Performance Based Reseal Contracts ----The Results
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Overview
- About Performance Based Chipseal (PBC) Contracts
- Have PBC Contracts provided Value for Money?
- Reasons for the Results
- Conclusions

What is a PBC contract?
A contract that specifies end result requirements rather than prescribing method and materials
PBC contracts commenced in NZ in 1997

Why have a PBC contract?
- Clearer definition of accountability and responsibilities
- More opportunity for the private sector to offer innovation
- Focussing of technical expertise to align with accountabilities and roles
- Client/Consulting expertise is focussed on asset management inputs and the contractor on technical design and construction issues
- More appropriate apportioning of risk with the contractor responsible for construction risk
- Increased opportunity to provide higher quality outcomes and more efficient delivery.

What's the Contract's Philosophy?
Minimum quality standards are set for the materials to be used
The Engineer (representing the road owner)
- selects type of bitumen & chipseal
- sets minimum performance requirements including "design life"
The Contractor
- designs and constructs the chipseal
- is paid on a square metre basis
- maintains the seal for 12 months
Payment is adjusted according to predicted chipseal "life" at 12 months

Principle Performance Requirements
Failure mechanisms
- Reduction of voids due to trafficking, plus embedment into the substrate leading to flushing
- Bitumen oxidation leading to cracking and/or chip loss
- Chip polishing leading to loss of skid resistance
- Repeated flexure leading to fatigue cracking
Principle Performance Requirements

<table>
<thead>
<tr>
<th>Performance Requirement</th>
<th>Criteria</th>
<th>Measurement</th>
<th>When Measured / Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>Skid Resistance</td>
<td>Aggregate PSV</td>
<td>C</td>
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<tr>
<td></td>
<td>Skid Resistance</td>
<td>Aggregate % Crushed</td>
<td>C</td>
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<tr>
<td></td>
<td>Chip Take</td>
<td>Texture Depth</td>
<td>C</td>
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<tr>
<td></td>
<td>Chip Take</td>
<td>Texture Depth</td>
<td>I</td>
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<td>Environmental</td>
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<td>Moisture</td>
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<td>Durability</td>
<td>Aggregate</td>
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C = at the time of construction; I = 10-12 months after construction.

Have PBC Contracts Provided Value for Money?

Consider the cost/km of chip sealing before and after PBC contracts taking into account:

- change in traffic volumes
- change in heavy traffic
- change in chipseal lives

Source: NZTA and Opus Central Laboratories

Traffic Volume Distribution (Cumulative)

Vehicle Dimensions and Mass Rule

Increase in Heavy Traffic Volumes

State Highways - Average Lifetimes

<table>
<thead>
<tr>
<th>Year (696-2001)</th>
<th>Average Lifetime (Years)</th>
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<tbody>
<tr>
<td>1961-1965</td>
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</tr>
<tr>
<td>1966-1970</td>
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<tr>
<td>1971-1975</td>
<td>10.3</td>
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<tr>
<td>1976-1980</td>
<td>10.5</td>
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<tr>
<td>1981-1985</td>
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<td>10.7</td>
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<td>1996-2000</td>
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<tr>
<td>2001-2005</td>
<td>10.2</td>
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</table>
Reasons For Results

The contractor is accountable for chipseal performance

- Competitive market at the tenderbox
  - Pressure to reduce rework and to maximise payment
  - The use of different seal designs
  - The use of different binders
  - Innovation

Conclusions

- Cost /km of reseals (1990 dollars) is the same today as it was in 1991
- Chipseals need to be much stronger today due to 75% increase in heavy traffic
- Innovation has increased
- Seals today last longer — 9.2 years compared to 7.8 years in 1993
- PBC contracts were introduced in 1997 and are responsible for this
- Cost of the consultant carrying out design is eliminated
- Savings from not needing the consultant estimated at 10%
- Savings from innovation to handle the extra stress estimated at 10%

References

(5) (1994): "Chipsealing in New Zealand", Transit New Zealand, Road Controlling Authorities & Roading New Zealand

Thank you