CHAPTER 5

SELECTION OF PRIORITY PROJECTS

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Taking into account the significance and urgency to solve problems which the NPVC and the people of Vientiane are encountering, the restoration work of the existing water supply system, the rehabilitation of the Kaolieo Treatment Plant and improvement of the Chinaimo Treatment Plant, and the construction of treatment plant facilities and transmission pipelines included in the 1st Stage of the best Alternative K-1, are selected as the priority projects. These projects are indispensable to improve the water supply condition in Vientiane and are urgently required to meet increasing water demand. For the selection of the priority projects, the Lao PDR side and the JICA Study Team have mutually agreed the projects and the priorities, as shown in Annex 1. The scope of the priority projects are as follows.

5.1 Priority Projects

- Rehabilitation of Existing Kaolieo Treatment Plant which has a production capacity of 20,000 m3/day
- Improvement of the Chinaimo Treatment Plant which has a production capacity of 80,000 m3/day. This includes:
    - Expansion of reservoir (10,000 m3), including additional distribution pumping facilities
    - Installation of a new transmission pipeline from Chinaimo Treatment Plant to the existing transmission pipeline (separation of transmission and distribution system)
- Expansion of the Kaolieo Treatment Plant, to increase capacity of 40,000 m3/day and total capacity will become 60,000 m3/day
- Improvement of the Km6 BP Station
- Installation of 2.2 km of transmission mains

(1) Rehabilitation of the Existing Kaolieo Treatment Plant

In order to secure water supply to the existing service area from the Kaolieo Treatment Plant, it has been judged that the rehabilitation work for the Kaolieo Treatment Plant is indispensable and selected as a priority project. Rehabilitation works for the existing Kaolieo Treatment Plant is listed in Table 51-1.

(2) Improvement of Chinaimo Treatment Plant

As pointed out in the previous chapter, because of the mixture of distribution and transmission systems at the Chinaimo Treatment Plant, the distribution system can not meet hourly fluctuations and the transmission system becomes unstable, depending on the quantity of distributed water

From these existing conditions, the separation of the distribution and transmission systems is indispensable to achieve stability in these systems. For the separation of these systems, a number of modifications will be required. The first requirement is an expansion of the reservoir (new reservoir adjacent to existing one), and secondly, the installation of distribution pumps to meet hourly fluctuations in demand. The final requirement is for, the installation of an independent transmission main from the plant to the branch point of the existing transmission pipeline. These modifications are detailed in Table 5-2. For the transmission system, the existing pumps will be utilized.

Table 51-1 Rehabilitation Work of Kaolieo Treatment Plant

Planned Components of Facility		
Intake Facilities	Intake Pump	Replace Pump: 7.65 m3/min. x 37 kW x 3 Units (Substitute Submersible Mixed Flow Pump for Vertical Mixed Flow Pump)
	Bank Protection	Repairing & Improving the Existing Bank Protection
	Maintenance Bridge	Repairing
Raw Water Transmission Pipe	Civil Works	Meter and Control Valve Chamber
	Electro-Mechanical Work	Ultrasonic Flow Meter and Flow Control Valve
Receiving Well & Mixing Well		Replacement of Flash Mixer
Flocculation & Sedimentation Basins		Repair of Structural Wall's Clacks
Filtration Facilities	Filter Basin	Replacement of Filter Media and Underdrain, and piping with accessories
	Filter Washing Equipment	Replacement of Valves & Gates in equipped with Automatic Control, Back Wash Pumps: 14.5m3/min x 60 kW x 2 Units
Clear Water Reservoir		Repairing the Structure and Valves if necessary
Distribution Pumping Facilities	Distribution Pump Building	Using the Existing
	Distribution Pump	6.3 m3/min. x 67.0 m x 110 kW x 4 Units
Chemical Feeding Facilities	Chemical Feeding Equipment	Installation of Equipment and Solution Tank
	Chemical Building	Located at Administration Building to be Expanded
Electrical Facilities	Power Receiving Facility	Power Receiving and Transformer Equipment
	Power Supply Facility	Power Supply Equipment
	Emergency Generator	Generator Cap. for 1/3 of Distribution Pump Capacity

	Instrumentation Equipment	Monitoring, Supervising and Controlling
Administration Building		Located at the expanded Building: A=300m2×2F
Laboratory		Located at Administration Building to be Expanded
Landscaping and Others		Including demolition & relocation of existing housings

Table 51-2 Improvement of Chinaimo Treatment Plant

Planned Components of Facility		
Clear Water Reservoir	Clear Water Reservoir	V=10,000 m3
	Piping	D1100mm
Distribution Pumping Facilities	Distribution Pump Building	A=250 m2
	Distribution Pump	12.1 m3/min. x 67.0 m x 195 kW x 4 Units
Electrical Facilities	Power Receiving Facility	Power Receiving and Transformer Equipment
	Power Supply Facility	Power Supply Equipment
	Emergency Generator	Generator Capacity for 1/3 of Distribution Capacity
	Instrumentation Equipment	Monitoring, Supervising and Controlling
Transmission Pipelines		0.6 km of dia. 700mm
Landscaping and Others		Including demolition of the existing housing

(3) Expansion of Kaolieo Treatment Plant

In order to find the best method to increase the treatment capacity to cope with the future demand in 2015, an alternative study was conducted to investigate five different alternatives. As a result of the alternative study, Alternative K-1 was selected as the best alternative for the expansion of the treatment capacity. The capacity of expansion will be 40,000 m3/dayat the existing Kaolieo Treatment Plant. Table 5-3 shows details of the expansion works.

Table 51-3 Details of Expansion Work of Kaolieo Treatment Plant

First Stage		**Expansion of 40,000 m3/day**
Planned Components of Expansion of Kaolieo Treatment Plant		
Intake Facilities	Intake Structure	Construction of New Intake
	Intake Pump	15.3 m3/min ×65 kW×3 Units
Raw Water Transmission Pipe		D700 mm×L40 m, Ultrasonic Flow Meter
Receiving Well & Mixing Well	Receiving Well!	1 Basin, D.T.=2.3 min.
	Mixing Well	1 Basin, D.T.=1.0 min.
Flocculation & Sedimentation Basins	Flocculation Basin	Up and Down Flow Baffle Channel 2 Units/Basin×2 Basins, D.T.=28.3 min.
	Sedimentation Basin	Horizontal Flow /w Launder Trough, 2 Basins D.T.=2.40 hr, Ave.Velocity=0.36 m/min.
Filtration Facilities	Filter Basin	A=78.0 m2×4 Basins, V=141 m/d
	Filter Washing Equipment	B.W.P.: 47.0m3/min×70kW×2 Units A.B.P.: 94.6m3/min×90kW×2 Units
Filtered Water Measurement & Chlorine Mixing Chamber	Measurement Chamber	1 Basin, D.T.=1.8 min.
	Mixing Chamber	1 Basin, D.T.=0.7 min.
Clear Water Reservoir	Clear Water Reservoir	V=10,000 m3
	Piping	D700mm, D600mm
Distribution Pumping Facilities	Distribution Pump Building	A=250 m2
	Distribution Pump	12.1 m3/min ×67m×195 kW×4 Units
Chemical Feeding Facilities	Chemical Feeding Equipment	Installation of Equipment and Solution Tank
	Chemical Building	Located in the Administration Building
Electrical Facilities	Power Receiving Facility	Power Receiving and Transformer Equip.
	Power Supply Facility	Power Supply Equipment
	Emergency Generator	Generator Cap. for 1/3of Dis. Pump Cap.
	Instrumentation Equipment	Monitoring, Supervising and Controlling
Administration Building		A=300m2×2F
Laboratory		Located in the Administration Building
Landscaping and Others		Including demolition & relocation of existing housings

D.T.: Detention time, BWP: Back wash pump, ABP: Air blower pump

(4) Improvement of Km6 Booster Pumping Station

Improvement of the Km6 BP Station will secure the water supply to the northern part of Vientiane, especially to the Dongdok area. The improvement will include the replacement of the existing pumps with new, larger capacity and higher head pumps, and construction of a pump house, as shown in Table 5-4.

Table 51-4 Improvement of Km6 Booster Pumping Station

Planned Components of Facility		
Booster Pumping Facilities	Pump House	A=45 m2
	Transmission Pump	4.8 m3/min. x 50 m x 57 kW x 2 Units
	Distribution Pump	6.0 m3/min. x 50 m x 72 kW x 3 Units
Electrical Facilities	Power Receiving Facility	Power Receiving and Transformer Equipment
	Power Supply Facility	Power Supply Equipment
	Emergency Generator	Generator Capacity for 1/3 of Trans. & Dist. Pump Capacity
	Instrumentation Equipment	Monitoring, Supervising and Controlling
Landscaping and Others		Including demolition of the existing housing

(5) Installation of Transmission Mains

As a priority project, the installation of a transmission pipeline to transmit water to the Dongdok ground reservoir independent of the distribution network will be required for the following section.

- Installation of 2.2 km of pipelines of 450 mm diameter, which is branched from the existing transmission pipelines of 500 mm diameter near the junction of National Road 13 and the Phonephanao-Phonetong Road, near Phonekheng, to the Km6 Booster Pumping Station.

5.2 Preliminary Cost Estimates for Priority Projects

According to the preliminary cost estimates mentioned in Chapter 4.9, costs for the priority projects selected in this chapter, and to be studied in a following feasibility study, are listed and summarised in Table 52-1.

Table 52-1 Preliminary Cost Estimates for Priority Projects

(x 1,000 US$)

	Total	Foreign	Local
PRIORITY PROJECT	**18,246**	**11,391**	**6,854**
1. Construction Cost	17,052	10,646	6,406
1.1 Treatment Plants	15,081	9,055	6,026
Expansion of Kaolieo T.P.	9,624	5,762	3,862
Rehabilitation of Kaolieo T.P.	3,023	1,951	1,072
Expansion of Reservoir in Chinaimo T.P.	2,434	1,342	1,092
1.2 Clear Water Transmission Pipelines	1,234	984	250
1.3 Booster Pump Station	737	607	130
2. Consulting Services	1,194	745	448
2.1 D/D and S/V for Stage 1 (2004 - 2007)	1,194	745	448

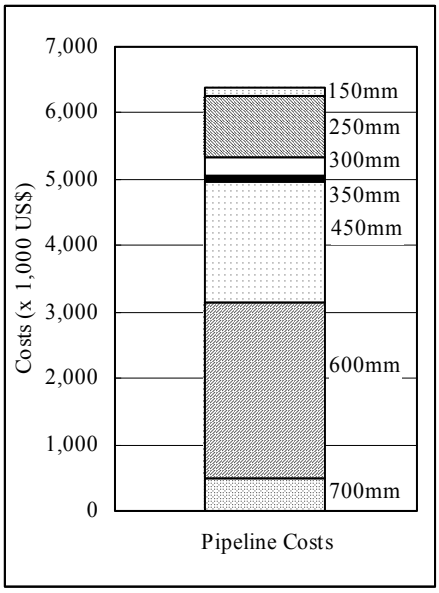
5.3 Improvement of Distribution Network System

Although the improvement of the distribution network system is not included in the priority projects as listed above, to complete Alternative K-1 plan, the installation of a 24.2 km length of distribution mains are also required. The required distribution mains by pipe diameters for the 1st Stage are shown in Table 53-1. Figure 53-1 shows the costs by diameters. However, the selection of priority projects and the feasibility study for these facilities will be conducted by the AFD study, as mentioned above. Therefore, distribution pipelines are excluded from the priority projects selected by the JICA Study.

Table 53-1 Pipeline Length by Diameters

	Distribution	Transmission	Total
Dia mm	Length m	Length m	Length m
150	2,840	0	2,840
200	0	0	0
250	9,450	0	9,450
300	1,380	0	1,380
350	320	0	320
400	0	0	0
450	4,890	2,220	7,110
500	0	0	0
600	4,660	0	4,660
700	680	575	1,255
800	0	0	0
900	0	0	0
Total	24,220	2,795	27,015

Figure 53-1 Costs by Diameters



The distribution network system is also indispensable for maintaining the function of the water supply system properly. The improvement of the distribution systems should be implemented at the same time as the implementation of expansion works at the Kaolieo Treatment Plant. It should be noted that without strengthening the distribution network system, the water supply system will not function properly even though the production capacity would be increased and transmission system was developed as a result of the JICA Study. Therefore, it is strongly recommended that the minimum required distribution mains for the system are installed at the same time as the expansion of treatment plant capacity and the development of the transmission system for the Vientiane water supply development.

According to the preliminary study for the minimum required distribution mains in the 1st Stage, which is attached to Annex 20, the total length of the minimum required distribution mains is estimated at about 15.2 km and is estimated to cost US$ 3.57 million, as shown in Table 53-2.

Table 53-2 Minimum Required Distribution Mains

Dia (mm)	Length (km)	Cost (1000 US$)
150	4.57	229
250	3.22	309
400	4.89	1,540
600	1.76	1,006
700	0.68	483
Total	15.12	3,567