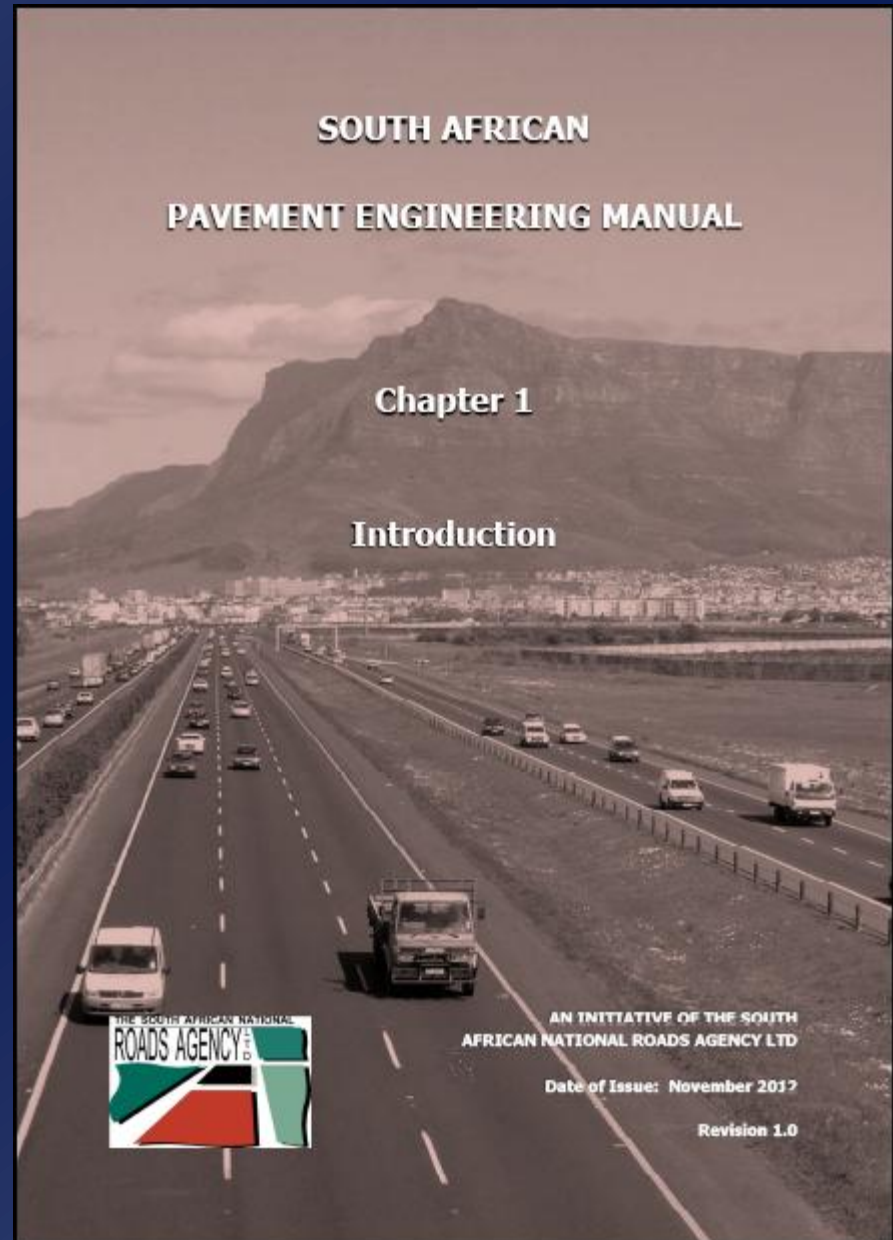


# SAPEM Update

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RPF

6 November 2012



# SAPEM Structure

	Title	Pages	App.
1	Introduction	18	
2	Pavement Composition and Behaviour	40	
3	Materials Testing	56	23
4	Standards	83	1
5	Laboratory Management	19	8
6	Road Prism and Pavement Investigations	82	22
7	Geotechnical Investigations and Design Considerations	66	30
8	Material Sources	63	
9	Materials Utilisation and Design	122	
10	Pavement Design	122	
11	Documentation and Tendering	24	
12	Construction Equipment and Method Guidelines	154	21
13	Quality Management	106	13
14	Post-Construction	33	

**TOTAL = 1 106 pages**



# SAPEM: Brief

- Technically appropriate
- Readable



Does it make sense?

# SAPEM: Brief

- Technically appropriate
- Readable
- Visually appealing




Does it make sense?



# Extract ...

- **Chapter 6: Road Prism and Pavement Investigation**

# SAPEM: Brief

- Technically appropriate
  - Readable
  - Visually appealing
  - 1<sup>st</sup> stop for anything related to pavement engineering
- Does it make sense?
- 



## Surfacing Seals

The following is a comprehensive guideline for all aspects of surfacing seals:

- **TRH3 (2007):** Design and Construction of Surfacing Seals.

Various aspects of seals are discussed in:

- Chapter 2: **Pavement Composition and Behaviour**, Section 6.1.1
- Chapter 3: **Materials Testing**, Section 4.4
- Chapter 4: **Standards**, Section 4.4
- Chapter 9: **Materials Utilisation and Design**, Section 11
- Chapter 13: **Quality Management**, Section 7



## References for Binders

Good references for binders are:

- **The Shell Bitumen Handbook**, 5<sup>th</sup> Edition (2003)
- **TG1: The Use of Modified Bituminous Binders in Road Construction** (2007)
- **TRH21: Hot Recycled Asphalt** (2009)



## Drainage Design

Efficient drainage is an essential part of good pavement performance. The following guideline provides details for the design:

- **Drainage Manual**, 5<sup>th</sup> edition, SANRAL, 2006. Download at [www.nra.co.za](http://www.nra.co.za).



## Homogenous and Non-Homogenous Modified Binders

- **Homogenous Binders:** A blend of polymer and bitumen where two distinct phases cannot be detected. An example is polymer modified binders (EVA, SBR and SBS).
- **Non-Homogenous Binder:** A blend of modifier and bitumen where two distinct phases are detectable. An example is bitumen rubber binders using crumbed rubber.



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# SAPEM: Brief

- Technically appropriate
  - Readable
  - Visually appealing
- } Does it make sense?
- 1<sup>st</sup> stop for anything related to pavement engineering
  - Roadmap for young engineers
    - Mentoring

# Examples

**TMH1 to SANS**

# Bitumen and Emulsion Specs

**Table 10. Types and Grades of Bituminous Binders**

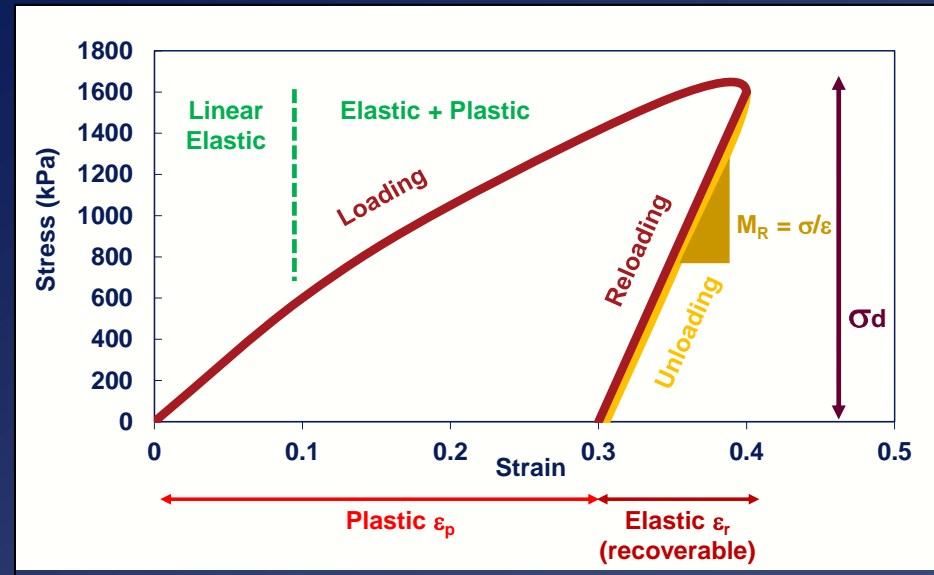
Type	Grade or Class <sup>1</sup>	Specification
<b>Penetration grade bitumen</b>	40/50 60/70 80/100 150/200	SANS 4001-BT1
<b>Cutback bitumen</b>	MC-30, MC-3 000	SANS 4001-BT2
<b>Modified binders (homogenous)</b> SBS SBR EVA Hydrocarbons	S-E2, A-E2, S-E1, A-E1, C-E1 A-P1 A-H1, A-H2	TG1 (2009)
<b>Modified binders (non-homogeneous)</b> Bitumen rubber	S-R1, A-R1, C-R1	
<b>Bitumen emulsion</b>	<u>Cationic Spray grade:</u> 60%, 65% and 70% binder content <u>Cationic Premix grade:</u> 60% and 65% binder content <u>Cationic and Anionic stable mix grade:</u> 60% binder content	<u>Anionic emulsions</u> SANS 309 (SANS 4001-BT3 <sup>2</sup> ) <u>Cationic emulsions</u> SANS 548 (SANS 4001-BT4 <sup>2</sup> )
<b>Modified bitumen emulsion</b>	<u>Inverted cationic emulsion</u> 80% binder content (including flux) SC-E2, AC-E2 SC-E1, AC-E1 CC-E1	SANS 1260 (SANS 4001-BT5 <sup>2</sup> )
<b>Pre-coat Fluids</b>	<u>Proprietary products:</u> bitumen based binders with cutters and adhesion agents.	

**Note**

1. The codes used for the various grades or classes are explained in detail in TG1.
2. SANS 4001-BT3, 4 and 5 are being reviewed by SANS and will be published thereafter.

# Back to Basics in Chapter 2

- **Mechanics of Materials**
  - Stresses and strains
  - Basic elements of mechanistic analysis
- **Materials Science**
  - Elasticity
  - Poisson's Ratio
  - Plasticity
  - Viscosity





# Pavement Design Methods



## Advantages of the DCP Method

- Suited to new and rehabilitation design
- Relatively simple and easy to apply
- Tested for South African conditions and materials



## Disadvantages of the DCP Method

- Need DCP Data
- Empirical: derived from CBR cover design
- Mostly applicable to unbound and lightly cemented pavements
- Variable results (need many repeats)
- Dependent on in situ moisture conditions (seasonal)
- Influenced by large aggregates in the pavement structure



## HMA Fatigue Transfer Functions

It is generally understood that the 1996 SAMDM fatigue transfer functions for asphalt are not that reliable.

In South Africa, we generally use asphalt layers that are less than 50 mm thick, and failure of the asphalt layer is not necessarily a terminal condition for the pavement. The pavement can continue to carry traffic with the application of crack sealants to cracks, a seal to waterproof the layer or patches to correct particularly weak areas. For these reasons, in an analysis of the full pavement system, the structural capacity of the asphalt layer is usually not considered in the critical layer analysis.

Both Shell (Huang, 1993) and the Asphalt Institute (Austroads, 1992) have transfer functions for fatigue of asphalt. It is appropriate to use these transfer functions as an additional check for a design.

# User-Friendly

- **Short sections with lots of sub-headings**
- **Easy to navigate**
- **Trial section checklists in printable format (Chapter 12)**

# Experience



## Active Clays

These preventative measures can be applied to reduce or retard deformation and cracking due to active clays:

- Remove and replace with inactive materials.
- Remove plant growth
- Irrigate clay
- Retard capillary action and evaporation
- Stabilise with lime
- Grade culverts and surface drains
- Keep shoulder surfaces impermeable
- Use a pioneer layer of dump rock
- Do not plant Bluegum (Saligna) or Karee (Rhus Lancea) trees



## Condition of the Milling Machine, Drum and Cutting Tools

Poorly maintained machines invariably produce a RA material with an inconsistent grading. In particular, the cutting tools play a major role in determining the grading of the milled material. A drum fitted with a new set of tools produces a more uniform product, compared to one where some of the tools are new and some are worn.



## Length of Seal Construction

Typically, approximately 1.5 lane kilometres of seal can be constructed in one day.



## Layer Movement after Slushing

The most important practical requirement when slushing, is that no movement should be present under the roller at the end of the slushing process. Should the layer continue to move under the roller even after slushing for a considerable period, then the layer should be **broken up, remixed and re-compacted**.



## Head of Material in Paver

The head of material is the depth of material evenly spread in front of the screed by the augers. Controlling the head of material is the most important factor in laying a smooth HMA pavement.

# Gaps

- **Block paving**
  - **Construction**
  - **Quality management**
- **SA Bitumen Performance Classification**
- **Gravel roads**
- **Photo credits**

# Your Input

- **Comments**
- **Corrections**
- **Experiences**
- **Case studies**
- **Photos or illustrations**

**All good productions end  
in...**

***the bloopers***



# Language!

- Long long long long very long and sometimes extra long sentences that take up the whole paragraph and contain/include/cover multiple/many aspects of varying importance etc and absolutely no commas included/used whatsoever.
- **COMMAS!**
- [www.grammarbook.com](http://www.grammarbook.com)





**spacemans**





**fox spray**