

Indonesia

Jakarta Water Supply Distribution Pipeline Project

Report Date: March 2001

Field Survey: August 2000

1. Project Profile and Japan's ODA Loan



Distribution Pipeline Laid by this Project (above), Location Map of the Project Area (right)

(1) Background

Water supply projects in Jakarta, the capital of Indonesia, began in 1968 with the foundation of the Jakarta Water Corporation (Pam Jaya) as a public water supply agency. The population supplied with water in Jakarta stood at 980,000 in 1981, rising to 1.29 million in 1986 and 1.9 million in 1989. Despite this growth, the water supply diffusion rate (population coverage) in 1990, at the time of the appraisal for this project, was only 23%. Those residents not covered by water supplies had to rely on shallow wells or purchases from water vendors. Factories and other users were unable to receive adequate supplies of industrial water, and they met their needs by pumping large volumes of groundwater from deep wells.

Water supply projects in Jakarta before the implementation of this project faced the following problems:

- **Increasing demand volume**

The population of existing urban areas naturally grows, and in Jakarta it is added to by large influxes from rural areas, causing rapid growth in water demand.

- **Delayed construction of water distribution pipelines**

The construction of water treatment plants was proceeding relatively smoothly, in relation to growth in water supply demand, but the lack of funds and executive ability on the part of the water corporation meant that projects to build water distribution networks were not implemented in time. The water supply diffusion rate in the city remained low as a result.

- **Declining capacity of facilities**

Dilapidation and inadequate maintenance of the various facilities required for water supply was causing a decline in the supply capacity of the facilities. In particular, rusting and erosion of the inner surfaces of distribution pipes, and the physical shocks imposed by traffic loads, left the pipes vulnerable to breakage. In order to improve this situation, it was extremely important and urgent to rehabilitate the existing water supply distribution network.

At the time of the appraisal, the targets for the long-term water supply plan set for Jakarta up to 2000 were as shown in Table one.

Table 1 Targets under the Jakarta Water Supply Project Plan

	1989 (at the time of appraisal)	1995	2000
Population of Jakarta	8.4 million	9.55 million	11 million
Population supplied with water	1.9 million	3.8 million	5.8 million
Water supply diffusion rate	23%	40%	53%
Number of water supply hydrants	190,000	360,000	550,000
Planned water treatment volume (average)	7.4m ³ /s	12.7m ³ /s	17.8m ³ /s
Planned water treatment volume (daily maximum)	8.6 m ³ /s	14.5 m ³ /s	20.5 m ³ /s
Unbilled water volume rate	51%	45%	40%

Note This project aimed to attain the planned targets for 1995, in cooperation with the World Bank portion.

For water treatment volumes under the long-term plan, Buaran Water Treatment Plant (using Japan's ODA loan) and Cisadane Water Treatment Plant (built with French aid) then under construction were to have a combined capacity of 17.9m³/s, which was deemed sufficient to avoid near-term capacity shortages. However, water distribution facilities (water distribution pipes and outlets) had to be built urgently.

(2) Objectives

This project was to expand the water distribution network and strengthen the organization of the water corporation to meet rapidly growing demand for water supply in Jakarta. By doing so, it was aimed to raise the city's water supply diffusion rate, thereby improving health and hygiene for the residents and promoting the development of industry in the region.

(3) Project Scope

This project was stage 1 of the PJSIP (Pam Jaya System Improvement Project) plan for overall improvement of the city's water distribution network. The areas covered by the project were divided between the World Bank and the Japan Bank for International Cooperation (JBIC), and the project as a whole was a co-financing by the two banks. The area to be supplied with water was divided into six zones, with JBIC taking zones 3 and 6 and the World Bank taking zones 1, 2, 4 and 5 as their project plan target areas (see Figure 1).

Figure 1 Water Supply Zones in Jakarta



The project content covered by the Japan's ODA loan is as follows:

- [1] Rehabilitation of the existing water distribution pipes.
- [2] New construction of zone meters, small/ branch water distribution pipes and water supply hydrants.
- [3] New laying of main water distribution pipes (diameters 300 ~ 1,000mm).
- [4] Laying drainage pipes around public water supply hydrants.
- [5] Consulting services.
 - i) Strengthening the organization of the water supply corporation.
 - ii) Detailed design and construction supervision.

(4) Borrower/Executing Agency

The Republic of Indonesia / Directorate General of Living Environment (Cipta Karya), Ministry of Public Works and DKI Jakarta

The direct executing agency for the project is Jakarta Water Supply Corporation (Pam Jaya) under the jurisdiction of two agencies above.

(5) Outline of Loan Agreement

Loan Amount/Loan Disbursed Amount	¥6,446million / ¥5,799 million
Exchange of Notes/Loan Agreement	December 1990 / December 1990
Terms and Conditions	Interest rate: 2.5%, Repayment period: 30 years (10 years for grace period), General untied (Partially untied for consulting services)
Final Disbursement Date	December 1997

2. Results and Evaluation

(1) Relevance

This project was Stage 1 of the overall PJSIP plan (the first six years of the ten-year plan), and as such it had clearly defined targets to be attained in the medium and long-term (service diffusion rates, business performance improvements targets, etc.). The goals set for the project was realistic and relevant. Similar targets were set for the subsequent project (Stage 2), as the relevance of the project goals was sustained.

Design changes caused the project scope to be altered slightly in terms of increases and reductions to procurement quantities, but those changes were appropriate to the attainment of project objectives. However, the plan called for the new construction of 34,500 water supply hydrants to operate on the basis of fee collection, but the number built under this ODA loan fell to 23,700 (69% of the planned volume). The change was made because delays of implementation schedule led to the expiry of the loan disbursement deadline, preventing procurement of the planned quantities. The executing agency used its own funds to purchase the remainder.

(2) Efficiency

The Cipta Karya had worked directly as the executing agency for previous water supply projects, but the Pam Jaya was the executing agency for this project, partly due to a suggestion by the World Bank, which was promoting transfer of power to regions.

The implementation schedule was delayed, but the implementation should be rated highly as it completed the physical scope of the project largely as planned and within the planned cost. One factor behind this success was that Project Implementation Unit (PIU) and Project Management Unit (PMU) were established to ensure the efficiency of the project's management, and they succeeded in reinforcing the ability of the executing organization.

The start of construction was delayed by approximately one year due to delays in consultant selection, land acquisition and the issue of permits by the authorities. Changes in the design, and the increase in the number of contract lots (from 11 lots initially planned to 33 lots) at the construction stage, increased the time required. The project was finally completed in June 1998, two years and three months behind the planned date of March 1996. As a result, some of the materials and equipment could not be procured and installed within the loan agreement deadline.

The project cost underran by 10%, costing ¥6,853 million against the planned ¥7,583 million. The main reasons for the reduction in cost were the reduction in procurement cost made possible by lower than anticipated results from competitive bidding, and the changed exchange rate (due to devaluation of the Rupiah).

(3) Effectiveness

The Jakarta Water Supply and Distribution Pipeline Project was implemented under public management until 1997 before being privatized in February 1998 (on a concession method). As a result, there is a discontinuity in data between before and after privatization¹. The project is analyzed below at two points, i) the end of 1997 and ii) the present. The project was completed in June 1998, but as this project rehabilitated and expanded the water distribution network while the water supply facilities were in operation, the affected parts came into service gradually. The main facilities for the project were nearly all completed by the end of 1997, and therefore it is reasonable to use performance indicators at that time to gauge the project's fulfillment of the project goals.

The nature of network projects means that it is difficult to gauge the effects within the scope of the project which can be ascribed solely to the project. Therefore the performance of the Jakarta Water Supply and Distribution Pipeline Project as a whole will be examined.

i) Analysis of the project as of the end of 1997

Table 2 shows the progress of the Jakarta Water Supply and Distribution Pipeline Project between 1990 and 1997. During that period, 2,265km of water distribution pipes were laid, and the number of supply hydrants more than doubled, to 462,000. The water supply diffusion rate exceeded the planned target of 49.1% to reach 52.1%. However, the target for public water hydrants was 4,900 in 1997, against 2,100 which were in place in 1990, but no new public water hydrants were built in that period. Conversely, as the diffusion of water supply connections to individual houses rose, the public water hydrants began to be scrapped, reducing the number in place to 1,500 by 1997. The reason was that, because almost no charges can be collected for public water hydrants, the water department has little incentive to install them. On the other hand, supply connections to individual houses, for which charges can be reliably collected, increased by 234,000 over the same period. By the end of 1997 the diffusion rate for household connections had reached around 50%, which still left a strong need for public water hydrants. Their number must be increased in order to encourage water supply service to the poor, who have no other means of accessing water. The volume of water production exceeded the planned target by 12%, but the volume of water sales fell by 14%, reflecting the way the non-collection rate did not improve in 1997, as described below. The right hand column of Table 2 shows values for this project and their shares of the overall values. The Japan's ODA loan made a 17% contribution to the building of the water distribution network, 10% to the total number of supply hydrants, and 13% to the volume of water supplied.

¹ Performance indicators from the public-run period covered all water supply zones, from 1 to 6, but no figures could be obtained for the zones covered by this project (zones 3 and 6). After privatization, the water supply area was divided into two zones, east and west, with former zones 3 and 6 being included in the east zone. Indicators for this project were measured for the east zone.

Table 2 Movements in Major Operating and Effect Indicators for the Jakarta Water Supply and Distribution Pipeline Project

Indicator	Units	1990	1997			Increase or reduction on the period -	Portion of the figures on the left ascribed to this project Figures in () are shares
			②Plan Note)	③ Actual	③/②(%)		
Total population of supplied areas	1,000 people	6,439	8,695	8,880	110	+2,441	
Water supply diffusion rate	%	35.4	49.1	52.1	106	+16.7	
Population supplied with water	1,000 people	2,280	4,135	4,624	112	+2,344	
No. of supply hydrants	1,000 units	228	414	462	108	+234	23.0 (10%)
Public hydrants	Units	2,100	4,900	1,500	31	▲600	
Production capacity	m ³ /s	10.4	17.9	17.0	95	+6.6	
Volume produced by Pam Jaya itself	1M m ³	263	339	430	127	+167	21.5 (13%)
Volume of water purchased	1M m ³	0	76	38	50	+38	
Total production volume	1M m ³	263	415	463	112	+200	
Sales volume	1M m ³	123	237	205	86	+82	10.7 (13%)
Non-collection rate	%	54	43	56	130	+2	
Water distribution network	km	3,672	n.a.	5,937		+2,265	378 (17%)

Source Documents from the World Bank, JBIC and Pam Jaya.

Note Planned targets for the overall plan of PJSIP.

Next, the attainment of management and financial targets for the project are considered. The organizational abilities of Pam Jaya were strengthened by the technical assistance provided with the Japan's ODA loan and the World Bank loan. The benefits were seen in better audit reports, more thorough personnel management, expanded education and training, reduced days required to recover outstanding credits, and fewer workers per 1,000 hydrants.

The financial targets were also largely achieved. Water charges rose by an average of 30% in November 1991 and by 54% in July 1994. The rate rise which was scheduled for 1997 was carried out in February 1998, after the business rights had been transferred to the private-sector operator. The water supply charge in the east zone was raised to 1,905 Rupiah/m³ in May 1998. A survey of 100 beneficiaries, which will be described later, showed that 69% were dissatisfied with charges they regarded as excessively high. There are moves to make further changes in water charges, but the right level for those charges is a matter that requires study.

The non-collection rate in 1997 was 56%, which failed to meet the target value of 43%, and was actually worse than the 54% recorded in 1990. A number of reasons can be noted for the high non-collection rate, but in addition to the losses due to physical leakage, there are many management-related factors such as complex charge structures, lack of customer account books, and lax meter reading and charge collection.

For internal rates of return, the FIRR was calculated at the time of the appraisal. When it was recalculated the new result was 10.9%, up 2.8% from the result at the time of the appraisal. The increase was due to capital cost and the added operation and maintenance costs, which were all substantially lower than planned, and there was an increase in profits because the base number of hydrants was reduced from the plan and there was a rate increase, so that the drop in profit was considerably reduced, relative to the plan forecast. For reference, the recalculated value of FIRR for the World Bank loan was 10.5%, close to that for

the Japan’s ODA loan.

From the above it can be concluded that the physical and financial targets of the project have largely been met.

ii) Analysis of the project at present

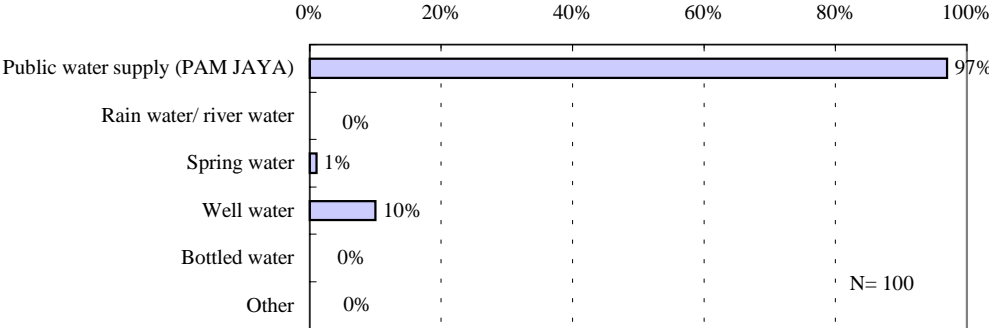
As will be described below, zones three and six were merged with zone two to form the east zone water supply project. The manage operations were contracted to the private sector operator, in which Thames Water of U.K has a central role. The non-collection rate, which stood at 56% in 1997, had risen by two points, but since then it has been improving steadily, falling to 52% in 1999 and 48% in 2000. Comparing targets with recorded results for the performance indicators set for the private-sector operators, it is clear that the effective water volume largely meets the target, but the supplied population, the diffusion rate and the non-collection rate are somewhat below the target values. On the financial side, the water rate, which was raised to 1,910 Rupiah/m³ immediately after privatization, was cut back to 1,590 Rupiah/m³ in January 1999. That level was maintained until the end of December 2000. While income from water charges fell short of targets for 1999 and 2000, it is rising steadily, by 5% on the preceding year in 1999 and by 11% in 2000.

This study included a questionnaire survey² conducted, with the cooperation of Pam Jaya, of 100 beneficiaries in zones 3 and 6 of the project area (50 households in each zone). This survey gathered the opinions expressed by beneficiaries for reference in connection with points where a cautious judgement is required, such as whether the beneficiaries have an accurate understanding of the effects anticipated from the project. The questions included content such as “usage of, and satisfaction with, water supply”, “water charges and payment status”, and “overall evaluation and further wishes”. The collated results are summarized below, in order.

<Usage of, and satisfaction with, water supply>

Of the 100 households, 97 drew the water they normally used from the water supply services. Around 10% of households used well water (Figure 2).

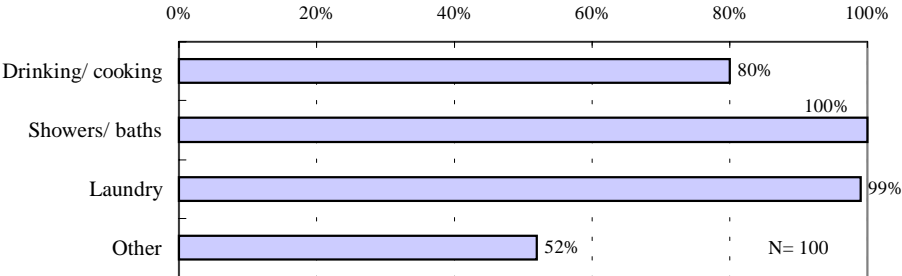
Figure 2 Where do you get the water you normally use? (multiple responses permitted)



² The subjects for the questionnaire survey were 100 households (50 per zone) selected at random from the areas that benefited from the project. The same questionnaire form was used for all respondents. N is the number of valid responses received for each question.

Nearly all water supply users used it for showers/ baths and for washing laundry, but only around 80%, a rather low proportion, used it for drinking/ cooking (Figure 3).

Figure 3 What do you use water supply for? (multiple responses permitted)



<Payment of water charges>

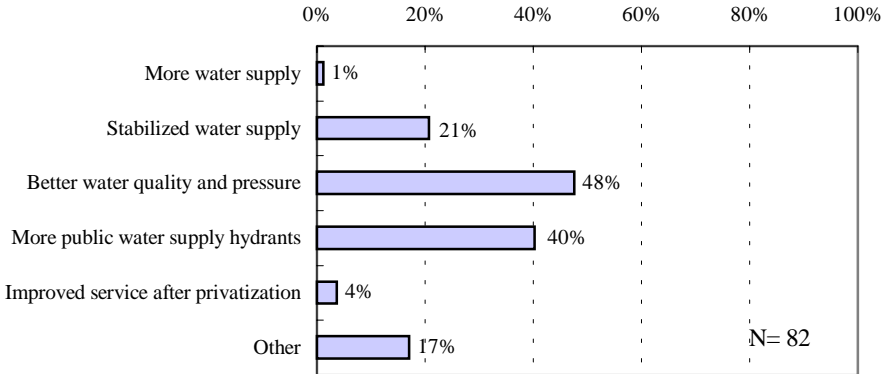
When respondents to the questionnaire survey (conducted in September 2000) were asked about their recent payment of their water usage charges, 94 of 97 household (97%) said that “We pay our bills in full”. Only three households said “We do not pay our bills”. On the level of charges, 32% said that it was “extremely high, (but we can’t do anything about it)” and 39% said “charges should be kept lower.” Thus over 70% of respondents thought charges were too high.

<Overall evaluation and further requests>

When respondents were asked to rate their satisfaction with the project on a four-grade scale, approximately 70% of them gave low evaluations, saying they were “rather dissatisfied” or worse. The most common reason for their dissatisfaction was “bad water quality”, cited by 40%, followed by “water pipes or other facilities are defective” and “the level of water charges is unreasonable”, each cited by nearly 30%. Approximately 20% answered that “water supply is unstable”.

The most common request for the future was “better water quality and pressure”, chosen by half of respondents. Some called for “more public water supply hydrants” and “more stable water supply” (Figure 4).

Figure 4 Further Requests for this Project (multiple responses permitted)



(4) Impact

i) Improved health preservation and hygiene

At the time of the appraisal the qualitative effects anticipated from this project were improved public health for the residents and reduction of ground subsidence due to reduced groundwater usage. It is difficult to evaluate the impact of the project in these areas because those situations deteriorated due to complex interactions with other factors not related to the project. Industrial development of the capital region and the rapid growth of the city, accompanied by diversifying ways of life, has caused rapid changes in the city's water environment.

There have been great improvements to date in quantitative indicators such as supply volume and diffusion rate, but there has been no improvement in turbidity and chromaticity. The main reasons are the declining quality of the water sent to the purification plants from water sources, and contamination of water in parts of the distribution network where water pressure is too low. This tendency was observed in the interview survey. Approximately 80% of residents are unsatisfied with the water supply service, mainly due to poor water quality, which is, in turn, mainly due to ongoing deterioration of water quality in the rivers the water is drawn from. The rivers are deteriorating in the face of household graywater and industrial waste water from the cities, which exert a negative impact on the residents' living environment. Improvement of the water environment is a task which needs to be addressed in future.

ii) Reduction of land subsidence

The following is true of the pumping up of groundwater. The population supplied with water rose from 2.28 million to 4.62 million between 1990 and 1997, but the population not receiving water supplies remained unchanged at the 4.2 million level. That suggests that the pumping of groundwater as an alternative method of obtaining water has not been reduced. The city authorities are watching the pumping of groundwater in an effort to catch those who pump excessive volumes, but they cannot monitor more than 30% of users for excessive pumping from deep strata, which is the main cause of subsidence. That kind of environmental monitoring should be reinforced in future. Also, the high setting of water charge rates means that the poor cannot afford to pay, and they miss the benefits of the water supply service as a result. Measures must be taken in future to make sure the nature of water supply as a service for the public good is maintained.

iii) Environmental impact

There was concern over environmental impact in the form of traffic disruption due to pipe laying works during the construction period. In fact, traffic congestion due to the works was minimized by measures such as working only at night on busy routes.

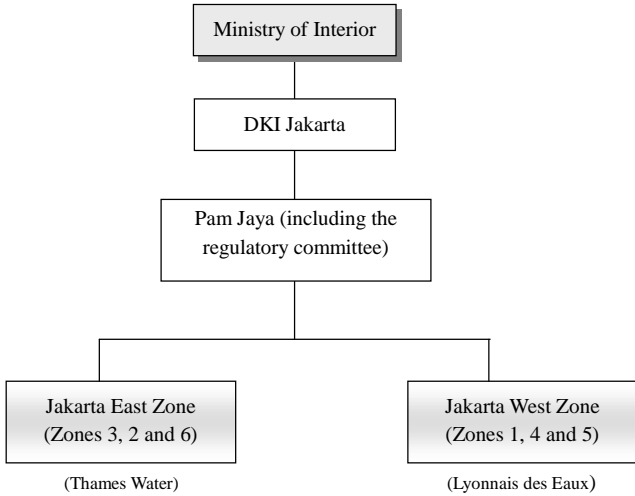
Drainage pipes were laid around the newly constructed public water hydrants as a measure to tackle drainage problems.

(5) Sustainability

Operation and maintenance of the water supply project was privatized between two private-sector operators in February 1998. The privatization method is known as the concession type, in which the division of roles between the private sector and the public sector is as shown in Table 3.

Table 3 Division of Roles Between Private Sector and Public Sector in the Privatization of Jakarta’s Water Supply

Roles	Jakarta municipality (formerly Pam Jaya)	Private sector operators
Ownership of assets	○	
Procurement of funds		○
Determination of investment plans		○
Operation		○
Maintenance		○
Construction and management		○
Performance monitoring	○	
Regulation and supervision	○	
Setting of charges	○	
Billing		○
Collection of charges		○



The Japan’s ODA loan facilities (zones three and six) are included in the Jakarta east zone. They are operated and maintained by the private sector Thames Pam Jaya, in which Thames Water of U.K has a central role. A staff of approximately 500 (8% of whom are engineers) handle operation and maintenance (O&M). A large portion of the staff who worked on the area’s O&M under Pam Jaya have transferred to the new company. There are no problems with the organizational scheme, and operation and maintenance are carried out appropriately. Pam Jaya still exists after privatization, as a regulatory authority with a staff of 188 people.

The performance of Thames Pam Jaya in O&M is assessed from the attainment of performance indicators (no. of hydrants, non-collection rate, sales volume, diffusion rate, etc.) specified in the concession

agreement between it and the municipality. Water quality at the intake point and after water treatment are monitored, as are quality and pressure, at a number of check points in the water distribution network. The private sector operators are also obliged to submit reports to Pam Jaya on the number and content of complaints from customers, and on their monitoring of ground water, but in fact this reporting is not carried out adequately.

The Indonesian government's policy shift to privatization reflects its strong intention to stabilize the financial position of Pam Jaya and to allow the private sector to contribute to improving water supply services. The new system put into effect from February 1998 is more highly profitable than that envisaged at the time of the appraisal. As mentioned above, the private-sector operators have succeeded in improving its performance indicators (non-collection rate etc.), and their operating efficiency has produced a short-term reduction in water charges, indicating initial success. However, the balance sheets of the private-sector operators showed a deficit in 1999 and 2000 (Pam Jaya makes up the deficit, as specified in the concession agreement), and it applied to the government in December 2000 for permission to remedy the problem by raising water rates by an average of 20~30%. As the interview survey noted above, the residents are not satisfied with the city's water supply service, and it is only natural that rate rises that are not accompanied by improved water quality will arouse strong discontent among consumers. Therefore it is not clear whether it will be possible to make such a rate increase.

The degradation of the water environment makes improvement of the source water a task that must be tackled in the long term. It is not clear whether the private-sector operators will have any more executive ability than Pam Jaya in persuading the government to encourage water source management programs and stabilize water resources. Also, the regulatory framework is not functioning adequately to reconcile stable provision of water supply services for the public good with the profitability of the services. These points necessitate very cautious ongoing monitoring of developments in post-privatization of Jakarta's water supply operations.

4. Recommendations

Even if there is no problem with debt security, the privatization of the Japan's ODA loan project raises important issues concerning whether or not the original objectives of the project will be achieved efficiently and effectively. In that sense, privatization comes under the description of an "important change", and this point needs to be considered in relation to this project. There is cause for concern that the privatization of this project will be accompanied by a prioritization of profit, in which the public benefit might be disregarded. The matter should be discussed and studied with the Indonesian government with a view to ensuring the stable supply of public services and the sustainability of the project's effects.

Comparison of Original and Actual Scope

Item	Plan	Actual
Project Scope		
1. Rehabilitation of existing water distribution pipes	23 elementary zones ^(Note)	29 elementary zones
2. New construction of small water distribution pipes	50 elementary zones	68 elementary zones
Zone meter	98	N.A.
Small water distribution pipes (Ø 150 ~ 250mm)	61 km	117.3 km
Branch water distribution pipes (Ø 50 ~ 100mm)	298 km	262.0 km
3. New construction of main water distribution pipes		
Ø300 mm	9.8 km	9.4 km
Ø 400 mm	5.9 km	4.0 km
Ø 500 mm	-	3.2 km
Ø 600 mm	3.4 km	7.9 km
Ø 800 mm	5.2 km	0.1 km
Ø 900 mm	1.2 km	-
Ø 1000 mm	2.4 km	-
Ø 1100 mm	-	0.2 km
Ø 1200 mm	-	0.4 km
4. Water supply hydrants	34,500	23,700
5. Meter testing equipment	None	One set for testing large meters One set for testing small meters
6. Consulting service	Organizational strengthening of the Water Corporation Detailed design, construction supervision	Same as left Same as left
Implementation Schedule	Apr. 1990 ~ Mar. 1996	Feb. 1991 ~ Jun. 1998
Project Cost		
Foreign currency	¥3,173 million	¥2,625 million
Local currency	¥4,410 million	¥4,228 million
Total	¥7,583 million	¥6,853 million
ODA loan portion	¥6,446 million	¥5,799 million
Exchange rate	¥1 = Rp.12.5	¥1 = Rp. 20

Note Elementary zones are small land zones extending over 1,000 hydrants or 20km of distribution pipes. They are the water supply zone units established by the Water Corporation in preparing and implementing project plans and carrying out ordinary management and operation work.