The continuation of the fence replacement programme between Cato Ridge and Hammarsdale on the N3 between Durban and Pietermaritzburg, has seen the planting of 3500 trees and shrubs. Initiated as a pilot project in 2001, 4 kilometers of plants are now in place to form a barrier for tribal cattle foraging onto the national road reserve. Although not an instant solution, this natural fence will, in time not only form a barrier against cattle problems experienced on this section of road, but will also be the start of the promotion of the return of other plant species enjoying the protection afforded by larger plant species. This will in turn encourage the settlement and colonization of the area by many insect, bird and reptile species.

Median Hedge

The successful propagation of the shrub Aloe arborescens by cuttings has seen them planted in their hundreds in the median between Lynnfield Park and Ashburton (N3). Together with the Aloe species, the shrub Portulacaria has also been planted. The Aloe has had its first flowering season on site and was noticed by passing motorists because of its bright orange flower spikes.
On the N2 between the KwaMashu and Sibayi Interchanges, 3000 trees and shrubs have been planted in the median. A further 400 trees have been planted in the road reserve. Further south on the N2 near Seadoone, 400 shrubs have been planted in the median.

Town Hill
As part of the replacement of gum plantations on Town Hill just outside Pietermaritzburg, 300 Yellow Wood trees have been planted on one of the embankments. Once all the Gum trees have been removed, a further 400 Yellow Wood trees will be planted, together with other suitable trees.

Hluhluwe Upgrade
During 2005 SANRAL undertook the upgrade of the route connecting the N2 to the R22 through the town of Hluhluwe. The once mundane road through the rural town was modernized, improved and traffic circles and centre islands introduced. An avenue of Fever trees was planted on the approach to the town and the 4 traffic circles planted with indigenous Aloes, shrubs and groundcovers totaling about 2,500 plants. Large containers were planted up with focal plants on the centre islands.
SANRAL, together with the Gauteng provincial and local authorities implemented an Intelligent Transport Systems (ITS) project on the Ben Schoeman Highway whereby various technologies are used to manage traffic and to provide road users with traffic conditions on a real time basis.

The area covered by the Pilot Project encompasses all the major national and provincial freeways in Gauteng. However, in order to test certain ITS applications, the focus of the project is the Ben Schoeman Highway. With the implementation of this pilot ITS project in cooperation with the Gauteng Department of Transport, Roads and Works and the Tshwane, Johannesburg and Ekurhuleni Local Governments, SANRAL has the following aims:

1. Improved Incident Management
2. Reduced Congestion
3. Increased Road Safety
4. Evaluation of the effectiveness of ITS technologies with a view for possible further deployment

These aims will be achieved by the several forms of ITS technology that has been deployed, including a centralised Network Management Centre (NMC), Closed Circuit Television Cameras (CCTV), Variable Message Signs (VMS), loops and other traffic detection and development.
traffic information devices, as well as continuous monitoring of the systems and its impact on improved road network operations. Further research and experimentation will continue to take place during the course of the 5 year operational phase of the pilot project to determine tailored made solutions for local conditions and road users.

A key component to the project is the interaction and enhancement of existing Incident Management Systems (IMS) in order to facilitate faster emergency and incident response. This is to be achieved by improving the lines of communication, and the speed and efficiency of notification, between the incident location and the IMS.

For the Ben Schoeman section, the following systems have been implemented:

• Fibre Optic communication Backbone for communication between the field devices and the Network Management Centre
• CCTV Cameras
• Variable Message Signs
• Inductive Loops traffic monitoring equipment
• Ramp Metering

For the area wide freeway monitoring, the following systems are considered:

• Electronic Vehicle Identification readers at approximately 3km intervals
• Web cameras at the same positions
• Semi dynamic road signs at decision points such as systems interchanges where expected travel times between an origin and destination will be displayed
• Wireless communication
• Modems to provide a communication link between field devices and the Network Management Centre

Both the Ben Schoeman and area wide systems will be managed at the Network Management Centre.

The Network Management Centre (NMC) is responsible for receiving all the inputs from the different sensors deployed via a communication backbone, to process them and to provide the required output. The operator at the NMC can visually monitor the network by means of the CCTV camera system, or use the CCTV system to validate whether incidents occurred as was identified by the traffic
monitoring equipment. Once an incident is validated, the relevant emergency services will be informed. The system can provide real-time (live) CCTV images at the emergency services dispatch centres which will enable them to determine the resources (e.g. ambulances, fire engines, etc) that is required to attend to the incident.

At the same time, the public will be informed about incidents in various ways. Road users will soon be able to access information through the SANRAL web site that links with the i-traffic website, and which will provide updated information about traffic conditions (speeds, etc), road works, expected travel times and incidents. Users will also receive updated images from the CCTV cameras via the website.

The information will also be forwarded to radio and television stations whereby the public can receive updated information before or whilst they travel. In the near future, users will be able to subscribe to an SMS service that will provide them with information about incidents, as well as progress in terms of the clearance thereof.

In order to communicate with the public while travelling, electronic sign boards (called variable message signs) are placed at strategic positions which will allow the operator to give information about incidents, road works, etc. by means of pre-programmed messages. In addition, electronic signs placed at high accident spots such as Buccleuch and New Road will warn travelers automatically to slow down when a queue is building up ahead of them.

The actual recordings of the incident, management of the incident itself and the impact it has on traffic delays are recorded and available for debriefing sessions for emergency services. Through this process, improved incident management plans and procedures will be developed that will decrease the time in respect of detecting, responding to, managing and clearing incidents.

Apart from detecting incidents and providing the emergency services and the public with validated information, the i-traffic system will also pro-actively assist to improve traffic flow conditions on the Ben Schoeman Freeway.

Between Buccleuch and Allandale Interchanges, an additional lane on the shoulder (far left lane) is available to traffic in peak hours. Traffic speeds and flow conditions are monitored by means of traffic detectors. When traffic conditions deteriorate, overhead signs (green arrow or red cross) will be activated to indicate that the shoulder lane is available/not available for use. The shoulder will be available until traffic conditions improve. The red cross will then indicate that the lane is no longer available for public use. Since these sections are under constant surveillance, the lanes can be closed for public use in the event of incidents to allow emergency vehicles to use the shoulder as an emergency lane.

Ramp metering will also be introduced. Accordingly, vehicles wanting to access the freeway network from on-ramps will be controlled by means of a traffic signal alternating between red and green in order to break up vehicle platoons so as to maintain flow conditions on the freeway network.

The SANRAL i-traffic project will soon be extended to other national freeways in Gauteng. SANRAL awarded contracts in September 2006 for the extension of the ITS system along the N1 past Pretoria, the N4 towards Witbank, the N1 down to the N12 at Soweto, the N12 to the south of Johannesburg, as well as between Gillooly’s and Daveyton, the N17 between the N3 and Dalpark, and the N3 from Buccleuch to Vosloorus. A communication link via the N3 and M2 is already completed, linking the SANRAL and Johannesburg Roads Agency projects.

The information dissemination via the ITS project to the public will enhance the principles of PIARC which promotes a shift from purely managing a road network to managing the road network and its users. The lessons learnt through this project may also be valuable in terms of the management of traffic in the 2010 FIFA world cup, for which it will be essential to manage the road network and incidents effectively.
SANRAL is proud to announce that we are selected as one of 15 countries to exhibit at the PIARC World Road Congress’s historical exhibition to be held from 17-21 September 2007, which is quite a coup for South Africa. This selection was based on a proposal submitted by SANRAL on the history of the Huguenot Tunnel. To follow are some interesting facts and figures about the Huguenot Toll Tunnel.

**Construction:**

- The Huguenot Toll Tunnel was opened on 18 March 1988. It was named to commemorate the 300th anniversary of the arrival in South Africa of the French Huguenots who had fled their country to escape religious persecution.

- A pilot bore was excavated in 1976. The geological data gathered proved invaluable for planning the excavation of the main bores. The initial 144 m on the western side posed great problems in that the soft ground material comprised saturated decomposed granite containing 17% water. Conventional mining resulted in ‘mud rushes’ and had to be abandoned in favour of ground freezing techniques. The advance rate was only 32 m for every 2 month freeze/mine cycle. The ground freezing took 16 months to complete.

- The hard rock excavation commenced in 1984 with mining proceeding from the east and west portals using laser alignment techniques. Drilling and blasting advance rates were much faster – the average rate was 60 m per week for each heading. The record rate was 87 m in a week. Breakthrough was on the 28th of November 1985. Almost
half a million cubic metres of rock had been excavated and the error of alignment was less than 3 mm!

- Excavation of the southern bore was immediately followed by that of the northern bore. While this was in progress the lining of the southern bore proceeded. This operation was completed in early 1987 when final electrical/mechanical equipping could begin. Only the southern bore was equipped, the northern bore remaining unfinished until such time that traffic demands necessitate its completion. The project was completed one month ahead of schedule at a cost of approximately R200 million.

- The tunnel was designed to accommodate 5% heavy vehicles. The figure has grown to 17%!

- The tunnel is 3913 m long and has a gradient of 0.08%.

- 11 Cross connections link the operational southern bore with the unfinished northern bore. Three of the cross connections allow vehicles of the size of fire tenders to cross between bores. The cross connections are intended for use as places of refuge in the event of fire in the tunnel.

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**Operation and Maintenance:**

- Some 30 million vehicles have used the facility since the tunnel opened.

- On average 7500 vehicles pass through the portals each day.

- Peak traffic is experienced over the Easter period. Last year 16 000 vehicles were recorded on the peak day.

- Heavy vehicles account for only 17% of the traffic using the tunnel but contribute +/- 50% of the toll income.

- The tunnel has a corridor attraction of 87%. The other 13% use the du Toits Kloof Pass which is 11 km longer and requires the vehicle to climb 400 m.

- The tunnel has recently undergone a R16 million retrofit of the control system. Extensive use is now made of programmable logic controllers, dual redundant fibre optics, video traffic monitoring and SCADA systems. Thirty-five CCTV cameras are used for surveillance and detection purposes.

- 6 CO/Vis monitors assess the CO and visibility in the tunnel and automatically control the fresh air fans to keep the air inside the tunnel within close tolerances. South African diesel fuel is sulphur rich (10 x the European level) and this, together with the fact that when strong winds blow from the east the ventilation is impeded and sensitive persons might experience a slight irritation to eyes and nose.

- The Main Control Centre and toll facility is located 6 km from the Western Portal of the tunnel. The route crosses the 650 m long Hugo River Viaduct which was the first curved incrementally launched structure in South Africa.
Operation and Maintenance:

• 10 toll booths are located at the toll plaza, five in each direction. Two booths are dual direction booths so directional peaks can be accommodated. The 10th toll booth has been taken out of service because the lane is used for emergency purposes. Speeding trucks on the down grade from the tunnel often experience brake failure and by passing the arrestor bed, use this lane.

• All heavy vehicles are screened for hazardous chemicals, height, security of tarpaulins, operation of lights and loose wheel nuts. This is done to minimize the chance of failure in the tunnel.

• In the event of a fire in the tunnel, fire detectors spaced 24 m apart sense temperature rise in excess of $10^\circ$ C/min or a maximum temperature in excess of $58^\circ$ C and automatically switch the fans to fire mode, alert the operator, call the fire brigade and switch the nearest facing TV camera to a designated monitor. The video based traffic monitoring system will hopefully have detected something amiss prior to this as facilities to sense deceleration and stopped vehicles are built in. The operator then can assess the situation and notify the fire brigade to stand down if necessary.
However, existing N2 alignment did not lend itself readily to the construction of the roundabout, and a number of design challenges were encountered, namely:

a) Fitting a roundabout of a size that would accommodate the huge design vehicle into the available road reserve was achieved as follows:
   • The existing road medians were narrowed to allow for the introduction of traffic slowing ‘s’ bends on the approach lanes.
   • This median narrowing also provided the critical deflection angle on the entry lanes at the roundabout.
   • It also allowed for a smaller overall roundabout size.

b) A design complication was that the intersecting local roads meet the N2 alignment at an angle of some 69°.
   • This causes acute left turning movements and, although not a problem for smaller vehicles – are generally a nightmare for the drives of large truck-trailer combinations.
   • The problem was addressed by introducing cobbled aprons on the two acute corners – so shaped to accommodate the wheel track of the largest design vehicle – a WB-20m.

c) Because of the economic constraint to minimize disruption to the existing road surfacing and structure, the roundabout had to be placed on top of the existing road formation and all gradients and transitions designed to conform to speed and safety standards.
   • This essentially meant that the prevailing 5.5% road gradients had to be warped on the approaches so as to create the more suitable and safer 4% gradients within the roundabout.
   • Each of the entry and exit lanes and the circular lanes had to be designed separately and reconciled into smooth transitions to provide safe, comfortable rides for traffic negotiating the roundabout.

Since its inception, the roundabout has stood the test of time over the busy holiday periods without incident, proving itself operationally sound. In addition, a roundabout navigational guideline was produced to educate motorists, cyclist and pedestrians on its usage.
Routine Road Maintenance (RRM) contracts are let on all SANRAL roads for contract periods of 3 to 5 years at a time. These contracts were identified by SANRAL as the ideal mechanism to develop small contractors through a sustainable development cycle where small contractors would be assisted and developed through their interactions with an experienced managing contractor. Independent mentors for small contractors are scarce and expensive, therefore a model linking an experienced contractor with developing contractors under the RRM contract was established.

The RRM contract model provides an environment where an experienced contractor is on the same site as developing contractors thus providing the small entrepreneur the opportunity to follow the tried and tested path to success by working side by side with an experienced contractor. The programme has been in place for several years and approximately 300 small contractors have been exposed to this model.

Challenges do exist with this model such as ensuring that contracts are profitable to both the managing as well as the small developing contractor, ensuring successful and measurable contractor development is implemented, coping with the varying ability of small contractors and ensuring the model is affordable to be implemented on a large scale.

SANRAL, in partnership with the South African Federation of Civil Engineering Contractors (SAFCEC) embarked on a pilot programme on the Routine Road Maintenance contract on the N2/N3 in Durban, managed by Raubex Construction, to determine how the current model should be adapted to cater for a range in capacity and ability of small contractors, from entry level to those past entry level who have successfully completed a number of contract cycles as subcontractors. The contract document specification for the training, coaching, guidance and mentoring of small contractors by the experienced managing contractor was modified to include three distinct phases in the development of the small contractors. Firstly, the experienced contractors will Assess the Development Potential of each of the small contractors being mentored. Secondly, this assessment will then be used as a guideline to develop an individual Development Plan for each of the small contractors and the implementation (measurement) of the development plan will be recorded as part of the Portfolio of Evidence which will be used as a record of the development progress of the individual small contractor.

The RRM contract model has been adapted to allow a development path for these small contractors, by providing for larger more sustainable contracts and with this, provide the developed small contractor the opportunity to move to the next stage by joint venturing with an experienced contractor. The first such opportunity was provided on the N5/R30 routine road maintenance contract in the Free State which was awarded to Kew Maintenance (an experienced contractor) who joint ventured with Vukuzenzele (an RRM subcontractor) as the main contractor, while still retaining a significant portion of the works for the entry level local small contractors and those still in the initial development phase.

The modified concept for training, coaching, guidance and mentoring of small contractors has been implemented on all recent RRM contracts and good progress is being made with this development programme.
South Africa's richness in fauna and flora is generally well known and appreciated by many of its citizens. Indeed, there are hundreds, if not thousands, of publications which cover this part of our natural heritage. However, how many of us are aware of, and can thus appreciate, our unique geology which has provided us with such beautiful and interesting landscapes as well as the mineral richness which has had a fundamental impact on the country's economic development? During our travels, how often do we wonder about the shape or form of a particular mountain ahead, the unusual pattern of a road cutting, the colour or texture of the roadside gravel or the purpose of a distant mine head?

A book entitled "Geological Journeys: A traveller's guide to South Africa's rocks and land forms" has recently been published, which offers answers and explanations about geological features along all the major national routes across South Africa. Also included are specific areas of unique geology located on some of the lesser routes, as well as the three main metropolitan areas of Johannesburg, Cape Town and Durban. The book includes:

- Beautiful photographs that support the text
- Maps of all the routes, showing numbered geosites that link with the text
- Diagrams showing the geological make-up of the sub-continent
- Illustrations that reveal major geological processes
- A glossary of geological terms
- A comprehensive bibliography

Whether one is an engineer or a layman, utilization of this guide can only add a totally new dimension to our travels across the length and breadth of our wonderful country. To quote from the foreword to the book by Nicky Oppenheimer, Chairman of De Beers Consolidated Mines (the sponsor of the book): "The geology of South Africa is a magnificent story, a journey through geological time going back almost four billion years. Enjoy the ride."

(PS. The book even contains a photo and accompanying explanation of the existence, and purpose, of those little blue marker boards located on all national routes.)
Impending legislation will make the consignor of goods, the haulier and the consignee co-responsible for the overloading of trucks. As such, the entire “supply chain” will become liable to prosecution if there are grounds to believe that the business practices of any of the three contribute to the damage caused to our roads by overloading. At the same time, the National Overloading Control Strategy of the Department of Transport encourages the private sector to implement self regulation in respect of loading and to refrain from the unfair business practice of overloading in their pursuit of market share.

SANRAL appointed the National Productivity Institute, who in turn appointed other service providers to undertake a pilot project to reduce overloading in the Timber sector. This pilot project was the foundation stone of what later became branded as “LAP – A Loading Accreditation Programme”.

LAP or RTMS as it is now known, involves a number of management actions and responsibilities that each member of the supply chain has to carry out in order to curb the occurrence of overloading. These include the recording of the mass of goods loaded, transported and off-loaded. Audit-trails are required that enable third party advisors to assist the parties involved to identify where overloads are being generated, and to overcome them. Those companies that properly implement the management procedures and demonstrate a history of compliance with overloading law may attain the status of “accreditation” and will be allowed to display an emblem that confirms their status as compliant businesses.

Incentives are sought by haulage companies that are accredited, such as being weighed less often at weighbridges (saving them lost time), a reduction in insurance premiums, reduced license fees and reduced toll tariffs. Although it is feasible to implement a system whereby accredited trucks are given the benefit of the doubt at truck screeners and are allowed to proceed past weighbridges, it is doubted that any of the other incentives will be able to be accommodated for legislative and administrative reasons.

The private sector companies that were initially exposed to LAP indicated that they felt that the same principles could be applied to managing vehicle and driver fitness. Consequently, LAP developed into a system not only aimed at curbing overloading, but also for the management of the roadworthiness and the maintenance of trucks, load securement and the most productive use of drivers whilst preventing them from driving for too-long periods, with poor eyesight and driving whilst sick or otherwise being unfit to drive.

With these further aspects being incorporated, it was felt that “LAP” was no longer a truly appropriate name, and “RTMS – the Road Transport Management System”, was adopted.

The RTMS initiative has achieved some remarkable results, mainly due to the stout efforts of the consignees – the mills at which timber is offloaded and who detain overloaded trucks for several hours before allowing them to commence their next trips. Although the results vary from 85% to 97% compliance between the different mills, a general compliance of approximately 93% in loading has been achieved. This should be seen against an initial benchmark, prior to RTMS, of 70%.

The carrying forward of RTMS will include the development of a National Standard for Accreditation along the lines of an ISO standard. As a first step, work on the standards has commenced with the writing of the Recommended Practice; Road Transport Management Systems, Part 1: Operator Requirements - Goods (ARP067-1). Further ARP documents will address recommended practices for Consignees and Consignors. The work is expected to be completed before the end of this year.

In view of the leading role that several major consignees are playing in the various structures of RTMS (e.g. Chamber of Mines, SAPPI, Mondi, and of late, members of the sugar and coal industries in Kwa Zulu-Natal and Mphumalanga, etc.) it is believed that RTMS will continue to grow as more corporate citizens come to appreciate the value to their businesses of using good trucks, being driven by good drivers on good roads.