ensure prolonged road pavement life

- Apply specifications and quality control systems*
- Enforce and Audit quality control systems*
- Post construction evaluation of road pavements*
- Monitor pavement and advice on maintenance Interventions*

OBJECTIVE 2: Ensure compliance with Structural integrity of buildings and bridges

- Sensitize the public on quality requirements, the need for involvement of professionals in design, testing and construction works*
- Establish well equipped testing laboratories in the Counties*
- Sensitize Local authorities to review and enforce building by-laws*
- Put in place a monitoring system for bridges in conjunction with the Roads Authorities*

OBJECTIVE 3: Enforce value for money in construction of roads and bridges

- Vet feasibility studies and designs for road construction projects*
- Enforce quality control systems during construction*
- Vet and accredit materials technical staff and quality control systems*
- Post construction pavement evaluation*
- Develop and review of specifications and quality control systems*
- Research on alternative construction materials and advise on cost effective methods*
- Do Construction materials inventory*
- Research on low cost bitumen surface roads*

Goal 2: Research

OBJECTIVE 1: Identify areas of research and innovations methods

- Develop guidelines on the standards to be used in providing the services*
- Build capacity to be able to undertake consultancy*
- Upgrade and renewal of equipments*

OBJECTIVE 2: Establish a resource centre for technical knowledge

- Develop a research policy*
- Establish a research committee*
- Collaborate with other research institutions and Roads Authorities*
- Research on delivery systems*
- Research on low cost bitumen roads*
- Disseminate research findings*
- Collaborate with relevant international renowned research institutions*

Goal 3: Testing and consultancy services

OBJECTIVE 1: Provide consultancy services to the building and construction industry

- Develop guidelines on the standards to be used in providing the services*
- Build capacity to be able to undertake consultancy*
- Upgrade and renewal of equipment*

OBJECTIVE 2: To identify areas of research and innovations methods

- Develop a research policy*
- Establish a research committee*
- Collaborate with other research institutions and Roads Authorities*
- Research on delivery systems*
- Research on low cost bitumen roads*
- Disseminate research findings*
- Collaborate with relevant international renowned research institutions*

OBJECTIVE 3: To establish a regional resource centre for technical knowledge and experience

- Develop a digital data bank*
- Install a wide area network*

Goal 4: Institutional capacity

OBJECTIVE 1: Expand and upgrade material testing facilities

- Acquire relevant publications*
- Refurbish the existing library*
- Install a wide area network*
- Recruit and train technical staff*
- Modernize test equipments*
- Refurbish physical facilities*

OBJECTIVE 2: Expand and upgrade ICT systems

- Improve communication*
- Recruit and training of technical staff*
- Develop and install Pavement Management System*
- Acquire modern and appropriate equipment*

OBJECTIVE 3: Attain and retain optimum HR levels

- Talent attraction, development and retention*
- Improve the work environment*
- Implement performance appraisal system*
- Enhance allowances*
- Outsource unskilled labour*
- Vet materials technical staff in road projects*
- Vet technical staff in private sector*

OBJECTIVE 4: Transform the Department into a SAGA

- Obtain appropriate legal and institutional framework*
- Operationalization of the SAGA*

Goal 5: Financial sustainability

OBJECTIVE 1: Establish Materials Testing and Research Fund

- Development of legal framework*
- Identify sources of funding*
- Review fees and charges base for consultancy and testing services*
- Develop a marketing strategy*

Develop funding mechanism from Road Authorities

Seek improved budgetary allocation from Treasury

OBJECTIVE 2: Establish resource mobilization mechanisms

Review fees and charges for the tests and consultancies

Widen fees and charges base for consultancy and testing services

Develop a marketing strategy

Develop funding mechanism from Road Authorities

Seek improved budgetary allocation from Treasury

5.1 Summary Strategies

The following **summary strategies** are currently being implemented to respond to Vision 2030 and related national and regional development challenges:

- Build capability by establishing a Low Volume Roads Research Centre within MRTD to specialise in delivery of relevant research projects
- Broaden and strengthen delivery of investigations, testing and design capability
- Restructure to align MTRD to more commercial operations
- Strengthen Quality Control services and plan for accreditation/certification activities
- Accelerate recruitment, staff development and training
- Increase efficiency by establishment of state-of-the-art ICT, Knowledge Management and document control systems
- Plan for transformation to a Semi-Autonomous Government Agency Status (SAGA)
- Strengthen regional presence by expanding current 11 regional laboratories to cover the 47 Counties
- Engage with funders and donors to maximise development funding in both short and long term
- Develop cooperation agreements with selected international research institutes and engage experts to provide Technical Assistance
- Set out long term development plans to become an internationally recognised research centre

5.2 Research Priorities relevant to the Strategic Plan

Priority research, development and dissemination programmes comprise:

- Improved technologies and methodologies for investigation, surveys, testing, modeling, monitoring and evaluating performance of roads
- Improved pavement designs for road upgrading, reconstruction, rehabilitation and strengthening works by roads authorities for prolonged life
- Construction and maintenance quality control systems including post construction evaluation
- Maintenance of pavement construction and maintenance data base
- Research on more economic road development, maintenance, and operations including research on new construction materials, construction methods and road safety studies
- Development and review of materials testing standards, road design manuals and standard specifications for construction and maintenance of roads in conjunction with stakeholders

- Database development and research management covering national materials inventory, properties of soils and rocks, roads condition and traffic flows
- Training and capacity building in research and innovation
- Publication and dissemination of research findings.

5.3 Status of research

MTRD carry out an extensive programme of research work relating to Low Volume Roads. The following list demonstrates the scale and breadth:

Research Projects

- Finalisation of Ken42 Study on Low Volume Roads, MTRD, for NORAD/GoK
- Trials on Labour Based Sealed Low Volume Pavements on Makenzie – Kandara Road (D415), Murang’a County, AFD Roads 2000 Project, Phase I, MTRD, for AFD/KeRRA
- Trials on Labour Based Sealed Low Volume Pavements in Meru, Tharake/Nithi, Embu, Machakos and Makuenu Counties under EU/GoK Roads 2000 Programme, Phase III, MTRD, for EU/KeRRA
- Trials on Labour Based Sealed Low Volume Pavements in Kiambu,, Nyandarua, Nyeri, Kirinyaga, Muranga, and Laikipia Counties under AfD/GoK Roads 2000 Programme, Phase II, MTRD, for AfD/KeRRA
- Trials on DCP Pavement Design Methodology in Kiambu, Nyandarua, Nyeri, Kirinyaga, Muranga and Laikipia Counties, MTRD, for AFCAP/KeRRA
- Trials on Sealed Single Layer Pavements for Low Volume Roads, MTRD, for KeRRA/KeNHA
- Study on GCS Stabilisation using Cement, Lime & Hydraulic Binders, MTRD, for IDA/KeRRA
- Study on Hand Packed Stone Pavement and Cobble Stone Surfacing, MTRD, for KeRRA/KURA/KenHA
- Study on Fibreglass Reinforced Polyester For Road Sign Base plates, Posts and Guard Rails, MTRD, for KeRRA/KeNHA/KURA
- Development of Design guidelines for Axle Loads Exceeding 130KN (13 tonnes), MTRD, for KenHA
- Design Manual on LV Roads, BCOM

6 EMERGING MOTI STRATEGIC THEMES

The Ministry is aligning transport and road activities closely together, and MRTD has been asked to develop its proposals for transport research to inform **transport policy**.

6.1 Transforming Kenya

The Kenyan Government Coalition’s Manifesto for Transforming Kenya (2013 – 2017) sets out an agenda for economic growth under three Pillars:

- Unity
- Economy

- Openness

Under the Second Pillar, the Manifesto sets out its agenda for *Transport & Infrastructure – A 21st Century Transport & Infrastructure System*. The challenge set is to deal with an aging road and rail network in order to improve accessibility, trade activities, freight and safety. The solutions identified include:

- Reforms of the road Authorities and Departments
- Devolution of management of rural roads to the Counties
- Programme of upgrades to the major road network
- Strengthen trans-national corridors
- Improvements rail, marine, inland water and aviation transport

Specifically, in relation to roads, the Government will:

- Increase the paved network from the current 11,000km (7%) to 24,000 (15%) including 8,000km of LV roads, in five years using modern development instruments such as concessions, PPP, BOT and toll and maintenance arrangements
- Develop the necessary policies to ensure safety of all transportation systems with an emphasis on road safety
- Rehabilitate existing roads and open up new areas
- Upgrade unpaved road networks to make them accessible to motor vehicles.

The newly formed MoTI agreed future transport strategic themes and KPI's at a Retreat held at Naivasha from 17th to 20th July 2013.

Relevant strategic themes and KPI's comprise:

A. Develop and manage transport infrastructure to facilitate efficient movement of goods and people whilst ensuring environmental sustainability

1. Increase paved road network from 7 to 15% and maintain the road network from present coverage of 40% to 60%.
2. Reduce overall transit time in urban centres by 30%.
3. Develop and implement an integrated information system for transport and infrastructure services.

B. Research and development for an efficient transportation system

1. Research on construction materials and methods with a view to reduce overall infrastructure development costs by 25% in the next 5 years
2. Undertake operational research to identify opportunities to reduce operational costs in the Northern corridor by 25%
3. Undertake research on transport to enhance safety to reduce overall carnage by 50%
4. Carry out research to identify the most efficient financing and implementation of structures to reduce finance costs by 25%

C. Develop and enforce regulations and standards for safe, secure and efficient transport systems

1. Improve safety and security occurrence of transport systems by 50%

D. Mobilise resources and capacity building

1. Increase number of professional skilled persons to 40,000
2. Increase number of trained local contractors to 9000

6.2 Activities and Proposed Budgets

The following table summarises proposed research activities to achieve the objectives and indicators under the Ministry's Theme relating to Research and Development. It also identifies targets and provisional budget requirements to achieve those targets.

THEME B: UNDERTAKE RESEARCH AND DEVELOPMENT FOR AN EFFICIENT TRANSPORT SYSTEM

	Objective	Performance Indicator	Target	Proposed Activities
3.1	To research on construction materials, methods and delivery options to reduce overall infrastructure development and maintenance costs by 25% in the next 5 years	Percentage reduction in overall infrastructure development and maintenance costs	25%	<ul style="list-style-type: none"> Development of research policy to support upgrading of 8,000 km of classified roads in counties to bitumen standards in the next 5 years Finalization of research on Low volume sealed roads and construction of road trials Mapping of natural construction material sources Profiling of subgrade soils along unpaved classified road corridors Research on pavement materials for heavy traffic loading Development and review of manuals and quality control systems Research on technology for Railway development and application for cost optimization
3.2	Undertake operational research to identify opportunities to reduce operational costs in northern corridor by 25% annually	Percentage reduction in operational costs in the northern corridor	25%	<ul style="list-style-type: none"> Research on best practice to improve Mombasa port efficiency through streamlined activities and procedures Research to improve efficiency of airport passengers and freight through administrative streamlining, including customs Traffic studies and pavement condition surveys to advise on maintenance interventions and on alternative routes to enhance route capacity and operation speeds pending dualling of all sections

	Objective	Performance Indicator	Target	Proposed Activities
3.3	Undertake research on transport to enhance safety to reduce overall carnage by 50% in the next 5 years	Percentage reduction in road carnage	50%	<ul style="list-style-type: none"> Develop traffic accident data management and analysis system Study the effect of the surge of motorcycle traffic volume on the existing road capacity and safety Research on the effect of enhancing training on driver and pedestrian behavior in road safety training curriculums. Review road safety provisions in the road design manual and maintenance standards.
3.4	Develop an urban integrated model to reduce transit time by 50% in the next 5 years	Percentage reduction in urban transit time	50%	<ul style="list-style-type: none"> Review public transportation policy for Nairobi and propose changes that promote use of public transport Optimise Railway links with road and air transport for both passengers and freight Review existing urban transport master plans and develop implementation strategy
3.5	Carry out research to identify the most efficient financing and implementation structures to reduce finance costs by 25%	Percentage reduction in finance costs	25%	Assess all infrastructure projects to determine the most efficient financing options i.e. increase in exchequer budgetary provisions, fuel levy, or internal borrowing and identify those which can attract public or private investment, and develop implementation structures
3.6	Capacity Building and Other programmes		100%	

6.3 Development of the Low Volume Road Research Centre at MTRD

Under the AFCAP initiative, it has restructured its operations to accommodate a Low Volume Roads Research Centre and has restructured its operations in Nairobi to reflect future needs as it prepares for transformation to a SAGA. Its structure comprises five main Branch arms comprising:

- Research, Standards & Performance Monitoring
- Project Design and Construction Control
- Chemistry and Paints
- Physics and Instrumentation
- Planning & Technical Administration

The Research, Standards and Performance Monitoring Branch comprises of 2 Divisions, as follows:

- Research & Standards Division
 - **Low Volume Roads (LVR) Research Centre**
 - General Road Research Section
 - Road Design Manual and Standard Specification Research Section
- Pavement Monitoring & Rehabilitation Design Division
 - Pavement Inventory and Performance Monitoring Section
 - Pavement Rehabilitation and Overlay Design Section

MTRD uses a flexible matrix structure to manage its operations. Much of its work is project based and it assembles teams from resource centres for defined projects, under the direction of

a Project Manager. The Centre is managed by a Research Coordinator, who reports to the Division Manager, Research and Standards.

6.4 Programmes and Activities

The following sections summarise roadmap priorities for building research capacity.

Broad Thematic Programme areas

Focus will be on selected activities from the following list:

- Policy, regulatory and reform-related issues
- Economics, financing and planning of road provision
- Road planning, operation and management
- Design and upgrading of 8,000km of LV roads to sealed standards
- Road engineering, geotechnics, materials and slope management
- Road maintenance
- Road user and pedestrian safety
- Road traffic management
- Travel behaviour
- Transport services and road user needs
- Social, environmental aspects of transport provision
- Sector statistics and data, monitoring and evaluation

Information Capture & Dissemination Opportunities (being undertaken by EU)

- Determine requirements with regards copyright and other governing legal instruments
- Determine type, location and relevance of existing knowledge (Manuals, books, reports, electronic media, maps, relevant regulatory, legal and policy documents etc) relevant to thematic sub-sectors
- Capture and catalogue this knowledge (or links) to enable easy interrogation, location and access (in hard copy and electronic)
- Identify opportunities to become recipient of information generated through commissioned on-going and planned rural road projects in the country
- Identify relevant statistical sources and where necessary establish database and record holding facilities
- Develop a knowledge dissemination strategy, including dissemination opportunities provided by electronic and other media
- Provide visibility by maximising attendance at national and regional events, representation at workshops, seminars and the like
- Provide updated information to stakeholders base through publication of regular newsletters
- Determination of means of procurement of information, where needed
- Establishment of web site.

The following short term actions are being implemented:

Establishment of the Low Volume Roads Research Centre (AFCAP funding)

For the new LVR Research Centre there will be software, hardware, equipment, training and capacity programmes for Phase 2. Senior staff will need orientation training, attendance at specialist national and international technical conferences/workshops and study tours.

Establish Knowledge Management Programme (EU funding)

Cooperate with stakeholders in the assimilation of existing information and knowledge (both National and International) to be applied in an appropriately modified way to the Roads Sector.

DCP Implementation activities (AFCAP funding)

Contribute to a programme of implementation activities around the DCP Manual including intensive training and development of related documents.

Establish Databank (EU funding)

Cooperate with stakeholders to establish a comprehensive databank of relevant international and national publications, documents and records.

Establish Databases (EU funding)

Currently, various data are collected and stored across many MDA’s. The reliability, quality and relevance of this data varies significantly. As use of good and representative data for research is paramount throughout the research and policy development cycle, it is proposed to establish a coordinated initiative to access and develop data from various sources to produce a consolidated database.

Extend Programme of Trials to other Counties (AFCAP Funding)

The current trials being undertaken for LVR seals will need to be extended to other regions and counties, to cover the full range of circumstances and geography’s.

7 FUNDING OF RESEARCH AND DEVELOPMENT

The following are the main Research and Development funders:

- Roads Department
- Kenya Roads Board
- KeNHA
- KeRRA
- KURA
- National Council for Science and Technology
- Universities and other institutions of higher learning
- IAEA
- JICA

- World Bank
- NORAD
- European Commission (E.C)
- African Development Bank (ADB)
- French Development Agency (AFD)
- Kreditanstalt Für Wiederaufbau (KfW)
- Kenya Bureau of Standards (KEBS)

The road sub-sector is funded from:

- GoK
- Local Government revenues
- RMLF via KRB
- Transit tolls
- Agricultural Cess
- Development Partners (DPs)

Principal Funding for Roads Sub-Sector , Bln Kshs (RSIP, RFB)

MOR Funding	2006/7	2007/8	2008/9	2009/10	2010/11
Fuel Levy RMLF	15.77	18.00	20.30	21.29	26.65
Development Partners	10.44	23.00	21.94	30.75	40.02
Government of Kenya	19.81	17.09	20.41	27.70	37.55
Sub-total	46.02	58.09	62.65	79.78	104.22

The following summarises information on current Development Partner funding arrangements (ICBTRS Inception Report, 2013) and prospects for funding related to the MTRD Transformation:

7.1 Department for International Development (DFID)

DFID are not presently funding directly to the roads sector, but are supporting several initiatives including the African Rural Access Programme (AFCAP) in largely research and CB activities on LVSR technology, and also by providing funds for Trademark EA, which has indirect impact for the road sector.

Subject to funds approval, DFID intends to establish a Programme Management Unit to deliver its new **Rural Roads and Transport Services Research Programme**. The programme will comprise two components: a second phase of the Africa Community Access Project (AFCAP2); and a new Asia Community Access Project (ASCAP). AFCAP2 will work in up to 14 African countries and ASCAP in up to six Asian countries. The estimated cost of the two components will be £40 million over 10 years (2014 – 2024) with about £15 million for AFCAP 2 from 2014 to

2018. The programme will focus on high quality, applied research to rural transport problems, communicate the research outcomes to stakeholders, support the mainstreaming of the research results into practice and build research capacity in Africa and Asia.

AFCAP2 will build on the country partnerships established by AFCAP (Ethiopia, Mozambique, Tanzania, Kenya, Malawi, South Sudan and DRC). It will operate in up to 14 African countries; these are likely to include countries in West, East and Southern Africa but will not extend to North Africa. Preliminary interest has been expressed by Uganda, Zambia, Zimbabwe, Ghana, Botswana and Namibia. AFCAP has helped to provide safe, reliable and sustainable all-season access to markets, healthcare and education for rural communities across Africa and South East Asia, through strengthening and promoting research to influence policy and practice in Africa and South East Asia for the construction and maintenance of rural roads. AFCAP aspires to the improved provision and maintenance of over 130,000km of rural roads in Africa by 2020. Collaboration and high level government support were critical to success and an intrinsic part of the programme strategy from the outset. The programmes worked closely with national governments and other bilateral and multilateral donors to build on investments in road construction and maintenance.

Research programmes are aimed at improving the sustainable access of poor women and men in rural communities to social and economic opportunities through uptake of high quality research. The programmes will identify and support the uptake of low cost, proven solutions for rural transport that maximise the use of local resources (labour, materials, enterprise and ingenuity). AFCAP2 will fund applied research to rural transport problems, communicate the research outcomes to stakeholders, support the mainstreaming of the research results into practice and build research capacity in Africa and Asia. The programmes will develop both a knowledge management and capacity building strategy focusing on low volume rural transport within the first 9 months of the research programme. These strategies and the implementation of them will be aligned with broader transport knowledge management and capacity building strategies as appropriate.

The research capacity building strategy will incorporate a vision for rural access research in both Africa and Asia. This is likely to include support to national, sub-regional and regional research bodies. Within the lifetime of the projects it is anticipated that AFCAP2 and ASCAP will be housed and part funded by an African and Asian institution. Increasingly through the lifetime of the projects research grants are expected to be awarded to southern researchers. For example in Africa the Council for Scientific and Industrial Research (CSIR) could be a key capacity building partner.

Further options are also currently being considered by DFID. These include:

- Establishment and development of regional research hubs. Three centres might be set up, perhaps eventually coordinated by a recognised African authority
- Transport services R & D
- R & D relating to primary/trunk roads.

7.2 European Union

The EU has many components to a support programme for the Kenyan roads sector, under its 10th EDF programme. Funding for a Ksh1.5 Billion LVSR KeRRA project in 5 counties will start in 2013. The Institutional Capacity Building to the Transport/Road Sector (IBCTRS) 3 year programme is funded by the EU, and the EU will be chairing the sector donor working group.

It is considering funding the STE TA component of the MTRD Transformation (Phase 2) project and also a LTE TA for MTRD Transformation, Phase 3. In addition, it is proposing to fund the production of a LV Roads Design Manual which is being scoped under AFCAP MTRD Transformation, Phase 1.

7.3 World Bank

Approximately 1.2Billion USD in current programmes. Wide ranging interventions, based on three components, The Northern Transport Corridor improvement, A Kenya Transport Sector Study, and a National Urban Transport study.

The World Bank has some significant CB and training activities. Some CB with KURA on Urban issues is taking place, and with the Ministry of Roads (subtotal cost US\$4.60 million, of which US\$3.60 million IDA).

The World Bank has agreed to finance the KeNHA Lodwar- Nadapal Road, boosting Kenya's ambition to link its market with South Sudan. The road is part of the 595 Kilometre Eldoret-Nadapal Road project that has been planned since the landlocked country gained its autonomy. Works for the 340-km section between Juba and Nadapal (340 kilometres) has already commenced after the World Bank provided some funding. The Corridor would run from Eldoret, through the border post of Nadapal, and finally to Juba. The World Bank has pledged to finance the construction of the road under its East Africa Regional Transport and Trade Facilitation Program (SS-EARTTFP)

MTRD has options for funding two priority components from the Northern Corridor Programme; the first, covering equipment purchase, has been taken up and the second, for Transformation, is pending.

7.4 Swedish International Development Agency (SIDA)

Roads 2000 implementation under Nyanza 2000 project. Now complete, with no plans for further engagement by SIDA in the roads sector. Comprised training for roads contractors in labour based construction. Also KeRRA staff from the districts trained.

7.5 Embassy of Finland (PALWECO)

A large scale rural development programme, around 9 Million Euros up to end June 2016, with roads being about 30% of the programme. Approximately 163km will be rehabilitated.

The programme will be carrying out training on labour based technology with local contractors and KeRRA staff in the region.

7.6 KFW (GERMANY)

The programme will be carrying out training with local contractors and KeRRA staff in the regions. Training on labour based technology.

7.7 Agence Francais de Development

Implementing roads projects in central Kenya under Roads 2000 Plan to upgrade 100km to gravel roads and 100km of Low Volume Sealed Roads sections.

7.8 Cross Sectoral African Development Bank (AFDB)

Operations focus to date has been on road development, mostly design and construction. They have been involved in a 250km KenHA road link to Ethiopian border. Mass transit systems in Nairobi are being planned, through an urban component. Also CB components to their programmes are being planned.

7.9 UN Habitat

Support to Kenyan Urban areas for all aspects related to mobility - so will be roads, pedestrian crossing, and other planning for public transport, such as the Bus Rapid Transport system. Staff in house with KURA providing technical support.

7.10 The International Labour Organisation (ILO)

Production of manuals for small-scale contractor training on labour based road works, best practises, as well as TA for KeRRA. Training carried out with KeRRA staff and selected contractors.

APPENDIX 1 LIST OF CONSULTEES

Those consulted in the development of the AFCAP strategy and priority research programme comprise:

MOTI

- Eng John K Mosonik, Principal Secretary Infrastructure
- XX, Roads Secretary

KeRRA

- Eng Mwangi Maingi, Director General
- Eng FD Karanja, General Manager, P&R 2000
- Eng Abraham Korir, Research Unit Officer
- King'ori Samuel, ICT Officer
- Eng SM Osiro, General Manager, Maintenance
- Eng PN Gatumia, Manager (Roads)
- Asfaw Kidanu, ILO Chief Technical Advisor, Roads 2000
- Eng. J. K. Gakubia

MTRD

- Eng SK Kogi, Chief Engineer (Materials)
- Eng MO Ndeda (Research)
- Eng DW Wanyiri, Project Engineer, DCP Design
- Eng JW Kiragu, Coordinator, Labour-Based Programme

ROADS DEPARTMENT

- Eng PM Mwinzi, Chief Engineer (Roads)
- Eng F Gitau, Deputy (Roads)

KENYA ROADS BOARD

- Dr FN Nyangaga, Executive Director
- Eng JZ Ruwa, General Manager, Planning and Programming
- Eng HW Kihumba

KURA

- Eng Dr T Nyomboi
- Eng MM Nyonge

KeNHA

- Eng H Gakuru

Consultants

- Eric Goss, Team Leader, AFD Roads 2000 Central, Phase II
- Asfaw Kidanu, ILO, KeRRA
- Jon Hongve, AFCAP Consultant, Design & Construction Oversight of Research Sections
- Mike Pinard, LV Road Specialist
- John Mills, TL, ICBTRS

- Steven Crosskey, ICBTRS (KeRRA)

Development Partners

- Eng. A. Gitonga, European Commission
- Eng. P. Methu, CAS
- Eng. Rosemary Kung'u, Kfw
- Peter Njenga, IFRTD

APPENDIX 2 KEY DOCUMENTS, REPORTS AND PROGRAMMES

The following is a list of key relevant documents, plans and projects from Government, MDA's, MTRD, national and International documents that inform and help to prioritise research programmes:

Government

- **Transforming Kenya – Securing Kenya's Prosperity, 2013 – 2017**
A harmonized Manifesto of the Coalition setting out its plans under three Pillars. Challenges for Transport and Infrastructure are set out, also opportunities and solutions. Specific plan and targets are addressed for roads and transport.
- **Vision 2030**, Government of the Republic of Kenya, 2007
This publication is a summary of Kenya's new long-term national planning strategy, officially known as Kenya Vision 2030. The publication briefly states the main goals of the Economic, Social and Political pillars that underpin Vision 2030. It also summarises the major (or flagship) projects to be embarked upon in the medium-term period of the Vision i.e. from 2008-2012.
- **Integrated National Transport Policy - May 2009**
The transport sector is recognized as a key pillar and a critical enabler in the achievement of economic, social and political development strategy. The sector is further expected to remain a key component in tackling such challenges as reduction of poverty by half by the year 2015. As a result a Policy Paper *on* Integrated National Transport Policy for Kenya *under the theme "Moving a Working Nation"* was published in 2009 after a series of participatory consultations. It identifies a number of challenges inhibiting the transport sector from performing its role at national, regional and international economies and provides strategies on how to move forward.
- **National Environmental Policy – Draft 2012 – Ministry of Environment & Natural Resources**
This National Policy aims to provide a holistic framework to guide the management of the environment and natural resources in Kenya. It further ensures that the linkage between the environment and poverty reduction is integrated in all government processes and institutions in order to facilitate and realize sustainable development at all levels in the context of green economy enhancing social inclusion, improving human welfare and creating opportunities for employment and maintaining the healthy functioning of ecosystem. The Draft Policy recognizes that industrial and infrastructural developments, besides contributing to economic growth and job opportunities, also contribute significantly to environmental degradation. This calls for an environmentally-friendly industrial and infrastructural development strategy that integrates and promotes cohesion of development and environmental policies and enhances transfer of environmentally sound technologies.
- **The National Transport and Safety Act 2012 – Kenya Gazette October 2012**
Survey reports indicate that road accidents in Kenya roads claim about 3,000 lives annually. It is estimated that the economy further loses approximately Ksh. 14 billion or 5 % of its gross domestic product on accident related expenses (MoTC, 2004). In an effort to curb further road carnage the Government of Kenya enacted The National Transport and Safety Authority Act 2012 of 26th October 2012 established the Kenya

- National Roads Authority under the Ministry of Transport. The Act also introduced stringent laws as a deterrent to careless driving. According to Kenya Gazette the functions of the Authority besides development and implementation of road safety strategies, shall be include research and audits on road safety.
- **Political Vision 2030**, Moving to the Future as One Nation, Government of the Republic of Kenya, 2007
 - **Draft Policy** on Aligning the Roads Sub-Sector with the Constitution, Ministry of Roads, September 2012
 - **Third Annual Progress Report 2010-2011**, On the Implementation of the First Medium Term Plan (2008-2012) of Kenya Vision 2030, Ministry of State for Planning, National Development and Vision 2030, April 2012
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 - **The Medium Term Plan (MTP) 2008 – 2012, Government of Kenya**
 - **Joint Statement of Intent, GoK and Development Partners, 2010 – 2013**

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- Kenya Poverty and Inequality Assessment, Vol 1, World Bank, June 2008
- Kenya Joint Assistance Strategy (KJAS), 2007 – 2012
- Project Review of ILO Technical Assistance to Roads 2000, June 2011
- Design Manual for Low Volume Sealed Roads, Ministry of Public Works, Malawi, October 2012
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- Manual for labour-based Construction of Bituminous Surfacing on LV Roads, TRL & DFID

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- Kenya Green Economy, Scoping Study, Min of Env and Min Resources, August 2012
- Operational Plan 2011-2015, DFID Climate and Environment Department, May 2011.
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- Climate Change Risk Assessment for the Transport Sector (2012) DEFRA UK

- Beyond Copenhagen: The UK Government's International Climate Change Action Plan (2010) Department of Energy and Climate Change
- Guidelines for Climate Proofing Investment in the Transport Sector: Road Infrastructure Projects (2011), ADB.

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- Road Design Manuals, Ministry of Roads
- AFCAP Design Manuals for Low Volume Roads, Ethiopia, Parts A to G, 2011 to 2012
- AFCAP/KEN/89 Research Project for Establishment of Appropriate Design Standards for Low Volume Sealed Roads in Kenya. Design Report, July 2012
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- Management of Improvement Works Volume 2 – Andreas Beusch and John Ndemi – Norken Ltd 2005 – Government of Kenya, UNDP & ILO/ASIST
- Cost Estimation Manual for Road Maintenance Works – 2011 Government of Kenya & JICA
- Procurement Manual for Works in Kenya - Public Procurement & Oversight Authority - 2009
- Community Participation in Road Maintenance - IT Transport – DFID 2003
- Guidelines for Low – Volume Sealed Roads – SADC July 2003 – funded by DFID, NORAD & SIDA