ASCP
AUSTRALIAN SOCIETY FOR CONCRETE PAVEMENTS

PAVEMENT NOTE NO.001 | APRIL 2020

CONCRETE PAVEMENT VALUE

ECONOMIC, OPERATIONAL AND COMMUNITY BENEFITS

CONCRETE PAVEMENTS

Lower construction cost
Lower maintenance costs
Lower whole of life costs
Extended life benefits
Available & safe
Skid resistant
Smooth & durable
Quicker to construct

KEY FINDINGS

- Concrete, when compared to Full Depth Asphalt, was found to deliver 25% saving on construction cost
- Concrete presented 50 – 60% savings on maintenance costs over a 40 year life
- 50% less road closures and traffic disruptions

KEY OUTCOMES

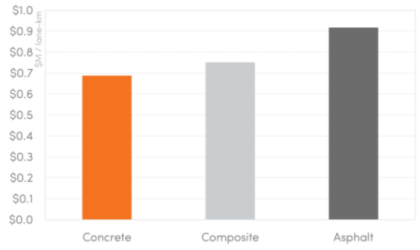
This metareview concludes that concrete pavements are significantly lower across all economic indicators when compared with flexible pavements. They are smooth, skid resistant, more durable, more available in-service and faster to construct than asphalt pavements.

CONCRETE PAVEMENTS SURPASS FLEXIBLE PAVEMENTS IN ALL ASPECTS

Concrete road pavements present a number of economic, accessibility and safety benefits when compared with flexible pavement options. This Pavement Note presents a summary of the latest findings which compare heavy duty pavement options. The intent of this Note is to provide road agencies and decision makers with factual information to inform funding decisions that maximise economic, operational and community value.

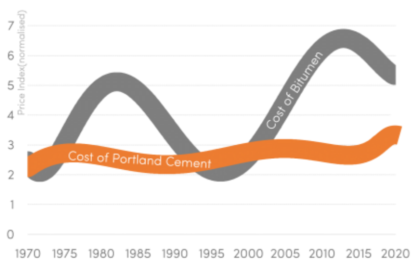
LOWER CONSTRUCTION COST

The capital costs of concrete pavements are typically 7 – 22% lower than for equivalent asphalt highway pavements [1 2 3 5 9].



CONCRETE vs COMPOSITE vs ASPHALT COST

Historical volatility in the price of bitumen has led to sustained higher asphalt pavement costs [1 4].



BITUMEN vs CEMENT COST

LOWER MAINTENANCE COSTS

Concrete pavements typically experience 3 – 4% total replacement over their life compared with asphalt pavements for which 15 – 45% total replacement is expected. As a result, concrete pavements are 47 – 58% lower in cost to maintain [1 2 3 5 7 9].

LOWER WHOLE OF LIFE COSTS

The combined effect of lower construction and maintenance cost leads to 18 – 28% lower whole of life costs for concrete pavements than any other highway pavement type [3 5].

EXTENDED LIFE BENEFITS

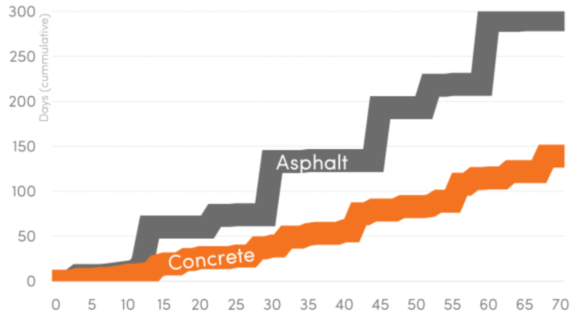
Through the application of upgrade treatments such as diamond grinding and joint stabilisation[7], it is possible to capitalise on the high residual value of a '40 year' design life pavement and extend the life by more than 20 years [3 8]. In extended life scenarios, the differential in whole of life cost reductions between concrete pavements and other highway pavements increases to 25 – 34% [8 9 10 11].

CONCRETE PAVEMENT VALUE

ECONOMIC, OPERATIONAL AND COMMUNITY BENEFITS

CORRIDOR AVAILABILITY & SAFETY

Owing to significantly lower maintenance levels of concrete roads compared with asphalt or other flexible pavement alternatives (4% vs 15% at 40 years), up to 58% less road closures and traffic disruptions are incurred [3]. The improved availability of critical road infrastructure has a positive impact on the local economy by reducing delays and inconvenience to road users [2 7]. The dramatic reduction in road closures substantially reduces the likelihood of accidents and exposure of workers and road users to hazards [9]. In extended life scenarios of up to 70 years of service, additional benefits are further realised [8].



REDUCED CLOSURE DAYS (0 to 70 years)

SKID RESISTANCE AND SURFACE DRAINAGE

Concrete is typically between 5% and 15% more skid resistant than asphalt during its service life [13]. It can be textured to achieve specific skid resistance properties for high and low speed traffic scenarios [12 14]. Longitudinal grooving and open graded textures can be applied to create low-spray conditions for wet weather performance [12 13 15].

MATCHED RIDE QUALITY

Initial ride quality of concrete pavements can exceed that of flexible pavements with infrequent low-cost texturing treatments such as diamond grinding used to maintain the ride quality at initial levels [12 15]. Over a 40 year service life, concrete pavements are 87 - 90% lower cost to maintain conforming ride quality [3].

HIGH-SPEED, LOW LABOUR AND PLANT

As a consequence of the multi-layered staged approach required for constructing asphalt pavements, as compared with the single-layer construction methodology utilised for construction for each of the concrete base and subbase layers, concrete pavements in greenfield scenarios are typically constructed 2½ times faster, are 74% less labour-intensive and require 38% less plant items than asphalt pavements [6 9].

CONCLUSIONS

Concrete pavements are significantly lower in construction cost, maintenance cost and, consequently, whole of life cost. Additionally, they are smooth, skid resistant, more rapidly constructed, less labour-intensive, less equipment-intensive, more durable, and more available in-service. As such, concrete pavements surpass asphalt pavements in all aspects.

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