PART II : FEASIBILITY STUDY

FS-S19 PRIORITY PROJECTS IDENTIFIED IN THE MASTER PLAN

Facilities Required for the Priority Projects

The Second Phase of the Second Stage as the priority projects which includes two parts of implementation programs are as follows.

(1) **Part 1**

- Expansion of existing Buaran Treatment Plant with the capacity of 5,000 l/sec taking raw water from the upgraded WTC.
- Expansion of existing Distribution Center R1 with the capacity of 2,000 l/sec receiving treated water from Buaran Treatment Plant (Treated water transmission pipeline will use existing transmission pipeline).
- New Distribution Center R6 with the capacity of 2,100 l/sec receiving treated water from Buaran Treatment Plant through Distribution Center R1.
- Treated Water Transmission Pipeline from Distribution Center R1 to R6 with the total pipeline length of 33.5 km.

(2) **Part 2**

- New construction of Cipayung Treatment Plant with the capacity of 5,000 l/sec taking raw water from the WTC through raw water transmission pipeline of which length will be 20.0km.
- Expansions of existing Distribution Centers R4 and R5 with the capacity of 2,600 l/sec and 1,600 l/sec, respectively, receiving treated water from Cipayung Treatment Plant.
- Treated Water Transmission Pipeline from Cipayung Treatment Plant to Distribution Centers R4 and R5 with the total pipeline length of 41.5 km.

In each program, implementation of installation of distribution mains and service mains are also included for expansion of service area.

Although the expansion works of the existing Buaran Treatment Plant was confirmed as the Part 1 Project, the Indonesian side pointed out other possible location of new treatment plant in Bekasi area instead of the expansion of Buaran Treatment Plant. According to the explanation by the Indonesian side, in the event of the Indonesian side encountering difficulties on additional land acquisition around existing Buaran Treatment Plant premises, there will be a possibility to shift the location of the treatment plant from Buaran to Bekasi.

Facilities required for each part are outlined on the **Figure-S18.1** and **S18.2**, respectively. Target year for each Priority Project is as follows.

Part One, Second Phase of Second Stage :	**Target Year 2005**
Part Two, Second Phase of Second Stage :	**Target Year 2008**

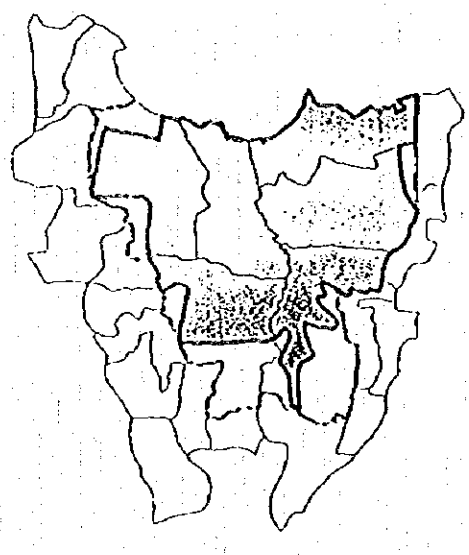
Service Area in Year 2005 and Year 2008

According to the results of the Master Plan, service area in Year 2005 which is the target year of the Part One, Second Phase of Second Stage, will be expanded widely from the existing service area. Direction of the service area expansion will be mainly to the west and to the east. The most of area inside the Outer Ring Highway will be covered as the service area. Southern part of Jakarta, outside of the Outer Ring Highway, will be still remained unserved area.

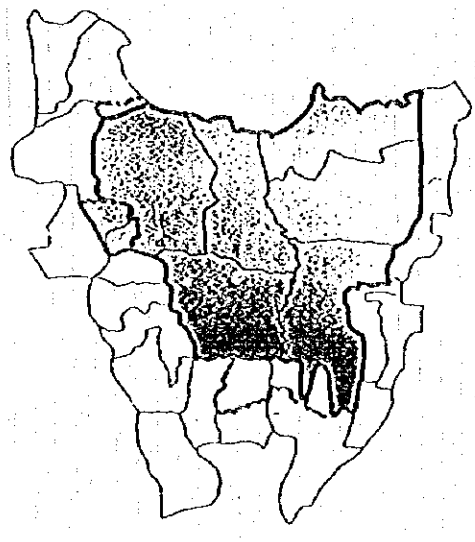
After completion of the Part One Project, service area will continuously expand beyond the Outer Ring Highway, and the most of DKI Jakarta will be included in the PAM JAYA service area in Year 2008 which is the target year of the Part Two Project. Because of expanding developing activities from the center of DKI Jakarta to outside of Jakarta beyond the administrative boundary, PAM JAYA service area will cover part of Kotamadya Tangerang, part of Cipondoh and Ciledug, in year 2008.

Service areas in Year 2005 and Year 2008 are shown on **Figure-S19.1.**

Figure-S19.1 FUTURE SERVICE AREA



2005



2008

Population and Water Demand until Year 2008

In this section, future population and future water demand until the target year 2008 are described as basic figures for the Feasibility Study.

Figure-S19.2 TOTAL POPULATION IN THE STUDY AREA

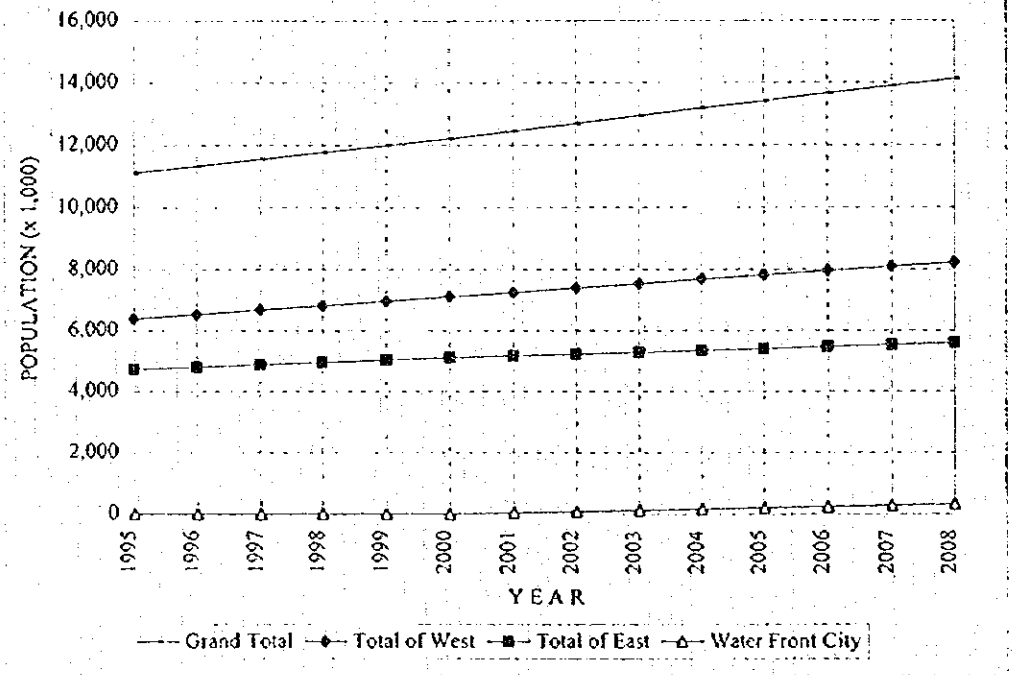


Figure-S19.3 SERVED POPULATION

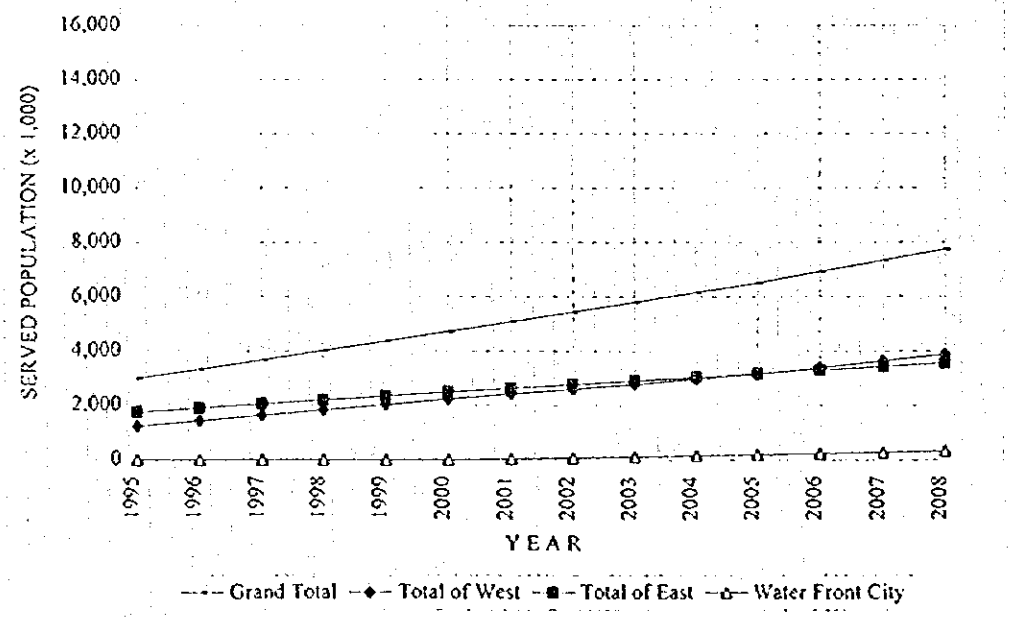


Figure-S19.4 SERVICE RATIO

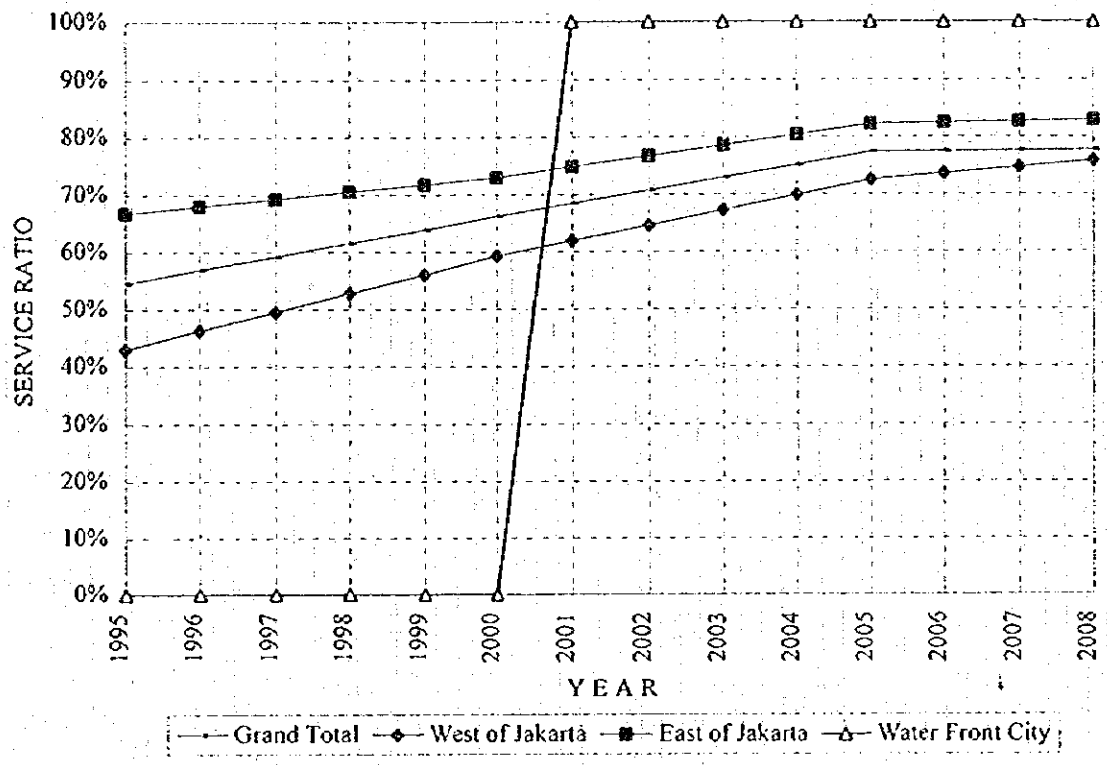


Figure-S19.5 DAY-AVERAGE WATER DEMAND

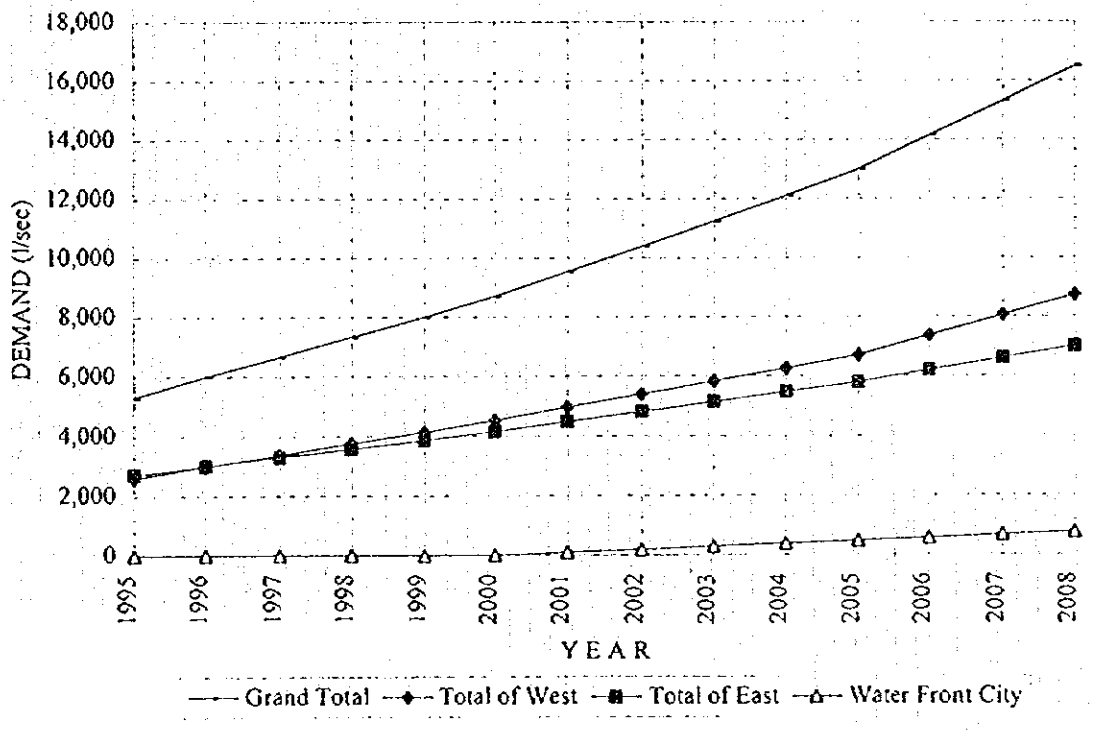


Figure-S19.6 UNACCOUNTED-FOR WATERE RATIO(%)

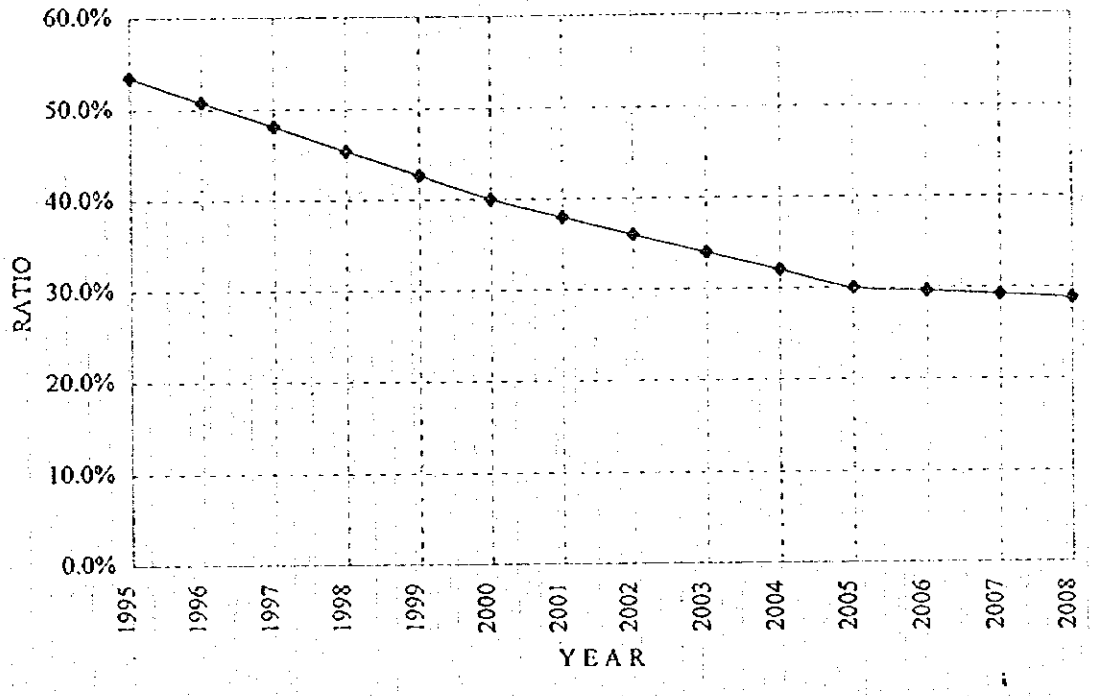
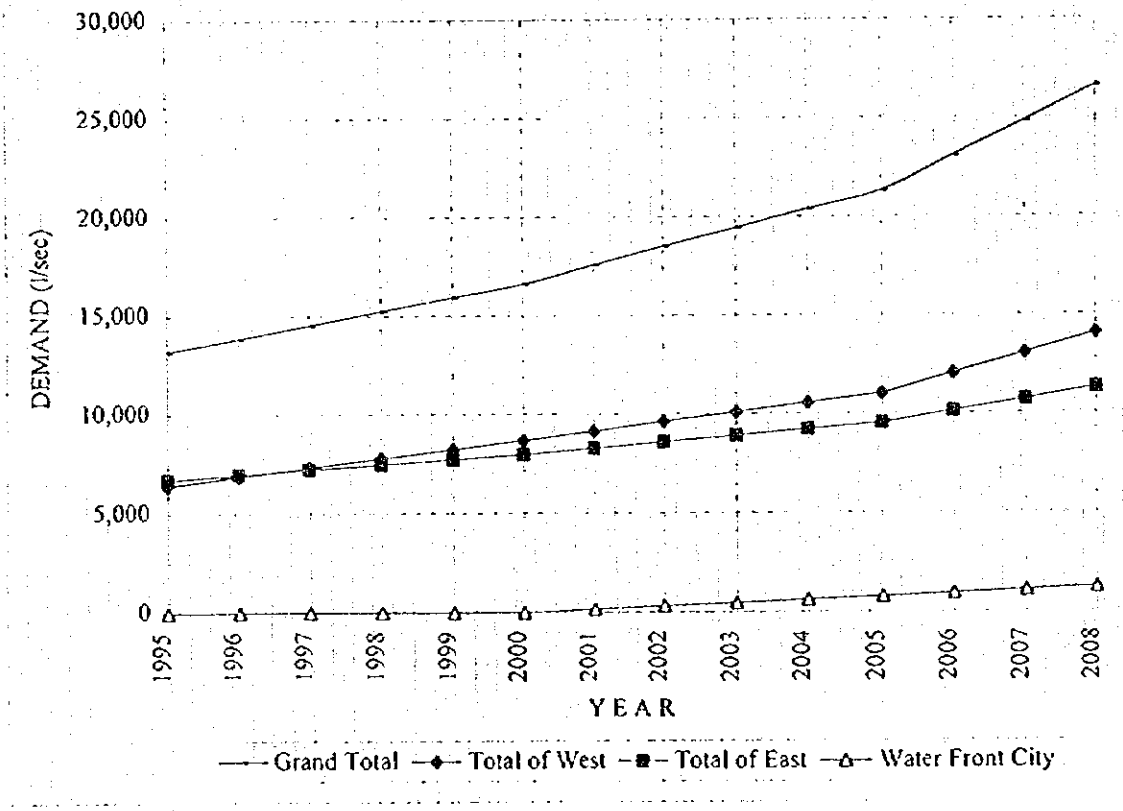


Figure-S19.7 DAY-MAXIMUM WATER DEMAND



FS-S20 WATER QUALITY IMPROVEMENT

In the Master plan, it is planned that improvement of water quality is implemented in three steps and the target of each step is as shown below. Necessary measures for the improvement are also studied in the plan.

Step 1	Potable Water at Treatment Plant Effluent
Step 2	Potable Water at The End of Distribution Mains
Step 3	Potable Water at Each Tap of All Consumers

In the Feasibility Study, realization of the Step 1 and Step 2 improvement are planned.

S20.1 Water Treatment Method

Conventional method with rapid sand filtration is employed to the water treatment method for the Priority Projects with the provisions for strengthening of chemical application for the water treatment and for isolation of WTC from Bekasi river as well.

Planned Raw Water Quality

For planned raw water quality, the present upstream quality of WTC is basically applied. After slight modification of the ranges of the present upstream quality, the quality values as listed in the **Table-S20.1** is applied for future quality of the raw water for planning of the water treatment process for the Priority Projects.

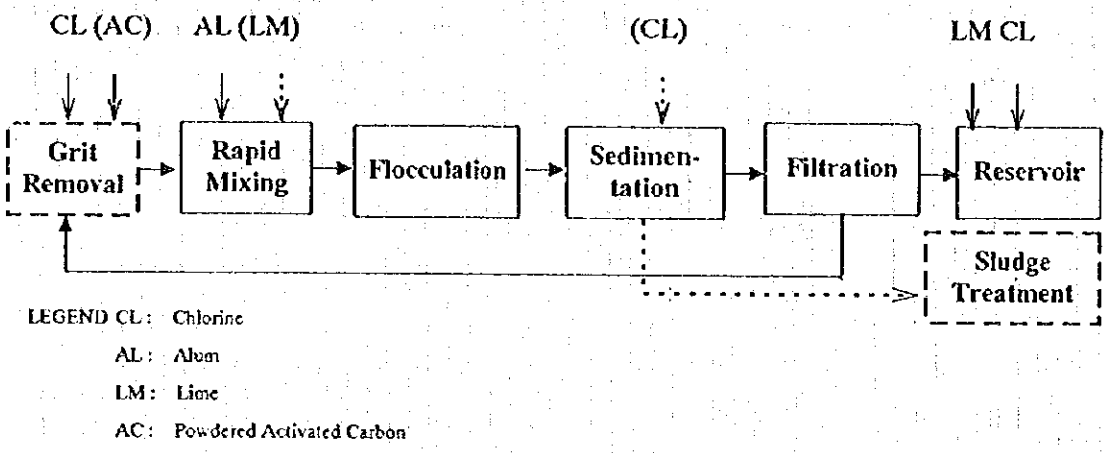
Water Treatment process

On the basis of the treatment method as described above, the process flow of water treatment of the Priority Projects is planned as shown in the **Figure-S20.1**.

Table-S20.1 FUTURE QUALITY OF RAW WATER OF WTC

Parameter	Unit	Range	Average	Remarks
Turbidity	NTU	10 - 1000	50 100	Dry Season Rainy Season
Color	TCU	1.0 - 15	5.0	
pH		6.5 - 8.0	7.2	
KMnO4	mg/l	1.0 - 10	5.0	
NH4	mg/l	0.0 - 1.0	0.1	
Fe	mg/l	0.05 - 1.0	0.4	
Mn	mg/l	0.0 - 0.1	0.03	
Detergent	mg/l	0.01 - 0.2	0.1	
E.Coli	mg/l	5000 - 200000	30000	

Figure-S20.1 FUTURE WATER TREATMENT METHOD



S20.2 Improvement of Raw Water Quality

Improvement of raw water quality of West Tarum canal by isolation of the canal from Bekasi river is indispensable for water treatment under the Priority Projects. The canal isolation is explained in FS-S21.

S20.3 Improvement of Distributed Water Quality

After achievement of the target of Step 1 improvement of water quality, that is to secure potable water at the treatment plant, next target of quality improvement, Step 2, for obtaining drinkable water at the end of distribution mains will be conquered. Required measures for improvement distributed water quality are as follows.

(1) Improvement by PJSIP
(2) Additional Chlorination at Distribution Center
(3) Zoning of Distribution Network
(4) Monitoring of Water Quality in Distribution Network

FS-S21 PRELIMINARY STUDY ON RAW WATER SOURCES

S21.1 Study on Upgrading of West Tarum Canal in Quantity Aspect

There are two (2) factors to make water balance study for checking future availability of raw water from the West Tarum Canal under past, present and future conditions ; 1) deduction of irrigation water demand by decreasing irrigation area, and 2) industrial water demand additionally increased by industrial development along and surrounding the West Tarum Canal.

In addition to the above information, the Jatiluhur Authority has estimated that an additional water with an amount of 2 to 3 m^3/sec out of 5 m^3/sec for the initial immediate measure might be already available at present, obtaining by reducing the irrigation area in Bekasi and it is predicted that availability of the remaining 3 to 2 m^3/sec for the initial measure is very sure before the end of Year 2001. The said information means that the initial immediate measure with an amount of 5 m^3/sec will be allocated by reducing only from the water use for the Bekasi irrigation area. Therefore, the total amount of supplied water from the West Tarum Canal before the confluence with the Bekasi river, having an amount of 31.1 m^3/sec, will be newly allocated to 5 m^3/sec for the Bekasi area and 26.1 m^3/sec for the DKI Jakarta.

As mentioned in the preceding Section, the West Tarum Canal will generate an additional water of 10 m^3/sec, out of which 5 m^3/sec each will be available in the Years 2002 and 2006

respectively.

The study on necessity of expansion works of the West Tarum Canal for upgrading was to check whether or not the existing canal cross section can allow increasing discharge, which is the sum of the existing allocated discharge and the additionally generated discharge.

For the said study purpose, the site investigation to measure the existing freeboard was conducted for entire section from the confluence with the Cibeet river to the Buaran intake of the existing Treatment Plant for the period in May and from July to August 1996. And the following results on necessity of the expansion works for the upgrading of the West Tarum Canal :

Section I
Not needed *Curug Intake - Confluence with Cibeet River*

Section II
Not needed *Confluence with Cibeet River - Confluence with Cikarang River*

Section III
Not needed *Confluence with Cikarang River - Confluence with Bekasi River*

Section IV
Confluence with Bekasi River - Buaran Intake

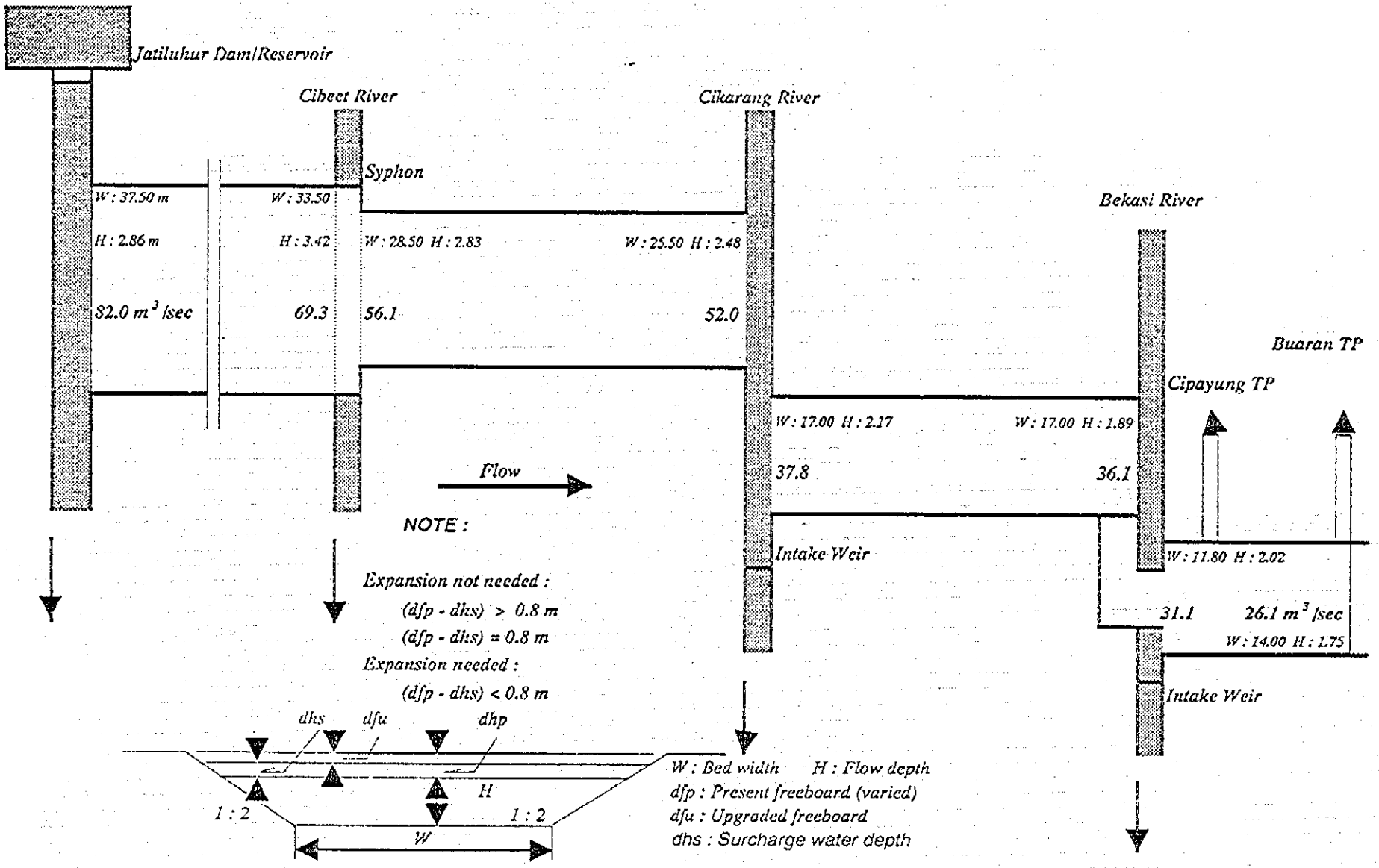
1.5 km downstream section from entrance of existing silt trap Needed
0.6 km upstream section from Buaran intake Needed

Other sections Not needed

For the sections, which require the expansion works, the cross section of the West Tarum Canal should be changed from trapezoid shape to rectangular shape. As an appropriate construction methodology, it is proposed that sheet piles are driven at the shoulders of both sides of the canal and that the remaining portions inside the sheet piles driven is removed by dredging.

Figure-S21.1 shows the flow chart of upgraded West Tarum Canal.

Figure-S21.1 FLOW CHART OF UPGRADED WEST TARUM CANAL



S21.2 Study on Upgrading of West Tarum Canal in Quality Aspect

The options for conveying raw water of an acceptable quality and in sufficient quantities to DKI Jakarta and its surrounding area (BOTABEK) have been studied by the Jabotabek Water Resources Management Study (JWRMS) financed by World Bank loan. The study concluded that upgrading of the present configuration of the West Tarum Canal to safeguard the water quality is the cheapest solution to satisfy a major part of the raw water demand of DKI Jakarta and Bekasi for the immediate future.

The short term and medium term measures is to keep the quality of West Tarum Canal water acceptable levels preventing inflow from the intercepted rivers and drainage into the West Tarum Canal. The solution to meet the original design concept can be accomplished by keeping the West Tarum Canal water separated from the intercepted water, while diverting the intercepted water directly to the relevant irrigation sectors, which can also be supplied from the West Tarum Canal in case of water shortage. To realize the said concept, an appropriate structures such as syphon, pipe bridge, etc. have to be constructed at the locations where the West Tarum Canal intercepts the rivers or where intercepted water has to cross the West Tarum Canal.

Following the JWRMS, the Jatiluhur Water Resources Management Project (JMP), Jatiluhur Water Resources Management Project Study (JMPS), has commenced and is being carried out the study on water management in accordance with the Terms of Reference as of October 1996. The said study has included water quality improvement of the West Tarum Canal for providing safe drinking water to parts of the DKI Jakarta and Botabek as immediate measure. In such situation, the JICA Study Team has closely coordinated with the JMPS through the Jatiluhur Authority, especially on scope of works under the said management study, of which the JICA Study Team shall undertake the most urgent works. Finally, it was proposed that the JICA Study Team would perform assistance works to implement the upgrading works, in quality aspect, only for the intercepting portion of the West Tarum Canal with the Bekasi river, which can be made as the consolidated works with the upgrading works, in quantity aspect, of the West Tarum Canal for the section from the Bekasi intake to the Buaran intake and raw water transmission by pipeline from the Bekasi intake to the proposed treatment plant.

S21.3 Conceptional Design and Preliminary Cost Estimate for Upgrading in Quantity Aspect

The upgrading works for the West Tarum Canal in quantity aspect is composed of sheet pile driving works at both left and right shoulder of the canal and dredging and excavation works inside the canal. The said upgrading works will be required only for 2.1 km against a total length of the canal from the outlet of the existing silt trap to the Buaran intake. The typical canal sections for upgrading and other related works are shown in **Figure-S21.2**. The total direct construction cost was preliminarily estimated to be US$ 11.0 million equivalent consisting of Yen 847 million (US$ 7.7 million equivalent) in foreign currency portion and Rp. 7.26 billion (US$ 3.3 million equivalent) in local currency portion as summarized below :

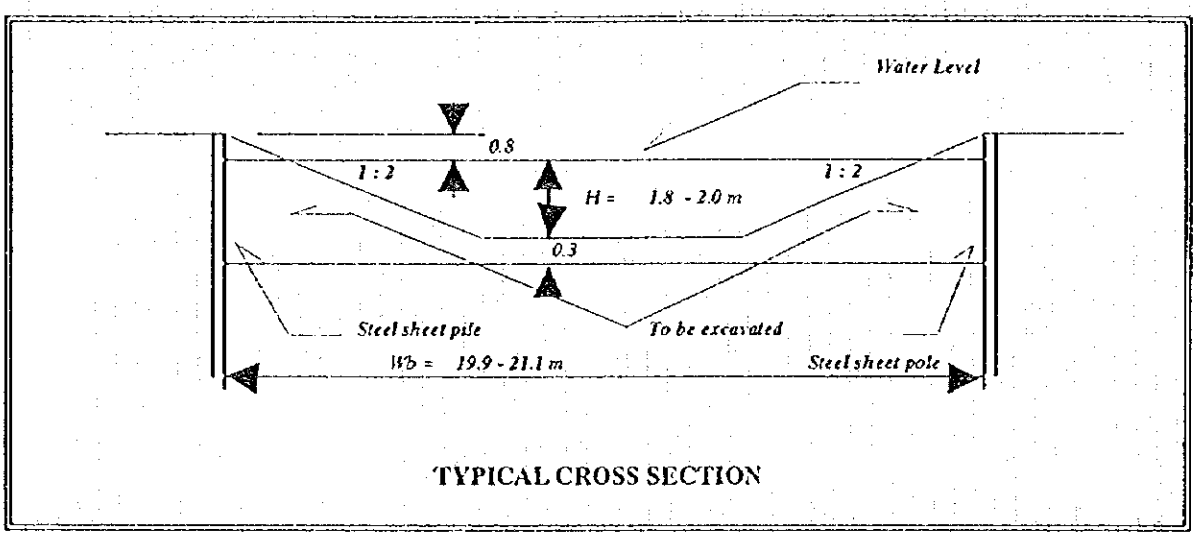
Table-S21.2 DIRECT CONSTRUCTION COST OF UPGRADING WEST TARUM CANAL IN QUANTITY ASPECT

No.	Item	Foreign Currency (Yen 10^3)	Local Currency (Rp. 10^3)	Total (US$ 10^3)
(1)	Preparatory Works	38,500	330,000	500
(2)	Steel Sheet Piling	639,100	5,478,000	8,300
(3)	Dredging/Excavation	26,950	231,000	350
(4)	Improvement Works for Canal Crossing Structures	77,000	660,000	1,000
(5)	Miscellaneous Works	65,450	561,000	850
Total Direct Construction Cost		**847,000**	**7,260,000**	**11,000**

S21.4 Conceptional Design on Structures for Upgrading in Quality Aspect

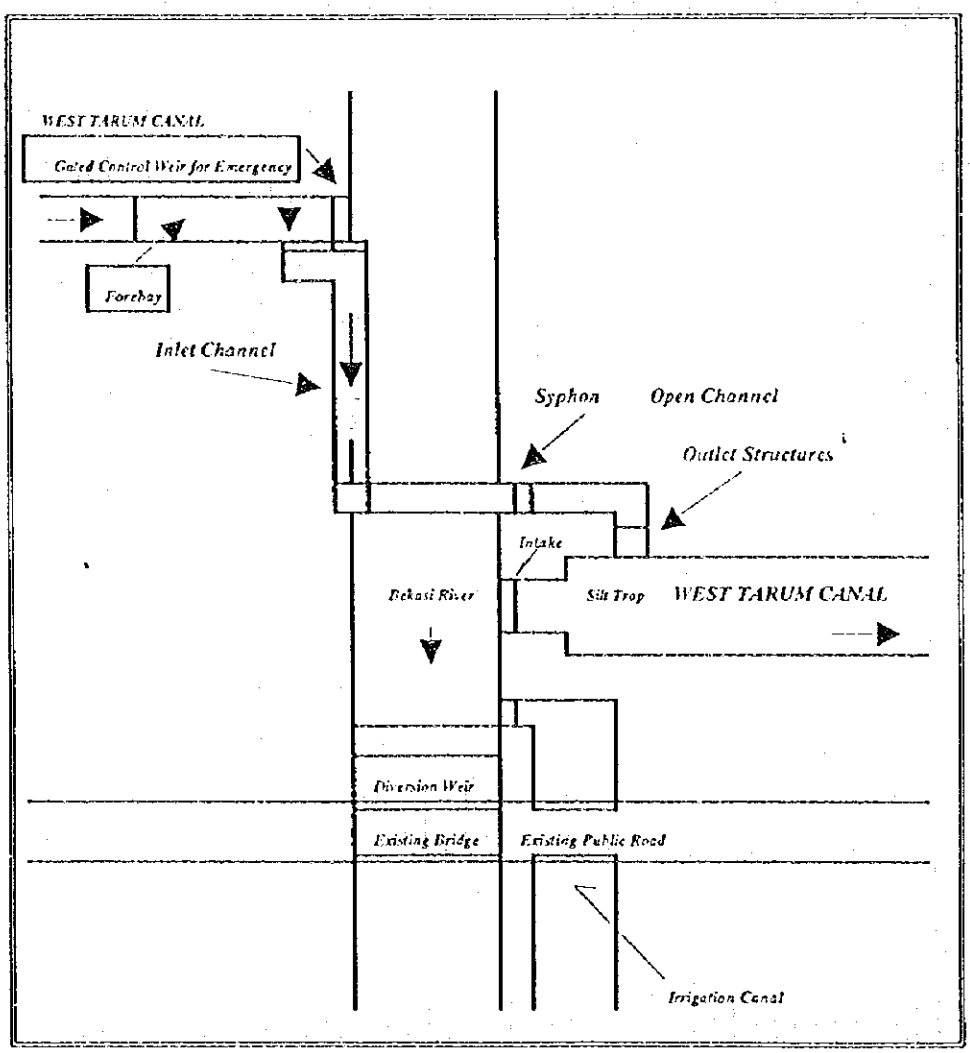
The proposed plan on structural series for crossing the Bekasi river has the following structures as shown on **Figure-S21.3**.

Figure-S21.2 UPGRADING OF WEST TARUM CANAL IN QUANTITY ASPECT



TYPICAL CROSS SECTION

Figure-S21.3 CONCEPTIONAL DESIGN OF UPGRADING OF WEST TARUM CANAL IN QUALITY ASPECT



The preliminary cost estimate was made in **Table-S21.2**, based on the rough work quantities under the conceptional design of the structures.

Table-S21.2 DIRECT CONSTRUCTION COST UPGRADING WORKS IN QUALITY ASPECT

No.	Item	Foreign Currency (Yen 10^3)	Local Currency (Rp. 10^3)	Total (US$ 10^3)
1.	Civil Works	555,170	4,758,600	7,210
(1)	Coffering & Dewatering	123,200	1,056,000	1,600
(2)	Forebay	38,500	330,000	500
(3)	Gated Control Weir for Emergency	8,470	72,600	110
(4)	Inlet Channel	177,100	1,518,000	2,300
(5)	Siphon	161,700	1,386,000	2,100
(6)	Outlet Channel & Outlet Structures	46,200	396,000	600
2.	Metal Works	96,250	825,000	1,250
(1)	Gated Control Weir for Emergency	26,950	231,000	350
(2)	Intake	26,950	231,000	350
(3)	Siphon	15,400	132,000	200
(4)	Outlet Structures	26,950	231,000	350
	Total Direct Construction Cost	**651,420**	**5,583,600**	**8,460**

FS-S22 TREATMENT FACILITIES

Under the priority projects, two treatment plants will be constructed, namely;

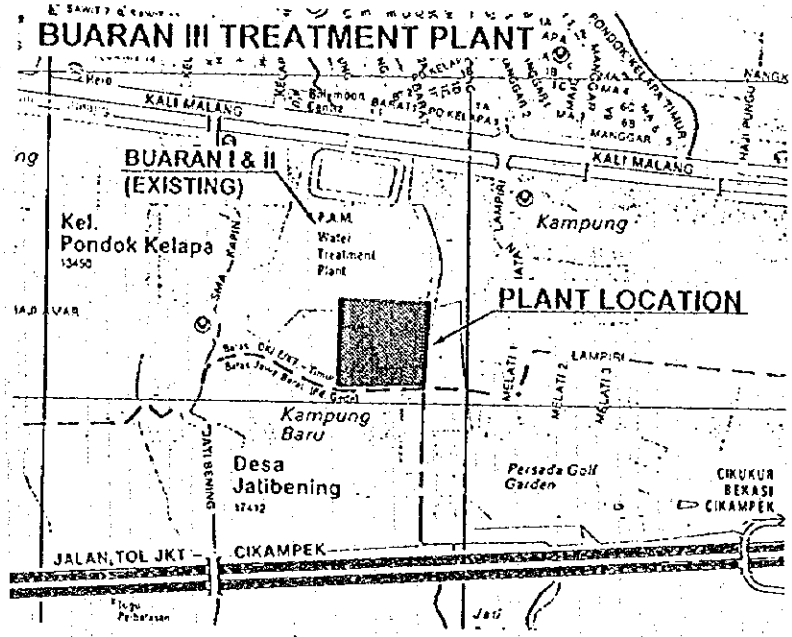
Buaran III Treatment Plant : Capacity 5,000 l/sec, and
Cipayung Testament Plant : Capacity 5,000 l/sec.

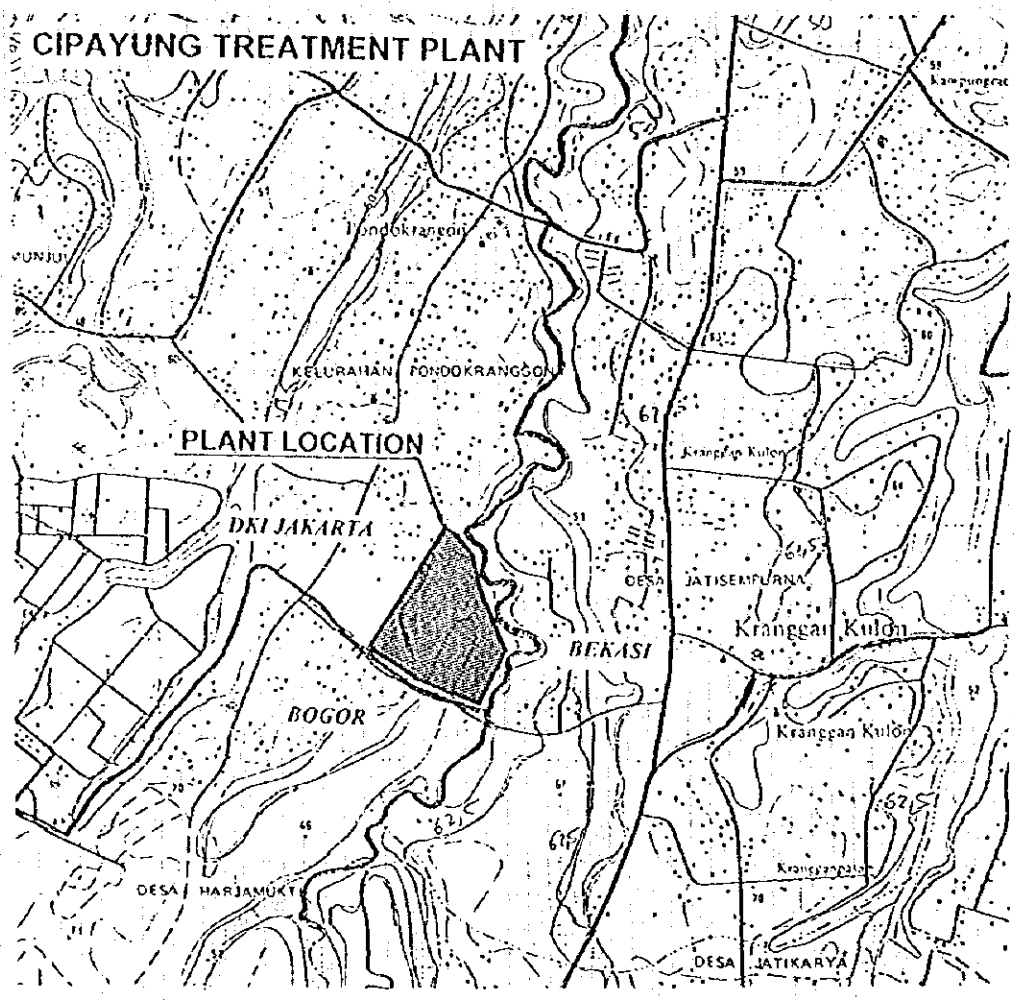
Location of these treatment plants are shown on **Figure-S22.1**

For design of the new treatment plant, following concepts were taken into account:

- Easy operation and maintenance
- Reduction of treatment plant loss
- Conforming to the existing facilities to be able to establish united system, for Buaran III
- Considering future expansion, for Cipayung
- Matching topographical and geographical condition

Figure-S22.1 LOCATION OF TREATMETN PLANTS





Because of nature of raw water from dam lake, fluctuation of raw water quality may be small and sudden quality change will not be foreseen. Under the circumstance, operation of the plants will be stable and constant, therefore, treatment system should be designed as simple system which will not require skilled or special know-how or control.

To reduce treatment plant loss, it should be considered to return backwash water from filter basin which is the major portion of the plant loss to intake or receiving well. Sludge treatment plant will be required in future to protect environment around the plants. Supernatant of sludge thickener which will be a part of sludge treatment plant in future, will not be recommended to return to intake or receiving well to avoid too complicated plant operation.

It is recommended to arrange or include land space required for the future sludge treatment plant when land for the treatment plant is acquired.

General layout of the Buaran III treatment plant and Cipayung treatment plant are presented on **Figure-S22.2** and **Figure-S22.3** respectively.

FS-S23 TRANSMISSION AND DISTRIBUTION SYSTEM

S23.1 General Concept

The roles of treated water transmission and distribution systems are to convey and distribute treated water continuously to consumers without deterioration of water quality nor without much waste. Adequate adjustment or control of water quantity, pressure and quality in the system is very important to satisfy the purpose. Hydraulically separated zoning system is recommended to be introduced in the Mater Plan as a suitable method for the control of distribution system. Although the whole service area will not be able to be separated into proposed seven zones during the priority project period, the area should be hydraulically separated gradually.

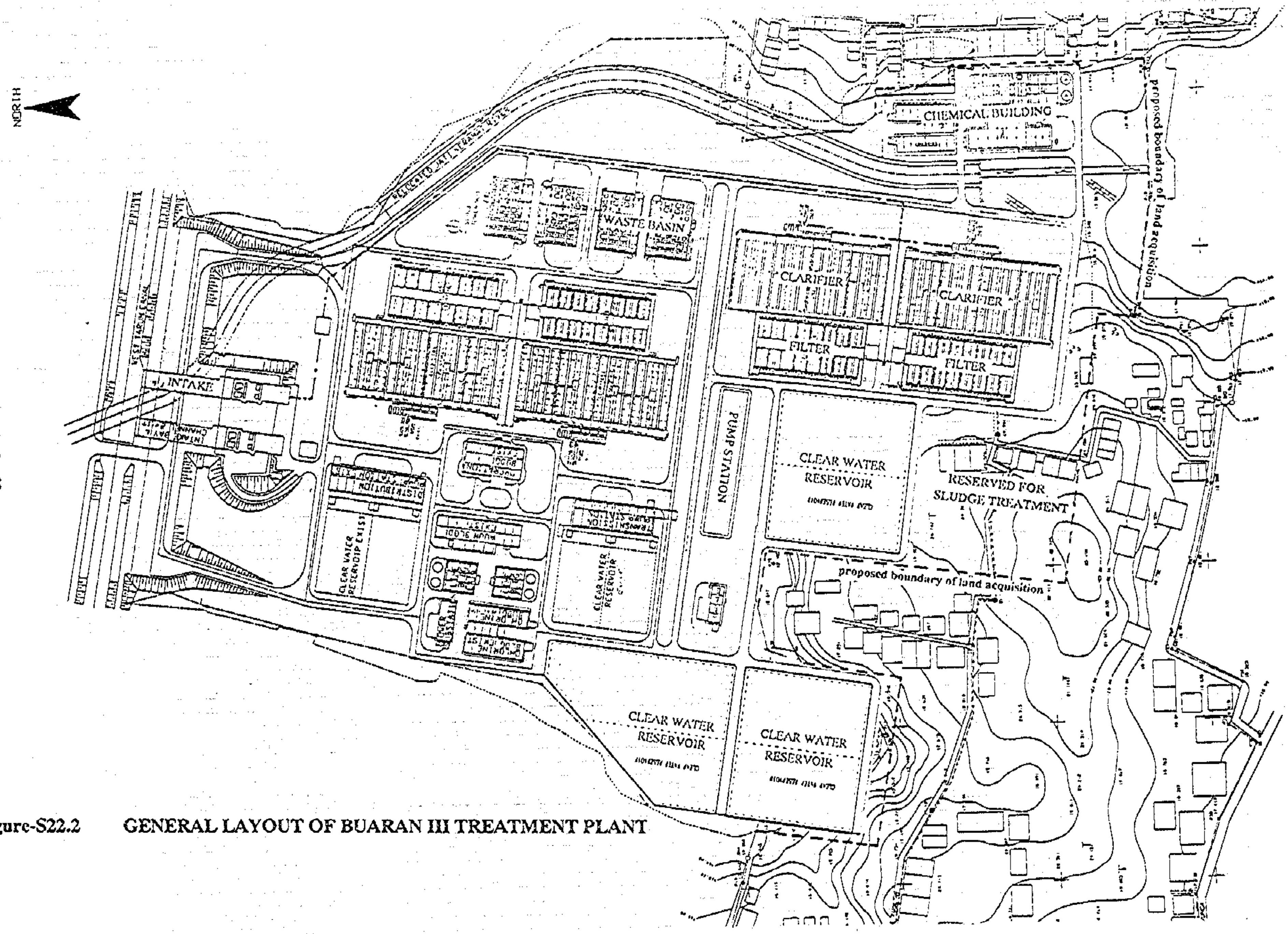
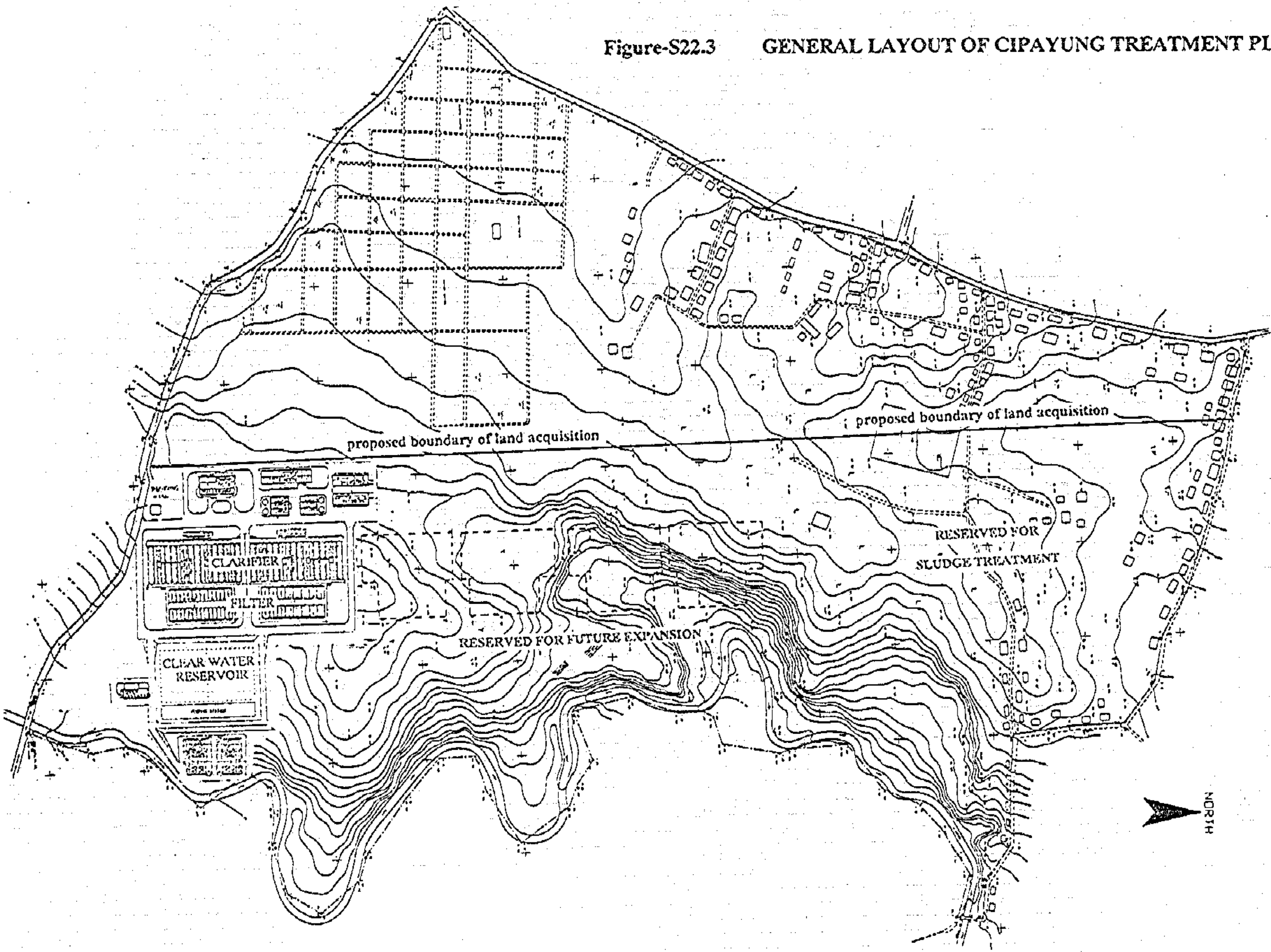


Figure-S22.2 GENERAL LAYOUT OF BUARAN III TREATMENT PLANT

Figure-S22.3 GENERAL LAYOUT OF CIPAYUNG TREATMENT PLANT



There are fluctuations in water demand seasonally and hourly. Among these variations, the following peak factors are used for the preliminary design.

- Day Maximum Water Demand : 115 % of day average water demand
  Transmission Pipe is designed on day maximum water demand basis.
- Hourly Maximum Water Demand : 130 % of day maximum water demand
  Distribution Pipe is designed on hourly maximum water demand basis.

S23.2 Treated Water Transmission

During the period for the immediate projects, water treatment plant will be expanded or newly constructed in eastern area whereas western area are expected to have great increase in water demand. Considering introduction of zoning system as discussed in the previous section treated water should be transmitted from treatment plants to distribution centers in western area through treated water transmission pipeline. Required construction of transmission pipeline during Part 1 and Part 2 of Second Phase of Second Stage are follows:

Part 1 of Second Phase of Second Stage, Target Year 2005

BUARAN III ⟶ **DC-R1** ⟶ **DC-R6**

EXISTING L=13.5Km

NEW L=33.5Km

Part 2 of Second Phase of Second Stage, Target Year 2008

CIPAYUNG ⟶ **DC-R5** ⟶ **DC-R4**

NEW L=23.5Km

NEW L=16.5Km

Pipe alignments of these treated water transmission pipeline are shown on **Figures-S23.1** and **S23.2.**

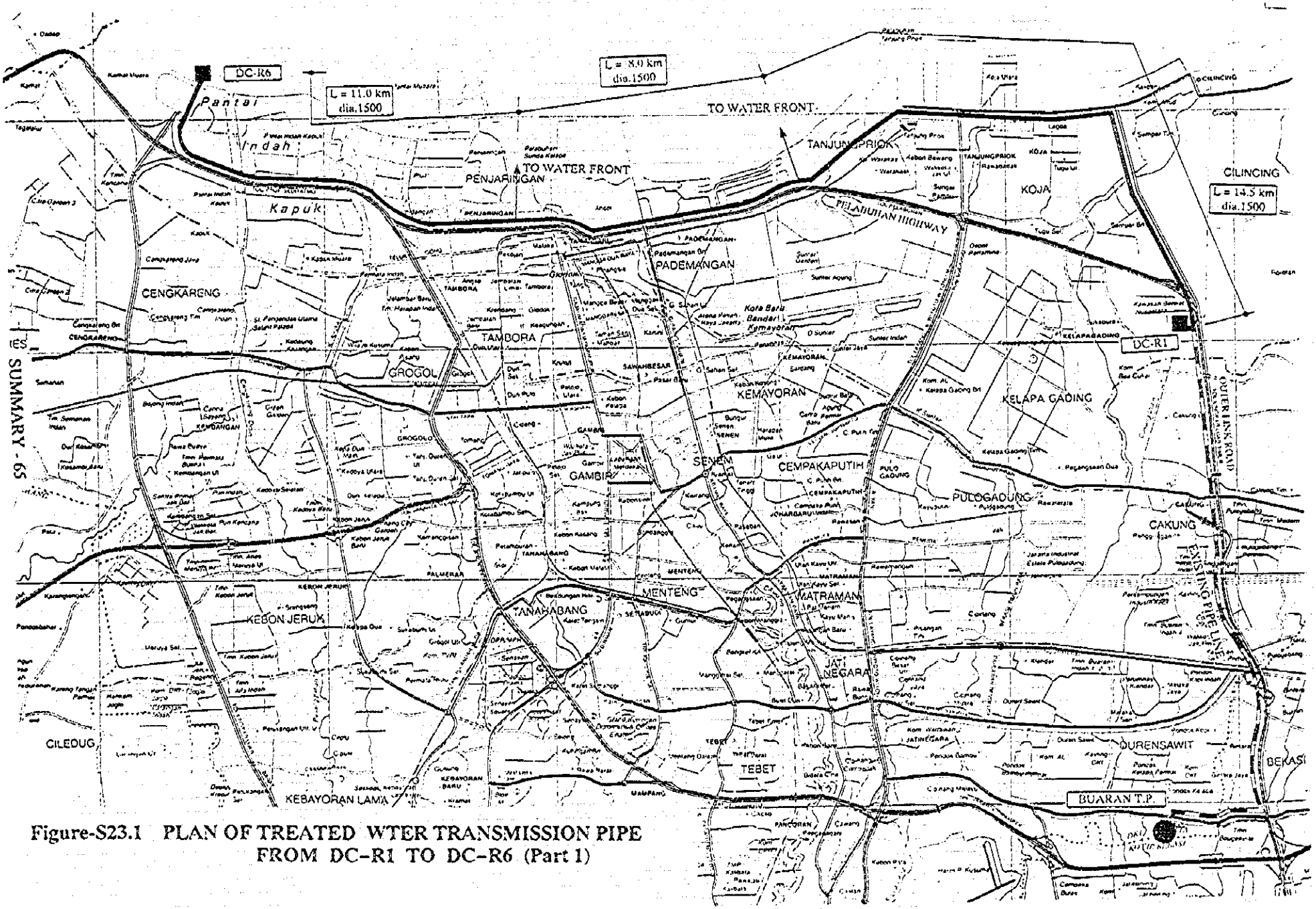


Figure-S23.1 PLAN OF TREATED WTER TRANSMISSION PIPE FROM DC-R1 TO DC-R6 (Part 1)

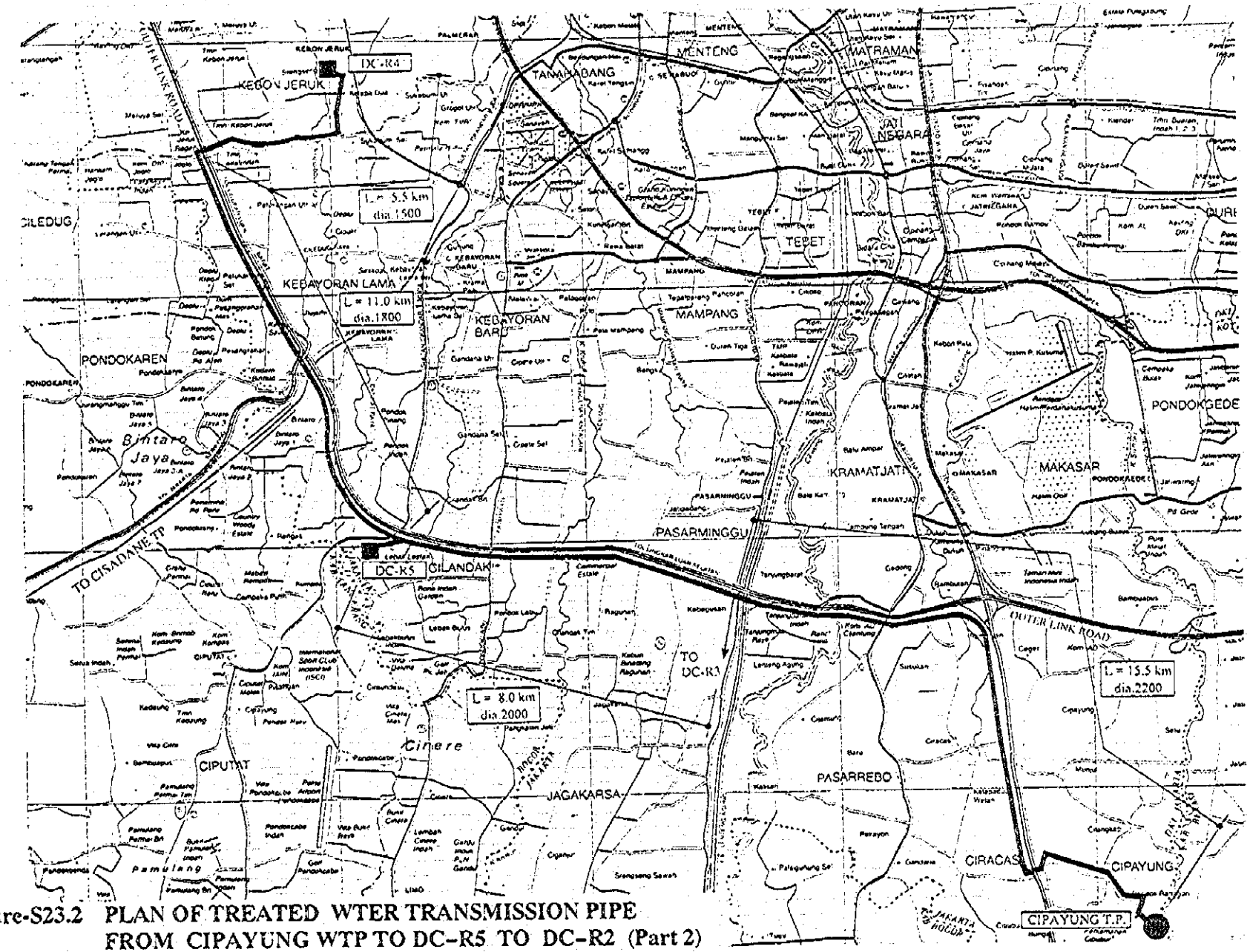


Figure-S23.2 PLAN OF TREATED WTER TRANSMISSION PIPE FROM CIPAYUNG WTP TO DC-R5 TO DC-R2 (Part 2)

S23.3 Distribution Center

Distribution centers are to be newly constructed or expanded in order to distribute water in each zone properly as water distribution terminals for zoning system. As the priority projects, DC-R1 and DC-R6 are planned to be expanded/constructed during Part 1 program, while DC-R4 and DC-R5 are to be expanded during Part 2 program. Distribution center have duty to regulate the fluctuations occurring between the quantity of transmitted and delived. DC-R1 has, in addition to above, another function as a pump station for treated water transmission.

The distribution center is composed of operational reservoir, distribution pump facilities and chlorination facilities. Operational reservoir is to store water which can be drawn upon during those hours of the day when distribution system demand is high and then replenished during the night when the system demand is low. Chlorination facilities are required to supplement the disinfection in the treatment plant considering long transmission pipeline from the plant and detention in operational reservoir and distribution pipelines.

Required capacity of operational reservoir and pump facilities is shown in Table-S23.1.

Table-S23.1 Required Capacity of Reservoir and Pump Facilities

		Part One Program		Part Two Program	
		DC-R1	DC-R6	DC-R4	DC-R5
Reservoir Capacity (m3)	Existing	27,000	-	21,600	21,600
	Newly required	18,360	32,400	46,800	36,000
	Required Total	45,360	32,400	68,400	57,600
Pump Capacity (l / sec)	Existing	3,000	-	1,200	1,600
	Newly required	2,000	21,000	2,600	1,600
	Required Total	5,000	21,000	3,800	3,600

DC-R1 and DC-R5 are planed to be expanded in the existing area while land acquisition is required for DC-R6 construction and DC-R4 expansion. Location of DC-R6, which was recommended by the Steering Committee to be constructed in Water Front City, is proposed to be selected near the Outer Ring Road.

S23.4 Distribution Pipe Network

Distribution pipeline will be classified into three categories by pipe sizes and purposes, namely, primary trunk main, secondary main and tertiary main as recommended in Master Plan in 1985.

Primary trunk main forms distribution pipe networks and distribute water to secondary mains which compose elementary zones. The size of primary trunk mains is 300 mm in diameter and larger. Secondary mains, from 150 mm to 250 mm in diameter, distribute water to tertiary mains which have diameter of 100 mm and smaller. House connections are to be branched from the tertiary mains only.

Pipe networks were preliminary analyzed for the year of 2005, the target year of Part One program, and 2008, the target year of Part Two Program.

Table-S23.2 provides a list of pipe length to be installed during Part One and Part Two programs. The proposed distribution pipe network system are shown in **Figure-S23.3** and **Figure-S23.4** respectively.

Table-S23.2 BREAKDOWN OF PRIMARY MAINS

Diameter (mm)	Existing Length * (m)	Part One Program		Part Two Program	
		Newly reqired Length(m)	Accumulated Length(m)	Newly reqired Length(m)	Accumulated Length(m)
	(a)	(b)	(c)=(a)+(b)	(d)	(e)=(c)+(d)
300	117,789	37,135	154,924	88,245	243,169
350	27,217	190	27,407	0	27,407
400	123,718	27,024	150,742	8,120	158,862
450	4,650	0	4,650	0	4,650
500	55,423	15,192	70,615	4,410	75,025
550	2,504	0	2,504	0	2,504
600	123,898	69,977	193,875	26,780	220,655
700	0	10,500	10,500	2,400	12,900
800	61,422	54,800	116,222	29,370	145,592
900	17,977	7,680	25,657	2,360	28,017
1000	27,126	19,220	46,346	12,034	58,380
1100	6,442	0	6,442	0	6,442
1200	5,590	16,930	22,520	0	22,520
1350	1,912	9,100	11,012	0	11,012
1500	640	15,492	16,132	900	17,032
1600	2,619	2,250	4,869	1,710	6,579
1800	2,962	7,634	10,596	580	11,176
Total	581,889	293,124	875,013	176,909	1,051,922

Note :

* Figures of existing pipe length are referred to JWSSP Distribution System Report in 1995. The length includes pipes to be installed by PJSIP Phase 1 and Phase 2

Figure-S23.3 PROPOSED PRIMARY DISTRIBUTION SYSTEM
(YEAR 2005) (Existing and Proposed Pipelines)

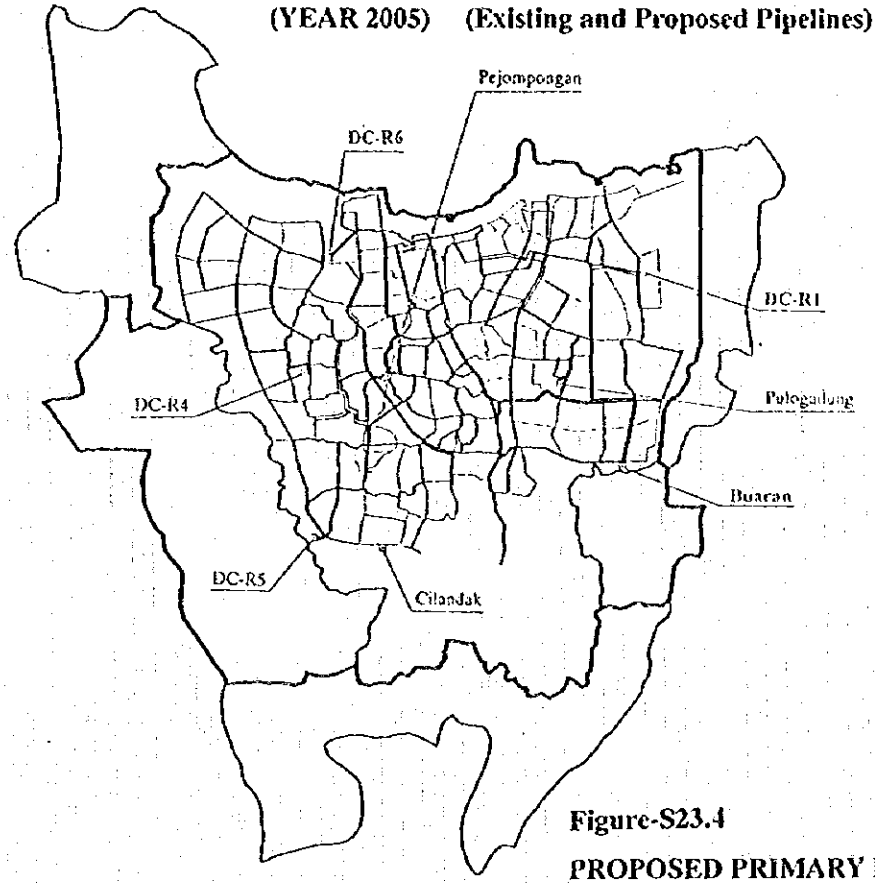
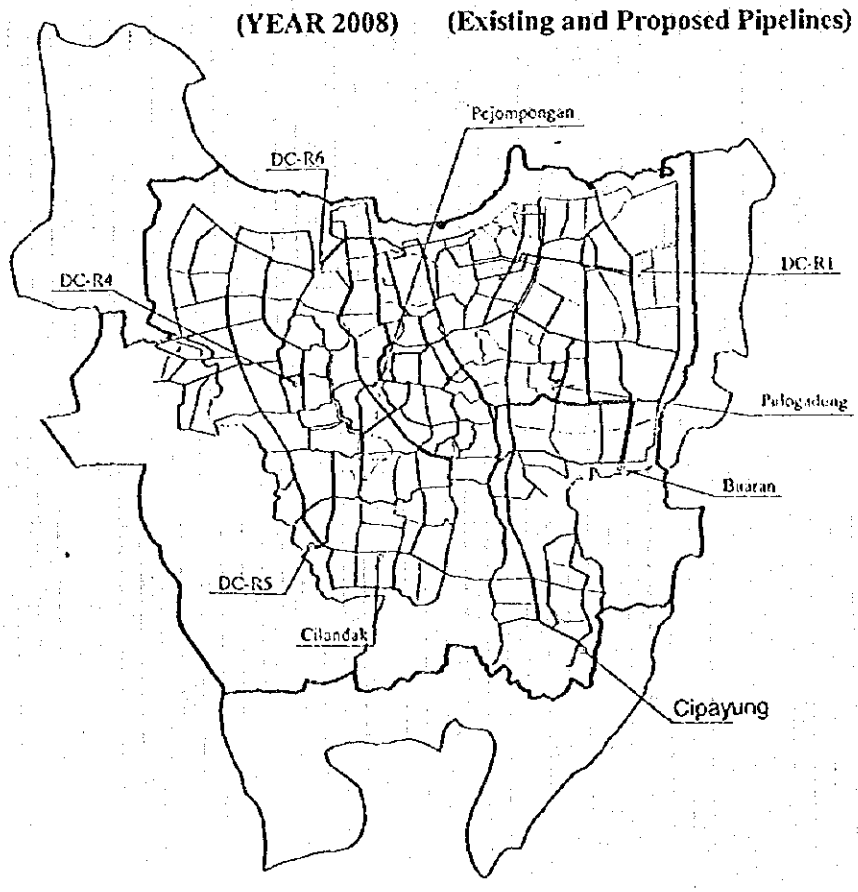


Figure-S23.4
PROPOSED PRIMARY DISTRIBUTION SYSTEM
(YEAR 2008) (Existing and Proposed Pipelines)



LEGEND

Pipe Diameter

200 ≤	< 400
400 ≤	< 600
600 ≤	< 800
800 ≤	< 1000
1000 ≤	< 1200
1200 ≤	< 1801

⊖ Treatment Plant / Distribution Center

FS-S24 OPERATION / MAINTENANCE AND MONITORING SYSTEM

S24.1 Operation and Maintenance

Among operation and maintenance of water supply facilities, daily inspection is most important and effective method to keep the facilities in good condition. So, standard daily inspection lists as a part of the operation and maintenance plan are prepared in this study for assisting private sectors to perform efficient operation and maintenance.

Both of Buaran Treatment Plant and Distribution Center I are the newest facilities among the existing Jakarta Water Supply System and their operation and maintenance seem satisfactory. Moreover, facilities under Part I of the Priority Project are expansion of Buaran Treatment Plant and Distribution Center (R1). Considering the above, operation and maintenance of the treatment plants and distribution centers are planned referring to these existing facilities.

Periodical inspection such as daily, monthly, and annual inspection is a fundamental of maintenance of water supply facilities, among these periodical inspection, daily inspection especially for mechanical/electrical facilities is the most important duty to maintain these facilities in good working condition.

In daily inspection, energy consumption, i.e. electrical current, is mainly checked because energy consumption represents operating condition of mechanical/electrical facilities. A visual inspection on site together with check on abnormal noise, vibration, heat and odor is important as well.

S24.2 Monitoring System

The monitoring system proposed in the Master Plan is divided into two categories of monitoring of water quality and monitoring of water supply operation, so these two categories are presented in this chapter.

Monitoring of Water Quality

The monitoring and strengthening of water quality is executed by the newly proposed Central Laboratory and laboratory at each treatment plant. The PAM JAYA monitors and controls overall water quality through cross check of distributed water at newly constructed Central Laboratory, and laboratory at each treatment plant.

The items to be analyzed and overall layout and necessary equipment at the Central Laboratory are proposed in the Feasibility Study.

Monitoring of Water Supply Operation

The monitoring of water supply operation is executed by proposed PAM SCADA System described in the Master Plan. The proposed procedure of introduction of PAM SCADA System is as follows:

a. Study on monitoring points
b. Detailed design of flow/pressure meter installation
c. Installation of flow/pressure meter
d. Accumulation of above data including outlet of treatment plant, transmission/distribution trunk main and distribution main of each supply subsystem
e. Analysis of accumulated data
f. Establishment of water supply operation strategy
g. Study on PAM SCADA System and detailed design
h. Study on organization for central supervisory system and pipeline maintenance
i. Training of operating engineer
j. Installation of PAM SCADA System

In order to maintain water supply facilities in economical/optimum water supply operating condition water supply facilities should be controlled through continuous monitoring. Monitoring of operating condition at strategic points of transmission and distribution system including production facilities is indispensable.

Confirmation of flow and pressure at;

- Outlet of production facility
- Receiving facility at Distribution Center
- Outlet of Distribution Center
- Branch point of distribution main

The installation of pressure and flow meter at the strategic points in transmission and distribution pipeline is divided into two steps, step1 and step2, considering SCADA System functions effectively. Sensors of pressure and flow rate, instrument, and recorder will be installed in step1 period and after collected data were analyzed Remote Terminal Unit (RTU) as a component of SCADA System, real time on-line monitoring system, will be installed in step2.

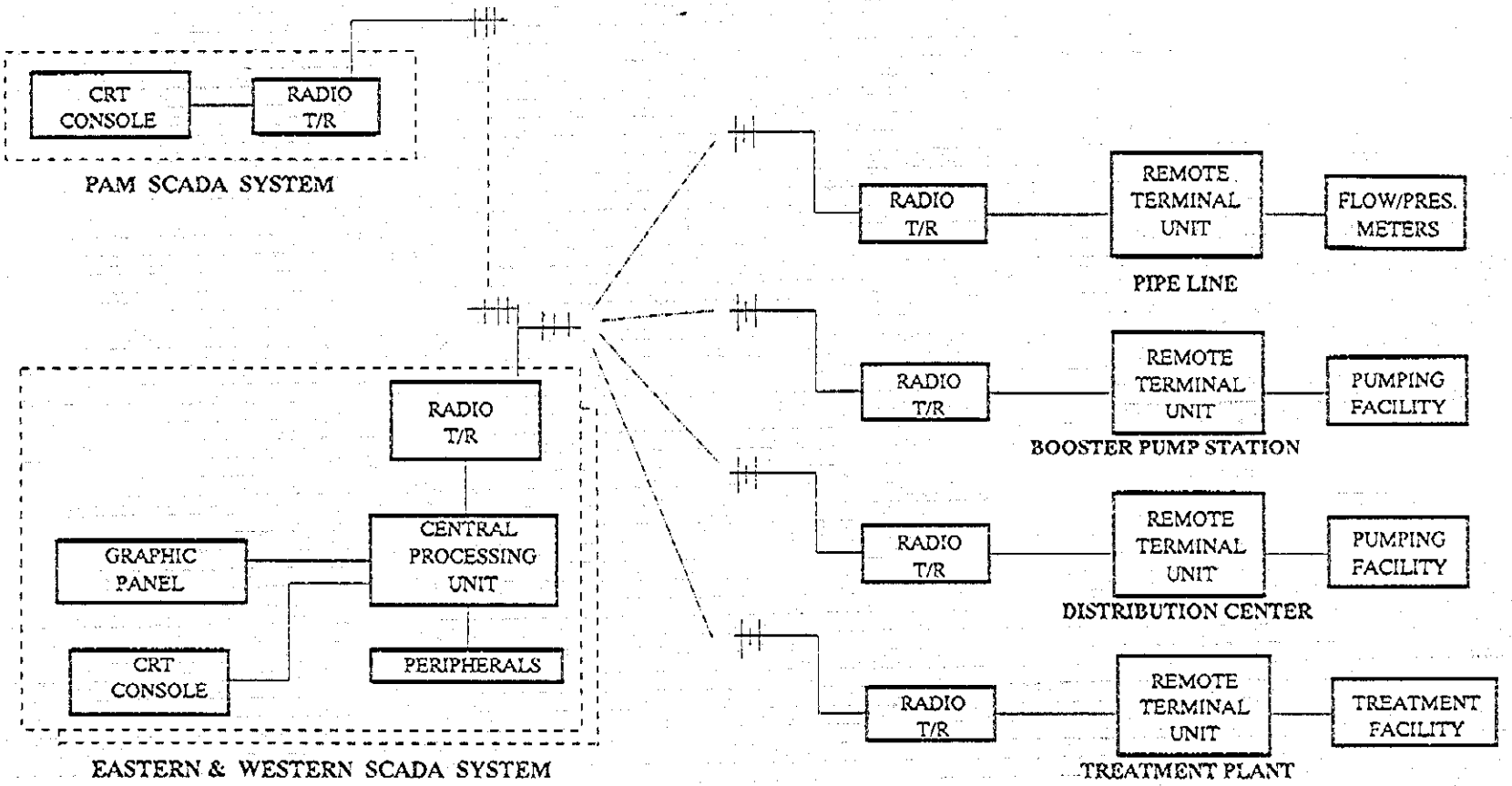
The layout of hardware of PAM SCADA System basically consists of the followings as shown in **Figure-S24.1.**

FS-S25 PRELIMINARY COST ESTIMATES

For the preliminary cost estimation, unit costs of recent projects were referred to. Although the standard price of Ministry of Public Works and DKI Jakarta were also referred to, these standard prices were usually different from the actual market price. Therefore, unit costs included in tender or contract for the recent projects were applied. Unit prices obtained from projects listed above were adjusted by price escalation rate and modified into 1996 price.

Costs required for the priority projects were preliminarily estimated in foreign currency portion and local currency portion, separately. The foreign currency portion will be disbursed mainly to imported materials and the local currency portion will be disbursed mainly to locally available materials.

FigurS24.1 HARDWARE LAYOUT OF PAM SCADA SYSTEM



Note: T/R Transmitter & Receiver

Summary of investment costs are as shown on **Table-S25.1**.

Table-S25.1 SUMMARY OF INVESTMENT COST

Unit : Million

	Foreign Currency Yen	Local Currency Rupiah	Total Equivalent Yen
2nd Phase, Part One	**54,967**	**986,743**	**101,952**
Buaran III Treatment Plant	6,726	115,479	12,226
Distribution Center R1 II	390	16,434	1,173
Distribution Center R6 I	409	37,869	2,212
Treated Water Transmission Main R1 - R6	7,203	31,993	8,727
Primary Mains	24,639	171,096	32,787
Service Mains	7,336	340,276	23,539
Engineering Services	3,268	21,392	4,284
Land Acquisition Costs	0	162,500	7,738
Phisycal Contingency	4,996	89,704	9,266
2nd Phase, Part Two	**47,740**	**1,000,973**	**95,409**
Cipayung Treatment Plant	4,709	86,753	8,839
Distribution Center R4 II	741	36,596	2,484
Distribution Center R5 II	312	27,127	1,604
Raw Water Transmission Pipeline	7,608	54,332	10,195
Treated Water Transmission Pipeline R5, R4	13,078	46,838	15,310
Primary Mains	8,750	80,100	12,566
Service Mains	5,363	248,812	17,212
Engineering Services	2,838	17,418	3,667
Land Acquisition Costs	0	312,000	14,857
Phisycal Contingency	4,341	90,997	8,675

Exchange Rate: 1 Yen = 21Rp.
1996 Price.

FS-S26 IMPLEMENTATION SCHEDULE

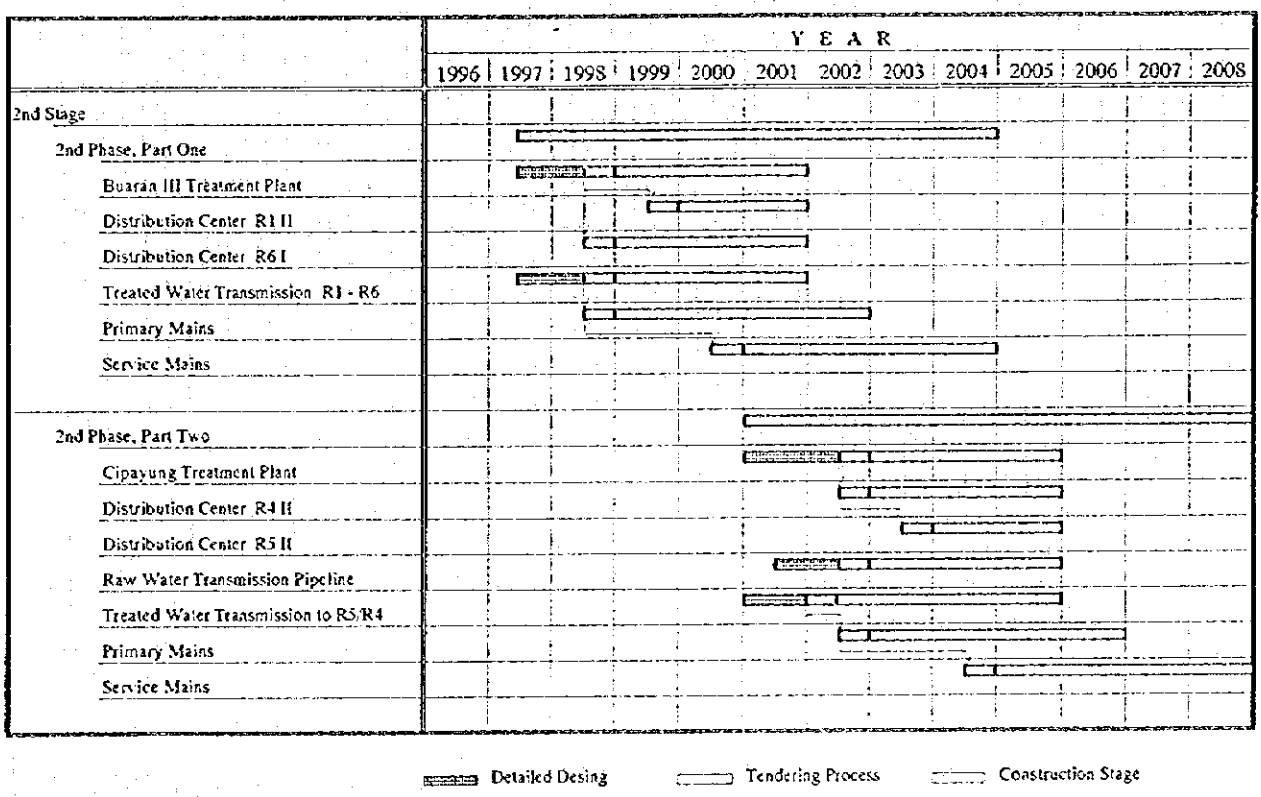
Implementation schedule for the priority projects, namely Part One and Part Two, 2nd Phase of 2nd Stage are proposed as shown on **Figure-S26.1**. Implementation schedule is prepared mainly taking the timing completion of upgrading works of WTC into account as explained in the previous section.

To satisfy increasing water demand in the service area, implementation of the priority projects should not be delay from this schedule. Part One Project will be commenced in the middle of year 1997. It is necessary to start selection of consultants for detailed design works from the

beginning of the year 1997 in order to start detail design works on schedule.

It also should be noted that land acquisition for Buaran III and Cipayung Treatment Plant is recommended to be completed as soon as possible. For the smooth implementation of the land acquisition, private sectors and PAM JAYA are recommended to have coordination discussion with agencies concerned and people those who are living in the planed land.

Figure-S26.1 IMPLEMENTATION SCHEDULE



FS-S27 ROLE SHARING BETWEEN PUBLIC AND PRIVATE SECTORS

In the Master Plan, desirable allocation of principal functions are defined. Based on the definition, further detail role sharing between public and private sectors are considered taking risk assignment into account.

Private sector participation in provision of infrastructure usually involves four parties which are government, private investor (or operator), customers and staff. In the case of the Jakarta water supply, these four parties can be interpreted as (1) PAM JAYA, (2) consortia, (3) customers, and (4) PAM JAYA employees. These four parties will have to assume certain risk in exchange for expected benefits from private sector participation.

It should be noted that risk can not possibly eliminated to the full extent. However, the mitigation is possible by efficient assignment to the parties. Risk assignment is the process of allocating the responsibility of managing particular risk or subrisk to a particular party. The most efficient risk assignment among the parties should realize the most acceptable financial structure which minimizes the project cost to be earmarked for reducing the risk.

To this end, there exists only one principle, i.e., "The party best able to manage and mitigate the risk should assume it". In other words, the party unable to bear the consequence of the risk should not take the risk concerned.

Table-S27.1 explains the proposed assignment of the risks associated with the PSP in Jakarta water supply. **Table-S27.2** summarizes mitigative measures for each risk shown on **Table-S27.1.**

Based on the consideration of the risk assignment and its mitigative measures, role sharing among public and private sectors is summarized as shown on **Table-S27.3.**

Table-S27.1 PROPOSED RISK ASSIGNMENT

PROPOSED RISK ASSIGNMENT

Type of Risk	Main assignee of Risk		REMARKS
	Public	Private	
Construction risk			
Cost overrun risk		X	D/D, S/V, Budgetary arrangement are Private Sector's responsibility
Delays in construction risk		X	Construction works and S/V are Private Sector's responsibility
Completion risk		X	Construction works and S/V are Private Sector's responsibility
Land acquisition risk	X		Procurement of land itself or assistance for procurement is Public Sector's responsibility
Capacity shortfall risk		X	Capacity and quality of constructed facilities are Private Sector's responsibility
Environmental risk		X	Environmental impacts should be minimized by contractor, Private Sector
Operating risk			
Raw water shortage risk	X		Raw water quantity should be secured by Public Sector
Raw water quality risk	X		Raw water quality should be guaranteed by Public Sector
Water demand shortage risk		X	Promotion should be executed by Private Sector
Treated water quality risk		X	Operation of water supply facilities is Private Sector's responsibility
Technology risk		X	Required technology level should be maintained by Private Sector
System maintenance risk		X	Operation of water supply facilities is Private Sector's responsibility
Public liability risk		X	Social benefit should be maximized by Private Sector under S/V of Public Sector
Tariff setting risk	X		Tariff should be decided by Public Sector
Credit risk			
Public sector credit risk		X	Project feasibility should be carefully checked by Private Sector
Private sector credit risk	X		Public Sector should carefully select contractor
Country risk			
Legal risk	X		Private Sector will not be able to control the risk
Change in law risk	X		Private Sector will not be able to control the risk
Approval risk	X		Public Sector's assistance is indispensable
Economic risk	X		Private Sector will not be able to control the risk
Currency risk	X	X	Both sides should pay attention
Force majeure risk			
Natural disaster risk	X	X	Not controllable
Civil disturbance risk	X		Private Sector will not be able to control the risk
Political risk	X		Private Sector will not be able to control the risk

Table-S27.2 Mitigative Measures for Risk

MITIGATIVE MEASURES FOR RISK

Type of Risk	Main assignee of Risk		MITIGATIVE MEASURES
	Public	Private	
Construction risk			
Cost overrun risk		X	Careful Detailed Design/Supervision by Contractor
Delays in construction risk		X	Careful Detailed Design/Supervision by Contractor
Completion risk		X	Completion test to contractor
Land acquisition risk	X		Careful site selection
Capacity shortfall risk		X	Selection of experienced contractor/Employment of proven technology
Environmental risk		X	Assistance by public sector in environmental regulatory information
Operating risk			
Raw water shortage risk	X		Guarantee by public sector/Establishment of bulk water supply company
Raw water quality risk	X		Guarantee by public sector/Establishment of bulk water supply company
Water demand shortage risk		X	Careful Feasibility Study/Control of groundwater abstruction
Treated water quality risk		X	Selection of experienced contractor and proven technology
Technology risk		X	Employment of proven technology
System maintenance risk		X	Employment of experienced operator/Training
Public liability risk		X	Confirmation of obligation/Monitoring by public sector
Tariff setting risk	X		Speeding-up of approval process by public sector/Agreement of timely revision system
Credit risk			
Public sector credit risk		X	Careful F/S by private/Guarantee letter
Private sector credit risk	X		Selection of experienced operator/Guarantee bond
Country risk			
Legal risk	X		Government guarantee/Legal support and coordination by public sector
Change in law risk	X		Government guarantee/Legal support and coordination by public sector
Approval risk	X		Assistance by public sector/Careful preparation by private sector
Economic risk	X		Careful F/S by private sector
Currency risk	X	X	Government guarantee/Exchange rate hedging with bank
Force majeure risk			
Natural disaster risk	X	X	Insurance/Allocation to all parties
Civil disturbance risk	X		Government guarantee
Political risk	X		Government guarantee

Table-S27.3 ROLE SHARING DERIVED FROM RISK ASSIGNMENT

ROLE SHARING DERIVED FROM RISK ASSIGNMENT

Type of Risk	Main assignee of Risk		ROLE SHARING	
	Public	Private	Public Sector	Private Sector
Construction risk				
Cost overrun risk		X	-	Detail Planning, D/D, S/V, Budgetary arrangement
Delays in construction risk		X	Monitor work progress	S/V
Completion risk		X	Observe completion tests	Execution of completion tests
Land acquisition risk	X		Land acquisition or Assist land acquisition	Assist Public Sector
Capacity shortfall risk		X	Observe completion tests	Completion of project implementation
Environmental risk		X	Assist Private Sector in regulatory aspects	Execute necessary measures to reduce impacts
Operating risk				
Raw water shortage risk	X		Guarantee required quantity	Measurement and payment of raw water
Raw water quality risk	X		Guarantee quality conforming to the Standard	Check raw water quality (routine)
Water demand shortage risk		X	Planning	Promotion for increasing customer
Treated water quality risk		X	Periodical cross check of data from Private Sector	Check treated/distributed/tap water quality (routine)
Technology risk		X	Technical audit	Maintain suitable technlgy level/assign qualified enginr.
System maintenance risk		X	Technical audit/research on customer satisfaction	Maintain suitable technlgy level/assign qualified enginr.
Public liability risk		X	Planning/research on customer satisfaction	Effort for max. of social benefit under plan of PAM
Tariff setting risk	X		Review proposal from private/approval of new tariff	Review tariff/preparation of proposal for new tariff
Credit risk				
Public sector credit risk		X	Guarantee	-
Private sector credit risk	X		Financial Audit	Issuance of Guarantee Bond
Country risk				
Legal risk	X		Legal support and coordination/Guarantee	-
Change in law risk	X		Legal support and coordination/Guarantee	-
Approval risk	X		Legal support and coordination/Guarantee	-
Economic risk	X		Legal support and coordination/Guarantee	-
Currency risk	X	X	-	-
Force majeure risk				
Natural disaster risk	X	X	-	-
Civil disturbance risk	X		Legal support and coordination/Guarantee	-
Political risk	X		Legal support and coordination/Guarantee	-

FS-S28 DESIGNING NEW ORGANIZATION STRUCTURE OF PAM JAYA

As described in the preceding chapter, the operation of Jakarta water supply by the two consortia will invite significant changes in both roles and organization structure of PAM JAYA. Nonetheless, a recent agreement between PAM JAYA and the private consortia requires that the existing organization (DKI Governor's Decree No. 360) continue for one year after the execution of the cooperation between the parties concerned.

In this chapter, new organization structure needed after the one year period is proposed, giving full regard to the role sharing among public and private sectors as summarized in **Table-S27.3.**

Among various roles of public sector, PAM JAYA should have responsibility for monitoring performance of private sectors and coordination between private sectors and other government agencies. Roles of PAM JAYA is summarized on **Table-S28.1.**

Based on the identified roles of PAM JAYA shown on **Table-S28.1**, detail of each role, actions required for each role, and responsible director/bureau are shown on **Table-S28.2**. Required new organization after the private sector participation will be discussed taking responsible director/bureau shown on the Table into account.

A significant change in organization stems from transferring branch (cabang), sub-branch (rayon) and treatment plants to the private consortia since private investors handle operations, maintenance and customer-related tasks, making it unnecessary for PAM JAYA to directly deal with consumers and facilities. In other words, PAM JAYA will indirectly interface with customers and facilities as a regulatory body, which necessities only headquarters function.

Four organization structures are prepared by taking into consideration the aforementioned PAM JAYA's roles after the private sector participation and the existing headquarters' functions of PAM JAYA. Main differences between four alternatives are the number of directors (vertical relationship) and managerial layers, more specifically, the existence of bureaus (horizontal relationship).

In selecting an alternative, particular attention should be paid to advantages and disadvantages

of each alternative and the latest situation at the time of reorganization. However, considering the new experience of PAM JAYA as a regulatory organization as opposed to the old roles as an operator, quick reductions in both organization and staff may bring about confusion. It is feasible, therefore, to select Alternative 1 at the initial period of private participation. After PAM JAYA fully possesses expertise as a regulator and coordinator, it is desirable that PAM JAYA should select Alternative 4 because this alternative will contribute to fast decision making, effective communication, and reduction in costs which will reflect in tariffs.

It is important to note that organization structures are provided as a guideline, therefore, they should be modified, if necessary, after the negotiation with the private consortia which will determine the number of the staff and roles of PAM JAYA

Table-S28.1 ROLE SHARING AMONG PUBLIC SECTOR

ROLE SHARING AMONG PUBLIC SECTOR

Type of Risk	Main assignee of Risk		ROLE OF PUBLIC SECTOR				
				PAM JAYA		OTHER GOVERNMENT AGENCIES	
	Public	Private					
Construction risk							
Cost overrun risk		X	-	-	-	-	-
Delays in construction risk		X	Monitor work progress	X	Monitoring		
Completion risk		X	Observe completion tests	X	Observation		
Land acquisition risk	X		Land acquisition or Assist land acquisition	X	Procurement	X	Assistance
Capacity shortfall risk		X	Observe completion tests	X	Observation		
Environmental risk		X	Assist Private Sector in regulatory aspects	X	Assistance	X	Approval
Operating risk							
Raw water shortage risk	X		Guarantee required quantity	X	Monitoring/Coordination	X	Guarantee
Raw water quality risk	X		Guarantee quality conforming to the Standard	X	Monitoring/Coordination	X	Guarantee
Water demand shortage risk		X	Planning	X	Forecasting/Planning		
Treated water quality risk		X	Periodical cross check of data from Private Sector	X	Quality check for monitoring		
Technology risk		X	Technical audit	X	Quality check for monitoring		
System maintenance risk		X	Technical audit/research on customer satisfaction	X	Research		
Public liability risk		X	Planning/research on customer satisfaction	X	Planning/Research		
Tariff setting risk	X		Review proposal from private/approval of new tariff	X	Review	X	Approval
Credit risk							
Public sector credit risk		X	Guarantee	X	Coordination	X	Guarantee
Private sector credit risk	X		-	X	Keep Guarantee Bond		
Country risk							
Legal risk	X		Legal support and coordination/Guarantee	X	Coordination	X	Legal support/Guarantee
Change in law risk	X		Legal support and coordination/Guarantee	X	Coordination	X	Legal support/Guarantee
Approval risk	X		Legal support and coordination/Guarantee	X	Coordination	X	Legal support/Guarantee
Economic risk	X		Legal support and coordination/Guarantee	X	Coordination	X	Legal support/Guarantee
Currency risk	X	X	-	-	-	-	-
Force majeure risk							
Natural disaster risk	X	X	-	-	-	-	-
Civil disturbance risk	X		Legal support and coordination/Guarantee	X	Coordination	X	Legal support/Guarantee
Political risk	X		Legal support and coordination/Guarantee	X	Coordination	X	Legal support/Guarantee
			Overall coordination between East and West	X	Coordination		

Table-S28.2 ORGANIZATIONAL ARRANGEMENT REQUIRED FOR PAM JAYA'S NEW ROLE

ORGANIZATIONAL ARRANGEMENT REQUIRED FOR PAM JAYA'S NEW ROLE

Type of Risk	ROLE OF PAM JAYA	Action Required		RESPONSIBLE DIRECTOR/BUREAU
Construction risk				
Cost overrun risk	-	-		-
Delays in construction risk	Monitor work progress	Monitoring		Technical Director
Completion risk	Observe completion tests	Observation		Technical Director
Land acquisition risk	Land acquisition or Assist land acquisition	Procurement		Planning/Finance Bureau
Capacity shortfall risk	Observe completion tests	Observation		Technical Director
Environmental risk	Assist Private Sector in regulatory aspects	Assistance		Technical Director
Operating risk				
Raw water shortage risk	Guarantee required quantity	Monitoring/Coordinatior	Quality analysis	W. Quality Monitoring Breu.
Raw water quality risk	Guarantee quality conforming to the Standard	Monitoring/Coordinatior	Quality analysis	W. Quality Monitoring Breu.
Water demand shortage risk	Planning	Forecasting/Planning		Planning Bureau
Treated water quality risk	Periodical cross check of data from Private Sector	Quality check for monitoring	Quality analysis	W. Quality Monitoring Breu.
Technology risk	Technical audit	Quality check for monitoring		Technical Director
System maintenance risk	Technical audit/research on customer satisfaction	Research	PAM SCADA System	O/M Bureau
Public liability risk	Planning/research on customer satisfaction	Planning/Research	PAM SCADA System	O/M Breu./Public Relation
Tariff setting risk	Review proposal from private/approval of new tariff	Review		Planning/Finance Bureau
Credit risk				
Public sector credit risk	Guarantee	Coordination		Finance Bureau
Private sector credit risk	-	Keep Guarantee Bond		Finance Bureau
Country risk				
Legal risk	Legal support and coordination/Guarantee	Coordination		General Affairs Bureau
Change in law risk	Legal support and coordination/Guarantee	Coordination		General Affairs Bureau
Approval risk	Legal support and coordination/Guarantee	Coordination		General Affairs Bureau
Economic risk	Legal support and coordination/Guarantee	Coordination		General Affairs Bureau
Currency risk	-	-		
Force majeure risk				
Natural disaster risk	-	-		
Civil disturbance risk	Legal support and coordination/Guarantee	Coordination		General Affairs Bureau
Political risk	Legal support and coordination/Guarantee	Coordination		General Affairs Bureau
	Overall coordination between East and West	Coordination	PAM SCADA System	O/M Bureau

FS-S29 FINANCIAL AND ECONOMIC ANALYSIS OF PROJECT

The priority projects proposed in this study are evaluated in financial and economic terms. For the assessment of financial feasibility of the project, financial internal rate of return (FIRR) is used to measure and subsequently assess the overall financial sustainability. In respect of economic evaluation, economic internal rate of return is obtained in order to analyze the project's contribution to the Indonesian national economy as a whole. The project's intangible economic benefits, which cannot be assessed in actual monetary terms, but should be entered into investment considerations, are described.

S29.1 Financial Analysis

The FIRR for the proposed projects works out at 9.17 percent. In order for the project to be financially feasible, this rate (9.17%) should be larger than the rate at which the water supply enterprise is able to borrow money. Provided that the private consortia are able to obtain Rupiah at the borrowing rate between 9 and 10 percent as PAM JAYA can currently do through such public funds as OECF and IBRD, this project is acceptable.

S29.2 Economic Analysis

The EIRR of this proposed project is estimated at 9.16 percent. With the current opportunity cost of capital of somewhere between 8 and 10 percent, if this tangible benefit is combined with intangible economic benefits explained below, the proposed project is economically viable and acceptable.

Intangible Economic Benefits

(1) Contribution to Local and National Economy

This project will absorb unskilled labor, thus will create jobs in the project area in particular. In addition, the project will stabilize the development of the manufacturing, commerce and service industry, which will create and increase employment opportunities in the area. Job creation resulting from this project together with procurement of materials during construction and operational period of the project will significantly promote the regional economy, which will indirectly contribute to the national economy as a whole.

(2) Health Improvement Effect

This project will reduce infant mortality and incidence of waterborne disease such as Acute Diarrhea, Bacillary Dysentery, Enteric Fever, Typhoid and Conjunctivitis, which will subsequently decrease medical expenditures. The improvement of sanitation and beautification will also contribute to further development of this thriving city.

(3) Fire Loss Reduction

As a result of the expansion of water supply service through this project, the fire fighting capabilities will be strengthened, which will protect property values. Thanks to reduced fire loss, personal injury and loss of human lives will be considerably reduced.

(4) Consideration for Women in Development (WID)

Expansion of the piped water through this project will emancipate women from drawing water and therefore lighten their household duties. This can contribute to improving the welfare of women in the project area.

FS-S30 EVALUATION OF FEASIBILITY OF THE PRIORITY PROJECT

S30.1 Technical Feasibility

Component of the proposed priority projects are expansion and new construction of treatment plants, distribution centers, and installation of transmission and distribution pipes. These construction works has been experienced in Jakarta Water Supply during last two decades.

Methodology employed in the new treatment plants are same method as practiced in the existing treatment plant. Therefore, it is judged that the priority projects are technically feasible.

It should be noted that the land space required for the priority projects such as for treatment plant and distribution centers should be acquired as soon as possible to realize implementation of the priority project.

Based on the results of environmental impact assessment , no fatal flaw has been found that renders the proposed project non-viable from an environmental impact point of view. The construction of treatment plants, pipelines and related infrastructure will not cause substantial disturbance. The environmental consequences associated with these impacts are not considered to be significant.

S30.2 Financial Feasibility

Financial feasibility of the project has been assessed by the calculation of a financial internal rate of return which is based on an incremental net benefit flow. In calculating the financial rate of return, the projected tariff of Scenario A3 (30 % tariff increase every 3 years) of financial projections in the Master Plan is taken because with this tariff rate the Jakarta water supply sector would be financial viable. However, the FIRR indicates that for this particular project the water supply enterprise should raise money with interest rate of 9.17 percent of lower for the priority project to be financially viable.

S30.3 Economic Feasibility

The economic aspect of the project has been evaluated by the economic internal rate of return which will determine the likelihood that the proposed project will contribute to the development of the total economy of Indonesia and that its contribution will be enough to justify using scarce resources.

The EIRR under the proposed project is estimated at 9.16 percent. Considering this EIRR as well as intangible economic benefits such as employment generation, health improvement effect, fire loss reduction, consideration for WID as described in the preceding section, this project is economically viable and acceptable.

FS-S31 RECOMMENDATIONS - IMMEDIATE ACTIONS REQUIRED

Water Resources

(1) Engineering works of upgrading of West Tarum Canal for financing arrangement

Requirement of the upgrading of the West Tarum Canal, Phase I-I, for the DKI Jakarta water supply system will be in 2002 after five (5) years from the beginning of 1997 and that for Phase I-II will be in 2006 after further four (4) years. Under such time schedule, necessary procedure for preparation of detailed design for financing arrangement should immediately commence to avoid delay of the completion of the scheme.

(2) Detailed environmental impact investigation and study

The SRCCIWR has made the preliminary environmental analysis and recommended to take the following immediate action :

1) Establishment of environmental monitoring and management unit (EMMU) consisting of environmental unit (EU) and environmental monitoring and management committee (EMMCC) to successfully execute the resettlement of local residents in the affected area by the proposed scheme.

2) Necessary procedures for commencement of environmental impact assessment.

(3) Establishment of comprehensive coordination and management committee of water sources and supply

As previously stated, it is suggested to take necessary action on establishing a comprehensive coordination and management committee on water sources and supply as soon as possible.

(4) Establishment of law and regulation on groundwater conservation and management

The Study preliminarily proposed the management and control plan on abstraction of groundwater in the DKI Jakarta as mentioned in Section 3.6.4. However, as implementation of the management and control plan needs national and local law and regulation, action on its procedures is recommended to be taken as soon as possible.

Water Supply Facilities

(1) Completion of Cisadane System

Cisadane System includes Cisadane Water Treatment Plant, treated water transmission pipe to Distribution Center R5, and Distribution Center R4. Construction works of the treatment plant and R5 have been completed except the treated water transmission pipeline. It is recommended to expedite the installation works of the transmission pipeline in order to receive water from the Cisadane Treatment Plant.

(2) Implementation of PJSIP II Project

To reduce NRW and to improve distribution system, Phase II of PJSIP Project (PJSIP II) is recommended to be implement as scheduled from 1996. According to the information from the PAM JAYA, construction works of Distribution Center R4 and treated water transmission pipeline from Tangerang to the R4 are included in the PJSIP II.

It should be noted that, in this study, the results of PJSIP II Project, such as reduction of NRW, addition of service mains, expansion of service area, treated water transmission pipeline to R4, and Distribution Center R4 are considered as existing system of the Jakarta Water Supply System. Unless the PJSIP II Project is implemented as schedule, the basis of the Master Plan becomes different.

(3) Arrangement for Acquisition of Land Space Required

Land space required for facilities included in the 2nd Phase of the Second Stage is recommended to be arranged and acquired. Facilities required newly or additional land space are listed below in the order of priority.

Immediately Required

- ☐ Buaran III Treatment Plant, for expansion (Addition), 15ha
- ☐ Distribution Center R6 (New), 6ha

- ☐ Cipayung Treatment Plant (New), 45ha
- ☐ Distribution Center R4, for expansion (Addition), 7ha

Required in future (for Third Stage)

- ☐ Cisadane Treatment Plant (Addition), 30ha
- ☐ Distribution Center R3, (New), 3ha

(4) Arrangement for Electric Power Allocation

New facilities or expanded facilities required electric power. PAM JAYA is recommended to discuss with authorities concerned to allocate additional power to water supply facilities.

(5) Engineering Service for Detailed Design

Construction works for the Part 1 of the 2nd Phase of the 2nd Stage should be started from the beginning of 1999. Prior to the construction works, engineering services on detailed design works for expansion of Buaran Treatment Plant (Buaran III), Distribution Center R1 and R6, treated water transmission pipeline, and expansion of distribution system are required. This engineering service should be conducted from 1997.

(6) Budgetary Arrangement

Budgetary arrangement for recommended actions listed above is immediately required for both foreign currency portion and local currency portion.

Institutional Framework

1. The *strong leadership of the government* to guide and regulate the private-driven operation and development of the Jakarta Water Supply System.

2. Preparation of *fundamental water law* to establish and announce the state principles of water supply service to support the execution of the government leadership.

3. Review of *administrative and organizational structure*, and *role sharing* among the agencies involved to guide the water supply system to work smoothly in line with the basic guidelines set forth in the fundamental water law.

4. *Review of legal systems* for water supply operation and development to regulate the water supply system into sound operation in line with the guidelines set forth in the fundamental water law.

5. *Stronger involvement of BAPPENAS* in the preparation of private participation in national infrastructure development and to check and supervise those programs in terms of

contents and progress, and guide them to be consistent with or not to hinder smooth implementation of the national development plan.

Organization and Management

1) Work analysis such as allocation of duties and responsibilities among sections and bureaus and between individuals are performed by management consultants.

2) Based on the analysis above, detailed job description of each staff should be prepared and required staff should be assigned in accordance with his/her skills and expertise.

Regulatory roles of PAM JAYA will necessitate further strengthening its managerial capabilities as well as staff skills. Strengthening skills and abilities of all levels of personnel in the organization should be done through effective training.

Finance

As most likely agreed between PAM JAYA and the private consortia, the fees to be charged by the consortia will be linked to an index of the cost elements of the consortia and will be adjusted semi-annually. However, considering the present tariff approval process of PAM JAYA, which generally takes more than one year, PAM JAYA water tariff would be unable to be revised as frequently as fees of the consortia. If the tariff remains unchanged for three years (as the current practice), it is probable that the semiannually increasing fee would result in PAM JAYA's insufficient cash flow to meet its requirement such as debt service, operating expenses and contribution to PEMDA DKI. This may cause PAM JAYA to borrow additional loans and/or to ask the government for subsidies. In order to avert the unfavorable circumstance, if the indexed fee significantly increases to such an extent that PAM JAYA cannot cover its requirements, fee should be reviewed by taking into account financial projection of both PAM JAYA and the consortia. On the other hand, PAM JAYA should use more open and transparent procedures and calculation methods in determining tariff as recommended.