

Improvement and Upgrading of National Route 1

FINALIST Community-based Projects Category

KEY PLAYERS

Client

South African National Roads Agency Limited (SANRAL)

Professional team

SNA Civil and Structural Engineers (Pty) Ltd / ITS Engineers Joint Venture

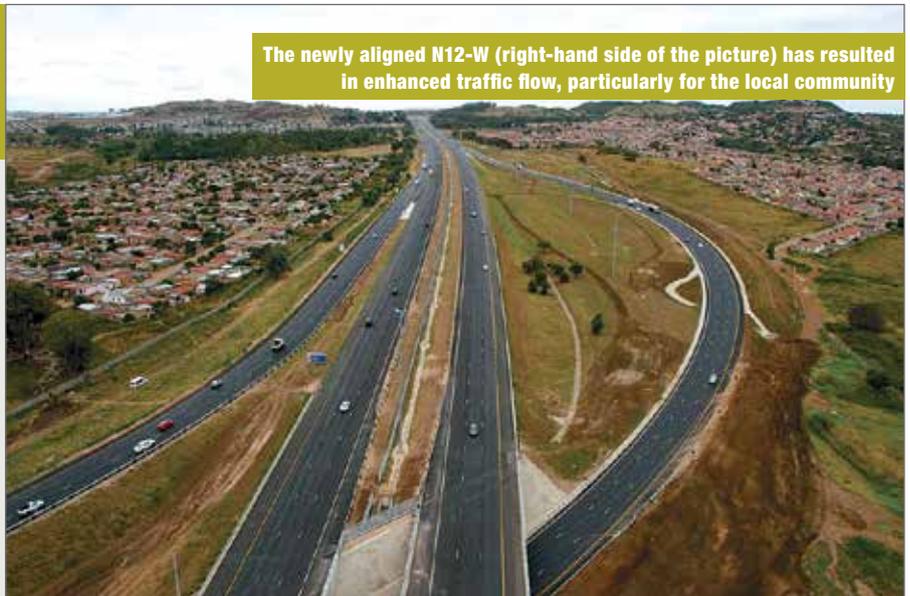
Main contractors

Basil Read / Tsimba Construction – Joint Venture

Sub-contractor

Ampcor Khanyisa cc

The newly aligned N12-W (right-hand side of the picture) has resulted in enhanced traffic flow, particularly for the local community



OVERVIEW

National Route 1, located southwest of Johannesburg on the N1-20 and N12, is an extension southwards of the SANRAL Gauteng Freeway Improvement Project (GFIP).

Although originally not considered by SANRAL as requiring an upgrade as part of the GFIP it was later upgraded solely as a benefit to the community to enhance traffic flow and provide a safer driving environment.

This required an increase in the number of lanes on the N12, as well as improving the geometric standards of the interchange through the realignment of ramps.

The total length of the works undertaken was approximately 3.8 km from km 6.4 to km 9.2 on the N1-20, and approximately 1 km of the N12 westward from the Misgund Interchange.

SAFETY CONCERNS

After completion of the N1-20 and N12 sections of the GFIP, the short section of the N1-20 between Misgund and the Golden Highway quickly became overloaded with traffic due to low-standard vertical and horizontal alignments on the N12-W off-ramp.

This resulted in the build-up of the N1-S (Misgund Interchange) during peak hours, which created bottlenecks and dangerous driving conditions, as it also lies on a very tight bend under the Misgund Bridge. Despite the 80 kph speed limit under the bridge, there had been an unacceptable number of vehicle accidents, with the bridge structure also suffering extensive damage.

It also soon became clear that the two ramps of the N12 would reach their optimum traffic volumes within two years after completion of the construction works. It was therefore decided to

increase the number of lanes on both the N12 ramps to three lanes.

This required a new alignment of the ramp under the Misgund Bridge, with extensive blasting of difficult rocky formations under heavy traffic conditions. Community members were kept informed of the blasting and traffic interruptions through a Community Liaison Officer (CLO), and regular meetings were held with the two local communities of Naturena and Devland.

What also arose from these meetings was the community's need for work for the locally unemployed. Fortunately, the contractor was able to offer such employment opportunities, so most of the unskilled labour was done by workers from the surrounding area.

The Provincial Department of Community Safety requested additional speed limit signage to be erected on the

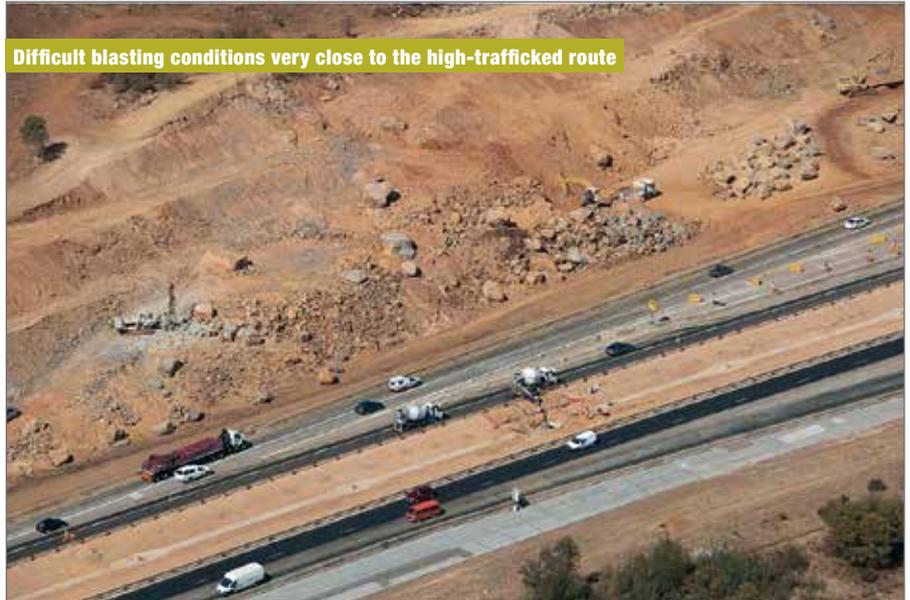
N12, as well as additional reflectors. New traffic barriers were installed under the bridge and a 1.8 m high security fence was erected along the N1-20 median preventing pedestrians from crossing the N1. High-quality lighting was also installed.

To further improve safety, the existing traffic barrier on the southern side of the N12-W was demolished and reconstructed on the new alignment to improve vertical and horizontal alignment, and an additional traffic barrier was constructed on the northern side of the N12-W. The parapets were also extended with transition sections to improve the continuity of the guardrails.

DESIGN AND UPGRADE

Each concrete pavement panel was inspected and the areas requiring repair were then marked with spray-paint.

There had also always been a flat area of the N1-20 NBC pavement where a downgrade and an upgrade met on a curve. On this flat area there had been several incidents of aquaplaning during heavy rainfall.



This was corrected without changing the alignment on this section. Thirteen rows of twelve no 50 mm diameter vertical PVC pipes were installed across the carriageway, draining into thirteen no 300 mm diameter HDP pipes crossing under the carriageway. Rain collecting on the flat area could therefore drain via these pipes to the

outer shoulder. Since completion there have been no further reports of aquaplaning.

A period of four months was allocated for the upgrading of the ramps, during which time the existing ramp under the Misgund Bridge would be reduced to a single lane. Within a week of starting the works it was obvious that this restriction



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of traffic flow would result in very serious congestion during peak periods, so the construction method was revised to keep two lanes open to traffic at all times.

CONSIDERATIONS

The fitment of three lanes on the N12-W and the new alignment through the skew-raked column bridge structure, which had to include a minimum of 5 200 mm

clearance, posed a number of challenges, which necessitated completely new horizontal and vertical alignments.

Also, only once construction had commenced, a main sewer line was discovered which posed further challenges.

In order to improve the geometric standards of the interchange under the Misgund Bridge, it was necessary to transgress onto a National Heritage Site,

which required time-consuming, but successful, negotiations with the South African Heritage Resource Agency.

CONCLUSION

This project was completed to SANRAL's and the local community's satisfaction, despite construction under severe traffic conditions with numerous design and construction challenges. □



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