



**TRL/ANE Research –
RRIP&AFCAP
Developing Mozambique
Guideline/Manual through
Research & Development**
Presentation by Kenneth Mukura



Introduction

- **Specifications and standards are a product of research**
- **It is important to carry out local research with local materials and for local environment**
- **Foreign specifications should be adapted to local situations**
- **Documentation should be adequate yet concise and comprehensible**

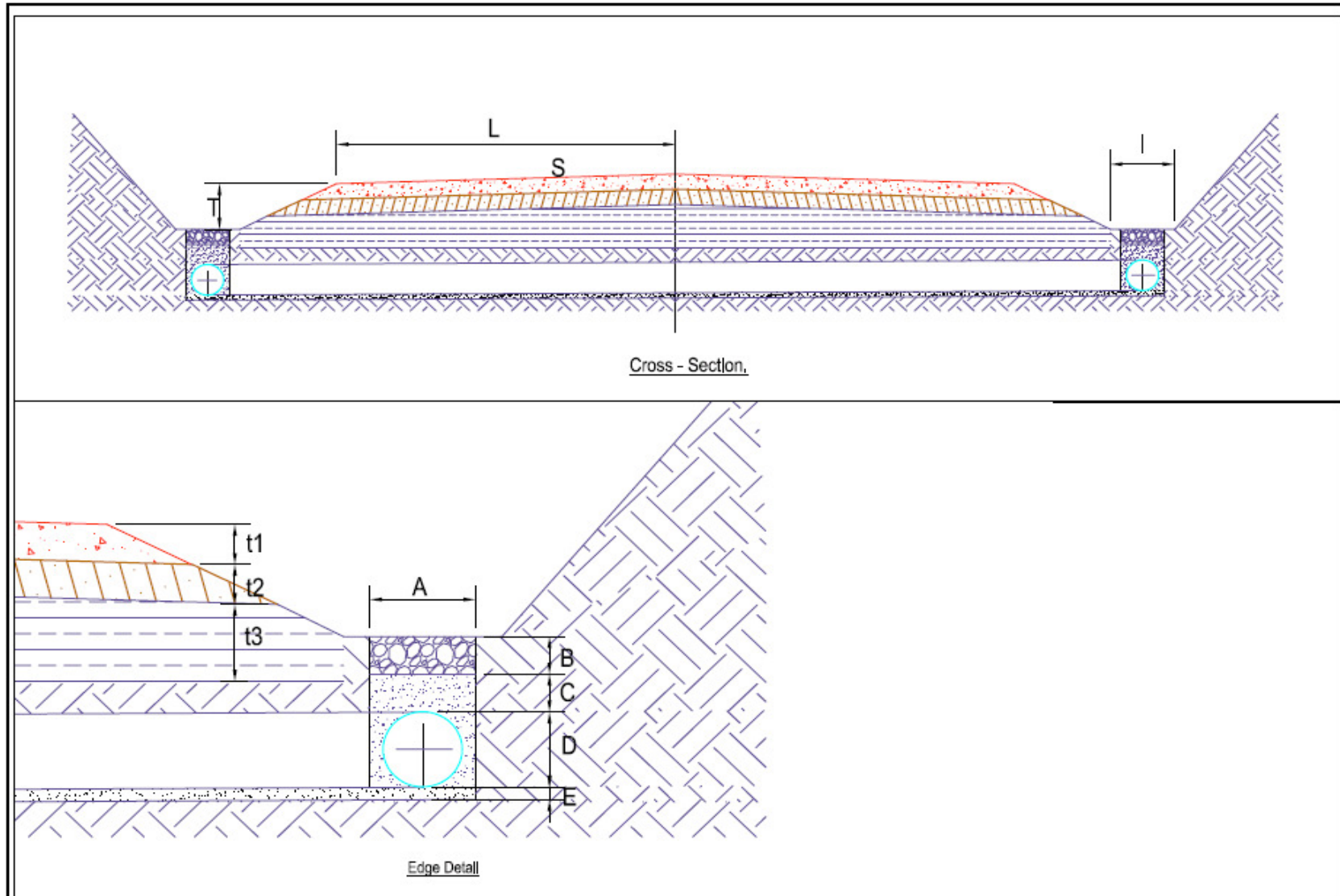
Background

- **Current documentation is a manual (Normas de Execucao) – a translation of the SATCC specification into Portuguese**
- **Mozambique has poor road building materials e.g. problematic coastal sands cover vast areas**
- **Majority of roads are low volume**
- **AFCAP research has provided an opportunity to develop specifications and work norms through research**

Draft Guideline on specifications and Work Norms for LVR chapters

- **Planning – provides road map to successful delivery**
- **Road evaluation – focus on in-situ strength**
- **Geometric design – follow existing alignment as much as possible**
- **Drainage design – focus on subsurface drainage**
- **Materials, pavement design and work norms – focus on minimising costs through efficient designs and QA**
- **Design of surfacing and work norms – choice of surfacing options and QA**

Illustration of subsurface drainage design



Pilot projects under RRIP and AFCAP

- **Phase 1: 10 projects - completed**
- **Phase 2: 13 projects - ongoing and some completed and 1 project abandoned and 6 singled out for detailed research**
- **Phase 3: 10 projects ongoing and 5 earmarked for detailed research**
- **Total length of test sections > 40km**
- **Scope of project: planning, design, construction, monitoring, analysis, documentation**

Research options

- **Blending of materials e.g. white sand with clay, red sand with plastic calcrete**
- **Emulsion treated sand bases**
- **Untreated sand bases**
- **Reprocessing existing wearing course for road base**
- **150mm and 100mm imported base**
- **Armoured sand bases**

Research options – (cont)

- **Concrete slabs with design variations and hand packed stone with strong concrete screed on ramps**
- **Cape seal and single surface dressing by LB methods and machine based with crushed and natural aggregate**
- **Otta seal with variations in nominal maximum size of aggregate (19mm, 13mm and 9mm) using quartzite and calcrete**
- **Slurry seal 15mm on ETB and untreated red sand base, ETB, and armoured sand bases**

Research options – (cont)

- **Sand seal on armoured sand base, blended base, etc.**
- **Sand seal on untreated red sand, normal gravel**
- **Penetration macadam with natural aggregate on untreated sand base**
- **Brick and cobble stone paving**
- **etc**

Inhacufera Machaze Road-Otta seal



Zero Mopeia Road – Otta seal



Xitaxi Moeda Road – Concrete slabs



Cumbana Chacane Road – Blending



Cumbana Chacane Road – calcrete Otta seal



Towards final Guideline/Manual for LVR

- **Unpaved roads – incorporate results of the Engineering Standards Project in Mozambique completed in 2006**
- **LVSR – RRIP/AFCAP research**
 - **Monitoring of test sections (Equipment procured through AFCAP and ANE)**
 - **Time limited for monitoring but ANE will continue monitoring beyond the project**
- **Preparation of specifications and work norms**
- **Final Guideline/Manual (ANE decision)**

Conclusion: QA Question

- **Which field compaction test result shows the best compaction and why? (Specification for minimum compaction of base is 95%)**
- **A. 87%, 91%, 95%, 96%, 100%, 110%**
Avg=96.5%
- **B. 95%, 98%, 113%, 120%, 125%, 127%**
Avg=113%
- **C. 94%, 95%, 95%, 97%, 98%, 98%**
Avg=96.1%

**Thank you
Amesegenalehu**

Kenneth Mukura – TRL

kmukura@yahoo.com

kmukura@trl.co.uk