

Principles for Pavement Selection

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In current times there is a continual daunting challenges for all Governments to plan and program the replacement and development of our infrastructure. Worldwide the maintenance of our ageing facilities has not been of a standard to ensure that these facilities are efficient, safe and still economical. Generally the introduction of new infrastructure has been totally inadequate to meet the needs of a first World economy and a modern society. As the maintenance needs increase, funding available for new or replacement works is reduced dramatically. There are, of course, no political votes from maintenance expenditure.

This is especially true of our road system. We as Engineers have the responsibility to society to maximise the longevity in service life of the roads we design and construct and conscientiously reduce the operating, safety and maintenance costs by applying the best technologies available.

The purpose of this paper is to draw attention to the required methodology to evaluate the benefits available from the advantages that concrete pavements can provide. It is accepted as a fact that concrete pavements provide structural longevity, minimal maintenance costs and generally lowest Life Cycle Costs.

For the evaluation of options the following Pavement Selection Criteria are used:

There are three criteria that must be considered:

- 1 Technical Assessment
- 2 Financial Assessment
- 3 Economic Assessment

The issues under these criteria should be evaluated in detail.

Technical Assessment

1 Traffic

- AADT + %age of commercial vehicles
- Annual growth
- 20 and 40 year total Design Traffic Loadings
- Traffic management

2 Constraints

- Interference by utilities
- Local access
- Land
- Working hours and pollution
- Underlying
- Ground and soil conditions
- Environmental restrictions

3 Speed of Construction

- Timings available
- Deadlines
- Plant and equipment available
- Seasons

4 Future Maintenance Requirements

- Life Cycle Maintenance Diaries
- Road occupancy for maintenance (Safety issues)
- Deterioration of Level of Service

5 Durability Requirements

- Wear and abrasion
- Weather
- Fire
- Usage

6 Deterioration and Safety

- Effect of weather
- Modes of distress
- Timings for repair
- Maintenance standards

7 Longevity and Design Life

- 20 or 40 years
- Quality Assurance considerations during construction and maintenance

8 Staging Requirements

- **Constraints**
- Available construction lengths
- Temporary works

9 Availability of Materials

- Local and imported
- Recycling opportunities

10 Environmental Considerations

- Sustainability

- Pollution
- Noise
- Waste
- Recycling opportunities
- Effect of heat sink
- Energy efficiency (e.g. street lighting)

11 Future Maintenance and Rehabilitation Requirements

- Frequencies
- Durations of lane occupancy (disruption and safety)
- Availability of resources and skills
- Reaction times

12 Future Requirements

- Widening
- Enhancements

Financial Assessment

- 1 Capital Costs of Options
 - Duration of construction and cash flow requirements
- 2 Cost of Maintenance and Rehabilitation
 - Frequency
 - Annual budget requirements
- 3 Comparison of Life Cycle Costs
 - Based on 40 year assessment period

Economic Assessment

Agency Costs

- 1 Construction
- 2 Maintenance and Rehabilitation
- 3 Residual (salvage) value
- 4 Comparison of BCRs

Road User Costs

- 1 Vehicle Operating Costs
- 2 Travel Time
- 3 Maintenance Work Zone delays

Overall Assessment

It must be appreciated that:

- 1 The Client's (often political) expectations of importance may differ from design or future requirements based on the technical, cost and long term economic assessments.
- 2 The design and behaviour factors of importance between flexible and concrete pavements are quite different and hence the assessments have to be made by an experienced technical group.
- 3 In the end, the best characteristics for the various assessment criteria for all the options will need to be balanced between what is important for design, longevity, construction, maintenance, rehabilitation, safety and costs and reported accordingly. The final selection of the preferred option is by the Client.