CAPSA'04

Roads - the arterles of Africa

Performance of sand seals in the Kruger National Park

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If required, position logo of Presenter's Organisation within this text box

Best practice in flexible pavement design, construction and maintenance

Introduction

- First recorded visit by motor vehicles in 1927
- By 1930 some 450 miles of gravel roads established
- First surfacing of 59 km of road in 1964
- First bitumen supplied in drums and melted in kettle
- Heated bitumen transferred to tractor drawn sprayer
- Vehicle count in 2003 was 261,736
- Over 900 km of surfaced roads in 2003

The Kruger National Park road network

Traffic - KNP

Vehicle count for period 1 April 2002 to 30 March 2003			Total vehicles
No. of persons per vehicle			
≤ 16	≥ 17	Caravans	
255503	6233	19133	280869

Typical material properties of layer works

Layer	Material classification	Atterberg limits	CBR	OMC
Base	C3 – C4	< 6	> 72	6,8
Sub base	G5 – G6	< 13	> 45	7,2
Selected sub grade	G6 – G7	< 13	> 20	9,0

Original melting kettle

Grading of the sand

Sieve size (mm)	Cumulative % passing	
	KNP Limpopo	*KNP Skukuza*
9,5	100	100
6,7	97,2	99,6
4,75	95,9	97,3
2,36	87,9	80,2
1,18	59,5	43,9
0,600	19,1	14,2
0,300	4	2,3
0,150	0,5	0,6
0,075	0,4	0,4

KNP Sand seal - Specification

- Primary seal

  MC 30 @ 0,80 l/m^2
  150/200 pen bitumen @ 1,35 l/m^2 hot
  River sand @ 0,011 to 0,014 m^3/m^2
  Rolling with 22 ton PTR
  Remaining sand removed after one month

- Seconday seal (after six months)

  150/200 pen bitumen @ 1,30 l/m^2 hot
  River sand @ 0,011 to 0,014 m^3/m^2
  PTR rolling

Spraying of the binder

Application of the sand

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The rolling process

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The surfacing activity raises a lot of interest

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Low dust generation

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Early stages of the seal

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Road verges are natural grazing area

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Maintenance Philosophy

- First reseal normally after 3 years
- Second reseal after first signs of fatique
- Second reseal generally after 15 to 20 years

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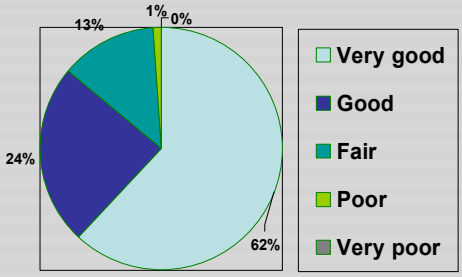
Condition of road network in 1999



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Test results obtained on recovered binder – 35 year old seal

Property	Test result	Specification requirement of 150/200 pen binder
Ring and Ball Softening Point (˚C)	79,2	36 – 43
Penetration @ 25 ˚C (0,1 mm)	10	150 – 200
Dynamic viscosity @ 165 ˚C (Pa.s)	0,315	0,12 – 0,30
Binder content (% m/m)	9,8	-

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Conclusion

Success of the sand seals can be attributed to:

- **Priming of the base**
- **Two layered seal**
- **High binder content of seal**
- **Use of soft binder**
- **Low traffic count**
- **Good drainage**

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