

ADVANCING THE PUBLIC INTEREST:
A case for surfacing gravel roads



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INFORMATION SERIES 2



1. INTRODUCTION

The purpose of this publication is to raise the awareness of the adverse impact and associated costs that unsurfaced roads have on road users and the communities which they serve. The document is targeted at non-technical persons associated with road provision and who also have the social and economical interests and well-being of communities at heart.

2. BACKGROUND TO SABITA

This document has been compiled by the Southern African Bitumen Association (Sabita) in the public interest. Sabita represents the various organisations involved in the manufacture and supply of bituminous road building materials, construction, maintenance and design of roads.

Sabita's main goals are to promote the efficient and cost-effective use of bituminous materials through:

- Undertaking research and development to advance our technology.
- Educating and training of our practitioners.
- Promoting sustainable practice in the construction and maintenance of roads.
- Engaging all shareholders to promote the efficient delivery and maintenance of roads.

The above activities form the basis of knowledge development through formal training programmes, conferences and seminars, the publication of technical articles and manuals as best practice guidelines for use by professionals in the road industry all aimed at advancing delivery within the roads sector.

3. WHAT IS THE VALUE OF A ROAD?

History shows us that roads are the lifeblood of any successful economy in that they:

- Are the least risky form of capital investment.
- Offer the highest economic rate of a return of all types of infrastructure projects.
- Complement and underpin all other forms of infrastructure such as:
 - Social services.
 - Facilities associated with trade and commerce.
- Are essential to economic growth and development of a nation.
- Uplift marginalised communities by providing safe access and mobility which, in turn leads to social, cultural and economic well being.

4. SOUTH AFRICAN ROAD NETWORK

South Africa has an extensive road network consisting of 155 000km of surfaced roads and 600 000km of unsurfaced (gravel or dirt) roads of which 220 000 are unproclaimed. The cost of maintaining the unsurfaced road network places a heavy financial burden on road authorities. Unsurfaced roads require regular grading and replacement of the gravel (a non-renewable resource) which is lost by erosion and traffic wear.

The rate of gravel loss will be more pronounced at higher traffic volumes whereas the local environmental conditions will have a greater impact at low traffic volumes (see Figure 1). It is estimated that about 240 tons of gravel is lost per annum per kilometre of road whereas a surfaced road only requires minimal routine maintenance.

Unsurfaced roads, which occur mainly in rural areas, can deny communities all weather access to social services and trade opportunities.

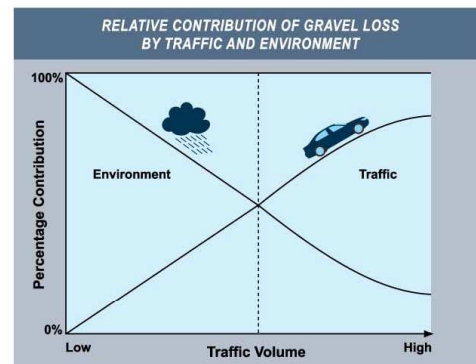


FIGURE 1

5. WHAT IS THE COST OF MAINTAINING AN UNSURFACED ROAD?

There are direct costs incurred by road authorities in the construction and maintenance of an unsurfaced road. Unsurfaced roads require regular blading and shaping by a motor grader as well as periodic re-gravelling to replace lost material in order to keep them in good condition. The main costs involved with these activities are obtaining suitable gravel, transporting it from a borrow pit to the road and the operating costs of the plant required to spread and compact it such as a motor grader, water cart and roller.

Unsurfaced roads are constructed and maintained with naturally occurring gravel mined from borrow pits. This is a non-renewable resource which is continually being depleted.

The alternative to having and maintaining a gravel road is to construct a once-off all-weather waterproof, skid-resistant surfacing. The initial cost of constructing a surfaced road is relatively high but regular maintenance costs are far lower. The financial impact of maintaining a gravel road compared to a surfaced road is best illustrated in Figure 2 which represents the costs incurred by the City of Tshwane in 2007 in maintaining their residential streets.

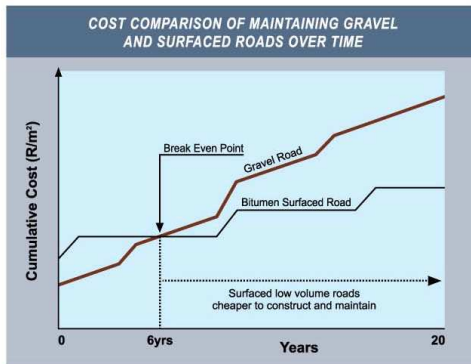


FIGURE 2

A gravel road which carries more than 200 vehicles per day can be sealed with a bituminous surfacing at a cost less than maintaining the unsurfaced road over a period of six years. Furthermore, the ongoing maintenance of both road types requires substantial institutional capacity to manage and where this is lacking the required regular gravel road maintenance is often neglected resulting in poor road conditions (see figure 4).

As the price of fuel increases and scarce sources of suitable gravel are located further and further apart, the argument for surfacing gravel roads gets progressively stronger. As an example, Figure 3 illustrates the impact of rising oil prices on haul costs for gravel roads compared to roads provided with a bituminous surfacing.

The costs for providing surfaced roads in an urban environment could be substantially more than that for rural roads because additional infrastructure could be required to manage the stormwater runoff.

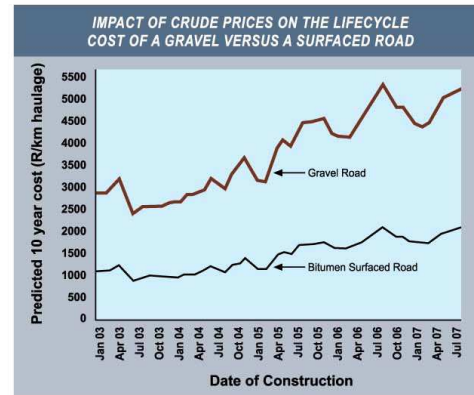


FIGURE 3

6. THE IMPACT OF UNSURFACED ROADS ON THE BROADER COMMUNITY

Some of the costs attributable to unsurfaced roads are more difficult to define as they are not borne by the road authorities. They are however, real costs to the economy and, as such should be considered by a public authority.

Some of these costs are:

- Road user costs.
- Environmental costs.
- Social costs.

6.1 Road User Costs

Road user costs include vehicle operating costs, time costs and costs of losses or damage arising from unsafe road surfaces. Rough road surfaces cause vehicles to experience increased fuel consumption, higher mechanical wear and tear and the more frequent replacement of tyres.

Studies have shown that the fuel consumption for a motor car increases by up to 20% and that of a truck by 27% on a poor condition gravel road when compared with a surfaced road. Gravel roads are also less safe than surfaced roads. They are slippery when wet, have less traction when dry and the presence of dust causes poor visibility which creates unsafe riding conditions, particularly at higher traffic volumes. For the same traffic volumes and distance travelled the accident rate on gravel roads is double that of surfaced roads.

According to studies carried out by the World Bank and taking all the components of road user costs into account it could cost up to two and a half times more to travel on gravel than on a surfaced road, as illustrated in Figure 4.

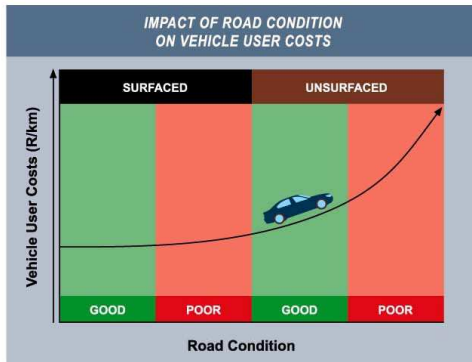


FIGURE 4

6.2 Environmental Costs

Gravel is a non-renewable resource obtained from borrow pits that are unsightly scars on the landscape and liable to cause soil erosion. It is estimated that approximately 30 million cubic metres of gravel material is lost on our roads every year due to erosion and traffic (see Figure 1). This volume equates to the size of Table Mountain and much of the material is washed into our precious rivers and water courses!

The other negative impact of gravel roads is the environmental degradation caused by dust. Dust pollutes the areas adjacent to a road which affects people's health, especially children, damages crops and has a harmful effect on vegetation, wild life and livestock in general.

Given the limited availability of suitable gravel, increased cost of transporting gravel over long distances together with the cost of expropriating borrow pits, environmental impact studies and site remediation, alternative road structures incorporating a permanent surface are fast becoming the preferred option for road authorities.

6.3 Social Costs

Surfacing roads improve the quality of life in communities by:

- Providing all weather access to schools, hospitals, places of work and cultural meetings.
- Reducing dust pollution.
- Creating jobs not only during construction of the road but also during ongoing maintenance.

The maintenance of gravel roads makes use of mechanical equipment such as motor graders and tipper trucks and thus offers limited opportunities for creating employment opportunities. The construction of a surfaced road can readily create more employment opportunities per rand of expenditure and the maintenance of the surfacing, although less frequent than gravel roads, is more suitable for local contractors to carry out due to the labour intensive nature of these activities.



SURFACING OF A GRAVEL ROAD USING LABOUR BASED TECHNIQUES

7. IN SUMMARY

Roads upgraded with a permanent surfacing provide all weather accessibility and increased economic opportunities for local communities, leading to:

- Improved quality of life.
- Improved safety.
- Trouble-free access to services and places of work.
- Reduction in travel times.
- Reduction in transport costs.
- Accelerated economic development.
- Sustainable job creation through ongoing routine maintenance.
- Improved community participation in regional development.
- Reduction in air pollution.
- Reduction in the depletion of gravel resources and pollution of crops and rivers.

Given the impact that gravel roads have over and above the financial costs to road authorities can we justify NOT TO surface our gravel roads?



Sabita has developed software to assist road authorities to evaluate the costs of upgrading their unsurfaced roads taking into consideration not only the construction and maintenance costs but also the road user, economic and social costs and benefits. The surfacing of gravel roads using labour based methods serves the requirements of the Expanded Public Works Program which in turn can lead to sustainable job creation.

The choice is clear!