

## PROJECT SUMMARY

<b>1. COUNTRY</b>	Lao People's Democratic Republic
<b>2. NAME OF STUDY</b>	The Study on Improvement of Roads in The Southern Region in Lao P.D.R.
<b>3. COUNTERPART AGENCY</b>	Ministry of Communication, Transport, Post and Construction (MCTPC)
<b>4. OBJECTIVE OF STUDY</b>	-To create a Master Plan (target year:2020) for the improvement of the road network in the southern region of Lao P.D.R., and to conduct a Feasibility Study on the most suitable road improvement project (target year:2007) - To promote technical transfer to Lao counterparts through the study

<b>1. STUDY AREA:</b> Four Southern Laotian Provinces of Champasack, Saravan, Sekong, and Attapeu, as well as the area along Route 1G in Savannakhet Province																			
<b>2. SCOPE OF STUDY</b>  <div style="text-align: center;"><u><b>Master Plan</b></u></div> <ol style="list-style-type: none"> <li>1) Analysis of socioeconomic framework and identification of development potential in Study regions.</li> <li>2) Forecast of future traffic demand</li> <li>3) Evaluating initial environmental impacts</li> <li>4) Establishment of maintenance and improvement plan</li> <li>5) Economic Analysis</li> <li>6) Establishment of Master Plan and selection of road links for Feasibility Study</li> </ol> <div style="text-align: center;"><u><b>Feasibility Study</b></u></div> <ol style="list-style-type: none"> <li>1) Execution of national condition survey</li> <li>2) Establishment of design standards and criteria</li> <li>3) Development of preliminary engineering design and cost estimation</li> <li>4) Evaluating environmental impacts</li> <li>5) Development of project implementation plan and maintenance plan</li> <li>6) Economic analysis and evaluation</li> </ol>																			
<b>3. MASTER PLAN</b> <p>The Master Plan covers national roads in the southern region and prioritise road improvement projects up to the year 2020 and select the most appropriate project for a feasibility study. The Study roads comprise 16 routes with 880km in the total length among 2,025km of the national road in the study area.</p> <p><b>Route 14A (between B.Houay Phek. and B.Soukhouma) and 16A(between 1km mark east of Pakson and B.Lak 52)</b> are the most appropriate for implementing and completion by the year 2007 for the southern region of Lao P.D.R.</p> <p><b>Route 14A</b> will contribute to improving access to the west part of the Mekong River as well as to the southern part of the west bank, which will fuel development of the Emerald Triangle Area.</p> <p><b>Route 16A</b> will contribute to rural development in an area near the Champasack-Attapeu border and also improve East-West connectivity between Thailand, Laos and Vietnam.</p>																			
<b>4. FEASIBILITY STUDY</b> <p>The base case <b>EIRR</b>s for the two projects, <b>10.5%</b> per cent for Route 14A and <b>10.7</b> percent for Route 16A, are close to the test discount rate of 12 per cent, indicating that project implementation 2005-2007 may be appropriate based on their benefit to road users. These particular projects are likely to produce significant social and other benefits in their influence areas and beyond, in addition to their direct economic benefits.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Project</th><th>EIRR (in%)</th><th>NPV(US\$ mill)</th><th>FYB (in%)</th><th>B/C</th></tr> </thead> <tbody> <tr> <td>Route 14A (59.3km)</td><td>10.5</td><td>-3.32</td><td>5.8</td><td>0.87</td></tr> <tr> <td>Route 16A(64.1km)</td><td>10.7</td><td>-2.97</td><td>5.8</td><td>0.89</td></tr> </tbody> </table> <p>Most of the anticipated environmental negative impacts can be avoided or minimized to an acceptable level through compliance with laws and regulations and effective implementation of mitigation measures and rigorous monitoring program.</p>					Project	EIRR (in%)	NPV(US\$ mill)	FYB (in%)	B/C	Route 14A (59.3km)	10.5	-3.32	5.8	0.87	Route 16A(64.1km)	10.7	-2.97	5.8	0.89
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<b>5. RECOMMENDATIONS:</b> <ol style="list-style-type: none"> <li>1) Cross-border agreement needs to be in place at early time.</li> <li>2) A detailed study of road user charge will be needed to establish an appropriate funding scenario for road maintenance.</li> <li>3) The environmental monitoring will be designed in order to ensure that the legislative and regulatory measures will be met within a realistic implementation framework.</li> <li>4) Weighing station (axle-load control) on the Project Road with one in each district will be needed to control overloading.</li> <li>5) Road safety program for rural children in communities will be needed.</li> <li>6) Road inventory data, road condition and traffic data require to be updated continuously.</li> <li>7) In the future, maintenance records and data should be retained on a computer database.</li> <li>8) A national system of guidance for the preparation of Work Plans should be introduced.</li> <li>9) Promotion of private sector capacity building for road maintenance is recommended.</li> <li>10) Standard simplified contract documents for road work should be introduced to promote private sector's participation.</li> <li>11) Enhancement of training capacity of training institutions on road maintenance will be needed.</li> </ol>																			

## ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State-Highway and Transportation Officials
ADB	Asian Development Bank
ADT	Average Daily Traffic
B/C	Benefit/Cost Ratio
CPC	Committee for Planning and Cooperation
CPI	Consumer Price Index
DBST	Double Bitumen Surface Treatment
DCTPC	Department of Communications, Transport, Post and Construction
DOR	Department of Roads (of MCPTC)
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
FIRR	Financial Internal Rate of Return
GDP	Gross Domestic Products
HDI	Human Development Index
HDM	Highway Development Management Model
IDA	International Development Association (World Bank)
IEE	Initial Environmental Examination
JICA	Japan International Cooperation Agency
MCA	Multi-Criteria Analysis
MCTPC	Ministry of Communication, Transport, Post and Construction
NBCA	National Biodiversity Conservation Area
NPV	Net Present Value
NTFR	Non-Timber Forest Resources
OD	Origin-Destination
PCU	Passenger Car Unit
P.D.R.	People's Democratic Republic
RMF	Road Maintenance Fund
SEZ	Special Economic Zone
SIDA	Swedish International Development Agency
STEA	Science, Technology and Environment Agency
TAZ	Traffic Analysis Zone
TRRL	Transport and Road Research Laboratory
UNESCO	United Nations Education, Science and Culture Organization
UXO	Unexploded Ordnance
VCR	Volume Capacity Ratio
VOC	Vehicle Operating Cost
VPD	(Motorized, Four-wheeled) Vehicles Per Day
WPA	Wetland Protected Area

The following foreign exchange rate is applied in the Study:

1 US dollar = 10,940 Kip = 125.55 Japanese Yen (October 2002), or 1 Kip = 0.01148 Japanese Yen

## SUMMARY OF THE STUDY

### 1. Background and Objective

Since 1986, the Government of Lao P.D.R.(GoL) has exerted great efforts to introduce new economic mechanisms that will change the country from being a socialist economy to a successful market economy. The GoL has been relatively successful in making this transition. However even now, poverty levels in Lao P.D.R. are some 39% and it is one of the least developed nations.

To cope with the accompanying future increases in traffic as a result of economic growth as well as poverty alleviation, the Asian Development Bank, World Bank, and JICA have assisted the GoL with its road infrastructure via grants and loans for such projects as the improvement of Routes 13 and 9 and the Pakse Bridge, as well as for the construction of the Second Mekong International Bridge. However, the GoL realizes that the current state of its road infrastructure is still incapable of handling traffic that has accompanied the above-mentioned socioeconomic growth as well as future potential growth. Especially, in the southern part of the country (i.e., Savannakhet, Champasack, Attapeu, Sekong, and Saravan), which is located between Thailand, Vietnam, and Cambodia and is envisioned to serve as a bridge to integrate these ASEAN member countries, only 28% of the national roads are paved and there are locations with superannuated bridges or no bridges at all. This has not only posed a barrier to the movement of international trade, but has also resulted in this part of Lao being much poorer than the rest of the country.

Given this background, the GoL wishes to draw up a road network improvement plan for the southern provinces that will upgrade inter-provincial connectivity, and that will establish a network that will be compatible with that of the surrounding countries to realize an effective international road system, with the aim of invigorating the socio-economy of southern Laos. In response to this request from the GoL, the Government of Japan has decided to carry out a study to draw up a Master Plan and execute a Feasibility Study for the roads of the southern provinces, i.e., “The Study on Improvement of Roads in the Southern Region in Lao People’s Democratic Republic” (hereinafter referred to as the Study).

Therefore, the ultimate goal of this Study is to assist the GoL in prioritizing and recommending those road improvement projects that are crucial for the socio-economic development of southern Lao.

## 2. Study Approach

The major focus of the Study is to develop a Master Plan, to select the most suitable road improvement project for a Feasibility Study, and to then examine the technical and economic viability of this project in the Feasibility Study.

- 1) To analyze the background and present situation of the natural and socio-economic conditions.
- 2) To analyze the present and future relevant development plans for surrounding areas and countries.
- 3) To examine the most suitable road network and to establish a road improvement **Master Plan** (target year: 2020) for the improvement of the road network in the southern region.
- 4) To examine the **feasibility** (target year: 2007) of high-priority road improvement projects and to draw up an implementation plan for the project with the highest priority.

### (1) Master Plan

- 1) Review of the related development plans, socio-economic data, transport sector data and natural condition data.
- 2) Analysis of socio-economic framework and identification of development potential in Study regions.
- 3) Conduct of supplementary surveys and analysis (e.g., road inventory, bridge inventory, and traffic survey).
- 4) Formulation of basic road network.
- 5) Forecast of future traffic demand
- 6) Establishment of rural road improvement/construction criteria and engineering standards.
- 7) Cost estimation of road improvement, construction and maintenance.
- 8) Initial environmental examination.
- 9) Evaluation of road links of proposed road network.
- 10) Establishment of road improvement, construction, and maintenance plans.
- 11) Economic analysis.
- 12) Selection of road links for Feasibility Study.

### (2) Feasibility Study on high-priority projects.

- 1) Natural condition survey.
- 2) Consideration of alternatives.

- 3) Design standards and criteria (geometry, structure, pavement, etc.).
- 4) Preliminary engineering design.
- 5) Environment impact assessment.
- 6) Project implementation plan.
- 7) Maintenance and rehabilitation plan.
- 8) Cost estimation.
- 9) Economic analysis and evaluation.

### **3. Road Network in Study Area**

Study roads contain parts of all national roads; Route 1,13, 14, 15,16, 18 and 20, excluding Route 9. The total length of the study roads is 2025km.

Although the national road network in the study area is planned to serve the whole area, there still exists virtually missing links on Route 1G, 1J and 14A (total length: approx.122km), some parts of the study roads become impassable condition in rainy season due to lack of bridges and drainage facilities. As a whole, the west-east routes have been relatively in the higher standard compared to the north-south routs such as Route 1G, 1I (under improvement) and 1J. Especially, on Route 1G, two large-scale rivers (i.e., Xe-Bang Hiang and Xe-Don) prevent traffic from crossing the river mostly all year round. In addition, routes running through the less inhabited area or remote areas have also not been upgraded as an all-weathered road including 18A and B, 16 (from Lamarm to Vietnam border) and 15 (Saravan to Vietnam border).

Attapeu, Sekong and Saravan Provinces are amongst the least developed and have until recently lacked all-weather connections to the national road network.

Champasack province is relatively more developed than the other three. Pakse is the most important town and the regional center. Communications between Pakse and the north and south of the country are being transformed by the paving of the main north-south highway Route13S from Savannakhet south to the Cambodian border, which was completed in middle of 2002. This project, together with the opening of the second bridge (Pakse Bridge) over the River Mekong at Pakse in November 2000 and the improvement of Route16 connecting it to the Thai border, should provide a springboard for the development of the whole of the southern region.

The improvement of existing national road that will contribute to provide a reliable arterial rout for connecting between west part of Mekong and Pakse via the Mekong Bridge, is expected to

be carried out at early time. There is not all-weathered national road at all in the western part of the Mekong except town road in Champasack. The improvement of existing national road that will contribute to provide a reliable arterial route for connecting between Thailand and Vietnam via Pakse, is also expected to be carried out at early time.

#### **4. Evaluating Environmental Impacts**

##### **Potential Negative Impacts**

Many of the potential negative social impacts can be dealt with through the design and mitigation process. It is clear that the process of resettlement will have to be a sensitive one that follows national procedures and regulations. Careful planning as well as the management of both the construction and operational processes may also minimize the potential impacts of road improvements on the cultural environment in many ways. Many of the potential physical environment impacts are also of a nature where a good quality design and management process can ensure minimal negative impacts.

The highest level of negative impact has to relate to the natural/ecological environment of some of the possible route alignments. There is no doubt that increased access will bring added pressures to negatively exploit national resources. There must also be a concern for the potential loss of animal species due to the intrusion of a road especially given higher levels of vehicular activity and speed. Given the existing level of data it is difficult to quantify this set of impacts but there is no doubt that one of the major considerations in choosing a road alignment must be in recognizing the potential impact on the ecological/natural environment. There is a particular concern of the natural/ecological impacts of any road improvements to routes 1G and 18A. Very careful study must be undertaken if the routes are seen as priorities and if they are to be developed to national road standards. There may be a case where access is improved for local purposes but full-scale improvement should be delayed until the natural/ecological capacities are improved and the full impacts of a road on the NBCAs are understood.

##### **Potential Positive Impacts**

Improved access will provide a strong set of positive socio-economic impacts. The assumption is that the necessary complementary mitigation and facilitation mechanisms are used to ensure the fullest possible benefits of any road construction and improvement. The social indicators presented above highlight the high priority that must be given to providing all weather access to all residents of the region (or at least those within 5 km of a designated road).

## 5. Proposed Project

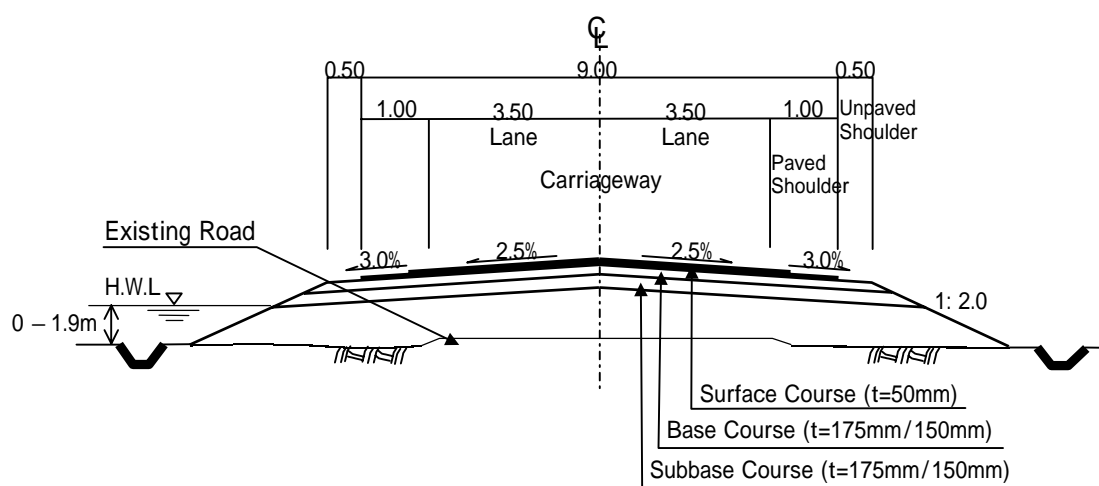
Based on the analyses of the Master Plan, the most appropriate road improvement project to be completed by a year 2007 was selected for further detailed examination by the feasibility study. The Study Team concludes that Route 14A (Ban Houay Phek – Ban Soukhouma :59.301km) and Route 16A (Paksong – Ban Lak 52 :64.138km) are the most appropriate routes to be examined

### Route 14A

This starts from Ban Houay Phek, which is located 2.0 km west of Pakse Bridge, and ends at Ban Soukhouma the capital of Soukhouma District, meaning that the entire route is located in Champasack Province and is 59.301 km in length. The characteristics of this route are as follows:

- (i) Terrain is flat over the entire route.
- (ii) The route passes through Champasack Town, which is the second largest town in the province.
- (iii) Wat Phou and Champasack Ancient City are located along the route.
- (iv) The 25 km Missing Link section is located in the northern part of the route.
- (v) Flooding from the Mekong River has inundated around 35 km in length of the route and effective countermeasures are therefore crucial.

Traffic volumes forecast for the target year of 2020 is about 1,100VPD (incl. motorcycle 3,000) on north section and 800VPD (incl. motorcycle 4,600) on south section respectively.



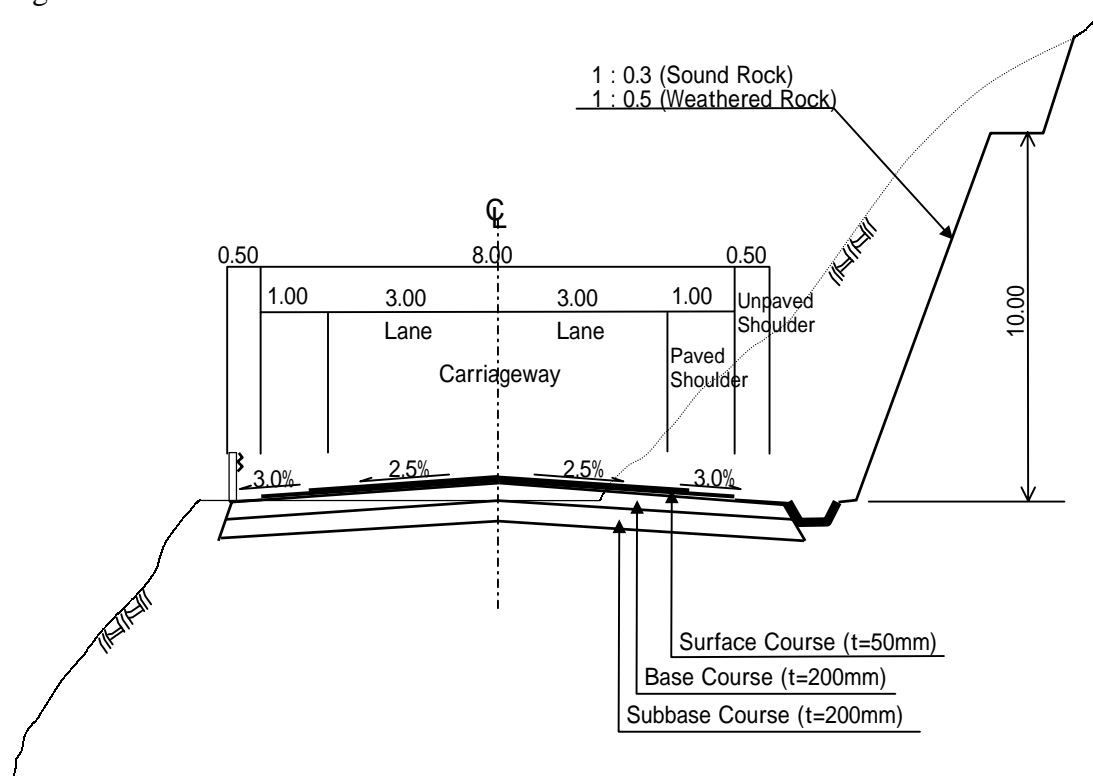
Typical Embankment Section (Route 14A)

## Route 16A

Route 16A starts from the junction with Route 16 located at the 1.0km mark east of Paksong in Champasack Province and ends at Ban Lak 52, or the junction with Route 11 in Attapeu Province. Total length is 64.138km. The characteristics of these routes are as follows:

- There is an existing road structure over the entire route except a section of the Shortcut Route.
- From the starting point to the 34km mark, the route is located in a hilly area. It goes through the Boloven Plateau, which is 900 – 1,300m above sea level.
- Then the route diverges from the existing road route. There is a river that is approximately 50m in width on this section. Terrain on this section is generally flat and land-use consists of forest and coffee plantations.
- From the 42km to the 58km mark, the terrain is mountainous and the existing road has an inadequate alignment at present (i.e., a small horizontal curvature radius and a steep vertical gradient) and therefore a resetting new alignment is required.

Traffic volumes forecast for the target year of 2020 is about 1,300VPD (incl. motorcycle 2,320) through the route.



Typical Mountainous Section (Route 16A)



## 6. Project Economic Analysis and Evaluation

The results of the economic analysis are presented in the following table. The indicators evaluated are: economic internal rate of return (EIRR); net present value (NPV) of costs and benefits discounted at the test discount rate of 12 per cent; first (opening) year benefit (FYB), expressed as a percentage of construction cost, escalated to opening year at 12 per cent per annum; and benefit cost ratio (B/C) at a discount rate of 12 per cent. The FYB is an indicator of the optimum year of project opening, while the EIRR, NPV and B/C indicate economic performance over the whole of the economic analysis period. A rate of 12 per cent has been used for the test discount rate as an indicator of the opportunity cost of capital for public sector projects of moderate risk.

The economic feasibility study outcomes for the two routes are very similar: there is no significant difference between the results. The new construction section of Route 14A has a higher EIRR than the improvement section, in spite of a 60 per cent larger construction cost per km, due to the distance savings it produces for diverting traffic and its 40 per cent higher traffic volume.

**Economic Analysis Results**

<b><u>Project</u></b>	<b><u>EIRR</u></b> (in%)	<b><u>NPV</u></b> (US\$ mill)	<b><u>FYB</u></b> (in%)	<b><u>B/C</u></b>
<b>Route 14A;</b>				
New construction km 0.0-34.0	11.1	-1.41	6.1	0.92
Improvement km 34.0-59.3	9.2	-1.91	5.0	0.77
Combined km 0.0-59.3	10.5	-3.32	5.8	0.87
<b>Route 16A:</b>				
Km 0.0-64.1	10.7	-2.97	5.8	0.89

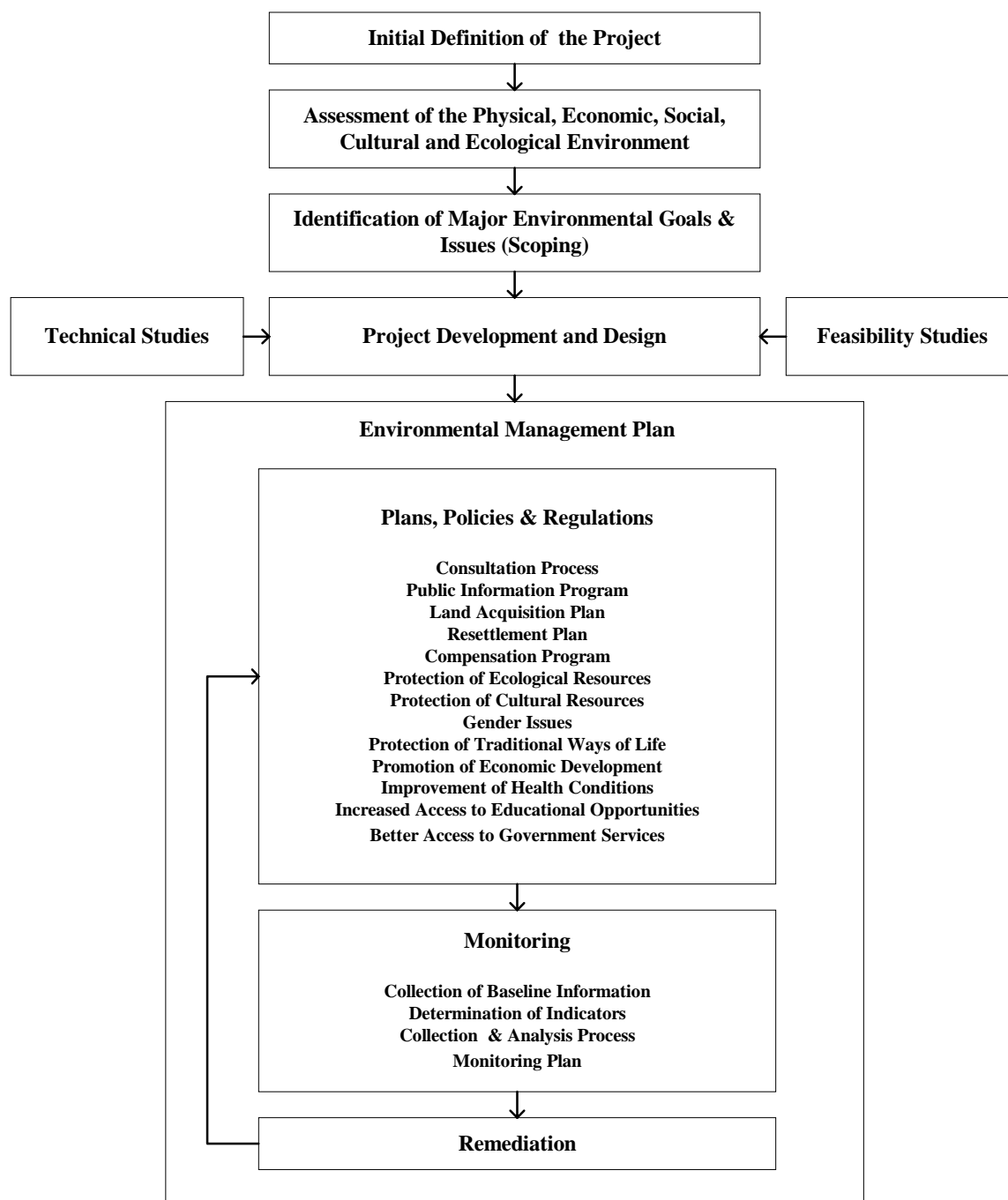
The base case EIRRs for the two projects, 10.5 per cent for Route 14A and 10.7 per cent for Route 16A, are close to the test discount rate of 12 per cent, indicating that project implementation 2005-2007 may be appropriate based solely on their benefits to road users. In fact, these particular projects are likely to produce significant social and other benefits in their influence areas and beyond, in addition to their direct economic benefits.

## 7. Environmental Management Plan

The environmental management plan is divided into two parts.

- Plan, Policies and Regulations
- Monitoring and Remediation Plan

The nature of the environmental management planning process can be seen in the following chart.



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**. OVERALL APPROACH &  
IMPLEMENTATION PROGRAM  
OF THE STUDY**

## **. OVERALL APPROACH AND IMPLEMENTATION PROGRAM OF THE STUDY**

### **1.1 Introduction**

The Government of Lao P.D.R. (GoL) wishes to draw up a road network improvement plan for the southern provinces of Savannakhet, Champasack, Attapeu, Sekong, and Saravan that will upgrade inter-provincial connectivity, and that will establish a network that will be compatible with that of the surrounding countries to realize an effective international road system, with the aim of invigorating the socio-economy of southern Lao P.D.R..

In response to this request from the GoL, the Government of Japan has decided to carry out a study to draw up a Master Plan and execute a Feasibility Study for the roads of the four southern provinces of Champasack, Attapeu, Sekong, and Saravan (including the area of Savannakhet along Route 1G), i.e., “The Study on Improvement of Roads in the Southern Region in Lao People’s Democratic Republic” (hereinafter referred to as the Study), in accordance with the relevant laws and regulations in force in Japan and Lao P.D.R.

Accordingly, the Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of the technical cooperation programs of Japan, has undertaken the Study in close cooperation with the authorities concerned in Lao P.D.R. The scope of work for the Study has been agreed to and was signed by both sides, Japan and Lao P.D.R., on August 20, 2001.

### **1.2 Background**

Since 1986, The GoL has exerted great efforts to introduce new economic mechanisms that will change the country from being a socialist economy to a successful market economy. This resulted in the country’s GDP, exports, and imports growing at an average annual rate of 5.6%, 9.8%, and 5.8%, respectively, between 1985 and 1996, indicating that the GoL has been relatively successful in making this transition. On the other hand, poverty levels in Laos are approximately 39% and one of the least developed nations, ranking 140<sup>th</sup> out of the 174 countries in the United Nations Human Development index.

To cope with the accompanying increases in traffic as a result of this economic upturn as well as poverty alleviation, the Asian Development Bank, World Bank, and JICA have assisted the GoL with its road infrastructure via grants and loans for such projects as the improvement of Routes 13 and 9 and the Pakse Bridge, as well as for the construction of the Second Mekong

International Bridge.

However, the GoL realizes that the current state of its road infrastructure is still incapable of handling traffic that has accompanied the above-mentioned socioeconomic growth as well as future potential growth. Especially, in the southern part of the country, which is located between Thailand, Vietnam, and Cambodia and is envisioned to serve as a bridge to integrate these ASEAN member countries, only 28% of the national roads are paved and there are locations with superannuated bridges or no bridges at all. This has not only posed a barrier to the movement of international trade, but has also resulted in this part of Lao P.D.R. being much poorer than the rest of the country. That is, the GNP per person in southern Lao P.D.R., which is lower than the national average of US\$ 300.

Therefore, the ultimate goal of this Study is to assist the GoL in prioritizing and recommending those road improvement projects that are crucial for the socio-economic development of southern Lao P.D.R.

### **1.3 Objectives**

The objectives of the Study were as follows:

- 1) To create a Master Plan (target year: 2020) for the improvement of the road network in the southern region of Lao P.D.R., and to conduct a Feasibility Study on the most suitable road improvement project (target year: 2007).
- 2) To transfer technology to Laotian counterpart personnel in the course of the Study.

### **1.4 Study Area**

The area of the Study covers the four southern provinces of Champasack, Saravan, Sekong, and Attapeu, as well as the area along Route 1G in Savannakhet Province.

## **1.5 Scope of the Study**

The Study covers the work items as agreed upon in the Scope of Work and the related Minutes of Meeting duly signed on 20 August 2001, by the Department of Roads of the Ministry of Communication, Transport, Post and Construction of Lao P.D.R. and the Preparatory Study Team of JICA.

### **(1) Master Plan**

- 1) Review of the related development plans, socio-economic data, transport sector data and natural condition data.
- 2) Analysis of socio-economic framework and identification of development potential in Study regions.
- 3) Conduct of supplementary surveys and analysis (e.g., road inventory, bridge inventory, and traffic survey).
- 4) Formulation of basic road network.
- 5) Forecast of future traffic demand
- 6) Establishment of rural road improvement/construction criteria and engineering standards.
- 7) Cost estimation of road improvement, construction and maintenance.
- 8) Initial environmental examination.
- 9) Evaluation of road links of proposed road network.
- 10) Establishment of road improvement, construction, and maintenance plans.
- 11) Economic analysis.
- 12) Selection of road links for Feasibility Study.

### **(2) Feasibility Study on high-priority projects.**

- 1) Natural condition survey.
- 2) Consideration of alternatives.
- 3) Design standards and criteria (geometry, structure, pavement, etc.).
- 4) Preliminary engineering design.
- 5) Environment impact assessment.
- 6) Project implementation plan.
- 7) Maintenance and rehabilitation plan.
- 8) Cost estimation.
- 9) Economic analysis and evaluation.

## **1.6 Study Approach**

The major focus of the Study is to develop a Master Plan, to select the most suitable road improvement project for a Feasibility Study, and to then examine the technical and economic viability of this project in the Feasibility Study. The basic issues and approach of the Study are as described below.

### **(1) Appreciation of Issues**

- 1) The southern region of Lao has high socio-economic potential due to the existence of agricultural resources in the Boloven Plateau and around the Mekong River, mines, forests, etc.
- 2) However, some bridge structures have not been built due to steep terrain and many rivers and also been destroyed by Indochina War. Furthermore, most roads and bridges in the region have deteriorated due to poor maintenance. Therefore, urgent improvement and/or development of suitable roads and bridge structures are required.
- 3) The poor condition of transport networks in this region blocks poverty reduction effort and stifles economic growth.
- 4) Recently, various donors such as the Asian Development Bank, World Bank, and Japanese Government have improved some major roads and a bridge in Lao (i.e., Route 13, Route 9, Pakse Bridge) and will construct a new bridge (i.e., the Second Mekong International Bridge). The road network in southern Lao should be improved taking these and other development plans into account in order to realize the maximum synergies possible.

### **(2) Approach of Study**

- 1) To analyze the background and present situation of the natural and socio-economic conditions.
- 2) To analyze the present and future relevant development plans for surrounding areas and countries.
- 3) To examine the most suitable road network and to establish a road improvement Master Plan.
- 4) To examine the feasibility of high-priority road improvement projects and to draw up an implementation plan for the project with the highest priority.

The Study flow is as shown in Figure 1.6.1 below.

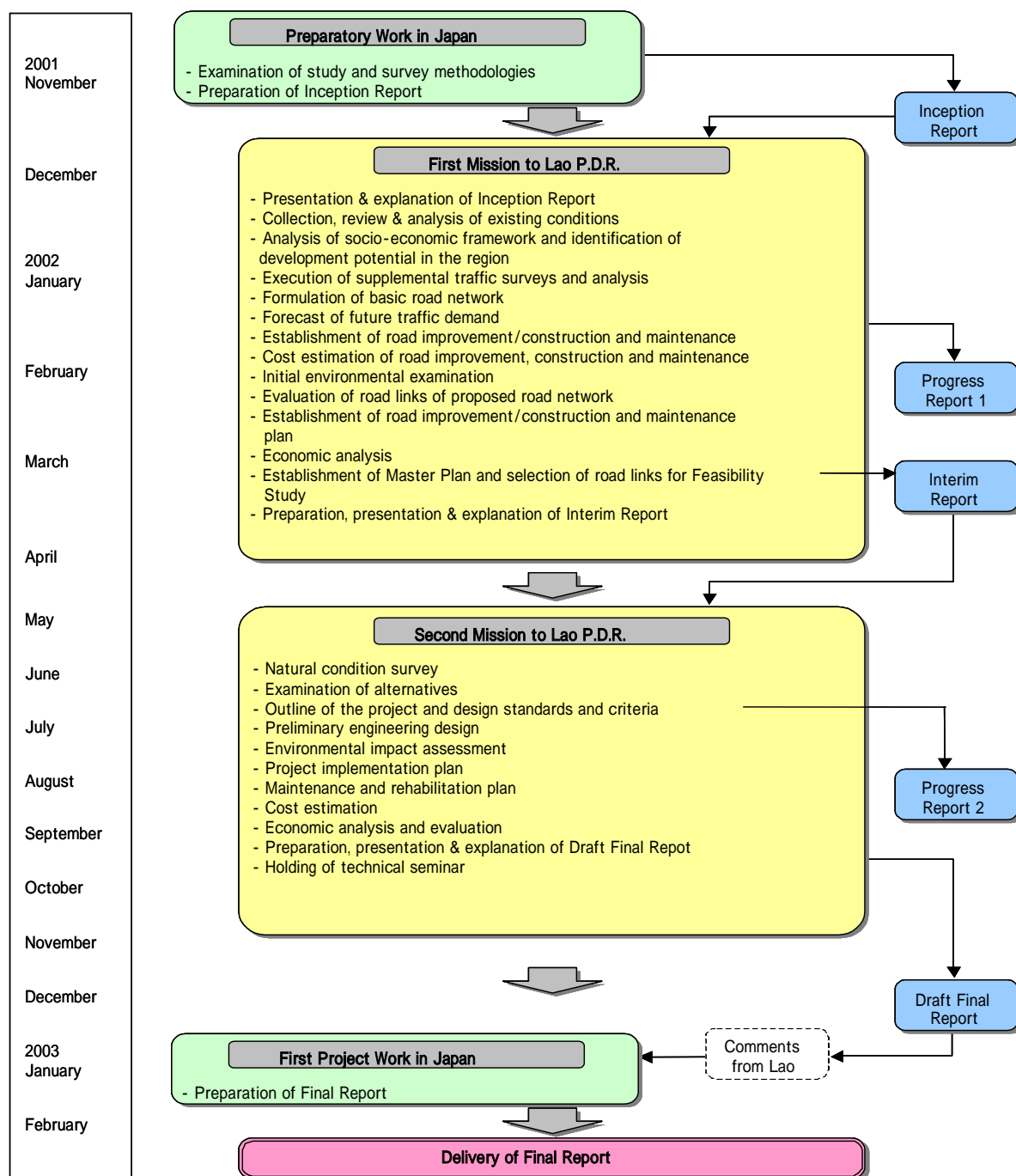
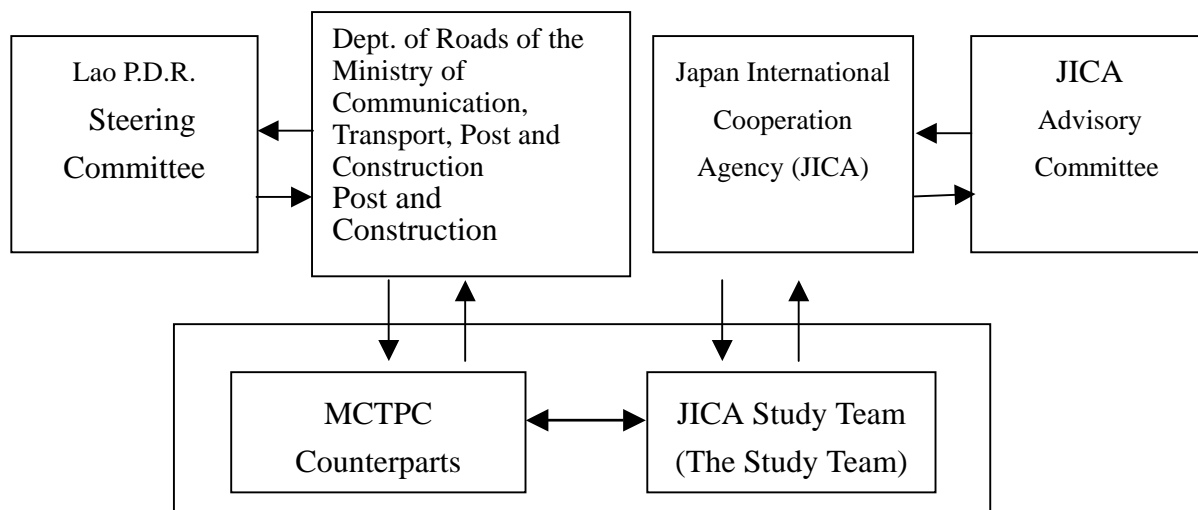


Figure 1.6.1 Study Flow

## 1.7 Study Implementation

### (1) Study Organization

The Study carried out jointly by the Ministry of Communication, Transport, Post and Construction (MCTPC) and the JICA Study Team, with guidance provided by a JICA advisory committee. The relationship among these institutions is as shown in Figure 1.7.1 below.



**Figure 1.7.1 Organizational Chart for the Study**

MCTPC, as the agency responsible for developing national road policy, acts as the counterpart agency to the Study Team and also as a coordinating body in relation to other government/non-government organizations concerned for the smooth implementation of the Study.

A Steering Committee was set up in order to conduct the Study efficiently and effectively, and it was recommended that the ministries and organizations listed below be included. However, if MCTPC recognized the necessity, other agencies /individuals could be added to this list.

- Ministry of Communication, Transport, Post and Construction (MCTPC)
- Department of Communication, Transport, Post and Construction (DCTPC) in Champasak, Sekong, Saravan, Attapeu, and Savanakheth
- Provincial officers of Champasak, Sekong, Saravan, Attapeu, and Savannakhet
- Committee of Planning and Cooperation
- Ministry of Agriculture and Forestry
- Science, Technology and Environment Agency
- Ministry of Industrial and Handicrafts
- Ministry of Information and Culture

**(2) Report Submission**

The Study Team prepares and submits the reports listed below in English to the Government of Lao P.D.R. (GoL).

**1) Inception Report (twenty copies)**

This report was submitted at the commencement of the Study and described the overall approach and implementation program of the Study.

**2) Progress Report 1 (twenty copies)**

This report was submitted in the beginning of February 2002, and it contained mostly the results of the reviews of existing materials and the analysis of data and information collected regarding the present status of the road network.

**3) Interim Report (twenty copies)**

This report was submitted in the middle of March 2002, and it mostly contained a rough outline of possible road improvement projects together with a selection of road links for examination in the Feasibility Study.

**4) Progress Report 2 (twenty copies)**

This report was submitted in the beginning of September 2002, and it contained mostly the results of the analysis of site conditions and consideration of design standards, etc.

**5) Draft Final Report (Main Text: twenty copies; Executive Summary: thirty copies)**

This report is submitted by the end of December 2002, and it contains all the Study results. The written comments on the Draft Final Report from the GoL is given to the Study Team within one (1) month after submission of the report.

**6) Final Report (Main Text: twenty copies; Executive Summary: thirty copies)**

This report is submitted by the end of January 2003, and it takes into consideration the comments of the GoL concerning the Draft Final Report, and is submitted one (1) month after receiving written comments on the Draft Final Report from the GoL.



### **(3) Technology Transfer**

The Study carried out jointly by the JICA Study Team and GoL counterparts, while taking explicitly into account the transfer of technology. In particular, the counterparts work together with the Study Team in regards to the activities listed below.

- 1) The collection of existing information clarifying the present status of the socio-economic, environmental, and transportation spheres of activities, as well as any other activities that may have a direct bearing on the Master Plan and Feasibility Study.
- 2) The execution of on-site surveys such as traffic, environmental, socio-economic, topographical, and geological surveys to gather necessary new data and information, as well as to supplement extant information.
- 3) The input, analysis, and evaluation of survey data and other related data.
- 4) The construction of models and/or techniques to maintain/update data, to simulate/explain present conditions and to forecast future conditions/scenarios using the data and information collected and processed.

In addition to the above, which includes on-the-job training, the following workshops and seminars for technology transfer were held at times and locations that facilitate the most effective distribution of information.

- Workshops on Progress, Interim, Draft Final Report held at Steering Committee Meeting
- Technical Seminar to disseminate information on the technology and methodologies of road network improvement, IEE implementation for road projects, and hydrological analysis etc.

## **. GENERAL APPRECIATION**

# **CHAPTER 1**

## **ROAD SYSTEM**

## . GENERAL APPRECIATION

### CHAPTER 1 ROAD SYSTEM

#### 1.1 Overview

Comparative data on the economical development of Lao, Cambodia, Thailand and Vietnam are given in Table 1.1.1. In 2000, Lao had the equivalent of 43 per cent of Cambodia's population, 8 per cent of Thailand's and 7 per cent that of Vietnam. Thailand was by far the most developed of the economies, with GNP per capita in 1999 being 6.5-7.2 times greater than that of the other countries, but it suffered from an economic collapse in 1997 and economic growth during 1995-2000 was negligible. Lao and Vietnam were less affected by the resulting Asia-wide instability, with 1995-2000 GDP growth rates only a little less than those of 1990-1995. Poverty levels in Lao, Cambodia and Vietnam are quite similar, ranging from 35.9-38.6 percent, based on each country's poverty line. All four countries are major rice producers, with per capita production ranging from 330-419 kg in 2000.

**Table 1.1.1 Lao and Lower Mekong Sub-Region**

Country	Population	GNP/Cap.	GDP Growth % pa		Poverty*	Rice Production	
	Mill. 2000	US\$ 1999	1990-1995	1995-2000	in %	Mill. T. 2000	Per Cap Kg
Lao PDR	5.2	290	6.4	6.2	38.6	2.2	413
Cambodia	12.2	280	na	4.2	35.9	4.0	330
Thailand	62.4	2,010	8.7	0.3	12.9	23.4	375
Vietnam	77.7	370	8.2	6.9	37.0	32.6	419

Source: *Key Indicators 2001* ADB

Note: \* latest year based on each country's poverty line

The southern region of Lao has considerable economic potential. There are agriculture and a number of attractive tourist sites, such as the Mekong River Falls and Wat Phou in the area. The region is socially and culturally diverse, with many ethnic minority groups in the hilly area who are poorer than lowland people.

The Fifth Five-Year National Socio-Economic Development Plan 2001 - 2005 set several major target as follows:

- to realize continued economic growth;
- to reduce current poverty levels by half;
- to achieve food security;
- to eliminate slash-and-burn cultivation;
- to pay serious attention to both state and private enterprise reform; and

- to develop human resources in various sectors.

The development objectives on southern Laos are as follows:

- 7-7.5% annual GDP growth;
- 4-5% annual growth for agriculture;
- 10-11% annual growth for industry;
- 8-9% annual growth for the service sector;
- Agriculture and forestry products to account for 47% of GDP;
- Industrial production to account for 26% of GDP;
- Services to account for 27% of GDP; and
- GDP per capita of US\$500-550.

The southern region borders Thailand, Cambodia and Vietnam and road developments will increasingly have cross-border implications. Lao, Cambodia and Vietnam are in the process of establishing a Socio-Economic Development Triangle, encompassing a three-country border zone. The first meeting of the Working Groups was held in Hanoi on 20-21<sup>st</sup> June 2001. This meeting agreed that the development of the cross-border transport network was a key priority. Route 18A/B and Route 15 were noted as key routes in Lao. A four-year project to rebuild Route 18B, financed by a loan from the Vietnamese government, started in December 2001.

The unimproved national roads are impassable during the rainy season and some sections are barely passable during the dry season. This is a barrier to domestic and international trade, and has resulted in this part of Lao being poorer than much of the country.

## 1.2 Road System

The Lao Ministry of Communication, Transport, Post and Construction (MCTPC), unlike China, has adopted a “One country one system” policy. In June 2000, the Ministry set out its 15-year strategy for the road sector in *Strategic Directions for the Development of the Road Sector*. The key sector objective is to support the socio-economic development and integration of the country, by:

- developing road sector institutions and an integrated management system;
- improving resource allocation across the road system, with high priority to preserving existing assets;
- enforcing measures to prohibit overloading;
- establishing sustainable domestic funding for the sector;

- creating an enabling environment for a healthy domestic contracting industry;
- providing “focal sites” accessing agricultural support, health and education services, and connecting all provincial and district centers to an all-weather network;
- minimizing environmental and social impacts;
- improving traffic safety; and
- encouraging community participation in planning and executing road sector work.

The road system is defined in the Road Law (No.04/99/NA) of April 1999, specifying six categories of road; national, provincial, district, urban, rural, and special roads. The national roads and the route numbering system are defined in Ministerial Decision 1311/MCTPC of June 1997. Responsibility for the road system rests with MCTPC, which is delegating some of its responsibilities to provincial DCTPCs. The Department of Roads under MCTPC provides the technical and financial administration of the network.

The road system has been considerably improved over the last decade, with, for example, the first all-weather north-south route from the Chinese border to the Cambodian border (Route13) to be fully open. Nevertheless, major problem areas remain. Only 39 percent of the national road length (all surface types) was classified as in good/fair condition, with 32 percent classified as poor and 30 percent as in bad condition. ADB TA No.3070 (March 2000) found that 23 percent of the provincial road network was impassable; a further 52 percent was passable for up to six months in a year and only 22 percent was all-weather road.

The road length in each province by main category and surface type as of end-2000 is given in Table 1.2.1. Data for the combined the five southern provinces are also shown. National roads accounted for 24.2 percent of the 28,738km length, provincial roads for 27.5 percent and urban roads for 48.3 percent. Just 15.1 percent of the network was paved, 28.2 percent was gravel and 56.7 percent was earth. Vientiane Municipality (an area of 3920 sq. km.) is considerably more developed than the northern and southern provinces.

As of the end of 2000, the total road length in five southern provinces was 11,290km, with 2,045km of national road and 2,942km of provincial road. The percentage distribution of national road in the study area was: Savannakhet 30, Saravan 21, Sekong 10, Champasack 22 and Attapeu 17 percent. The national road length was 975km paved, 658km gravel and 413km earth. While the five provinces contained 29.4 percent of the total national road length, it accounted for only 28.0 percent of the paved length.

**Table 1.2.1 Road Lengths by Surface Type (year 2000, in km)**

No.	Province	National Roads				Provincial Roads				Urban Roads				All Roads			
		Paved	Gravel	Earth	Total	Paved	Gravel	Earth	Total	Paved	Gravel	Earth	Total	Paved	Gravel	Earth	Total
1	Vientiane Municipality	166.1	52.0	15.5	233.6	11.0	237.0	6.0	254.0	202.7	907.7	320.2	1,430.6	379.8	1,196.7	341.7	1,918.2
2	Phongsali	133.0	322.0	0.0	455.0	0.0	0.0	136.0	136.0	0.8	0.1	35.6	36.5	133.8	322.1	171.6	627.5
3	Luang Namtha	138.1	163.0	0.0	301.1	0.0	0.0	201.0	201.0	3.4	0.0	392.0	395.4	141.5	163.0	593.0	897.5
4	Oudomxai	318.0	0.0	0.0	318.0	0.0	55.0	46.0	101.0	3.4	10.0	929.8	943.2	321.4	65.0	975.8	1,362.2
5	Bokeo	0.0	33.0	61.0	94.0	0.0	35.1	284.7	319.8	16.4	52.5	149.2	218.1	16.4	120.6	494.9	631.9
6	Luang Prabhang	413.0	97.0	40.0	550.0	0.0	313.9	100.0	413.9	0.0	81.3	322.7	404.0	413.0	492.2	462.7	1,367.9
7	Houaphan	313.0	129.0	0.0	442.0	0.0	146.0	442.0	588.0	5.0	20.0	510.0	535.0	318.0	295.0	952.0	1,565.0
8	Sayaburi	26.9	240.7	245.8	513.4	6.9	0.7	688.0	695.6	17.3	13.5	702.0	732.8	51.1	254.9	1,635.8	1,941.8
9	Xiang Khouang	230.0	74.0	91.0	395.0	0.0	31.0	390.0	421.0	7.4	156.3	715.6	879.3	237.4	261.3	1,196.6	1,695.3
10	Vientiane	266.0	61.0	74.0	401.0	50.0	371.9	144.6	566.5	18.7	310.4	257.5	586.6	334.7	743.3	476.1	1,554.1
11	Borikhamxai	326.0	55.0	140.0	521.0	3.0	156.0	243.0	402.0	10.5	141.1	376.8	528.4	339.5	352.1	759.8	1,451.4
12	Khammouan	166.0	248.6	35.0	449.6	7.2	208.9	248.4	464.5	21.8	166.6	418.4	606.8	195.0	624.1	701.8	1,520.9
13	Savannakhet	455.0	35.0	117.0	607.0	312.8	477.9	395.3	1,186.0	98.5	652.7	1,305.4	2,056.6	866.3	1,165.6	1,817.7	3,849.6
14	Saravane	89.0	320.0	22.0	431.0	0.0	168.5	440.0	608.5	15.8	184.4	1,771.1	1,971.3	104.8	672.9	2,233.1	3,010.8
15	Sekong	47.0	70.0	86.0	203.0	0.0	0.0	54.5	54.5	4.6	0.0	625.7	630.3	51.6	70.0	766.2	887.8
16	Champasack	362.4	89.9	0.0	452.3	20.0	487.0	266.0	773.0	35.0	238.0	839.0	1,112.0	417.4	814.9	1,105.0	2,337.3
17	Attapeu	21.5	143.0	187.5	352.0	0.0	17.0	303.0	320.0	7.5	98.6	426.2	532.3	29.0	258.6	916.7	1,204.3
18	Xaisomboun	0.0	145.0	103.0	248.0	0.0	82.0	303.9	385.9	0.0	8.0	272.6	280.6	0.0	235.0	679.5	914.5
	Total	3,470.9	2,278.2	1,217.8	6,966.9	410.9	2,787.9	4,692.4	7,891.2	468.8	3,041.2	10,369.8	13,879.8	4,350.6	8,107.3	16,280.0	28,737.9
13-17	Study Area	974.9	657.9	412.5	2,045.3	332.8	1,150.4	1,458.8	2,942.0	161.4	1,173.7	4,967.4	6,302.5	1,469.1	2,982.0	6,838.7	11,289.8
	Study Area as % of Total	28.1	28.9	33.9	29.4	81.0	41.3	31.1	37.3	34.4	38.6	47.9	45.4	33.8	36.8	42.0	39.3

Source: MCTPC, 1<sup>ST</sup> August 2001

14 Savannakhet includes Route 9.

16 Champasack does not include Route 14 which is not National Road as of 2001.

## 1.3 Study Area Network

### 1.3.1 General

In early 2002, the Study Team reviewed the national road network in the five southern provinces for the purpose of the Study. The road network in the Study area and its upgrade history is illustrated in Figure 1.3.1 and Table 1.3.1. The data of five provinces shown in previous Table 1.2.1 differ from the one of Table 1.3.1. The Study team reviewed the road network and summarized it as shown in Table 1.3.1 for the Study, basing on the following view points:

- (1) Route 14 located in Champasack Province is currently classified as a national road and is included in the national road network in the Study area.
- (2) For the Study, Route 9 as a cordon line for traffic analysis and not part of the study road network.
- (3) Different figures of road inventory are recorded by each organization, e.g. MCTPC and

DCTPC. The Study Team has unified them for the purpose of the Study.

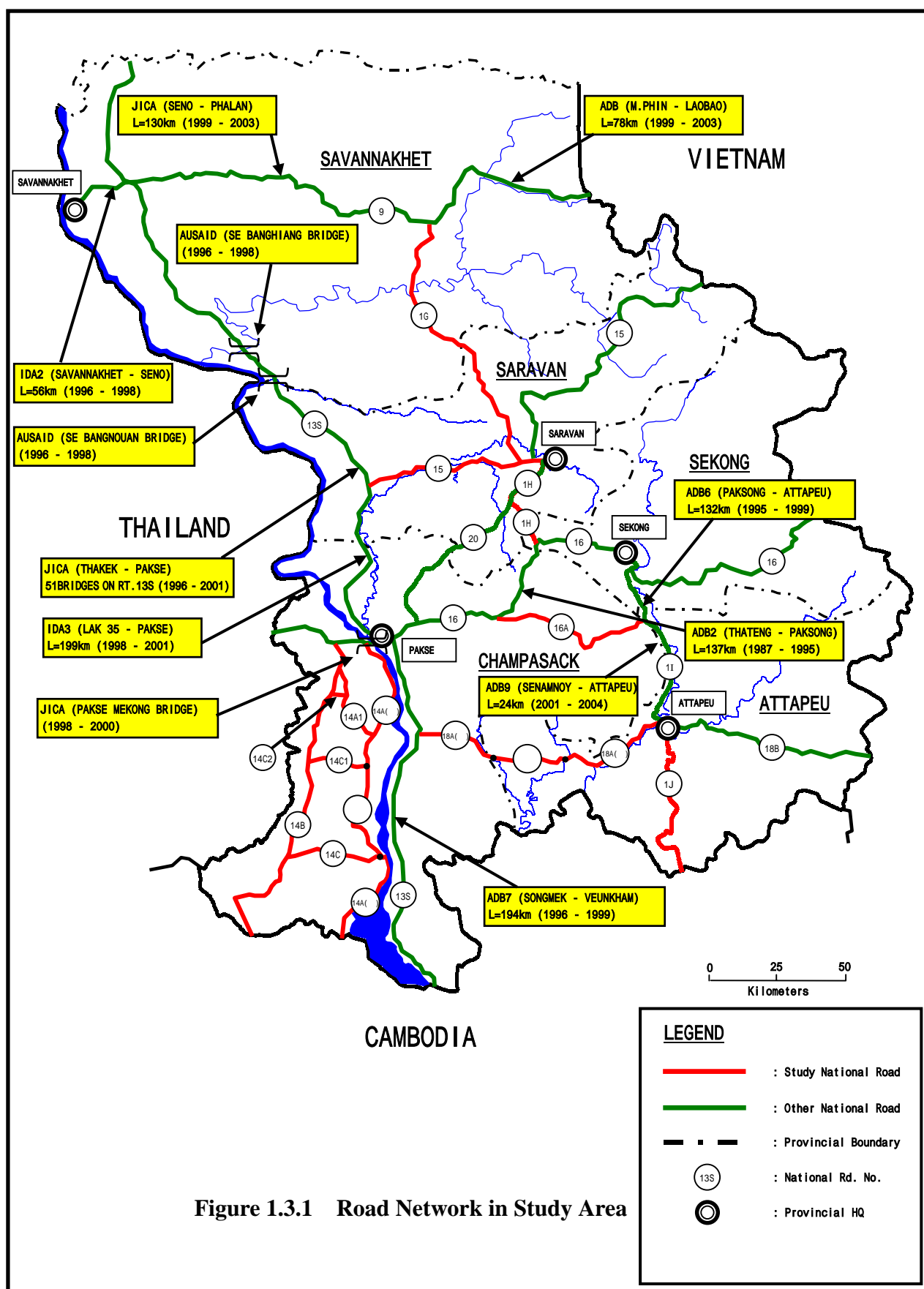
Study roads contain part or all of national road Routes 1,13, 14, 15,16, 18 and 20, excluding Route 9. The total length of the study roads is 2025km. The national roads within the study area are described in the following sections.

Although the national road network in the study area is planned to serve the whole area, there still exists virtually missing links on Routes 1G, 1J and 14A (total length: approx.122km), some parts of the study roads become impassable in the rainy season due to lack of bridges and drainage facilities. As a whole, the east-west routes have been relatively of a higher standard than the north-south routes such as Routes 1G, 1I (under improvement) and 1J. In particular, on Route 1G, two large-scale rivers (i.e., Xe-Bang Hiang and Xe-Don) prevent traffic from crossing for most of the year. In addition, routes running through the less inhabited or remote areas have also not been upgraded to all-weathered standard including Routes 18A and B, 16 (from Lamarm to Vietnam border) and 15 (Saravan to Vietnam border).

Attapeu and Sekong Provinces are amongst the least developed and have until recently lacked all-weather connections to the national road network. Champasack province is relatively more developed. Pakse is the most important town and the regional center. Communications between Pakse and the north and south of the country have been transformed by the paving of the main north-south highway Route13S from Savannakhet south to the Cambodian border, which was completed in mid - 2002. This project, together with the opening of the second bridge (Pakse Bridge) over the River Mekong at Pakse in November 2000 and the improvement of Route16 connecting it to the Thai border, should provide a springboard for the development of the whole of the southern region.

JICA, the ADB and the World Bank have assisted the GoL with its road infrastructure via grants and loans for such projects as the improvement of Routes 1I,9,13,16 and 20 and the Pakse Bridge, as well as for the design for construction of the Second Mekong International Bridge in Savannakhet Province.





**Table 1.3.1 Length of National Roads in Study Area (year 2002)**

Route	Origin	Province	Destination	Province	Road Length (km)					
					Savannakhet	Saravan	Sekong	Champasack	Attapeu	Total
1 G	Junction of Route. 9	Savannakhet	Junction of Route 15	Saravan	67.0	63.0				130.0
1 H	Junction of Route 15	Saravan	Junction of Route 20	Saravan		22.0				22.0
	Junction of Route 20	Saravan	Junction of Route 16	Sekong		12.0	10.5			22.5
1 I	Junction of Route 18	Sekong	Junction of Route 18 A	Attapeu			17.3		59.3	76.6
1 J	Junction of Route 16 B	Attapeu	Border of Cambodia	Attapeu					81.0	81.0
13 S	Junction of Route 9	Savannakhet	Border of Cambodia	Champasack	105.0	88.0		202.0		395.0
14 A	Phone Thong Dist.	Champasack	Border of Cambodia	Champasack				137.5		137.5
14 A1	Ban Ang Kham	Champasack	Ban Don Talath	Champasack				32.0		32.0
14 B	Junction of Route 16	Champasack	Border of Cambodia	Champasack				149.0		149.0
14 C	Ban Nong Nga	Champasack	M. Moonlapa-mok	Champasack				42.0		42.0
14 C1	Ban Hieng	Champasack	Ban Sam Kha	Champasack				23.0		23.0
14 C2	Ban Phong Photh	Champasack	Ban Nong Te	Champasack				6.0		6.0
15	Junction of Route 13 S	Saravan	Junction of Route 1H	Saravan		73.0				73.0
	Junction at Ban Phone Dou	Saravan	Border of Vietnam	Saravan		165.0				165.0
16	Border of Thailand	Champasack	Lamarm	Sekong			51.0	121.0		172.0
	Lamarm	Sekong	Border of Vietnam	Sekong			123.0			123.0
16 A	Junction of Route 16	Champasack	Junction of Route. 1 I	Champasack			12.0	59.0		71.0
18 A	Junction of Route 13 S	Champasack	Junction of Route 18 B	Attapeu				30.3	82.2	112.5
18 B	Junction of Route 18 A	Attapeu	Border of Vietnam	Attapeu					123.0	123.0
20	Junction of Route 16	Champasack	Junction of Route 1 H	Saravan		30.0		39.0		69.0
	<b>TOTAL</b>				172.0	453.0	213.8	840.8	345.5	<b>2,025.1</b>

Source: Study Team

### **1.3.2 National Road 1 (Route 1)**

This 1062km north-south route from the Chinese border at Yot Ou to the Cambodian border is (with Route13) one of the two “backbones” of the network. It has, however, suffered severe damage in past conflicts and is not functioning as a long distance through route. The Study includes a part of Route1, south of its intersection with Route 9 in Savannakhet to the Cambodian border. This comprises sections Route 1G/H/I/J.

The central section of Route1G is impassable due to large rivers without crossing structures. Route1H from Saravan to the intersection with Route20 was paved (6m DBST) in 1992 under ADB’s Second Road Improvement Project. An unpaved 22.5km section runs south to Thateng. From Thateng, the connection to Route1I at Sekong is via a paved 45km section of Route16. Route1I, the 76.6km Sekong-Attapeu section, is being paved under ADB’s Nine Road Improvement Project, but one bailey bridge has not been replaced yet. Route1J has been graded for the initial 16km from Attapeu, but is in very poor condition southwards to the border.

### **1.3.3 National Road 13 (Route 13)**

The 1546km Route13 is the most important route in the country, providing a north-south connection from the Chinese border at Boten via Luang Prabang to Vientiane (Route13N) and from Vientiane via Pakse to the Cambodian border at Veun Kham (Route13S). Route13S is the only passable north-south route through the study area. The whole route length in the study area has recently been or is being paved, with existing bridges replaced to provide all-weather access. The Savannakhet-Pakse section roadway is being financed by IDA under the World Bank’s Third Highway Improvement Project and by JICA for the bridges (which are complete). The roadway is expected to be complete by late-spring 2002. The 160km Pakse-Veun Kham section, financed by ADB as part of its Seventh Road Improvement Project, was completed in May 2001. This project also included the 39km Pakse-Chong Mek (Thai border) section of east-west Route16. The total project cost was US\$51.9 million, of which the ADB loan contribution was 81.4 percent.

### **1.3.4 National Road 14 (Route 14)**

Route 14 has been proposed for re-designation as a national road and it is currently classified as a national road. It serves the area of Champasack to the west of the Mekong and to the south of Route16 (Chong Mek-Pakse section). It is divided into three routes: Route 14A/A1, 14B and 14C/C1/C2.

Route 14A runs parallel to and close to the Mekong River. The section south from Route 16 to Champasack is impassable. South of Champasack there is a short paved section connecting to Wat Phou. Route 14A runs on south via the district centers of Sukhuma and Mounlapamok to the Cambodian border. After improvement, Route 14A would provide direct access from Thailand and Pakse to the famous Khmer mountain temple, Wat Phou Champasack, 6km south-west of Champasack. This temple was designated a World Heritage Site in 2002. At present the temple is reached via Route 13S and requires a ferry crossing of the Mekong. The existing Pakse-Wat Phou distance is 49km, while via Route 13, Ferry and Route 14A. Route 14A also serves the Si Phan Don (four thousand islands) area and the Mekong falls. ADB is planning a tourism-related loan of US\$40-50 million for disbursement 2002-2004, which will be considering a number of projects in the study area. In addition, 14A1 diverts from Route 14B at Ang Kham, 11km, from Route 16 Junction, and reaches Dam Talath, junction of 14A. Its total length is 32 km.

On the one hand Route 14B runs south from Phonthong parallel to the Thai border to Cambodian border. Now this road is under upgrading near the Cambodian border but it still unpaved road. Its total length is 149 km.

There are three routes of Route 14C; namely, 14C, 14C1 and 14C2. These routes basically connect Route 14A with Route 14B. Route 14C2 is the northern route with 6km in length connecting Nongte on Route 14A with Phongphoto on 14B. Route 14C1 is the center route with 23km connecting Samkhanaboua with Hiang. This route is under upgrading with 11m in width. Finally, Route 14C is a newly developed southern route and now under construction with 11m in width. This connects Route 14A junction, 3km west from Mounlapamok, with Nong Nga on 14 B with 42km in length. Although those three 14C routes are under upgrading, the surface has not paved.

### **1.3.5 National Road 15 (Route 15)**

This east-west unpaved route runs from an intersection with Route 13S to the north of Khongsedon District via Saravan to the Vietnamese border. The west section to Saravan with 73 km in length are relatively maintained unpaved road and opens almost through a year except for one bridge section and a submergible bridge section. The 147km section of 165km in total east of Saravan has been final designed by a Vietnamese conglomerate, which is planning to pave the road as a private-sector project at a cost of US\$47 million. Construction by Cheung Fu Company No.18 is expected to begin in the near future from the Saravan end, with completion by 2006.

### **1.3.6 National Road 16 (Route 16)**

This east-west route runs from the Thai border at Chong Mek via Pakse, Paksong, Thateng, Sekong and Dakchung to the Vietnamese border. The sections east and west of Pakse are connected via a short stretch of Route 13S. The 39km Chong Mek-Pakse section, the western part of Route 16, was recently paved (7m DBST) under the ADB Seventh Road Improvement Project. The US\$48 million JICA-financed second Mekong Bridge, which opened in November 2000, connects to East of Pakse, the 42km section of Route 16 to Paksong was paved (6m DBST) under ADB's Second Road Improvement Project. The adjoining 82km section to Sekong was recently paved (6m DBST) under ADB's Sixth Road Improvement Project. East of Sekong there is a 33km gravel section, after which Route 16 deteriorates to an earth track for the 90km on to the border. The Malaysian-Lao Timber Co. has signed a memorandum of understanding to pave the Sekong-Dakchung section, excluding the bridge crossing over Xe-Kong, at a cost of US\$33 million.

Route 16A is a 70.4km gravel road running east from Route 16 at Paksong to an intersection with Route 11. This was originally constructed as an access road to a dam and power station. It becomes virtually impassable for approximate three months in the rainy season in the mountainous section.

### **1.3.7 National Road 18 (Route 18)**

This east-west route is divided into two sections: the 112.5km Route 18A runs from an intersection with Route 13S south of Pakse to a junction with Route 11 near Attapeu. The 123km Route 18B runs on east to the Vietnamese border. Both sections are dry-season only for through traffic. A three-year project to pave Route 18B commenced on 1st December 2001, with reconstruction of the initial 37km east from Pakse, to be completed in 2004. From km37 to the Vietnamese border, new construction will be necessary, as the existing route will be flooded under an irrigation project. The new alignment runs well to the north of the existing route and will reduce the total length of Route 18B to 113km. Project financing is being provided by a US\$48 million loan from Vietnam, its first loan to Lao P.D.R. The loan terms are: 15-year repayment period, an interest rate of 1.5 percent and a 5-year interest-free grace period. The new route will connect to an existing paved road on the Vietnamese side. A southward connection to Cambodia from Route 18B will be lost with the realignment. A replacement connection is to be provided, but not under the project.

Route 18A is a gravel road in fair/poor condition km0-24, after which it deteriorates to a track

for the central km30-70 section with a number of missing bridges, including a major river crossing at km30.5 ( Xe-Khampho ) and at 69.3km ( Xe-Pian ). From km70 to the end the road is in fair/poor condition.

### **1.3.8 National Road 20 (Route 20)**

This 69km route runs north-east from an intersection with Route16, at 20km east of Pakse via Bachiangchareunso and Laongam to an intersection with Route1H. It was paved (6m DBST) under ADB's Second Road Improvement Project in 1992.

## **CHAPTER 2**

# **CAPACITY FOR ROAD CONSTRUCTION & MAINTENANCE**

## CHAPTER 2 CAPACITY FOR ROAD CONSTRUCTION AND MAINTENANCE

### 2.1 Current Capital Expenditure on Road System

Government finances in recent years have been significantly affected by the depreciation of the currency of the kip. The average kip rate per \$ fell from 952 in 1996 to 3548 in 1998 and to 8020 in 2000. The end-2001 rate was about 9500. Most revenue sources are denominated in kip and with unchanged duty and tax rates, the dollar value of revenue fell. With most expenditure committed to capital projects, this forced a squeeze on current spending, which fell to only 4.9 per cent of GDP in FY1999, less than half its level in the early 1990s. The FY2001 budget showed a recovery to 10.0 per cent. Both ADB and the World Bank have noted that recurrent expenditure is too low in relation to investment and does not provide sufficient funds to adequately maintain the capital stock. This imbalance is potentially serious for the road sector and is being addressed by the setting up of a dedicated Road Maintenance Fund (RMF), as described below.

During the 1990s, expenditure on road projects formed the largest single element of the Public Investment Program (PIP), accounting for half the total and more than 5 per cent of GDP. Investment over the period (at today's prices) totaled about \$730 million, on upgrading 6000km of roads and bridges. Of this, approximately 80 per cent was contributed by bilateral and multi-lateral donors. In the 1995-2000 period donors contributed \$313 million for rehabilitation projects and \$23 million for maintenance. Japan was the largest bilateral donor with a contribution of \$86 million. Further donor support of \$203 million for rehabilitation and of \$43 million for maintenance is foreseen for the 2000-2005 period.

The amount of the budget has fluctuated ranging from US\$ 76 million to US\$ 120 million in last 5 years due to dependence on the foreign fund. The trend of budgets for the road sector is shown in Table 2.1.1.

**Table 2.1.1 Trend of Budgets for Road Sector (Unit: MillionUS \$)**

Year	'94/95	95/96	96/97	97/98	98/99
Amount	83.5	94.3	76.6	90.9	119

Those budgets have been mainly utilized for national road construction so far and the allocation to maintenance has not been stressed on.



## 2.2 Expenditure and Funding Plan on Road Maintenance

### 2.2.1 Funding Needs and Allocation

The World Bank is considering a long-term commitment to improving the maintenance regime through a Road Maintenance Project (RMP). The first phase RMP-1 will run to end-2004, with the Bank contributing \$25.0 million of the expected cost of \$47.8 million. Phase 2 (RMP-2) will run to end-2009, with the Bank contributing half the \$70 million cost. The Nordic Development Fund and SIDA are expected to co-finance Phase 1, with the Lao PDR Government contributing \$16.5 million.

As shown in Table 2.2.1, maintenance needs for first four fiscal years (2001/2002-2004/2005) of RMP-1 are estimated.

**Table 2.2.1 Prospected Maintenance Needs FY 2001/2-2004/5 (in \$ million)**

	2001/2	2002/3	2003/4	2004/5	Total for 4 years	Annual Average
<b>Routine Maintenance</b>	2.1	3.2	3.7	4.3	13.3	<b>3.3</b>
<b>Periodic Maintenance</b>	13.4	13.8	14.1	14.2	55.5	<b>13.9</b>
<b>Administration</b>	0.2	0.2	0.2	0.2	0.8	<b>0.2</b>
<b>Total</b>	15.7	17.2	18.0	18.7	69.6	<b>17.4</b>

Source: Project Appraisal Document, World Bank, 31 January 2001

On the other hand, the planned funding allocation on the road maintenance works for 2001-2015 is summarized in Table 2.2.2, extracted from the 'Strategic Directions for the Development of the Road Sector, June 2000). The allocations have been structured in co-ordination with the donor agencies, and taken into account the gradual development of the road network and the capacity of the provinces. The allocation plan is drawn up based on \$90 million/annum (Source: MCTPC) for both road network development and maintenance, and the funding for maintenance is allocated as presented in Table 2.2.2 using the following bases:

Routine maintenance by need.

Periodic maintenance identified from the '10-year Periodic Maintenance Program, DoR, February 2000'. For the purpose of this allocation plan, the 'limited funding' scenario has been applied. It is intended that competing investment projects will be prioritized on the basis of EIRR.

**Table 2.2.2 Planned Funding Allocation 2001-2015 (in \$ million)**

	2001-05		2006-15		Total for 2001-2015
	Total	Annual	Total	Annual	
<b>Routine Maintenance</b>	14.6	2.9	49.5	5.0	64.1
<b>Periodic Maintenance</b>	43.2	8.6	143.0	14.3	186.2
<b>Total</b>	57.8	11.5	192.5	19.3	250.3

Source: Strategic Directions for the Development of the Road Sector, June 2000

Note: excludes rehabilitation

Based on the above comparison of funding needs and allocation, it found that there would be budgetary constraints for the maintenance at least for next four fiscal years.

## 2.2.2 Funding Plan and Available Fund

With the assistance of the World Bank, a Road Maintenance Fund (RMF) has been set up to enhance the road maintenance capability in Laos. The principle of RMF is that road users contribute directly to a fund, ring-fenced for maintenance.

The 'Decree of the Prime Minister on Road Maintenance Fund' was issued on 15 January 2001. The operation of RMF will start soon. It reports to MCTPC, but is supervised by the seven-member RMF Advisory Board comprising deputy-director general level representatives of: MCTCP; Ministry of Finance; and Ministry of Commerce from the public sector and of the Chamber of Commerce; Fuel Importers Association; Land Transport Operators; and the Land Passenger Transport Operators from the private sector. Day to day administration is provided by the RMF Secretariat.

The RMF are funded by:

- a Kip 40 per liter fuel levy on diesel and petrol, as provided for under Decree 01 of January 2001 (the levy will increase by 25 per cent annually for five years). The levy is much lower than recommended in World Bank studies: \$0.01 (Kip 95) increasing to \$0.05 (Kip 475) over five years. The levy is refunded for off-road fuel use by agricultural vehicles;
- heavy vehicle surcharges;
- fines for overloading of vehicles;
- tolls on bridges and roads;
- transit charges, provided for under loan covenants on Route 9; and

- penalty payments.

The RMF will also be funded by donors. Revenue raised for the RMF will pass directly to the Fund, bypassing the Government's consolidated budget. The prospective RMF financial plan for the first four fiscal years (2001/2002-2004/2005) of RMP-1 is given in Table 2.2.3.

RMF revenue will be allocated initially 90 per cent for national roads and 10 per cent for local roads. These percentages will change once national road maintenance needs have been addressed. The Fund's priorities in order are:

- routine maintenance, emergency and periodic maintenance
- renewal works (after the former has been provided for)
- road safety works (as funds permit).

**Table 2.2.3 Prospected RMF Revenue FY 2001/2-2004/5 (in \$ million)**

Source	2001/2	2002/3	2003/4	2004/5	Total for 4 years
<b>Fuel Levy (40kip/l)</b>	1.59	2.05	3.48	5.73	12.85
<b>Heavy Vehicle Surcharge</b>	0.30	0.30	0.40	0.40	1.40
<b>Other Local</b>	0.30	0.30	0.30	0.30	1.20
<b>Sub Total Local (Total Local/Total)</b>	2.19 (23%)	2.65 (23%)	4.18 (28%)	6.43 (42%)	15.45 (30%)
<b>IDA (World Bank)</b>	6.92	8.46	10.13	8.50	34.01
<b>ADB</b>	0.50	0.50	0.50	0.50	2.00
<b>Total</b>	9.61	11.61	14.81	15.43	51.46

Source: Project Appraisal Document, World Bank, 31 January 2001

Prospected Revenue is estimated based on the following assumption:

Fuel levy rate increasing 50 percent per year for the first three years.

Taxable volume – equal to 70 percent of total import volume – increasing at 10 percent per year.

Heavy vehicle fleet (busses and trucks) increasing at 4 percent a year

Average Heavy Vehicle Surcharge Rates (HVS) increasing at 20 percent a year

Based on the comparison of funding needs and RMF revenue for the first four fiscal years (2001/2002-2004/2005) of RMP-1, there would be shortfall in funding of \$18 million.

Domestic funding of maintenance is expected to cover around 40 per cent of needs by the end of RMP-1(year 2004) and 90 per cent by the end of RMF-2 ( year 2009), ensuring sustainability. It currently covers just 7 percent as of 2000.

The financial resources of the road budget are summarized as followings:

- Internal (Domestic) funds
  - Funding from the government's consolidated budget
  - Road Maintenance Fund (Road user charge + funds from foreign donors)
- External donor funds
  - Grants from both bilateral and international donors
  - Loans from international agencies
  - Agreements with foreign private interest groups

## **2.3 Organization Responsible for Road and Road Transport**

### **2.3.1 Ministry of Communication, Transport, Post and Construction (MCTPC)**

MCTPC is fully responsible for the transport sector in Lao PDR. Among six technical departments under MCTPC, there are two departments which are mainly associated with road and road transport; the Department of Roads (DOR), which has responsibility for new development of the road network and their maintenance and road transport at the national level and provides technical and financial administration at the national level, and the Department of Transport (DOT), which deals with vehicle registration, driver licensing, traffic safety and transport regulation regarding the road transport.

### **2.3.2 Department of Roads (DOR)**

The DOR consists of seven divisions shown in Figure 2.3.1. The main role of the DOR is to undertake the planning and disbursement of payment for national road maintenance from the Road Maintenance Fund and to allocate the funds to each DCTPC for provincial road maintenance.

As of 2001, MCTPC employs 838 permanent staff at central level. Among them, professional staff accounts for 52% and the rest is of technical and administrative officers. In addition to this number, 1355 staff has been working at DCTPC in each province appointed by MCTPC, which comprises 498 professional staff and 857 technical and administrative staff.

Among the total number of staff working for MCTPC, 173 staff belongs to the DOR, which accounts for the second largest number in all departments of MCTPC. Those staff is assigned to the seven divisions, project coordination unit and particular projects funded by ADB and IDA.

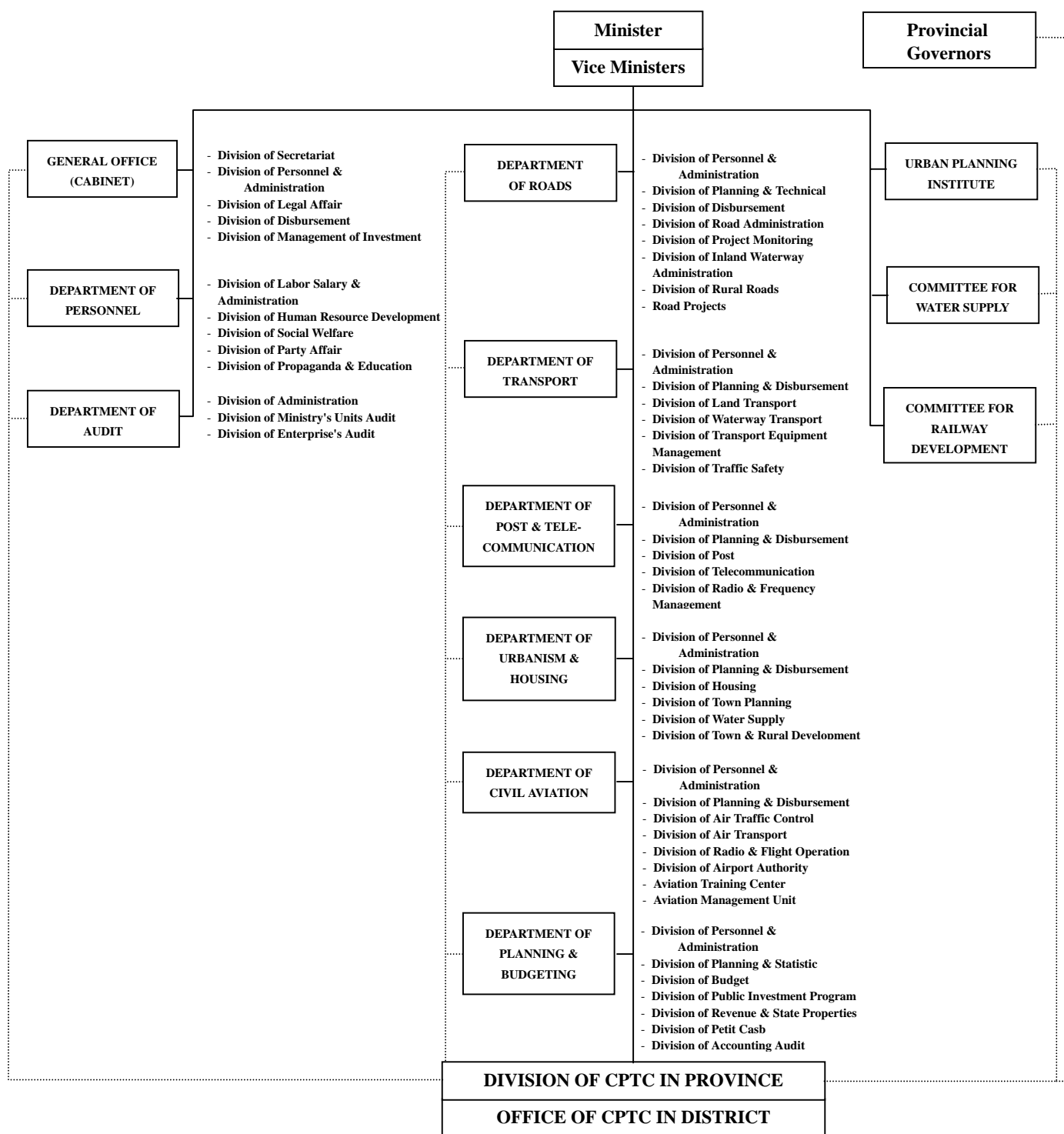


Figure 2.3.1 MCTPC Organizational Chart

### **2.3.3 Department of Communication, Transport, Post and Construction (DCTPC)**

Although each province also has the Department of Communication, Transport, Post and Construction (DCTPC), the DCTPC has a dual role; whereas one is to act as the provincial level of arm of MCTPC, another is to deal with road network development and maintenance at the provincial level. Accordingly, their responsibilities include the management of national road projects undertaken within each province as well as administration of provincial roads.

### **2.3.4 Institutional Capacity of Road Agencies**

According to the government policy for decentralization in the last five years, MCTPC has been delegating their responsibilities for work to the DCTPC in each province. Although this devolution process has just started, organization structures of the road sector are relatively well developed and aligned to the functional responsibilities of the MCTPC and DCTPC. Furthermore, it seems to clarify roles of both the MCTPC as a planning agency and DCTPC as an implementing one. This process is expected to facilitate efficiency of the administrative procedures as well as to promote the provincial's ownership and further involvement to the road sector. However, there are still some issues remains to improve institutional capacity of the road sector. The final report on Road Infrastructure for Rural Development Project (March 2000), undertaken by ADB fund, pointed out the following issues:

- To further clarify definition of responsibilities at departmental, divisional and individual level and the way of measuring their performance
- To develop standardization of procedures and documentation of road administration activities including financial and accounting system, and record keeping one.
- To facilitate human resource development, particularly to strengthen technical and administrative capability of staff through on/off job training
- To increase the maintenance management capabilities

In response to these issues, MCTPC has made efforts to improve the institutional capacity. The Telecom and Communication Training Institute (TCTI) was established in 1997 supported by several international organizations and ministries concerned under MCTPC as a result of merging two training institutions. TCTI now offers training programs to personnel from not only MCTPC but also other external agencies. The contents of programs include a wide variety of 1-4 week short-term courses such as English skills, road engineering, procurement procedures, construction management and human resource management. In 2000,

the TCTI received 4597 trainees.

Furthermore, MCTPC started a capacity building program 'RMP: Road Maintenance Project' for both MCTPC and DCTPC funded by WB and supported by SIDA from 1997.

The RMP assists the development of system that can only be established progressively and over a long-term period. RMP will include two phases.

#### **RMP-1 (2001-2004): development and initiation**

The maintenance systems for the national road network will be developed and implemented countrywide, and the maintenance system for the provincial, district and rural roads (i.e. local network) will be designated and tested in four selected provinces, one of which – Champasack – is in the study area.

#### **RMP-2 (2004-2009): operation and expansion**

The maintenance system for the national and local road network will be refined, taking into account the lesson learned during the first phase, and will be gradually implemented in all 17 provinces and one special zone of country.

The project would achieve the following main output:

Additional financial resources for road maintenance are mobilized and efficiently allocated:

Capacity of institution dealing with road maintenance at central, provincial and local level is strengthened (including road sector organizations, contracting / consulting industry and road users / beneficiaries): and

Control overloading of vehicle is required.

## **2.4 Level of Technology for Road Construction and Maintenance**

### **2.4.1 Road and Bridge Construction Work**

There are two types of construction companies in ownership to deal with road and bridge construction work; one is a state-owned company and another is a private one including joint-venture company with international contractor. Those local contractors have not reached to have sufficient technical level compared with international contractors due to less opportunity to join large-scale and complicated road and bridge construction projects. However, those contractors seem to have steadily improved their capability through joining

the foreign donors projects. For instance, whereas some local contractors have already had experience to build a medium-scaled bailey bridge with 100m in bridge length and a concrete slab bridge with short span, but still less experience of a pre-stressed concrete bridge, many local contractors have sufficient technique to undertake pavement work with double bituminous surface treatment method because that method is widely utilized for road projects in Lao PDR.

#### **2.4.2 Road and Bridge Maintenance Work**

DCTPC in each province has responsibility to maintain both national and provincial roads within their jurisdiction. However, they usually entrust maintenance work to local contractors by competitive bidding because they have insufficient machinery and equipment to undertake the maintenance work by them. For example, in the study area, only DCTPC of Saravan Province has necessary equipment for road maintenance.

There are some companies that have experience road and bridge maintenance work in each province except for Saravan Province. Although through the road and bridge inventory survey, the Study team observed that maintenance work was relatively well undertaken, it is also found that its quality varies depending on work items or places. Accordingly, although it will be concluded that in general local contractors have capability to undertake road maintenance work at sufficient level of quality, they are still required to improve their quality control skill.

#### **2.4.3 Materials for Road Construction and Maintenance**

In general, the availability of major construction materials is summarized in Table 2.4.1.



**Table 2.4.1 Availability of Construction Materials for Roads and Bridges**

Items	Locally Available	To be Imported	Remarks
Filling materials			
Sand			
Aggregate, Crusher-run			
Stones			
Asphalt emulsion			
Cement			Locally available but not large quantity
Reinforcement			Ditto
PC cable			
Hume RC pipe			Locally produced
Gabion			

Because of current many road projects, several concrete plants were established around the Pakse area. They are producing a hume RC pipe and RC drainage as well as delivering mixing concrete by using a concrete-mixing vehicle. Those products have been utilized in current road construction projects.

Since the current road construction activities may result in changing availability of major construction materials, further confirmation should be required.

#### **2.4.4 Equipment and Machinery for Road Construction and Maintenance**

There is no local leasing company of construction machinery and equipment in Lao PDR. Since most of machinery and equipment currently utilized here were brought into this country by international contractors to implement a project contracted, once the project completed those machinery principally carry out of the country. On the other hand, local contractors also hold some machinery and equipment for road construction and maintenance. The report on Infrastructure Basic Survey in Southern of Lao PDR, funded by JICA in 2001, is well summarized a list of construction equipment which local contractors in each province of the study area own. Although major equipment for road construction and maintenance such as excavator, bulldozer and roller are owned by such local contractors, those do not meet the current demand. In addition, it is difficult to locally procure equipment and machinery for PC bridge construction due to less demand. Accordingly, major construction equipment will be required to procure from third countries such as Thailand for smooth implementation of large-scale construction.

#### **2.4.5 Unit Costs for Road Construction and Maintenance**

The unit costs for the road and bridge construction are not sufficiently provided by MCTPC, maybe due to less locally funded road projects. Accordingly, previous road projects prepared the unit costs necessary for the project. For instance, recent ADB projects analyzed the real construction costs of similar projects from the bidding documents and determined the unit costs in consideration with the site conditions such as terrain, distance from major cities and so on. Accordingly, the Study Team takes into account such analyzed cost data and estimate appropriate construction costs.

On the other hand, DCTPCs hold the unit costs data for road and maintenance cost. This is because current maintenance works have been undertaken through the bidding process. Consequently, the Study team will collect such maintenance cost data and reflect to estimates of road and bridge maintenance costs required in this study.