



Lao People's Democratic Republic

Peace Independence Democracy Unity Prosperity

Ministry of Ministry of Public Works and Transport

Department of Roads

Local Resource Solutions to Problematic Rural Road Access in Lao (PDR)

SEACAP 17 Rural Access Roads on Route No.3

Module 4 – Information Dissemination and Training Report

December 2008



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Dear Sir

Local Resource Solutions to Problematic Rural Road Access in Lao (PDR)

SEACAP 17 Rural Access Roads on Route No.3

Module 4 – Information Dissemination and Training Report

It is with great please that we submit seven copies of the Module 4 Report for this project with the final comments from the DFID Technical Manager incorporated.

The Final Report will incorporate all four modules and will be submitted in both English and Lao.

Yours faithfully

A handwritten signature in blue ink, appearing to read "S.D. Gillett", is written over a light blue horizontal line.

Dr. S.D. Gillett

Enc.

Local Resource Solutions to Problematic Rural Road Access in Lao (PDR)

SEACAP 17 Rural Access Roads on Route No.3

Module 4 – Dissemination Report

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Department of Roads
Ministry of Public Works and Transport
Lao People's Democratic Republic



In association with

LTEC
Lao Transport
Engineering Consult

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www.seacap-info.org

Abbreviations

ABD	Asian Development Bank
CBR	California Bearing Ratio
CRM	Community Road Model
DCP	Dynamic Cone Penetrometer
DCTPC	Department of Communication Transport Post and Construction
DFID	Department for International Development
DOR	Department of Roads
DRR	District and Rural Roads
DWPT	Department of Public Works and Transport, previously DCTPC
EOD	Environmentally Optimised Design
GOL	Government of Laos
gTKP	global Transport Knowledge Partnership
IFG	International Focus Group
IRAP	Integrated Rural Accessibility Planning
IRI	International Roughness Index (m/km)
KfW	Kreditanstalt für Wiederaufbau
LAK	Lao Kip
LBES	Labour Based Equipment Supported Maintenance
LECS	Lao Expenditure and Consumption Survey
LRD	Local Road Division
LRN	Local Road Network
LSRSP	Lao Swedish Road Sector Project
LTEC	Lao Transport Engineering Consult
LVR	Low Volume Rural Roads
MCTPC	Ministry of Communication Transport Post and Construction
MDD	Maximum Dry Density
MPWT	Ministry of Public Works and Transport, previously MCTPC
NEC	Northern Economic Corridor
NGL	Natural Ground Level
NGPES	National Growth and Poverty Eradication Strategy
NPV	Net Present Value
NRN	National Road Network
PRC	People's Republic of China
PRoMMS	Provincial Road Maintenance Management System
PRTP	Participatory Rural Transport Planning
QA	Quality Assurance
RIP	Rural Infrastructure Project
RMF	Road Maintenance Fund
RMI	Road Maintenance Initiative under the Sub Saharan Africa Transport Policy Programme
RMP1	Road Maintenance Project 1
RMP2	Road Maintenance Project 2
RMS	Road Management System
RRSR	Rural Road Surfaces Research
SATCC	South Africa Transport and Communications Commission
SEACAP	South East Asia Community Access Programme
SID	Spot Improvement Design
Sida	Swedish International Development Cooperation Agency
SPM	SEACAP Practitioners Meeting
TCTI	Transport and Communication Training Institute
THIP	Third Highway Improvement Project
TKP	Transport Knowledge Partnership
USD	United States Dollar
VMC	Village Maintenance Committees
VOC	Vehicle Operating Costs

Local Resource Solutions to Problematic Rural Road Access in Lao (PDR)

EXECUTIVE SUMMARY

The Lao People's Democratic Republic is in the centre of the Mekong region of South East Asia. Lao PDR is an agrarian economy with more than three-quarters of the population living in rural areas, dependent on agriculture. It is estimated that some 90% of the poverty in Lao PDR is rural-based with a strong correlation between access to basic infrastructure services and the incidence of poverty.

SEACAP's goal is to support the uptake of low cost, sustainable solutions for rural access. Improving the sustainability and affordability of rural access will lead to improved access to economic opportunities, and health and education services; thereby creating opportunities for pro-poor growth and poverty alleviation. SEACAP 17 aims at identifying cost-effective methods of improving all-year access to the rural poor through low-cost locally resource based improvement of problematic lengths of road resulting in sustainable rural access roads.

Having completed the design and construction of the pavement trials, conducted the baseline data capture and planned a future programme of monitoring all engineering aspects of this project are completed. However, importantly, all of this will be in vain unless the awareness of good practice experience from this project is disseminated at the national, sub-regional and international levels.

Throughout this project the transfer of knowledge and the dissemination of the information attained have been taken as one of the key aspects of the SEACAP programme. 'Dissemination' has been achieved by a number of different methods during the course of this project, namely:

- Workshops
- Training
- Guidelines and Specifications
- Mainstreaming

These dissemination methods are described in this report.

1 INTRODUCTION

1.1 Background

The Lao People's Democratic Republic is in the centre of the Mekong region of South East Asia. It has an agrarian economy with more than three-quarters of the population living in rural areas and dependent on agriculture. It is estimated that some 90% of the poverty in Lao PDR is rural-based and there is a strong correlation between access to basic infrastructure services and the incidence of poverty.

The goal of the South East Asia Community Access Programme (SEACAP) is to support the uptake of low cost, sustainable solutions for rural access. Improving the sustainability and affordability of rural access will lead to improved access to economic opportunities and to health and education services, thereby creating opportunities for pro-poor growth and poverty alleviation. SEACAP 17 aims at identifying cost-effective methods of improving all-year access to the rural poor through low-cost locally resource based improvement of problematic lengths of road resulting in effective and sustainable rural access roads.

The project has been implemented in conjunction with the Asian Development Bank (ADB) funded Northern Economic Corridor Project (NEC) to carry out research on a group of rural access roads in Houay Xai district of the Lao PDR. The project has required close collaboration between Ministry of Public Works and Transport ADB, SEACAP and the Consultant.

The research has been implemented in four modules as follows:

- Module 1: Project Planning and Initiation Report Submitted June 2005¹
- Module 2: The Construction Phase and Base Data Capture
- Module 3: Operational Data Capture and Interpretation
- Module 4: Information Dissemination and Training

A breakdown of the requirements of each of these modules is shown in Appendix A.

The approach adopted has been to identify key sections at specific locations along the access roads and to replace the standard NEC gravel pavement proposed for these sections with a SEACAP trial pavement. The pavement types selected for the trials were taken from those presented at the Knowledge Exchange Workshop in December 2004 (set out in the Module 1 report) and the specifications for each of the trial pavements has been developed from similar projects in the region and worldwide as follows:

1. **Standard NEC Gravel**, this construction comprises 200 mm of gravel wearing course with a bearing capacity of $CBR \geq 25\%$ constructed on an in-situ subgrade which, after mechanical modification, should have a bearing capacity of $CBR \geq 8\%$ in fill and $CBR \geq 5\%$ in cut. Alternatively, where the in-situ subgrade does not meet these standards a 300 mm thick selected subgrade layer should be imported having a bearing capacity of $CBR \geq 8\%$.
2. **Bamboo Reinforced Concrete**, a bamboo reinforced surface consists of a layer of concrete, reinforced with strips of bamboo, and laid upon a compacted base.
3. **Geocell**, manufactured plastic formwork is used to construct in-situ concrete paving. The plastic formwork is sacrificial and remains embedded in the concrete creating a form of block paving.
4. **Mortared Stone**, this surface consists of a layer of large stones, placed closely together to form a tight surface. The voids are filled with mortar to form an impervious layer.

¹ **Local Resource Solutions to Problematic Rural Roads Access in Lao PDR, SEACAP Access Roads on Route 3. SEACAP 17, Module 1 Report, July 2005**

5. **Hand Packed Stone**, this surface consists of a layer of large stones into which smaller chips are packed. Remaining voids are filled with sand or gravel to form a strong and semi-impervious matrix.
6. **Concrete Paving Blocks**, the blocks are precast in moulds and then laid side by side on a prepared subbase. Gaps between blocks are filled with fine material to form a strong and semi-impervious layer.
7. **Sand Seal**, this seal consisting of a machine applied film of bitumen followed by the application of excess sand which is lightly rolled into the bitumen.
8. **Otta Seal**, this surface comprises a layer of binder followed by a layer of aggregate that is rolled into the binder using a roller or loaded trucks. It is different to surface dressing in that an 'all in' graded gravel or crushed aggregate is used instead of single sized chippings. The layer is thicker and more bitumen is used.
9. **Engineered Natural Surface**, this construction is used where the existing subgrade material comprises natural gravel with the same engineering characteristics as the pavement layer.

In order to monitor the pavement trials, various preliminary data have been collected, specifically; the bearing capacity of the road foundations, the gradients and alignment, predicted traffic loading and climatic data. This data is stored in a database (developed in Microsoft Access) which is owned by the Ministry of Public Works and Transport (MPWT).

On completion of the trial sections, base condition monitoring was conducted as follows:

- Visual Inspection and surface condition logging;
- Photographic logging;
- Surface deformation recording (dipped levels and rut measurement);
- Surface roughness using a MERLIN apparatus;
- Surface Texture (sand patch test);
- Classified traffic counts, and;
- Structural integrity using a Dynatest 3031 LWD Light Weight Deflectometer.

The records have been collected in a similar method to that of other SEACAP projects and stored in a similar format (an MS Excel based database) so that comparisons with trial sections on other projects can be made.

Having examined the performance of various pavement types, one of the main objectives of the project is to disseminate the findings to regional and international agencies. Workshops and seminars will allow all practitioners to share experiences from projects within Lao PDR, the SE Asia region and worldwide.

2 INFORMATION DISSEMINATION

Having completed the design and construction of the pavement trials, conducted the baseline data capture and planned a future programme of monitoring all engineering aspects of this project are completed. However, importantly, all of this will be in vain unless the awareness of good practice experience from this project is disseminated at the national, sub-regional and international levels.

This project is part of the wider South East Asia Community Access Programme (SEACAP) which is investigating and improving sustainable and affordable rural access in order to encourage expanding social and economic opportunities for rural people, thereby enhancing pro-poor growth and poverty alleviation efforts. SEACAP is a poverty-targeted transport initiative within the global Transport Knowledge Partnership² (gTKP) framework. It is aimed at improving the sustainable access of poor people in rural communities to health, education, employment and trade opportunities.

SEACAP 17 will contribute to this overall objective through the development of the engineering goals set out in Modules 1 to 3 and mainstreaming of the achievements and results. This report describes how this project has increased the awareness of this project by disseminating the outcomes at the national, sub-regional and international levels.

Local ownership of the techniques and practices investigated and described during this project is very important for sustainability and this theme has been pursued throughout this work.

It is reported³ that a number of partners at different levels and in different sectors (government, private, public, education) are involved in planning, management, construction and maintenance of rural low-volume roads or provide support services to it. Also, that the current capacity in terms of roadwork planning and implementation shows some limitations, particularly at district level and in the private sector.

This project has focused on the dissemination of the finds and achievements to these partners throughout the project period.

2.1 Dissemination Strategy

Throughout this project the transfer of knowledge and the dissemination of the information attained have been taken as one of the key aspects of the SEACAP programme. 'Dissemination' has been achieved by a number of different methods during the course of this project, namely:

- Workshops In order to develop an understanding of the engineering mechanisms being introduced to Lao (PDR) and to promote the benefits of long term solutions workshops were organised that specifically targeted groups such as MCPC/DCPC staff; LTEC supervision staff; university lecturers and trainers, the contractor and local village groups.
- Training Training sessions were conducted in the province of Bokao in order to ensure transfer of knowledge at all levels. The training was in the form of discussion groups and on-the-job training which covered all aspects of the research together with management issues relating to the project implementation.

² **global Transport Knowledge Partnership** framework <http://www.gtkp.com>

³ **Dissemination, Mainstreaming and Training Strategy Review, SEACAP 3 Technical Paper No 3, Andreas Beusch (Intech-Beusch), Ministry of Communication Transport and Construction, Lao (PDR), October 2007**

- Guidelines and Specifications Throughout the project various guidelines and specifications have been explored and brought to the attention of participants in SEACAP 17. During the project a number of specifications were development and trialled during the construction.
- Mainstreaming In order to disseminate the project information via national, international and regional agencies the information must available to a wide audience which has been achieved by:
 - The attendance and presentation of the project findings at International Conferences;
 - The compilation, and presentation, of a proper scientific paper describing the work done and the results, and;
 - The publication of the project details and findings on Websites.

2.2 Workshops

Two workshops were held under this project one at the start of the project and one towards the end, as follows:

- Inception Knowledge Exchange Workshop
- National Knowledge Exchange Workshop

2.2.1 Inception Knowledge Exchange Workshop

The Knowledge Exchange workshop was held in Vientiane in December 2004 as reported in the Module 1 report which contains, an agenda, a summary of the presentations made over the two days and a list of the participants. This workshop was planned with two distinct purposes:

- To introduce the SEACAP and specifically the SEACAP 17 project to the staff and consultants of MCPC;
- To share experiences from projects within Lao PDR, the SE Asia region and worldwide.

The participants represented a cross section of local and international delegates. MCPC participants included the heads of the different divisions within the DoR and from other departments that had a direct interest in the implementation of rural access infrastructure. In addition, international consultants working on projects for MCPC were also represented including those of the ADB NEC project, Lao-Swedish Road Sector Project B and SEACAP the programme. International participants included Roughton International, Intech Associates, Transport Research Laboratory and the Institute of Transportation Science and Technology in Vietnam all of whom are conducting research into rural access roads worldwide.

The presentations were grouped into four sessions and at the end of each session some time was allowed for discussion and comments on the presentations.

Fundamentally, for the project the potential surface types were selected, based on the views of the participants

The overall consensus was that the workshop was a success for both the local and international participants. It provided the opportunity to learn from each other about the problems with providing rural access and the potential solutions available.

2.2.2 National Knowledge Exchange Workshop

Rather than conduct the Pavement Design Workshop in Vientiane at the end of the research project as specified in the ToR it was agreed with SEACAP to hold a National Knowledge

Exchange Workshop in Houay Xai. This workshop was held at the Meeting Hall of Provincial Governor Office in Houay Xai on the 6 and 7 November 2007 with the distinct purpose of disseminating the knowledge gained during the SEACAP 17 project to the MPWT and the provincial staff of the MPWT. The workshop was held within the project area so that all engineers present could see and appreciate the trial pavements as described in the various presentations. A number of international participants involved with rural access projects in Lao PDR were invited to partake in order that they could share experiences from other projects. The proceedings of this workshop are described in a report⁴ submitted to the SEACAP with contained a description of the workshop, and electronic copies of the presentations.

The presentations were grouped into sessions and at the end of each session some time was allowed for discussion and comments on the presentations. A significant handout describing the trials, the construction methods, the specifications and the presentations was presented to the attendees.

The overall consensus was that the workshop had been a success for both the local and international participants. It provided the opportunity to learn from each other about the problems with providing rural access and the potential solutions available.

2.3 Training Sessions

Throughout the project training sessions were conducted with the purpose of describing each aspect of the project (planning, design, supervision, monitoring and maintenance). During the planning, design and tender evaluation stages, in Vientiane, our staff worked closely with the MWTP staff thus transferring knowledge. During the construction supervision all of the LRD staff visited frequently and thus were privy to the construction techniques and our supervision methods.

In general training sessions were informal, held as meetings and discussions either in the office or in the field. Various papers and guidelines were referred to during these sessions as described in the next section.

The specific MCTPC staff training was described in the various progress reports submitted throughout the project. For example in our 'Progress Report March to June 2006' it was reported that:

MCTPC staff training in computer applications continued during January completing the training in database management and in page layout using MS Publisher. The staff trained now has sufficient skills to enable them to produce the SEACAP newsletter and we will be looking to transfer this activity to MCTPC.

In view of the interest shown in this training, DoR requested an additional course to train trainers in order to improve computing skills throughout MCTPC and its provincial offices. During March, we provided a Training of Trainers course to selected MCTPC staff. The course included computing skills in MS Access, MS Project, MS PowerPoint and MS Publisher and training techniques.

Although not specifically included in the ToR these activities form part of the general institutional development aspect of the project and serve to increase awareness and interest in the wider field of management information and research.

This informal training continued through the project but was more concentrated during the early part of the project when our team was based in Vientiane, once the construct commenced this more general training was confined to site visits and informal discussions regarding the work.

⁴ **National Knowledge Exchange Workshop, Project Completion, Local Resource Solutions to Problematic Rural Road Access in Lao (PDR), SEACAP 17 Rural Access Roads on Route No.3, November 2008**

2.4 Guidelines, Design Manuals and Specifications

The designs of the pavement structures to be implemented were presented in the Inception Knowledge Exchange Workshop and guidelines describing the methodologies used formed part of the workshop notes. Guidelines and specifications for each pavement technology option were submitted evaluated as described in the Module 2 report.

It is intended that these methods and specifications will be adopted by future road development projects and used for independent spot improvements.

2.5 Mainstreaming

In order to disseminate the project information via national, international and regional agencies the project information has been made available via the following methods:

- The attendance and presentation of the project findings at Workshops and International Conferences;
- The compilation, and presentation, of a proper scientific paper describing the work done and the results, and;
- The publication of the project details and findings on Websites.

2.5.1 Workshops

Wherever possible, over the duration of the project, our staff have tried to participate in as many local workshops as possible. An example of this is our presentation at the recent SEACAP 3 workshop Pilot Training Course held in Vientianne in November 2007 where the Consultant's resident engineer, Mr.V.Vorasack, made a presentation describing the SEACAP 17 pavement trials.

2.5.2 International Conferences

A number of international conferences have been attended specifically associated with the project namely:

Fifth International Focus Group Meeting (IFG) on Rural Roads Engineering, Arusha, Tanzania, March 2005.

This is an association of interested members committed to the provision of sustainable transport access for the poor. It provides a platform for the dissemination of knowledge and information on rural roads engineering within the context of poverty reduction. At present IFG has 20 member countries. IFG offers the opportunity to disseminate information through their web site, which provides a download page for users to access information, and through their workshops. Mr.Mektakul (Deputy Director Local Roads Division) was made a member of the IFG Executive Committee.

Papers presented:

Local Resource Solutions to Problematic Rural Road Access in Lao PDR, M.James and Mektakul.S.

Transport Infrastructure Management Workshop, Phnom Penh, Cambodia June 2005

The seminar was organised with the intention to bring together researchers, practitioners and decision makers, to stimulate the documentation, presentation and discussion of recent experiences and developments, and contribute to the collection and dissemination of knowledge, experiences and best practices for meeting the needs of improved rural accessibility and poverty reduction.

Papers presented:

Laos - Community Participation in Rural Road Maintenance, M.James and Mektakul.S.

Sustainable Access and Local Resource Solutions, PIARC Seminar, Siem Reap Cambodia, November 2005

The seminar objectives were to promote better awareness of sustainable solutions for rural roads facilitating the documentation of practice guidance on rural roads and accessibility as part of the PIARC TC 2.5 intended work programme outputs.

Papers presented:

Dissemination of SEACAP 17 Activities in Lao PDR, M.James and Mektakul.S., November 2005.

SEACAP Practitioners Meeting (SPM) Year 2007, Vietnam

The second annual SPM was held in Hanoi, 12 to 13 September 2007. Over 100 rural transport practitioners attended the event. In addition to the SEACAP participating countries, representatives from several other countries in the region, as well as representatives from key international organizations participated. The main purpose of the SPM was to:

- Share experiences gained from completed and on-going projects;
- Assess achievements and progress, and;
- Considered the future direction and priorities of the programme.

Papers presented:

SEACAP 17: Local Resource Solutions to Problematic Rural Road Access in Laos, S.D.Gillett, Wotton,R.C. and Vorasack,V. September 2007.

SEACAP Practitioners Meeting (SPM) Year 2008, Lao (PDR)

- The third annual SPM was held in Vientiane, 4 to 5 September 2007. Again over 100 rural transport practitioners attended the event which was in a similar format to the earlier SPM meetings.

Papers presented:

Laos - SEACAP 017/001: Local Resource Solutions to Rural Access – Road Trials, S.D.Gillett, November 2007.

2.5.3 Scientific Paper

On the completion of all of the four module reports a final all encompassing report will be compiled in English and in Lao and a scientific paper containing the findings and conclusions of the project will be compiled which can be published officially.

2.5.4 Websites

SEACAP 17 appears on a number of websites as can be found by typing 'SEACAP 17' into a search engine. Specifically, however, a description of SEACAP 17 and all of the reports and papers can be found on the SEACAP website, www.seacap-info.org

Appendix A

The Basic Requirements of the Terms of Reference

Module 1 – Project Planning and Initiation

Close liaison with other practitioners and with international donor agencies should be a feature of the consultant's work programme for Module 1. In particular, liaison with the ADB, the World Bank and the Swedish International Development Cooperation Agency and their consultants/ contractors in relation their rural road development activities in Lao PDR, should form an integral part of the Module 1 planning process. Module 1 should comprise the following key activities:

- a) Develop a working arrangement with the MCTPC's (MPWT) Project Management Unit.
- b) Develop a working arrangement with LTEC, the MCTPC's (MPWT) domestic consultants. The consultant should make maximum use of local consultants for implementing this project to enable knowledge transfer.
- c) Develop a working arrangement with the NEC project consultants.
- d) Access primary information relevant to other road development activities.
- e) Access or derive where possible ancillary data sets, e.g. climate, terrain, geology etc.
- f) Input and collate existing data into a finalised database under key planning data sets, for example e.g. province and gravel type.
- g) Prepare a final list of the trial sections that are to be tested based on a likely spread of matrix variables. Provide rationale for selecting a specific trial method for each trial sections.
- h) Prepare a detailed design for specific trial sections (pavement surface, pavement structure, subgrade or any special structure required for the specific technology) based on a literature review of suitable solutions. The Consultant shall make maximum use of the existing detailed design provided by the NEC project consultant to avoid duplication of work and to provide cost savings.
- i) In conjunction with the MCTPC (MPWT) and the NEC project consultant review the access roads proposed for inclusion in the SEACAP programme.
- j) Undertake detailed planning of the main field programme based on the final road sections identified.
- k) Identify specifications and costings and prepare detailed bills of quantity for the surfacing trials to be undertaken by the successful SEACAP funded contractors.
- l) Following receipt of the bid documents for the SEACAP access road contracts from the MCTPC, superimpose the detailed designs and bills of quantity on to the bid documents.
- m) Where necessary, make modifications to the location of the trial sections on the SEACAP access roads based on the data (survey, ground conditions, materials, etc.) as received from the NEC project consultant.
- n) Verify the suitability of the detailed pavement design for the remaining length of the SEACAP access roads.
- o) Draft a detailed data collection programme.
- p) Draft an information dissemination and training strategy, based on the overall SEACAP information dissemination process in South East Asia.
- q) Submit a report detailing project actions and outcomes.
- r) Assist MCTPC (MPWT) in the assessment and award of the works contracts.
- s) Prepare proposal for slope stabilisation trials on alternate routes.

Module 2 – Representative Data Capture

The consultant should undertake the following key data collection and management activities:

- a) Construction of SEACAP Access Roads
 - (i) Instruct the contractors appointed by the MCTPC for conducting the SEACAP access roads. These instructions will include the type of surfacing technology to be used and the procedure for implementing it at the identified locations.
 - (ii) Supervise the construction of the SEACAP access roads at the identified locations.
 - (iii) In the event that a particular SEACAP access road does not succeed, the SEACAP consultant will provide supervision for the rehabilitation of the section so that this does not cause any lasting problem with access.
- b) Data Capture
 - (i) Liaise with survey teams appointed for undertaking the main data collection phase.
 - (ii) Instruct the survey teams on the objectives, methodology and procedures associated with the research project, probably by means of a training workshop.
 - (iii) Supervise initial data collection surveys in selected provinces as a follow-up to the training process.
 - (iv) Incorporate any minor adjustments in the procedures resulting from the training programme.
 - (v) Implement the data collection programme.
 - (vi) Complete the principal road condition data capture programme
 - (vii) Collect relevant village and district based information such as, maintenance activity, flood data, local climate etc.
 - (viii) Ensure the quality of the recovered data by undertaking crosschecks on the field teams' procedures
 - (ix) Carry out laboratory testing on collected samples e.g. particle size, Atterberg Limits and visual inspection and classification, and document the results
 - (x) Input acquired data into a database
 - (xi) Submit reports detailing project actions and outcomes.

Module 3 – Data Interpretation

The consultant should undertake the following key activities:

- a) Quality assurance of collected data.
- b) Analysis of data including the derivation of surface performance relationships with key road environment factors.
- c) Recommendations as to ranking of specific material usage within differing Lao PDR road environments utilising an appropriate performance model.
- d) Reporting on surface performance, including input to rural road decision-making process together with recommendations for long term monitoring.

Module 4 – Information Dissemination

The consultant should undertake the following key activities:

- a) Based on the technology solutions arrived at from the earlier modules, implement the information dissemination strategy.
- b) At an early stage in the project, the consultant will conduct a Knowledge Exchange Workshop to bring together key stakeholders in Lao PDR. The object of this Workshop will be to disseminate information relating to the proposed project and to collect relevant information that will assist the implementation of the proposed project.
- c) Ensure training sessions are conducted throughout all Modules for transferring knowledge at all hierarchical levels in the provinces. These will form part of a continuous programme of training, technology transfer and capacity building throughout the research activities.
- d) Deliver a series of guidelines, design manuals and specifications for each technology option evaluated in the earlier Modules. This will be in a format which can be readily adopted by future road development projects or used for independent spot improvements.
- e) Conduct a Pavement Design Workshop in Vientiane at the end of the research project. The consultant will prepare and facilitate briefing documents for the workshop. The main object of the workshop will be to generate buy-in from various stakeholders on the strategy for pavement design and to identify further investigations and support that will be required to mainstream it, if possible, this Workshop should be organised under the domain of the Transport Knowledge Partnership or the International Focus Group.

Appendix B

Specific Guidelines and Manuals that were Referred to During the Course of this Project

Specific guidelines and manuals that were referred to during the course of this project

ORN 1 1987	Maintenance management for district engineers. Overseas Road Note 1, Transport Research Laboratory, Crowthorne, United Kingdom, 1987
ORN 2 1985	Maintenance techniques for district engineers. Overseas Road Note 2, Transport Research Laboratory, Crowthorne, United Kingdom, 1985.
ORN 3 1992	A Guide to Surface Dressing in Tropical and Sub-Tropical Countries, Overseas Road Note 3, Transport Research Laboratory, Crowthorne, United Kingdom, 1992
ORN 18 1999	A guide to the pavement evaluation and maintenance of bitumen-surfaced roads in tropical and sub-tropical countries. Overseas Road Note 18, Transport Research Laboratory, Crowthorne, United Kingdom, 1999
ORN 31 1993	A Guide to the Structural Design of Bitumen-Surfaced Roads in Tropical and Sub-Tropical Countries, Overseas Road Note 31, Transport Research Laboratory, Crowthorne, United Kingdom, (4th Edition) 1993
TRH 3 1998	Surfacing Seals for Rural and Urban Roads, Draft TRH 3, Committee of State Road Authorities, CSIR, Pretoria, South Africa, 1998.
TRH 4 1996	Structural Design of Flexible Pavement for Interurban and Rural Road, Committee of State Road Authorities, CSIR, Pretoria, South Africa, 1996
TRH 6 1985	Nomenclature and methods for describing the condition of Asphalt Pavements. Committee of State Road Authorities, Pretoria, South Africa
TRH 14 1985	Guideline for Road Construction Materials, Committee of State Road Authorities, CSIR, Pretoria, South Africa, 1985
TRH 20 1990	The Structural Design, Construction and Maintenance of Unpaved Roads. Technical Recommendations for Highways 20, Committee of State Road Authorities, Pretoria, South Africa, 1990
TMH9	Pavement Management Systems: Standard Visual Assessment Manual for Flexible Pavements, Committee of State Road Authorities, Pretoria, South Africa, 1992
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