



AfCAP
Africa Community Access Partnership



Technical Assistance to the Kenya Materials Testing and Research Department for the Monitoring of Research Sections

Mission Report



Author: J. Hongve

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Cover Photo: Marking E511 Trial Section (author's photo)

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ReCAP Project Management Unit
Cardno Emerging Market (UK) Ltd
Oxford House, Oxford Road
Thame
OX9 2AH
United Kingdom



AFRICA COMMUNITY ACCESS PARTNERSHIP (AfCAP)

Safe and sustainable transport for rural communities

AfCAP is a research programme, funded by UK Aid, with the aim of promoting safe and sustainable transport for rural communities in Africa. The AfCAP partnership supports knowledge sharing between participating countries in order to enhance the uptake of low cost, proven solutions for rural access that maximise the use of local resources. AfCAP is brought together with the Asia Community Access Partnership (AsCAP) under the Research for Community Access Partnership (ReCAP), managed by Cardno Emerging Markets (UK) Ltd.

See www.afcap.org

Acronyms, Units and Currencies

AfCAP	Africa Community Access Partnership
AsCAP	Asia Community Access Partnership
DCP	Dynamic Cone Penetrometer
GoK	Government of Kenya
KES	Kenya Shilling
KeRRA	Kenya Rural Roads Authority
Km	Kilometre
LVSr	Low Volume Sealed Road(s)
MoTI	Ministry of Infrastructure and Transport
MOU	Memorandum of Understanding
MTRD	Materials Testing and Research Department
OMC	Optimum Moisture Content
RM	Regional Manager
UK	United Kingdom (of Great Britain and Northern Ireland)
UKAid	United Kingdom Aid (Department for International Development, UK)

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1 Background

The Africa Community Access Partnership (AFCAP) is a research programme funded by the UK Government's Department for International Development (DFID). AFCAP is promoting safe and sustainable rural access in Africa. AFCAP supports knowledge sharing between participating countries in order to enhance the uptake of low cost, proven solutions for rural access that maximise the use of local resources.

A significant portfolio of research activities has now been established in the AFCAP participating countries. AFCAP provides technical assistance for these activities and promotes the uptake of the research findings through revised, country specific design standards and specifications.

Government of Kenya (GoK) has set ambitious targets for upgrading of low volume rural roads to paved standard. Due to the increasing scarcity of good construction materials in many areas, construction costs are becoming high partly because of long haulage distances. AFCAP has been asked by the Ministry of Transport and Infrastructure (MoTI) through Materials Testing and Research Department (MTRD) and Kenya Rural Roads Authority (KeRRA) to support research on utilization of non-standard materials for Low Volume Sealed Road (LVSR) pavements. An LVSR is a road that carries up to 300 vehicles per day, has a bituminous or concrete surfacing, and a structural design life up to 1 million equivalent standard axles. As part of this process trial sections have been constructed on roads in various locations in Kenya for research purposes.

Four of these trial sections were designed using the DCP-DN design method. In addition research will be carried out on several roads constructed under the Roads 2000 programme in Central Province.

The trial sections to be monitored are:

Table 1: Site names and lengths

Road/Site Name	Length (m)	Monitoring Requirements	Completion date
D379 Kiambu	400	Whole section, Including 200 m LTTP Completed July 2012	July-12
E511 Murang'a	900	Whole section, Including 200 m LTTP Completed December 2014	Sep-14
D382 Nyandarua	600	Whole section, Including 200 m LTTP Completed May 2014	Aug-14
D435 Nyeri	600	Whole section, Including 200 m LTTP Completed March 2015	Jul-15
E1531 Kangoo – Kamwangi	5600	Baseline monitoring only of 1000 m including 200 m LTTP	Ongoing
D415 Muruka–Kandara	7500	Baseline monitoring only of 1000 m including 200 m LTTP Training road	Mar-16 Jan-12
E579 JnC70 Ruringu@ – D434 Kiriunga	5300	Baseline monitoring only of 1000 m including 200 m LTTP	Nov-15
D419 Muranga	5700	Baseline monitoring only of 1000 m including 200 m LTTP. R 2000 Batch 1.	Jul-14
D420 Muranga	13700	Baseline monitoring only of 1000 m including 200 m LTTP. GoK.	Feb-15
D421 Muranga	3300	Baseline monitoring only of 1000 m including 200 m LTTP. R 2000 Batch 1.	Nov-14
D381 Nyandarua	Compl. sections 8500	Baseline monitoring only of 1000 m including 200 m LTTP. R 2000 Batch 1.	Jun-15
D388 Nyandarua	Compl. Sections 8500	Baseline monitoring only of 1000 m including 200 m LTTP. GoK.	Nov- 15

2 Objectives

The objective of the assignment is to:

- Assist MTRD with the implementation of the monitoring programme for the research sections; and
- Assist the Monitoring Consultant in the execution of monitoring activities, compilations of data and monitoring reports.

3 Mission itinerary

The assignment will be carried out in separate missions, the timing of which will be determined based on the progress of the monitoring programme. This mission was carried out in the period 31 October - 12 November to oversee and assist in the monitoring activities.

Follow-up with MTRD, KeRRA and Norken (I) Ltd on the inception activities for the new trial section on D484 in Meru County was also carried out.

4 Summary of activities and achievements

Most of the monitoring activities had already been carried out whilst some were yet to be carried out as shown in Table 1.:

Table 1: Summary of activities and achievements as of 12 November 2016

Activity	Status as per 12th November 2016
Marking of Trial Sections	Complete. Carried out by AA Consultants
Traffic counts	Complete. Carried out by AA Consultants
Axle load survey	Complete. Carried out by MTRD. Results ready to be analysed to determine actual traffic loading and Vehicle Equivalent Factors
FWD tests	Complete. Results can only be analysed once the Trial Pits / Trenching have been carried out to determine the pavement layer configuration
Rut measurements	Complete. Carried out by MTRD
Roughness measurements	Complete. Carried out by MTRD
DCP tests	Complete. Carried out by MTRD.
Visual inspection	In progress. Carried out by Across Africa Consultants together with an experienced engineer from MTRD in order to “calibrate” the assessor to ensure consistent assessments using the prescribed formats to determine the Performance Serviceability Index as per the ToR.
Trial pits/ Trenching	Complete. Carried out by Across Africa Consultants with the assistance of a local contractor.
Materials testing and pavement moisture determination	In progress.
Installation / use of Dual Probe Strata gauge	Procurement of spare/replacement parts for Strata Gauge in progress.

Several meetings were held with MTRD and Across Africa Consultants to agree on the way forward.

Results from the DCP tests, Traffic Count, Axle Load Survey, Roughness and Rut Measurements were made available to the consultant. When scrutinising and analysing the data several errors were detected, such as:

- A systematic error in the Axle Load calculation spreadsheet used by MTRD. It appears that the same error has gone undetected for several years and has probably affected calculation of Vehicle Equivalent Factors on many, if not all, surveys conducted by MTRD.
- Several typing errors in the DCP data when transferring data from the field sheets to Excel.
- Obviously incorrect IRI values on some, if not all, sections. It appears that the automatic measurements carried out with the MTRD vehicle may not have been carried out correctly, alternatively that there is a calibration/software problem. MTRD was advised to repeat the exercise using a Merlin or Profiler.

Analysis of the data and test results can only be carried out once all the remaining data have been verified and submitted by MTRD. Across Africa Consultants will then be assisted with the compilation of the results in a meaningful manner in accordance with the draft Monitoring Report template.

A site visit was undertaken to D382 in Nyandarua. The pavement appears to be in reasonable condition although there was some cracking on limited sections, a few shallow potholes and an area where the surfacing had come off completely. The Regional Manager, Nyandarua was advised to rectify these problems before the onset of the short rains to prevent further rapid deterioration.

The patching on the trenches carried out by Across Africa Consultants was also of poor quality and should be re-done.

Table 2: D382 – November 2016





5 New Trial Section on D484, Meru County

The contract for Design and Supervision of the Trial Section was awarded to Norken (Int'l) Ltd with effective date of commencement 31st October 2016.

Separate meetings were held with Norken (Int'l) Ltd to discuss the way forward as well as joint meetings with MTRD, KeRRA and Norken (Int'l) Ltd.

The Inception Report for the Design and Supervision contract was submitted on 8th December 2016.

The main focus of the Technical Assistance for the design and construction of the Trial section will be on the following issues:

- Development of the Research Matrix. Comments have been made on the proposed research matrix presented in the Inception Report. Further development and agreement on the research aspects will be done in conjunction with Norken (Int'l) Ltd, MTRD and KeRRA to ensure that the objectives of using locally available, non-standard materials are attained. The detailed research matrix will be submitted as part of the design report for approval.
- Capacity Building. The capacity building topics and workshops proposed in the Inception Report are all within the remit and capabilities of Norken (Int'l) Ltd project staff. It will therefore make more sense to use the limited time available for AfCAP TA consultants to complement the capacity building programme with generic topics like Environmentally Optimised Design principles, Use of DCP for Compaction Quality Control and other issues that are not part of the standard tasks in design, construction and supervision, in addition to the general support and on-the-job training in the design and construction activities.
- Assistance with systematic data collection during construction.
- Establishment of Long Term Pavement Performance (LTPP) section in line with the regional M&E Protocol developed under AfCAP and assistance with the initial Baseline Survey.