

## **APPENDICES**

## **APPENDIX 1**

### **MEMBER LIST OF THE STUDY TEAM**

### Member List of the Study Team

#### 1. Field Survey (June 24 to August 1, 2000)

Mr. Kazuo Nakagawa	Leader	Managing Director Office of Technical Coordination and Examination, Grant Aid Management Department, JICA
Mr. Yuichi Matsushita	Project Coordinator	Third Project Management Division, Grant Aid Management Department, JICA
Mr. Minoru Miura	Chief Consultant / Road Traffic Planner	Katahira & Engineers International
Mr. Hidetaka Sagara	Road Designer / Surveyor	Katahira & Engineers International
Mr. Yasuaki Muramoto	Bridge Designer	Katahira & Engineers International
Mr. Masao Aizawa	Natural Condition Surveyor (Soil Mechanics)	Katahira & Engineers International
Mr. Keiichi Murakami	Construction Planner/ Cost Estimator	Katahira & Engineers International

#### 2. Explanation of Draft Report (October 17 to October 26, 2000)

Mr. Yoshikazu Yamada	Leader	Director Third Project Management Division, Grant Aid Management Department, JICA
Mr. Minoru Miura	Chief Consultant / Road Traffic Planner	Katahira & Engineers International
Mr. Hidetaka Sagara	Road Designer / Surveyor	Katahira & Engineers International
Mr. Keiichi Murakami	Construction Planner/ Cost Estimator	Katahira & Engineers International

**APPENDIX 2**

**STUDY SCHEDULE**

### Study Schedule

#### 1. Field Survey (June 24 to August 1, 2000)

No.	Date		Activities
1	June 24	Sat	Tokyo to Bangkok (Messrs. Miura, Sagara, Muramoto, Aizawa)
2	June 25	Sun	Bangkok to Vientiane (Above 4 people) Internal meeting
3	June 26	Mon	Courtesy call on CIC Courtesy call and meeting with JICA Lao office Courtesy call and discussion with MCTPC
4	June 27	Tue	Discussion with MCTPC
5	June 28	Wed	Vientiane to Savannakhet (Above 4 people)
6	June 29	Thu	Site Survey Tokyo to Bangkok (Mr. Murakami)
7	June 30	Fri	Site Survey Bangkok to Vientiane (Mr. Murakami)
8	July 1	Sat	Site Survey Vientiane to Savannakhet (Mr. Murakami)
9~12	July 2 ~ July 5		Site Survey
13	July 6	Thu	Site Survey Savannakhet to Vientiane (Messrs. Miura, Murakami)
14	July 7	Fri	Courtesy call on Embassy of Japan Discussion with MCTPC, Meeting with JICA Lao office Site Survey
15	July 8	Sat	Site Survey Vientiane to Savannakhet (Messrs. Miura, Murakami)
16~17	July 9 ~ July 10		Site Survey
18	July 11	Tue	Arrival at Savannakhet (Messrs. Nakagawa, Matsushita)
19	July 12	Wed	Courtesy call on Governor of Savannakhet Province Site Survey
20	July 13	Thu	Site Survey
21	July 14	Fri	Savannakhet to Vientiane (Messrs. Nakagawa, Matsushita, Miura, Murakami) Discussion with MCTPC Site Survey
22	July 15	Sat	Internal meeting Site Survey
23	July 16	Sun	Internal meeting Site Survey Savannakhet to Vientiane (Mr. Aizawa)
24	July 17	Mon	Signing of Minutes of Discussions Report to JICA Lao office Site Survey

No.	Date		Activities
25	July 18	Tue	Departure from Vientiane (Messrs. Nakagawa, Matsushita) Vientiane to Savannakhet (Messrs. Miura, Aizawa, Murakami) Site Survey
26~27	July 19 ~July 20		Site Survey
28	July 21	Fri	Site Survey Savannakhet to Vientiane (Mr. Aizawa)
29	July 22	Sat	Site Survey Data collection and analysis
30	July 23	Sun	Site Survey Data collection and analysis Savannakhet to Vientiane (Mr. Murakami)
31~32	July 24 ~July 25		Site Survey Data collection and analysis
33	July 26	Wed	Data collection and analysis Savannakhet to Vientiane (Messrs. Miura, Sagara, Muramoto)
34	July 27	Thu	Report to JICA Lao office Data analysis
35	July 28	Fri	Discussion with MCTPC Data analysis
36~37	July 29 ~July 30		Data analysis
38	July 31	Mon	Vientiane to Bangkok (Messrs. Miura, Sagara, Muramoto, Aizawa, Murakami)
39	Aug. 1.	Tue	Bangkok to Tokyo (Above 5 people)

## 2. Explanation of Draft Report (October 17 to October 26, 2000)

No.	Date		Activities
1	Oct. 17	Tue	Tokyo to Bangkok (Messrs. Miura, Sagara, Murakami)
2	Oct. 18	Wed	Bangkok to Vientiane (Above 3 people) Courtesy call on CIC, Courtesy call on Embassy of Japan Courtesy call and meeting with JICA Lao office
3	Oct. 19	Thu	Explanation of draft report to MCTPC
4	Oct. 20	Fri	Discussion with MCTPC
5	Oct. 21	Sat	Internal meeting
6	Oct. 22	Sun	Hanoi to Vientiane (Mr. Yamada) Internal meeting
7	Oct. 23	Mon	Courtesy call on Embassy of Japan Discussion with MCTPC
8	Oct. 24	Tue	Signing of Minutes of Discussions Report to JICA Lao office
9	Oct. 25	Wed	Vientiane to Phnom Penh (Mr. Yamada) Vientiane to Bangkok (Messrs. Miura, Sagara, Murakami)
10	Oct. 26	Thu	Bangkok to Tokyo (Above 3 people)

**APPENDIX 3**

**LIST OF PARTIES CONCERNED  
IN LAO PEOPLE'S DEMOCRATIC REPUBLIC**

### **List of Parties Concerned in Lao PDR**

Committee for Investment & Cooperation (CIC):

Mr. Latsamee Keomany                      Deputy Director General

Ministry of Communication, Transport, Post and Construction (MCTPC):

Mr. Phao Bounaphon                      Minister  
Mr. Khamloud Sithvakone              Acting Minister

Department of Roads (DOR):

Mr. Sommad Pholsena                      Director General  
Mr. Viengsavath Siphandone              Acting Director General  
Ms. Keoviengsanh Khamkaosy              Director, Disbursement Division  
Mr. Chansy Nouanmaly                      Director, International Relations Division  
Mr. Chanh Bouphalivanh                      Director, Road Administration Division  
Ms. Chanthanom Souligno                      International Relations Division  
Ms. Phongeun Souvannavong              Project Monitoring Division  
Mr. Vilaxay Phanphyla                      Project Manager  
Mr. Khattayasak Chayavong              Project Manager  
Mr. Seumkhom Chanthavong              Project Manager

Department of Communication, Transport, Post and Construction, Savannakhet Province (DCTPC):

Mr. Xayarath Baphanith                      Deputy Director

Provincial Government of Savannakhet:

Mr. Inepong Khaiyavong                      Governor  
Mr. Thong Tearn                              Vice Governor  
Mr. Bouakham Sisoulath                      Deputy Director, Chief Cabinet Office  
Dr. Kongchack Nokeo                      Deputy Director, Chief Cabinet Office  
Mr. Bounhou Thammavong                      Deputy Director, Planning Division



## **APPENDIX 4**

### **MINUTES OF DISCUSSIONS**

## 1. At Field Survey

MINUTES OF DISCUSSIONS  
ON THE BASIC DESIGN STUDY  
ON THE PROJECT FOR IMPROVEMENT  
OF NATIONAL ROAD ROUTE 9 (PHASE 2)  
IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

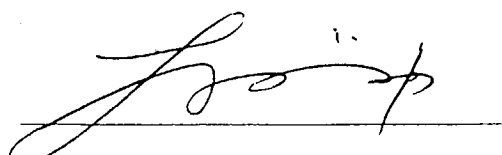
In response to a request from the Government of Lao people's Democratic Republic (hereinafter referred to as "Lao PDR"), the Government of Japan decided to conduct a Basic Design Study on the Project for Improvement of National Road Route 9 (Phase 2) (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA dispatched to Lao PDR the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Kazuo Nakagawa, Managing Director, Office of Technical Coordination and Examination, Grant Aid Management Department, JICA, and is scheduled to stay in the country from June 25 to July 31, 2000.

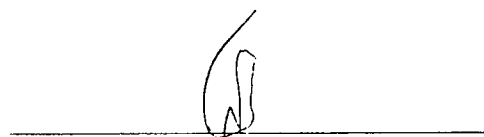
The Team held discussion with the officials concerned of the Government of Lao PDR and conduct a field survey at the study area.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed with further works and prepare the Basic Design Report.

Vientiane, July 17, 2000



Kazuo Nakagawa  
Leader  
Basic Design Study Team  
JICA



Sommad Pholsena  
Director General  
Department of Roads  
Ministry of Communication, Transport, Post  
and Construction

## ATTACHMENT

### 1. Objective

The Objective of the Project is to improve National Road Route 9 to cope with socio-economic demand of the country.

### 2. Project Site

The project site is shown in ANNEX-1.

### 3. Responsible and Implementing Agency

The responsible agency of the Project is Ministry of Communication, Transport, Post and Construction (MCTPC).

The Implementing Agency of the Project is Department of Roads, MCTPC.

The organization chart is shown in ANNEX-2.

### 4. Item requested by the Government of Lao PDR

In the discussion between the Team and the Government of Lao PDR, the following items were finally requested by the Government of Lao PDR. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

Improvement of the deteriorated road condition on National Road Route 9 including 13 bridges, from Muang Phalan (CH72.913km) to Muang Phin (CH131.075km) (approximately 60km).

### 5. Japan's Grant Aid Scheme

- (1) The Government of Lao PDR understands the Japan's Grant Aid Scheme explained by the Team, as described in ANNEX-3.
- (2) The Government of Lao PDR will take necessary measures, as described in ANNEX-4, as a condition for the Japan's Grant Aid to be implemented for the Project.

### 6. Schedule of the Study

- (1) The consultants will proceed with further studies in Lao PDR until July 31, 2000.
- (2) JICA will prepare the draft report in English and dispatch a team in order to explain its contents around the middle of October, 2000.
- (3) In case that the contents of the report are accepted in principle by the Government of Lao PDR, JICA will complete the final report and send it to the Government of Lao PDR by January, 2001.

### 7. UXO Removal Work

- (1) The Lao side will remove all UXOs in accordance with the results of the UXO search (identification of the location including excavation) conducted by the consulting firm under the

contract with the Team.

- (2) The report of the results of the search mentioned above (1) will be notified by the consulting firm to the Team, the Lao side, and JICA Lao office.
- (3) The Lao side will report the progress of the removal work monthly and whenever UXO be removed, and submit the certification of all removal work upon its completion, to JICA Lao office.
- (4) The Lao side will assign coordinators as liaison among MCTPC, consulting firm (Search teams) and Lao Army. The coordinator will accompany with the consulting firm on site.
- (5) Compensation to local people caused by the need to removal structures, damage crops, etc. during the UXO search will be the responsibility of the Lao side. However, the consulting firm will seek approval from the Lao side before taking any action that may cause damage to crops, fences or other structures that may lead to compensation claims.
- (6) The Lao side should be responsible for all necessary actions to avoid explosion accident after UXO identification conducted by the consulting firm.

#### 8. Quarry Permission and Environmental Impact Assessment

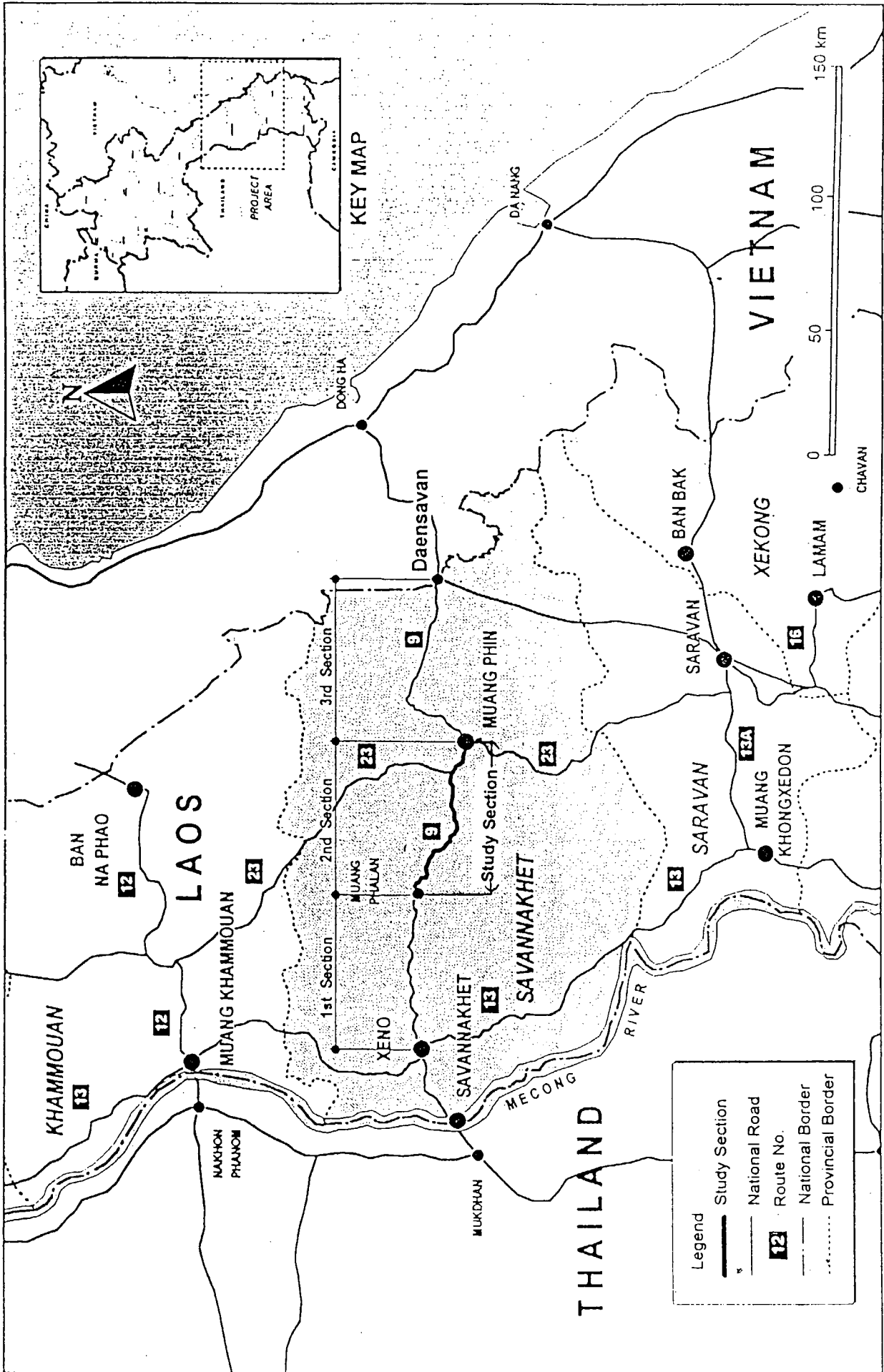
Quarry areas shall meet the requirements of approvals under the National Forestry Law. JICA will provide necessary data and information to the Lao side at the time of explanation of Draft Basic Design Report around middle of October, 2000.

The Department of Roads, MCTPC shall prepare an environmental management plan clearly defining the works area, environmental constraints, rehabilitation requirements and any necessary compensation provisions based on the Draft Basic Design Report until the end of November, 2000 and shall get the permission of Quarry approved by the Ministry of Agriculture and Forestry before Exchange of Notes.

The condition of tree re-planting of Quarry shall be undertaken by the Lao side.

#### 9. Other relevant issues

- (1) The Lao side shall ensure enough budget and personnel to operate and maintain the facilities after the completion of the Project.
- (2) The Lao side has agreed to provide necessary number of counterpart personnel to the Team during the period of their studies.
- (3) The Lao side shall submit answers to the questionnaire which the Team handed to Lao side by July 28, 2000.
- (4) MCTPC shall coordinate and solve any issues related to the Project which may be raised from third parties or inhabitants in the Project areas during implementation of the Project.
- (5) The Lao side will take necessary measures to coordinate between the Government of Japan and the Asian Development Bank.
- (6) The Lao side will take all possible measures to secure the safety of the concerned people during the study and implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.



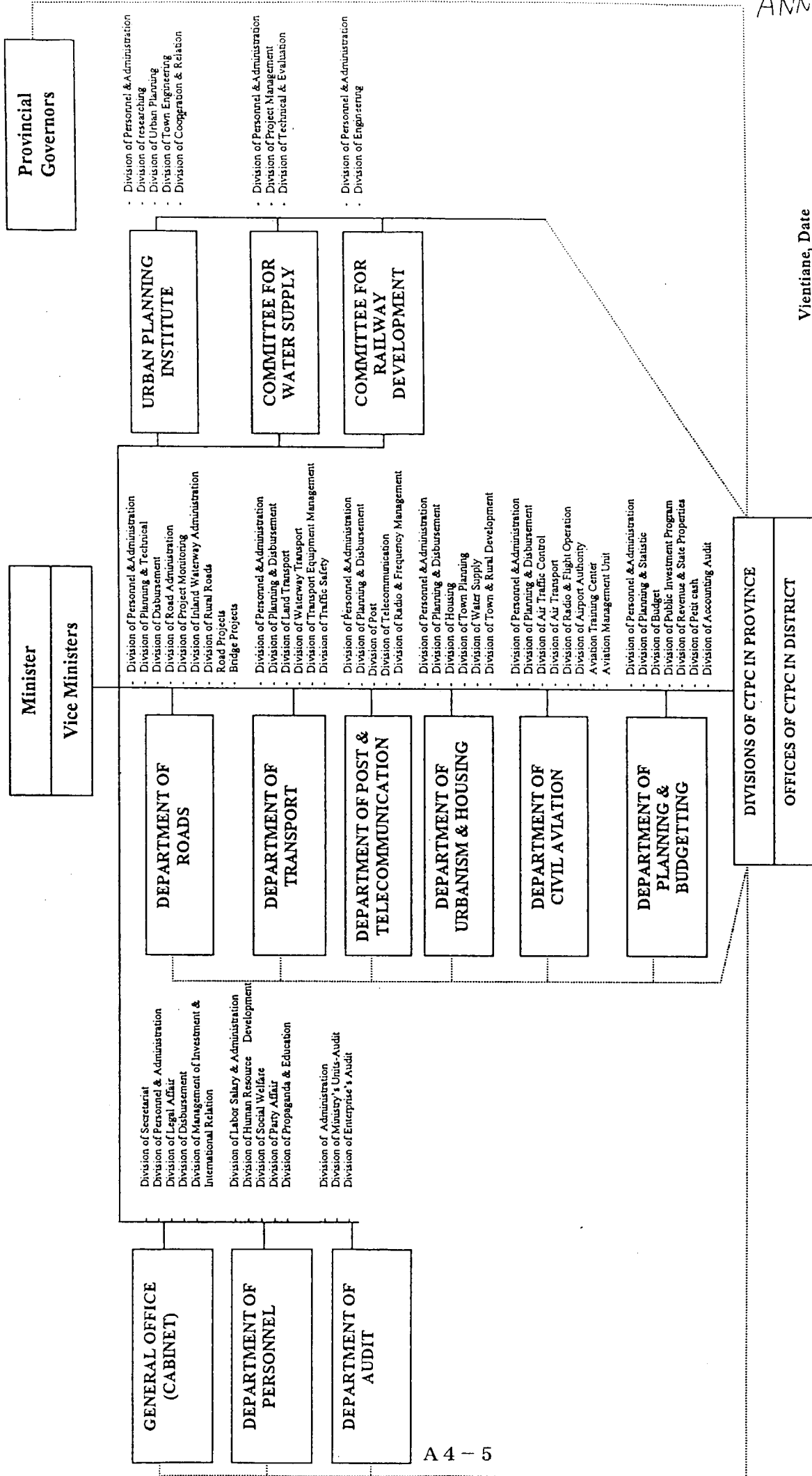
LOCATION MAP

85

EP

# ORGANISATION CHART OF MINISTRY OF COMMUNICATION TRANSPORT POST AND CONSTRUCTION

ANNEX - 2



Vientiane, Date  
Director General,  
Department of Personnel

Minister, Ministry of communication,  
Transport, Post and Construction

*A. S. P.*

*W. Gumb*

*[Signature]*

## Japan's Grant Aid Program

### 1. Japan's Grant Aid Procedures.

- (1) The Japan's Grant Aid is executed by the following procedures.
- **Application** (request made by a recipient country)
  - **Study** (Preparatory Study / Basic Design Study conducted by JICA)
  - **Appraisal & Approval** (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
  - **Determination of Implementation** (Exchange of Notes between the Governments of Japan and the recipient country)
  - **Implementation** (Implementation of the Project)
- (2) Firstly, the application or a request for a Project submitted by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is suitable for Japan's Grant Aid. If the request is deemed appropriate, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the study (Basic Design Study), using a Japanese consulting firm(s). If the background and objective of the requested project are not clear, a Preparatory Study is conducted prior to a Basic Design Study.

Thirdly, the Government of Japan appraises the project to see whether or not the Project is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted for approval by the Cabinet.

Fourthly, the Project approved by the Cabinet becomes official when pledges by the Exchange of Notes (E/N) signed by the both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

## 2. Basic Design Study

### (1) Contents of the Study

The purpose of the Study (Preparatory Study / Basic Design Study) conducted on a project requested by JICA is to provide a basic document necessary for appraisal of the project by the Japanese Government. The contents of the Study are as follows:

- (a) to confirm background, objectives, benefits of the project and also institutional capacity of agencies concerned of the recipient country necessary for project implementation;
- (b) to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view;
- (c) to confirm items agreed on by both parties concerning the basic concept of the project;
- (d) to prepare a basic design of the project.
- (e) to estimate cost involved in the project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

### (2) Selecting (a) Consulting Firm(s)

For smooth implementation of the Study, JICA uses (a) consulting firm(s) registered. JICA selects (a) firm(s) through proposals submitted by firms which are interested. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference made by JICA.

The consulting firm(s) used for the study is(are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency.

48

1



### 3. Japan's Grant Aid Scheme

(1) What is Grant Aid?

The Grant Aid provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with the relevant laws and regulations of Japan. The Grand Aid is not in a form of donation as such.

(2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, in which the objectives of the Project, period of execution, conditions and amount of the Grand Aid, etc., are confirmed.

(3) "The period of the Grant Aid" means Japanese single fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as Exchanging of Notes, concluding contracts with (a) consulting firm(s) and (a) contractor(s) and a final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of single fiscal year at most by mutual agreement between the two Governments.

(4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant may be used for the purchase of products or services of a third country origin.

However, the prime contractors, namely, consulting, construction and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.)

(5) Necessity of the "Verification"

The Government of the recipient country or its designated authority will conclude into contracts in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. The "Verification" is deemed necessary to secure accountability to Japanese tax payers.

(6) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid, the recipient country is required to undertake necessary measures such as the following:

- (a) to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,
- (b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- (c) to secure buildings prior to the installation work in case the Project is providing equipment,
- (d) to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
- (e) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,
- (f) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contract, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

43

W

(8) Re-export

The products purchased under the Grant Aid should not be re-exported from the recipient country.

(9) Banking Arrangements (B/A)

- (a) The Government of the recipient country or its designated authority shall open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by Government of the recipient country or its designated authority under the contracts verified.
- (b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

43

WB

## Major Undertakings to be taken by Each Government

NO	Items	To be covered by Grant Aid.	To be covered by Recipient side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
4	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
5	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
6	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
7	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
8	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities		●
9	To coordinate and solve any issues related to the Project which may be raised from third parties or inhabitants in the Project area during implementation of the Project.		●
10	To re-plant tree of Quarry		●

## 2. At Explanation of Draft Report

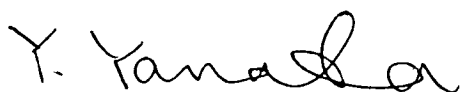
MINUTES OF DISCUSSIONS  
ON THE BASIC DESIGN STUDY  
ON THE PROJECT FOR IMPROVEMENT OF  
NATIONAL ROAD ROUTE 9 (PHASE 2)  
IN LAO PEOPLE'S DEMOCRATIC REPUBLIC  
(EXPLANATION ON DRAFT REPORT)

In July 2000, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for Improvement of National Road Route 9 (Phase 2) (hereinafter referred to as "the Project") to Lao People's Democratic Republic (hereinafter referred to as "Lao PDR"), and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain and to consult Lao PDR on the components of the draft report, JICA sent to Lao PDR the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Yoshikazu Yamada, Director, Third Project Management Division, Grant Aid Management Department, JICA, from October 18 to October 25, 2000.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Vientiane, October 24, 2000



Yoshikazu Yamada  
Leader,  
Draft Report Explanation Team,  
Japan International Cooperation Agency



Viengsavath Siphandone  
Acting Director General,  
Department of Roads,  
Ministry of Communication, Transport, Post  
and Construction

## ATTACHMENT

### 1. Components of the Draft Report

The Government of Lao agreed and accepted in principle the components of the draft report explained by the Team.

### 2. Japan's Grant Aid Scheme

The Lao side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Lao as explained by the Team and described in Annex-3 and Annex-4 of the Minutes of Discussions signed by both parties on July 17, 2000.

### 3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Government of Lao by January, 2001.

### 4. UXO Removal Work

- (1) Both sides confirmed the UXO removal work to be taken by the Lao as described in "7.UXO Removal Work" of the Minutes of Discussions signed by both parties on July 17, 2000.
- (2) The Lao side should submit the certification of all removal work at Basic Design Stage to JICA Lao office.
- (3) The Lao side will remove all UXOs without delay when UXOs are found at construction stage.

### 5. Other Relevant Issues

- (1) The Lao side shall ensure enough budget and personnel to operate and maintain the facilities after the completion of the Project.
- (2) MCTPC shall coordinate and solve any issues related to the Project which may be raised from third parties or inhabitants in the Project area during implementation of the Project.
- (3) The Lao side will take necessary measures to coordinate between the Government of Japan and the Asian Development Bank.
- (4) The Lao side will take all possible measures to secure the safety of the concerned people during the implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.
- (5) Based on the request from the Lao side, the Team explained the plan of the consultant services for a safety measure for inhabitants as one of the components of the Grant Aid. The Lao side agreed to the plan in principle.



**APPENDIX 5**

**COST ESTIMATION BORNE  
BY THE GOVERNMENT OF LAO PDR**

### Cost Estimation Borne by the Government of Lao PDR

#### 1. Land Acquisition

It was informed by DOR that right of way for a national road is 70 m width which is 35 m each on both sides from centerline. The necessity of additional land acquisition is not required because this project was designed within present right of way of the whole stretch.

#### 2. Compensation

For the implementation of this project, it is necessary to relocate some huts and cultivated land. It was estimated that the compensation for the relocation, based on the unit cost provided by DOR, and is shown below.

##### Huts

Chainage	Number	Area (m <sup>2</sup> )
KM 0 + 100	4	128
KM 2 + 250	5	160
KM 10 + 800	11	132
KM 46 + 800	2	30
KM 47 + 400	5	212
KM 48 + 100	5	120
KM 50 + 400	1	28
KM 60 + 500	4	76
<b>Total</b>	<b>37</b>	<b>886 m<sup>2</sup></b>
	Unit Cost	Kip 10,000 /m <sup>2</sup>
	Compensation	Kip 8,860,000

##### Cultivating Land

Chainage	Area (m <sup>2</sup> )
KM 0 + 300	800
KM 18 + 100	200
KM 19 + 200	1,800
KM 33 + 900	300
KM 40 + 200	400
<b>Total</b>	<b>3,500 m<sup>2</sup></b>
	Unit Cost
	Kip 400 /m <sup>2</sup>
	Compensation
	Kip 1,400,000



### 3. Removal & Clearance of UXO

In this study, UXO search was carried out only on 44.9 ha where it is planned construction of the detour. For the remaining 133.8 ha in construction area, the contractor shall carry out UXO search work during construction. However, it shall be the responsibility of the Government of Lao PDR to remove and to make harmless discovered UXO. It is estimated that the necessary cost for UXO clearance based on the unit cost provided by DOR as shown below.

$$133.8 \text{ ha} \times \text{Kip } 4,000,000/\text{ha} = \text{Kip } 535,200,000$$

### 4. Re-planting Trees at Closed Quarry

Operation of quarry is not planned in this project. However expansion of an existing quarry, about 9 ha, is required to excavate the necessary volume of crushed stone for this project. After closing the quarry, Japanese side shall carry out land restoration , while it shall be the responsibility of Lao side to replant trees. It is estimated the replanting cost based on the unit cost provided by DOR as shown below.

$$9 \text{ ha} \times \text{Kip } 3,862,000/\text{ha} = \text{Kip } 34,758,000$$

### 5. Total Cost Borne by the Government of Lao PDR

The cost borne by Lao side for the implementation of this project is total of the above and estimated at 580.2 million Kip.

## **APPENDIX 6**

### **PAVEMENT CONDITION SURVEY**

## Pavement Condition Survey

Accurate condition survey which assesses a pavement's physical distress is vital to a successful improvement work. In order to evaluate the pavement condition of existing roads, the following surveys were conducted.

- Visual Survey
  - Functional condition (Present Serviceability Rating)
  - Structural condition (Structural adequacy and effective structural capacity)
  - Other relevant Condition (Shoulder, Drainage, Environment etc.)
- Material Testing
  - C.B.R Test (Strength of subgrade)

### 1. Functional Condition

The functional condition of existing pavement are visually assessed based on comfortability of road users and pavement functional deterioration such as roughness, potholes, and safety consideration. Based on the field survey, the conditions were classified into the following four (4) categories for each section of 1km.

- Good (G)
- Fair (F)
- Bad (B)
- Very Bad (VB)

### 2. Structural Condition

The structural condition of existing pavement involves the assessment of current condition based on distress including its type, amount and severity.

The following distresses were visually assessed.

- Fatigue or alligator cracking (AL,AM,AH)
- Localized Failing area (LFA)
  - Disintegrated underlying layer
  - Collapse of AC surface
  - Stripping of AC basecourse

Alligator cracking which is considered a major structural distress of AC pavement, were assessed and classified into the following level of severity for each sections of 1km.

- Low Severity (AL)  
Longitudinal disconnected hairline cracks running paralleled to each other.  
The cracks are not spalled. (class 1 cracking)
- Medium Severity (AM)  
Further development of low-severity alligator cracking into pattern of pieces formed by cracks that may be lightly surfaced spalled. (class 2 cracking)
- High Severity (AH)  
Medium alligator cracking has progressed so those pieces are more severely at the edges and loosened until the cell rock under traffic (class 3 cracking)

Each section of 1 km was assessed and rated at highest severity level of the Section.

The following road condition surveys were conducted to assess the existing condition of road and pavement.

- General Condition of Existing Road
  - Chainage
  - Alignment
  - Road width (Carriage way, Shoulder)
  - Pavement Type (Carriage way, Shoulder)
  - Road structure
  - Roadside environment
- Pavement Condition of Existing Road
  - Functional Condition
  - Structural Condition
  - Geotechnical Investigation

General conditions of existing road are reported in Table 6-1.

Table 6-1 General Condition of Existing Road

1	2	3		4		5	6	7	Remarks	
		Carriage way (m)	Shoulder (m)	Carriage way	Shoulder					
0.0-1.0	F	7.7	2.5	D	G	B	AH(LFA)	B	P/R	Br.No1 0.6km
1.0-2.0	F	6.5	1.5	D	G	B/T	AH/AM	B	P	
2.0-3.0	F	7.5	1.5	D	G	F	AM	B	P/R	
3.0-4.0	F	7.0	1.0	D	G	F	AM	B/L	F	
4.0-5.0	F	7.0	1.2	D	G	F/B	AM/LFA	B/L	F	
5.0-6.0	F	7.1	1.5	D	G	B	AM/LFA	B/L	F	
6.0-7.0	F	7.2	1.0	D	G	F	AM	B/L	R/F	
7.0-8.0	R	7.0	1.0	D	G	F	AM	B/L	F	Br.No2 7.2km
8.0-9.0	F	7.0	1.0	D	G	B	AH(LFA)	B/L/C	F	
9.0-10.0	R	6.5	1.5	D	G	B	AH	L/C	F	
10.0-11.0	R	7.0	1.0	D	G	VB	AH(LFA)	L	P/R	
11.0-12.0	R	7.5	1.0	D	G	F	AM	L/B	P/R	
12.0-13.0	R	7.5	1.0	D	G	F	AM	B/L	F	Br.No3 12.1km
13.0-14.0	R	7.2	1.0	D	G	F	AM	B/L	F	
14.0-15.0	R	7.5	1.0	D	G	F	AM	L	P/F	
15.0-16.0	R	7.3	1.0	D	G	F	AM	B/L	F	
16.0-17.0	R	7.2	1.2	D	G	F	AM(LFA)	B/L	F/P	
17.0-18.0	R	7.4	1.1	D	G	B	AH	B/L/C	F	
18.0-19.0	F	7.0	1.3	D	G	B	AH(LFA)	B/L	R/P	Br.No4 18.2km
19.0-20.0	F	7.5	1.4	D	G	B/G	AH/AL	B	P/F	Br.No5 19.2km
20.0-21.0	F	7.2	1.1	D	G	B	AH(L.F.A)	B/L/C	P/F	Br.No6 20.5km
21.0-22.0	R	7.2	1.1	D	G	B	AH(L.F.A)	B/L/C	P/F	
22.0-23.0	F	7.1	1.2	D	G	B/G	AH/AL	B/L/C	F	Br.No7 22.5km
23.0-24.0	R	7.2	1.1	D	G	G/B	AH/AL	B/L/C	F	
24.0-25.0	R	6.9	1.2	D	G	B	AH(L.F.A)	L	F	
25.0-26.0	R	7.0	1.1	D	G	VB/B	AH(L.F.A)	B	F	
26.0-27.0	R	6.8	1.3	D	G	VB/B	AH(LFA)	B/L/C	F	
27.0-28.0	R	7.0	1.5	D	G	VB/B	AH(LFA)	B/L/C	F	
28.0-29.0	R	7.2	1.0	D	G	B	AH(LFA)	B/L/C	F/R	Br.No8 28.1km
29.0-30.0	R	7.0	1.0	D	G	B	AH(LFA)	B/L/C	F	
30.0-31.0	R	6.9	1.1	D	G	B	AH(LFA)	L/B	F/R	
31.0-32.0	R	6.8	1.0	D	G	B	AH(LFA)	B	F/R	
32.0-33.0	R	6.9	1.3	D	G	V.B/B	AH(LFA)	B/L/C	P/R	
33.0-34.0	R	6.8	1.2	D	G	B	AH(LFA)	L/B	P/F	
34.0-35.0	R	7.0	1.5	D	G	V.B/B	AH(LFA)	B/L/C	P/R	
35.0-36.0	R	6.9	1.4	D	G	V.B/B	AH(L.F.A)	L/C	F/P	
36.0-37.0	R	7.2	1.3	D	G	V.B/B	AH(L.F.A)	B/L/C	F/P	
37.0-37.7	F	6.9	1.2	D	G	B	AH(LFA)	B/L	F	
										Equation
40.0-41.0	R	7.2	1.1	D	G	G/B	AL/AH	B/L/C	R/P	Br.No9 40.9km
41.0-42.0	R	7.3	1.4	D	G	B	AH(LFA)	B/L/C	F/P	
42.0-43.0	R	7.2	1.1	D	G	B	AH(L.F.A)	B/L/C	F	
43.0-44.0	R	7.3	1.2	D	G	V.B/B	AH(LFA)	B/L/C	F/P	
44.0-45.0	R	7.1	1.1	D	G	V.B/B	AH/AL	B/L/C	F/P	
45.0-46.0	R	7.5	1.0	D	G	G	AL	B/L/C	R/P	
46.0-47.0	F	7.3	1.2	D	G	G/F	AL/AM	B/L	R/P	Br.No10 46.3km
47.0-48.0	F	7.5	1.3	D	G	F	AM	L	R	(Xetha Mouak)
48.0-49.0	F	7.0	1.5	D	G	V.B/B	AH(L.F.A)	B/L	R/W	
49.0-50.0	F	7.2	1.5	D	G	B	AH(L.F.A)	B/L	P/W	
50.0-51.0	F	7.5	1.5	D	G	F	AM	B/L/C	P/F	

## Appendix 6

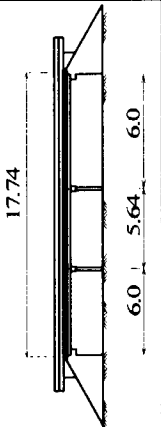
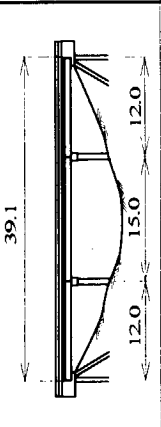
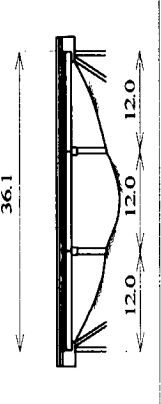
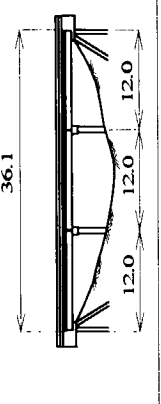
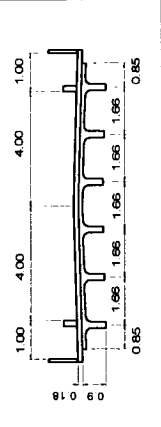
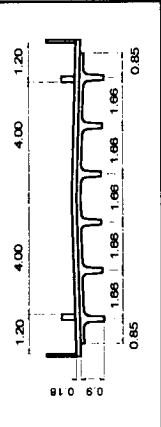
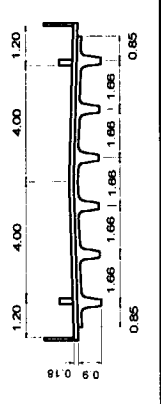
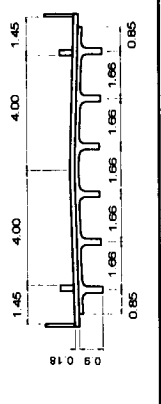
1	2	3		4	5	6	7	Remarks		
		Carriage way (m)	Shoulder (m)							
Chainage (Km)	Align-ment	Road width		Pavement Type		Functional Condition	Structural Condition	Road Structure	Roadside Environ-ment	
				Carriage way	Shoulder					
51.0-52.0	F	7.2	1.2	D	G	V.B/B	AH/AM	B/L/C	P/R	
52.0-53.0	F	7.6	1.0	D	G	V.B	AH(L.F.A)	B/L	P/F	Br.No11 52.5km
53.0-54.0	F	7.5	1.2	D	G	F/B	AM/AH	B/L	P/P	
54.0-55.0	F	7.2	1.0	D	G	B	AH(L.F.A)	B	R/P	Br.No12 54.1km
55.0-56.0	F	7.5	1.0	D	G	B	AH(LFA)	B/L/C	R/F	Br.No13 54.4km
56.0-57.0	F	7.5	1.5	D	G	B	AH(LFA)	B/L/C	P/F	
57.0-58.0	F	6.6	1.0	D	G	B	AH(LFA)	B/L/C	P/F	
58.0-59.0	F	7.0	1.2	D	G	B	AH(LFA)	B/L/C	R/F	
59.0-60.0	F	7.2	1.4	D	G	V.B/B	AH(LFA)	B/L	R/P	
60.0-61.3	F	7.3	1.2	D	G	B/F	AH/AH	B/L	R	(Muang Phin)

- 1) Chainage  
Distance from the beginning point of the Project
- 2) Alignment  
F = Flat  
R = Rolling  
M = Mountainous
- 3) Pavement Type  
D = Double Bituminous Surface Treatment  
S = Single Bituminous Surface Treatment  
G = Gravel
- 4) Functional Condition  
G = Good  
F = Fair  
B = Bad  
VB = Very Bad
- 5) Structural Condition  
AL; Low-severity Alligator Cracking  
AM; Medium-severity Alligator Cracking  
AH; High-severity Alligator Cracking  
LFA; Localized Failing Area
- 6) Road Structure  
L; Level  
B; Embankment  
C; Cut
- 7) Roadside Environment  
R; Resident Area  
P; Rice Field  
F; Forest Area  
W; Wasteland

**APPENDIX 7**

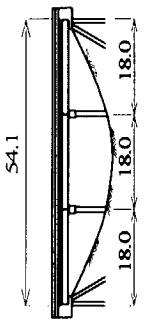
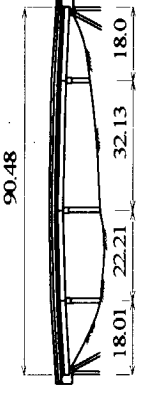
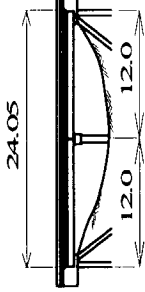
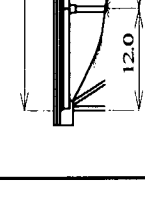
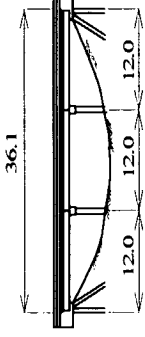
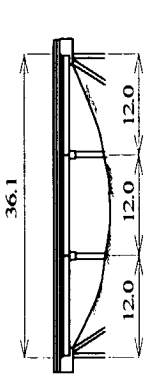
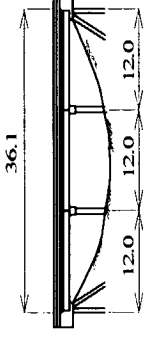
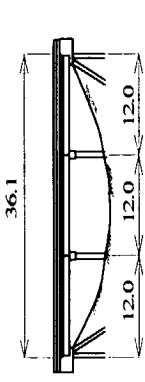
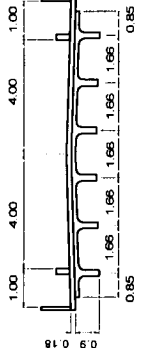
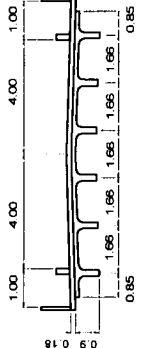
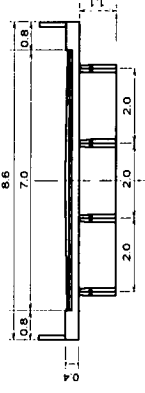
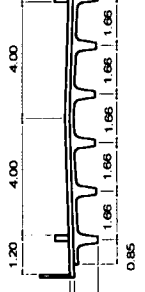
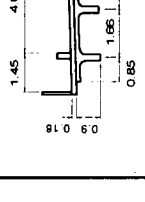
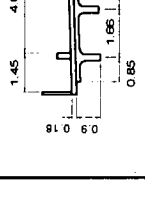
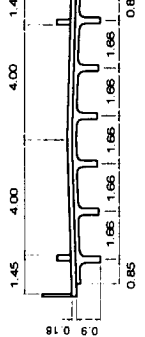
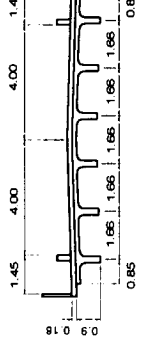
**EXISTING CONDITION OF BRIDGES  
AND IMPROVEMENT METHOD**

**Existing Condition of Bridges and Improvement Method (1/4)**

Name of Bridge	No.1 Bridge		No.2 Bridge		No.3 Bridge		No.4 Bridge	
	Existing	Improvement	Existing	Improvement	Existing	Improvement	Existing	Improvement
Side View								
Cross Section of bridge								
Super Structure	R,C,Simple girder		R,C,Simple girder		R,C,Simple girder		R,C,Simple girder	
Support	Plate type		Plate type		Plate type		Plate type	
Expansion Joint	Butt joint		Butt joint		Butt joint		Butt joint	
Abutment	Gravity Type		Abutment on pile bent		Abutment on pile bent		Abutment on pile bent	
Pier	Wall type		Wall type		Wall type		Wall type	
Concrete Slab	Hairline cracks in all most all section		Hairline cracks in all most all section		Hairline cracks in all most all section		Hairline cracks in all most all section	
Girder	Fair		Fair		Fair		spalled concrete	
Expansion Joint	Fair		Rusted		Rusted		Rusted	
Drainage	Bad		Bad		Bad		Bad	
Railing	Rust and damage in members on both sides		Rust and damage in members on both sides		Rust and damage in members on both sides		Rust and damage in members on both sides	
Scouring of Abutment/pier	Scouring on Abut.		Scouring on Abut.		Scouring on Abut.		Scouring on Abut.	
Approach sidewalk	Insufficient width		Insufficient width		Insufficient width		Insufficient width	
Special Issue	-----		-----		-----		-----	
Item of Space Investigation	No repair with AC Provision of drainage paths with AC overlay		No repair with AC Provision of drainage paths with AC overlay		No repair with AC Provision of drainage paths with AC overlay		No repair with AC Provision of drainage paths with AC overlay	



Existing Condition of Bridges and Improvement Method (2/4)

Name of Bridge	No.5 Bridge		No.6 Bridge		No.7 Bridge		No.8 Bridge	
	Existing	Improvement	Existing	Improvement	Existing	Improvement	Existing	Improvement
Side View								
Cross Section of bridge								
Super Structure	R,C,Simple girder		Steel Simple girder		R,C,Simple girder		R,C,Simple girder	
Support	Plate type		Roller type		Plate type		Plate type	
Expansion Joint	Butt joint		Butt joint		Butt joint		Butt joint	
Abutment	Abutment on pile bent		Abutment on pile bent		Abutment on pile bent		Abutment on pile bent	
Pier	Wall type		Wall type		Wall type		Wall type	
Concrete Slab	Hairline cracks in all most all section		Hairline cracks in all most all section		Hairline cracks in all most all section		Hairline cracks in all most all section	
Girder	Fair		much deflection		Fair		Spalled Concrete	
Expansion Joint	Rusted		Fair		Rusted		Rusted	
Drainage	Bad		Bad		Bad		Bad	
Railing	Rust and damage in members on both sides		Rust and damage in members on both sides		Rust and damage in members on both sides		Rust and damage in members on both sides	
Scouring of Abutment/pier	Scouring on Abut.		Scouring on Abut.		Scouring on Abut.		Scouring on Abut.	
Approach sidewalk	Insufficient width		Insufficient width		Insufficient width		Insufficient width	
Special Issue	-----		-----		-----		-----	
Item of Space Investigation	Overlay with asphalt concrete		No repair		No repair		No repair	
	No repair		No repair		No repair		No repair	
	Provision of drainage paths with AC overlay		No repair		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay	
	Repair		Repair		Repair		Repair	
	Scouring on Abut.		Scouring on Abut.		Scouring on Abut.		Scouring on Abut.	
	Insufficient width		Insufficient width		Insufficient width		Insufficient width	
	-----		-----		-----		-----	
	Overlay with asphalt concrete		No repair		No repair		No repair	
	No repair		No repair		No repair		No repair	
	Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay	
	Repair		Repair		Repair		Repair	
	Scouring on Abut.		Scouring on Abut.		Scouring on Abut.		Scouring on Abut.	
	Insufficient width		Insufficient width		Insufficient width		Insufficient width	
	-----		-----		-----		-----	
	Overlay with asphalt concrete		No repair		No repair		No repair	
	No repair		No repair		No repair		No repair	
	Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay	
	Repair		Repair		Repair		Repair	
	Scouring on Abut.		Scouring on Abut.		Scouring on Abut.		Scouring on Abut.	
	Insufficient width		Insufficient width		Insufficient width		Insufficient width	
	-----		-----		-----		-----	
	Overlay with asphalt concrete		No repair		No repair		No repair	
	No repair		No repair		No repair		No repair	
	Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay	
	Repair		Repair		Repair		Repair	
	Scouring on Abut.		Scouring on Abut.		Scouring on Abut.		Scouring on Abut.	
	Insufficient width		Insufficient width		Insufficient width		Insufficient width	
	-----		-----		-----		-----	
	Overlay with asphalt concrete		No repair		No repair		No repair	
	No repair		No repair		No repair		No repair	
	Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay	
	Repair		Repair		Repair		Repair	
	Scouring on Abut.		Scouring on Abut.		Scouring on Abut.		Scouring on Abut.	
	Insufficient width		Insufficient width		Insufficient width		Insufficient width	
	-----		-----		-----		-----	

Existing Condition of Bridges and Improvement Method (3/4)

Name of Bridge	No.9 Bridge		No.10 Bridge		No.11 Bridge		No.12 Bridge	
	Existing	Improvement	Existing	Improvement	Existing	Improvement	Existing	Improvement
Side View								
Cross Section of bridge								
Super Structure	R,C,Simple girder		Steel Simple girder		R,C,Simple girder		R,C,Simple girder	
Support	Plate type		Roller type		Plate type		Plate type	
Expansion Joint	Butt joint		Butt joint		Butt joint		Butt joint	
Abutment	Abutment on pile bent		Abutment on pile bent		Abutment on pile bent		Abutment on pile bent	
Pier	Wall type		Wall type		Wall type		Wall type	
Concrete Slab	Hairline cracks in all most all section		Hairline cracks in all most all section		Hairline cracks in all most all section		Hairline cracks in all most all section	
Girder	Fair		much deflection		Fair		Fair	
Expansion Joint	Rusted		Fair		No repair		No repair	
Drainage	Bad		Bad		Bad		Bad	
Railing	Rust and damage in members on both sides		Rust and damage in members on both sides		Rust and damage in members on both sides		Rust and damage in members on both sides	
Scouring of Abutment/pier	Scouring on Abut.		Scouring on Abut.		Scouring on Abut.		Scouring on Abut.	
Approach sidewalk	Insufficient width		Insufficient width		Insufficient width		Insufficient width	
Special Issue	-----		-----		-----		-----	
Item of Space Investigation	Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay		Provision of drainage paths with AC overlay	

**Existing Condition of Bridges and Improvement Method (4/4)**

Name of Bridge	No. 13 Bridge		Existing	Improvement	Existing	Improvement	Existing	Improvement
	Existing	Improvement						
Side View								
Cross Section of bridge								
Super Structure	R, C, Simple girder							
Support	Plate type							
Expansion Joint	Butt joint							
Abutment	Abutment on pile bent							
Pier	Wall type							
Concrete Slab	Hairline cracks in all most all section			Overlay with asphalt concrete				
Girder	Fair	No repair						
Expansion Joint	Rusted	Overlay with AC		Provision of drainage paths with AC overlay				
Drainage	Bad							
Railing	Rust and damage in members on both sides	Repair						
Scouring of Abutment/pier	Scouring on Abut.	Repair						
Approach sidewalk	Insufficient width	Repair						
Special Issue	-----	-----						
Item of Space Investigation								

## **APPENDIX 8**

### **DESIGN STANDARDS**

Design Manual (Provisional Use), Communication Department, MCTPC

I	Road Design Class			I			II			III			IV			V			VI			VII			
	Traffic (ADT)	> 8000			3000-8000			1000-3000			300-1000			100-300			50-100			< 50					
III	Terrain	F	R	M	F	R	M	F	R	M	F	R	M	F	R	M	F	R	M	F	R	M	F	R	M
IV	Design Speed (km/hr)	100	80	60	100	80	60	80	60	40	80	60	40	60	40	20	60	40	20	60	40	20	40	30	20
V	Total Formation Width	32	32	20	21.5	21.5	11	12	12	12	8	9	9	7	7	7	6.5	6.5	6	6	6	6	6	6	5.5
1	Number of Lanes	4			2			2			2			2			2			1			1		
2	Lane Width (m)	3.75	3.75	3.5	3.75	3.75	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	2.75	2.75	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.5
3	Carriageway (m)	15	15	14	7.5	7.5	7	7	7	6	6	6	6	6	5.5	5.5	5	5	5	5	5	5	5	5	3.5
4	Median Width (m)	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Island between motorized and non-motorized traffic	2 x 3	2 x 3	-	2 x 3	2 x 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Paved shoulder (m)	2x0.5	2x0.5	2 x 2	2x0.5	2x0.5	2 x 2	2 x 2	2 x 2	2 x 1	2 x 1	2 x 1	2 x 1	2 x 1	2x0.75	2x0.75	2x0.5	2x0.5	2x0.5	2x0.5	2x0.5	2x0.5	2x0.5	2x0.5	-
7	Lane for slow traffic (m)	2 x 3	2 x 3	-	2 x 3	2 x 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Unpaved shoulder (m)	2x0.5	2x0.5	-	2x0.5	2x0.5	-	2x0.5	2x0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 x 1
VI	Max. Gradient (%)	5	6	7	5	6	7	6	7	8	7	8	7	8	7	8	7	8	9	7	8	9	8	9	10
VII	Min. Horizontal Curve (m)	400	250	130	400	250	130	250	130	60	250	130	60	250	130	60	130	60	130	60	130	60	20	60	20
VIII	Min. Vertical Curves :																								
1	Crest (km)	10	5	2.5	10	5	2.5	5	2.5	1	5.0	2.5	1	2.5	1	0.5	2.5	1	0.5	1	0.5	1	0.5	1	0.5
2	Sag (km)	3	2	1.5	3	2	1.5	2	1.5	0.6	2.0	1.5	0.6	1.5	0.6	0.2	1.5	0.6	0.2	1.5	0.6	0.2	1.5	0.6	0.2
IX	Superelevation (m)	3 - 10																							
X	Crossfall :																								
1	Paved (%)	2 - 3																							
2	Unpaved (%)	3 - 4																							
3	Paved Shoulder (%)	> 3																							
4	Unpaved Shoulder (%)	> 4																							
XI	ROW Reserve (m)	60			40			40			30			20			HS - 20 - 44								
XII	Bridge Design Live Load	9.1																							
XIII	Max. Axle Load (Ton)	9.1																							

**APPENDIX 9**

**TOPOGRAPHIC SURVEY**

## Topographic Survey

For the execution of a basic design on the study section with about 60 km in length (Muang Phalan~Muang Phin), following surveys were carried out in this study. And the results were reflected on drawings of this basic design.

### 1. Route Survey

Route survey was carried out along the centerline of existing road. Technical specification is as follows:

#### 1) Centerline survey

The centerline of existing road was observed with maximum interval of 50 m. It established BC (beginning of curve), EC (end of curve) and IP (intersection point) on the curves and observed the horizontal alignment.

#### 2) Longitudinal profile survey

Leveling survey was carried out along the centerline of existing road. It was observed with maximum interval 80 m and established temporary bench mark at every 500 m.

#### 3) Cross section survey

Leveling survey was carried out at every 100 m for cross section along the normal line to the centerline. The distance to be covered is 20 m each on both sides of the centerline. Every inclination points were observed, and the location of houses, side ditches, fence, etc. were noted on the field book and reflected on drawings.

#### 4) Drawings

Based on the result of route survey, it prepared drawings with scales as follows:

Plan 1/1000 with contour interval 1 m

Profile Vertical 1/100 Horizontal 1/1000

Cross Section 1/200

### 2. Plane Table Survey

Area around existing 13 bridges were observed by plane table survey with scale 1/200 and contour interval 1 m. The area to be covered was as follows:

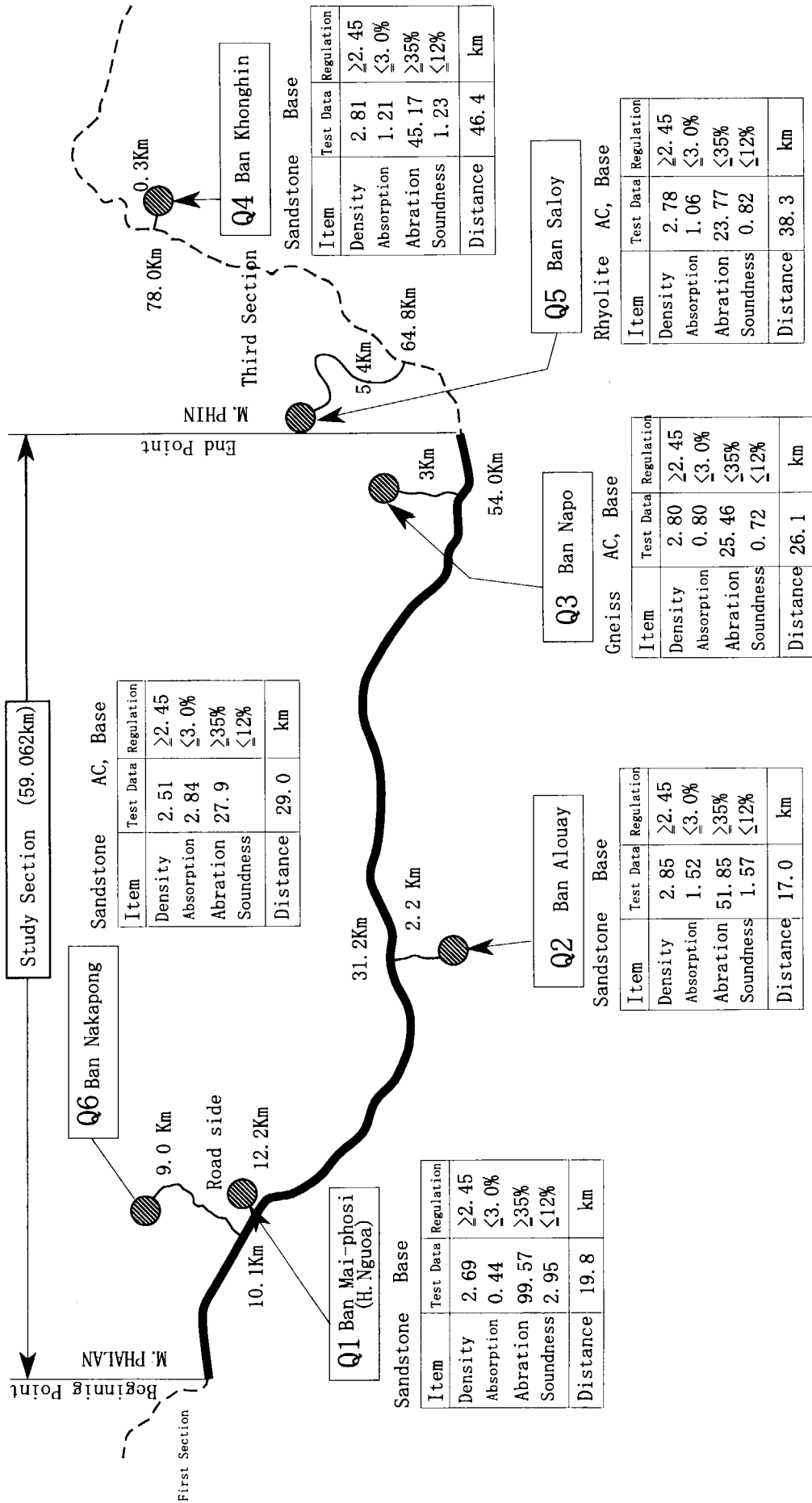
Length : Bridge length plus 20 m each on both sides from edges of bridge

Width : 25 m each on both sides of the centerline

**APPENDIX 10**

**GEOTECHNICAL SURVEY**





Candidate Quarries and Test Data

Table 10-1 Test Data for Sub-grade

Sample No.	Chainage	Classification	Atterberg Limits (%)		Specific Gravity	Sieve Analysis (%)							CBR	
			LL	PI		75	50	25	9.50	4.75	2.00	0.425		0.075
1	0 + 025	Clayey Sand	42.00	24.05	2.72			100	94.73	88.34	83.87	81.63	40.34	3.7
2	2 + 032	Clayey Sand	41.00	23.99	2.72			100	84.29	72.89	67.13	63.00	38.74	4.3
3	4 + 136	Clayey Sand	41.00	24.21	2.72			100	86.90	66.80	50.23	45.19	34.62	5.0
4	6 + 095	Clayey Sand	40.00	23.92	2.72			100	96.02	83.59	69.48	65.21	49.39	4.5
5	8 + 246	Clayey Sand	38.00	20.04	2.69		100	97.41	86.53	63.86	51.95	46.12	32.11	5.5
6	10 + 536	Clayey Sand	41.00	23.68	2.70			100	89.69	78.16	69.52	67.12	38.64	3.6
7	12 + 736	Clayey Sand	26.50	17.13	2.67			100	84.82	68.46	51.51	44.51	19.38	4.6
8	14 + 966	Clay with gravel	40.05	24.10	2.70		100	98.79	94.45	80.42	63.52	60.27	50.57	3.8
9	16 + 450	Clayey Sand	42.00	24.40	2.71			100	87.43	75.60	61.15	52.41	40.37	5.8
10	18 + 300	Clayey Sand	23.00	15.26	2.68			100	93.26	89.89	85.73	81.69	38.31	4.5
11	20 + 405	Clayey Sand	41.00	24.14	2.71			100	93.23	77.57	68.10	59.35	37.70	3.2
12	22 + 440	Clayey Sand	41.00	24.10	2.71			100	94.25	72.12	52.96	45.27	39.20	4.5
13	24 + 470	Clayey Sand	42.00	23.86	2.72			100	88.64	63.04	50.64	47.84	29.92	5.2
14	26 + 505	Clayey Sand	41.00	23.94	2.72			100	95.00	80.46	70.50	67.12	42.58	4.9
15	28 + 470	Clayey Sand	40.00	23.71	2.71			100	94.06	83.70	74.87	71.59	41.05	2.6
16	30 + 620	Clayey Sand	39.50	22.88	2.70			100	95.87	79.97	66.04	61.87	33.92	2.8
17	32 + 686	Clayey Sand	30.50	18.47	2.68			100	91.19	75.24	64.94	61.13	32.26	3.4
18	34 + 740	Clayey Sand	41.00	23.50	2.71			100	94.61	77.56	60.84	55.96	41.83	3.2
19	36 + 770	Clayey Sand	43.50	24.86	2.72			100	93.72	82.33	71.13	65.86	44.62	3.1
20	41 + 305	Clayey Gravel	40.00	24.12	2.70		100	68.53	44.83	35.94	29.41	25.41	22.93	3.8
21	43 + 440	Clayey Sand	43.00	24.07	2.72		100	98.96	96.93	89.42	74.05	67.43	46.22	3.6
22	45 + 355	Clayey Gravel	41.00	23.66	2.71			100	96.56	66.04	41.80	33.15	25.15	7.5
23	47 + 380	Clayey Gravel	41.50	24.47	2.72			100	86.48	59.83	36.79	29.27	20.51	6.3
24	49 + 450	Clayey Gravel	40.50	24.27	2.71		100	93.07	76.55	50.61	42.97	36.64	29.49	4.8
25	51 + 380	Clayey Sand	41.00	24.28	2.71			100	92.35	71.96	63.81	55.08	46.54	3.6
26	53 + 360	Clayey Sand	41.00	23.95	2.71		100	98.48	85.27	72.13	56.60	44.99	36.14	3.4
27	55 + 475	Organic Sand	42.00	25.79	2.71			100	92.59	78.88	64.60	58.01	45.74	3.2
28	57 + 520	Clayey Sand	41.00	24.92	2.71			100	83.12	65.16	52.33	47.31	35.92	2.8
29	59 + 560	Clayey Sand	40.00	23.07	2.72			100	90.95	87.92	84.49	79.79	44.32	3.8
30	61 + 135	Clayey Sand	42.00	23.95	2.72		100	95.91	88.56	75.22	52.98	42.95	36.12	4.4

**APPENDIX 11**

**TRAFFIC SURVEY**

## Traffic Survey

For satisfying the accuracy of a basic design, Traffic Survey was carried out to determine present traffic volume on the study section.

In accordance with the specification of this study, traffic count was carried out at 3 locations, which were Muang Phalan (Km 0 + 200), Xethamouk (Km 47 + 950) and Muang Phin (Km 60 + 300), on July 13 and 14, 2000. Observed vehicles were recorded on every 1 hour by direction and vehicle type in 12 hours on each days. Classification of vehicle is into 10 types as shown below.

- Passenger Car (include wagon and jeep)
- Pick-up Truck
- Mini Bus (include tuktuk and pick-up utilized for bus)
- Bus (include truck utilized for bus)
- Medium Truck (2 axle)
- Large Truck (More than 2 axle)
- Trailer
- Special Vehicle (Tractor, Construction equipment, etc.)
- Motor Bike
- Bicycle

The weather was rain on July 13 and cloudy/fine on July 14.

However, there was not much difference on traffic volume of each days and it satisfied the accuracy of this study.

The results of traffic count at 3 locations are shown in Table 11-1~3 respectively.

Table 11-1 Traffic Volume at Muang Phalan (Both direction, Ave. of 2 days)

No.	Vehicle Type	Traffic Volume / hour 6:00~18:00														Total	
		6:00~	7:00~	8:00~	9:00~	10:00~	11:00~	12:00~	13:00~	14:00~	15:00~	16:00~	17:00~	18:00~			
		7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00				
1	Passenger Car	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
2	Pick-up Truck	2	1	3	2	2	3	4	4	2	3	4	4	2	2	4	32
3	Mini Bus	3	3	6	8	4	2	4	2	4	2	4	4	3	3	2	47
4	Bus	0	1	0	2	0	1	2	2	0	1	2	0	1	1	0	10
5	Medium Truck	2	4	2	2	3	6	4	4	3	4	4	2	2	2	1	35
6	Large Truck	3	5	3	7	7	5	8	4	4	4	4	11	4	8	11	76
7	Trailer	4	4	1	4	2	7	4	4	4	4	4	4	7	6	8	55
8	Bicycle	36	60	30	39	41	19	18	13	20	9	15	15	15	19	19	319
9	Motor Bike	13	38	24	17	25	14	14	23	18	15	18	18	18	22	22	241
10	Special Vehicle	3	4	1	2	2	2	1	1	1	0	1	1	1	1	1	19
	Total	66	120	70	83	86	59	59	57	61	49	57	61	49	57	68	835

Table 11-2 Traffic Volume at Xethamouk (Both direction, Ave. of 2 days)

No.	Vehicle Type	Traffic Volume / hour 6:00~18:00														Total		
		6:00~ 7:00	7:00~ 8:00	8:00~ 9:00	9:00~ 10:00	10:00~ 11:00	11:00~ 12:00	12:00~ 13:00	13:00~ 14:00	14:00~ 15:00	15:00~ 16:00	16:00~ 17:00	17:00~ 18:00					
1	Passenger Car	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2
2	Pick-up Truck	2	1	1	1	1	3	3	2	2	3	2	3	2	2	2	5	32
3	Mini Bus	1	1	1	2	3	4	2	5	2	2	2	2	2	2	3	28	
4	Bus	1	1	1	1	1	1	1	0	2	1	0	2	2	0	1	13	
5	Medium Truck	1	0	2	2	2	2	1	1	0	0	0	4	3	5	5	27	
6	Large Truck	3	4	2	0	1	2	2	1	1	2	1	1	3	6	5	32	
7	Trailer	2	1	3	4	1	5	0	1	1	0	0	0	4	9	2	32	
8	Bicycle	74	71	52	42	28	26	33	33	33	33	33	33	32	50	54	528	
9	Motor Bike	18	33	19	23	18	19	23	18	20	26	25	22	22	3	6	264	
10	Special Vehicle	1	4	1	3	1	1	1	1	0	0	0	0	0	3	6	22	
	Total	103	116	82	79	56	72	66	61	66	74	102	103	980				

Table 11-3 Traffic Volume at Muang Phin (Both direction, Ave. of 2 days)

No.	Vehicle Type	Traffic Volume / hour 6:00~18:00														Total	
		6:00~ 7:00	7:00~ 8:00	8:00~ 9:00	9:00~ 10:00	10:00~ 11:00	11:00~ 12:00	12:00~ 13:00	13:00~ 14:00	14:00~ 15:00	15:00~ 16:00	16:00~ 17:00	17:00~ 18:00				
1	Passenger Car	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2
2	Pick-up Truck	1	5	3	3	5	3	1	2	2	1	2	6	5	5	8	47
3	Mini Bus	1	1	2	2	3	6	2	6	6	2	6	4	1	4	0	32
4	Bus	0	1	1	2	1	1	1	1	1	1	1	0	3	2	1	14
5	Medium Truck	2	2	1	1	0	3	2	2	3	2	2	3	4	5	9	34
6	Large Truck	7	3	1	1	2	1	1	1	1	1	1	0	2	4	4	27
7	Trailer	2	1	4	3	3	1	3	1	1	3	1	1	9	2	6	36
8	Bicycle	44	49	41	23	21	21	20	21	21	20	21	17	16	32	30	335
9	Motor Bike	39	41	43	38	32	31	27	27	31	27	27	38	36	44	30	426
10	Special Vehicle	0	3	1	0	0	0	3	1	0	3	1	1	2	1	1	13
	Total	96	106	98	73	67	67	60	62	71	78	99	89	966			

## **APPENDIX 12**

### **UXO SEARCH**



## UXO Search

In order to ensure the safety precautions at project site, UXO search aims at finding out remaining UXO, which shall be removed by Lao side, before the construction of this project.

### 1. Stage 1

#### a) Desk Top Review

On the desk top review, study section (60 km) was divided into 40 sections and Readings of Fragment/Scrap on every 50 m<sup>2</sup> were analyzed. Readings of Fragment/Scrap on each sections were shown 2~39. The records of past and present were also investigated carefully. Based on the results, it was presumed that many UXO are lying at sections between KM 0 km~KM 10 km and KM 45 km~KM 60 km.

#### b) Safety Support and Search

The Safety Support was carried out to ensure the safety during the site survey by the team. During site survey, UXO search was carried out on topographic survey route and bridge site, by search equipment, and the areas where UXO were discovered was clearly indicated with red tape. For the excavation and piling deeper than 30 cm during survey and pitting, deep search was carried out. During safety support, a total of 15 unexploded bombs were discovered at 8 locations.

Safety Support was also carried out at 5 locations of proposed quarry and its access road for the investigation and sampling. Discovered was some fragments of bomb only.

#### c) Sampling

Sampling Search including determining degree of metallic content and conditions of vegetation was carried out to determine the degree of contamination of UXO on the project site, and the search was planned on Stage 2. Sampling area is approximately 2 % of project site and is 100 m<sup>2</sup>, where length is 2 m and width is 25 m each on both sides of centerline, at every 100 m along road.

First, it cuts vegetation to use search equipment effectively, then shallow search is done by metallic detector. Secondly, deep search is done by magneto meter. During sampling search, total 68 unexploded bombs were discovered.

## 2. Stage 2

Based on the result of stage 1, the area and specification for search work on Stage 2 was determined.

### Procedure

- 1) Detection : To remove obstacles on the ground and search for UXO by metallic detector and magnetometer.
- 2) Excavation & Confirmation : To excavate the point where reactions are observed on detection and confirm whether reaction is due to UXO or scrap. If it is UXO, it shall be indicated by red pile and red tape.
- 3) Clearance : To remove and dispose for being harmless (to be executed by Lao side)

Search area was 44.9 ha with 7.4 m~10.4 m in width around detours which will be constructed in the project. For the remaining area, UXO search shall be carried out during construction, and it is estimated at 133.8 ha.

Area of UXO search carried out in Stage 2 is shown in Figure 12-1.

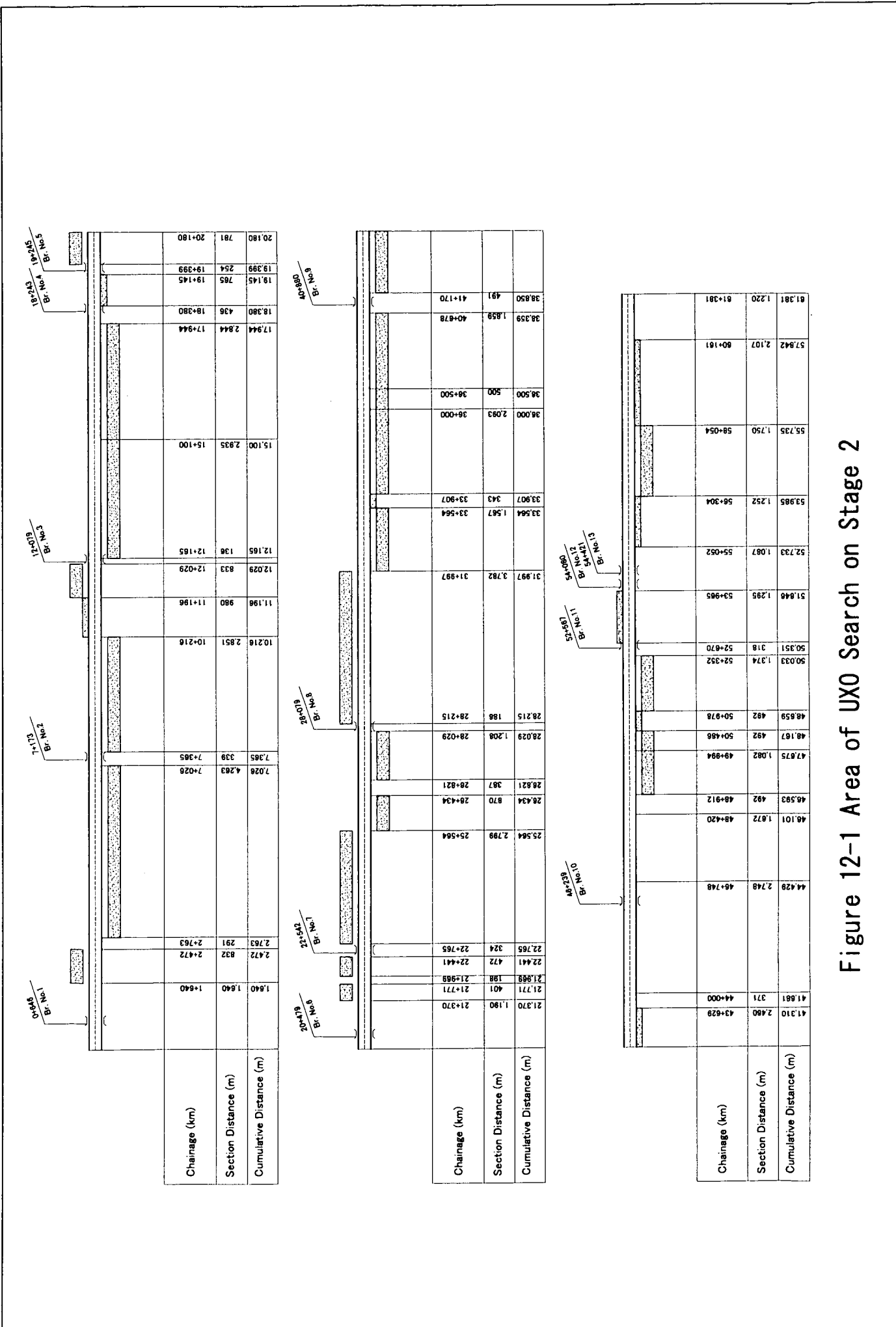


Figure 12-1 Area of UX0 Search on Stage 2