

Bayhead Road Upgrade



The upgrading of Bayhead Road involved large-scale construction and realignment to counter truck congestion

FINALIST Technical Excellence Category

KEY PLAYERS

Client

Transnet National Ports Authority;
Transnet Capital Projects

Professional team

Design: TCP / Jeffares & Green
Construction Management: TCP / Aurecon
Construction: TCP / Stefanutti Stocks

OVERVIEW

The need to upgrade Bayhead Road between Langerberg Road and Pier 1 in Durban from a two-lane, two-way road to a four-lane, dual carriageway was necessary to accommodate the predicted traffic volume increase resulting from the planned conversion of Salisbury Island and Pier 1 into a container terminal. Further objectives were to relieve current traffic congestion, rehabilitate the existing road and provide for a truck staging area to streamline terminal operations.

It involved construction of 2 100 m of dual carriageway with a central median and sidewalks with associated storm-water drainage and street lighting, key intersection realignment, construction of two formal truck staging areas with approximately 140 bays, a new road-over-rail bridge, and the relocation of a pollution control building.

PROJECT DESCRIPTION

The Bayhead Road link before the upgrade comprised two 4.5 m wide lanes on a single carriageway, providing two-way traffic to the port. As one of the most heavily trafficked heavy goods vehicles (HGVs) roads in the southern hemisphere, the road was extremely congested with HGVs parking in an informal and uncontrolled manner alongside the road while waiting for clearance to enter the port.

The pavement was also rutted, disintegrating, pot-holed and incapable of adequately carrying the existing and anticipated future traffic volumes. This bottleneck also created a knock-on ef-

fect in terms of traffic flow in the greater Bayhead area and associated roads.

The solution was to convert a 2 500 m section of the road to a dual carriageway and realign the geometry of particular areas to create a truck staging area for the port, thereby removing the parked trucks from the roadway. Sequencing their arrival and departure from the port terminals would also create a more streamlined, efficient and safe terminal operation.

As the carriageway was heavily-trafficked with HGVs, the road design required accurate prediction of the stress it would undergo. Traffic studies were carried out to determine variables such as predicted heavy vehicle volume increases, as well as average axle loads on the road up to 2020 and beyond, when the expected conversion of Pier 1 and Salisbury Island into a container terminal would be completed.

Bayhead Road's lane width was then upgraded from single lane to double lane in both directions. The length of road is approximately 2.5 km and can be divided into three different sections. The first section is a completely new road, the second section is

a single lane road widened to a double lane road, and the last section is the refurbishment of an existing double lane road.

Truck staging areas

An area of 5 000 m² of formalised staging for trucks to relieve congestion was constructed, including drainage, provision of sleeves for future operations, as well as high mast lighting and access off and onto Bayhead Road.

Road-over-rail bridge

The construction of the road-over-rail bridge entailed the construction of a concrete bridge which was an extension of the existing bridge to allow double-lane traffic in both directions.

Pavement design

Extensive research and modelling were undertaken to ensure the pavement design used the right materials in the right places to achieve the most economically efficient solution. Both flexible and rigid pavement designs, as well as additional lanes were incorporated in the rehabilitation to last for the 30-year design period.

Risk factors

This project had an unusually high number of risk factors (more than 30 were identified) associated with the relocations of an existing water main, communication lines, overhead electrical cables and railway tracks, as well as heavy traffic and challenging geotechnical conditions in the construction area.

The road upgrade section is in the vicinity of a National Key Point, with live fuel and gas pipelines crossing the main road within the construction area. A serious safety challenge was the deep excavations in sandy, water-logged material in order to install pipe protection culverts around the live pipelines.

To combat the potentially dangerous collapse of sand, extensive dewatering was undertaken for excavations deeper than 1.5 m below the water table, as well as the use of sheet piling.

Road safety challenges were compounded by the close proximity of railway lines, with associated overhead high-voltage traction equipment. Strict compliance with the E(7) specification, which details best practice methods when undertaking work near railway lines, was enforced. In addition, enforcing round-the-clock trained supervision for



The old Bayhead Road alignment on the right and both staging areas visible to the left



Pipe culverts being installed

overhead track electrification work, which was undertaken by Transnet Capital Project's Rehabilitation, Maintenance and Emergency unit, was critical.

Aurecon also encouraged and motivated workers to abide by safety behaviour principles on site, recognising those workers who espoused good safety practices – these workers received personally made trophies which further encouraged the continuance of safety best practices.

Traffic accommodation

As the construction site was within an industrialised area, continued access to traffic had to be provided.

Bayhead Road is also frequented by 22 m long super-link trucks. At any given time, these trucks carrying large cargo, bulk commodity products or hazardous material had the potential to pose a

serious threat to the safety of construction personnel and road users should an accident have occurred. Careful planning, detailed construction signage, traffic calming measures, such as temporary deviations and speed humps, and close cooperation with the eThekweni Metro Police ensured everyone's safety.

Given the hazardous conditions, the project team exceeded the bar in safety best practices to achieve zero lost time injuries on completion of the project and over 1 000 000 lost time free man-hours.

CONCLUSION

The completed project resulted in improved access to the port's terminals, and achievement of the client's main objective of relieving growing congestion levels and supporting a commercial port system that is globally competitive, safe and secure. □