Key Management Issues for Low Volume Rural Roads in Developing Countries

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Presentation

• Research in South East Asia - gTKP & SEACAP

• Tertiary and Access Roads:
  – Low Volume Rural Roads (LVRRs): <400vpd
  – Very Low Volume Rural Roads (VLVRRs): <50vpd
Key Issues

- Policy
- Rural Road Classification
- Road Standards
- Road Environment
- Environmentally Optimised Design
- Surface & Paving Options
- Whole Life Costing
- Materials
- Specifications and Supervision
- Maintenance
- Further Investigations
Policy

Framework for objectives and approaches, addressing:

- Classification
- Ownership
- Responsibilities for managing
- Financing and resourcing
- Setting and monitoring standards & specifications
- Socio-economic, employment, technology, safety, health and sustainability issues
- Monitoring performance
Rural Road Classification

• Appropriate - based on local conditions and priorities.

• Relating to transport policy, responsibilities, traffic characteristics, economic and social factors

• Available financing

• LVRRs (<400 vpd) usually local authority responsibility

• VLVRRs (<50 vpd) likely require a stakeholder partnership
Road Standards

- Compatible with
  - task,
  - road category,
  - environment, and
  - affordability
Road Environment

![Graph showing the relationship between traffic impact and percentage contribution. The graph illustrates the area of interest for LVRRs and the impact on environment and traffic.](image)
Road Environment

Holistic approach for LVRR design
Environmentally Optimised Design (EOD)

• Standards and designs = f ( road task + environment + available recourses ).

• Solutions: range from spot to whole link upgrades.

• Technologies: Engineered Natural Surfaces - Paving
Spot improvement strategy

Main Road

Spot/Surface Application:

Option 1: Marshy ENS

Option 2: Low Cost Structure or culvert

Option 3: Engineered Natural Surface (ENS)

Village

Maintenance: MAINTENANCE REQUIRED THROUGHOUT

Surface Options

Low Cost Structure or culvert

Engineered Natural Surface (ENS)

Maintenance

SEACAP 10
Paving Options – Traditional ‘Rule of Thumb’

Surface Choice based on Whole Life Costs

Whole Life Cost

Traffic (Vpd)

Earth Roads

Gravel Roads

Conventional Paved Roads

Rule of Thumb

Upgrade from Earth to Gravel at 50 vehicles per day and above.

Upgrade from Gravel to a Conventional Paved Road at 200 vehicles per day and above.

Now Discredited
Research - Gravel

**NOT** appropriate if:

- Gravel quality is poor
- Compaction & thickness cannot be assured
- Drainage is not provided
- Haul distances are long
- Rainfall is very high (>2m), or dry season dust problems
- Traffic levels are high
- Longitudinal Gradients (> 4% if rainfall >1,000mm/year)
- Adequate maintenance cannot be provided
- Sub-grade is weak or soaked (flood risk), or
- Gravel deposits are limited/environmentally sensitive
PROVEN Options:

- Stone
- Bitumen
- Concrete
- Brick

Whole Life Cost + Local Resource Use
Whole Life Costing (WLC)

WLC = Investment + Maintenance + Residual

Current constraints are:

• Limitations of existing models
• Knowledge of maintenance costs
• Actual maintenance capacity
• Local VoC – road condition relationships

More research is required
Materials

Issues:
• Resources - non-renewable
• Gravel - ‘wasting’ surface
• Growing sustainability/energy issue

Select materials:
• Fitness for purpose;
• Adapting specs/design to suit available materials; and
• Adapting/modifying materials to suit realistic specifications.
Specifications & Supervision

Keys issues:

• Materials excavation, transportation, processing, placing, compaction;
• Source and on-site testing;
• Authority/motivation of the supervision staff;
• Must be achievable with materials, plant, contractors available; and
• Evidence of widespread non-compliance of gravel.
Maintenance

Key issues are:
• All roads require maintenance
• Vital if the investments are not to be wasted
• Widespread in-effective maintenance
• Some surfaces require less maintenance and are intrinsically lower risk
• Need to get ALL stakeholders engaged and committed.
Conclusions

• LVRR are a substantial challenge for road managers, engineers and the communities themselves

• Range of issues justifies more attention than hitherto provided

• Recent research has improved knowledge of low cost, more sustainable road and access solutions
Further Investigations

Improved knowledge required for:

• Maintenance arrangements and costs related to all technology options

• Vehicle Operating Cost – road condition relationships for range of Asian environments and vehicles

• Social costs and benefits
Further Information

Two important dissemination forums supporting LVRR knowledge:

**gTKP:** [www.gtkp.com](http://www.gtkp.com)

**SEACAP:** [www.seacap-info.org](http://www.seacap-info.org)