

**SEACAP workshop June 2009: EOD Manual**

# **EOD Manual and its application**

## **SEACAP 3.02**



**SEACAP workshop June 2009: EOD Manual**

### **Objective:**

**Present the LVRR Standards and  
Specifications in a format suitable for use  
on site by engineers and technicians**



## SEACAP workshop June 2009: EOD Manual

### Project steps

1. Review the Standards and Specifications
2. Short trial in Vientiane
3. Draft Manual
4. Trial in Phongsaly (SEACAP 31)
5. Final draft of the Manual
6. Present to LRD
7. Translate, approve and disseminate



## SEACAP workshop June 2009: EOD Manual

1. Review the Standards and Specifications

### How best to present the material

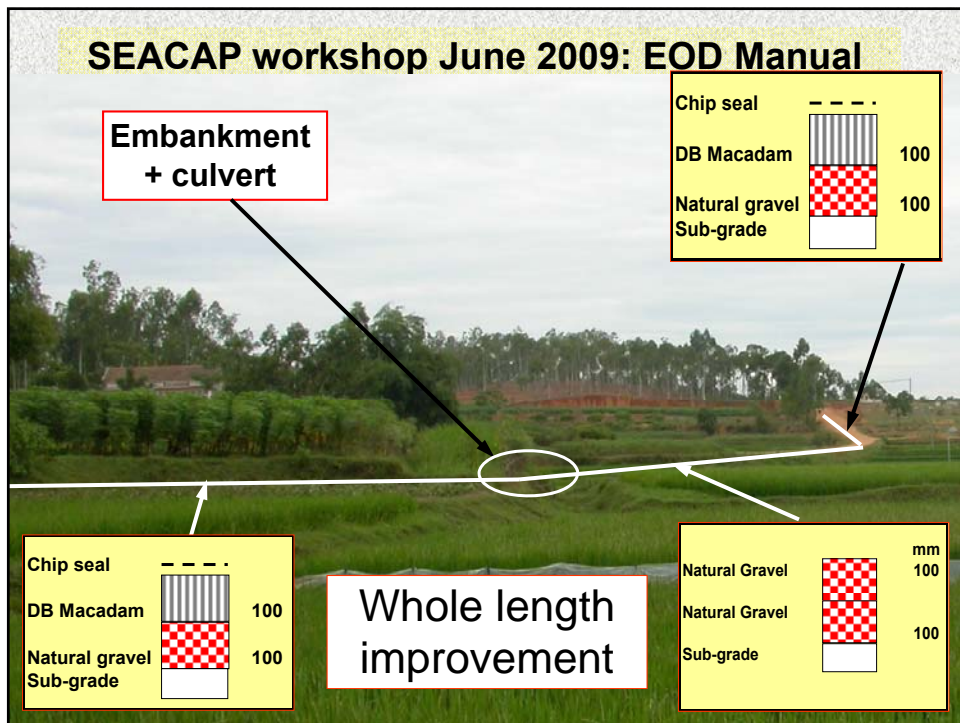
#### EOD principles:

1. Design depends on local conditions (EOD)  
(material, gradient, flooding, rainfall, C&M capacity, traffic)
2. Design varies as conditions vary  
(road to road; site to site)
3. Spot improvements when funds restricted  
(priority: impassability, dangerous sites, people, etc)

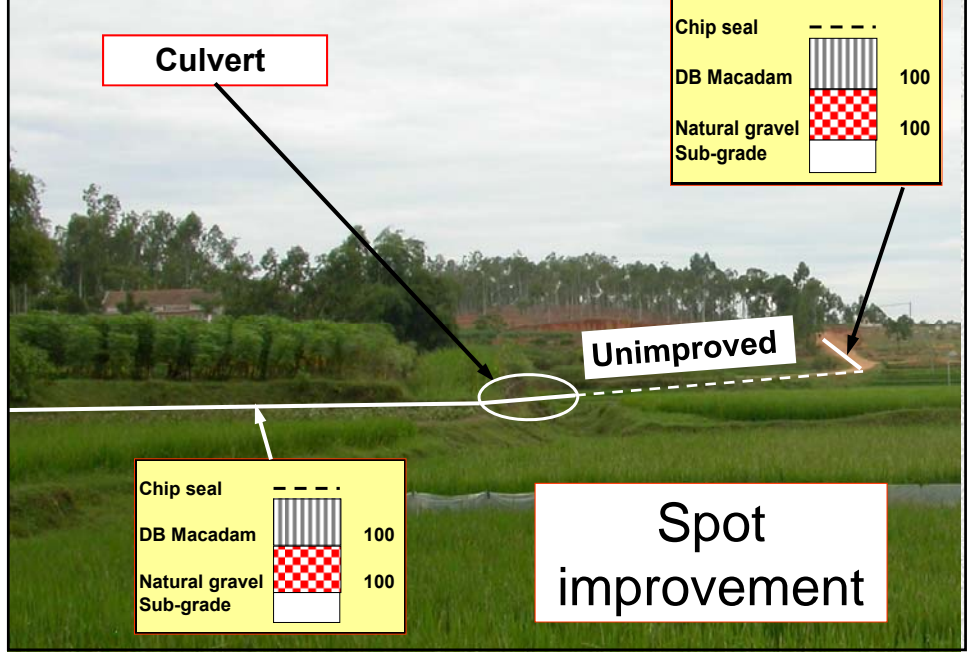


> steep hills, villages, culverts, embankments





SEACAP workshop June 2009: EOD Manual



SEACAP workshop June 2009: EOD Manual

2. Short trial in Vientiane

Flat terrain

Approximate level of survey detail



**SEACAP workshop June 2009: EOD Manual**

**3. Draft Manual – survey & design steps**

**Screening – funding, skill, traffic**

**Rapid survey –**

initial understanding of nature, problems, solutions

**Assessments – traffic, terrain, rainfall, mat's, C&M**

**Initial design work –**

width, camber, height, curvature, gradient



**SEACAP workshop June 2009: EOD Manual**

**3. Draft Manual**

**Main survey \***

**Data collection –**

DCP, lab tests, subgrade strengths, material sources

**Selection of improvements – defects linked to improvements**

**Pavement and surface design \***





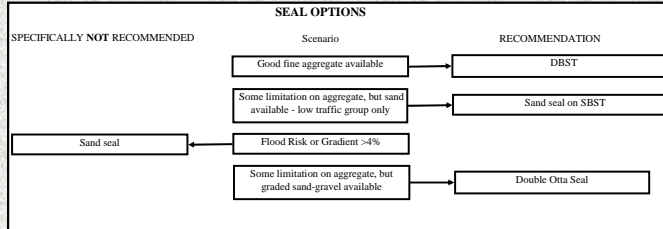
# SEACAP workshop June 2009: EOD Manual

## 3. Draft Manual

### Pavement and surface design – select appropriate type



Then refer to appendices for the selected pavement and surface



# SEACAP workshop June 2009: EOD Manual

## 3. Draft Manual

### Appendices – pavement design charts (and other guidance)

Table A8 Sealed granular pavement design table without a capping layer

Subgrade soaked CBR (%)	Pavement layer	Layer thickness (mm)	
		Traffic Group A	Traffic Group B
2-3.9	Surface	Seal *	Seal *
	Granular base	100	100
	Granular sub-base	225	325
4-6.9	Surface	Seal *	
	Granular base	100	
	Granular sub-base	175	
7-10.9	Surface	Seal *	
	Granular base	100	
	Granular sub-base	100	
> 11	Surface	Seal *	
	Granular base	100	100
	Granular sub-base	100	150

Table A9 Layer strengths for a sealed granular pavement

Pavement layer	Minimum Soaked CBR (%)	
	Traffic Group A	Traffic Group B
Granular base	50 *	80
Granular sub-base	25	25
Capping	10	10

\* Gravel with CBR of 25% may be used if there are no trucks (including Koloas) in the traffic seal

\* Seal can be either DBST or double Otta seal



**SEACAP workshop June 2009: EOD Manual**

**4. Trial in Phongsaly (2 weeks: Aug & Nov 2008)**

LSRSP rehabilitation & gravelling contract on Samphan Road

**Objective**

**Trial S&S and Manual  
Design improvements  
Training**

**Participants**

**DPWT  
OPWT – 3 Districts  
LRD  
NUoL  
LSRSP Site supervisor  
Contactor**



**SEACAP workshop June 2009: EOD Manual**

**4. Trial in Phongsaly**

**Training \***

**Assessments**

**Surveys – subgrade strength, gradient**

**Selection of sections – villages and steep hills**

**Testing – DCP tests, laboratory tests of subgrade**

**Analysis**

**Design**

**Prioritisation – from the start of the road**

**Road – new construction/poor condition**



**SEACAP workshop June 2009: EOD Manual**

**4. Trial in Phongsaly – Training**

**DCP**

**Hand level**

**Accurate, quick, easy to learn**



**SEACAP workshop June 2009: EOD Manual**

**5. Final draft of the Manual**

**Understood the survey and design process**

**Revised the survey & design steps**

**Allowing consistent sections**

**Flexibility in pavement design**



**SEACAP workshop June 2009: EOD Manual**

**6. Present to LRD**

**August 2008**

**Accepted**



**SEACAP workshop June 2009: EOD Manual**

**7. Translate, approve and disseminate**

**Very important steps**

**National use of the Standards and Specifications and Manual**



**SEACAP workshop June 2009: EOD Manual**

**Application**

- Complete approval process**
- Harmonise across the sector**
- Include partners outside MPWT**
- Demonstrations & trials**
- Include other pavements as they are proved**
- Expand principles to other roads**
- Training**



**SEACAP workshop June 2009: EOD Manual**

**Recap of key issues:**

**SEACAP 3**

**Developing and  
mainstreaming LVRR  
standards**





## SEACAP workshop June 2009: EOD Manual

### 3. Improve priority sections if funds are insufficient

Prioritisation according to:

- \* Safety
- \* Passability, etc

Spot improvements (criteria: see later)

(water crossing, hills, villages, flooding, etc)



## SEACAP workshop June 2009: EOD Manual

### 4. Target roads:

- \* Low traffic – volume, width, axle load
- \* Length – c. 5 km



## SEACAP workshop June 2009: EOD Manual

### 5. Outputs

Part I Road classification  
Geometric standards

Part II Pavement and surfacing options  
Specifications  
Design guidance

Part III Guidance document



## SEACAP workshop June 2009: EOD Manual

Next steps for mainstreaming:

LVRR Manual to present guidance in a site usable style  
.....SC3.02

Site trials of the LVRR standards and specifications  
.....SC31

Separate projects but run as a single project



## SEACAP workshop June 2009: EOD Manual

### SC3.02: LVRR Manual

- \* July-November 2008
- \* Review of relevant manuals
- \* Reworking of LVRR standards and specifications into format for a manual
- \* Drafting of manual
- \* Workshop in August to discuss manual with LRD and SEACAP – approved
- \* Completion in November



## SEACAP workshop June 2009: EOD Manual LVRR Manual

1. Design process for road in poor condition
  1. Assess budget
  2. Assess traffic
    - 5 traffic categories (NMT, 3W, Kolao, Isuzu, large)
    - Is traffic within LVRR envelope?
    - Traffic group – low or medium?
  3. Assess terrain
  4. Select cross section and geometry
    - Based upon traffic, terrain and surface
    - Exceptions from geometric standards
  5. Look up annual rainfall
  6. Assess local materials



**SEACAP workshop June 2009: EOD Manual  
LVRR Manual**

**1. Design process for road in poor condition**

**7. Assess construction and maintenance capacity**

Technical ability, resources and maintenance system

**8. Survey and analyse the road**

**Identify uniform sections** – gradient, condition, village, etc

**Measurements** – camber, width, etc

**Assess condition** – slippery, dusty, impassable, etc

**Assign priority criteria** – prioritised spot improvements

**Additional surveys** – DCPs, test pits, etc



**SEACAP workshop June 2009: EOD Manual  
LVRR Manual**

**1. Design process for road in poor condition**

**9. Select and design improvements**

Condition-improvement table

Pavement and surfacing selection guidance

**10. Estimate costs**

**11. Prioritise the improvements**

Prioritisation guidance – reducing costs

**12. Prepare contract documents**





## SEACAP workshop June 2009: EOD Manual

### LVRR Manual

#### 2. Design process for a new road

##### Differences:

- \* More flexibility on alignment
- \* Unable to use condition to assess a road

#### 3. Appendices

Design charts from standards (traffic and subgrade)  
Guidance on shoulders, safety, slope protection, etc

#### 4. Example calculations – traffic, pavement design



Trials → Completion → Translation



## SEACAP workshop June 2009: EOD Manual SC31: Trials – Design and Construction

### Trial of LVRR Manual

### Trial of LVRR Standards and Specifications

### Training

- \* Samphan Road, Phongsali Province
- \* LSRSP III road improvement and gravelling contract
- \* Currently has been opened over 30 km – not full width
- \* 54 km – focus on the first 10 km
- \* Additional pavement improvements – c. 2 km in total



## SEACAP workshop June 2009: EOD Manual

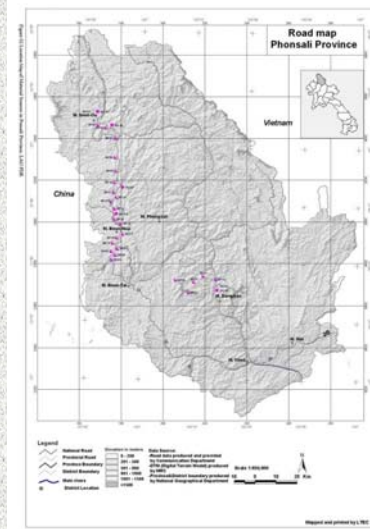
### Manual trials

Initial site visit in June 2008

Week 1 – early September  
4 days of trialling and training  
Given by LTEC and TRL

Attendees

DPWT Phongsali  
OPWT Khoa, Samphan, Bountai  
LRD  
Contractor  
Site supervisor  
National University of Lao



Week 2 to follow



## SEACAP workshop June 2009: EOD Manual

### Manual trials – week 1

Day 1: Explanation of the manual  
Discussion  
Preparation for survey



Day 2: Survey of 10 km of Samphan Road in groups

Day 3: Identifying sections for improvement  
Selecting improvements for sections  
Preparation of group presentations

Day 4: Group presentations  
Discussions  
Group selection of improvements  
Discussion of manual



lots of interest in the concepts, the trials and the manual



**SEACAP workshop June 2009: EOD Manual**

**Group selection of improvements**

**Focus on:**

**Villages  
Steep sections  
(health and safety)**



**(unable to focus on poor condition or passability)**



**SEACAP workshop June 2009: EOD Manual**

**Caveats about the trial use of the manual  
on Samphan Road**

- \* Road is long and is likely to attract higher and heavier traffic
- \* Unable to use condition as an indicator
- \* Need to measure gradients accurately
- \* Restriction to pavement improvements



## SEACAP workshop June 2009: EOD Manual

### Manual trials – week 2

Need for road to be fully widened and formed ready for gravel  
Delays due to rain and landslides  
Soaked CBR tests carried out

Week 2 is planned – same participants:

1. Discussion of pavement standards and design methods
2. Site visit
  - Confirm gradients
  - DCP tests & comparison with soaked CBRs
3. Design work
4. Finalisation of design



## SEACAP workshop June 2009: EOD Manual

After week 2:

### LVRR Standards and Specifications trials

Construction of trial improvements  
Supervision and training  
Monitoring

Demonstration of spot improvements  
Improved low volume rural access  
Sustainability



This phase or next phase?