

New life for SA roads

By Eamonn Ryan

With the exceptions of national roads, and provincial roads in Gauteng and the Western Cape, South Africa's provincial, municipal, and rural road and bridge infrastructure is in a precarious condition.

South Africa's latest SAICE infrastructure scorecard paints a mixed picture as far as road infrastructure is concerned: a creditable B for Sanral's national road network is offset by a D for paved provincial roads; C- for paved metropolitan roads; D- for other paved municipal roads; and E for provincial, metropolitan, and municipal gravel roads.

Grade E, by the way, stands for 'unfit for purpose' — infrastructure that has failed; D is infrastructure 'not coping with demand'; and C is 'satisfactory for now'.

The road network is highly variable, much of it well beyond the

20-year theoretical design life and suffering from poor maintenance. In the absence of adequate maintenance, the deterioration in our roads is accelerating. SAICE's report states: "Of the nation's road network of approximately 750 000km, Sanral controls 21 403km and maintains them to a high standard. The proportion in 'poor' to 'very poor' condition has crept slightly above the international benchmark of 10%, mainly due to the acquisition of provincial roads in poorer condition. Constraints on funding due to revenue shortfalls in toll operations may affect operational and maintenance requirements. Despite this, the overall change in condition of national roads has

Coreslab's proposed pre-stressed I 8 precast beams were a more cost-effective method of constructing the structure and Nyeleti Consulting, the consulting engineer, incorporated its suggestion into their design.

Construct



CoreSlab was extensively involved in the construction of two new bridges over the Molototsi River in the Mopani District, on behalf of the Roads Agency of Limpopo.



N4 toll road between the M17 Garankuwa and R512 Brits interchanges.

shown an increase in 'good' and 'very good' sections.

"A slight improvement in the paved provincial network score is due to the shifting from 'fair-good' in 2011 to 'good-very good' in Gauteng. Over 90% of sections in the Western Cape are either 'fair', 'good' or 'very good', maintaining their standard. However, the condition in other provinces remains precarious or is deteriorating. There is a risk of further deterioration due to vehicle overloading, poor maintenance, and the reduction of skilled personnel in provincial departments.

"Regarding municipal roads, data on asset management is difficult to come by, even for municipalities that might have sound practices in place for their road systems. A particular issue is the difficulty in discovering to what extent monitoring is conducted and, if it is, to what extent this is used for effective asset management.

"South African gravel roads constitute 75% of the road network. There has been some improvement in the Western Cape, contrasted with extraordinary deterioration in the North West Province. Due to neglect, gravel roads are generally in a very unhealthy condition, with between just 2% and 12% in the 'good' to 'very good' condition, depending on the province. By contrast, the 'poor' to 'very poor' condition applies to 40% to 90% of the category," the report states.

The dearth of road projects is at least in part due to the collapse of the user-pays model in Gauteng — a very controversial topic, but a real challenge that requires workable solutions as soon as possible.

Sanral sees project pipeline tail off

Skhumbuzo Macozoma, CEO of Sanral, speaking at last year's SAFCEC Annual National Conference, provided an outline of the hold-ups in the road project pipeline.

"Supply chain reforms in government have sought to



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From left: Paul Heslop, MD of Rhino Excavator Hammers, and Wiseman Mlobeli, operations manager of Rhino Earthmovers Plant Hire.

strengthen good governance in procurement of infrastructure projects. However, there are serious unintended consequences that must be addressed with National Treasury, including project delays and cancellations, and conflict with construction general conditions of contract. This is becoming a serious issue that is threatening to hamstring government from releasing tenders to the benefit of industry and the delivery of infrastructure," says Macozoma.

He notes that the impasse with National Treasury had led to 50 of Sanral's contracts not proceeding in the previous financial year, and that this would affect the construction industry with an 18-month lag in contracts awarded, as most of these delayed contracts are still in a design phase as a result. Things should return to normal after that, Macozoma hopes, "unless of course what the president was saying holds true: that the capacity in the country will have been reduced by then — the industry will not be able to absorb the projects and we'll be looking outside.

"On the positive side, there is a silver lining: despite low investor confidence, industry output is projected by analysts to rise at a compound annual rate of 1.5% over the medium term. Public investment

"The production and turnaround times are also much quicker than concrete."

in housing, energy, transport, and logistics are seen as drivers of this growth. Certainty over the National Development Plan's five-year cycle of the national infrastructure plan is crucial if the industry is to gear up for a solid project pipeline.

"Sanral has awarded two mega projects on the N2 Wild Coast at a cost of R3-billion, with a further seven packages soon to be tendered for a budgeted amount of an additional R6-billion. It is our hope that with the help of government and industry players, we can unlock the rest of the R128-billion worth of national road projects that are sitting at Sanral right now, not able to be rolled out because there's a general anti-toll sentiment in the country."

Nonetheless, the current Sanral 2018/19 non-toll budget allocation amounts to R54-billion, plus another R15-billion for the toll portfolio that will go towards traditional maintenance and priorities capex.

"We are the stimulus before the [Ramaphosa] stimulus package," says Macozoma.

Shaun Hadkinson, marketing manager of CoreSlab, CoreCivils, and Corestruc, describes the general state of the road building industry: "The entire construction industry is in a very difficult position. This can be attributed to underspending on infrastructure by the state, including roads — the bread and butter of the construction industry — due to a number of reasons. More recently, Sanral started spending again. This follows a protracted delay in investment into its roads infrastructure. According to the Ministry of Transport, Sanral's spending is set to rise as high as R20-billion by 2020/21.

"In the City of Johannesburg, only 6% of bridges are claimed to be in good condition and the balance requires urgent intervention. Some of these bridges are between 60 and 90 years old and an investment of R170-billion is required to attend to this growing backlog. The municipality wants to raise more than R50-million to attend to this shortfall," says Hadkinson.

According to Sanral, bridges on its road network are in good condition. The national road system comprises more than 9 800 bridges and major culverts, which are inspected every five to six years by accredited inspectors. This includes the 927 bridges and culverts on routes managed by concession holders. According to its 2017/18 financial results, 93% of travel on national roads involved bridges considered to be in good condition — slightly lower than in 2016/17, when the figure was 94%. "It notes that the majority of the national bridges and culverts were inspected from 2015 to 2017 and, wherever road upgrades include new bridges and culverts, inspectors ensure that these structures meet the specified flood-capacity standards," he says.

JG Afrika, a firm of consulting engineers, is supervising the doubling of an approximately 30km section of the N4 toll road between the M17 Garankuwa and R512 Brits



Skhumbuzo Macozoma, CEO of Sanral.

interchanges. The roughly R500-million project was undertaken in response to a substantial increase in traffic on this section of the road corridor, which is administered by the Bakwena Toll Concessionaire on behalf of Sanral.

JG Afrika started working on the preliminary and detailed design of the two new carriageways on the east and west sides of the existing road in 2016, and a joint venture (JV) between Raubex and Enza Construction mobilised to site in mid-2018 to begin the three-year works programme. Phakamile Ngqumshe, a director of JG Afrika, says that the project is an extensive undertaking.

"It involves the construction of about seven large structures, including the Crocodile River Bridge with its 120m span. This is in addition to the lengthening of a number of smaller structures, such as culverts, along this section of the N4. The scope of work also involves extensive earthworks, with as much as 80% of the clays on the project site to be replaced by rock fill," Ngqumshe says. The rock fill comprises material sourced from a mine waste dump in the vicinity of the project. This approach was proposed by Raubex

and Enza Construction and eliminates the need to open borrow pits along the route.

It supports Sanral's focus on building 'green' roads and demonstrates the innovation that the two contracting companies brought to the professional team at this early stage of the project. The project is providing numerous opportunities for small black-empowered businesses located within the vicinity of the road-dualisation project. Bakwena has committed to sourcing as much as 30% of all project requirements from local businesses, with 10 emerging contractors working alongside the Raubex and Enza Construction JV.

"We have engaged and involved the many community members who will participate in this project early on via two nominated officials from the City of Tshwane Metropolitan Municipality and the Steve Tshwete Local Municipality. This approach has ensured a spirit of goodwill between the contractors and the respective communities and is already bearing fruit, as is evidenced by the minimal disruption to construction works that we have recently experienced," he says.

"We are the stimulus before the [Ramaphosa] stimulus package."

**Skhumbuzo Macozoma,
CEO of Sanral**

Road testing and design

Roads have an extensive design and test process, and South Africa is currently in the process of moving to a performance-based system due to constantly increasing road traffic growth. An important redesign process is currently under way regarding asphalt mix design for road building. Industry-driven, it aims to help roads withstand potentially hotter climatic conditions for greater durability.

Herman Marais, technical director at Much Asphalt, says of the mix design: "If it is for a major contract like Sanral or a city council, then it will go to their consulting engineer, which may in turn have the design verified or recommend some tweaking of the mix. Once the design is finalised,

the plant produces a physical sample of that design to prove it can actually be manufactured at the plant. That sample is then tested, and if it again passes the prescribed tests, a paving trial is conducted on the road. The contractor will thereafter pave for two or three days, performing trial tests during that time, which may require further tweaking of the design based on actual performance.

"We are currently moving over to an entirely new bitumen specification and asphalt mix design process, which is performance based and is being driven by the industry. The current bitumen specification covers a number of empirical tests, mainly for viscosity at different temperatures. These tests are done before and after short-term ageing and although they give an indication of ageing that takes place during the asphalt mixing and paving process, they do not cater for prediction of long-term ageing that happens on the road," Marais explains.

"The new performance grade (PG) specification classifies bitumen in different temperature grades relating to the maximum and minimum expected pavement temperatures, as well as traffic class to which the asphalt will be subjected. The new PG specification does not only look at the viscosity of the binder and the effect of short-term ageing, but also incorporates a long-term ageing process — using the pressure ageing vessel (PAV) —

which simulates three to 10 years of ageing on the road. The testing that is performed on the aged bitumen also tests the response of the binder to repeated stresses applied in the dynamic shear rheometer (DSR) as well as low-temperature performance in the bending beam rheometer (BBR)."

Dave Bennet, general manager of National Asphalt plant in Pretoria North, says: "The current asphalt mix requirements are not suited to handle these high traffic volumes and in future, all product will have to be supplied with a performance guarantee of a minimum of five years. For this reason, the consistency of the asphalt mix component will be even more critical."

Concrete manufacturers are in the process of lobbying for more roads to be constructed using concrete. This may be a hard sell given that a new innovative asphalt mixture developed in France (EME) using a harder binder grade has been earmarked to replace concrete pavements. "This product is not just cheaper than concrete but is rendering similar stiffness values as concrete with the advantage of flexibility. The production and turnaround times are also much quicker than concrete; therefore, curing time delays are no longer needed, which in turn reduces the construction period by 70%," says Bennett.

Advantages of equipment

One of the major contributors to road rehabilitation efficiency, is the sophistication of the equipment used. Paul Heslop, MD of Rhino Excavator Hammers, explains that the state of the construction industry means Rhino does more work operating its equipment on civils sites and mines than on selling its excavators and hammers. "We normally put hammers onto road building equipment for the secondary breaking after blasting. We also provide an alternative to blasting on quarries, which is our major connection to road building."

Marc Beer, Baseline Civil Contractors' plant director, says: "As we speak, there is a fair amount of new work coming out in both the public and private sector, and we feel we've geared up in terms of advanced new equipment to meet these challenges and above all, provide our clients with a better product than our competitors."

It is the more sophisticated equipment that sets the company apart and gives it a technological edge, he claims. "With much of the new work in both road construction and rehabilitation on offer, tender specifications demand that certain specialised equipment be used to ultimately create a better and longer-lasting road surface," Beer adds. ■■



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