ROAD USER DISRUPTION COSTS

SEPTEMBER 1996

The "Hidden" Cost of Road Maintenance

AN ANALYSIS OF ROAD USER DISRUPTION COSTS ASSOCIATED WITH ROAD MAINTENANCE

PREPARED BY THE STEEL REINFORCEMENT INSTITUTE OF AUSTRALIA

New economic research paves

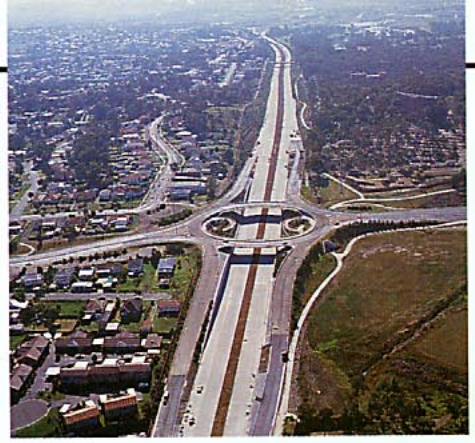

Photo courtesy RTA NSW

On-going maintenance on roads not only costs the community in direct dollar terms, it also causes immense social disruption.

Repair and maintenance activities can result in traffic delays over a period of days, weeks or months, depending on the scale of the works, hampering traffic flow and the daily routines of commuters and those who utilise roads for their livelihood.

New economic research commissioned by the Steel Reinforcement Institute of Australia shows that the type of construction system chosen for roads can have a major impact on the extent and cost of this disruption to road users.

Prepared by Decicorp Pty Ltd, a company which specialises in the economic analyses of the building and construction industries, the research incorporates a number of proposals for modelling road user disruption costs and whole-of-life or lifecycle costs.

A detailed financial analysis of a major road construction project — the soon to be constructed 38 km long, 8-lane Pacific Highway Upgrade between Beenleigh and Reedy Creek in South East Queensland — clearly illustrates that continuously reinforced concrete pavements (CRCP) have the lowest maintenance requirements of all road pavements and, consequently, the lowest road user disruption costs (RUC).

Decicorp's analysis found that over the 40 year life of the selected road project*, the disruption costs imposed on motorists due to maintenance activities were at least $17 million lower on a CRCP road than for all other pavement alternatives using a net present worth (NPW) discount rate of 6% pa.

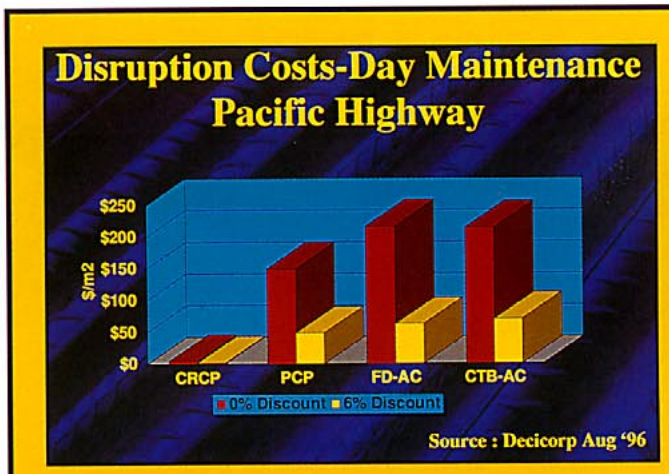

FIGURE 1: ROAD USER DISRUPTION COSTS
Day Maintenance @ NPW = 0 & 6% pa in $/m²
The low maintenance requirement for CRCP means that irrespective of when maintenance occurs, CRCP imposes a far lower disruption cost onto road users than the alternative pavements.

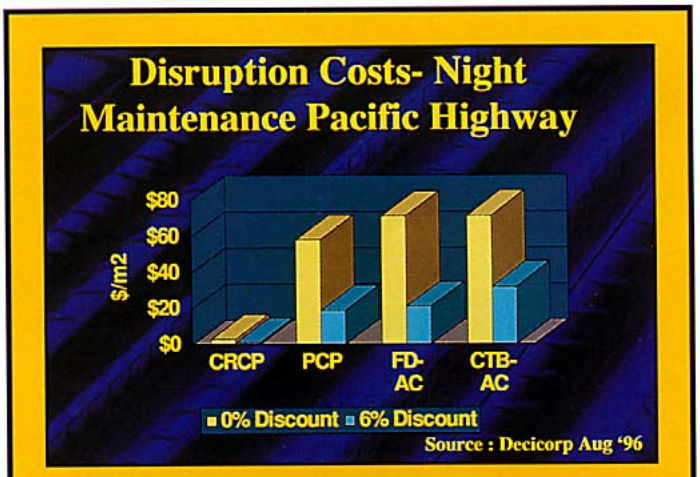

FIGURE 2: ROAD USER DISRUPTION COSTS
Night Maintenance @ NPW = 0 & 6% pa in $/m²
Should the road authority focus on minimising disruption costs by undertaking all maintenance activity at night, the cost resulting from using CRCP remains almost one-twentieth of the next lowest cost pavement.

Net present worth discount rates

The discount rate used in the cycle cost analysis of projects can have a fundamental impact on investment decision-making. Discount rates which are set too high, typically result in the selection of low capital cost, high maintenance solutions which impose an undue burden on future generations. Another separate research project, *The Neutral Evaluation of Infrastructure Projects*, conducted by The Allen Consulting Group Pty Ltd, recommends evaluation of projects using a discount rate close to the "risk-free" rate determined by the Capital Asset Pricing Model — i.e. 6% pa.

way for increased use of CRCP

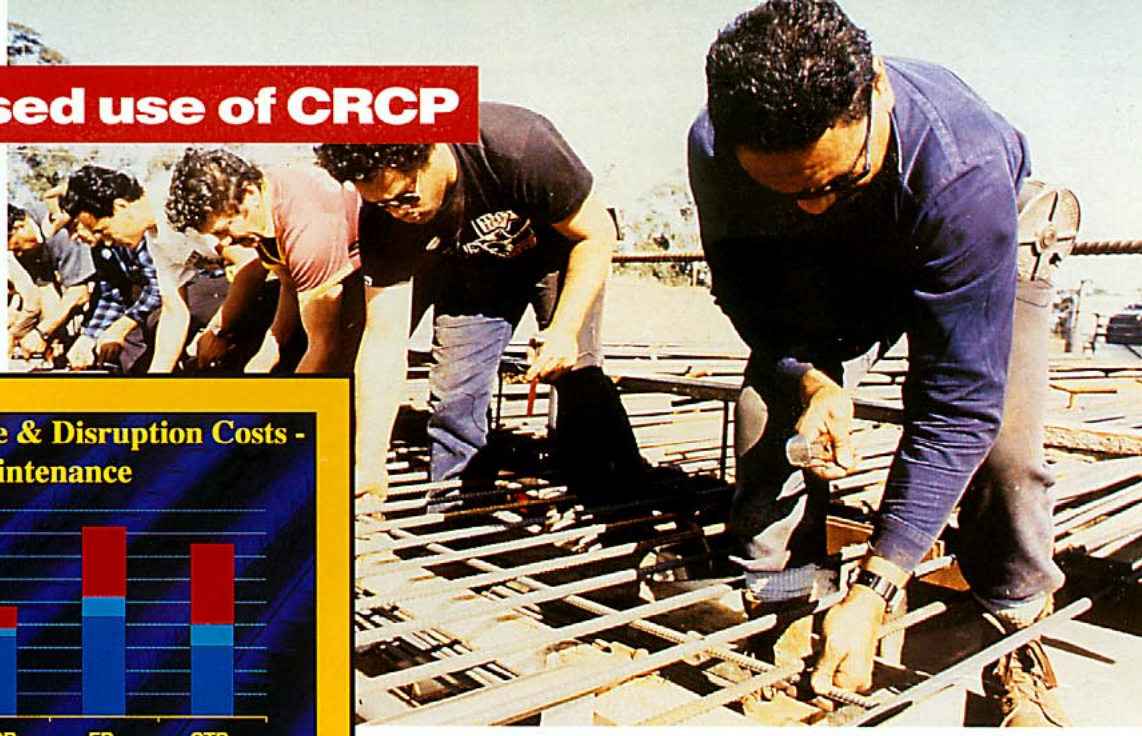

FIGURE 3: COMBINED LIFE CYCLE & DISRUPTION COSTS
Day Maintenance @ NPW = 6% pa in $/m²
Bringing together the "whole-of-life" costs provides an important perspective of the direct and indirect costs associated with each type of pavement. Given day maintenance, CRCP is clearly the lowest cost alternative at either NPW = 0 or 6% pa (as illustrated).

incurred by undertaking night-time maintenance, which is becoming an increasingly popular strategy to minimise road user disruption, adds between $4/m² to $6/m² to the LCC of asphalt pavements, but only $0.60/m² to the LCC of CRCP (at NPW of 6% pa).

Figures 1, 2, 3 & 4 illustrate the large variation in road user disruption costs between the different pavement types.

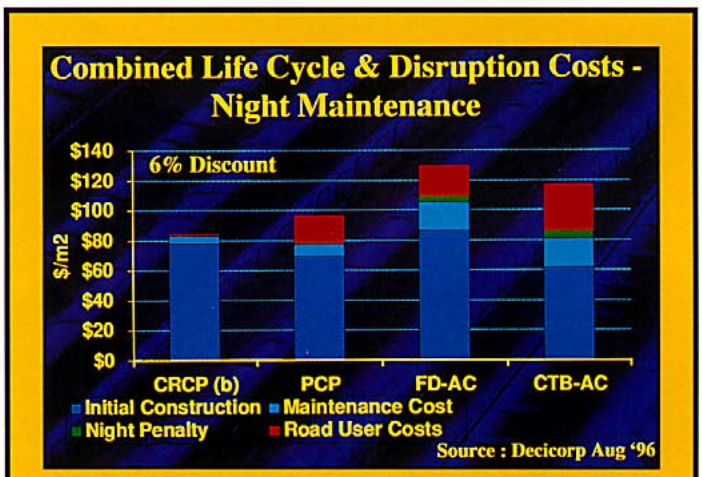

FIGURE 4: COMBINED LIFE CYCLE & DISRUPTION COSTS
Night Maintenance @ NPW = 6% pa in $/m²
Even with night maintenance, when road user disruption costs are significantly lower, CRCP remains the lowest cost alternative, costing about $13 million less than the next lowest cost pavement, plain concrete pavement (PCP).

The five alternative pavements considered in the analysis were:

- Continuously reinforced concrete pavement (CRCP)
- Plain concrete pavement (PCP)
- Full depth asphalt (FD-AC)
- Cement treated base with asphalt overlay (CTB-AC); &
- Granular overlay asphalt pavement (GO-AC)**.

The research also demonstrated that the lifecycle cost (LCC) of CRCP is clearly the lowest of the pavement alternatives at NPW discount rates of 0% pa and 6% pa, although the pavements with lower initial construction costs but higher maintenance requirements become more competitive as higher discount rates are applied.

The research also showed that additional expenses

Background

Two years ago, the Steel Reinforcement Institute of Australia commissioned a highly detailed economic study of road construction using continuously reinforced concrete pavement (CRCP).

This research, which was also conducted by Decicorp, identified and, possibly for the first time ever, quantified, significant economic, technical and social benefits from specifying and constructing CRCP.

Notable areas of original research in the report included the analysis of the import replacement impact on Australia's balance of payments; the analysis of GDP and employment multipliers for each of the major material supply industries; a review of the taxation implications of pavement choice for private road owners; and the development of a methodology for modelling the costs of disruption associated with maintenance activities.

Earlier this year, the SRIA called on Decicorp to carry out a second economic study into the competitiveness of CRCP, reviewing three areas of Decicorp's original road user (RUC) disruption cost model and the pavement lifecycle cost (LCC) model.

Continuously Reinforced Concrete Pavement (CRCP)

Continuously reinforced concrete pavement (CRCP) is a form of road construction which utilises slip-formed quality concrete and steel reinforcing.

The use of continuous steel reinforcement enables the construction of pavements which provide a long lasting, smooth riding road surface ideally suited to high traffic volume freeways, urban arterials and interstate highways.

Based on overseas experience, CRCP can have a design life of 40 years, which is considerably longer than that which can be obtained with flexible pavement construction.

CRCP also requires much less maintenance than flexible pavements — pot-holes and rutting are non-existent. Reduced maintenance results in less disruption to traffic and to the flow of goods and services.

In fact, it is this reduced requirement in terms of maintenance which makes CRCP very competitive on a "whole-of-life basis".

Photo courtesy RTA NSW

Some of the Benefits of CRCP Construction

Economic Benefits

- Long Life — CRCP has a life of around 40-60 years.
- Import Replacement — CRCP uses all locally sourced materials, whereas bitumen can only be sourced from imported crude oil.
- Employment Multipliers — The use of CRCP on a major project would boost short-term employment in the steel and concrete industries.
- Maintenance Deferral — CRCP is less sensitive to deterioration if maintenance is deferred through changing fiscal policy.
- Competitive Cost — Reduced maintenance and disruption costs makes CRCP very competitive on a "whole-of-life" cost basis.

Technical Benefits

- Low Maintenance — With CRCP, there are no joints to maintain and pot-holes and rutting are non-existent.
- Low Traffic Disruption — Less maintenance reduces the impact on road users.
- Fuel Efficiency — Studies commissioned by the World Bank suggest substantial fuel savings for commercial vehicles on concrete roads.

Further Information

The Steel Reinforcement Institute of Australia is a non-profit making, national organisation which provides information to the building and construction industry. This is achieved through regular publications, lectures and seminars, and sponsorship of educational courses, seminars, and study tours.

Copies of a summary of the SRIA's economic research into *Road User Disruption Costs* may be obtained by contacting the address below.

A summary of the SRIA's original economic analysis of the competitiveness of CRCP — *Building Assets, Not Liabilities* — is also available.

For further details, please contact:

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Crows Nest, NSW 2065, Australia.
Tel: (02) 9906 2699.
Fax: (02) 9906 3266.

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Community Benefits

- Less disruption — With CRCP requiring less maintenance, community disruption is significantly reduced.
- Safety — CRCP is textured to provide a safe, skid-resistant surface and its light colour improves nighttime visibility and can reduce lighting requirements.
- Noise — CRCP can be produced to offer low-noise characteristics which endure for the life of the pavement.

Summary

Federal and State Governments, through their statutory authorities, have a responsibility to provide value for money in infrastructure development.

The use of CRCP on selected projects will provide immediate benefits for all Australians and reduce the burden for future generations.

The SRIA requests that road authorities evaluate all major projects on a whole-of-life basis using an analysis period corresponding to the longest lasting pavement, as recommended by AUSTROADS, and for the lifecycle costing to incorporate community costs, especially road user disruption costs.

** Decicorp's analysis was based on estimates of construction and maintenance costs along with projections of lane closures for each type of maintenance treatment provided by the Nerang Branch of the Queensland Department of Transport.*

*** GO-AC was included in the analysis for comparative purposes only as it is not considered to be a viable pavement type for the selected road.*