

# Model Kloof Pedestrian Bridge and Walkway

A community development project and Africa's first *Greenroads™* South Africa pilot project



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## THE PROBLEM

A relatively large number of pedestrians, in the morning, were observed walking along the N11 towards the Ladysmith Central Business District from the suburbs of Limit Hill and Model Kloof. The same movement was observed, in the opposite direction, during the afternoon peak period. These pedestrians were using the N11 shoulder.

School children who attend the Limit Hill Primary School were also observed directly crossing the N11 due to lack of appropriate pedestrian infrastructure, during both the morning and afternoon peak periods. In addition, traffic entering Ladysmith during the morning peak period was backing up to

On the northern outskirts of Ladysmith, KwaZulu-Natal, the Limit Hill and Model Kloof neighbourhoods are separated by the busy National Route 11 (N11) which connects Ladysmith in the south to Newcastle in the north. The N11 has two access roads in the area – Muller Street, which accesses the N11 from Model Kloof to the west, and 1st Avenue, which accesses the N11 from Limit Hill to the east. Commercial developments nearby had resulted in increased vehicle traffic volumes in the area making the section of the N11 between Limit Hill and Model Kloof unsafe for both vehicles and pedestrians.



The project site is located on the N11 on the northern outskirts of Ladysmith at the intersection of Muller Street and 1st Avenue (Image credit: Google Earth)

the Muller/1st Avenue intersection, thus creating unsafe conditions for both pedestrians and motorists.

The South African National Roads Agency Ltd (SANRAL) conducted a pedestrian count to determine the pedestrian flow patterns in the area. The data showed that four times as many crossings of the N11 took place in the afternoon as opposed to during morning peak hours, which indicated that the community deemed the N11 too dangerous to cross in the morning. The pedestrian numbers, including vehicle numbers, verified that a pedestrian bridge over the N11 was warranted.

### FINDING A SOLUTION

In 2011 SANRAL identified the project as a community development project. Royal Haskoning DHV (formerly SSI Engineers & Environmental Consultants) were appointed as the consulting engineers and construction supervisors for the project. Afrostructures were subsequently awarded the construction contract. The project entailed construction of a pedestrian bridge over the N11, as well as surfaced walkways connecting the Model Kloof neighbourhood to Limit Hill and central Ladysmith four kilometres away. In addition, dedicated pedestrian walkways would be constructed to eliminate the dangerous pedestrian usage of the N11 shoulder, as well as a 460 m safety wall adjacent to the pedestrian bridge to prevent at-grade crossings.

Although the existing intersection included painted pedestrian crossings and guardrail-protected sidewalks, these were not being used, as they were located outside the direct line of travel preferred by pedestrians. Pedestrian use of the roadway shoulder instead of the protected raised sidewalks highlighted a need for roadway safety education in the community, particularly for learners.

### GOING BEYOND THE ORIGINAL SCOPE OF WORKS

From the outset, SANRAL and the project team agreed to identify opportunities for implementing social, environmental and job creation best practices on the project. In 2010, Greenroads™, a road-specific rating system inspired by the concept of Green Buildings, was unveiled in the United States. A year later, at the time when the Model Kloof project was being conceptualised, SANRAL completed the construction of their award-winning Head Office building in Pretoria to Green Star South Africa 4 Star standards. The project team was thus sensitive to both the

costs and benefits of a third-party certification process and consequently interested in assessing the potential of a similar system specifically suited for road infrastructure.

Because Greenroads™ was developed in the USA, the existing rating system focuses on environmental considerations of construction and pavement designs and not on job creation and skills development. Addressing employment and development issues is a critical component to a sustainably operating South Africa. The project team therefore investigated options to combine the existing best practices with new contextually relevant best practices with a view to testing a concept that might be defined as 'Greenroads™ South Africa'. Where possible, existing SANRAL initiatives such as durability class concrete, contract participation goals and youth in-service training were treated as potential new credits for a localised version of Greenroads™.

Additional examples of contextually relevant best practices included increased reporting or use of:

- Emerging contractors
- Labour-intensive construction
- Sustainable remuneration
- Road safety outreach
- Community involvement
- Follow-up traffic surveys

Examples of best practices from the Greenroads™ rating system used on the project included:

- Waste management plan
- Recycled materials
- Site vegetation
- Pedestrian access
- Stormwater pollution prevention
- Noise mitigation and monitoring

Existing facilities were not being used by pedestrians, confirming that road safety education was needed in the area (Image credit: Google Street View)



For the Model Kloof project the contractor prepared example panels for the emerging contractors' site clarification meeting



Involving the community – RHDHV's under-35 organisation, *The Young Royals*, hosted a fun-filled bridge-building contest where pupils built their own structures using sweets and toothpicks

Where possible, the client's vision for implementing best practices was written into the project tender document. The additional considerations were written more descriptively than prescriptively. For example, the tender document highlighted areas where waste material would be generated during construction and provided suggestions for how to reuse or recycle the material. The contractor was also asked to provide a quality assurance document and waste management plan, but these documents were not critiqued against a prescribed standard set out by the client. Penalties for lack of compliance were not included in the project document, nor were specific targets laid out defining contractual obligations.

This was done to 'test the waters' of implementation without the risk of incurring additional project costs unnecessarily.

### ABOUT GREENROADS™ SOUTH AFRICA

The Greenroads™ South Africa concept currently exists in the form of an interim board consisting of representative stakeholder organisations within the road infrastructure industry. One of the tasks of the interim board is to develop a localised version of Greenroads™ for use in South Africa. SANRAL is represented on the board, as well as on the technical development committee tasked with the development process.

Via a memorandum of understanding with the American Greenroads™ Foundation, the localised version of the rating system (Greenroads™ South Africa) is based on the American version of the rating system. Existing American credits are being modified to suit local needs while entirely new credits are also being developed for use.

The Model Kloof Pedestrian Bridge project provided an opportunity for SANRAL to compare the project's implementation and reporting standards to the international best practice standards contained in Greenroads™ and the new draft best practices of Greenroads™ South Africa.

### PROJECT EXAMPLES

For example, a basic life-cycle inventory was carried out for the project. The data input and output methods met the requirements of Greenroads™ and provided SANRAL with a potentially new project standard for quantifying life-cycle energy use and CO<sub>2</sub> equivalents in the project's materials. These calculations account for construction equipment, material transport and material production for the roadwork materials from construction through the project's maintenance service life. Whilst having natural limitations, the process of data gathering took less than three hours.

An important initiative taken on the Model Kloof Pedestrian Bridge and Walkway project was the added provision of a follow-up pedestrian survey. This low-cost addition to the project was intended to serve two purposes:

- To determine whether pedestrians in the area are taking advantage of the facilities, and to what extent. This serves to validate (or invalidate) the original design assumptions and provide lessons if such assumptions were incorrect.
- To quantify how traffic movement patterns are influenced by the new infrastructure.

The two Model Kloof pedestrian surveys revealed that, whilst only 17 people were recorded crossing the N11 at grade in the



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morning prior to the project, 134 people were recorded crossing the N11 using the bridge shortly after completion. However, during the construction period of the bridge, pedestrians, particularly school children, were assisted by a pointsman to cross the N11. The walkway into central Ladysmith was also used, with 141 peak period users recorded. The large number of pedestrians utilising the new infrastructure validated the implementation of the project. The bridge and walkway were opened to the public in December 2012 and to date no accidents have been reported. A notable lesson learned following the project is that one or two at-grade crossings still occur daily due to illegal drop-offs on the N11 at Muller Street.

Another contextually relevant initiative for Model Kloof was the use of 24-hour noise-monitoring equipment to ensure that nearby residents and learners at Limit Hill Primary School would not be negatively affected by construction noise. As a Greenroads™ SA pilot project, a full list of best practices implemented, as well as the reporting processes, data collection and supporting documents will be made publicly available online.

### **TURNING MODEL KLOOF'S SUCCESS INTO FUTURE SUCCESSES**

Each credit in the existing Greenroads™ rating system includes 'Approaches & Strategies', 'Potential Issues', 'Examples' and supporting 'Research'. These sections do not exist yet for the new draft credits adopted for trial on the Model Kloof Pedestrian Bridge project, but it is envisaged that SANRAL and members

of the civil engineering industry will scrutinise the project data once it has been fully compiled to create similar, but locally relevant, sections, and more. Model Kloof has already provided lessons to be learned. Recommendations and project pitfalls have already begun to be compiled in order to populate the earliest version of Greenroads™ South Africa's new draft credits.

The aim is to 'pay it forward' so that future projects, regardless of road owner agency, consultant or contractor, can easily build on the successes and failures of previous projects.

### **LESSONS LEARNED AND RANDS SPENT**

In order to more successfully implement some of the best practices, project documents will require more prescriptive measures in the form of 'B Items' and construction items in the project bill of quantities. Construction items would likely need to be in the form of 'extra overs', provisional sums and lump sums with the possibility of penalties for non-compliance and/or bonuses for exceptional compliance.

The additional time-related costs borne by the consultant team will be an important factor in determining successful implementation of best practices. To ensure that future project teams adhere to the transparent reporting requirements of Greenroads™ South Africa, data collection and calculations are required. While many of these calculations are simple, some require a familiarity with life-cycle design or cost-benefit analyses. These calculations no longer form an integral part of infrastructure development in South Africa (or the United States) as they did forty years ago.

The cost of additional design work, data collection and modifications to the tender document for Greenroads™ South Africa was less than 1% of the project's construction cost. It is anticipated that the percentage of project cost will decrease in time with experience, improved local resources from Greenroads™ South Africa and larger project sizes.

It is a goal of the Greenroads™ South Africa technical development committee to provide a streamlined process to include prescriptive best practices for future projects without requiring that project teams 'reinvent the wheel'. The underlying challenge facing successful adoption of the Greenroads™ South Africa concept will likely be balancing the cost of implementation against the perceived benefit to the project and its stakeholders. To further reduce the cost of implementation and ensure project success, the improved project specifications and lessons learned during implementation will be made available via the Greenroads™ South Africa organisation.

Additional projects with wide-ranging scopes will be required for pilot project assessments in order to ascertain which concepts can be carried out affordably while still providing value either through better reporting or improved project delivery.

### CONCLUSION - MOVING FORWARD

Adopting the philosophy of sustainable practice on road infrastructure projects is not without challenges and potential

criticism. 'Sustainability' and 'best practice' will always be subjective and politically charged. Industry-supported sustainability metrics such as Green Buildings and Greenroads™ partially address these challenges by providing a common language and a uniform system for comparing the sustainability of projects within their industries. Perhaps the most important value of such systems is the creation of a sustainable design manual and the subsequent increased awareness and knowledge-sharing throughout the industry. It is through the improved access to knowledge and technical guidance for project teams that road infrastructure projects can begin to achieve greater success in meeting the country's sustainable growth objectives.

### ACKNOWLEDGEMENTS

- The authors would like to thank the United States Greenroads Foundation for their continued collaboration, flexibility and, most importantly, patience.
- The authors are also grateful for recognition of their hard work from SAICE whose Durban Branch awarded the project Best Community-Based Project for 2012-2013.
- Lastly, the project team could not have achieved its successes with the local community without the incredible contribution of SANRAL Public Liaison Officer, Mondli Luvuno, who tragically passed on before the project was successfully completed. □

The completed pedestrian bridge; the choice of handrail colour was influenced by the prominence of blooming aloes in the area



The bridge is now open!



A follow-up pedestrian survey showed that the number of people crossing the N11 increased by almost 700% following completion of the new bridge



Source:

[http://www.saice.org.za/downloads/monthly\\_publications/2013/2013-Civil-Engineering-August/#/0](http://www.saice.org.za/downloads/monthly_publications/2013/2013-Civil-Engineering-August/#/0)