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1. Member List of the Study Team

1. *Mr. Fumihiko OKIURA*
Director, Water Resources Management Division 1, Water Resources and Disaster Management Group, Global and Environment Department, JICA
2. *Mr. Yoshiharu YONEYAMA*
Senior Representative, JICA Laos Office
3. *Cooperation Planning: Mr. Satoshi HAMONA*
Deputy Assistant Director, Water Resources Management Division 1, Water Resources and Disaster Management Group, Global and Environment Department, JICA
4. Chief Consultant/ Water Supply Planning Specialist: Mr. Takemasa MAMIYA
Nihon Suido Consultants, Director, Overseas Services Department
5. Deputy Chief Consultant: Mr. Takashi HOSHINO
Nihon Suido Consultants, Overseas Services Department
6. Water Supply Facilities Designer 1: Mr. Takehiko Oga
Nihon Suido Consultants, Overseas Services Department
7. Water Supply Facilities Designer 2: Mr. Hideharu KIKUCHI
Nihon Suido Consultants, Overseas Services Department
8. Waterworks Management Specialist: Mr. Daizo IWATA
Nihon Suido Consultants, Overseas Services Department
9. Environmental & Social Considerations Specialist: Mr. Koji KIMURA
Nihon Suido Consultants, Overseas Services Department
10. Mechanical and Electrical Equipment Specialist: Mr. Makoto MIZOSHITA
Nihon Suido Consultants, Overseas Services Department
11. Procurement / Construction Plan / Cost Estimation Specialist: Mr. Kozo Obara
Nihon Suido Consultants, Overseas Services Department
12. Coordinator / Natural Condition Investigation Assistant: Mr. Takahiro Nakata
Nihon Suido Consultants, Overseas Services Department

2. Study Schedule

Study Schedule (Survey 1)

Days	Date/Weekday		Mr. OKIURA Mr. HAMANO	Mr. MAMIYA	Mr. HOSHINO	Mr. KIKUCHI	Mr. MIZOSHITA	Mr. KIMURA	Mr. IWATA	
1	16 th Jan.	Mon	NRT→BKK→VTE							
2	17 th Jan.	Tue	JICA office, Meeting with MPWT	NRT→BKK→VTE						
3	18 th Jan.	Wed	Visit to JICA office, Meeting with MPWT							
4	19 th Jan.	Thu	Signature of Minute	Signature of Minute, VTE→TKK						
5	20 th Jan.	Fri	VTE→BKK	Meeting with NPKM						
6	21 st Jan.	Sat	BKK→NRT	Field Survey, Meeting with NPKM						
7	22 nd Jan.	Sun								
8	23 rd Jan.	Mon		Field Survey, Meeting with NPKM						
9	24 th Jan.	Tue		Field Survey, Meeting with NPKM						
10	25 th Jan.	Wed		TKK→VTE		NRT→BKK→ VTE	PNNP→VTE			
11	26 th Jan.	Thu		Inner Meeting	Inner Meeting, VTE→TKK					
12	27 th Jan.	Fri		VTE→BKK	Field Survey, Meeting, Data Collection					
13	28 th Jan.	Sat		→NRT	Field Survey, Meeting, Data Collection					
14	29 th Jan.	Sun								
15	30 th Jan.	Mon			Field Survey, Meeting, Data Collection					
16	31 st Jan.	Tue			Field Survey, Meeting, Data Collection		NRT→BKK→VTE			
17	1 st Feb.	Wed			Field Survey, Meeting, Data Collection		VTE→TKK			
18	2 nd Feb.	Thu			Field Survey, Meeting, Data Collection					
19	3 rd Feb.	Fri			Field Survey, Meeting, Data Collection			BKK→VTE→TKK		
20	4 th Feb.	Sat			Field Survey, Meeting, Data Collection					
21	5 th Feb.	Sun								
22	6 th Feb.	Mon			Field Survey, Meeting, Data Collection					
23	7 th Feb.	Tue			Field Survey, Meeting, Data Collection	TKK→VTE→ BKK→NRT	Field Survey, Meeting, Data Collection			
24	8 th Feb.	Wed					Field Survey, Meeting, Data Collection			
25	9 th Feb.	Thu					Field Survey, Meeting, Data Collection			
26	10 th Feb.	Fri					Field Survey, Meeting, Data Collection			
27	11 th Feb.	Sat					Field Survey, Meeting, Data Collection			
28	12 th Feb.	Sun				TKK→VTE				
29	13 th Feb.	Mon			Field Survey, Meeting, Data Collection	VTE → BKK → NRT	TKK→VTE	Data Collection		
30	14 th Feb.	Tue						VTE→BKK→JKT	Data Collection	
31	15 th Feb.	Wed								TKK→VTE
32	16 th Feb.	Thu								VTE → BKK →NRT
33	17 th Feb.	Fri								
34	18 th Feb.	Sat								
35	19 th Feb.	Sun								
36	20 th Feb.	Mon			TKK→VTE					
37	21 st Feb.	Tue			Market Survey					
38	22 nd Feb.	Wed			Reporting to JICA					
39	23 rd Feb.	Thu			Reporting to					
40	24 th Feb.	Fri			Embassy VTE→BKK→NRT					

Study Schedule (Survey 2)

Days	Date/Weekday	Mr. HAMANO	Mr. MAMIYA	Mr. HOSHINO	Mr. OGA	Mr. KIKUCHI	Mr. MIZOSHITA	Mr. KIMURA	Mr. IWATA	Mr. OBARA	Mr. NAKATA			
1	1 st Apr. Sun	NRT→BKK→VNT												
2	2 nd Apr. Mon	Meeting with MPWT, VNT→TKK												
3	3 rd Apr. Tue	Field Survey, Meeting with MPWT												
4	4 th Apr. Wed	TKK→VNT		Field Survey, Meeting, Data Collection										
5	5 th Apr. Thu	Discussion for M/D												
6	6 th Apr. Fri	Signature of M/D, VNT→BKK	Signature of M/D											
7	7 th Apr. Sat	BKK→NRT	VNT→TKK											
8	8 th Apr. Sun													
9	9 th Apr. Mon	Field Survey, Meeting with MPWT												
10	10 th Apr. Tue	TKK→VNT												
11	11 th Apr. Wed		VNT→BKK	VNT→TKK										
12	12 th Apr. Thu		BKK→NRT											
13	13 th Apr. Fri													
14	14 th Apr. Sat													
15	15 th Apr. Sun													
16	16 th Apr. Mon													
17	17 th Apr. Tue			Field Survey	VNT→TKK		VNT→TKK							
18	18 th Apr. Wed			Field Survey			Field Survey							
19	19 th Apr. Thu													
20	20 th Apr. Fri													
21	21 th Apr. Sat													
22	22 th Apr. Sun													
23	23 th Apr. Mon			Field Survey		NRT→VNT	Field Survey				NRT→VNT			
24	24 th Apr. Tue												Field Survey	
25	25 th Apr. Wed							Field Survey			NRT→VNT			
26	26 th Apr. Thu							VNT→TKK				VNT→TKK		
27	27 th Apr. Fri	Field Survey								Field Survey				
28	28 th Apr. Sat													
29	29 th Apr. Sun													
30	30 th Apr. Mon			Field Survey							Field Survey			
31	1 st May. Tue								NRT→VNT					
32	2 nd May. Wed								VNT→TKK					
33	3 rd May. Thu	Field Survey, Meeting, Data Collection												
34	4 th May. Fri	Field Survey, Meeting, Data Collection												
35	5 th May. Sat													
36	6 th May. Sun													
37	7 th May. Mon	Field Survey								Field Survey				
38	8 th May. Tue			Field	TKK→	Field Survey			NRT	Field Survey				

					Survey	VNT→ BKK			→ VNT		
39	9 th May.	Wes				BKK→ NRT			VNT → TKK		
40	10 th May.	Thu							Field Survey		
41	11 th May.	Fri									
42	12 th May.	Sat									
43	13 th May.	Sun						TKK→ VNT			
44	14 th May.	Mon						VNT→ BKK	Field Survey		
45	15 th May.	Tue			Field Survey		BKK→ NRT				
46	16 th May.	Wes									
47	17 th May.	Thu									
48	18 th May.	Fri			Meeting with Stakehold ers		Meeting with Stakeholders		Meeting with Stakeholders		
49	19 th May.	Sat									
50	20 th May.	Sun									
51	21 th May.	Mon			Field Survey		Field Survey		Field Survey		
52	22 th May.	Tue			Meeting with DPWT		Meeting with DPWT		Meeting with DPWT		
53	23 th May.	Wes			Field		Field Survey		Field Survey		
54	24 th May.	Thu			Survey						
55	25 th May.	Fri			Meeting with NPKM		Meeting with NPKM		Meeting with NPKM		
56	26 th May.	Sat					TKK→VNT		TKK→VNT		
57	27 th May.	Sun					VNT→BKK		VNT → BKK		
58	28 th May.	Mon			TKK→ VNT		BKK→NRT		BKK → NRT	TKK→ VNT	
59	29 th May.	Tue			Meeting with MPWT			VNT→ BKK		VNT→ BKK	Meeting with MPWT
60	30 th May.	Wes						BKK→ NRT		BKK→ NRT	
61	31 th May.	Thu			Reporting to JICA and Embassy, VNT→BKK						Reportin g to JICA and Embassy, VNT→BKK
62	1 st Jun.	Fri			BKK→ NRT						BKK→ NRT

Study Schedule (DFR)

Days	Date/Weekday		Mr. HAMANO	Mr. MAMIYA	Mr. OGA	Mr. IWATA
1	6 th Nov.	Tue	NRT→BKK→VTE			
2	7 th Nov.	Wed	Visit to JICA office, Meeting with MPWT			
3	8 th Nov.	Thu	Discussion for M/D			
4	9 th Nov.	Fri	Signature of M/D, VTE→BKK			
5	10 th Nov.	Sat	BKK→NRT			

3. List of Parties Concerned in the Recipient Country

Ministry of Public Works and Transport (MPWT)

Department of Housing and Urban Planning (DHUP)

- Mr. Thamthavy THAIPHACHANH Director General
- Mr. Noupheuak VIRABOUTTH Deputy Director General in Charge of Water Supply Affairs, Urban Development & International Relations
- Mr. Khanthone VORACHIITH Director of Water Supply Division
- Mrs. Malychanh SANANIKHOM Deputy of Division, Budget and External Cooperation, Planning and Budget Division
- Dr. Xayphaxa LIENGSONE Sewer Staff of WSD

Khammouane Province

- Mr. Chanh BOUPHALIVANH Director General, Department of Public Works and Transport (DPWT)
- Mr. Daidanvong KIENMANY Vice Director, Department of Public Works and Transport (DPWT)
- Mr. Xaisomvang LIENTHISONE Deputy, Housing and Urban Planning

Ministry of Natural Resources and Environment (MNRE)

Department of Natural Resources and Environment, Khammouane Province (DNRE)

- Mr. Khamphai PHENGPHAENGMEUNG Director General
- Mr. Sinnasone SENGCHATHAVONG Deputy Director
- Mr. Dethsada Somphousy Head of Section, Environment Section

Khammouane Water Supply State Enterprise (NPKM)

- Mr. Khangeun SENGIEM General Director
- Mr. Phouthone SOULINHONG Deputy Director
- Mr. Khamveuy TAYAVONG Deputy Manager
- Mr. Khampasith SITHEPHAVON Chief, Technical Section
- Mr. Saykham VONGPHADY Engineer, Technical Section
- Mr. Amphaivanh DOUANGKHAMCHANH Vice Chief, Technical Section
- Mr. Phasouk XAYAONTA Chief, Water Treatment Plant
- Mr. Khamphouvieng SOUVANNASAO Engineer, Groundwater Facility
- Mr. Inthavong SOULAPHONE Engineer, Groundwater Facility
- Mr. Somsanith KHOTSOUVANH Chief, Financial Section
- Ms Outhid MANNOLINH Chief, Commercial Section
- Mr. Ounkham SOULINHONG Engineer, Electrical and Mechanical Facility
- Mr. Bounmee PHONMANY Engineer, Electrical and Mechanical Facility
- Mr. Soulaphong PHABOUDDY Chief, Administration Section
- Ms. Naphaphone NANTHAVILAI Staff, Administration Section
- Ms. Vannida PHENGTHALANGSY Staff, Financial Section
- Ms. Viphavanh SENGSAVANG Staff, Secretary
- Mr. Somiphasouk TAILIYA Staff, Technical Section

4. Minutes of Discussions

MINUTES OF DISCUSSIONS
ON THE PREPARATORY SURVEY
ON PROJECT FOR
THAKHEK WATER SUPPLY DEVELOPMENT IN KHAMMOUANE PROVINCE,
LAO PDR

In response to the request from the Government of the Lao People's Democratic Republic (hereinafter referred to as "Lao PDR"), the Government of Japan decided to conduct a Preparatory Survey on Project for Thakhek Water Supply Development in Khammouane Province (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Lao PDR the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Mr. Fumihiko Okiura, Director, Water Resources Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, JICA, and is scheduled to stay in the country from January 16 to 20, 2012.

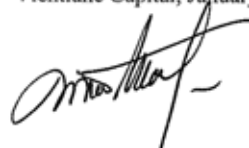
The Team held discussions with the officials concerned of the Government of Lao PDR.

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

Vientiane Capital, January 19, 2012



Fumihiko OKIURA
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan



Khamthavy THAIPHACHANH
Director General
Department of Housing and Urban Planning
Ministry of Public Works and Transport
Lao People's Democratic Republic



Chanh BOUPHALIVANH
Director General
Department of Public Works and Transport
Khammouane Province
Lao People's Democratic Republic

ATTACHMENT

1. Objective of the Project (Request)

The objective of the Project is to improve the water supply services in urban area of Thakhek district in Khammouane province in order to supply safe water and sufficient water for the residents.

2. Project site (Request)

The site of the Project is as shown in **Annex-1**.

3. Responsible and Implementing Agency

3-1. The Responsible Agency is Department of Housing and Urban Planning (hereinafter referred to as "DHUP") of Ministry of Public Works and Transport (hereinafter referred to as "MPWT").

3-2. The Implementing Agencies are the Khammouane Provincial Water Supply State Enterprise (hereinafter referred to as "PNP Kammouane") under supervision of Department of Public Works and Transport of Kammouane Province.

4. Items originally requested by the Government of Lao PDR

The items originally requested by the Lao side are described in **Annex-2**.

The both sides confirmed that the appropriateness of the request would be examined in accordance with the further studies and analysis, and the final components of the Project would be decided by the Japanese side.

5. Japan's Grant Aid Scheme

5-1 The Lao side understood the Japan's Grant Aid Scheme explained by the Team, as described in **Annex-3**.

5-2 The Lao side will take the necessary measures, as described in **Annex-4**, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Survey

6-1 The consultant members of the Team will proceed to further studies in Lao PDR until June, 2012. The studies include 2 field surveys that 1st field survey has started since January until late February 2012 and 2nd field survey will conduct from April to June 2012.

6-2 JICA will prepare the draft outline design report in English and dispatch a mission in order to explain its contents to the Lao side around October 2012.

6-3 In case that the contents of the report are accepted in principle by the Lao side, JICA will finalize the report and send it to the Lao side around December 2012.

6-4 The Lao side understood that execution of the Preparatory Survey (hereinafter referred to as "the Survey") does not necessarily imply the Japanese Government's commitment of the project implementation.

7. Other relevant issues

The following issues were discussed and confirmed by both sides.

7-1. Phasing of Field Survey

The Team explained that the field survey in Lao PDR will be divided into following two phases in order to share the basic policy for design including location, future of existing Water Treatment Plant (hereinafter referred to as "WTP"), covered area, intake type and the capacity of WTP with both side before starting the design.

- 1) Field Survey I (from January to late February, 2012)
 - Confirmation of the necessity and appropriateness of the project requested by the Lao side
 - Collection and analysis of the necessary information and data
 - Examination of the existing WTP and appropriate scale of the project as a grant aid project
- 2) Homework in Japan (March, 2012)
 - Discussion of the outline policy for design by Government of Japan
- 3) Field Survey II (from beginning of April to June, 2012)
 - Explanation of the outline policy for design to Lao side
 - Implementation of the survey necessary for the design of priority project

7-2. Future of the existing water treatment plant

The Team explained that the usage of existing water treatment plant should be reasonably considered. Therefore, the team will study various aspects including as follow:

- 1) Structure
- 2) Function of mechanical and electrical equipment
- 3) Treatment performance
- 4) Future operation and maintenance
- 5) Financial viability

7-3. Installation of service pipes and water meters

As for individual house connections, both side agreed that necessity of provision of the materials such as water meters and pipes will be considered in the survey in order to assist the expansion of water supply to poor communities. Both sides also confirmed that Lao side will bear the cost for installation works.

7-4. Social and Environmental Considerations

- 1) Lao side explained that the Environmental Impact Assessment (EIA) is not needed but Initial Environmental Examination (IEE) is needed for the project under the laws and regulations of Lao PDR.
- 2) The Team explained that the environmental and social considerations studies would be

conducted according to JICA's Guidelines for Environmental and Social Considerations in order to examine the mitigation measures of impacts and monitoring plan during/after the implementation.

7-5. Tax exemption

The taxes including Value Added Tax (VAT), custom duty, and any other taxes and levies in Lao PDR which is to be arisen from the Project activities will be exempted by Lao side. DHUP will take any procedures necessary for the tax exemption with the Ministry of Finance of Lao PDR at its responsibility.

7-6. Overlapping with other projects

Both side confirmed that the on-going / proposed projects in Thakhek district supported by other donor agencies, NGO, and Lao official organization(s) should be carefully investigated to avoid overlapping with the Project. Lao side agreed to provide necessary information on related projects.

7-7. Items requested by Japan Preparatory Survey Team

The Lao side agreed to undertake the actions requested by the Team, as described in **Annex-5**.

Annex-1	Project Sites Map
Annex-2	Items Requested by the Lao Side
Annex-3	Japan's Grant Aid Scheme
Annex-4	Major Undertakings to be taken by Each Government
Annex-5	ITEMS REQUESTED BY JPST



Annex-1: Project Sites Map



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Annex-2: Items Requested by the Lao Side

A) Construction of Water Treatment Plant with production capacity of 10,000m³/day

Water Intake Facilities	- 3 Intake Pumps - Installation of Water Transmission Pipe : dia.350mm - Construction of Intake
Mixing Basin	- 1 Mixer
Flocculation Basin	- 4 Flocculators - 4 Flocculation Basins
Sedimentation Basin	- 2 Sedimentation Basins
Rapid Filtration Basin	- Installation of Filter Sand Bed - 4 Rapid Sand Filters
Clear & Backwash Reservoir	- 1 Reservoir (1,500m ³)
Elevated Tank	- 1Elevated Tank (1,000m ³)
Transmission Pipeline	- Installation of Transmission Pipe: dia. 400mm
Transmission Pump	- 3 Transmission Pumps
Distribution Main Pipeline	- Extension of Distribution Pipes: dia. 350-100mm
Electrical Equipment	- Substation Equipment - Installation of Switchgear and Panels - Installation of 1 Diesel Generator
Chemical Equipment	- Installation of Chemical Tank Equipment - Chemical Feeding System
Administration Building	- Construction of Administration Building

B) Supply of Equipment

Water Meter Dia. 13mm	- 2,000 pcs
Maintenance Machineries	- 1 Pick-up Truck (2,500 cc) - 2 Motor Bike (100 cc)

Annex-3: JAPAN'S GRANT AID SCHEME

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, JICA was reborn on October 1, 2008. Based on the law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Project, for Fisheries and for Cultural Cooperation, etc.

Grant Aid is non-reimbursable fund to a recipient country 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. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures (Attachment 1)

Japanese Grant Aid is conducted as follows-

- Preparatory Survey (hereinafter referred to as "the Survey")
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Determination of Implementation by Exchange of Notes (hereinafter referred to as "the E/N")
 - The Notes exchanged between the GOJ and a Government of recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid scheme.

JICA 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) Selection of Consultants

For smooth implementation of the Survey, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the E/N will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

The consultant firm(s) used for the Survey will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A, in order to maintain technical consistency.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority 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, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

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

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Attachment 1.

(6) Proper Use

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

(7) Export and Re-export

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

(8) Banking Arrangements (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 a bank in Japan (hereinafter referred to as "the Bank"). JICA 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 JICA under an Authorization to Pay (A/P) issued by the Government of the 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.

(10) Social and Environmental Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and JICA environmental and social considerations guideline.

FLOW CHART OF JAPAN'S GRANT AID PROCEDURES

Stage	Flow & Works	Recipient Government	Japanese Government	JICA	Consultant	Contractor	Others
Application	Request (D/R : Terms of Reference)	✓					
	Screening of Project → Evaluation of T/R → Project Identification Survey		✓	✓			
Project Formulation & Preparation	Preparatory Survey → Field Survey Home Office Work Reporting	✓	✓	✓			
	Preparatory Survey 2 (Outline Design) → Selection & Contracting of Consultant by Proposal → Field Survey Home Office Work Reporting	✓	✓	✓	✓		
	Explanation of Draft Final Report → Final Report	✓	✓	✓	✓		
Appraisal & Approval	Appraisal of Project		✓				
	Inter Ministerial Consultation		✓				
	Presentation of Draft Notes	✓	✓				
	Approval by the Cabinet		✓				
Implementation	E/N & G/A (E/N : Exchange of Notes, G/A : Grant Agreement)	✓	✓	✓			
	Banking Arrangement	✓					✓
	Consultant Contract → Verification → Issuance of A/P	✓		✓	✓		
	Detailed Design & Tender Documents → Approval by Recipient Government → Preparation for Tendering	✓		✓	✓		
	Tendering & Evaluation	✓		✓	✓	✓	
	Procurement / Construction Contract → Verification → A/P	✓		✓	✓	✓	
	Construction → Completion Certificate by Recipient Government → A/P	✓		✓	✓	✓	
	Operation → Post Evaluation Study (A/P : Authorization to Pay)	✓		✓			
Evaluation & Follow up	Ex-post Evaluation → Follow up	✓		✓			

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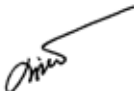
Annex-4: Major Undertakings to be taken by Each Government

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 construct gates and fences in and around the site		•
4	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		•
5	To ensure prompt unloading and customs clearance at the 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	(•)	(•)
6	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		•
7	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		•
8	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		•
9	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the transportation and installation of the equipment		•

(B/A: Banking Arrangement, A/P: Authorization to Pay)

Annex-5: ITEMS REQUESTED BY JPST

- (1) Provide JPST with available relevant data, information and materials necessary for the execution of the Survey including items in the attached questionnaire;
- (2) Carry out IEE and hold stakeholder meetings, as required with assistance from JPST;
- (3) Provide written approvals/confirmations, issued by the Ministry of Public Works and Transport (MPWT) or organizations concerned, for additional raw water intake from the Mekong River, land use for planned water supply facilities, pipe installation on the right of way, power supply for the planned water supply facilities, no further requirement for EIA, securing space for temporary stock yard, contractor/consultant offices, and disposal for excavated soil, and other related requirements;
- (4) Assign full-time counterparts to the JPST team during their stay in Lao PDR, on the following:
 - Making appointments, setting up meetings with authorities, departments, relevant institutions, and organizations JPST requires to visit;
 - Accompanying JPST onsite surveys and other visits and making the necessary arrangements for accommodation, transportation, and obtaining permissions if required; and
 - Assisting and advising JPST on collection of data and information as much as possible;
- (5) Secure the permission to photograph and enter into private properties and restricted areas as required;
- (6) Inform JPST members of any dangers and/or risks expected in the survey areas, and take the necessary measures to ensure the safety of the members of JPST;
- (7) Make arrangements to allow JPST to bring back to Japan any necessary data, maps and materials, related to the study, subject to approval by the GOL, in order to prepare the reports; and
- (8) Supply office space in Thakhek for JPST. The required space would be about 100 m2 with basic furniture, at least 8 desks and chairs. Electricity and telephone line connections would be also required. The telephone charge would be borne by JPST.



MINUTES OF DISCUSSIONS
ON THE PREPARATORY SURVEY (FIELD SURVEY II)
ON PROJECT FOR
THAKHEK WATER SUPPLY DEVELOPMENT IN KHAMMOUANE PROVINCE,
LAO PDR

Japan International Cooperation Agency (hereinafter referred to as "JICA") sent Lao People's Democratic Republic (hereinafter referred to as "Lao PDR") to the Preparatory Survey Team (hereinafter referred to as "the Team") for the Field Survey II of the Project for Thakhek Water Supply Development in Khammouane Province (hereinafter referred to as "the Project") , which is headed by Mr. Yoshiharu Yoneyama, Senior Representative, JICA Laos Office, and the Survey II is scheduled from the beginning of April to the end of May, 2012.

The Team held discussions with the officials concerned of the Government of Lao PDR.

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

Vientiane Capital, April 6, 2012

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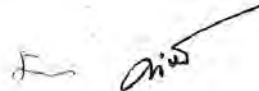
Mr. Yoshiharu YONEYAMA
Senior Representative
Laos Office
Japan International Cooperation Agency
Japan



Mr. Khamthavy THAIPHACHANH
Director General
Department of Housing and Urban Planning
Ministry of Public Works and Transport
Lao People's Democratic Republic



Mr. Chanh BOUPHALIVANH
Director General
Department of Public Works and Transport
Khammouane Province
Lao People's Democratic Republic



ATTACHMENT

The following items were confirmed by both sides.

1. Framework of the Outline Design

1-1. Target Year of the Supply Capacity

In line with the Lao PDR's long term goal of the water supply sector that is to provide 24-hours per day access to safe drinking water for 80% of the urban population, the target year for outline design shall be 2020.

1-2. Abandonment of the Existing Plant in the Future Water Supply System

Through the field survey I and study in Japan, the Team deliberated about the usage of the existing water treatment plant in Thakhek. According to the cost analysis comparison between utilizing of the existing plant or not, both sides confirmed the new planned water supply system without existing plant would be reasonable compared to with existing plant.

1-3. Project Scope for New Planned Water Supply System

As a consequence of the discussions described in 1-1 and 1-2 above, both sides confirmed the project scope described as Case 3-2 of APPENDIX I is the most appropriate option of this project. The Team will prepare the outline design based on the scope in the field survey II.

2. Installation of the Pipe by Lao side

Both sides confirmed that after completion of the project, Lao side would have responsibility to install the distribution and service pipes between main distribution pipes installed by the project and houses in service area to enable 80% of the urban population to have the stable access to drink safety water in Thakhek district up to 2020, as described in 1-1 above.

3. Social and Environmental Considerations

Both sides reconfirmed that the Environmental Impact Assessment (EIA) is not needed but Initial Environmental Examination (IEE) is needed for the project, according to the Government of Lao PDR's regulation: "Decision on Approval and Promulgation of the List of Projects that shall Undertake IEE and EIA", No.697/PMO, WREA 2010 (Item 3.52 of the list on Page 6), as both sides had agreed in the minutes of discussion on the inception report meeting signed on January 19, 2012.

4. Field Survey II in Lao PDR

The following activities will be carried out in the field survey II:

- 1) Explanation and discussion of results of the First Study in Japan;
- 2) Formulation of Project components and plans;
- 3) Environmental and social considerations (2) (consideration of environmental management plan, checklist preparation, assistance to stakeholder meetings conducted by the GOL, etc.);
- 4) Investigation of natural conditions of the candidate site (topographical survey, soil exploration, etc.);
- 5) Investigation of social considerations related to the candidate site (questionnaire survey, etc.);
- 6) Formulation of operation and management (O&M) plan for the Project and considerations of

technical assistance.

Major study/survey points

- Project scoping
- Facility design (outline design)
- Operation and maintenance arrangements
- Financial study
- Environment/social considerations
- Preliminary costing
- Implementation schedule, procurement plan
- Necessity of Soft component

5. The Schedule of the Project

- Field Survey II (the beginning of April to the end of May, 2012)
- Design and cost estimation work in Japan (June to September, 2012)
- Explanation of the Draft Final Report (October, 2012)
- Submission of the Final Report (December, 2012)

APPENDIX I Case Study for WTP and for Alternative Target Years



Preparatory Survey on Project for Thankheh Water Supply Development in Khammouane Province in Lao People's Democratic Republic
Case Study for WTP and for Alternative Target Years

(Blue color implies less costly than the other case.)

Target Year	Water Demand (Daily Max) m ³ /day (Required Capas.)	Case	Supply Capacity (m ³ /day)		Preliminary Project Cost (Million Yen)	O&M Cost (Electrical Power Cost) (Ratio) *	Sustainability	Required Nos. of Operators in WTPs		Service Ratio in Urban Area (%)	Population Served	Population in Urban Area	
			Existing Wells	Existing WTP				New WTP	Total				Exisl. WTP
Case 1													
2015	12,000	Case 1-1	2,000	2,500	7,500	12,000	1.00	Life-time is unknown. Requiring periodical repair work.	0	9	15	36,000	55,900
		Case 1-2	2,000	Abandon	10,000	12,000	0.95	Life-time is generally 40 to 50 years for concrete structures.	non	9	9		
Case 2													
2018	15,500	Case 2-1	2,000	2,500	11,000	15,500	1.29	Life-time is unknown. Requiring periodical repair work.	6	9	15	46,000	59,700
		Case 2-2	2,000	Abandon	13,500	15,500	1.25	Life-time is generally 40 to 50 years for concrete structures.	non	9	9		
Case 3													
2020	17,000	Case 3-1	2,000	2,500	12,500	17,000	1.41	Life-time is unknown. Requiring periodical repair work.	6	9	15	50,000	62,300
		Case 3-2	2,000	Abandon	15,000	17,000	1.39	Life-time is generally 40 to 50 years for concrete structures.	non	9	9		

Confidential

*O&M Cost (Electrical Power Cost) is the ratio when the cost of Case 1-1 is assumed 1.00.

Water Demand Projection

Items / Year	2010	2015	2018	2020
Domestic Demand (m ³ /day)	3,754	5,604	7,255	7,980
Per Capita Consumption (L/capita/day)	150	155	157	160
Non Domestic Demand (m ³ /day)	1,609	2,402	3,109	3,420
Total Demand (m ³ /day)	5,513	8,161	10,521	11,660
NRW (%)	25%	20%	20%	20%
Daily Average Demand (m ³ /day)	7,151	10,098	12,955	14,250
Peak Factor	1.2	1.2	1.2	1.2
Daily Maximum Demand (m ³ /day)	8,600	12,000	15,500	17,100

Tentative Cost Breakdown

Case / Items	Rehabil. of Exisl. WTP	New WTPs ²	New Trans. & Distrib. System ³	Procurement of Equipment	Consultant Cost	Total ⁴
Case 1-1						Confidential
Case 1-2						
Case 2-1						
Case 2-2						
Case 3-1						

*1: The above costs were estimated roughly from the past similar projects, but not estimated from the exact drawings and quantities.
 In the final Survey Report, the Team will estimate based on the exact drawings and quantities.

*2: Cost of "New WTP" includes costs for intake facilities, clar & backwash reservoirs, etc.

*3: Cost of "New Trans. & Distrib. System" includes costs for transmission mains, distribution mains, and elevated tank.

THE MINUTES OF DISCUSSIONS
ON
THE MISSION FOR THE PREPARATORY SURVEY
ON
THAKHEK WATER SUPPLY DEVELOPMENT PROJECT
IN
LAO PDR
(EXPLANATION OF DRAFT REPORT)

In April 2012, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the 2nd Preparatory Survey Team on Thakhek Water Supply Development Project in Khammouane Province (hereinafter referred to as "the Project") to the Lao People's Democratic Republic (hereinafter referred to as "Lao PDR") and through discussions, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the survey.

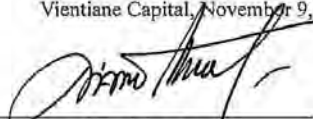
In order to explain and to consult the officials concerned of the Government of Lao PDR on the components of the draft report, JICA dispatched the Preparatory Survey Mission (hereinafter referred to as "the Mission") to Lao PDR, which was headed by Mr. Masato TOGAWA, Chief Representative of JICA Laos office, from November 6th to 9th, 2012.

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

Vientiane Capital, November 9, 2012



Mr. Masato TOGAWA
Chief Representative
Laos Office
Japan International Cooperation Agency
Japan



Mr. Khamthavy THAIPHACHANH
Director General
Department of Housing and Urban Planning
Ministry of Public Works and Transport
Lao People's Democratic Republic



Mr. Chanh BOUPHALIVANH
Director General
Department of Public Works and Transport
Khammouane Province
Lao People's Democratic Republic

ATTACHMENT

1. Components of the Draft Report

Lao side agreed and accepted in principle the components of the draft report as explained by the Mission. The project site map and components of the project are shown respectively in Annex-1 and Annex-2.

2. Japan's Grant Aid Scheme

Lao side understood the scheme of Japan's Grant Aid and would take the necessary measures and allocate necessary budget properly for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented. The Grant Aid Scheme and necessary measures were described in Annex-3.

3. Responsible and Implementing Agency

Both sides reconfirmed the responsible and implementing agencies as follows:

- 1) The Responsible Organization is the Department of Housing and Urban Planning, Ministry of Public Works and Transport (hereinafter referred to as "DHUP").
- 2) The Implementing Agencies are the Department of Public Works and Transport, Khammouane Province (hereinafter referred to as "DPWT") and Khammouane water supply state-owned enterprise (hereinafter referred to as "NPKM").

4. Schedule of the Survey

JICA will finalize the report and send it to the Government of Lao PDR around December 2012.

5. Other Relevant Issues

5-1 Project Cost Estimate and Budgetary Arrangement

The Mission explained to Lao side the estimated project cost as attached in Annex-5. Both sides confirmed that this cost estimate was provisional and would be examined further by the Government of Japan for its final approval. Furthermore, both sides confirmed that this project cost estimate is confidential, and should never be duplicated in any forms or released to any other parties until the relevant contracts are awarded by Government of Lao PDR, in order to secure fairness of tender procedure.

5-2 Necessary Budget to be covered by Lao Side

Japanese side explained necessary project cost to be covered by Lao side and necessary operation and maintenance cost as attached in Annex-5. DPWT agreed to secure necessary budget as attached in Annex-5.



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5-3 Service Area of the Project covered by Japan side

The Mission explained distribution area covered by Japan side was changed as shown in Annex-1 after 2nd field survey due to budget limitation. Lao side agreed the service areas, the locations of principal facilities, and the routes of transmission and distribution pipelines as shown in Annex-1 and Annex-2.

5-4 Soft components

Both sides confirmed that Lao side requested soft component for "Operation and Maintenance of WTP" and "Distribution Control" to the Mission in order to operate properly new water supply system introduced by the Project, and the Mission agreed it. NPKM shall assign proper staff for these soft components.

5-5 Environmental and Social considerations

Both sides confirmed Environmental and Social considerations issues as follows:

1) Monitoring for Environmental and Social considerations

Monitoring for Environmental and Social considerations will be conducted by DPWT/NPKM in accordance with the Monitoring Plan for the Project described in the Preparatory Study Report. The results of monitoring will be provided to JICA on a quarterly basis until 1 year after the completion of the project and by filling in the Monitoring Form attached as Annex-7 as part of progress reports.

2) Disclosure of Monitoring Result

JICA may disclose the part of the monitoring results as shown in Annex-7 conducted by DPWT/NPKM. JICA explained that JICA will disclose further information, when third parties request, subject to approval of DPWT/NPKM.

3) Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex 6.

5-6 Other undertakings of Lao side

The Mission explained to Lao side its undertakings as listed in Annex 4 and Lao side understood and promised to execute them. The following items are to be emphasized:

1) Exemption of financial duties

Both sides reconfirmed DHUP shall take necessary measures to facilitate project implementation, such as exemption of Value Added Tax, customs duties, and any other taxes and fiscal levy charges in Lao PDR arisen from the Project activities, collaborating with the signer of the Grant Agreement of the recipient side.



2) Installation of distribution and service pipe by 2020

Both sides reconfirmed Lao side shall install necessary distribution and service pipes up to 2020, in accordance with Lao PDR's policy that aims to cover 80% people of urban area with piped water in 2020.

3) Demolishing of Existing Intake facility and Water Treatment Plant

Both sides confirmed Lao side shall remove existing intake facility and Water Treatment Plant (WTP) after completion of the project components by Japanese grant aid, because they will not be used after constructions of new intake facility and WTP.

4) Power and Telephone Lines to the Project Sites

Both sides confirmed Lao side shall install the power and telephone line to the project site, and Japan side will install substation equipment in the premises of new intake facility and WTP.

Annex 1 Project Site Map

Annex 2 Components of the Project

Annex 3 JAPAN'S GRANT AID SCHEME

Annex 4 Major Undertakings to be taken by Each Government

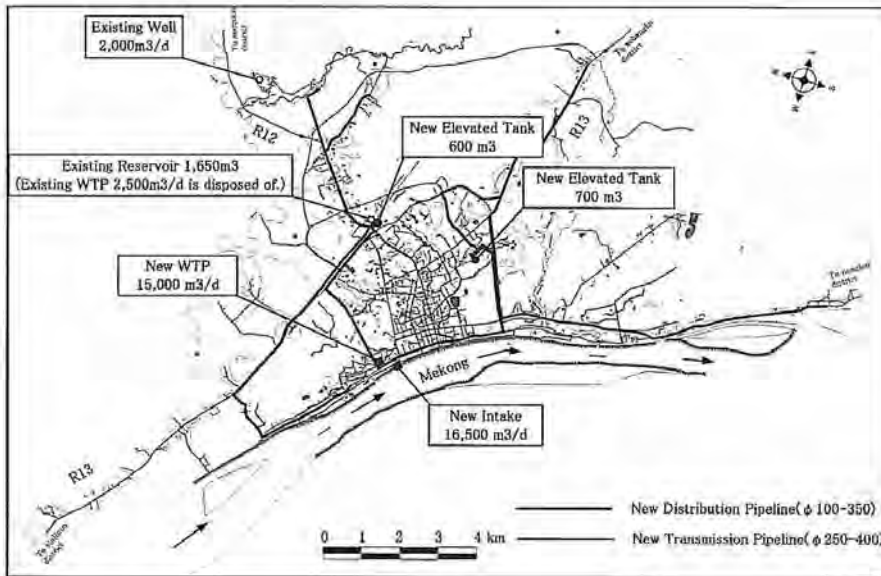
Annex 5 Cost Estimation

Annex 6 Check List (Environmental and Social Considerations)

Annex 7 Monitoring Form for Environmental and Social Considerations



Annex-1: Project Site Map



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Annex-2: Components of the Project

Project Summary

	By Japan Grant Aid	By Lao Government
1. Constructions		
(1) Water Intake Facilities	- Intake Facility - 3 intake submergible pumps	- Electricity Supply Line (150 kVA)
(2) Raw Water Transmission Pipeline	- Intake to WTP (DIP Φ 450 mm, L \approx 550m)	
(3) Water Treatment Plant	- Plant Capacity: 15,000 m ³ /day - Mixing Basin - Flocculation Basin - Sedimentation Basin - Rapid Filtration Basin - Clear & Backwash Reservoir - Transmission Pump - Electrical Equipment - Chemical Equipment - Administration Building	- Electricity Supply Line (500 kVA)
(4) Treated Water Transmission Pipeline	- WTP to Pakdong ET (DIP Φ 250-300 L \approx 6,100m) - WTP to KM4 Reservoir (DIP Φ 350-400 L \approx 4,800m)	
(5) Elevated Tank	- Pakdong ET (V=700 m ³) - KM4 ET (V=600 m ³) - Modify of the Existing KM4 ground reservoir	
(6) Distribution Main Pipeline	- ETs to Expansion Areas (L \approx 40km) (DIP Φ 350 L=578m) (HDPE Φ 300 L=2,318m) (HDPE Φ 250 L=9,992m) (HDPE Φ 200 L=5,795m) (HDPE Φ 150 L=8,998m) (HDPE Φ 100 L=12,051m)	- Extension of Distribution Main Pipelines (L \approx 10km) (HDPE Φ 150 L=5,780m) (HDPE Φ 100 L=4,220m)
(7) Distribution Sub Main Pipeline		- Branches from Distribution Main Pipelines (L \approx 33km) (HDPE Φ 80 L=7,530m) (HDPE Φ 65 L=6,260m) (HDPE Φ 55 L=5,180m) (HDPE Φ 40 L=4,690m) (HDPE Φ 30 L=4,790m) (HDPE Φ 25 L=4,550m)
(8) Service Connections		- House Connection (3,800 households)
2. Procurements		
(1) Procurement of the Equipment	- Water quality analysis equipment at laboratory in administration building of WTP	- Water meter (2000 pc),
(2) Removal of Existing Facility		- Existing Water Treatment Plant - Existing Intake Pumping Station
3. Soft Components		
(1) Technical Assistance	- Operation and Maintenance of WTP - Distribution Control	

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Annex-3: JAPAN'S GRANT AID SCHEME

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, JICA was reborn on October 1, 2008. Based on the law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Project, for Fisheries and for Cultural Cooperation, etc.

Grant Aid is non-reimbursable fund to a recipient country 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. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures (Attachment 1)

Japanese Grant Aid is conducted as follows-

- Preparatory Survey (hereinafter referred to as "the Survey")
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Determination of Implementation by Exchange of Notes (hereinafter referred to as "the E/N")
 - The Notes exchanged between the GOJ and a Government of recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid scheme.

JICA 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) Selection of Consultants

For smooth implementation of the Survey, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the E/N will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

The consultant firm(s) used for the Survey will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A, in order to maintain technical consistency.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority 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, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals", (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

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

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Attachment 1.

(6) Proper Use

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

(7) Export and Re-export

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

(8) Banking Arrangements (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 a bank in Japan (hereinafter referred to as "the Bank"). JICA 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 JICA under an Authorization to Pay (A/P) issued by the Government of the 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.

(10) Social and Environmental Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and JICA environmental and social considerations guideline.



Attachment for Annex-3 FLOW CHART OF JAPAN'S GRANT AID PROCEDURES

Stage	Flow & Works	Recipient Government	Japanese Government	JICA	Consultant	Contractor	Others
Application	Request (T/R : Terms of Reference)	✓					
	Screening of Project → Evaluation of T/R → Project Identification Survey		✓	✓			
Project Formulation & Preparation	Preparatory Survey → Field Survey Home Office Work Reporting	✓	✓	✓			
	Preparatory Survey 2 (Outline Design) → Selection & Contracting of Consultant by Proposal → Field Survey Home Office Work Reporting	✓	✓	✓	✓		
	Explanation of Draft Final Report → Final Report	✓	✓	✓	✓		
Appraisal & Approval	Appraisal of Project		✓				
	Inter Ministerial Consultation		✓				
	Presentation of Draft Notes	✓	✓				
	Approval by the Cabinet		✓				
Implementation	E/N & G/A (E/N : Exchange of Notes, G/A : Grant Agreement)	✓	✓	✓			
	Banking Arrangement	✓					✓
	Consultant Contract → Verification → Issuance of A/P	✓		✓	✓		
	Detailed Design & Tender Documents → Approval by Recipient Government → Preparation for Tendering	✓		✓	✓		
	Tendering & Evaluation	✓		✓	✓	✓	
	Procurement / Construction Contract → Verification → A/P	✓		✓	✓	✓	
	Construction → Completion Certificate by Recipient Government → A/P	✓		✓	✓	✓	
	Operation → Post Evaluation Study (A/P : Authorization to Pay)	✓		✓			
Evaluation & Follow up	Ex-post Evaluation → Follow up	✓		✓			

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Annex-4: Major Undertakings to be taken by Each Government

NO	Items	To be covered by Grant Aid	To be covered by Recipient
1	To secure land, construct gates and fences in and around the site		•
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) 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	(•)	(•)
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 the transportation and installation of the equipment		•
9	To give due environmental and social consideration in the implementation of the project and provide the results of monitoring with format attached as Annex-7		•
10	To remove existing WTP and intake facility after completion of the Project		•
11	To install transmission, distribution, and service pipes (Details are shown in Annex-2).	•	•
12	To install power and telephone lines to the project sites		•

(B/A: Banking Arrangement, A/P: Authorization to Pay)

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Cost Estimations

1. Project Components by Japan Grant Aid

Confidential

2. Project Components by Lao Government

Total Project Cost borne by Lao Government: approximately 1,640,500 USD (13.2 Billion Kip).

(1) Electricity Supply Cost to Intake Facility and Water Treatment Plant

	Capacity	Estimated amount, USD (billion Kip)
Intake Facility	150 kVA	6,200 (0.05)
Water Treatment Plant	500 kVA	12,400 (0.10)
Total		18,600 (0.15)

*Estimated amount is based on EDL's quotation via NPKM

(2) Distribution Main Pipeline

	Pipe Size (mm)	Total Length (km)	Estimated amount, USD (billion Kip)
Installation of Distribution Main Pipeline	150	5.78	166,400 (1.34)
(Lao side portion)	100	4.22	104,300 (0.84)
Total		10.00	270,700 (2.18)

*Estimated amount is based on installation by local contractor.

(3) Sub-main Pipeline

	Pipe Size (mm)	Total Length (km)	Estimated amount, USD (billion Kip)
Installation of Distribution Sub-main Pipeline for existing distribution network	80	0.22	5,000 (0.04)
	65	0.71	14,900 (0.12)
Installation of Distribution Sub-main Pipeline from new main pipeline	80	7.31	167,700 (1.35)
	65	5.55	115,500 (0.93)
	55	5.18	90,700 (0.73)
	40	4.69	73,300 (0.59)
	30	4.79	65,800 (0.53)

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	25	4.55	48,400	(0.39)
Total		33.00	581,300	(4.68)

*Estimated amount is based on installation by local contractor.

(4) Service Connection Cost except Water Meter (paid by Customers)

	Number of household	Estimated amount, USD (billion Kip)
Service Connection	3,800	534,000 (4.30)

*Estimated amount is based on a quotation via NPKM

(5) Water Meter Cost (paid by Customers)

	Quantity	Estimated amount, USD (billion Kip)
Water Meter	3,800	86,900 (0.70)

(6) Removal of Existing Water Treatment Plant

	Description	Estimated amount, USD (billion Kip)
Existing Water Treatment Plant	2,500m ³ /day, Constructed of Steel Plate and RC	145,300 (1.17)
Existing Intake Pumping Station	Horizontal Pump 4 sets, Submersible Pump 2 sets and a Barge	3,700 (0.03)
Total		149,000 (1.20)

3. Operation and Maintenance

Annual O&M Cost Estimation of Water Supply Facilities in Thakhek District from the year 2020

(Unit: million Kip)

No.		Estimated Amount
1	Electricity cost	2,071.23
2	Chemical cost	908.89
3	Personal cost	592.20
4	Fuel cost	88.48
5	Others	5.40
6	Maintenance cost	154.17
7	Depreciation cost *	2,040.00
8	Total costs (per annum)	5,860.37

Note: *, Depreciation cost estimates only for mechanical equipment which shall be replaced by NPKM, excluding that for the other facilities.

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Check List (Environmental and Social Considerations)

Environmental Social Consideration Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) Y (b) Y (c) N (d) Y	(a) The IEE report was prepared and was approved (b) No conditions added (c) The approval of usage of Mekong River for the intake tower was completed
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) By holding the stakeholder meeting, adequate explanation was done and stakeholders agreed the project basically. (b) Comments were stated and requests were submitted from the stakeholders and countermeasures will be disclosed.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations? (a) Is there a possibility that chlorine from chlorine storage facilities and chlorine injection facilities will cause air pollution? Are any mitigating measures taken? (b) Do chlorine concentrations within the working environments comply with the country's occupational health and safety standards?	(a) Y (a) N (b) Y	(a) Alternative plans are partially explained in the stakeholder meeting and fully described in the report. (a) Low concentration chlorine (e.g. 2%) is planned to be used for good working condition and prevention of air pollution. (b) By using low concentration chlorine and installing ventilators, the safety standard (3mg/m ³) will be complied with.
2 Pollution Control	(2) Water Quality	(a) Do pollutants, such as SS, BOD, COD contained in effluents discharged by the facility operations comply with the country's effluent standards?	(a) Y	(a) Except SS, even raw water can comply with the standards already. SS is going to be removed in a sludge pond and only purified supernatant will be discharged.
	(3) Wastes	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed in accordance with the country's regulations?	(a) Y	(a) The country's regulation allows to discharge sludge directly but a sludge pond will separate sludge and it will be dried, transferred and dumped in a designated site, according to the current design.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
2 Pollution Control	(4) Noise and Vibration	(a) Do noise and vibrations generated from the facilities, such as pumping stations comply with the country's standards?	(a) Y	(a) The intake pump will be installed under water and little noise can be produced. The transmission pump will be installed in the WTP site being covered with RC walls and noise will not reach the boundary of the site.
	(5) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N/A	(a) No groundwater will be exploited.
3 Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The project sites are all outside of protected areas. No adverse impacts are expected by the project.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?(b) Does the project site or discharge area encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?(d) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) N/A (d) N	(a) The sites are all within developed lands. (b) As above (c) / As above (d) Even in a significant dry season, the intake will affect only 0.01% of Mekong River water flow.
	(3) Hydrology	(a) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect surface water and groundwater flows?	(a) N	(a) Even in a significant dry season, the intake will affect only 0.01% of Mekong River water flow.

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Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		<p>(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?</p> <p>(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?</p> <p>(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?</p> <p>(d) Is the compensations going to be paid prior to the resettlement?</p> <p>(e) Is the compensation policies prepared in document?</p> <p>(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>(g) Are agreements with the affected people obtained prior to resettlement?</p> <p>(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p>	<p>(a) N (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A</p>	<p>(a) No resettlement occurs (b) As above (c) As above (d) As above (e) As above (f) As above (g) As above (h) As above (i) As above (j) As above</p>
4 Social Environment	(1) Resettlement			
	(2) Living and Livelihood	<p>(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>(b) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect the existing water uses and water area uses?</p>	<p>(a) Y (b) N</p>	<p>(a) Construction activities can cause inconvenience to inhabitants but the countermeasures for impact minimization were agreed in the stakeholder meeting. (b) Positive impact such as prevention of ground water exploitation is possible, instead.</p>
	(3) Heritage	<p>(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?</p>	<p>(a) N</p>	<p>(a) The sites are all within developed lands and no heritage exists there.</p>

Category	Environmental Item	Main Check Items	Yes/No	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5 Others	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?(b) What are the items, methods and frequencies of the monitoring program?(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment and adequate budget to sustain the monitoring framework)?(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) Y (c) Y (d) Y	(a) The monitoring plan was prepared according to the EMP.(b) The monitoring contents were decided by consultation between the proponent and authorities.(c) The monitoring plan includes such components.(d) As above
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Dam and River Projects checklist should also be checked.	(a) N/A	(a) No dams are included as project components and the impact to Mekong River is very little.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N/A	(a) The project does not have possibility of significant adverse impacts on environment.

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.

In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.

Monitoring Form (Environmental and Social Considerations)

Monitoring Results of Thakhek Water Supply Development Project (Before and During the Construction Phases)

1. Monitoring Results of Noise Pollution

Table M-1-1 Results

No.	Date	Measured Value															Unit: dB(A)
		St.1	St.2	St.3	St.4	St.5	St.6	St.7	St.8	St.9	St.10	St.11	St.12	St.13	St.14	St.15	
Pre-Construction Phase (Baseline)																	
1																	
2																	
Construction Phase																	
1																	
2																	
3																	
4																	
5																	

Table M-1-2 Station

Measured Station	Adopted Standard*)	Detailed location
St.1		
St.2		
St.3		
St.4		
St.5		
St.6		
St.7		
St.8		
St.9		
St.10		
St.11		
St.12		
St.13		
St.14		
St.15		

*) Refer to Table M-1-3

Table M-1-3 National Standard values (Lao PDR)

Type of Area	Standard Value in dB(A)		
	6.00-18.00	18.00-22.00	22.00-6.00
Quiet areas: hospitals, libraries, treatment places, kindergartens and schools	50	45	40
Residential areas: hotels and houses	55	55	45
Commercial and service areas	70	70	50
Small industrial factories located in residential areas	70	70	50

Table M-1-4 Other Standard values

Country	Industrial Area	Commercial Area	Residential Area	Silence Zone
U.S(E.P.A)	70	60	55	45
W.H.O	65	55	55 / 45 (day / night)	45 / 35 (day / night)
E.C	65	55	55 / 45 (day / night)	45 / 35 (day / night)

2. Monitoring Results of Dust Pollution

Table M-2-1 Results

No.	Date	Measured Value															Item: Dust	Mark: "✓"
		St.1	St.2	St.3	St.4	St.5	St.6	St.7	St.8	St.9	St.10	St.11	St.12	St.13	St.14	St.15		
Construction Phase -1 st Year																		
1																		
2																		
3																		
4																		
5																		
6																		
Construction Phase -2 nd Year																		
1																		
2																		
3																		
4																		
5																		
6																		

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Construction Phase -3 rd Year											
1											
2											
3											

Observed Station	Station	Detailed location	Remark
St.1			
St.2			
St.3			
St.4			
St.5			
St.6			
St.7			
St.8			
St.9			
St.10			
St.11			
St.12			
St.13			
St.14			
St.15			

Country	Standard values		Item: Dust (as PM10)	Unit: µg/m ³
	Annual mean	Daily mean		
Lao PDR	-	-		
U.S.(E.P.A)	50	150		
W.H.O	20	50		
E.C	40	50		

3. Monitoring Results of Waste Management

Table M-3 Result as of (Date: _____) Item: Waste Management Mark: "✓" if management is good

Station	Location	Kind of Waste	Whole amount (m ³)	Receiving Dumping Site	Situation of General Waste Management/Remark
Construction Phase - No. (1/2)	□ 1 st Year / □ 2 nd Year / □ 3 rd Year				
St. 01					
St. 02					
St. 03					
St. 04					
St. 05					
St. 06					
St. 07					
St. 08					
St. 09					
St. 10					
St. 11					
St. 12					
St. 13					
St. 14					
St. 15					
St. 16					
St. 17					
St. 18					
St. 19					
St. 20					

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4. Monitoring Results of Safety Management

Table M-4 Result as of (Date: _____) Item: Safety Management Mark: "✓" if management is good

Station	Location	Description of Incident (Injury, Accident and so on)	Situation of Fencing and Other Safety Management/Remark
Construction Phase - No. (1/2)	□ 1 st Year / □ 2 nd Year / □ 3 rd Year		
St. 01			
St. 02			
St. 03			
St. 04			

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St. 05	
St. 06	
St. 07	
St. 08	
St. 09	
St. 10	
St. 11	
St. 12	
St. 13	
St. 14	
St. 15	

5. Monitoring Results of Sanitary Management

Table M-5-1 Result as of (Date: _____) Item: Sanitary Management Mark: "✓" if the item is well conducted

Interviewee	Items indicated by Sanitary Program				Remark
	(i)	(ii)	(iii)	(iv)	
Construction Phase - No. (1/2)	<input type="checkbox"/> 1 st Year	<input type="checkbox"/> 2 nd Year	<input type="checkbox"/> 3 rd Year		
In and around the Labour Camps					
LC-01					
LC-02					
LC-03					
LC-04					
LC-05					
LC-06					
LC-07					
LC-08					
LC-09					
LC-10					
LC-11					
LC-12					
LC-13					
LC-14					
LC-15					
In and around the Construction Sites					
St.1-1					
St.1-2					
St.1-3					
St.2-1					
St.2-2					

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St.2-3									
St.3-1									
St.3-2									
St.3-3									
St.4-1									
St.4-2									
St.4-3									
St.5-1									
St.5-2									
St.5-3									
St.6-1									
St.6-2									
St.6-3									
St.7-1									
St.7-2									
St.7-3									
St.8-1									
St.8-2									
St.8-3									
St.9-1									
St.9-2									
St.9-3									
St.10-1									
St.10-2									
St.10-3									
St.11-1									
St.11-2									
St.11-3									
St.12-1									
St.12-2									
St.12-3									
St.13-1									
St.13-2									
St.13-3									
St.14-1									
St.14-2									
St.14-3									
St.15-1									
St.15-2									
St.15-3									

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Monitoring Results of Thakhek Water Supply Development Project (Operation Phase)

Monitoring Results of Total Suspended Solids

Table 1 Concentration Values of Total Suspended Solids (TSS) Units: mg/L Country's Standard: 40 mg/L (EC: 35 mg/L, WB: 50 mg/L)

Y / M	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015												
2016												

Table 2 Detail of Measurement

Year	Month	Day	TSS Value (mg/L)	Measurer	Certifier	Remark
2015	1					
	2					
	3					

5. Soft Component (Technical Assistance) Plan

5.1 Background of Soft Component

Water Supply facilities constructed by this project include intake facility, raw water transmission pipe, WTP, transmission pump, transmission pipe, elevated reservoir, and distribution pipe, etc. By the establishment of water supply facility of this project, capacity of WTP in Thakhek district is expanded to 15,000 m³/day. In order to maintain the water supply facility perpetually, O&M staff of NPKM for Thakhek district must obtain the enough skills to perform their tasks by the start of operation.

In this project, it is proposed to implement the Soft Component in the following 2 fields;

- 1) Operation and Maintenance (O&M) of WTP
- 2) Distribution Control

1) Operation and Maintenance (O&M) of WTP

Currently, existing WTP in Thakhek district supplies treated water with high turbidity, that is, water treatment is not conducted effectively. The causes of it includes; first; WTP supplies more water than its designed capacity, second; flocculation is not sufficient because chemical dosing volume is not appropriate, third; turbid materials are not removed fully at sedimentation basin and filter. On the other hand, actual data such as; chemical dosing volume, backwash, and flow rate inside WTP, which are necessary for continuous proper water treatment, are not recorded fully and not stored orderly. It makes insufficient system to enable relevant operation continuously. At completion of the project, it is difficult to imagine that appropriate treatment will be automatically realized without special training for more O&M staff (including new staff) than present one, caused by capacity expansion by this project and staff movement to the other area. Therefore, training is required for O&M of entire WTP in order to produce safety and clean water with sufficient treatment by generating the capacity of new WTP.

Concerning the operations of individual equipment as valve or pump, contractor responsible for procurement and construction shall explain them at commissioning of the facility. Nevertheless, training for O&M of entire WTP by coordinated operations of some equipment, for example, flow rate control inside WTP by flow control valve at intake facility and control of chemical dosing, etc. is out of scope of the contractor. Consultant who designed the WTP is suitable to teach the skill. Therefore, as Soft Component of this project, training is conducted concerning O&M of WTP to enable effective treatment. Furthermore, regular data acquisition, record, and keeping of them shall also be guided in the Soft Component, for the staff to be able to use the data for O&M after that. Finally, O&M manual for WTP shall be prepared to continuously generate the treatment capacity. Regarding the water quality analysis and control, it is assumed that required training will be conducted by Laos side before the start of Soft Component. Therefore, an input plan is prepared assuming that water quality analysis and control are excluded from this Soft Component and from its manual.

2) Distribution Control

In the new transmission and distribution system expected to be established by this project, treated water from new WTP is separated by 2 transmission pipes to reach at new elevated tank and the existing WTP site (refer to **Figure 5.1-1**). Transmitted water to existing WTP site is again separated into 2 ways; one is to existing distribution reservoir and the other is to new elevated tank at existing WTP site. In other words, treated water from a single WTP is transmitted into total 3 ways (1 distribution reservoir and 2 elevated tanks). On the other hand,

transmission pumps are installed at new WTP. In order to keep the water levels of these 3 water tanks with different altitude relevantly, proper operation at the right time is required to open or close the flow control valve and to switch on or off the transmission pumps at new WTP by observing the water levels of 3 tanks. Here, new skills are necessary to operate transmission pumps and flow control valves integrally to distribute necessary water to each 3 lines relevantly by observing water levels of 3 tanks, and to record, keeping, and usage of water level data, etc.

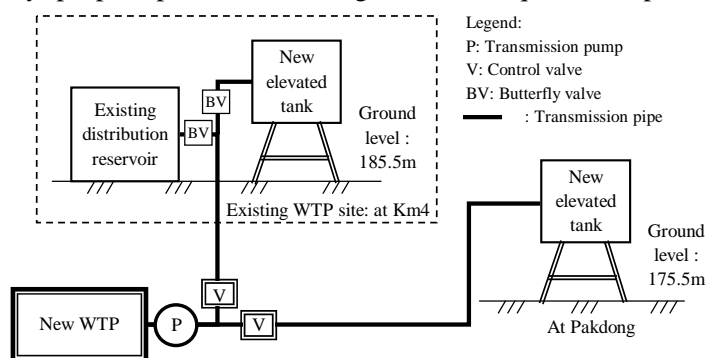


Figure 5.1-1 Image of related facilities of Distribution Control

Regarding the operation of individual machinery equipment including transmission pump and flow control valve, contractor explains them at commissioning. Integral operation of these equipments and necessary data record are the specific skills for this project which have not yet conducted by NPKM. Then, Soft Component is applied to the trainings for distribution control and data record, recordkeeping, and usage with preparing the necessary data formats.

JICA implements the Technical Cooperation Project for 3 Nam Papis in Laos including NPKM for the period between August 2012 and August 2017 to improve the capacity of water supply management in parallel with this project. Therefore, input for this Soft Component makes limited volume, then, the Technical Cooperation Project is supposed to monitor the O&M conditions in Thakhek district utilizing manuals to be prepared by this Soft Component and support the O&M capacity improvement by NPKM.

5.2 Purpose of Soft Component

Purpose of the Soft Component of this project is as follows;

“O&M staffs of NPKM for Thakhek district record and keep the data, and are able to produce properly treated safe water based on the data. Also, they are able to control the transmitted water volume by operating flow control valve and transmission pump appropriately.”

5.3 Outputs of Soft Component

Outputs of Soft Component of this project are as follows;

1) Operation and Maintenance of WTP

Staffs of Treatment Plant Section in NPKM understand the water treatment system of this project, then, they are able to produce properly treated safe water based on data.

2) Distribution Control

Staffs of House Connection Section and related staffs of Treatment Plant Section in NPKM understand the transmission and distribution system of this project, and learn proper manner of operations of transmission pump and flow control valve. Then, they are able to transmit the treated water to distribution reservoir and elevated tanks (2 units) in an appropriate manner.

5.4 Evaluation of Achievement of Outputs

Table 5.4-1 shows the methodology of evaluation of achievements for each field and output of Soft Component.

Table 5.4-1 Methodology of Evaluation of Achievement of Each Output

Field	Output	Achievements	Evaluation Method
O&M of WTP	Staffs of Treatment Plant Section in NPKM understand the water treatment system of this project, then, they are able to produce properly treated safe water based on data.	<ol style="list-style-type: none"> Staff can record WTP operation data, such as; water vol. (intake, transmitted), chemical dosing vol., backwash, no. / hours of pumps operating, every day. Chemicals are dozed properly based on relevant chemical consumption decided by water quality control. 	<ol style="list-style-type: none"> Records of water vol., chemical dosing vol., no. / hours of operating pumps Record of chemical consumption Manual on all of the above.
Distribution Control	Staffs of House Connection Sec. and related staffs of Treatment Plant Sec. in NPKM understand the transmission and distribution system of this project, and learn relevant manner of operations of transmission pump and flow control valve. Then, they are able to transmit the treated water to distribution reservoir and elevated tanks (2 units) in an appropriate manner.	<ol style="list-style-type: none"> Staff can record the water level of elevated tanks and distribution reservoir every day. Staff can record the hourly water pressure at lowest water pressure point found by distribution network analysis Staff can operate transmission pumps and flow control valves properly with least power consumption, by monitoring the power consumption of pumps, flow volume, water pressure and water quality of transmission system and distribution system. 	<ol style="list-style-type: none"> Water level record of elevated tanks and distribution reservoir. Water pressure record of lowest pressure point Existence of related record and related manual.

5.5 Activities of the Soft Component (Input Plan)

Details of activities of the Soft Component (Input Plan) are shown in Table 5.5-1. Interpreter / Supporting staffs (local staffs) are planned to be employed 2 persons 1.90 M/M each. As will be explained in “Section 5.7 Implementation Schedule of Soft Component”, Japanese Experts (2 persons) will be dispatched to Laos 2 times each. Before going back to Japan at 1st field work, the Experts shall give homework to NPKM staffs, such as filling up the record formats. Local staffs for Interpreter / Supporting guide and assist the homework of NPKM staffs in addition to the report to Experts. Therefore, the assignments of the local staff are set longer than Japanese Expert for 0.30 M/M each.

Table 5.5-1 Activities of the Soft Component (Input Plan)

Field	Output	Activities	Necessary input
O&M of WTP	Staffs of Treatment Plant Section in NPKM understand the water treatment system of this project, then, they are able to produce properly treated safe water based on data.	<ol style="list-style-type: none"> Lecture on entire WTP system (training material preparation and lecture), Check the existing WTP related records, Preparation of WTP operation record formats to fill in records of water volume (intake, transmitted), chemical consumption, backwash, number and hours of operated pumps, etc., Training of how to fill in the above formats, Preparation of WTP O&M manual, Lecture and actual training of the above 	<p>WTP O&M Expert (Japanese Consultant): 1 person by 1.6 M/M (2 times dispatches at rainy season and dry season)</p> <p>Interpreter / Supporting (Local Staff): 1 person by 1.9 M/M</p>

		manual.	
Distribution Control	Staffs of House Connection Sec. and related staffs of Treatment Plant Sec. in NPKM understand the transmission and distribution system of this project, and learn relevant manner of operations of transmission pump and flow control valve. Then, they are able to transmit the treated water to distribution reservoir and elevated tanks (2 units) in an appropriate manner.	<ol style="list-style-type: none"> Lecture on entire transmission & distribution system (training material preparation and lecture), Check existing transmission & distribution system related record, Preparation of formats to fill in the records of water levels of elevated reservoir and distribution reservoir, water pressure of lowest water pressure point, and so on, Training of how to fill in the above formats, Preparation of O&M manual of transmission & distribution systems (operation procedures of pumps and valves, but excluding NRW countermeasures), Lecture and actual training of the above operation schedule and manual. 	Distribution Control Expert (Japanese Consultant): 1 person by 1.6 M/M (2 times dispatches at rainy season and dry season) Interpreter / Supporting (Local Staff): 1 person by 1.9 M/M

Assignment schedule of the Soft Component is shown in **Figure 5.5-1**.

Figure 5.5-1 Assignment Schedule of Soft Component

	Title	Name	Month	1st	2nd	3rd	4th	5th	M/M			
									Sub total		Total	
									Field work	Home work	Field work	Home work
Japanese Expert	WTP O&M Expert			0.8				0.8	1.60	0.00	1.60	0.00
	Distribution Control Expert			0.8				0.8	1.60	0.00	1.60	0.00
									3.20	0.00	3.20	0.00
Local Staff	Interpreter / Support 1 (WTP)			0.8	0.1	0.1	0.1	0.8	1.90	0.00	1.90	0.00
	Interpreter / Support 2 (Distribution Control)			0.8	0.1	0.1	0.1	0.8	1.90	0.00	1.90	0.00
Report			Progress Report			Completion Report						

Legend :  Japanese expert & Local staff  Local staff only

5.6 Procurement Method of Resources for Soft Component Implementation

In this Soft Component, the following 2 Engineers are planned to be dispatched. The purpose of this Soft Component is to be able to produce properly treated safe water at WTP responding to water quality change of each season, and to be able to control the transmitted water volume by coordinated operation of flow control valve and transmission pump in an appropriate manner. Under the present O&M conditions, it is considered difficult for local engineer to achieve the expected outputs. Therefore, it is proposed to assign the experienced Japanese consultants for these tasks. This Soft Component is conducted through direct support of Japanese consultants.

1) WTP O&M Expert

A Japanese consultant is dispatched as a WTP O&M Expert who is acquainted with operation and maintenance (O&M) of WTP. A contractor shall teach the operation of each mechanical and electrical equipment. The Expert provides the trainings of coordinated operation of water flow control inside WTP and chemical dosing, support on related manual preparation, and trainings of record, keeping, and usage of related information / data, all for staffs to enable effective water treatment.

2) Distribution Control Expert

A Japanese consultant is dispatched as a Distribution Control Expert who is acquainted with operation of transmission and distribution system. A contractor shall teach the operation of each mechanical and electrical equipment. The Expert provides trainings of coordinated operation of transmission pump and flow control valve to keep the proper distribution volume and pressure of water from distribution reservoir and elevated tanks. The Expert also give training and support for the NPKM staffs to know the necessary information for the operation and to record, keeping, and usage of related information / data.

5.7 Implementation Schedule of Soft Component

Implementation schedule of the Soft Component is shown in **Figure 5.7-1**.

Figure 5.7-1 Implementation Schedule of Soft Component

No.	Activities	Month	1st					2nd					3rd					4th					5th				
1. Operation and Miantenance of WTP			[Gantt chart for Section 1: Black bars for Japanese expert & Local staff, blue bars for Local staff only]																								
1)	Lecture on entire WTP system (training material preparation and lecture)		[Gantt chart for activity 1: Black bar in 1st month, blue bar in 1st month]																								
2)	Check the existing WTP related records		[Gantt chart for activity 2: Black bar in 1st month]																								
3)	Preparation of formats to fill in records of water volume, chemical consumption, backwash, number and hours of operated pumps, etc.		[Gantt chart for activity 3: Black bar in 1st month]																								
4)	Training of how to fill in the above formats (During the absence of Japanese Expert, local staff follows the task.)		[Gantt chart for activity 4: Black bars in 1st, 2nd, 3rd, 4th months; blue bars in 2nd, 3rd, 4th months]																								
5)	Preparation of WTP O&M manual		[Gantt chart for activity 5: Black bar in 5th month]																								
6)	Lecture and actual training of the above manual		[Gantt chart for activity 6: Black bar in 5th month]																								
2. Distribution Control			[Gantt chart for Section 2: Black bars for Japanese expert & Local staff, blue bars for Local staff only]																								
1)	Lecture on entire transmission & distribution system (training material preparation and lecture)		[Gantt chart for activity 1: Black bar in 1st month, blue bar in 1st month]																								
2)	Check the existing transmission & distribution system related record		[Gantt chart for activity 2: Black bar in 1st month]																								
3)	Preparation of formats to fill in records of water levels of elevated reservoir & distribution reservoir, water pressure of lowest pressure point		[Gantt chart for activity 3: Black bar in 1st month]																								
4)	Training of how to fill in the above format (During the absence of Japanese Expert, local staff will follow the task.)		[Gantt chart for activity 4: Black bars in 1st, 2nd, 3rd, 4th months; blue bars in 2nd, 3rd, 4th months]																								
5)	Preparation of O&M manual of transmission & distribution systems (including operation schedule of transmission pump but excluding NRW countermeasures)		[Gantt chart for activity 5: Black bar in 5th month]																								
6)	Lecture and actual training of the above manual		[Gantt chart for activity 6: Black bar in 5th month]																								
	Submission of soft component progress report		[Gantt chart for activity: Black bar in 5th month]																								
	Submission of Completion Report		[Gantt chart for activity: Black bar in 5th month]																								

Legend : [Black bar] Japanese expert & Local staff [Blue bar] Local staff only

Field work of each Expert is divided into 2 times, to assign the homework to NPKM staff between the field works of the Experts. NPKM staffs are expected to do the homework, such as; filling in the several formats using the observation data of existing water facilities. At the next field work, the Experts are expected to follow-up the results of homework, by checking how to fill in the formats.

The purpose of this Soft Component is that NPKM staffs become to operate and maintain the completed water supply facilities properly. The last field work of the Expert is supposed to be held at the timing of completion of project facilities including new WTP and transmission & distribution facilities.

5.8 Outputs of Soft Component

Outputs of the Soft Component are as follows;

- Operation and Maintenance of Soft Component

Training material for lecture, data input formats, WTP O&M manual including information transmission flow chart (manual excludes the activities of water quality analysis & control).

- Distribution Control

Training material for lecture, data input formats, O&M manual of transmission & distribution system (manual excludes the activities of NRW countermeasures).

Followings are the reports of Soft Component to be informed to Laos side and Japanese side;

- Progress Report of Soft Component
- Completion Report of Soft Component

These reports will be prepared in accordance with JICA's "Soft Component Guidelines for Consultants, 3rd Edition" (October 2010).

5.9 Obligations of Recipient Country Concerning Soft Component

It is necessary to allocate the relevant number of staffs in Treatment Plant Section and House Connection Section which are target group of this Soft Component. Personnel procurement and allocation are the obligation of Laos side. The staff allocation to the target group including basic staff training in NPKM must be completed before the start of Soft Component.

For the training of O&M of WTP, there must be staffs in NPKM who are familiar with water quality control. It is difficult to generate the planned outputs by designated inputs within planned period, unless the water quality staffs of NPKM master the skills of water quality

analysis and Jar test which is to decide the optimal chemical dosing volume before the implementation of this Soft Component. Laos side must arrange to provide the training of water quality control including water quality analysis, jar test, how to prepare and treat chemical and coagulant aids, to the water quality staff in NPKM by utilizing Training Center of NPNL, and so on.

6. Other Relevant Data (List of Collected Data)

No.	Name	Figure Book · Video Map · photo etc	Original · Copy	Issuing institution	The date of issue
G1	Disital Map of Thahkek area	CD (CAD)	Copy	Department of Map, Vientiane	2012
G2	Topographical Map of Thahkek area (1/100,000)	Map	Original	Department of Map, Vientiane	1987
G3	Topographical Map of Thahkek area (1/10,000)	Map	Original	Department of Map, Vientiane	2012
W1	Lower Mekong Hydrologic Year Book 2001-2002	CD	Copy	Mekong River Commission	2004
W2	Lower Mekong Hydrologic Year Book 2003-2004	CD	Copy	Mekong River Commission	2004
W3	Mekong River (Gage Height in Mater at Thekhek) 1968-2001	Data	Copy	Mekong River Commission	2012
W4	Mekong River (Gage Height in Mater at Thekhek) 2002-2011	Data	Copy	Department of Meteorology	2012
W5	Xebanfai Water Supply Project	Report	Copy	NPNL	2010
W6	Water Production Summary 2010	Report	Copy	NPKM	2010
W7	Water Production Summary 2011	Report	Copy	NPKM	2011
W8	Water Supply Construction Agreement	Book	Copy	NPKM	2000
W9	Report of Thakhek Urban Improvement Project, Khammouane Province	CD	Copy	DPWT	2009
W10	Summary Information Regarding Nampapa Work for 3 Districts; Thkhek, Nongbok, Mahaxai 2009	Report	Copy	NPKM	2009
W11	Summary Information Regarding Nampapa Work for 3 Districts; Thakhek, Nongbok, Mahaxai 2010	Report	Copy	NPKM	2010
W12	Regulation of Nampapa	Book	Copy	NPKM	2011
W13	Regulation on Water Supply Operation in Lao PDR	Book	Copy	WASA	2008
W14	Urban Water Supply and Sanitation in Lao PDR	Report	Copy	NPKM	2012

No.	Name	Figure Book · Video Map · photo etc	Original · Copy	Issuing institution	The date of issue
W15	Khounekhram Project Water Treatment Plant (900m ³ /day)	Report	Copy	DM Construction-Trading LTd	2011
W16	Study Report of Design for Bualapha District (900m ³ /day)	Report	Copy	NPNL	2007
W17	Memorandum of Understanding between Neighboring Countries Economic Development Cooperation Agency and Provincial Waterworks Authority of Thailand and Department of Housing and Urban Planning, Ministry of Public Works and Transport of Lao PDR	Report	Copy	NEDA	2011
W18	Population of Thakhek (Water Supply & Expansion Area) 2010	Data	Copy	NPKM	2010
W19	Population of Thakhek District 2009-2012	Data	Copy	NPKM	2012
W20	Regulation of LPCD	Data	Copy	NPKM	2012
W21	Summary of Water Production, Water Sold and Loss (Yearly 1999-2011, Monthly 2011, Daily 2010-2011 Data)	Data	Copy	NPKM	2011
W22	Summary of Water Distribution and Sold in 2010 and 2011	Data	Copy	NPKM	2011
W23	Record of Water Meter from Well 2012	Data	Copy	NPKM	2012
W24	Record of Water Meter from Mekong 2012	Data	Copy	NPKM	2012
W25	Drinking Water Standards, Guide Line and Recommended Value	Data	Copy	NPNL	
W26	Drainage Outlet Location	Map	Copy	NPKM	2012
W27	Phoukhyo Specific Economic Zone	Brochure	Copy	SV Group	2012
W28	Tender Documents Lot 2 (Well and Reservoir Construction)	Book	Copy	Nampapa Lao (NPL)	1995
W29	Feasibility Study of Project Development on Thakhek Specific economic Zone	Document	Copy	DPWT-KM	2012
W30	Feasibility Study of Project Development on Phu Khyo Na	Document	Copy	DPWT-KM	2010

No.	Name	Figure Book · Video Map · photo etc	Original · Copy	Issuing institution	The date of issue
	Khonh Project				
W31	Thakhek Water Supply Project Lot1:Supply of Plant and Equipment, Drilling and Equipping of Wells Final Implementation Report	Document	Copy	NPKM	1996
W32	Management and technical Guidelines Water Supply	Document	Copy	NPKM	2009
W33	As Built Drawing Nam Theun 2 Hydropower Project (Lao PDR) Public Road Zone A1	Document	Copy	DPWT-KM	2010
W34	From The Entrance of Hinboun Road-Juntion Mittaphap/Friendship Bridge no.03-Juntion Road no.12-Nabouap	Document	Copy	DPWT-KM	2011
W35	Thakhek Water Supply System Feasibility Study and Detailed Design	Document	Copy	NPKM	2011
W36	The Project for the Construction of New Water Supply Pipeline System In Expansion Circle Road Area, Km2 to PamSokxai	Document	Copy	NPKM	2011
E1	Decree on the Implementation of the Environmental Protect Low	Book	Copy	STEA, UNDP, NORAD	2002
E2	Communicable Disease in Khammauane Provine 2010-2011	Data	Copy	Khammauane Province	2011
E3	Precipitation and temperature (monthly average / 2007-2011 / Thakhek)	Document	Original	Khammauane Province	2012
E4	Mekong River flow rate (2002-2011)	Data	Copy	Department of Meteorology	2012
E5	Land use allocation in Khammouane province	Data	Copy	DNRE	2012
E6	Population in planned service areas	Document	Original	Thakhek district office	2012

No.	Name	Figure Book · Video Map · photo etc	Original · Copy	Issuing institution	The date of issue
E7	Breakdown of Agricultural products	Document	Original	Department of Agriculture	2012
E8	Land use of Thakhek	Data	Copy	DNRE	2012
E9	Environmental Protection Law (1999)	Data	Copy	DNRE	1999
E10	Decree on Environmental Assessment	Data	Copy	DNRE	2010
E11	Type and Size 697 PM WREA	Data	Copy	DNRE	2010
E12	Lao National Environment Standard	Data	Copy	DNRE	2009
E13	Approved Resettlement Guideline	Data	Copy	DNRE	2010
E14	DECREE 192_Compensation&Resettlement	Data	Copy	DNRE	2005
E15	Khammouane Environmental Strategy to the years 2020 and Action Plan for the years 2006-2010	Book	Original	STEO, LENS	2007
E16	Laos People's Democratic Republic Peace Independence Democracy Unity and Prosperity	Document	Copy	Prime Minister Office Water Resource and Environment Authority	2010
M1	Customer Number of Thakhek, Mahaxay, Nongbok 2010-2011	Data	Copy	NPKM	2012
M2	Organization Chart of Khommouane Water Supply Enterprise in 2011	Data	Copy	NPKM	2012
M3	Summary of Water Meter Installation	Data	Copy	NPKM	2012
M4	Water Leakage Detection Instruments provided by JICA Partnership Program	Data	Copy	NPKM	2012

7. References

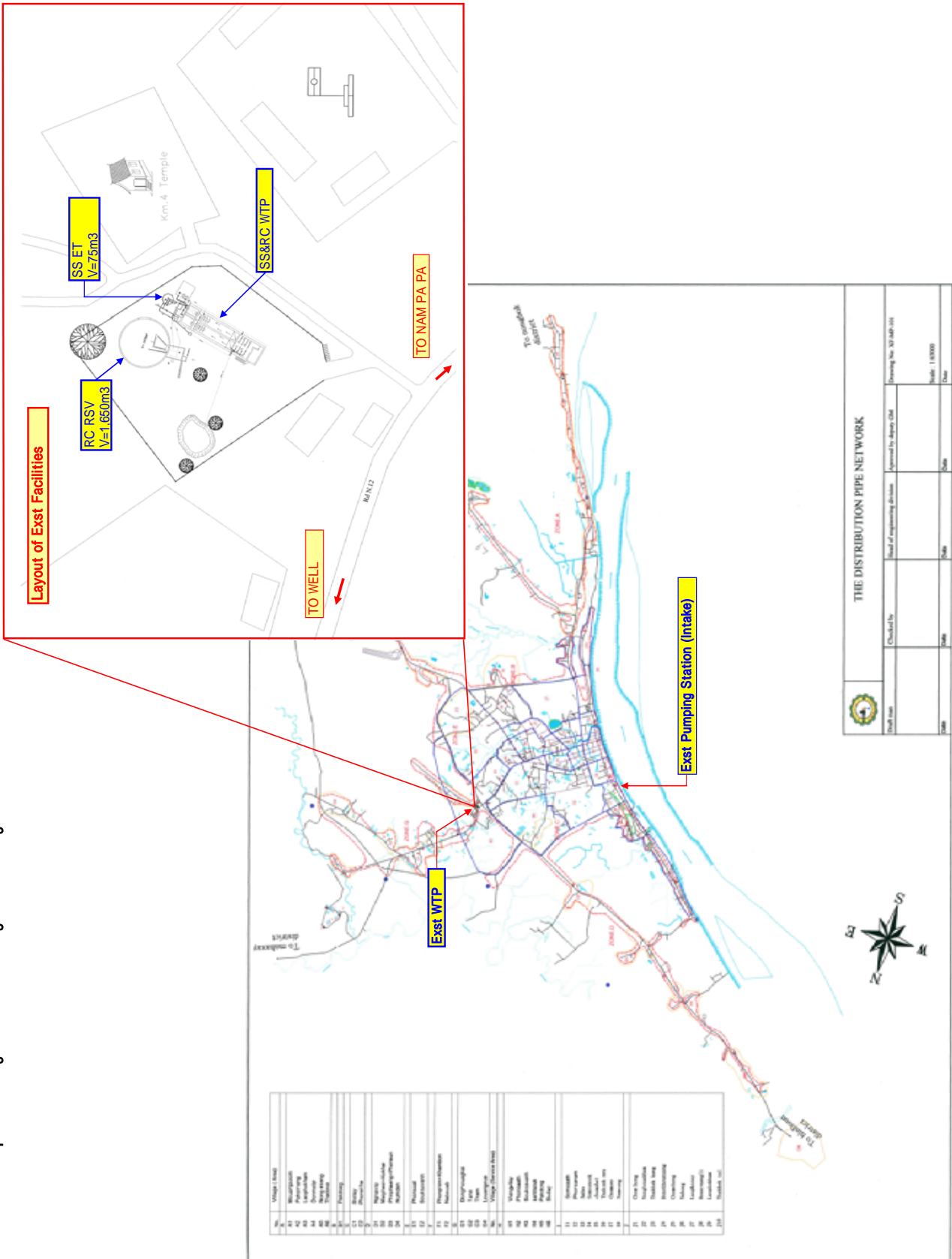
7-1 Survey Results for Diagnosis of Existing Facility

- Function degradation diagnosis results for existing intake and WTP (Civil Structure)
- Location map of target facilities for diagnosis
- Diagnosis results
 - Water Intake
 - Water Treatment Plant
- How to treat the existing facilities
- Function degradation diagnosis results for existing intake and WTP (Mechanical & Electrical Equipment)

Diagnosis of Existing Facilities (Civil)

1. Facilities carried out Deterioration Diagnosis
 - 1.1 Existing Intake (Pumping Station)
 - Pipe Support (Plane Concrete)
 - Angle and post (Steel)
 - 1.2 Existing WTP
 - (1) Treatment Facilities
 - Receiving Well, Flocculation Basin, Sedimentation Basin(Steel)
 - Foundation of above (RC)
 - Chemical Dissolution Tank Stand(Steel, RC)
 - Rapid Sand Filter Base (RC)
 - (2) Elevated Tank
 - Foundation (RC)
 - Steel Tank and Truss (Steel)
 - (3) Reservoir (RC)
2. Survey Item
 - 2.1 RC
 - Existence of Crack
 - Scale of Crack
 - Existence of Efflorescence
 - 2.2 Steel
 - Rust and Tubercle
 - Damage by Corrosion
 - Deflection of Materials

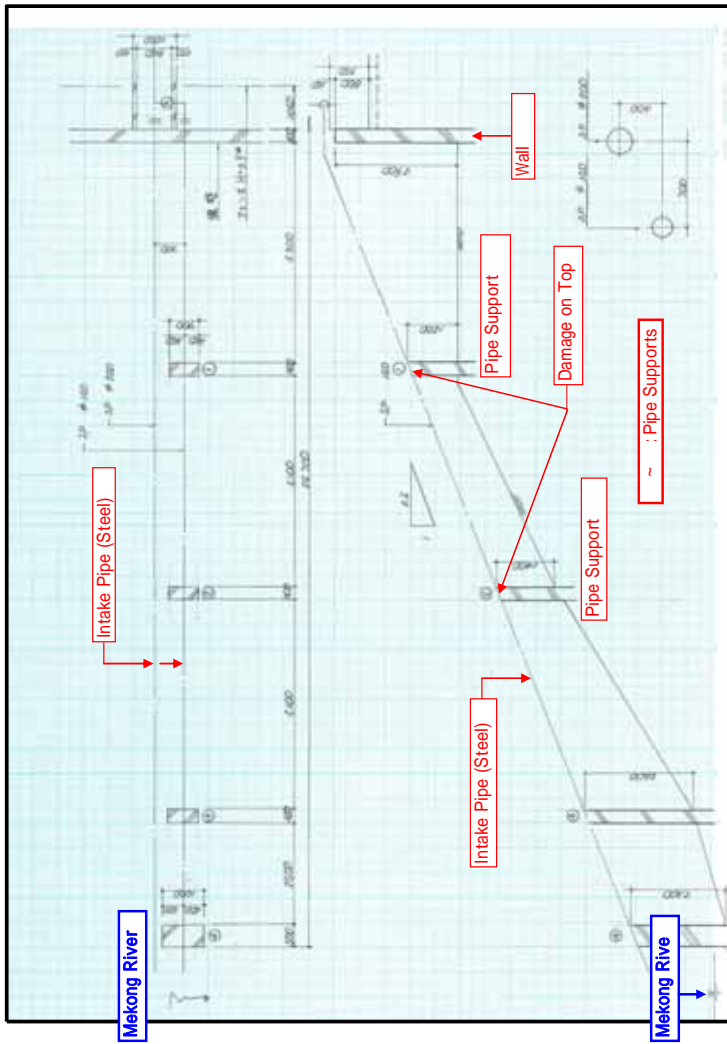
Location Map of Existing Facilities for Diagnosis for Degradation



3. Results of Diagnosis for Degradation

3.1 Existing Intake Facilities

(1) Outline Map of Survey



(2) Survey Results

- 1) Pipe Support: Plain Concrete
 - Scraping on Top of Pipe Support &
 - Small exfoliation in Pipe Support from to
- 2) Support Material (Steel)
 - Angle and Steel Pipe
 - Unstable Angle in
 - Loosen in fixed band(SS plate, BN)
 - rust-through

[Pipe Support Damage on Top]



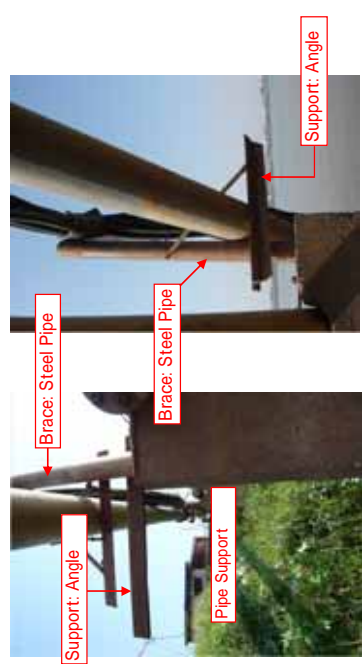
Damage by Scraping

[Pipe Support Damage on Top]



Unstable Angle

[Pipe Support]



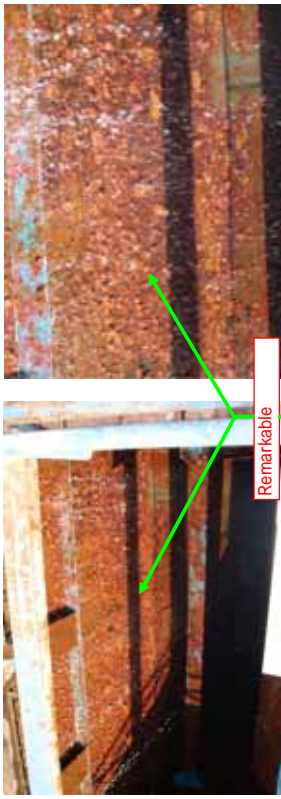
3.2 Existing Water Treatment Facilities

(1) Receiving Well, Flocculation Basin, Sedimentation Basin, Steel

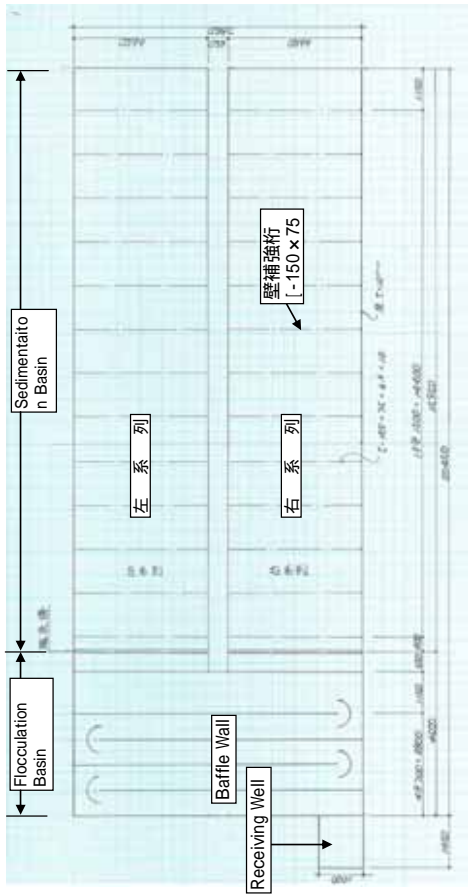
1) Inside

Only Sedimentation Basin was surveyed, since receiving well and flocculation basin are only one basin (not able to be empty).

[Inside Wall of Sedimentation Basin]



[Beam, Inside Wall of Sedimentation Basin]



[Baffle Wall, Flocculation Basin]



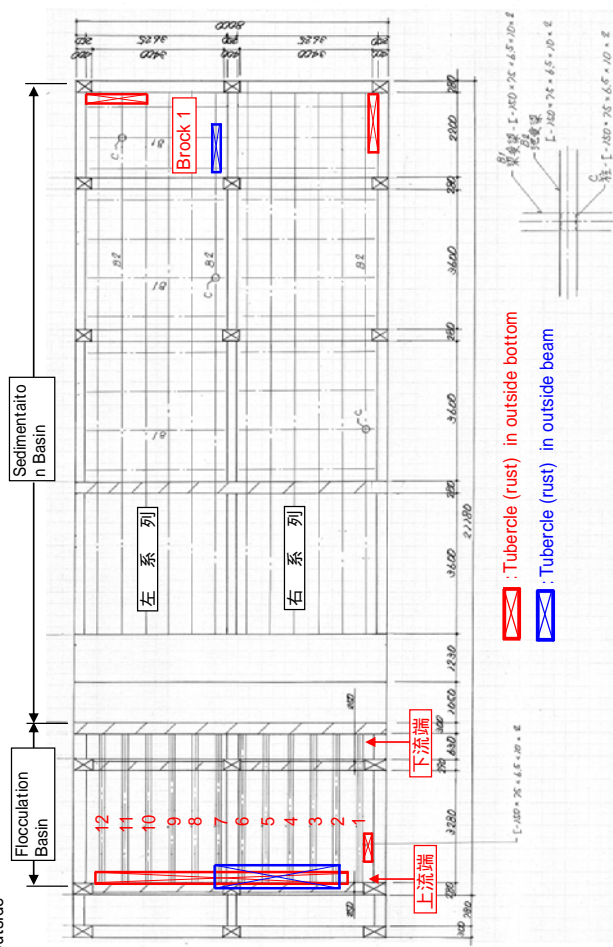
[Bottom of Sedimentation Basin]



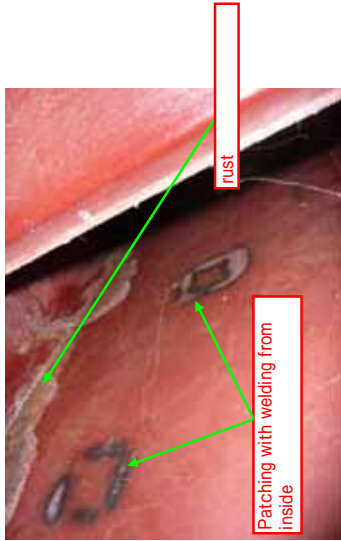
Bottom of right basin



2) Outside

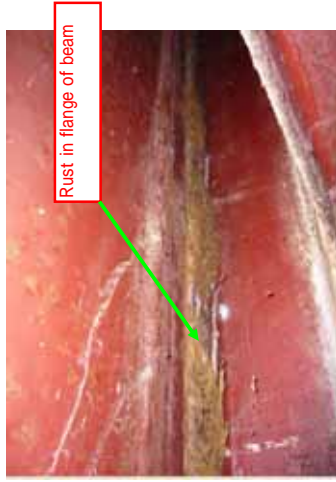


[Bottom plate and beam of sedimentation basin]



rust

Patching with welding from inside



Rust in flange of beam

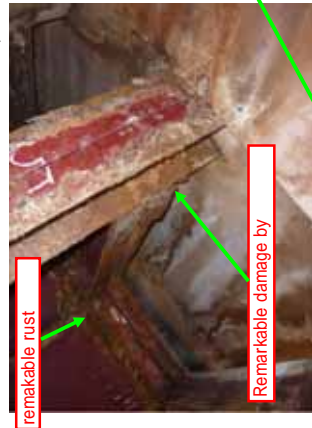
[Post in bottom of sedimentation basin (Brock 1)]



Damage by corrosion

All 18 posts in Brock 1 have such damages.

[Bottom plate and beam of flocculation basin]



remarkable rust

Remarkable damage by



Remarkable damage by



受柵5上流端及び底板状况写真



受柵6上流端及び底板状况写真

[Outside of flocculation basin and sedimentation basin]



フロック形成池～沈澱池左外面状況写真

3) Survey Results

[Inside]

- Deflection in baffle wall
- Remarkable tubercle (rust) in wall
- A lot of patching in bottom in sedimentation basin
- Right basin: 58 locations Left basin: 35 locations
- Abruption of painting in bottom of sedimentation basin
- Remarkable tubercle (rust) in wall and beam of sedimentation basin



フロック形成池～沈澱池右外面状況写真

[Outside]

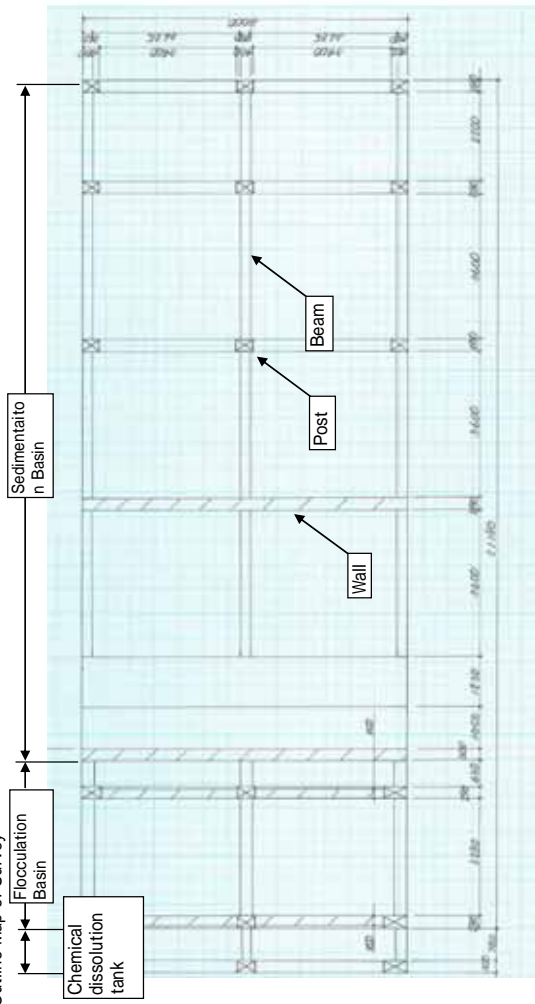
- Abruption of painting in wall
- No damage in flocculation basin of upper stream
- Remarkable corrosion in beams of flocculation basin
- Remarkable corrosion in post and rust in bottom plate
- Remarkable damage and corrosion in foundation post near ground



Outside of flocculation basin (upstream)

(2) Receiving Well, Flocculation Basin, Sedimentation Basin, RC

1) Outline Map of Survey



【ブロック形成池、沈澱池基礎状況】



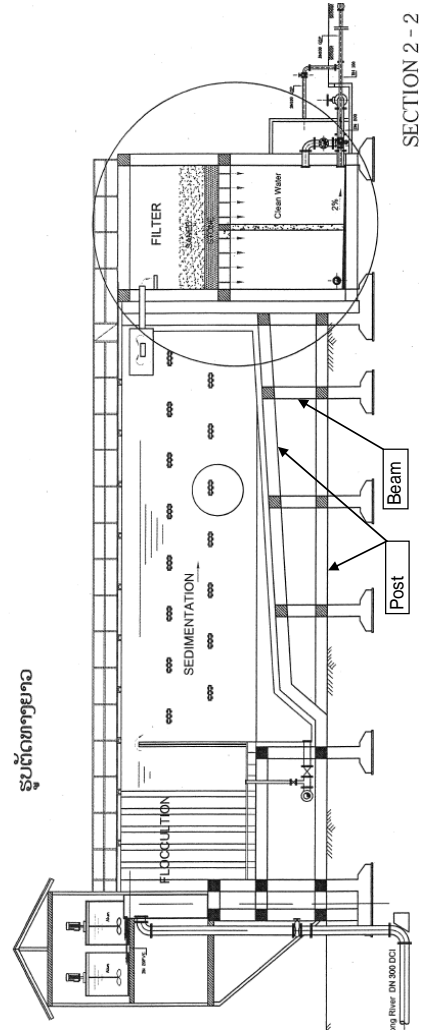
端部梁、柱状況写真(1)



端部梁、柱状況写真(2)



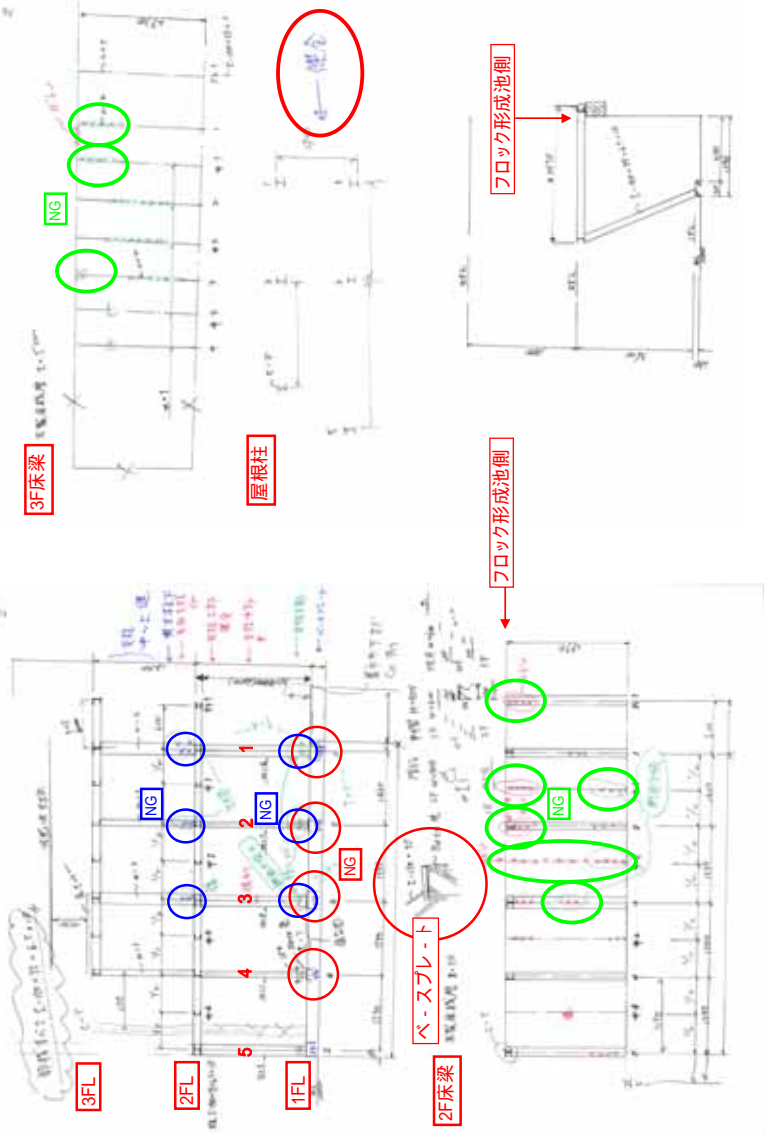
池底部梁、柱状況写真



2) Survey Results
No crack and no efflorescence in post and beam

(3) Chemical dissolution tank: Steel
 1) Outline Map of Survey

桁、柱部材：すべて溝形鋼 1 - 150 x 75 x 6.5 x 10



[薬品溶解槽架台全景]



[Base plate]



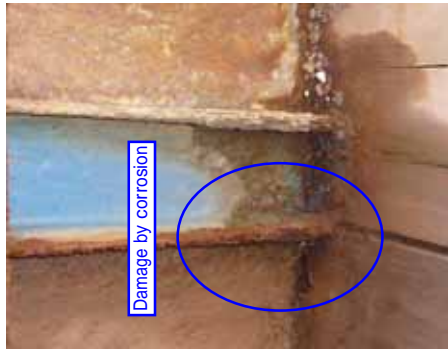
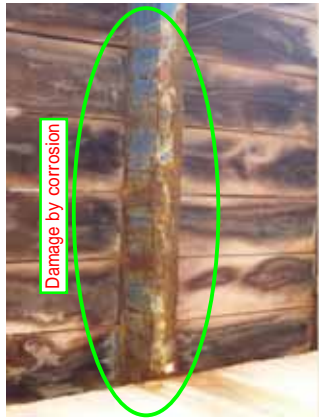
[1F-2FL]



[2F-3FL]



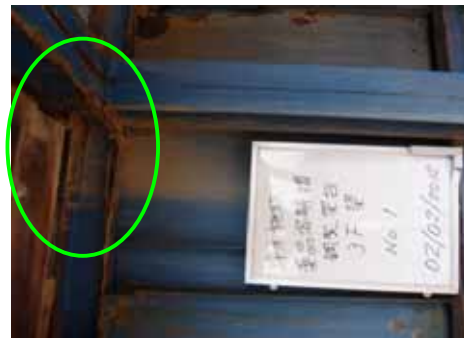
[2F Beams]



[3F]



[Receiving well]



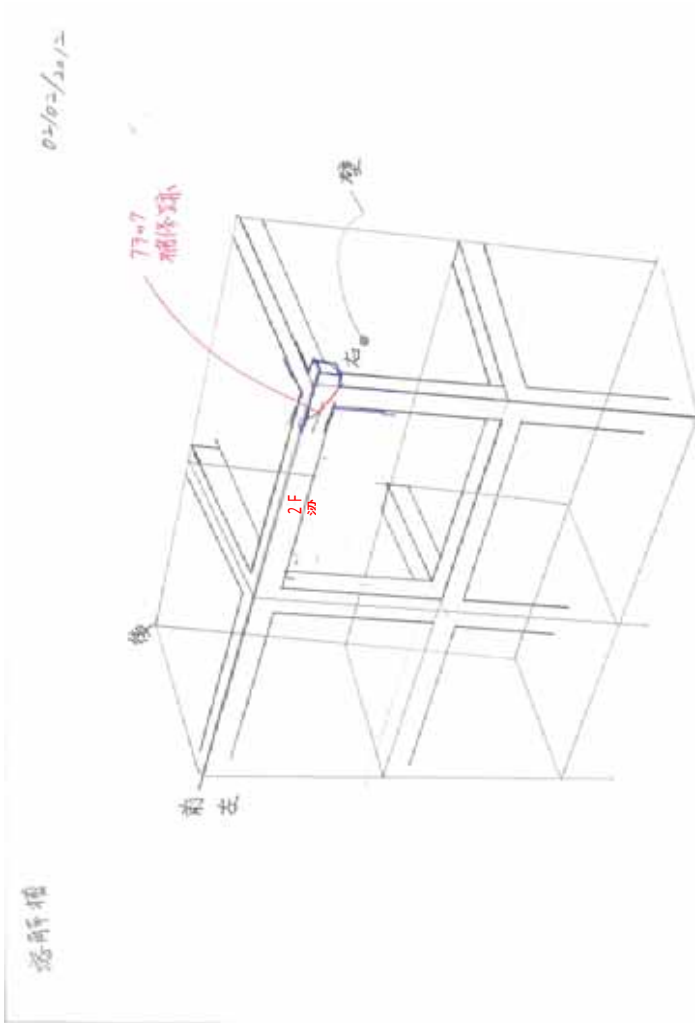
2) Survey Results

Remakable damage by corrosion listed below

- Post 1, 2, 3, 4, and Base plate
- Posts 1, 2, 3 (1F-2F)
- Posts 1, 2, 3 (2F-3F)
- Beams (2F and 3F)
- Outside of receiving well

- (図及び写真中の 印部分)
- (図及び写真中の 印部分)
- (図及び写真中の 印部分)
- (図及び写真中の 印部分)
- (写真中の 印部分)

(4) Stand of chemical dissolution tank: RC
 1) Outline Map of Survey

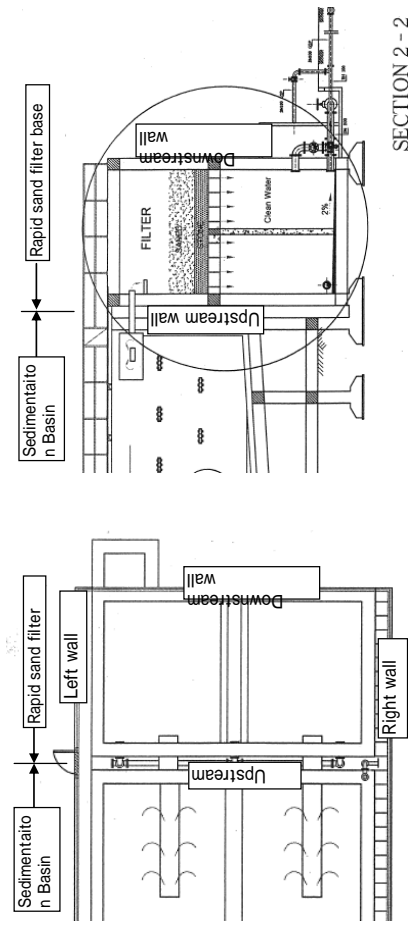


[Stand of chemical dissolution tank]

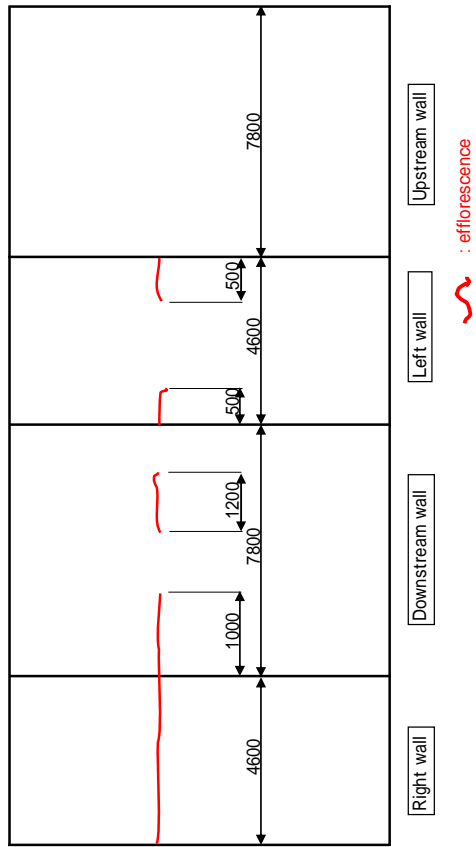


2) Survey Results
 Crack in 2F was repaired. No crack and no efflorescence in other parts

- (5) Rapid sand filter base: RC
- 1) Outline Map of Survey



[Outside walls]



- 2) Survey Results
- Efflorescence in walls except upstream wall
- No damage inside of walls

[Outside of rapid sand filter base]



Right wall: efflorescence



Left wall: efflorescence

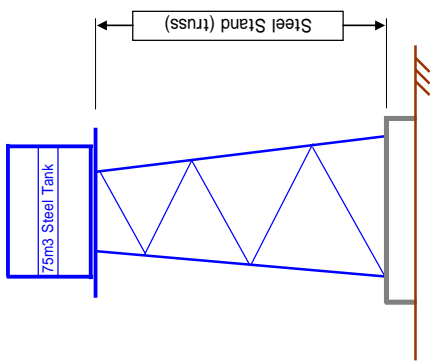


Left wall: efflorescence

[Inside of rapid sand filter base]



(6)Elevated Tank: RC (foundation), steel (tank and stand)
 1) Outline Map of Survey

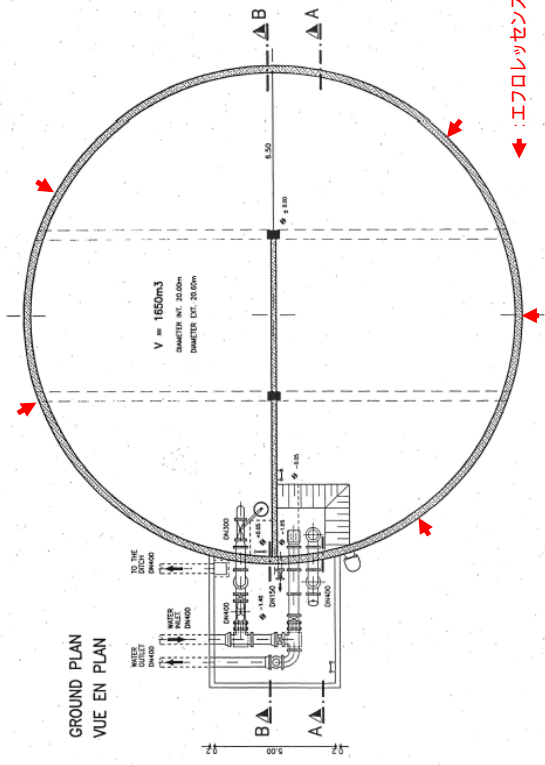


- 2) Survey Results
- No damage in RC foundation
 - Some rusts in steel stand truss
 - No damage in Steel tank

[Stand]



- (7) Reservoir: RC
- 1) Outline Map of Survey



【配水池全体状況】



【配水池エフロレッセンス発生状況】



- 2) Survey Results
- Five efflorescence in wall

4. Handling of Existing Reservoir in Future

Repair works for the existing intake and WTP (when these will be used in future) are summarized below.

4.1 Existing Pumping Station (Intake)

For continued use of the existing intake

- 1) To Repair surface of RC pipe supports
- 2) To replace steel angles and fix the intake pipe to support.

This works are not difficult with temporary support during the work.

4.2 Existing WTP

For continued use of the existing WTP (Elevated tank and RC facilities are able to be continuously used without Repair)

(1) Receiving well, flocculation basin, sedimentation basin: Steel

1) Inside Repair works

Rust removal and re-painting

2) Inside Repair works

- Walls of Receiving Well, Flocculation Basin, Sedimentation Basin

Rust removal and re-painting

- Flocculation Basin

Replace of bottom beam and post, which are seriously damaged by corrosion.

Cut and replace the bottom plate, where the place are seriously damaged by corrosion.

- Sedimentation Basin

Rust removal and re-painting in bottom plate and beams

Replace all pasts in Brock 1 with heavy duty coating

3) Problems

- Operation of the existing WTP must be stopped during the Repair works

Therefore

- Repair work must be after completion of new WTP construction with elaborate plan

- or another temporary water production facility should be provided

- Rust removal and re-painting works should be repeated after several years since it is steel material

- When the water demand increased, the rust removal and re-painting work become difficult.

(2) Stand of Chemical Dissolution Tank: Steel

1) Repair Works

Replace the materials those are damaged by corrosion.

2) Problem

In the repair works of the stand, chemical dissolution tank must be removed to another place,

e.g. on the flocculation basin.

4.3 Handling of the existing facilities

(1) Existing Intake

Repair work for pipe support can be carried out with out difficulty.

However, the floating intake facility has sometime risks for the river flow in Mekong River.

It is, therefore, better the existing intake should be canceled and integrated to new intake facility constructed future.

(2) Existing WTP

Repair work

- Operation of the existing WTP must be stopped during the repair works.
- Repair work, therefore, must be carried out after the operation of new WTP constructed in future
- Repair work must be repeated after several years with difficulty in future.

Then, the following two alternatives are recommended.

Alt. 1: The existing WTP should be renewed with RC materials, instead of steel materials.

Alt 2: The existing WTP should be integrated to new WTP (The existing WTP will be canceled, but the existing reservoir and elevated tank will be used.)

Diagnosis of Existing Facilities (M&E)

List of Mechanical Equipment

No	Sub No	Facilities	Equipment	Spec	Manufacture	Year	Sttus	Repair Work
001	TMI001	Exst. Intake	Intake Pump No1	2.0m3/min	IN-LINE MOTOR	2001	be working	Repair when broken
002	TMI002	"	Pump Motor No1	55kw		2001	be working	Repair when broken
003	TMI003	"	Suction Pipe	150mm		2001	all serene	usable
004	TMI004	"	Delivery Pipe	100mm		2001	"	usable
005	TMI005	"	Check Valve	100mm		2001	"	usable
006	TMI006	"	Regulating Valve	100mm		2001	"	usable
007	TMI007	"	Intake Pump No2	2.0m3/min	KR MOTOR	2001	be working	Repair when broken
008	TMI008	"	Pump Motor No2	55kw		2001	be working	Repair when broken
009	TMI009	"	Suction Pipe	150mm		2001	all serene	usable
010	TMI010	"	Delivery Pipe	100mm		2001	"	usable
011	TMI011	"	Check Valve	100mm		2001	"	usable
012	TMI012	"	Regulating Valve	100mm		2001	"	usable
013	TMI013	"	Intake Pump No3	2.0m3/min	KR MOTOR	2001	be working	Repair when broken
014	TMI014	"	Pump Motor No3	55kw		2001	be working	Repair when broken
015	TMI015	"	Suction Pipe	150mm		2001	all serene	usable
016	TMI016	"	Delivery Pipe	100mm		2001	"	usable
017	TMI017	"	Check Valve	100mm		2001	"	usable
018	TMI018	"	Regulating Valve	100mm		2001	"	usable
019	TMI019	"	Intake Pump No4	2.0m3/min	KR MOTOR	2001	be working	Repair when broken
020	TMI020	"	Pump Motor No4	55kw		2001	be working	Repair when broken
021	TMI021	"	Suction Pipe	150mm		2001	all serene	usable
022	TMI022	"	Delivery Pipe	100mm		2001	"	usable
023	TMI023	"	Check Valve	100mm		2001	"	usable
024	TMI024	"	Regulating Valve	100mm		2001	"	usable
025	TMI025	"	Heder Pipe	150mm		2001	"	usable
026	TMI026	"	Regulating Valve	150mm		2001	"	usable
027	TMI027	"	Flexible Intake Pipe	150mm		2001	"	usable
028	TMI028	"	Flexible Pipe	150mm		2001	"	usable
029	TMI029	"	Y Pipe No1	150mm		2001	"	usable
030	TMI030	"	Y Pipe No2	150mm		2001	"	usable
031	TMI031	"	Y Pipe No3	150mm		2001	"	usable
032	TMI032	"	Y Pipe No4	150mm		2001	"	usable
033	TMI033	"	Regulating Valve	150mm		2001	"	usable
034	TMI034	"	Regulating Valve	200mm		2001	"	usable
035	TMI035	"	Intake Pump No5	80mm		2001	"	usable
036	TMI036	"	Pump Motor	3.3m3/min	山東顏山原並	2005	Broken	Under Repair
037	TMI037	"	Delivery Pipe	150kw		2005	all serene	Repair when broken
038	TMI038	"	Check Valve	150mm		2005	"	usable

No	Sub No	Facilities	Equipment	Spec	Manufacture	Year	Sttus	Repair Work
039	TMI039	"	Butterfly Valve	150mm		2005	"	usable
040	TMI040	"	Intake Pump No6	3.3m3/min	山東顔山原並	2005	be working	Repair when broken
041	TMI041	"	Pump Motor	150kw		2005	all serene	Repair when broken
042	TMI042	"	Delivery Pipe	150mm		2005	"	usable
043	TMI043	"	Check Valve	150mm		2005	"	usable
044	TMI044	"	Butterfly Valve	150mm		2005	"	usable
045	TMI045	"	Flexible Intake Pipe	200mm		2005	"	usable
046	TMI046	"	Flexible Pipe	200mm		2005	"	usable
047	TMI047	"	Y Pipe No1	200mm		2005	"	usable
048	TMI048	"	Y Pipe No2	200mm		2005	"	usable
049	TMI049	"	Y Pipe No3	200mm		2005	"	usable
050	TMI050	"	Y Pipe No4	200mm		2005	"	usable
051	TMI051	"	Regulating Valve	200mm		2005	"	usable
052	TMTT001	Transmission	Transmission Pipe	300mm		2001	"	usable
053	TMTT002	"	Regulating Valve	300mm		2001	"	usable
054	TMTT003	"	Regulating Valve	200mm		2001	"	usable
055	TMT001	Treatment	Flash Mixing No1	2.2kw		2001	Broken	Should be renewed
056	TMT002	"	Flash Mixing No2	2.2kw		2001	be working	Repair when broken
057	TMT003	"	Flash Mixing No3	2.2kw		2001	be working	Repair when broken
058	TMT004	"	Drain Valve No1	100mm		2001	all serene	usable
059	TMT005	"	Drain Valve No2	100mm		2001	"	usable
060	TMT006	Sand Filter	Treated Water Valve No1	300mm		2001	"	usable
061	TMT007	"	Treated Water Valve No2	300mm		2001	"	usable
062	TMT008	"	Control Valve	300mm		2001	"	usable
063	TMT009	"	Drainage Valve No1	100mm		2001	"	usable
064	TMT010	"	Drainage Valve No2	100mm		2001	"	usable
065	TMT011	"	Backwash Valve No1	100mm		2001	"	usable
066	TMT012	"	Backwash Valve No2	100mm		2001	"	usable
067	TMT013	"	Backwash Air Valve No1	100mm		2001	"	usable
068	TMT014	"	Backwash Air Valve No2	100mm		2001	"	usable
069	TMT015	"	Integrating flowmeter	300mm		2001	be working	Repair when broken
070	TMT016	"	Backwash Blower	11kw	LNG TECH	2001	be working	Repair when broken
071	TMT017	"	Inflow Silencers			2001	all serene	usable
072	TMT018	"	Outflow Silencers			2001	"	usable
073	TMT019	Elevated Tank	Main Valve	100mm		2009	"	usable
074	TMT020	"	Lifting Pump No1	18.5kw		2009	be working	Repair when broken
075	TMT021	"	Check Valve	100mm		2009	all serene	usable
076	TMT022	"	Gate Valve	100mm		2009	"	usable
077	TMT023	"	Lifting Pump No2	5.5kw		2009	Broken	Should be renewed

No	Sub No	Facilities	Equipment	Spec	Manufacture	Year	Stttus	Repair Work
078	TMT024	"	Check Valve	100mm		2009	all serene	usable
079	TMT025	"	Gate Valve	100mm		2009	"	usable
080	TMT026	Chemical Equip	Mixing Tank No1	1500L		2001	"	usable
081	TMT027	"	Mixing Tank No2	1500L		2001	"	usable
082	TMT028	"	Mixing Machine No1	1.5kw		2001	be working	Repair when broken
083	TMT029	"	Mixing Machine No2	-		2001	Broken	Should be renewed
084	TMT030	"	Chlorine Solution No1	50L		2001	all serene	usable
085	TMT031	"	Chlorine Solution No2	50L		2001	"	usable
086	TMT032	"	Chlorine Feeder Pump No1			2001	be working	Repair when broken
087	TMT033	"	Chlorine Feeder Pump No2	-	Grundfos	2001	Broken	Should be renewed
088	TMT034	Reservoir	Flowmeter (for Well)			2001	Broken	Should be renewed
089	TMT035	"	Air Valve (for Well)	100mm		2001	all serene	usable
090	TMT036	"	Inlet Valve (for Well)	400mm		2001	"	usable
091	TMT037	"	Drain Valve	150mm		2001	"	usable
092	TMT038	"	Pressure Gauge			2001	be working	usable
095	TMT039	"	Regulating Valve	400mm		2001	all serene	usable
096	TMT040	"	Outlet Vuive	400mm		2001	"	Repair when broken
097	TMT041	"	Integrating flowmeter	400mm		2001	Broken	Should be renewed
098	TMT042	"	Air Valve	100mm		2001	all serene	usable
List of Electrical Equipment								
001	TEI001	Intake	Transformer	22kv/380v 250k	UNION THIA	2001	E D L	usable
002	TEI002	"	Low Pressure Power Board		Lao	2001	E D L	usable
003	TEI003	"	No1 Pump Start Board		France	2001	be working	Repair when broken
004	TEI004	"	No2 Pump Start Board		France	2001	be working	Repair when broken
005	TEI005	"	No3, No4 Pump Control Board		Lao	2001	be working	Repair when broken
006	TEI006	"	No3, No5 Pump Control Board		Lao	2001	be working	Repair when broken
007	TEI007	"	No5 Pump Start Board		China	2005	be working	Repair when broken
008	TEI008	"	No6 Pump Start Board		China	2005	be working	Repair when broken
009	TEI009	"	Control Panel		Lao	2001	be working	Repair when broken
010	TEI010	"	Control Panel		Lao	2001	be working	Repair when broken
011	TEI011	"	On Site Control Panel		Lao	2001	be working	Repair when broken
012	TEI012	"	On Site Control Panel		Lao	2001	be working	Repair when broken
013	TEI013	"	Air Conditionor	9000BTU	Thai	2001	be working	Repair when broken
014	TET001	WTP	Mixing Machine Control Panel		Lao	2001	be working	Repair when broken
015	TET002	"	Treatment Machine Control Panel		Lao	2001	be working	Repair when broken
016	TET003	"	Lighing Equipment		Lao	2001	be working	Repair when broken
017	TET004	"	Transformer	22kv/380v 250k	Thai	2001	E D L	usable
018	TET005	"	Low Pressure Power Board		Lao	2001	be working	Repair when broken