Challenges in the Implementation of Highway asset Management in Developing Countries

Case Study:
Establishing an OPRC in the Punjab

Tony Porter
tony.porter@opus.co.nz
“Having vision is not enough. Change comes through realising the vision and turning it into a reality. It is easy to espouse worthy goals, values and policies; the hard part is implementation” ………………Sir Peter Blake
Outline

- The Location
- The Project
- Some of Challenges and Solutions
PUNJAB

- Area: ~ 50,362 sq. km (1.5% of India)
- Population: ~ 24.35 Million

Top ranked in India for:
- Overall Quality of Life
- Agriculture
- Infrastructure

Weather: Sub tropical
- Average Rainfall: 392 mm
- Temp: -0.8 deg C (Min) / 44.0 deg C (Max)
The Punjab is the “Granary of India”

A robust road network is an essential element of the State’s Economy
Opus’ Project

- Funded by loan from World Bank
- The aim being to improve asset management skills and outcomes through the introduction of a Performance Based Contract
  - An “OPRC”
What’s an OPRC?

An **Output and Performance-based Road Contract**
- The World Bank’s preferred PBC Model

Based on NZ Hybrid Model
- Sample Bidding Documents @ www.worldbank.org
  - First Edition 2002 and revised in 2005

Used in a wide range of situations
- Typically Sample Bidding Documents need significant modification to suit actual network conditions
Why move to an OPRC?

1. Increased focus on management of assets
2. To provide more consistent levels of service to road users
3. Improved and guaranteed life of pavements
4. To enhance traffic safety
   1. consistent signs and road markings
      ▪ adequate carriageway widths
      ▪ well maintained shoulders
5. A desire to harness the benefits of outsourcing.
   ▪ Drive more innovation into existing construction and maintenance regime
Punjab Network

Amritsar Network

Anandpur Sahib – Garshankar Network

Sangrur - Mansa - Bathinda - Muktsar Network
Gathering data on the network

- "RAMM data"
- ROMDAS
- Potholes
The geology and topography is consistent across the network.
• the network is on a uniformly flat alluvial plain
• the subgrade is consistently silty sand.
• groundwater levels vary according to the season

It is hard to imagine a more consistent environment
Traffic

- Light to moderate with little congestion
  - 1000 to 4000 VPD at present
  - Projected growth rate 7.5%

- Typical Traffic Mix
  - 10% “slow modes”
  - 60% light vehicles
  - 30% heavy vehicles

- Significant overloading
  - Early failure of the pavements
“Current” Network Condition

Pavement

- all roads in the network are surfaced with Hot Mix Asphalt
- About 50% of the network is in good to fair condition
- There are some sections of pavement with extensive cracking and potholes
Contract’s underlying Asset Management Philosophies

- Get safety benefits as soon as possible
  - Signs lines and shoulders to standard within 12 months
  - All widening to be completed in the first 3 years
- Extract as much life as we can from the existing pavement
  - We have allowed for some “holding Surfacings” in first years
Contract’s underlying Asset Management Philosophies

New pavements to be designed for an “expected life” of at least 22 years
- Minimum service life is 15 years

Opportunities to improve the asset’s amenity are considered when pavement is being constructed
- Additional safety improvements
- Drainage improvements
Contract’s principal aims

1. Improved service to road users
   - Improve road safety
     - Improved Road Marking, Signage and Shoulders
     - Improved traffic management at work sites
     - Improved width – paved shoulders
Carriageway widening

Blue roads are all to be widened in first 3 years
Contract’s principal aims

2. Reduced road user costs
   - Consistent level of service over full life cycle

3. Reduced life cycle cost for the PWD
   - Pavements are to be designed for expected loading
     - Much heavier pavements than have been traditionally provided
   - All pavements in the contract area are to be rehabilitated over the term of the contract
Challenges and Solutions
Cultural Differences

- Jargon
- Attention to detail
- Trees
Cultural Differences

- Overloading
- “Corruption”
  - Issues
    - Procurement
    - Workmanship
      - No payment for rework
      - Independent Quality assurance testing
      - No rehab in last three years
      - Guarantees
Cash Flow

Extensive Capital Improvements

- Upgradation
- Improvement Pavement’s carrying capacity
- Improvement
- 100% rehab and resurfacing
Cash flow

Extensive Capital Improvements
- Upgradation
- Improvement Pavement’s carrying capacity Improvement
- 100% rehab and resurfacing
## Proportioning the costs

<table>
<thead>
<tr>
<th>Description</th>
<th>Bathinda</th>
<th>Sangrur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Widening with Rehabilitation of Existing Pavement</td>
<td></td>
<td>36.2%</td>
</tr>
<tr>
<td>Widening with Resurfacing of Existing Pavement</td>
<td></td>
<td>2.4%</td>
</tr>
<tr>
<td>Rehabilitation Only</td>
<td></td>
<td>23.4%</td>
</tr>
<tr>
<td>Resurfacing Only</td>
<td></td>
<td>10.9%</td>
</tr>
<tr>
<td>Network Performance [Includes Routine Maintenance]</td>
<td></td>
<td>27.1%</td>
</tr>
<tr>
<td>Total Percentage</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

**Note:** The percentages are specific to Bathinda and Sangrur.
Residual life

Predicting residual life from FWD’s is subject to much more error than we thought.

- NZ Transport Agency research report 381
  - Accuracy of predicted life is + or – 500% at best!
  - “…use of FWD for compliance testing is questionable”

Solutions

- Don’t rely of FWD by itself.
- Design review + QC testing.
- Underpin with min lengths of rehab.
The Vision
Thank you