High Speed Pavement Moisture Measurement Trials

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Moisture monitoring project – Field tests in New Zealand 2015

Downer, Roadscience and Roadscanners (Finland)
Funded by NZTA Research Project with inkind support from Downer
Plan In Finland to Reduce Road Maintenance Costs

1. The road maintenance standards will be improved, especially drainage maintenance. This increases pavement life time and cuts down annual paving costs. **Savings 10-30%.**

2. Proactive maintenance policy will be used and maintenance crews will react to arising problems before they cause damages in the pavement. **Savings 20-60%.**
THE RELATIONSHIP BETWEEN TRAFFIC LOADING AND ENVIRONMENTAL FACTORS TO LOW VOLUME ROAD DETERIORATION

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Observations from the data revealed that the rut rate of low volume roads was 2.5 times as high on poor drainage sections compared to sections where adequate drainage was provided.
NZ Moisture Monitoring Project
Laboratory tests

New-Zealand Box 1: Winstone Aggregates GAP40
New-Zealand Box 2: Poplar Lane Quarry
Moisture Damage Index – a unit-less number derived to give relative difference of level of saturation combined with the materials sensitivity to moisture (primarily clay content) at 3 depths: (MDI > 120 and BLACK = worst areas)

Top       Middle       Bottom
0 – 230mm, 230 – 450mm, and 450 – 700mm,
Otanga Road
Case Otanga Rd
No 2 Line 5800-5950m

Sandwich / moisture traps
Hawkes Bay Case SH50 0033

Side sloping ground / shallow ditches / moisture susceptible material
Recurring costs on same section of road

<table>
<thead>
<tr>
<th>Year</th>
<th>Pavement</th>
<th>Surfacing</th>
<th>Grand Total</th>
<th>10 years</th>
<th>5 years</th>
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<tr>
<td>Grand Total</td>
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<td>$ 44,662</td>
<td>$ 85,649</td>
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</tbody>
</table>

Recurring Costs $ 7,403 $ 4,085

X 10 patches on network
Renewal and/or Improve Drainage?

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
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</thead>
<tbody>
<tr>
<td>Widen road</td>
<td>Widen road</td>
<td>Widen road</td>
<td>Re-surface</td>
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<tr>
<td>Rehab</td>
<td>Rehab</td>
<td>Renewal</td>
<td>Improve Drainage</td>
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<tr>
<td>No drainage</td>
<td>With drainage</td>
<td>With drainage</td>
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</table>
Benefits Moisture monitoring – GPR and Laser Lidar

- Prioritise drainage improvement spend
- Drainage/Surface waterproofness to defer pavement renewals and patching – 20% savings
- Measuring and treating the cause of pavement distress rather than symptoms'
- Assisting in Pavement Renewal Design and Investigations
- Unsealed Roads Management – Laser Lidar – high lip, geometry, ditch depth, corrugations, vegetation/tree trimming
- NZTA Research Report 611 Pavement moisture measurement to indicate risk to pavement life