DEVELOPMENT OF A PAVEMENT REHABILITATION STRATEGY FOR NATIONAL ROADS IN QUEENSLAND

Presenter: Tyrone Toole, ARRB Group

2008 Engineering Technology Forum – “Connecting Technically”
Scope

• Background

• Objectives

• Road network data and analysis

• Current and potential investment policies

• Findings and recommendations

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Objectives

• Strategy development
  – assessment of the current condition of existing sealed and asphalt surfaced roads
  – determination of strategic needs and cost estimates, including backlogs
  – determination of the geographical location of investment candidates
  – presentation of future performance scenarios in terms of key performance indicators

• Program development
  – provision of detailed data for application at region level
Data and site investigations

- 5440 physical segments
- Section specific deterioration and costs
- Field reviews and treatment selection
- Investigation of major highways in SEQ

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Warrego Highway: Condition data

Warrego Highway: Comparison of New and 2005 distress data

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Treatment reviews

• Need to include distress and structural strength based trigger for asphalt pavements at low roughness
  – revised cracking limits
  – if max deflection < 0.7 mm, patch and resurface
  – If max deflection > 0.7 mm, rehabilitation

• Otherwise, confirmed suitability of moderate standards
Current Status Analysis

• AusLink Preservation Maintenance Indicator
  – 8% exceeds the target, 3% in poor or very poor condition

• AusLink Ride Quality Indicator
  – 16% mediocre or poor ride quality, 3% poor or very poor

• Pavement age
  – 38% with last rehabilitation age > 20 years, 1% > 50 years

• Pavement (Structural) Risk Index
  – 19% < 5 years, 60% > 20 years

• Routine maintenance costs

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## Example Ride Quality Matrix

<table>
<thead>
<tr>
<th>Roughness range (IRI)</th>
<th>Roughness range (NRM)</th>
<th>Traffic range (vehicles per day)</th>
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2008 Engineering Technology Forum – “Connecting Technically”
Distribution of PRI

― “Connecting Technically”
Distribution of routine maintenance costs

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<th>Annual costs</th>
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Strategies examined

Current Funding Policy (Base case)
- full preventative (programmed) maintenance
- section specific routine pavement costs pre-rehab

Desirable Minimum Standards Policy (No pavement in ‘Very Poor’ condition)
- full preventative (programmed) maintenance
- section specific routine pavement costs pre-rehab
- Pavement rehabilitation if Very Poor

01 Economic Strategy (Maximise NPV)
- Base Maintenance v Moderate Standards, with 4 timing options

02 Moderate Standards (Forced – No pavement in ‘Poor’ condition)
- Single strategy with full set of treatments & immediate implementation

03 Maximise change in roughness
- Base Maintenance & Moderate standards, with 4 timing options

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Data assembly, analysis & reporting

Project database (ex-ARMIS)

Network Details and ‘User-specified’ data

Configured HDM - 4
Version 2.0

RDWE
RAC
RUC
Economic

Reporting Tools
MS Excel & Access

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Example of treatment strategies

Base case
Routine Maintenance Only

Overlay at 5 IRI m/km
Mean = 3.8 IRI m/km

Overlay at 4 IRI m/km
Mean = 3.4 IRI m/km

Intervention Level

With Project cases?
Total transport costs

- Excess transport costs
- Budget shortfall
- Minimum transport cost
- Sum of costs
- Agency’s maintenance cost
- Road user cost
- Actual budget
- Optimum budget

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Findings

• Costs
  – 5 year needs between 3.6 (Minimum desirable) and 4.8 (Moderate standards) times current budget
  – Proposed future rates of coverage similar to other states

• Benefits
  – $2 to $3 net benefits per $ investment above current funding level
  – Realisation depends on what is available
  – Corresponding road user savings between $3 billion and $3.5 billion in 20 years

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Recommendations

1. Aim to justify funding level based on identified need and level of benefits

2. Give priority to routine and preventative maintenance, then rehabilitation using a suitable prioritisation indicator

3. Verify detailed results at a region level and consider in works program development
Presentation of data

- Executive report
- Region level and summary data
  - works, priorities and supporting data
  - summary data by road and corridor
- HDM-4 reporting tool (for HQ)
Surface condition and deflection triggered additional works

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Future condition

Ride Quality Index Distribution
Current Funding

Ride Quality Index Distribution
Strategy 2 - Forced standard

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Region level data 1

- **Tables** – Lists of 1 km results
  - Location information
  - Assessed condition, by Traffic, RMPCs, PRI, etc
  - First predicted work, BCR, Works Category
  - Second predicted work
  - Distress and structural based rehab flag

- **Maps** – spatial presentation of 1 km results

- **Pivot tables** by region, road, corridor
  - Treatment type and length by period
  - Treatment type and cost by period

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Region level and summary data 2

Qld Auslink Network - HDM-4 strategy 2 predicted capital works - desired standard

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<td>1.91</td>
<td>Rehab</td>
<td>2019</td>
<td>Reuse</td>
<td>FALSE</td>
<td>FALSE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Region level summary data 3
Tasmanian Road Network - Annual Asset Value
Comparison of Strategies

Year

Annual Asset Value ($mill.)

Preventative Stds
Desirable Min Eng Stds
Desirable Eng Stds No Reinst
Desirable Eng Stds 60yr Reinst
Desirable Eng Stds 40yr Reinst
Application of the results!

Thank you

2008 Engineering Technology Forum – “Connecting Technically”