

SAFETY INITIATIVES IN THE RURAL EASTERN CAPE

WITH SPECIFIC FOCUS ON

NATIONAL ROUTE R61 SECTION 8

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ABSTRACT

The paper describes the implementation of safety improvement measures on the R61 Section 8 between Mthatha and Port St Johns.

The paper details the infrastructure development and community requirements for those communities living adjacent to the national road. It then continues to describe the design considerations taken into account during the formalisation of engineering solutions, with particular emphasis on improving vehicular and pedestrian safety at at-grade intersections.

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1. INTRODUCTION

This paper describes the road safety improvements that are being implemented. By the South African National Roads Agency Limited (SANRAL) along National Route R61 Section 8 between Mthatha and Port St Johns in the Eastern Cape. This portion of the R61 forms part of the proposed N2 Wild Coast Highway.

The project entails the construction of roadworks, structures and facilities relating to vehicular and pedestrian safety along National Route R61 Section 8 (R61-8). The extent of the works was defined as commencing in Sprigg Street in Mthatha CBD East and proceeding eastward towards Ndwalane, some 80km away, where this portion of the route under SANRAL terminates.

The primary objective of the improvements along the R61 was to primarily address vehicular and pedestrian safety along the road. The road initially fell under the authority of the Eastern Cape Department of Roads and Transport, however when the authority for the road was transferred to SANRAL it was determined that safety improvements were required along this route.

Initially, the required safety procedures were assessed using SANRAL's draft document, the Practical Design Guidelines for Pedestrian Facilities on Higher Order Roads. This assessment led to the formulation of basic designs that were defined with an emphasis on road class and function. They defined the hierarchy of addressing road safety as a 3-step process, namely:

1. Prevention;
2. Warning; and
3. Mitigation.

The guidelines recommended a macro level assessment to address road design aspects. The guidelines were drafted using this portion of the R61 as an example of the draft guidelines application. As such, an estimation of engineering works along this portion of the R61 was contained as an addendum to the guidelines, which set out a schedule of works required to achieve safety objectives. This addendum formed the basis for the project. SANRAL required that the abovementioned guidelines be assessed critically; thereby determining accurately the necessary works to achieve the same objectives.

A series of design meetings were held over a period of two years, where design proposals were interrogated, thereby developing the design scope into a logical set of infrastructure upgrading projects.

Although the planned N2 Wild Coast Highway (N2WCH) does not affect the works recommended under the appointment, it was unavoidable that the implications of this would need to be considered. The approach that was adopted was that, where the N2WCH is known to have an effect on the current designs, those designs must take cognisance thereof. The recommended works was anticipated to amplify the goals of the N2WCH once it is developed.

2. LOCATION

The R61 Section 8 passes through the rural areas of the Eastern Cape. The road is predominantly located on a watershed and is the regional distributor to coastal areas east of Mthatha. The R61 Section 8 commences in Mthatha where terrain is generally flat. After approximately 34 km the road becomes increasingly undulating. After a further 10km, the terrain undulation increases and becomes hilly, almost mountainous with sharp rises and falls with the road constructed

along the hill ridges meandering into the valleys below up to the end of the project limits. A location plan is shown as Figure 1.

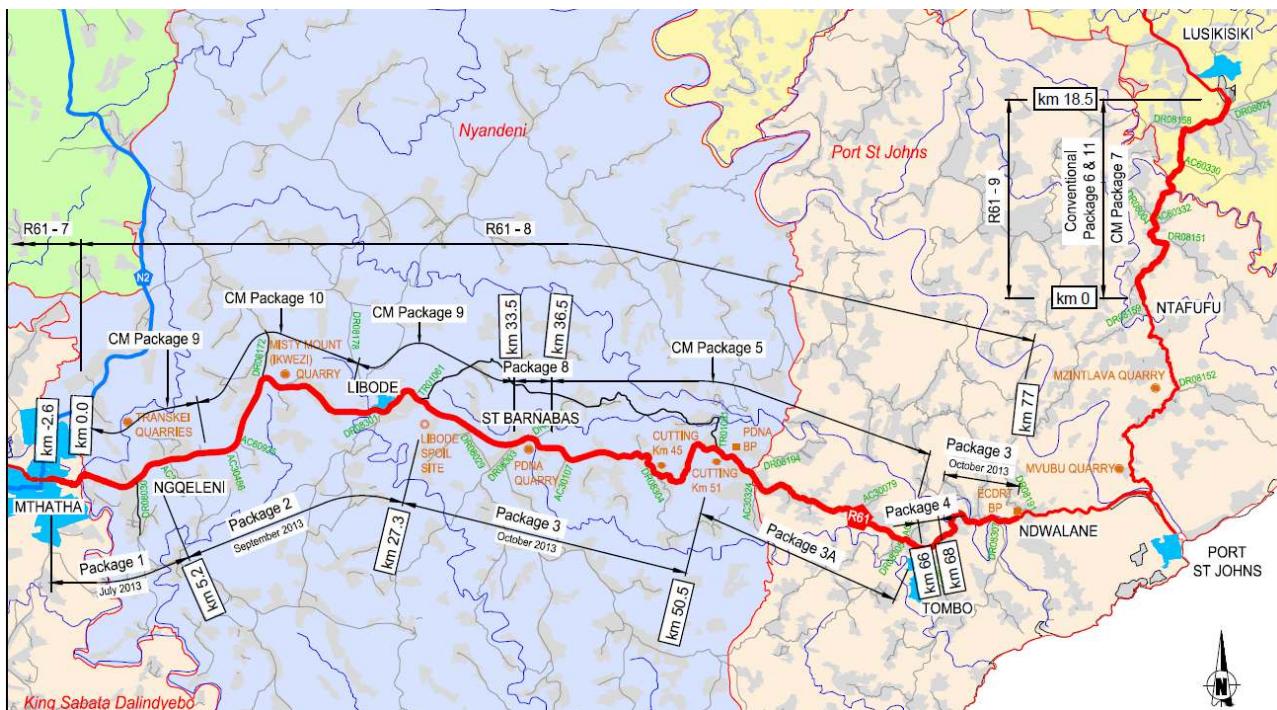


Figure 1 : Location Plan

3. SOCIAL ASPECTS

The villages bordering the road are predominantly rural and typified by poor households. The Integrated Development Plans of the local communities indicate that unemployment is at 50.3% and that 60% of the unemployed are youth (Port St Johns IDP 2013/2014, page 70). This situation means that people movement is predominantly by foot or by taxi. The result is that pedestrian movement is significant, especially to and from schools.

This area is also typified by ribbon developments along the major roads. With the poor riding quality and infrequent maintenance of the roads, communities favour access onto the surfaced roads. Figure 2 shows a portion of the route illustrating the typical ribbon development that occurs along the route.

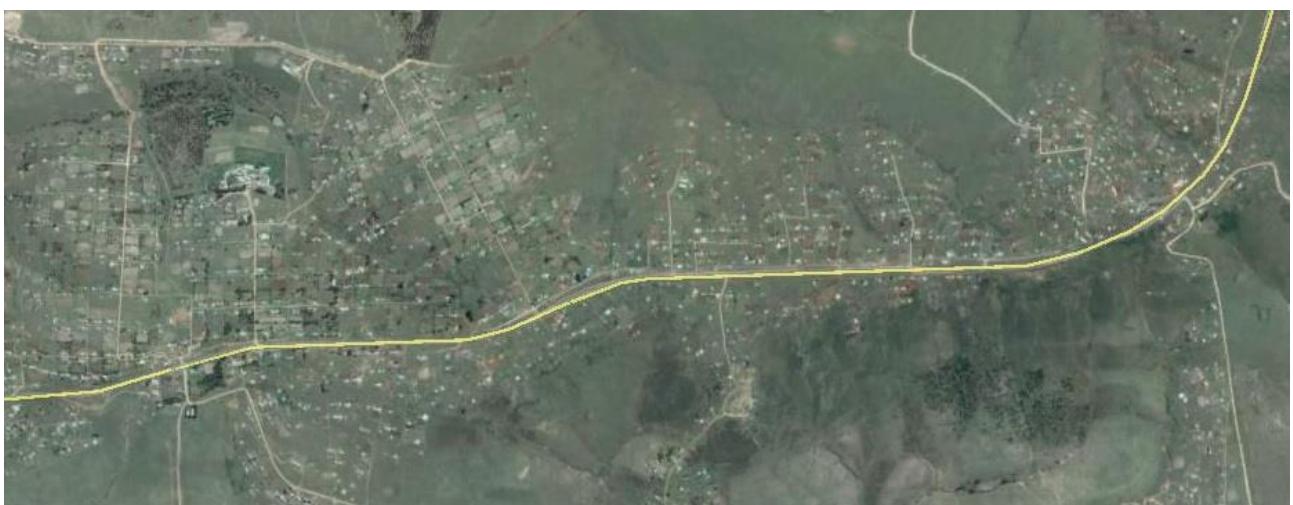


Figure 2 : Typical ribbon development (image from google earth)

4. INTER –GOVERNMENTAL DEPARTMENT PLANNING CO-ORDINATION

The location of government services has not been co-ordinated and as such has resulted in road safety aspects being ignored in the development of infrastructure. Examples of this are the construction of schools across the road from the school feeder population. This is illustrated in Figure 3 below.

Figure 3 shows that the lack of planning has resulted in easy access for the teachers, but the positioning of the schools requires pupils to either walk on the R61 or to cross it. No provision was made for the safe movement of learners to the school.



Figure 3 : Community infrastructure (image from google earth)

5. SAFETY CONCERNS

The safety concerns are similar to those experienced in rural areas, however if it is considered that the R61 is the main regional distributor road and that it is indicated to form part of the proposed N2WCH, these safety concerns are required to be addressed in a formal manner.

5.1 Vehicular

Vehicular safety concerns related to right hand turning movements as well as uncontrolled and informal accesses onto the R61. Image 1 shows a typical uncontrolled access and vehicle parking onto the R61.



Image 1

5.2 Pedestrian

Pedestrian safety concerns included pedestrians crossing the R61 as well as pedestrian usage of the R61 by walking on the bitumous surface inside of the yellow line. Images 2, 3 and 4 illustrate this occurrence.



Image 2



Image 3



Image 4

At four areas along the route, pedestrian crossing movements have been accommodated by the placing of speed humps with a raised central median (image 5).



Image 5

5.3 Livestock

Livestock are herded across the R61 at various points. The crossing areas are not sign posted so motorists have no advance warning of the potential conflict area. Image 6 is an example.



Image 6

6. ROAD SAFETY AUDIT

No road safety audit has been undertaken on the road, however if the risk assessment matrix of the South Africa Road Safety Audit Manual (2nd edition, 2012) is used, then all these potential conflict areas would be rated as being “intolerable” or “high”. The implication of this is that safety improvement measures must and should be implemented even though the costs may be high.

SANRAL has recognised this and is implementing safety improvements to the value of R1.2 billion on this section of road.

7. ROAD SAFETY INITIATIVES

The road has a design speed of 100km/h with this speed being reduced to 60km/h through the larger formal settlements. In order to achieve the free flow of vehicles along this route it is not possible to reduce the speed limit for each of the formalised intersections.

The road safety initiatives that have been implemented include a number of conventional solutions which include the following:

- The construction of 9 km of dual carriageway sections;
- The construction of 5 km of divided carriageways with median barriers to limit random pedestrian movement;
- The construction of 2 new interchanges;
- The construction of 2 pedestrian bridges;
- The construction of 13 agricultural under- and over-passes;
- The construction of 4 vehicular under- and over-passes;
- The construction of 4 new bridges over rivers;
- The formalisation of intersections, including acceleration, deceleration and right turning lanes, and closing of all other informal accesses (26 formal intersections and 68 closed informal accesses);
- The construction of 40 km of parallel surfaced service roads to facilitate the movement of vehicles to the formal intersections;
- The construction of 70 km pedestrian walkways at the edge of the road reserve so as to provide all-weather pedestrian movement routes.

8. INTERSECTION UPGRADE

The upgrade of intersections proved to be the most difficult in terms of engineering design. The difficulty arose in an attempt to develop “hard” engineering solutions for “softer” social and communal requirements. This was particularly the case where intersections were located adjacent to schools.

The R61 is predominantly located along a watershed, as such the terrain precluded the use of conventional solutions such as the construction of either under- or over-passes. As such this posed an intersection design problem centred on the facilitation of pedestrian crossing movements while maintaining the unimpeded flow of through traffic.

8.1 Vehicular considerations

In proposing a possible solution, it was determined that it would be impractical to reduce the speed from 100km/h to 60km/h at every intersection due the relatively short distance between adjacent intersections. Further to this, observations of driver behaviour show that unless a physical obstacle is encountered by a motorist forcing a reduction in speed, the reduced speed limit is largely ignored.

The next feasible option was to change the visual appearance of the road so that the motorist would be more observant because the road way had changed significantly. In order to achieve the visual change from a motorist's perspective, each intersection was widened with a central dedicated turning lane. Prior to the development of this lane the through lane was diverted to the left to create the area required for the turning lane. Taper rates were designed for a 100km/h vehicular speed.

The turning lane was protected from being used as a through lane by the placing of rumble strips and road studs. Figure 4 provides a layout of the proposed intersection.

A change in road wearing surface in terms of seal was also implemented so that motorists would hear and feel a change in the road surface. Further to this fluorescent yellow green borders were designed for all road signage.

A further innovative option which is being investigated is the possible use of audible warnings to motorists. The proposal is to lay strips of designed width and spacing such that when a vehicle drives over the strips, at the speed limit, the acoustic sound generated would sound like a spoken word, thus producing an audible warning. In discussions with an acoustic engineer, the proposal was possible in theory, but insufficient time and research precluded this option from being included in this project.

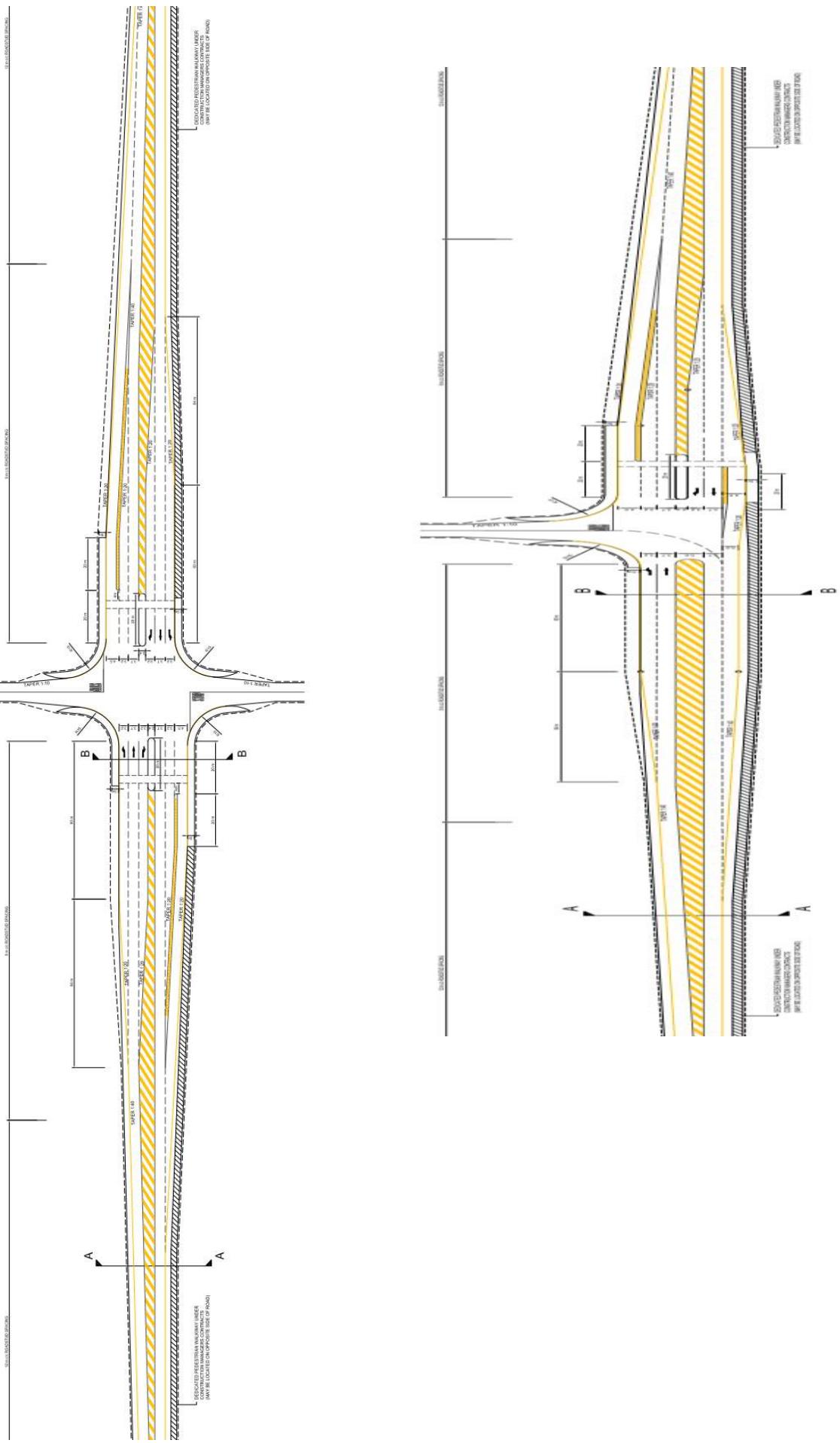


Figure 4 : Typical intersection design

8.2 Pedestrian considerations

As mentioned earlier, the terrain precluded the grade separation of pedestrians and vehicles, therefore provision had to be made for the pedestrian to cross at each of these intersections.

In order to achieve this, dedicated pedestrian crossings were allowed for at each intersection. The crossings were located at the taxi drop off points. The addition of an extra lane increased the road width to a point that it was felt would be too wide for a pedestrian to cross in one movement. As such a central refuge needed to be created so that pedestrians only needed to cross traffic from one direction.

The provision of a central painted median provided sufficient refuge. The rumble strips and road studs would provide sufficient warning to motorists should they deviate off the through lane and onto the painted median. It was further felt that pedestrians would require a raised median to indicate where the refuge was, thus providing a measure of intangible reassurance that they were standing in the correct place. To this end, a raised median was designed and placed on the painted median at the allocated pedestrian crossing.

In order to prohibit the raised median from becoming a potential accident risk to vehicles, should they continue on the painted median, the median would be constructed from mountable kerbs and would protrude a maximum of 60mm above the road level.

Pedestrian walkways are included in the intersection to provide dedicated pedestrian routes outside of the roadway. The walkways are further separated from the roadway by guardrails. The guardrails are maintained until the walkways are separated from the roadway and are located at the outside of the road reserve.

Discussions with the local communities revealed that the communities believe that vehicles are becoming quieter, in terms of both engine and road noise. As such, pedestrians and especially the younger children, were failing to hear approaching vehicles. In order to address this it was proposed that the change in seal used to alert the drivers of a change in environment, should be designed to be a "noisy seal". To achieve this, pavement engineers researched which seal would produce the most road noise while still being able to accommodate vehicle turning movements at the intersections as well as the dissipation of stormwater from the wearing course. This proved to be an interesting exercise in that it required the pavement engineers to reverse engineer a solution that was contrary to conventional research where road noise is attempted to be reduced.

Due to unexpected extended time required in the finalisation of land relocations required, no intersection had been completed at the time of drafting this paper. However, interim attempts to use measures, such as rumble strips, as a means of an auditory alert mechanism for pedestrians has been well received.

8.3 Road safety education

A training service provider was appointed to undertake road safety training at the school located adjacent to the R61 Section 8. While the training was well received by both the teachers and learners, it was clear that SANRAL will have to continue with road safety education for a number of years until community awareness of the dangers increases and road safety becomes a communal mantra.

9. LESSONS LEARNT

The predominant lessons learnt on this project were threefold. The first of these lessons being that pedestrian safety and movement considerations appear to be largely ignored in the development of infrastructure.

The second lesson was that in rural areas, where no apparent town planning is evident or enforced, it is imperative to have a forum for inter-governmental co-ordination with specific emphasis on infrastructure development. Without it, the retrospective implementation of vehicular and pedestrian safety measures is difficult from a design perspective and is also very expensive to implement.

The third lesson being that this project required that infrastructure improvements be designed from a pedestrian perspective, taking into account social attitudes and nuances. The inclusion of these social factors in determining an engineering solution requires significant consultation with stakeholders and substantial engagement with the Client so that conventional technical engineering can be amended and changed to include creative solutions. Maintaining the balance between the social realities and the technical engineering requirements is difficult to achieve.

10. CONCLUSION

SANRAL, in fulfilment of its legislative requirements, identified the need to improve pedestrian and vehicular safety along the R61 Section 8. The implementation of the safety initiatives required an investment of close to R1.2 billion.

This project provided a unique opportunity to improve the lives of rural communities by investing in their safety. The project provided real challenges from a design and a community relationship perspective.

REFERENCES

1. Practical Design Guidelines for Pedestrian Facilities on Higher Order Roads, SANRAL, 2010
2. South Africa Road Safety Audit Manual (2nd edition), 2012