

Chapter 3 Project Evaluation and Recommendations

3 - 1 Project Effect

(1) Present Situation and Existing Issues

Laos has been affected so far by severe meteorological phenomena such as heavy rain, wind gust, thunderstorm caused by typhoon or monsoon, all of which cause tremendous amount of damage in various areas in Laos. The extensive losses from disastrous weather conditions are the determining factor for significant set-back of national economy and development activities of Laos.

In addition, 5 air crash accidents occurred during the last 20 years in the surrounding areas of Vientiane and they gave great losses including casualties to the country and created a decline in the reliability on safe operation of the civil aviation and several cases that aircrafts returned near Vientiane back to the place of departure due to severe weather conditions have occurred every year. Since Laos is a landlocked country, the air transport is a major mean of transport to have access to each province and the neighboring countries.

In order to prevent and mitigate meteorological disasters and air-traffic accidents by severe weather conditions, it is necessary to instantaneously predict severe weather condition and to inform its occurrence to the public and the relevant governmental agencies with disaster management. For prompt issuance of precise forecasts and warnings regarding heavy rain and torrential rain in various areas in Laos and air-turbulence in the surrounding areas of Vientiane International Airport, establishment of the disastrous weather monitoring structure in Laos to match with people's demand is urgently required.

(2) Effects of the Project

Expectable effects of the Project are as follows.

1) Direct Effects

[1] Improvement of capability and precision for monitoring of meteorological phenomena

- Improvement of capability for rainfall monitoring in a part of Northern area and Central area of Laos which receives the largest volume of precipitation in the

Mekong River basin such as spatial resolution from 115km to 2.5km mesh and time resolution from 3 hours to 10 minutes intervals will be actualized.

- Number of weather monitoring in the whole country will be increased from every 3 hours to every hour.
- Capability for air turbulence monitoring for Vientiane International Airport will be improved from visual observation as subjective observation in the area of 20km to radar observation as objective observation in the area of 250km surrounding Vientiane International Airport.

[2] Increase of issuance frequency of weather forecasts, warnings and disaster information

- Weather and flood forecasts and warnings will be promptly and timely announced and issuance number of forecasts and warnings will be increased more than the present number of issuance time (presently once or twice a day).
- Deliver of severe weather information in the surrounding area of Vientiane International Airport to the airport officials in real time will be possible.

[3] Contribution to disaster management

- In order to provide longer leading time for the public and the governmental officials concerned with disaster management for contributing implementation of effective disaster mitigation, prediction of the river water level for 1 - 3 days will be possible.

[4] Establishment of precipitation database for agriculture

- Establishment of detailed precipitation database for agricultural irrigation and cultivation will be possible.

2) Indirect Effects

[1] Accumulation of information data on meteorological phenomena and meteorological disaster

- Accumulation of accurate and detailed data on disastrous weather conditions in Laos in chronological order will be possible. More in-depth researches to increase the level of understanding/knowledge about relationship between meteorological phenomena and meteorological disaster will be conducted for exploring future disaster management.

[2] Collaboration with Mekong River Commission: MRC

- Due to transfer of the headquarters of MRC from Cambodia to Laos in 2004, it is anticipated the further strengthening of the collaboration between MRC and DMH on exchange of observed/predicted data in meteorological and hydrological sectors.

Effects of the Project

Present Situation and Existing Issue	Remedial Measures under the Project	Positive Effects and Degree of Improvement
Unable to provide the accurate public information (observed data, forecasts and warnings) on heavy rain and torrential rain generated in and spread out from the Central area that is a very heavy rainfall area of Laos (annually more than 3,000mm rainfall).	Construction of the radar tower building. Installation of the meteorological doppler radar system and the meteorological satellite data receiving system.	To enable real time monitoring for cloud movements in the whole areas of Laos and the neighboring countries by the meteorological satellite data receiving system and fine spatial and timely observation for severe weather conditions around Vientiane as the capital city having the international airport receiving frequent heavy rainfall by the meteorological radar system, then quantitative observation data in real time will be obtained.
Unable to implement advance dissemination of information on possibility of occurring meteorological disaster to the residents and the government officials	Construction of the radar tower building. Installation of the meteorological radar and meteorological satellite data display systems at the weather observation and forecasting room in the radar tower building.	To enable precise forecasting for heavy rain, flood, turbulence, etc. and also timely and precise issuance of meteorological and hydrological forecasts and warnings to the government officials concerned with disaster management.
Unable to monitor air-turbulence (wind-shear, down-burst) in the surrounding area of Vientiane International Airport necessary for safe operation of the aircrafts. Currently visual observation as subjective observation in the area of 20km surrounding Vientiane International Airport is implemented.	Construction of the radar tower building. Installation of the meteorological radar and meteorological satellite data display systems at the meteorological office, the area control center and the flight control room in the control tower, Vientiane International Airport.	To enable monitoring of severe weather condition in the area of 250km surrounding Vientiane International Airport by the meteorological doppler radar system as objective observation.
Unable to provide authentic information on disastrous weather conditions in the surrounding area of the airport for air-crafts in landing and take off being vulnerable to air-turbulence	Installation of the meteorological radar and meteorological satellite data display system at the meteorological office, the area control center and the flight control room in the control tower, Vientiane International Airport.	To enable real time deliver of severe weather warnings to the airport officials.

3) Synergy Effects with Activities of Mekong River Commission (MRC)

As MRC Secretariat will move from Phnom Penh to Vientiane this year, it is expected that the relationship between DMH and MRC on exchange of meteorological and hydrological observation/forecasting data will be enhanced more.

Products of the weather radar system to be supplied in this Project observing high-resolution rainfall distribution around the central part of Laos would be an input for basin modeling tools such as flood prediction of the lower Mekong River basin and contribute to monitoring water use, developing basin development plans, etc.

The following diagram shows expected synergy effects with MRC.

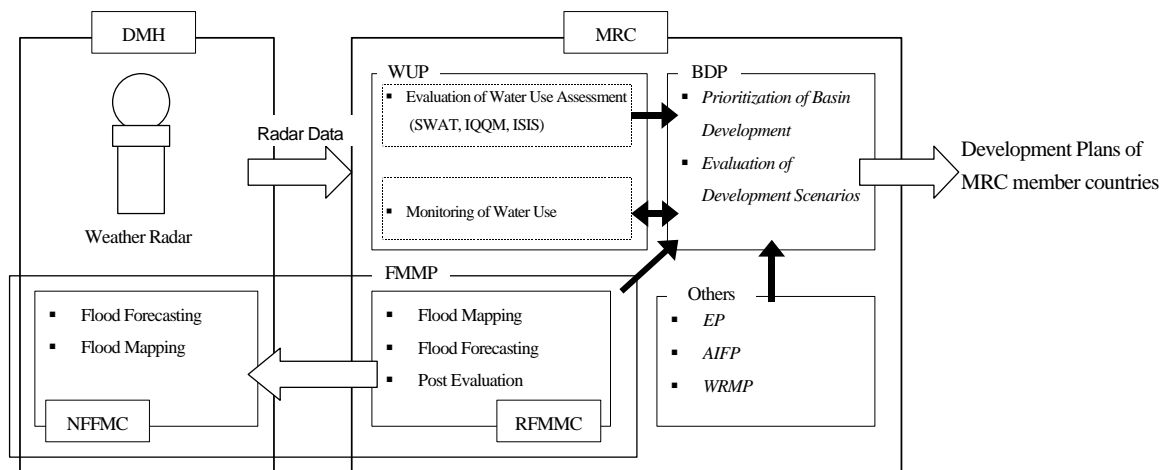


Diagram of expected synergy effects with MRC

(3) Achievement Indicator of the Project

As a consequence of the basic design study, the existing issue in Laos has been identified as “precise meteorological and hydrological forecasts and warnings are not timely issued for utilization of disaster management”. To solve the existing issue, enhancement of the meteorological monitoring capability is the immediate top priority and it is necessary to improve accuracy of meteorological forecasts and warning using observed data obtained by the enhanced monitoring. According necessity of the solution, it has been set specific targets for achievement in the Project as follows.

Achievement Indicator

Summary		Present (Base Line)	Target	Expected Achievement Time
Enhancement of Monitoring Capability	Enhancement of capability for rainfall monitoring in a part of Northern area and Central area of Laos (in Central area along the course of Mekong River) located in the radar coverage area	Spatial Resolution of 115km mesh Time Resolution at intervals of 3 hours	Spatial Resolution of 2.5km mesh Time Resolution at intervals of 10 minutes	At the completion of the Project
	Increase of number of weather monitoring in the whole country	Every 3 hours	Every hour	At the completion of the Project
	Enhancement of capability for air turbulence monitoring around Vientiane International Airport	Visual observation as subjective observation in the area of 20km surrounding Vientiane International Airport	Radar observation as objective observation in the area of 250km surrounding Vientiane International Airport	After 1 year from the completion of the Project
Upgrade of Forecast/Warning	Increase of issuance number of forecasts/warnings during severe weather conditions	1-2 times/day	Prompt and timely provision More than the present	After 2 years from the completion of the Project
	Issuance of aerodrome severe weather warnings at Vientiane International Airport	No activity	Issuance of warning in real time	After 2 years from the completion of the Project
	Extension of lead-time of flood forecasting for Mekong River mainstream during rainy season	For 1 day (tomorrow)	For 3 days	After 2 years from the completion of the Project

(4) Population to be benefited by the Implementation of the Project

Due to real time monitoring for cloud movements in the whole areas of Laos and the neighboring countries by the meteorological satellite data receiving system and fine spatial observation for severe weather conditions such as air-turbulence, heavy rain, thunderstorm, etc. around Vientiane, quantitative observation data in real time can be obtained to know what & when & where dangerous weather conditions occur. The information regarding the severe weather conditions can be delivered to the whole nation of Laos and the governmental agencies concerned with disaster management through the existing national networks of DMH and the governmental administration and the mass medias. Therefore, the number of population to be benefited by the implementation of the Project is the whole nation of Laos (the population of Laos in 2001: 5,377,000). The number of population in the lower Mekong River basin to be benefited by the synergy effects with MRC is approximately 60 million.

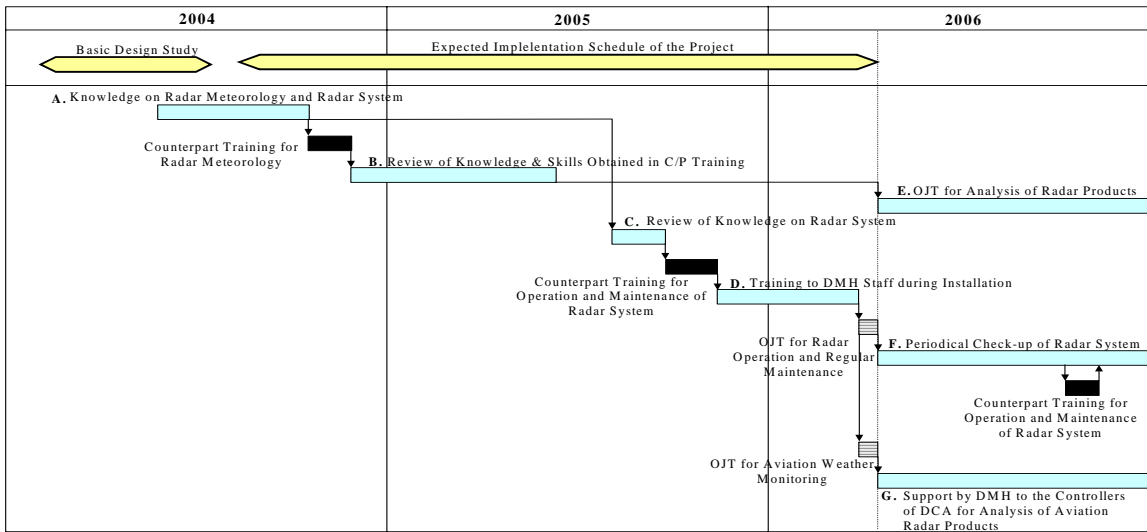
3 - 2 Recommendations

The Project is expected to produce the considerable benefits as mentioned above. After the implementation of the Project, the government monitoring structure for meteorological disasters will be dramatically bolstered due to constant monitoring for severe weather conditions by the meteorological radar system and the meteorological satellite data receiving system to be established under the Project. In order for further acceleration of generating the Project's effects, the following recommendations should be utilized.

- a) To develop more qualified technical personnel.
- b) To secure necessary financial measures for appropriate operation & maintenance and also procurement of spare parts & consumables for the whole equipment to be supplied under the Project.
- c) To take appropriate measures against any damage and disappearance of the equipment.
- d) To make very close communication and association with the governmental agencies and international institutions as the governmental organization obtained a special obligation of mitigation of the meteorological disaster.
- e) To disseminate the information on hazardous weather condition more speedily and accurately to the general public, the governmental agencies and other organizations concerned with meteorological disaster mitigation.
- f) To conduct research to increase the level of understanding/knowledge about the meteorological disaster and its mechanism along with other related meteorological phenomena.
- g) To widely diffuse knowledge and information on disaster-prevention activities.

For effective utilization of the meteorological radar system for meteorological observation and forecasting works to be implemented by DMH, technical training and technology transfer are required for the staff of DMH. The technical training and support on radar meteorology and operation and maintenance of the meteorological radar system in Japan associated with DMH's own training are quite useful for extending and improving the knowledge, the technical skill and the ability of DMH. The following training schedule has been prepared based on the point of view described above.

Tentative Schedule of Training Programs



- Training to be Conducted by DMH in Laos
- Counterpart Training to be provided by Japanese side in Japan
- On-the-job Training to be provided by Japanese side in Laos

Appendix 1. Member List of the Survey Team

(1) Basic Design Survey Team

Mr. Akira OKUYAMA	Team Leader	Director, Fourth Project Management Division, Grant Aid Management Department, Japan International Cooperation Agency (JICA)
Mr. Masahisa KIMATA	Technical Advisor	Observation Division, Observation Department, Japan Meteorological Agency (JMA)
Mr. Katsuya KUGE	Project Coordinator	Fourth Project Management Division, Grant Aid Management Department, Japan International Cooperation Agency (JICA)
Mr. Takehiko FURUKAWA	Project Manager / Disaster Prevention Planning	Japan Weather Association
Mr. Hiroaki MIZUKAMI	Weather Monitoring / Data Transmission System Planning	Japan Weather Association
Mr. Yoshihisa UCHIDA	Weather Radar Design / Facility Design	Japan Weather Association
Mr. Teruaki HIRAOKA	Procurement Planning / Quantity Survey	Kume Sekkei Co., Ltd.
Mr. Kenji MORI	Project Manager Assistant	Japan Weather Association

(2) Second Basic Design Survey Team

Mr. Hidetaka NISHIWAKI Team Leader

Resident Representative
JICA Laos Office

Mr. Takehiko FURUKAWA

Project Manager / Disaster Prevention Planning
Japan Weather Association

Mr. Hiroaki MIZUKAMI

Weather Monitoring / Data Transmission System Planning
Japan Weather Association

Mr. Yoshihisa UCHIDA

Weather Radar Design / Facility Design
Japan Weather Association

Appendix 2. Study Schedule

(1) Basic Design Study

Study Schedule	Governmental Member			Consultant Member				
	Mr. Akira OKUYAMA Team Leader	Mr. Yoshihisa KIMATA Technical Advisor	Mr. Katsuya KUGE Project Coordinator	Mr. Takehiko FURUKAWA Project Manager / Disaster Prevention Planning	Mr. Hiroaki MIZUKAMI Weather Monitoring / Data Transmission System Planning	Mr. Yoshihisa UCHIDA Weather Radar Design / Facility Design	Mr. Teruaki HIRAOKA Procurement Planning / Quantify Survey	Mr. Kenji MORI Project Manager Assistant
2004								
1	15 Feb. Sun				Narita-Bangkok (JL717, 10:55-15:55)			
2	16 Feb. Mon				Bangkok-Vientiane (TG690, 08:15-09:25) Courtesy call on JICA and DMH			
3	17 Feb. Tue				Discussion with DMH, Discussion with MAF, Site Survey at DMH Head Office			
4	18 Feb. Wed				Discussion with DMH, Site Survey at DMH Head Office			
5	19 Feb. Thu				Visit to NDMO and LAMC, Meeting with DCA, Meeting with DMH, Site Survey at DMH Head Office and Vientiane International Airport			
6	20 Feb. Fri				Meeting with DMH, Data Collection, Report to JICA		Narita-Bangkok (JL717, 10:55-15:55)	
7	21 Feb. Sat				Internal Meeting		Bangkok-Vientiane (TG690, 08:15-09:25) Internal Meeting	
8	22 Feb. Sun				Narita-Bangkok (JL717, 10:55-15:55)			
9	23 Feb. Mon				Bangkok-Vientiane (TG690, 08:15-09:25) Courtesy call on Embassy of Japan and JICA, Meeting with DIC			
10	24 Feb. Tue				Meeting with MAF, Meeting with DMH, Meeting with DCA		Data Collection	
11	25 Feb. Wed				Meeting with DMH Meeting with Department of International Cooperation and Ministry of Finance		Data Collection	
12	26 Feb. Thu				Meeting with DIC, Meeting with DMH		Data Collection	
13	27 Feb. Fri				Signing on Minutes of Discussions Report to Embassy of Japan, JICA		Signing on Minutes of Discussions Data Collection	
14	28 Feb. Sat				Vientiane-Bangkok (TG691, 10:30-11:35) Narita (JL718, 22:30-06:10)		Internal Meeting, Data Collection	
15	29 Feb. Sun				Narita (06:10)		Internal Meeting	
16	1 Mar. Mon						Discussion with DMH, Data Collection Visit to NDMO	Narita-Bangkok (JL717, 10:55-15:55)
17	2 Mar. Tue						Discussion with DMH, Data Collection Discussion with DMH, Data Collection Survey at DCA	Bangkok-Vientiane (TG690, 08:15-09:25) Survey at DCA
18	3 Mar. Wed						Discussion with DMH, Data Collection	
19	4 Mar. Thu						Discussion with DMH, Visit to ETL Data Collection	Data Collection
20	5 Mar. Fri						Report to JICA Discussion with DMH, Survey at International Airport	Report to JICA Survey at DMH, Survey at International Airport

Appendix 2. Study Schedule

Study Schedule	Governmental Member			Consultant Member				
	Mr. Akira OKUYAMA Team Leader	Mr. Yoshihisa KIMATA Technical Advisor	Mr. Katsuya KUGE Project Coordinator	Mr. Takehiko FURUKAWA Project Manager / Disaster Prevention Planning	Mr. Hiroaki MIZUKAMI Weather Monitoring / Data Transmission System Planning	Mr. Yoshihisa UCHIDA Weather Radar Design / Facility Design	Mr. Teruaki HIRAKOKA Procurement Planning / Quantity Survey	Mr. Kenji MORI Project Manager Assistant
2004								
21	Sat				Internal Meeting			
22	Sun				Internal Meeting			
23	Mon				Discussion with DMH, Data Collection			
24	Tue				Discussion with DMH Data Collection Report to JICA	Visit to EDL Survey at DCA Data Collection Report to JICA	Data Collection Report to JICA	Data Collection Survey at DCA Report to JICA
25	Wed				Discussion with DMH Data Collection	Discussion with DMH Discussion with DCA Data Collection	Data Collection	Data Collection
26	Thu					Vientiane-Bangkok (TG691, 10:30-11:35), Data Collection		Discussion with DMH, Data Collection
27	Fri				Data Collection	Visit to Thai Meteorological Department, Data Collection	Data Collection	Discussion with DMH, Data Collection
28	Sat					Internal Meeting, Data Collection		Data Collection
29	Sun					Internal Meeting, Data Collection		Vientiane-Bangkok (TG691, 10:30-11:35)
30	Mon					Bangkok-Narita (JL708, 08:30-16:10)		

DMH: Department of Meteorology and Hydrology
DCA: Department of Civil Aviation
MAF: Ministry of Agriculture and Forestry
DIC: Department of International Cooperation

LNMC: Lao National Mekong Committee
NDMO: National Disaster Management Office
MCTPC: Ministry of Communication, Transportation, Post and Construction
VUDAA: Vientiane Urban Development and Administration Authority

ETL: Enterprise Telecommunication Laos
EDL: Electricite du Laos

Appendix 2. Study Schedule

(2) Explanation of Draft Report

Study Schedule	Governmental Member		Consultant Member	
	Mr. Hidetaka NISHIWAKI	Mr. Takehiko FURUKAWA	Mr. Hiroaki MIZUKAMI	Mr. Yoshihisa UCHIDA
2004年				
1 28 May. Fri	Team Leader	Project Manager / Disaster Prevention Planning	Weather Monitoring / Data Transmission System Planning	Weather Radar Design / Facility Design
2 29 May. Sat			Narita-Bangkok (JL717 11:00-15:30)	
3 30 May. Sun			Bangkok-Vientiane (TG690 08:20-09:30)	
4 31 May. Mon			Internal Meeting	
5 1 Jun. Tue			Courtesy call on Embassy of Japan, JICA and DIC	
6 2 Jun. Wed			Discussion with JICA, DMH and DCA, Explanation of Draft Report to DMH and DCA	
7 3 Jun. Thu			Explanation of Draft Report to DMH	
8 4 Jun. Fri			Courtesy call on MAF, Discussion with VUDAA, Explanation of Draft Report and Discussion with DMH	
9 5 Jun. Sat			Explanation of Draft Report to DMH	
10 6 Jun. Sun			Signature on M/D Report to JICA	
			Vientiane-Bangkok (TG691 10:30-11:35)	
			Bangkok - Narita (JL708 08:35-16:35)	

DMH: Department of Meteorology and Hydrology

DCA: Department of Civil Aviation

MAF: Ministry of Agriculture and Forestry

DIC: Department of International Cooperation

LNMC: Lao National Mekong Committee

NDMO: National Disaster Management Office

MCTPC: Ministry of Communication, Transportation, Post and Construction

VUDAA: Vientiane Urban Development and Administration Authority

Appendix 3. List of Party Concerned in the Recipient Country

Laos

- **Lao National Mekong Committee (LNMCS)**

Mr. Vongdara KEOMUONGCHANHE Deputy Director General of LNMCS

- **Ministry of Foreign Affairs**

Department of International Cooperation

Prof. Dr. Bountheuang MOUNLASY Director General

- **Ministry of Labour and Social Welfare**

National Disaster Management Office (NDMO)

Mr. Phetsavang SOUNNALATH Director

Mr. Thonephkham INTHASONE LUDMP Coordinator

- **Ministry of Agriculture and Forestry**

Dr. Phouang Parisak Pravongviengkham Permanent Secretary

Permanent Secretary Office, Division of International Cooperation & Investment

Mr. Phommy INTCHACK Program Officer, Asia Pacific and Africa Desk

Department of Meteorology and Hydrology

Mr. Nitharath SOMSANITH Director General

Mr. Pheng PIENGPANYA Deputy Director General

Mr. Singthong PATHOUMMADY Director of Meteorological Network and Agro-meteorology Division

Mr. Khanmany KHOUNPHONH	Director of Technical Division
Mr. Sithanh SOUTHICHAK	Director of Weather Forecasting and Aero-meteorological Division
Ms. Buagneun OUDOMCHITH	Director of Climate Division
Ms. Souvanny PHONEVILAY	Deputy Director of Weather Forecasting and Aero-meteorological Division
Mr. Nene PONGKHAMXAO	Deputy Director of Administration Division
Mr. Bouchoum KONEMIXAY	Technical Staff, Technical Division
Mr. Bounteum SISOUPHANTHAVONG	Staff of Weather Forecasting and Aero-meteorological Division
Mr. Somboun PONGKHAMSAO	Staff of Weather Forecasting and Aero-meteorological Division
Mr. Somphanh VITHAYA	Chief of Flood Forecasting Unit
Mr. Somphavanh SITTIPHONG	Chief of Instrument Maintenance Unit
Mr. Saleumsack Sidavong	Staff of Meteorological Network and Agro-meteorology Division
Dr. Palikone THALONGSENGCHANH	Technician, Flood Forecasting Unit

- **Ministry of Communication, Transportation, Post and Construction (MCTPC)**

Department of Housing and Urban Planning

Dr. Sengthusng VANGKEOMARY	Chief of Housing and Urban Planning, Housing Division
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Department of Civil Aviation of LAO PDR

Mr. Kaykeo VORARATH	Deputy Director General, Director of Airport Authority
Mr. Vanpheng CHANTHAPHONE	Deputy Project Director, Airport Improvement Project (Airport Engineer)

Lao Airport Authority

Mr. Symoon BOUNTAENG	Chief of Vientiane Area Control Center, Airport Authority
Mr. Sithideth SAVANMANOTHAY	Chief of Navigation

Department of Telecommunication

Mr. Somlith PHOUTHONESY	Deputy Director General
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• **Vientiane Prefecture**

Vientiane Urban Development and Administration Authority (VUDAA)

Mr. Bounpakob PHONHARATH	Chief of Technical & Town Planning Division
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• **Electricite du Laos**

Mr. Khamphone SAIGNASANE	Deputy General Manager
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Thailand

• **Thai Meteorological Department**

Mr. Anant THENSATHIT	Director General
Mr. Amorn CHANTANAVIVATE	Director of Forecasting Division

Appendix 4. Minutes of Discussion

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
ON
THE PROJECT FOR ESTABLISHMENT OF DISASTROUS WEATHER MONITORING
FOR SAFE KEEPING OPERATION IN VIENTIANE
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC

Based on the results of the Preparatory Study, the Government of Japan decided to conduct a Basic Design Study on the Project for Establishment of Disastrous Weather Monitoring for Safe Keeping Operation in Vientiane (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Lao People's Democratic Republic (hereinafter referred to as "Laos") the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Akira OKUYAMA, Director, Fourth Project Management Division, Grant Aid Management Department, JICA, and is scheduled to stay in the country from 16 February to 14 March, 2004.

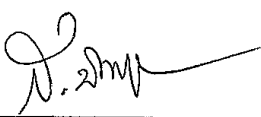
The Team held discussions with the officials concerned of the Government of Laos and conducted a field survey at the study area.

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

Vientiane, 27 February, 2004

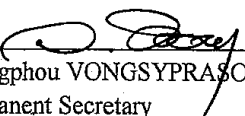


Akira OKUYAMA
Leader
Basic Design Study Team
Japan International Cooperation Agency
Japan



Nitharath SOMSANITH
Director General
Department of Meteorology and Hydrology
Lao People's Democratic Republic

WITNESS



Thongphou VONGSYPRASOM
Permanent Secretary
Ministry of Agriculture and Forestry
Lao People's Democratic Republic

ATTACHMENT

1. Objective of the Project

The main objective of the Project is to contribute to the safe operation of the capital city by strengthening the disastrous weather monitoring capabilities and providing more accurate hazardous weather information. The Project also contributes to the safe operation of the civil aviation.

2. Project site

The sites of the Project are located in follows

- 2-1 Head office of the Department of Meteorology and Hydrology (hereinafter referred to as "the DMH"), Ministry of Agriculture and Forestry (hereinafter referred to as "the MAF") in Vientiane
- 2-2 Control tower at Vientiane International Airport, Department of Civil Aviation (hereinafter referred to as "the DCA"), Ministry of Communications, Transport, Posts and Construction

3. 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 Laos as explained by the Team and described in Annex-1.

4. Responsible and Implementing Agency

The responsible and implementing agency is the DMH.

5. Administration of the Project

5-1 The Lao side shall set up the Steering Committee (hereinafter referred to as "the SC") for the coordination, guidance and supervision for the smooth implementation of the Project. The SC consists of the representatives of following ministries/agencies.

<Chairman>

- Permanent Secretary Office, the MAF

<Member>

- the DMH (Member/Secretary)
- the DCA
- Department of International Cooperation, Ministry of Foreign Affairs
- Department of Public Investment Program, Committee for Planning and Cooperation



<Observer/Adviser>

- Embassy of Japan
- JICA

5-2 The Lao side shall conclude Minutes of Understanding (hereinafter referred to as "the MOU") between the DMH and the DCA, which confirms the task sharing of their undertakings as shown in Annex-2.

5-3 The Lao side will take the necessary measures according to the MOU, as described in Annex-2, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Items requested by the Government of Laos

The Government of Laos requested items as follows and Annex-3, and explained necessity of above mentioned items.

- Radar system -
antenna, radome, other radar equipment, radar imagery display equipment,
power supply equipment, radar tower building
- Meteorological Satellite Data Acquisition System (MTSAT of Japan) -
antenna, data ingestion and display equipment, other necessary equipment
- Data Communication System between the DMH Head Office and the control tower at
Vientiane International Airport -
antenna, data communication equipment, other necessary equipment

7. Schedule of the Study

7-1 The consultants will proceed to further studies in Laos until 14 March, 2004.

7-2 JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around May, 2004.

7-3 In case that the contents of the report is accepted in principle by the Government of Laos, JICA will complete the final report and send it to the Government of Laos approximately by August, 2004.

8. Other relevant issues

8-1 The Lao side explained the basic operation plan of the meteorological radar system as follows.

<Rainfall Monitoring Purpose>

(1) From November to March

20 minutes per 3 hours

(2) In June and October

20 minutes per 1 hour

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slz

(3) In April, May, July and September

20 minutes per 30 minutes

(4) In August

24 hours a day

<Aviation Weather Purpose>

20 minutes every aircraft takeoff and landing on the Vientiane International Airport

8-2 The team explained the minimum estimation cost of the operation and maintenance for the meteorological radar system, as shown in Annex-4. And the Lao side promised to allocate the necessary budget and personnel for operation and maintenance of the facilities and equipment, as certified by the Official Letter No.0253, dated 4 April, 2003, signed by Minister, the MAF, as shown in Annex-5.

8-3 The Lao side requested the following technical training courses by JICA for DMH staff to promote further results of the Project. The team promised to consider the necessity of the technical training in Japan.

(1) radar meteorology

(2) operation and maintenance of radar system

(3) aviation weather monitoring

8-4 Both sides agreed that the DMH would enable the weather information obtained by the meteorological radar system and MTSAT to provide to any users such as Japan, WMO, Mekong River Commission and so on to promote safety of neighboring counties for natural disaster.

8-5 The Lao side agreed that the DMH would improve the distribution methods, such as homepage on web site and mass media, of weather forecast and warning to Lao people for mitigation of the national disasters.

8-6 The Lao side agreed that the DCA would be responsible for the operation and maintenance of the equipment installed at control tower of the Vientiane International Airport.

8-7 The Lao side shall ensure not to construct any building and facility higher than the meteorological radar antenna to keep its appropriate radar observation.

8-8 The Lao side explained that the DMH would consider generating income for cost recovering by providing the meteorological and hydrological data to any users such as private sectors, research institutes and so on.

JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedure

1) Japan's Grant Aid Program is executed through the following procedures.

Application (Request made by a recipient country)

Study (Basic Design Study conducted by JICA)

Appraisal & Approval (Appraisal by the Government of Japan and Approval by Cabinet)

Determination of Implementation (The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request. If necessary, JICA send a Preliminary Study Team to the recipient country to confirm the contents of the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

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

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.



2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project"), is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

- a) confirmation of the background, objectives and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation;
- b) evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;
- c) confirmation of items agreed on by both parties concerning the basic concept of the Project;
- d) preparation of a basic design of the Project; and
- e) estimation of costs of 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 through 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) Selection of Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participates the Study and prepares a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to

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maintain the technical consistency between the Basic Design and Detailed Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant" means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and 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 one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

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

However, the prime contractors, namely consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

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

- 6) Undertakings required to the Government of the recipient country
 - a) to secure a lot of land necessary for the construction of the Project and to clear the site;
 - b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;
 - c) to ensure prompt unloading and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid;
 - d) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts;
 - e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work;
 - f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Project; and
 - g) to bear all the expenses, other than those covered by the Grant Aid, necessary for the Project.

- 7) "Proper Use"

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

- 8) "Re-export"

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

- 9) Banking Arrangement (B/A)
 - a) The Government of the recipient country or its designated authority should open an

account in the name of the Government of the recipient country in an authorized foreign exchange 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 the Government of the recipient country or its designated authority under the verified contracts.

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 recipient country or its designated authority.

9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

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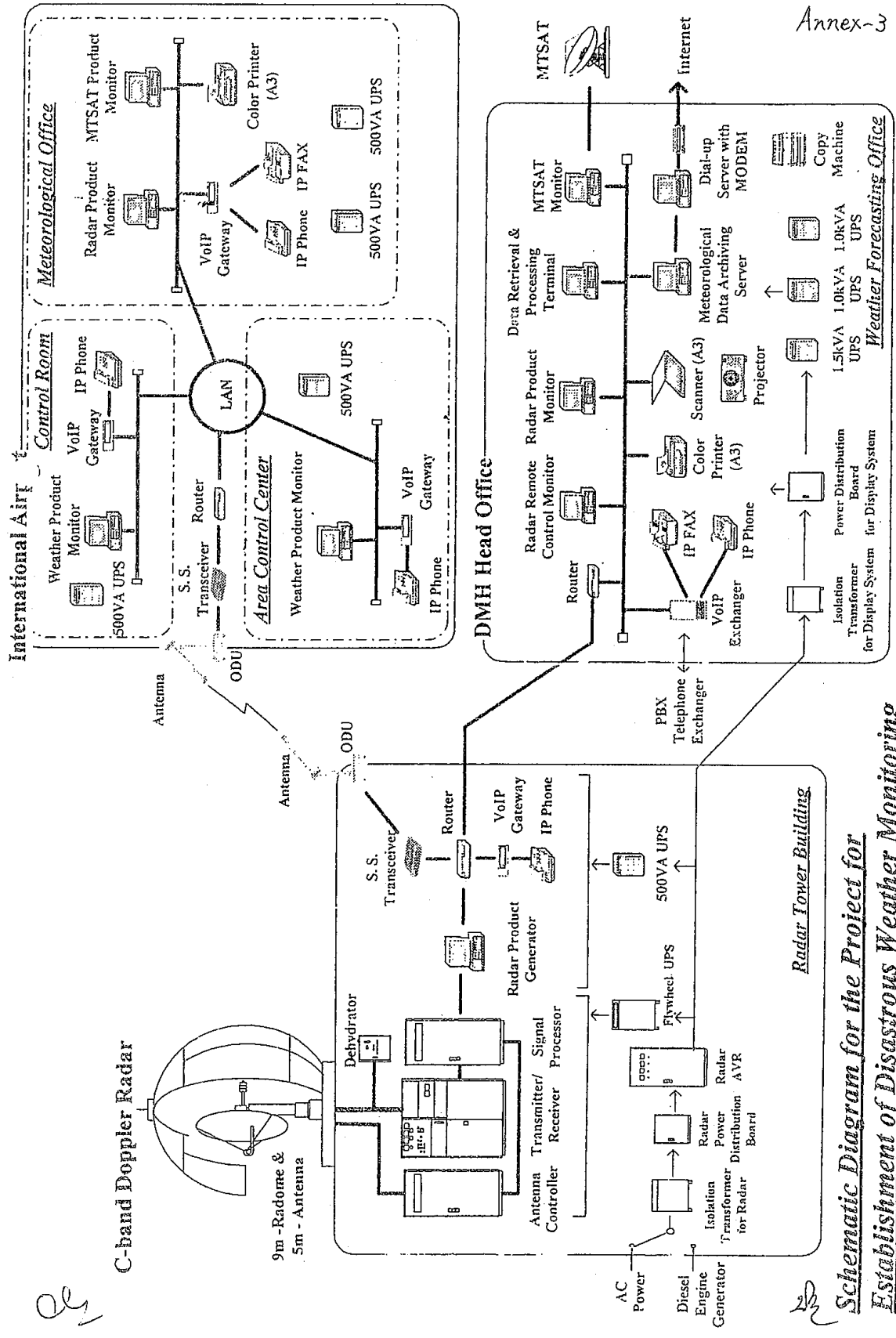
Major Undertakings to be taken by Each Government

No.	Items	Japan	DMH	DCA
1	To secure land		◎	
2	To clear level and reclaim the site when needed		◎	
3	To construct gates and fences in and around the site		◎	
4	To construct the parking lot	●		
5	To construct roads			
	1) Within the site	●		
	2) Outside the site		◎	
6	To construct the building	●		
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities			
	1) Electricity			
	a) The distributing line to the site		◎	
	b) The drop wiring and internal wiring within the site	●		
	c) The main circuit breaker and transformer	●		
	2) Water Supply			
	a) The city water distribution main to the site		◎	
	b) The supply system within the site (receiving and elevated tanks)	●		
	3) Drainage			
	a) The city drainage main (for storm sewer and others to the site)		◎	
	b) The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●		
	4) Telephone System			
	a) The telephone trunk line to the main distribution frame/panel (MDF) of the building		◎	
	b) The MDF and the extension after the frame/panel	●		
	5) Furniture and Equipment			
	a) General furniture		◎	
	b) Project equipment	●		
8	To bear the following commissions to the Japanese foreign exchange banking services based upon the B/A			
	1) Advising commission of A/P		◎	
	2) Payment commission		◎	
9	To ensure unloading and customs clearance at port of disembarkation in recipient country			
	1) Marine (Air) transportation of the products from Japan to the recipient country	●		
	2) Tax exemption and custom clearance of the products at the port of disembarkation		◎	
	3) Internal transportation from the port of disembarkation to the project site	●		
10	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		◎	
11	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 contracts		◎	
12	To maintain and use properly and effectively the facilities contracted and equipment provided under the Grant		◎	○
13	To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment		◎	

◎; Responsible and Implementing Agency, ○; Implementing Agency

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Annex-3

Schematic Diagram for the Project for Establishment of Disastrous Weather Monitoring

Estimated Recurrent Cost of the Project (C-band Doppler Radar)
to be borne by DMH

- Spare Parts and Consumables

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9 year	10 year	Remarks
1. Antenna	Oil	0											
	Grease	1	18,000 kip	18,000 kip	18,000 kip	18,000 kip	18,000 kip	18,000 kip	18,000 kip	18,000 kip	18,000 kip	18,000 kip	18,000 kip
	Timing belt	2	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 kip
	Transmitter/receiver	6											18,000 kip
	TR Limiter	6											18,000 kip
	Adaptation of Solid State TR Limiter	6											18,000 kip
2. Transmitter/receiver	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
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	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
3. Antenna controller	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
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	Adaptation of Solid State TR Limiter	6											
4. Signal processor	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
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	Adaptation of Solid State TR Limiter	6											
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	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
5. Pre-heat Monitor	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
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	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
6. Power Monitor	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
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	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
7. Power Monitor	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
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8. Power Monitor	TR Limiter	6											
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9. Power Monitor	TR Limiter	6											
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	Adaptation of Solid State TR Limiter	6											
10. Power Monitor	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
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	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
11. Power Monitor	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
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	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
12. Power Monitor	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
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	Adaptation of Solid State TR Limiter	6											
	TR Limiter	6											
	Adaptation of Solid State TR Limiter	6											

*1 Various types of products of meteorological phenomena will be received by terminals of DMH.

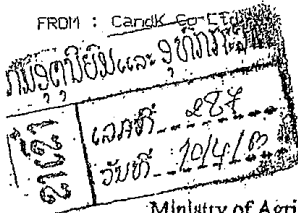
- Others

Equip. Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9 year	10 year	Remarks
Electricity Charge	1	19,221,696kip	19,221,696kip	19,221,696kip	19,221,696kip	19,221,696kip	19,221,696kip	19,221,696kip	19,221,696kip	19,221,696kip	19,221,696kip	
DMH Forecasting Room	1	7,085,611kip	7,085,611kip	7,085,611kip	7,085,611kip	7,085,611kip	7,085,611kip	7,085,611kip	7,085,611kip	7,085,611kip	7,085,611kip	
Fuel Cost	1	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	
Communication Cost	1	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	1,382,500kip	
Change for internet Web Hosting and Domain Registration	1	6,888,000kip	6,888,000kip	6,888,000kip	6,888,000kip	6,888,000kip	6,888,000kip	6,888,000kip	6,888,000kip	6,888,000kip	6,888,000kip	
Telephone charge for warning dissemination via FAX	1	1,204,000kip	1,204,000kip	1,204,000kip	1,204,000kip	1,204,000kip	1,204,000kip	1,204,000kip	1,204,000kip	1,204,000kip	1,204,000kip	
Water supply charge	1	365,000kip	365,000kip	365,000kip	365,000kip	365,000kip	365,000kip	365,000kip	365,000kip	365,000kip	365,000kip	
Subtotal (kip)		35,844,811kip	35,844,811kip	35,844,811kip	35,844,811kip	35,844,811kip	35,844,811kip	35,844,811kip	35,844,811kip	35,844,811kip	35,844,811kip	
Total Amount to be borne by DMH (kip)		38,164,102kip	38,164,102kip	38,164,102kip	38,164,102kip	38,164,102kip	38,164,102kip	38,164,102kip	38,164,102kip	38,164,102kip	38,164,102kip	

*2 Estimated annual operating hour of Diesel Engine Generator
Expected annual power stoppage around the DMH Head Office in Vientiane: 20 min. x 10 times/year = approx. 3.4 hours
During occurrence time of thundercloud, Diesel Engine Generator supplies power to the Radar System since the commercial power supply is infeasible.
Number of days thunderclouds occurred a year: approx. 60 days. 1-3 hours/day x 60 days = around 180 hours/year
(Hourly Power consumption of the Radar System: 14kWh x 100 hours = 1,400kWh)
Estimate of Annual Fuel Cost for Diesel Engine Generator
Fuel consumption: approx. 0.25L/kWh
1,400kWh (expected annual production of electricity by the generator) x 0.25L x 350L (annual fuel consumption) = 1,225L
5 times/day x 28days x 5 minutes x 8 users x 2.5kip = 1,204,000kip

*3 Telephone charges for warning dissemination by FAX
330L x 3,950L/kip = 1,322,500kip

FROM : Candk Sp. L.T.



Annex-5

Lao People's Democratic Republic
Peace Independence Democratic Unity Prosperity

Ministry of Agriculture and Forestry

No. 0253 /

Date: 04 APR 2003

Mr. Takao SHIBUSAWA
Leader
JICA Preparatory Study Team

C.C. JICA Laos Office

Dear Sir,

With reference to the Project for Establishment of Disastrous Weather Monitoring for Safe Keeping Operation of the Department of Meteorology and Hydrology (DMH), it is our great pleasure to provide our official response on budgetary allocation for operation and maintenance for meteorological radar system and meteorological satellite receiving system (MTSAT) and data communication system as per a request of the Preparatory Study Team, JICA.

We understand the Project is now under evaluation procedure by the authorities concerned Grant aid Assistance in your Government.

We are sure that DMH has a confidence of maintaining a weather radar system as long as possible once DMH will get a Japanese radar system under the Government's budgetary support. As the Government of Lao P.D.R. (as the supervising ministry of DMH), we are very pleased to inform you that we will make all the necessary financial arrangement to DMH for operation and maintenance of the whole equipment including a Japanese weather radar system provided through the Project, if the Project will be completed, so that DMH could carry out its task with the Japanese weather radar system for a long time.

We have completely recognized the importance of weather radar systems since a weather radar system in Vientiane will provide useful weather information for disaster management, safety operation of civil aviation, protection of capital city (life & property) from hazardous phenomena, etc. A doppler weather radar system is the only equipment to enable DMH to observe severe weather phenomena and contribute to socio-economic development of Lao P.D.R.

We very honestly believe that your Government will accept our request for Japan's Grant Aid Assistance to realize the Project for further improvement of mutual meteorological services.



Sincerely,
[Signature]

Sitaheng RASPHONE

In the Minister, Ministry of Agriculture and Forestry

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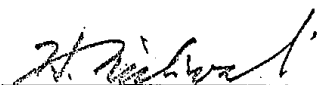
**MINUTES OF DISCUSSIONS
ON
BASIC DESIGN STUDY
ON
THE PROJECT FOR ESTABLISHMENT OF
DISASTROUS WEATHER MONITORING SYSTEM IN VIENTIANE
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC
(EXPLANATION ON DRAFT FINAL REPORT)**

In February 2004, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for Establishment of Disastrous Weather Monitoring System in Vientiane (hereinafter referred to as "the Project"), and through discussion, field survey, and technical examination of the study results in Japan, JICA prepared a draft final report of the study.

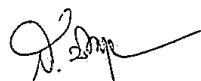
In order to explain and to consult Lao People's Democratic Republic (hereinafter referred to as "Laos") on the components of the draft final report, JICA sent to Laos the Draft Final Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. NISHIWAKI Hidetaka, Resident Representative, JICA Laos Office and has been scheduled to stay in the country from 29 May to 5 June, 2004.

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

Vientiane, 4 June, 2004

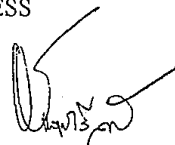


Hidetaka NISHIWAKI
Leader
Basic Design Explanation Team
Japan International Cooperation Agency
Japan



Nitharath Somsanith
Director General
Department of Meteorology and Hydrology
Lao People's Democratic Republic

WITNESS



Phouang Parisak Pravongviengkham
Permanent Secretary
Ministry of Agriculture and Forestry
Lao People's Democratic Republic

ATTACHMENT

1. Components of the Draft Final Report

The Government of Laos agreed and accepted in principle the components of the draft final 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 Laos as explained by the Team and described in Annex-1 and 2 of the Minutes of Discussions signed by both parties on 27 February, 2004.

3. Schedule of the Study

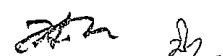
JICA will complete the final report in accordance with the confirmed items and send it to the Government of Laos by around August, 2004.

4. Other Relevant Issues

- 4-1. The Team explained to Lao side that the minimum recurrent cost for operation and maintenance of the equipment and the facility to be supplied in the Project under proper operation and maintenance has been estimated as a result of the basic design study, as shown in Annex-1. The Lao side promised to allocate necessary amount of the budget and personnel for operation and maintenance for the Project, as certified by the Official Letter No.0253, dated 4 April, 2003, signed by the Deputy Minister of the MAF, as described in Annex-5 of the Minutes of Discussions signed by both parties on 27 February, 2004.
- 4-2. In case that repair cost is needed due to unexpected damage of the equipment or the facility to be supplied under the Project, the required amount from the Counter Part Budget shall be allocated by the Lao side through coordination of the Steering Committee, as described in the Minutes of Discussions signed by both parties on February 27, 2004
- 4-3. The Team explained that any facilities taller than 40m within a 5km-radius from the radar tower building constructed under the Project would be obstructions for the radar observation. The Lao side completely understood it and Vientiane Urban Development Authority agreed to strictly keep and follow the present Land Use Zone & Regulations for Construction Permit (Vientiane Master Plan 2002) and also not to issue further construction permits for any facilities taller than 40m within a 5km-radius from the radar tower building.

4-4. Both side agreed on the technical training plans for DMH staff by themselves and JICA, as shown in Annex-2, to promote further results of the Project.

4-5. Both side recognized importance of the meteorological and hydrological observation stations for improvement of weather and flood forecasting and warning. DMH promised to prepare detailed and feasible schedule of operation, maintenance and rehabilitation of the meteorological and hydrological observation stations and agreed to provide it to JICA Laos Office by the end of June, 2004.

Handwritten signatures in black ink, appearing to be initials or names, located in the bottom right corner of the page.

Estimated Recurrent Cost of the Project

<to be borne by DMH>

Spare Parts and Consumables

(US\$1 = approx. 10,000Rp)

QTY	Item	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10 year	Remarks
1	Antenna	18,000 Rp	18,000 Rp	18,000 Rp	18,000 Rp	18,000 Rp	18,000 Rp	18,000 Rp	18,000 Rp	18,000 Rp	18,000 Rp	18,000 Rp
2	Transmitter/Receiver	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 Rp
1	Timer relay for pre-heating	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 Rp
1	Blower unit	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 Rp
2	AC fan	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 Rp
2	Fuse for the power supply unit	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 Rp
1	Lamp for operation panel	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 Rp
1	Fuse for the power supply unit	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 Rp
1	Lamp for servo amplifier system	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 Rp
1	Product Monitor	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	18,000 Rp
1	Multis for melting product data	100,000 Rp	100,000 Rp	100,000 Rp	100,000 Rp	100,000 Rp	100,000 Rp	100,000 Rp	100,000 Rp	100,000 Rp	100,000 Rp	100,000 Rp
2	Printer Ink (7 set)	US\$144.00	US\$144.00	US\$144.00	US\$144.00	US\$144.00	US\$144.00	US\$144.00	US\$144.00	US\$144.00	US\$144.00	1,440,000 Rp
1	Copy Machine	US\$70.00	US\$70.00	US\$70.00	US\$70.00	US\$70.00	US\$70.00	US\$70.00	US\$70.00	US\$70.00	US\$70.00	700,000 Rp
6	Compact UPS	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	500,000 Rp
1	Battery (about 500V.A)	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	500,000 Rp
1	Relay for remote power control	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	500,000 Rp
1	Oil seal and filter	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	500,000 Rp
1	Battery for Engine start	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	US\$50.00	500,000 Rp
1	Subtotal (Rp)	118,000Rp	118,000Rp	118,000Rp	118,000Rp	118,000Rp	118,000Rp	118,000Rp	118,000Rp	118,000Rp	118,000Rp	1,180,000Rp
1	Subtotal (US\$)	US\$11.800	US\$11.800	US\$11.800	US\$11.800	US\$11.800	US\$11.800	US\$11.800	US\$11.800	US\$11.800	US\$11.800	118,000Rp

*1 Various types of products of meteorological phenomena will be recorded by terminals of DMH.

Utilities

Cost Item	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10 year	Remarks	
1. Electricity Charge	41,979,834Rp	41,979,834Rp	41,979,834Rp	41,979,834Rp	41,979,834Rp	41,979,834Rp	41,979,834Rp	41,979,834Rp	41,979,834Rp	41,979,834Rp	419,798,340Rp	
2. Fuel Cost	1,655,000Rp	1,655,000Rp	1,655,000Rp	1,655,000Rp	1,655,000Rp	1,655,000Rp	1,655,000Rp	1,655,000Rp	1,655,000Rp	1,655,000Rp	16,550,000Rp	
3. Communication Cost	6,388,000Rp	6,388,000Rp	6,388,000Rp	6,388,000Rp	6,388,000Rp	6,388,000Rp	6,388,000Rp	6,388,000Rp	6,388,000Rp	6,388,000Rp	63,880,000Rp	
4. Water Supply	1,204,000Rp	1,204,000Rp	1,204,000Rp	1,204,000Rp	1,204,000Rp	1,204,000Rp	1,204,000Rp	1,204,000Rp	1,204,000Rp	1,204,000Rp	12,040,000Rp	
5. Radar Tower Exterior Finish	365,000Rp	365,000Rp	365,000Rp	365,000Rp	365,000Rp	365,000Rp	365,000Rp	365,000Rp	365,000Rp	365,000Rp	3,650,000Rp	
1	Paint on steel	0Rp	0Rp	0Rp	0Rp	0Rp	0Rp	0Rp	0Rp	0Rp	0Rp	0Rp
1	Subtotal (Rp)	51,791,834Rp	51,791,834Rp	51,791,834Rp	51,791,834Rp	51,791,834Rp	51,791,834Rp	51,791,834Rp	51,791,834Rp	51,791,834Rp	517,918,340Rp	
1	Subtotal (US\$)	US\$5,179.834	US\$5,179.834	US\$5,179.834	US\$5,179.834	US\$5,179.834	US\$5,179.834	US\$5,179.834	US\$5,179.834	US\$5,179.834	51,791,834Rp	

*2 Electricity consumption of air conditioning

Equipment Room (60kW) - Nov-Mar: 180day Apr-Oct: 240day Annual: 60kW x 7,700h = 464,400kWh
 Observation and Forecasting Room (3kW), Data Room (0.88kW) - Annual: 3.88kW x 9,600h = 37,248kWh
 Maintenance Room (1.36kW) - operated during rainy season (7 months) (1.36kW x 5,040h) = 6,854kWh

*3 Estimated annual operating hours of Diesel Engine Generator

Expected annual power stoppage around the DMH Head Office in Ventnians: 20 min. x 10 times/year = approx. 3.4 hours
 During occurrence time of thundercloud, Diesel Engine Generator supplies power to the Radar System since the commercial power supply is unstable
 Number of days (thunderclouds occurred a year, approx. 60 days) 1.3 hours/day x 60 days = around 100 hours/year
 (Hourly Power consumption of the Radar System: 1.676kW x 100 hours = 1,676kWh)

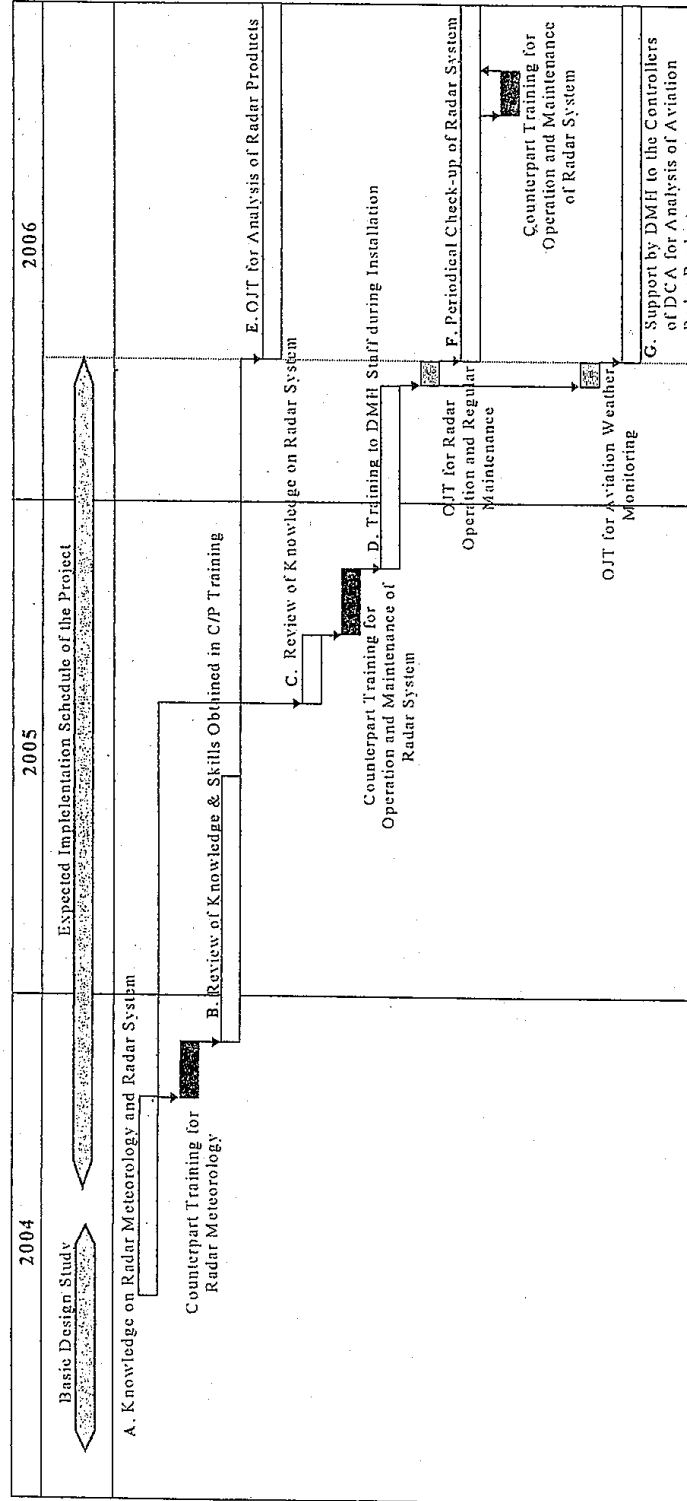
Estimate of Annual Fuel Cost for Diesel Engine Generator

Fuel consumption: approx. 0.25L/kWh
 1,676kWh (expected annual production of electricity by the generator) x 0.25L = 419L (annual fuel consumption) = 1,655,050Rp
 *4 Telephone charges for warning dissemination by FAX
 5 times/day x 20 days x 5 minutes x 8 users x 21 Rp/min = 1,204,000Rp

<to be borne by DCA> - Spare Parts and Consumables											
Sl. No.	Description	Quantity	Unit	Rate (USD)	Rate (KIP)	Rate (USD)	Rate (KIP)	Rate (USD)	Rate (KIP)	Rate (USD)	Rate (KIP)
1.	Printer Monitor	1		US\$114.00	774,384KIP	US\$114.00	774,384KIP	US\$114.00	774,384KIP	US\$114.00	774,384KIP
2.	Hard disk	1		US\$50.00	387,000KIP	US\$50.00	387,000KIP	US\$50.00	387,000KIP	US\$50.00	387,000KIP
3.	Compass (GPS)	5		US\$50.00	387,000KIP	US\$50.00	387,000KIP	US\$50.00	387,000KIP	US\$50.00	387,000KIP
Subtotal (US\$)				US\$214.00	1,548,768KIP	US\$214.00	1,548,768KIP	US\$214.00	1,548,768KIP	US\$214.00	1,548,768KIP
- Others											
1.	Electricity charge	1		774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP
	Control Center	1		774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP
	Avion Control Center	1		774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP
	Metereological Office	1		1,548,768KIP	1,548,768KIP	1,548,768KIP	1,548,768KIP	1,548,768KIP	1,548,768KIP	1,548,768KIP	1,548,768KIP
	Equipment Room	1		774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP	774,384KIP
Subtotal (KIP)				3,871,920KIP	3,871,920KIP	3,871,920KIP	3,871,920KIP	3,871,920KIP	3,871,920KIP	3,871,920KIP	3,871,920KIP
Total Amount to be borne by DCA (KIP)				5,311,920KIP	5,311,920KIP	5,311,920KIP	5,311,920KIP	5,311,920KIP	5,311,920KIP	5,311,920KIP	5,311,920KIP

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Tentative Schedule of Training Programs



- Training to be Conducted by DMH in Laos
- Counterpart Training to be provided by Japanese side in Japan
- On-the-job Training to be provided by Japanese side in Laos

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Appendix. 5. Cost Estimation Borne by the Recipient Country

The following major undertakings to be borne by Laos side are necessary for the implementation under Japan's Grant Aid Assistance.

Items	Capital Cost (Laos Kip)
Removal of the existing facility at the construction site in DMH	5,000,000 kip
Electricity laid down cost	38,000,000 kip
Telephone line laid down cost for 2 lines	2,900,000 kip
Water supply pipe laid down cost and connection work at a gate valve	2,000,000 kip
Total	47,900,000 kip

Appendix 6. References

1. Mekong River Commission, Mekong River Commission Secretariat
2. Foreign Aid Report 2000 – 2001, Committee for Planning and Cooperation
3. Annual Report 2001, Bank of The Lao P.D.R
4. Results from the Population Census 1995, State Planning Committee National Statistical Centre
5. Lao Agricultural census, 1998/99 Highlights, Steering Committee for the Agricultural Census
Agricultural Census Office
6. MRC Work Programme 2004, Mekong River Commission
7. Annual Report 2002, Electricite du Laos
8. National Statistical Center 2002, Committee for Planning and Cooperation