

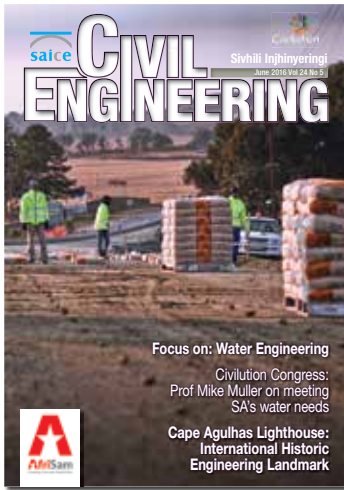
# CIVIL ENGINEERING



**Focus on: Water Engineering**

Civilition Congress:  
Prof Mike Muller on meeting  
SA's water needs

**Cape Agulhas Lighthouse:  
International Historic  
Engineering Landmark**



Sivhili Injinyeringi = Xitsonga

## ON THE COVER

*AfriSam is supplying the cement for the rehabilitation of the N1 section from Sydenham to Glen Lyon near Bloemfontein. The project, done on behalf of SANRAL, is a showcase of innovative design characteristics and outstanding labour-intensive workmanship. The other key players are Raubex Construction, Roadmac Surfacing and WorleyParsons.*



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# ON THE COVER

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► The rehabilitation of the N1 section from Sydenham to Glen Lyon near Bloemfontein includes the placing of geotextiles to overcome high clay content in the northern portion of the contract

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# Spreading quality on SANRAL road overhaul

## INTRODUCTION

The South African National Roads Agency SOC Limited (SANRAL) is known for demanding only the best from the country's road-building fraternity.

This is exactly the case with the rehabilitation of the N1 section from Sydenham (km 28.8) to Glen Lyon (km 62.4) near Bloemfontein in the Free State. When completed in May 2017, this road will have a life of up to 20 years, mirroring innovative design characteristics and outstanding workmanship.

Johan Acron, project manager at Raubex Construction, Africa's largest road builder, says the high-level design specifications for this road makes it one of South Africa's many flagship projects in terms of road rehabilitation works.

Designed by consulting engineering firm, WorleyParsons, the road is made up of 350 mm G4-stabilised subbase, 120 mm bitumen-treated base (BTB) course and 20 mm ultra-thin friction course (UTFC).

## TEAM APPROACH

Joining Raubex on the project is Roadmac Surfacing, which is tasked with the BTB and the surfacing components, while Raubex handles the subbase.

Raubex arrived on site in late February 2015 to commence with the R538 million project. The project includes the rehabilitation of bridges and culverts (which together are valued at about R2 million), as well as a host of ancillary works.

By mid-March 2016, the contractor was making steady progress on the project, being 22 days ahead of schedule, with about 68.8% of the subbase completed on the just more than 67 km long works package.

Acron attributes the stellar performance of the contractor to the proactive approach taken by the client, consulting engineer and various subcontractors. However, he also gives credit to the outstanding performance of the participants in the very critical supply chain of this project, including AfriSam and Raubex's sister companies, Tosas and Petra Quarry. Tosas and Petra Quarry are both part of Raumix, the materials division of the Raubex Group.

The rehabilitation of the N1 stretch from Sydenham to Glen Lyon near Bloemfontein in progress – two loads of cement are delivered to the site every day from AfriSam's depot in Bloemfontein





Accurate spreading is done by hand, meeting SANRAL's labour requirements, and then compacted mechanically



The placement of the geotextiles is extremely labour-intensive, and is one of the more challenging aspects of the project

He says the project has been divided into 16 sections, each about four kilometres in length. Work starts with the measurement of the natural ground levels, followed by the milling of 50 mm of the base of the existing pavement. This milled material is being used to produce the 20% of recycled asphalt used in the BTB that is being batched by Much Asphalt as part of SANRAL's ongoing focus on sustainable road construction.

The construction team then surveys the area and places a quality G4 material, which it imports from Petra Quarry in Bloemfontein, and pre-shapes the subbase layers before stabilising them to a depth of 350 mm with 2% CEM II cement from AfriSam.

An interesting aspect of the spreading on this road construction programme is that it is being done by hand, as opposed to using mechanical methods. This labour-based approach is helping the contractor adhere to SANRAL's strict protocols of ensuring that all its road works create numerous jobs during construction. Shortly after the project peaked, 227 people were working on site.

### AFRISAM WELL POSITIONED

A significant competitive edge for AfriSam in the Free State is that it has a depot in Bloemfontein, which receives cement directly by rail from its Ulco clinkering and grinding operation in the Northern Cape. The depot is strategically situated a mere five kilometres from the construction site. This is one of the reasons why AfriSam's cement features so prominently on all of Raubex's recent road-building projects in the province. As AfriSam's Stefan Roos notes, should an emergency arise, the company guarantees that it will have cement on site within an hour.

This project alone will consume 20 000 tons of the company's Roadstab 32.5N CEM II B-L cement.

Apart from the high quality of AfriSam's cement, Acron is most impressed by the company's strict delivery schedule, which helps Raubex keep to its tight construction programme, of which the subbase work is a critical component.

After both Raubex and AfriSam had drafted and agreed on an optimal delivery schedule, weekly contact has been maintained between both companies to ensure an uninterrupted supply of cement. Two loads of cement, each comprising 1 440 bags, are delivered to the site every day, with the first loads arriving at 04:00 in the morning.

Small, medium and micro enterprises are then tasked with offloading the cement from the trucks and spreading the cement manually before stabilisation starts.

### LABOUR-INTENSIVE OPERATION

While Acron is very familiar with both mechanical and labour-based spreading, he is impressed by the accuracy and optimal productivity levels achieved by the subcontractors using manual techniques, and he believes this can be attributed to the team of professionals' proactive approach to managing the project.

Once recycling is completed on the various sections, Raubex primes the subbase with the invert bitumen emulsion that it sources from Tosas. When the surface has dried, Roadmac Surfacing applies two layers of BTB, each 60 mm thick, whereafter the company places the 20 mm thick layer of UTFc.

Acron says there were few challenges on this aspect of the project, describing it as a straightforward, heavy-road rehabilita-

tion project to which the contractor has become accustomed over the years. "Raubex always strives to produce the best possible riding quality, enabling it to hand a high-quality product back to its client and the public."

### USE OF GEOTEXTILES

However, there is a section of the works that is keeping the entire construction team on their toes.

Special geotextiles – geogrid and glassgrid supplied by Fibertex Geotextiles – have to be placed on a portion of the northern section of the road to counter the anticipated ground movements due to the high clay content.

Acron says this process requires skill, is highly time- and labour-intensive, and needs to be managed carefully to ensure that work progresses according to schedule. He explains that Raubex removes the existing base course by milling and stockpiling the surplus material. Then a selected gravel layer, comprising 95% G6 material compacted to a thickness of 150 mm, is hauled from a local borrow area and compacted as prescribed. Geogrid is then placed on the selected gravel layer for soil stabilisation and covered with a neat 50 mm layer of G4 material obtained from Petra Quarry in Bloemfontein. This operation necessitates skill when end-tipping to ensure that there is no damage to the geotextile product.

The entire layer is saturated with water and compacted using a 12 ton smooth drum roller to ensure a rideable area for the delivery of the required 250 mm commercially obtained

G4 material. The neat, unstabilised 30 mm G4 layer is then compacted to 97% modified AASHTO density. This compacted layer is left to dry for approximately seven days, after which the final level is cut and secured. The layer is then primed at 0.7 litres per square metre.

Approximately three days are allowed for the prime to dry, after which time SS60, supplied by TOSAS, is applied at 1 litre per square metre as an adhesive for the glassgrid, which is then rolled open over the entire subbase area. This is a very labour-intensive operation and requires diligence from all parties involved to ensure a quality product.

### CONCLUSION

This is yet another project that Raubex will be able to add to its impressive portfolio of successful road construction contracts. Furthermore, it is proving to be an excellent learning experience for Raubex's young and enterprising team of *pad-makers*. Their capabilities and creativity point to the ongoing success and future of this powerhouse in the African road construction industry.

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