AAPA 2017 WA OUTSTANDING PROJECT AWARD WINNER

AUSTRALIAN ASPHALT PAVEMENT ASSOCIATION

Downer
Relationships creating success

RECONSTRUCTION OF KINGSFORD SMITH AVENUE

A 700-metre section of the heavily trafficked Kingsford Smith Avenue (a busy approach road to Perth Airport) was suffering from pavement failures and losing shape largely as a result of deep level uncompacted sand in the sub-base.

The unstable nature of this sub-base was aggravated by a poor drainage system and a water table that reached as high as the existing seal in winter months. This was also impacting on the integrity of the asphalt wearing course.

The client, Perth Airport Authority, had been presented with a proposed design for remedial works, which necessitated boxing out the impacted area at depth, importing significant quantities of material to raise existing levels and subsequent reconstruction of the roadway.

The client was concerned that this proposed solution would result in extreme disruption to local stakeholders, including the main Toll distribution depot, for an extended period. It would also have impacted negatively on travellers, restricting access to the airport car park, potentially resulting in delays and missed flights.

Additionally, the raising of the road levels would add significant cost because it would have required the re-alignment of existing heavy duty concrete crossovers, services and lighting.

Downer was approached to deliver an alternative solution that would minimise disruption. Following extensive discussions, an innovative alternative approach was proposed.

This proposal involved the in-situ pulverising of the existing road utilising the high-quality materials that were already in place. The pulverised area was then to be wet mixed and the affected area reshaped. This was then to be impact rolled to achieve much higher densities at up to 1.5 metres depth in the sand. The road was then stabilised to a depth of 350mm using foam bitumen stabilisation, providing the strongest flexible pavement that can be achieved in a single lift.

In order to achieve compaction at depth in the sand sub-grade in the minimum time, Downer proposed the use of a high impact roller. This type of roller is not normally used during the construction of urban road networks due to the potential for structural damage, but a risk assessment was undertaken and its use in this circumstance was deemed acceptable.

Once the PMB seal was completed, the road was to be surfaced with a dense-graded 14mm 75b asphalt to provide the final wearing course.

The benefits included considerably reduced construction times and cost, but most significantly,

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minimise the impact of construction on the major Toll freight yard, travelling public, carpark users and commuters.

The works were programmed to take place when the water table was lowest to minimise the impact on the works. Considerable consultation and planning was required, minimising traffic impact during the necessary road closures.

Works methodology

1. Complete drainage services prior to the pavement works with no impact on traffic flow due to use of underground boring techniques, completion of other open drainage works and rock pitching.
2. Pulverise and wet mix existing asphalt base course and sub-base materials at approximately 300mm and reshape the road to the required new levels and cross falls.
3. Impact roll the entire area with 10 passes of a large tractor-drawn impact roller to proof roll and increase density of sand subgrade at depths of 1.5 metres.
4. Trim the area again to remove irregularities from settlement from impact rolling.
5. Spread supplementary binder (cement) over existing road surface.
6. Foam stabilise the pavement at 350mm incorporating the bitumen binder, supplementary binder and extra water required to achieve compaction.
7. Compact with a large padfoot roller to achieve density at 350mm.
8. Grade to shape and compact with a combination of flat drum roller and multi-tyred rollers.
9. Complete works in two sections to allow continued access to the freight yard and the airport carpark.
10. Leave pavement sections for two days to achieve dryback. The area was highly durable and was trafficable during the dryback phase.
11. Provide a two-coat seal, 40mm of PMB asphalt, and white lining the project.

Outcomes

This Downer solution delivered significant benefits to the client and the various stakeholders including:

- Construction time of the works was reduced from about six weeks to less than two weeks
- 100 per cent recycling of existing materials was achieved
- No requirement for import of materials, reducing cost and traffic movements
- The provision of a 350mm watertight sub-base prevents the ingress of water into the new seal and subsequent failure
- A road construction method that removed the risk of further pavement failures resulting from the low-density sand sub-strata
- A 60 per cent saving on the original budgeted cost of the project.