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GRAVEL ROAD UPGRADING

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Primary Reasons for Upgrading

Commercial
Environmental
Aesthetic
Economic



SABITA MANUAL 10

- ❑ Addresses upgrading using life-cycle costing and a break-even level of traffic with and w/o user costs.
- ❑ Cost-Benefit analysis
 - ✓ Looks at a range of conditions which will result in varying construction costs : min, low, ave, high & max
 - ✓ Allows a range of surfacing types.
 - ✓ Plots Break-even cases versus Traffic Volume **Pages 15 & 16**
- ❑ Choice of Surfacing
 - ✓ Good advice on : Environment, Maintenance capabilities, Gradients, Intersections/Turning movements and gives a very nice appreciation of individual surfacings. **P 21 & 22**
- ❑ Surfacing Selection Tables **Pages 24 & 25**
 - ✓ Pavement Structure and reseals

UPGRADE

❑ FUNDAMENTALS

- Geometrics
- Drainage
- Poor Subgrade

❑ MUST GET THE BASICS RIGHT

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TREATMENT METHODS for EXISTING GRAVEL

It is likely that the existing wearing course gravel, if performing satisfactorily, may not be suitable as a base layer. Conversely problem gravels may be suitable.

Consider the gravel as follows :-

What is its quality – will it make **appropriate base**?

Yes Then there's no further action needed – shape and compact

Nocan the existing gravel be improved or should new gravel be imported as an overlay?

If the in-situ gravel can be improved is it economic in comparison with importing good quality base?

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TREATMENTS – EXISTING BASE OK

☐SURFICIAL

- CaCl (short term – eg mine roads, by-pass)
- Dust Palliatives (Short term – bypass)
- Thin Seals
- Gravseal

Note : These superficial treatments do not improve the load carrying capabilities of the pavement. They protect the surface against water ingress, erosion and ravelling.

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TREATMENTS to **IMPROVE EXISTING GRAVEL**

CHEMICAL / BITUMINOUS

Cement, Lime, RBI – significant strength and decreased moisture sensitivity.

Emulsion – some strength and < moisture sensitive.

Bitumen – Strength and insensitive to moisture.

Sulphonated Oils – some modest strength, improved compaction and decreased moisture sensitivity.

Doubts about effectiveness – check cation exchange and agreement certificates

MECHANICAL

Blending with imported materials of better quality – some improvement in strength.

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TREATMENTS to **IMPROVE EXISTING GRAVEL**

NB – No single “Cure-all”. Consider Ease of Application, COST and Anticipated Life.

SULPHONATED OILS

Relatively cheap. Best value when used with plastic fines. Check effectiveness!!

CEMENT

Low Plasticity (<10) – needs fines – can give large strength gain but also likely to crack.

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TREATMENTS to **IMPROVE EXISTING GRAVEL**

LIME

Moderate plasticity soils (PI 6 to 20) – Fair strength gain but can also be subject to block-cracking.

BITUMEN EMULSION

Only currently used with low plasticity soils (PI < 8) granular materials of fair quality

FOAMED BITUMEN

Materials quality similar to that for bitumen emulsion – grading important

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SURFACING

➤ **Where a riding surface improvement is required for more than about 2 years none of the surficial treatment methods will survive without some kind of surfacing.**

➤ **TWO OPTIONS :-**

- **Durable Seal – Expensive.**
- **Light Seal – Stage construction approach.**
Must allow for further action in 3 to 5 years.
Dust palliative which is self-priming is an attractive option, blinded with grit.

Refer to SABITA Manual 10 pages 21 & 21

UPGRADING

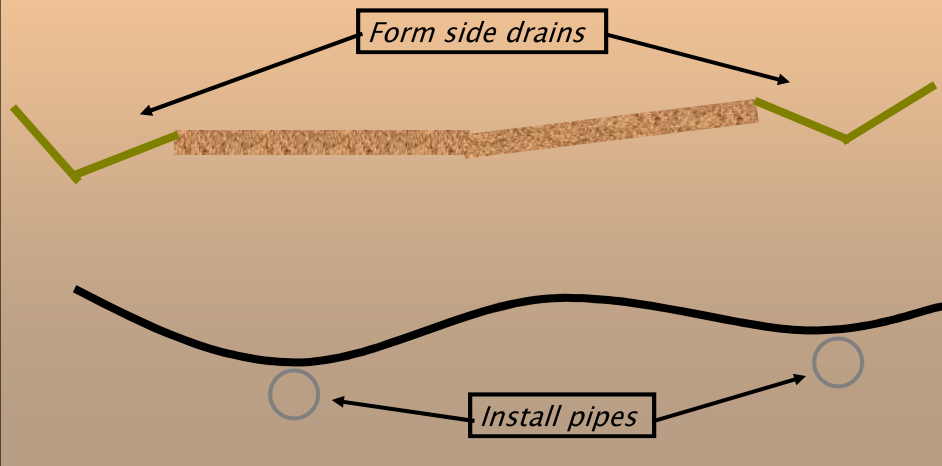


Typical rural gravel road problems

- Poor profile
- Ruts and potholes
- Poor drainage
- Poor riding quality

UPGRADING

Step 1 :- Improve drainage



**Step 2:
profile**

**Import gravel and reshape the
profile**

At least 2.5%
camber

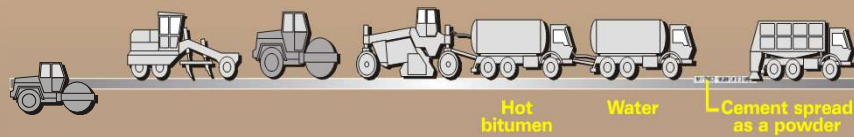


EXAMPLE of FOAMED BITUMEN UPGRADEING – WET REGION



Recycler

Cement
spreader



FOAMED BITUMEN UPGRADING – WET REGION

The gravel is treated to a depth of 125 mm using foamed bitumen or bitumen emulsion

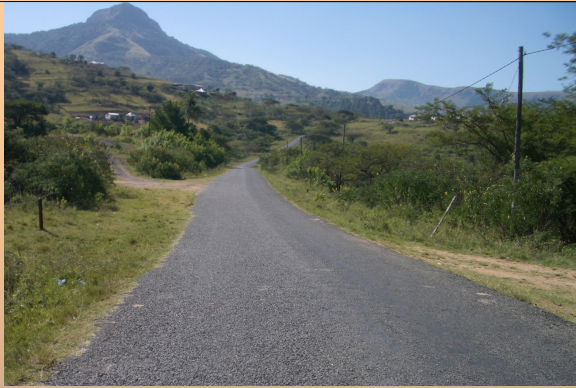


FOAMED BITUMEN UPGRADING – WET REGION

A bituminous surfacing seal is applied to the surface



FOAMED BITUMEN UPGRADING – WET REGION



FOAMED BITUMEN UPGRADING – WET REGION



FOAMED BITUMEN UPGRADING – WET REGION

