

Road upgrade – White Bridge to Knysna

INTRODUCTION

The road upgrade between White Bridge and Knysna (Trunk Road 2 Section 10) by the Provincial Administration Western Cape – Department of Transport and Public Works, Roads Infrastructure Branch – was designated as a World Cup 2010 project and completed in May 2010.

This stretch of road is approximately 6 kilometres long and is situated along one of the most picturesque sections of the Garden Route. This section consisted of a single carriageway road with a surfaced width of approximately 7,4 m.

The entire section of road is bordered by the environmentally sensitive Knysna Lagoon on the south-western side and steep embankments on the north-eastern side.

The shore protection along this entire section was in rather poor condition. An assessment of the road done in 2003 indicated that the pavement had in fact reached the end of its structural life. The poor condition of the road was attributed to heavy traffic flow – the average annual daily traffic was estimated at 12 500 vehicles per day, of which approximately 2 000 were heavy vehicles. During December the average daily traffic count increased to approximately 30 000 vehicles per day, which justifies a four-lane roadway in terms of current geometric standards.

Two main intersections are found on this road, the Welbedaght Road and Old Cape Road intersections. No turning or passing lanes were present at these intersections which resulted in safety problems and long waiting periods.

A major shortcoming of the old road was the absence of facilities for pedestrians and cyclists.

① The restrictive nature of the road environment on the White Bridge to Knysna stretch presented demanding design and construction challenges

ENVIRONMENTAL IMPACT ASSESSMENT

The possible environmental impact of the road upgrade had to be considered seriously, as the Knysna lagoon ranks very highly in terms of conservation. An estuarine study was therefore done and it was found that no permanent loss of habitat or species would result from the road upgrade.

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PUBLIC LIAISON PROCESS

The liaison process resulted in the public appealing for the avoidance of travelling delays during construction. The possible use of one-way traffic accommodation during construction was heavily objected to, as this would have resulted in long travelling delays.



ROAD UPGRADE – WHITE BRIDGE TO KNYSNA Trunk Road 2 Section 10

Technical Excellence category

KEY PLAYERS

Client Provincial Administration Western Cape,
Dept of Transport and Public Works, Roads Infrastructure Branch

Professional Team ERO Engineers and ITS Engineers Joint Venture

Main contractor Haw & Inglis Civil Engineering (Pty) Ltd



Informal traders had been active along this road for many years. The two major trading areas were the so-called “Dust Bowl” near Knysna and the “Cheeseman Site” near White Bridge.

Both these informal trading areas had to be relocated as their locations were inside the footprint of the newly planned road. Also, after completion of the road, insufficient space would exist for safe access and parking. Various potential sites were investigated and eventually a site in Knysna was selected which was to the satisfaction of all parties and the traders were successfully relocated.

DESIGN INNOVATION IN THE NEW ROAD

The design of the road upgrading presented numerous challenges considering the sensitive and restrictive nature of the site, the requirements of the environmental Record of Decision, the requirements of the Client to maximise labour opportunities, and the requirement of the public regarding minimum travelling delays.

Shore protection

Four alternative shore protection measures were considered, consisting of combinations of rock fill, gabions, concrete and Terraforce® walls and concrete sheet piling. After evaluation, the hybrid rock fill and gabion wall combination was chosen.

The advantages of this concept were the intrinsic stability of the structure, the low risk of contamination of the lagoon due to the clean rock used, and the potential labour opportunities of the gabion construction.

Road cross-section

The road was widened to a Class 2 cross-section from White Bridge to the Point which basically consists of two surfaced lanes (3,4 m each) with 1,5 m surfaced shoulders. A raised sidewalk of 2,8 m wide was provided on the lagoon



2 No pedestrian facilities before the upgrade

3 Construction of rock core next to the Knysna lagoon

4 Clay had to be imported for the construction of coffer dams at the major structures. In order to prevent pollution of the lagoon, the clay was placed in agricultural bags and then used to construct the coffer dams

5 Turbidity screen at work to protect the Knysna lagoon

side along the entire length of road to protect pedestrians and the lagoon from out of control vehicles.

Due to the number and spacing of the main intersections on the stretch from the Point to Knysna, an additional 3,4 m traffic lane was added in each direction. On this stretch, turning and passing lanes and traffic lights were added at the main intersections to improve safety and capacity and to reduce waiting periods.

Traffic accommodation

The public participation process was dominated by the appeal from the public to prevent unnecessary travelling delays during construction.

After consultation with the relevant environmental authorities, the road was widened sufficiently to the lagoon side to accommodate two-way traffic. The future sidewalk area was therefore initially utilised for traffic accommodation.

The added benefit of this design was the creation of a drop zone on the opposite side of the road for rock falls during rains.



CONSTRUCTION OF NEW ROAD

The civil engineering contractor, Haw & Inglis Civil Engineering (Pty) Ltd, commenced construction in June 2008. The initial contract period was for 18 months which was extended to 22 months due to additional work. Completion date was to be May 2010.

Scope of works

The scope of works included the following:

- Shore protection over a distance of approximately 3 500 m to protect the road fill from erosion by tidal and wave action.
- A 20-year design life pavement structure with final surfacing of 19 mm

Cape Seal up to the Point and 40 mm asphalt up to Knysna.

- A 2,8 m wide raised sidewalk constructed along the entire length of the road to accommodate pedestrians.
- Drainage which was generally dealt with via concrete culverts.
- The construction of one single-span bridge situated at the Salt River.
- The realignment of all major intersections, and the adding of lanes to improve safety.

Job opportunities

In line with government's Expanded Public Works Programme objectives, the road was designed to maximise the labour content. At any given time, up to 350 local workers were employed and trained, which generated a wage payout of approximately R14 million over the contract duration.

Emerging black contractors

The project included participation by emerging black subcontractors, to the extent of approximately R25 million. Eight emerging black subcontractors were employed in gabion construction, pipe laying, concrete operations, transport of material, layerworks construction, kerb laying, brick paving etc. Three of the eight subcontractors had women shareholders with one being 100 percent female-owned.

Shore Protection

All shore protection was constructed in place. Problems with tides were overcome by planning the construction in such a way that the construction of the rock core

foundation and the first layer of gabions were done during low tides.

In consultation with the contractor and suppliers, a turbidity screen was developed to constrain contamination inside an acceptable area. The screen was anchored to the lagoon floor with weights and attached to floating pipes on the other side to ensure effectiveness during changing tides.

Coffer dams

Clay had to be imported for the construction of the coffer dams at the major structures. In order to prevent pollution of the lagoon, this clay was placed in agricultural bags and then used to construct the coffer dams.

Construction Materials

For the sourcing of materials, the old Red Bridge Borrowpit near Knysna was used. This borrowpit had been abandoned twenty years ago, unfinished. An offer was made to the relevant authorities to properly finish this borrowpit and in the process extract approximately 175 000 m³ for fill, selected and crushed subbase.

Secondly, 125 000 m³ of rockfill and 20 000 m³ of hand-selected gabion aggregate were acquired from a commercial quarry situated just outside Knysna.

Budgetary Compliance

This project was awarded to the contractor Haw & Inglis (Pty) Ltd to the value of R110 000 000.

Approved extra works and additional works were ordered during the contract to

the value of approximately R40 000 000. The expected final value of the contract was R150 000 000.

CONCLUSION

This project had the potential to become something special and the end product indeed lives up to this expectation.

The successes of this project include the following:

- safety improvement of the road for the road user
- improvement of the intersections to reduce waiting periods
- improvement of the sea life environment next to the road
- the creation of pedestrian and cycle facilities
- the improvement of the entrance to Knysna from an aesthetic point of view
- the creation of job opportunities to relatively large numbers of people, and the training of these workers
- the training and employment of small emerging contractors
- the finishing of the abandoned Redbridge Borrowpit which had been an eyesore for many years
- the relocation of the informal traders to an improved site.

The entire team feels privileged to have been involved in this project, and we would like to thank the Provincial Administration Western Cape for the opportunity. □

6 and 7 Views of the completed road and rehabilitated embankment

