

Above: A concrete highway under construction in Kwa-zulu Natal

TIME HAS PROVED CONCRETE ROADS' DURABILITY AND ECONOMY

Concrete pavements are widely used globally to carry heavy loads and provide long-lasting solutions for highways, airports, and bridge decks as well as low-volume municipal roads. Bryan Perrie, CEO of Cement and Concrete SA (CCSA) and a world authority on concrete pavements, here discusses the subject:

Q: When in modern times did concrete pavements emerge as a meaningful alternative to bituminous pavements? How old are the longest-serving concrete roads in the world, and what is the norm now when it comes to longevity?

BP: The first concrete pavement in the world was built in Inverness, Scotland, in 1865. Some of the concrete pavement laid in Edinburgh, Scotland, in 1872 is still in use today. The first modern concrete pavement in the USA was constructed in Bellefontaine, Idaho, in 1893 and is still in service. Concrete roads have been built in the Eastern Cape since the late 1920s and some by Italian prisoners of war in North West Province during and after the last world war. Some of these roads are still in service. The first modern concrete freeway in SA was built on the N2 outside Cape Town in the late 1960s and some parts are still in use.

Q: What are some of the major advantages of concrete pavements compared to alternatives?

BP: There are some significant advantages, some of which are listed below. In terms of economy:

There are comparable initial costs for similar designs in other materials, lower life-cycle costs for equivalent plans, low maintenance, and user disruption costs. Also, it can reduce fuel costs for trucks and minimize stormwater reticulation if needed.

In terms of performance:

Long service life;
Resists oil and fuel spillages;
Does not rut, shove, or corrugated; and
Easy to repair and maintain.

In terms of construction:

It is labor-friendly, i.e., ideally suited to laborintensive and labor-based construction methods.

In terms of safety and environment: •Excellent light reflection and greater visibility requiring less energy to illuminate; •Long lasting skid resistance and traction for safer driving:

•No rutting creating conditions for aquaplaning; •Texture can be varied to warn motorists of hazards;

·Local material usage – cement, sand, stone, and water – for construction, and importantly, it can be recycled entirely. There are comparable initial costs for similar designs in other materials, lower life-cycle costs for equivalent plans, low maintenance, and user disruption costs. Also, reduced fuel costs for trucks and it can minimize stormwater reticulation if needed.

In terms of performance:

- ·Long service life;
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In terms of construction: It is labor-friendly, i.e., ideally suited to laborintensive and labor-based construction methods.

In terms of safety and environment: •Excellent light reflection and greater visibility requiring less energy to illuminate; •Long lasting skid resistance and traction for safer driving;

•No rutting creating conditions for aquaplaning; •Texture can be varied to warn motorists of hazards:

•Uses local materials – cement, sand, stone, and water – for construction, and •it can be recycled entirely.

Q: How many types of concrete pavements are commonly used?

BP: There are two main types: in situ concrete and the other, concrete block paving. In the case of the in-situ concrete, there are different design types, with the most commonly used in South Africa being plain jointed and block paving generally for lower volume roads and continuously reinforced mainly used for freeways and higher volume roads. The same situation applies internationally.

Q: How important is design when it comes to concrete pavements? Are there enough professionals who are adequately trained in this aspect in SA?

BP: There are a significant number of qualified people who have successfully designed concrete pavements. CCSA's School of Concrete Technology runs a course specifically covering the design and construction of concrete pavements to assist consultants and contractors in this regard. In addition, CCSA is developing and updating a software package to design concrete pavements based on performance in South Africa for our conditions. The package is comprehensive and innovative as it takes the variability of all the inputs into account and predicts the degree of likely failure. It also considers life-cycle costs and not just initial costs - an essential factor in costing concrete pavements.



Above: A piggmented concrete bus lane near Kempton Park in Ekurhuleni, Gauteng.

Q: With potholes now a significant problem after good summer rains, should municipalities not consider more concrete pavements in terms of low volume traffic?

BP: Concrete is ideal for low-volume roads and can also be used for overlaying damaged asphalt roads. Concrete roads generally have significantly lower maintenance costs and lend themselves to laborintensive construction. These are both significant benefits for municipalities.

Q: Do concrete pavements form any part of the Government's infrastructural development program?

BP: It is hoped that they will. SANRAL is already busy rolling out several tenders for concrete pavements for upgrading and widening the N3 between Pietermaritzburg and Durban and on the N2 around Durban.

Q: With unemployment running rampant, could concrete pavement construction help in providing work for local communities?

BP: Yes, as stated previously, concrete pavements - even on high-volume routes - lend themselves to labor-intensive construction and help create jobs for local communities.

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