UPDATE ON S E ASIAN RURAL ROAD RESEARCH AND LESSONS LEARNT

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Contents

- Very brief summary of the research
- Outcomes - technical
- Lessons learnt – mainstreaming and sustainability
Introduction

Between 2003 and 2009 DfID, World Bank and ADB co-funded research into appropriate LVRR pavement and surfacing options in Vietnam, Lao and Cambodia under (SEACAP). This work is now continuing under WB.

- Performance of gravel roads
- Pavement trials
- Standards and Specifications
- Mainstreaming and Uptake
Gravel Loss - (95% Level)

Survey Sites: Cumulative %

20 mm/yr: Limit of sustainability

Gravel Loss -mm/yr
The Pavement and Surfacing Trials

180 km of trials - Vietnam, Lao, Cambodia

Seals – 4 types
Unsealed – 4 types
Bases/sub-bases – 11 types
Block/Brick – 4 types
Concrete – 4 types

110 sections of 100-200m have been monitored regularly in Vietnam for up 5 years
Trial Layouts

Revised Da Nang Trials Layout

Locations of these sections will depend on drainage structures.

Existing Commune roads

Da Nang RRST- I

HUE: Trial Section Layout

Hue RRST- I
Gravel Section: High Rainfall

As Built

After 6 Months
Rainfall Hue 2006-08

2007-2008
3 storms @ 300-350mm/24 hrs
Seals

Sand seals – poor performance without a 2\textsuperscript{nd} seal

Double emulsion chip seals – equal or better performance than standard hot bitumen double chip
Blocks

Sand jointed concrete blocks – erosion in high rainfall without maintenance

Mortared cobble stones/stone blocks – highly resistant to tropical storms.
Bamboo reinforcement makes no effective contribution

Good non-reinforced concrete is a far solution
Poor Performance

Design–Task mis-match

Poor Construction control

Drainage

No effective maintenance
Ethnic minority people volunteer their working days to build inter-commune roads— VNA/VNS Photo Ngô Lích
2-Phase Pavement selection and design procedure

Phase I
Selection of appropriate general pavement type or types

Phase II
Detailed design of selected option

All Pavement Options

Materials

Traffic Regime

Construction Issues

Erosion Regime

Maintenance Regime

Scio-Economic Analysis

Short List to Phase II
Environmentally Optimised Design (EOD) principles:

Design depends on local conditions

Design varies as conditions vary

Spot improvements when funds restricted
EOD – Spot Improvement

A manual produced and trialled in N. Lao to present the LVRR Standards and Specifications for Lao in a format suitable for use on site by provincial and district engineers and technicians.
<table>
<thead>
<tr>
<th>Typical pavement option</th>
<th>Vietnam Region</th>
<th>Cost (US$/km) 3.5m wide LVRR carriageway</th>
</tr>
</thead>
<tbody>
<tr>
<td>200mm Non-reinforced concrete</td>
<td>N.Highlands</td>
<td>25,000</td>
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<tr>
<td></td>
<td>N. Coastal</td>
<td>30,000</td>
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<td></td>
<td>C. Highlands</td>
<td>40,000</td>
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<tr>
<td>200mm Dry-Bound Macadam + Double Chip Seal</td>
<td>N.Coastal</td>
<td>22,000</td>
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<td></td>
<td>C. Coastal</td>
<td>25,000</td>
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<td></td>
<td>C. Highlands</td>
<td>35,000</td>
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<tr>
<td>Unsealed “Gravel” (200mm)</td>
<td>Mekong Delta</td>
<td>8,000</td>
</tr>
<tr>
<td></td>
<td>N.Coastal</td>
<td>5,000</td>
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<tr>
<td></td>
<td>C. Highlands</td>
<td>5,000</td>
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</tbody>
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Hill region:
4% gradient; 2000mm rain/yr; 50-100 ADT
Sub-grade CBR 7%;
4.5T axle load
Period 8 years

<table>
<thead>
<tr>
<th>Option</th>
<th>Costs/km</th>
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<tbody>
<tr>
<td></td>
<td>Construction</td>
<td>Construction +</td>
<td>NPV Total</td>
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</tr>
<tr>
<td>Unsealed gravel (200mm)</td>
<td>$8,000</td>
<td>$45,000</td>
<td>$30,000</td>
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<tr>
<td>Sealed dry-bound macadam (200mm)</td>
<td>$20,000</td>
<td>$32,000</td>
<td>$26,000</td>
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</tr>
</tbody>
</table>
Maintenance Costs

Available figures used by Donors suggest around $1500/km/yr for routine maintenance in Vietnam. Actual norms are around $300-500/km/yr.

SEACAP research has highlighted that the additional costs for periodic maintenance vary considerably with pavement type:

- Concrete pavement +/- $150/km/yr
- Bitumen sealed pavement +/- $300/km/yr
- Unsealed gravel +/- $2000/km/yr.
Sustainable Applied Research

Requirement defined by the local practitioners

Clearly established local ownership including active participation from day 1.

Steering Committee drawn from key participating organisations
Sustainable Applied Research

Clearly defined and costed practical end-game for the research programme

Formal adoption of outputs into National Standards and Specifications

Knowledge and technology transfer to “front-line” provincial and district engineers

Train-Trainees – with care and monitoring
Specific dissemination and mainstreaming projects or research and implementation programmes that have a long enough time-span to enable mainstreaming to be effective.

Disseminate “outside the box”: economists; transport planners; etc.
Finally - !

"SEACAP was ultimately an important program doing important work that is not being done elsewhere. To discontinue it would be to leave a major gap in a sector that clearly underpins poverty reduction, rural development and access to education, healthcare and markets"

DfID independent project review 2009