11th Conference on Asphalt Pavements for Southern Africa (CAPSA)

16-19 August 2015, Sun City Convention Centre, Pilanesburg, South Africa

Conference Report

AUTHOR: M I Pinard
September 2015

Speciality Session on Low Volume Surfaced Roads
# TABLE OF CONTENTS

1. **INTRODUCTION**
   1.1 Background .......................................................................................................................... 1
   1.2 Purpose of Report .................................................................................................................. 1

2. **CONFERENCE OVERVIEW**
   2.1 Conference Attendance ........................................................................................................ 1
   2.2 Conference Papers ............................................................................................................... 2
   2.3 Conference Programme ........................................................................................................ 2

3. **AFCAP PRESENTATIONS AT SPECIALITY SESSION**
   3.1 Session Structure and Format .............................................................................................. 3
   3.2 Session Attendance .............................................................................................................. 3
   3.3 Synopsis of Papers Presented .............................................................................................. 3
   3.4 Summary of Discussions .................................................................................................... 4
   3.5 Other Conference Presentations ......................................................................................... 5
   3.6 Conference Resolutions .................................................................................................... 5

4. **OBSERVATIONS AND RECOMMENDATIONS**
   4.1 Summary of Observations .................................................................................................. 5
   4.2 Summary of Recommendations ......................................................................................... 6

   **ANNEX A – CONFERENCE PHOTOGRAPHS** .................................................................. 7
1. INTRODUCTION

1.1 Background

The Conference for Asphalt Pavements in southern Africa (CAPSA) has been held every 4 years since 1969 and is generally acknowledged as a premier event in the field of flexible pavement engineering. The eleventh conference was held at the Sun City resort, Pilanesberg, South Africa from 16 – 19 August, 2015. The particular theme for this conference was “Innovation for Quality and Value”.

The main objective of the 2015 conference was to build on the resolutions emanating from the 2011 conference which focused on sustainable practice in road construction as an underpinning value set in road design and construction. Within this framework, CAPSA 2015 sought to explore innovative practice and advance its implementation in pavement engineering practice.

1.2 Purpose of Report

In addition to providing general information on the conference in terms of the programme, attendance, papers presented, etc., the main purpose of this report is to summarise the outcome of the session on low volume roads at which three papers were presented by delegates who were supported by AFCAP.

2. CONFERENCE OVERVIEW

2.1 Conference Attendance

The conference was attended by approximately 550 delegates comprising 495 registered delegates, and 55 companions. Whilst the majority of delegates were from South Africa, about 85 per cent, there was also a large number from other countries, including 14 African countries (excluding South Africa), as shown in the table below.

<table>
<thead>
<tr>
<th>Country</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>3</td>
</tr>
<tr>
<td>Belgium</td>
<td>3</td>
</tr>
<tr>
<td>Botswana</td>
<td>3</td>
</tr>
<tr>
<td>Brazil</td>
<td>1</td>
</tr>
<tr>
<td>Canada</td>
<td>1</td>
</tr>
<tr>
<td>Czech Republic</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
</tr>
<tr>
<td>DRC</td>
<td>1</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1</td>
</tr>
<tr>
<td>France</td>
<td>6</td>
</tr>
<tr>
<td>Germany</td>
<td>5</td>
</tr>
<tr>
<td>India</td>
<td>2</td>
</tr>
<tr>
<td>Japan</td>
<td>1</td>
</tr>
<tr>
<td>Kenya</td>
<td>1</td>
</tr>
<tr>
<td>Malawi</td>
<td>1</td>
</tr>
<tr>
<td>Mozambique</td>
<td>4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>4</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2</td>
</tr>
<tr>
<td>Norway</td>
<td>1</td>
</tr>
<tr>
<td>Nigeria</td>
<td>3</td>
</tr>
<tr>
<td>Norway</td>
<td>1</td>
</tr>
<tr>
<td>Namibia</td>
<td>4</td>
</tr>
<tr>
<td>South Africa</td>
<td>425</td>
</tr>
<tr>
<td>South Sudan</td>
<td>1</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1</td>
</tr>
<tr>
<td>USA</td>
<td>6</td>
</tr>
<tr>
<td>Uganda</td>
<td>1</td>
</tr>
<tr>
<td>Zambia</td>
<td>5</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>1</td>
</tr>
</tbody>
</table>

AFCAP supported the participation of 2 presenters to the conference who had prepared papers for presentation at the Speciality Session on Low Volume Roads as well as 12 African Research Centre Managers who constitute the African Road and Transport Research Forum (ARTReF) whose aim is to promote research and innovation in roads and transport for sustainable development in Africa. The managers in attendance were from Botswana, DRC, Ethiopia, Kenya, Malawi, Namibia, Nigeria, Sierra Leone, South Sudan, Tanzania, Zambia and Zimbabwe.
2.2 Conference Papers

Some 163 peer reviewed papers were accepted for inclusion in the conference proceedings which were provided on a CD. Of these, 17 were presented in the plenary sessions, 23 in the Speciality Sessions and 11 in the Workshops.

2.3 Conference Programme

The conference programme was structured around the following themes and topics which formed the basis of the paper content and conference sessions.

- Optimising structural design in new construction and rehabilitation.
- Up-to-date procurement practice for products and services to promote efficient, sustainable and innovative delivery.
- The design of asphalt layers and spray seals to ensure efficient application and adequate performance.
- Construction, practice and materials assessment for a high level of efficiency.
- Low volume surfaced roads to promote access and mobility in southern Africa.

The conference programme covered a wide variety of topics pertaining to various aspects of asphalt paved roads and was structured as follows:

- Plenary sessions
  - Opening Session
  - Procurement and Sustainability
  - Structural Design of Pavements
  - Materials Assessment
  - Closing Session

- Speciality Sessions
  - Design of Asphalt
  - Low Volume Surfaced Roads
  - Specifications for Bituminous Binders
  - Construction Practice
  - Design of Seals
  - Airport Design

- Workshops
  - Rehabilitation Assessment and Design
  - Innovative Procurement
  - Low Volume Urban Access Roads
  - Sustainable Practice in Road Provision
  - A new Asphalt Design Method for South Africa
  - Transition to PG Binder Specification
  - Accreditation/Certification of Asphalt Mixes
  - Maximising Seal Work Throughout the Year – Design, Specifications and Construction
  - Structural Design of BSM Pavements
For the first time at a CAPSA conference, a speciality session was devoted to the topic of low volume roads – testimony to the growing importance of this component of the road network which impacts significantly on the livelihoods of the majority of the population of many countries in the region who live and work in rural areas where poverty levels are generally very high. This topic was of special importance to the AFCAP partnership which seeks to promote safe and sustainable rural access in Africa through research and knowledge sharing between participating countries and the wider community.

3. AFCAP PRESENTATIONS AT SPECIALITY SESSION

3.1 Session Structure and Format

The following was the structure and format adopted at the 2-hour Speciality Session on Low Volume Surfaced Roads.

13.30 – 13.35 Opening of workshop by Session Chair (Nkululeko Leta)

13.35 – 13.40 Workshop format by Session Facilitator (Mike Pinard)

13.40 – 14.00 Presentation on Developments in Low Volume Roads Technology: Challenging Conventional Paradigms - By Mike Pinard, InfraAfrica Development Consultants


3.2 Session Attendance

The Speciality Session was very well attended by about 200 delegates. Such numbers may well be a reflection of the growing importance and interest in the “veins” of the road system (LVRs) that, together with the “arteries” (HVRs), are an integral component of national road networks.

3.3 Synopsis of Papers Presented

3.3.1 Paper 1 - Presentation on Developments in Low Volume Roads Technology: Challenging Conventional Paradigms

This paper outlines the unique characteristics of LVRs that challenge conventional engineering practice and promotes the need for adopting an “environmentally optimized” approach to their design. Various examples are provided to illustrate the manner of providing LVRs in a more affordable and sustainable manner than hitherto, and without incurring unmanageable risk for road users or the agencies that provide them. The paper concludes that a paradigm shift in thinking is required to move away from the conservative, and often inappropriate, approaches of the past to more progressive approaches informed by research-based evidence.

3.3.2 Paper 2 - An Alternative Philosophy on the Deterioration of Low Volume Roads
This paper assesses the performance of low volume roads based on the conventional mechanistic analyses used to design them and concludes that such methods tend to either significantly over- or under-estimate their structural capacity. The paper then describes an alternative method using the DCP to design LVRs that takes into account both the cumulative infinitesimal permanent deformation as well as the potential for shear failure in the upper pavement structure. In this method, issues regarding the determination of elastic modulus (stiffness) and Poisson’s ratio, the shear strength in terms of cohesion (C), friction angle (\(\phi\)) and normal stress (\(\sigma_n\)) are avoided by using the in situ shear strength obtained directly from the DCP. An appropriate design catalogue that was developed from comparison of actual pavement strength (layer strength diagrams) with the stress for different vehicle configurations and categories was then presented.

3.3.3 Paper 2 - Can South African Road Authorities Satisfy Constitutionally Protected Basic Access Needs Without Sacrificing Economic Growth.

This paper combines economic theory with GIS application to assess whether South African road authorities can satisfy constitutionally protected basic access needs without sacrificing economic growth. The trade-off between access to basic services for all citizens and economic growth is investigated, with particular attention to issues of constitutional obligations, quality of life, and the fundamental role of economic growth in poverty reduction. Following the definition of basic access roads and an investigation of the national demand profile, the extent of the potential basic access road network is estimated using primary and secondary schools as a proxy for service centres. The paper concludes that the demand for basic access can be addressed through multi-functional roads. The remainder of the demand, although significant, is manageable within the current budgetary constraints.

3.4 Summary of Discussions

The presentations made by the AFCAP presenters provoked wide-ranging discussions on a number of issues pertaining to the provision of LVRs. The following is a summary of the conclusions reached on the issues raised:

- **Terminology**: Avoid use of negative terminology such as low cost roads, marginal materials, un-engineered roads, etc.
- **Definition of low volume roads**: Is based on AADT and MESA, but should also include *design vehicle requirements (max. GVM/axle loads)*.
- **Lack of uptake of new technology**: Need to engender buy-in from stakeholders; quantify and “sell” benefits to decision makers; promote revision of national standards and specifications.
- **Climate impact**: Need to provide guidance on striking balance between providing counter-measures and related costs.
- **Road safety**: Type/cost of alignment improvements should be related to road function and traffic levels.
- **Risk**: Once new technology is accepted by client on proven basis and included in national standards and specs, there would normally be no unacceptable risks to consultants or contractors.
3.5 Other Conference Presentations

There was one other presentation that merits special mention in terms of its relevance to the AFCAP programme. This was Workshop W1.3 on Low Volume Urban Access Roads. This workshop was of particular significance to the AFCAP programme as it was based on the experience of the Ethekwini Municipality in South Africa in the upgrading of their Low Volume Unsurfaced Road Network.

Normally, the Ethekwini Municipality bases its urban road upgrading in accordance with the guidelines contained in TRH4: Structural Design of Flexible Pavements for Interurban and Rural Roads. However, the use of this approach would have resulted in a cost of approximately 6 million South African Rand per kilometer for a 5 m wide pavement, which was prohibitively expensive for the municipality. Instead, they based their approach on the Republic of Malawi’s “Design Manual for Low Volume Sealed Roads” which makes extensive use of the DCP design method. The use of this method resulted in an average cost of 1.38 million South African Rand per kilometer, i.e. the cost/km was approximately 25 per cent of that based on the use of TRH4. Whilst it is early days yet, it is very important that the performance of these roads is monitored, so as to provide factual feedback to practitioners on the use of the DCP design method.

3.6 Conference Resolutions

3.6.1 Speciality Session on LVRs
“Low volume roads are a key component of the road network and any measures to provide them in a more cost-effective and sustainable manner should be supported by all stakeholders”.

3.6.2 Conference Resolution:
CAPSA 2015 Resolution no 4 - “CAPSA and RPF (Road Pavement Forum) should establish regular contact with AFCAP to exchange road technologies pertinent to the needs of the African continent”.

4. OBSERVATIONS AND RECOMMENDAATIONS

4.1 Summary of Observations

- CAPSA 2015 lived up to its reputation as being the premier conference in the region on flexible pavement engineering. The variety and quality of papers presented and workshops held were all of a high standard and provided a wealth of information for delegates.

- The conference provided an excellent opportunity for AFCAP delegates to network and interact with each other and with other conference delegates to identify areas of mutual interest. It also provided an excellent forum for capacity building purposes.

- The AFCAP exhibition stand attracted much interest and many delegates sought information on the type of work being carried out and how it could be of benefit to their organization.

- The Speciality Session on Low Volume Surfaced Roads certainly generated much interest in low volume roads and, in the process, raised and enhanced the profile of AFCAP in a very
significant manner.

- The conference would have provided ARTReF with a glimpse of the type of research being carried out in the region, particularly in South Africa, and identified niche areas for possible follow-up within their research centres.

4.2 Summary of Recommendations

- Future participation in CAPSA conferences should be supported by AFCAP and as many delegates as possible should be encouraged.

- There should be pro-active follow up with those organisations that are involved in research/projects that are closely aligned to that being undertaken by AFCAP.

- AFCAP should endeavor to influence future conference programmes to ensure the case of low volume roads and other focus areas are highlighted as was the case at CAPSA with speciality session of LVR.
ANNEX A

Conference Photos

Members of ARTReF at CAPSA 2015 Conference

The AFCAP team at the Speciality Session on Low Volume Surfaced Roads
AFCAP PMU members manning the AFCAP exhibition stand during session intervals