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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

PROJECT PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

INDONESIA - Surakarta Potable Water Project

AID- DLC/P-2199

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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

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AID-DLC/P-2199
September 13, 1976

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Indonesia - Surakarta Potable Water Project

Attached for your review is the recommendation for authorization for a loan to the Government of the Republic of Indonesia of not to exceed six million, eight hundred thousand United States dollars ($6,800,000) to assist in financing the United States dollar and local currency costs of a potable water project for the city of Surakarta.

This loan is scheduled for consideration by the Development Loan Staff Committee on Monday, September 20, 1976, at 2:00 p.m. in Room 3886 New State; please note your views are requested by close of business, Thursday, September 23, 1976. If you are a voting member, a poll sheet has been enclosed for your response.

Development Loan Committee
Office of Development Program Review

Attachments:
Summary and Recommendations
Project Analysis
Annexes

SURAKARTA POTABLE WATER PROJECT
-Indonesia-

Capital Assistance Committees:

USAID/Indonesia

Chairman/Loan Officer	David W. Devin
Health Advisor	William H. Johnson
Engineer	Walter H. McAleer
Environmentalist	Abraham Grayson
Economist	James A. Norris
Controller	Richard Warin
Sociologist Consultant	Kie Bok Lee
Implementation	William Fraser
Legal Advisor	Rodney W. Johnson
Annexes	Martha Eprana

AID/Washington

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT DATA FACESHEET
TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE (X appropriate box)
[X] Original [ ] Change [ ] Add [ ] Delete

PP

DOCUMENT CODE 3

2. COUNTRY/ENTITY
Indonesia

3. DOCUMENT REVISION NUMBER

4. PROJECT NUMBER
497-0262

5. BUREAU
[ ] Asia [ ] Near East [ ] Latin America

6. ESTIMATED FY OF PROJECT COMPLETION
FY 82

7. PROJECT TITLE (Maximum 40 characters)
Surakarta Potable Water

8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION
a. INITIAL mo. 6 yr. 76 b. FINAL FY 76

9. ESTIMATED TOTAL COST ($000 or equivalent, $1 =)

A. PROGRAM TRACK	FIRST YEAR FY ___			ALL YEARS		
	c. FX	d. L/C	e. Total	f. FX	g. L/C	h. Total
AID APPROPRIATED TOTAL	6,800		6,800	6,800		6,800
(GRANT)	( )	( )	( )	( )	( )	( )
(LOAN)	6,800	( )	6,800	6,800	( )	6,800
OTHER 1						
OTHER 2						
HOST COUNTRY					3,800	3,800
OTHER DONOR(S)						
TOTAL	6,800		6,800	6,800	3,800	10,600

10. ESTIMATED COSTS AND APPROPRIATED FUNDS ($000)

A. PROGRAM TRACK	B. APPROPRIATION	C. PURPOSE CODE	D. SECTOR CODE	FY 76		FY 77		FY 78		ALL YEARS	
				e. Grant	f. Loan	g. Grant	h. Loan	i. Grant	j. Loan	k. Grant	l. Loan
					6,800						6,800
					6,800						6,800
					-0-		527		1,520		

12. PROJECT PURPOSE(S) (Maximum 480 characters) [ ] Check if different from PID/RP

A health-oriented project (1) to increase amount, reliability and quality of potable water delivered to present users in Surakarta, (2) to extend availability of water as much as possible to lower income families, provide free water, sanitary facilities including paramedical health care units to poor and destitute and (3) to evaluate periodically the social, economic and health impact of project outputs.

13. WERE ANY ITEMS CHANGED IN BLOCKS 10, 11, 12 OF THE PID FACESHEET? IF YES, ATTACH CHANGED PID FACESHEET.

14. CLEARANCE

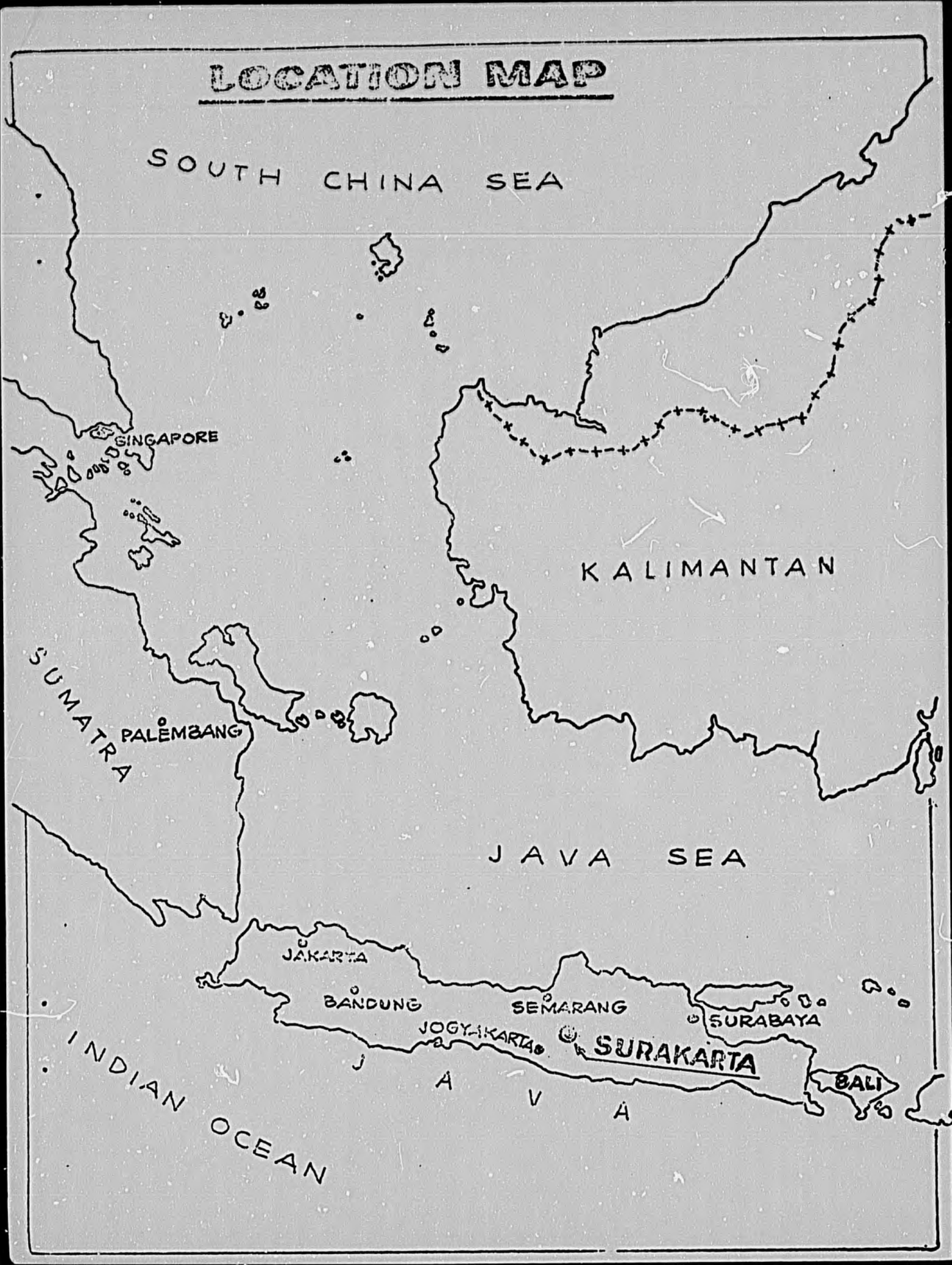
Kenneth M. Kauffman

TITLE: Kenneth M. Kauffman, Acting Director

DATE SIGNED: 06 07 76

15. Date Received in AID/W, or For AID/W Documents, Date of Distribution: mo. ___ day ___ yr. ___

AID 1330-4 (9-76)


LOCATION MAP
SOUTH CHINA SEA
SINGAPORE
KALIMANTAN
SUMATRA
PALEMBANG
JAVA SEA
JAKARTA
BANDUNG
SEMARANG
SURABAYA
JOGYAKARTA
SURAKARTA
BALI
INDIAN OCEAN
JAVA

Surakarta Potable Water Project
- Indonesia -

Abbreviations/Acronyms Used:

1. GOI - Government of Indonesia
2. Cipta Karya - Directorate General of Housing, Urban Development and Sanitary Engineering
3. DSE - Directorate of Sanitary Engineering
4. SWE - Surakarta Water Enterprise
5. HH&S - Howard Humphreys & Sons Consulting Engineers
6. BM/TA - Joint Venture of Burns and McDonnel Engineering Co. and Trans - Asia Engineering Associates
7. The Consultant - BM/TA
8. IGGI - International Governmental Group for Indonesia
9. Kampong - Indonesian word for the smallest administrative unit - a ward of village or city
10. L/SEC - Liters/Second
11. LPCD - Liters per capita per day
12. MGD - Million gallons per day

SURAKARTA POTABLE WATER PROJECT

- INDONESIA -

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ANNEXES

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ANNEXES

* Copies on file in ASIA/PD (235-9006

SURAKARTA POTABLE WATER PROJECT
-Indonesia-

Part I. Summary and Recommendations

A. Project Paper Facesheet

B. Recommendations

1. The Loan and Terms

A loan is requested to finance the foreign exchange and part of the local currency costs for the Surakarta Potable Water Project as described below. The proposed terms of the loan are:

Amount	:	Six million eight hundred thousand dollars ($6,800,000).
Maturity	:	Forty (40) years including a ten (10) year grace period.
Interest	:	Two percent per annum during the grace period and three percent per annum thereafter.
Currency	:	Interest and principal repayable in U.S. dollars.

2. Borrower and Executing Agency

The Borrower is the Government of the Republic of Indonesia (GOI). The executing agency is the Directorate General of Housing, Urban Development and Sanitary Engineering (Cipta Karya) one of four major organizations within the Ministry of Public Works and Electric Power. Responsibility for coordination and management of construction will be exercised by the Directorate of Sanitary Engineering (DSE) one of five directorates within Cipta Karya. Upon completion and acceptance of the physical facilities they will be turned over to the newly established Surakarta Water Enterprise (SWE) for operation and maintenance.

3. GOI Contribution

The total GOI contribution is estimated at $3,800,000 in local currency which is 36% of the estimated total project cost. In addition the SWE will continue to fund operation and maintenance of the Surakarta water system, a recurring cost not included as a project cost.

4. Second Step Loan and Terms

The GOI will in turn loan 60% of total Project Costs excluding the costs of two proposed studies to the SWE. The remaining 40% will be considered as GOI purchase of "equity" in the SWE until such time as the SWE wishes to buy out this equity. They will be allowed to do so at any time in the future for the face values of the equity. Such purchase of equity will give the SWE complete autonomy. The proposed terms of the second step loan are:

Amount	: 60% of Total Project Costs, excluding the studies, to be determined after last expenditure is made.
Maturity	: Thirty (30) years including a six (6) year grace period for principal and interest.
Interest	: Nine percent per annum.
Currency	: Interest and prinicpal repayable in local currency.

C. Description of the Project

1. Why

Until the late 1960's, foreign donors placed priority on helping to maximize the rate of increase in aggregate output and income of individual third world countries. More recently primary attention has turned toward what can be done to improve the lot of the rural poor people of these countries. Most recently, the plight of the urban poor in the LDC's has brought demands for assistance to these thousands of millions of people whose numbers are growing most rapidly and who possess least the preconditions for family stability - enough food, clean water, shelter, education and gainful employment.

The U.S. Government through the AID is giving assistance to the LDC's in three primary areas; food and nutrition, health and education. The PRP contains a discussion of the priority and relevance of this project within the GOI second five year plan and the USAID development assistance strategy. It is suffice to say here that the GOI has specifically requested AID assistance for this project and it is part of the U.S. Government pledge to the IGGI non-food assistance to Indonesia through GOI fiscal year 1976-77.

The proposed project is a health project which will increase by a factor of 266% the supply of potable water for inhabitants of Surakarta, a major city in Central Java, with increased emphasis on distribution to lower income families, the poor and the destitute. Enough additional water will be supplied within five years to solve the immediate problems of this very thirsty city, especially the drinking and sanitary needs of the very poor.

Available data suggests that the public potable water supply system of Surakarta as constructed in the late 1920's was being fully utilized by the late 1950's and it has been reported by authorities that the first serious problems with shortages in supply began in the early 1960's. From 1965 no further service connections have been permitted with the exception of official connections. By 1970 the lack of potable water had reached crisis proportions and the British Government was requested to assist in the development of an Emergency Project. By December of 1971 a prefeasibility study was completed but due to over commitment of assistance funds

the British Government was forced to conclude in the spring of 1972 that it could not finance the project. In June of 1975 USAID assisted the GOI with funding for a contract for the final design of the project. The plans have been completed and are now under review by Cipta Karya and USAID.

The population of Surakarta has grown from 163,000 people when the present system was constructed to an estimated 460,000 people today. Best estimates of population growth predict a population of 540,000 people by 1981 and close to 1,000,000 by the year 2001. The existing system provides potable water to only 7,877 customers or an estimated 49,680 residential users. About 85% of the population are dependent upon shallow wells for water. Unfortunately, a great number of these wells are contaminated, a situation that can only get worse as population grows. Furthermore in some areas high salinity and seasonal shortages restrict the use of such shallow wells, forcing some of the less fortunate of the populace to use river water which is highly contaminated following its multi-purpose use. Even the river has been known to go dry in some years causing severe hardships for the city. While it appears that the tolerance threshold of the population to contaminated water is high, several potentially lethal or debilitating waterborne diseases including cholera, typhoid and enteritus are endemic.

In summary the proposed project Beneficiaries will be: (1) the estimated 49,860 family members of the present residential consumers who currently represent 92% of all service connections and use about 75% of all water sold, (2) the approximate 664 non-domestic consumers who together employ an estimated 27,660 people, the majority of which do not have house connections, (3) an estimated 78,000 lower income people who will be served by private yard hydrants, (4) about 60,000 poor people who are expected to use the public faucets and (5) thousands more of poor and destitute people who will use the public latrines and bathhouses. As a minimum it is expected that the project will directly benefit 188,000 people or 35% of the assumed 1982 population versus the present service which provides unreliable, low pressure water to about 11% of the city's inhabitants most of whom would be best described as middle class by Indonesian standards.

2. What

The proposed improvements will permit the flow of water from the existing source of supply, i.e. Cokrotulung Spring located 20 km outside of the city, to be increased from 150 liters per second to 400 liters per second. Under the proposed project a new water main will be constructed from a water intake structure already completed at the spring to the newly constructed water reservoir at Kartosuro a distance of 14.3 km. Both of these new structures have been recently built by Cipta Karya in anticipation of the project. From Kartosuro a further new main will be constructed 13 km to the Jebres Reservoir in Surakarta which has served the system by

means of the old main since 1927. Approximately 51.5 km of new distribution lines will be installed and integrated with 106 km of old distribution lines to supply the additional water to inhabitants of the city. An orderly program of leak detection, maintenance and repair will be put into continuous operation to ensure that leakage does not consume an excessive amount of the water supplied to the system.

It is planned that all of the potable water supplied to Surakarta by the Cokrotulung Spring will flow to the existing customers, and to the urban poor. A new rate structure will be introduced that will make the new utility financially viable and insure that the additional water being provided by the project is not wasted.

The project benefits will flow to the lower income families by the installation of up to 13,000 new metered yard hydrants in the most congested areas of the city which will be used in preference to contaminated wells for drinking, food preparation and bathing. The rate structure on these hydrants will encourage usage up to 75 lpcd and discourage usage beyond that level. To reach the very poor and the destitute 200 public faucets and 10 new public bathhouses will be constructed. These bathhouses will include an extra stall which will be operated by the City Health Department for para-medical health care to the very poor. In addition the existing 147 public latrines will be upgraded and provided with water 24 hours a day.

Since improved health is the project goal and so little is actually known about the health effects of such a project beyond a general association between improved quality and particularly, increased quantity of water and a reduced incidence of enteric disease, a study is proposed to continually evaluate the health, economic and social impact of the project. There are at present no yard hydrants or public taps at all in the city. But these facilities are being used in other cities in Indonesia and should prove beneficial as will the bathhouses and latrines in improving sanitation and general health among the urban poor in Surakarta. Since none of the above terminal facilities can be built until the new water main and distribution system is constructed, there will be ample time to launch the impact study which will determine exactly how many and where these terminals will be built to maximize the social, economic and health benefits to the urban poor. This impact study should prove useful to identify correctable deficiencies in the present project design and to contribute to the general knowledge that will result in better water supply projects elsewhere in Indonesia and the third world. The study design will follow in general similar studies being conducted in the Philippines. See Annex B, 8.

To insure that the benefits of this project flow to the lower income families and the destitute the central government and the city have agreed to continue the present policy that there will no more industrial,

commercial or house connections to the city system until additional water supply sources are located and brought into the system for that purpose. Therefore, it is proposed that groundwater studies be incorporated into the project as a necessary measure to enable continuance of the present policy by providing for an immediate search for such additional sources of water supply. The proposed project provides for up to 18 exploratory boreholes and funds for expanding up to ten of them into producing wells (See Annex B. 7). Fortunately for project purposes, most of the larger industrial and commercial firms as well as the military have their own water supply from deep wells so the GOI is confident that with the inclusion of the groundwater studies as an integral part of the project, the present "no new connections" policy can be continued. There is also ample time in the project implementation schedule to complete the groundwater studies before construction of the new system is completed so that allocation of the new water supply to the urban poor will not become an impracticality.

As a condition precedent to disbursement the GOI and USAID will agree to a general implementation plan that will describe in detail the proposed upgrading of the new utility, the project beneficiaries, the rate structure and the financial arrangements between the City and the utility.

3. How

In accordance with current GOI policy for construction of city water supply projects, the executing agency will be Cipta Karya. All offshore procurement and expatriate consulting services will be contracted for by this Directorate General. Under Cipta Karya, the DSE will have responsibility for coordination and management of construction. This organization has a regional representative for Central Java stationed at Semarang and a local representative at Surakarta. The local representative and his staff, assisted by consultants, will supervise construction and monitor project implementation. They will report to the regional representative who has a larger more competent support staff. He has been delegated authority to enter into local construction and procurement contracts. However, those contracts involving loan funds will be reviewed by the DSE in Jakarta and by USAID.

Upon completion of construction, the DSE will turn the completed and upgraded system over to the newly established SUE for operation and maintenance. By that time the three key staff who will manage the new utility will have been upgraded and given special training. In addition the rest of the staff will have received considerable on-the-job training.

Also in keeping with other recent city water supply projects the GOI has instituted a second step loan policy as recommended by the World Bank in its "Five Cities Water Project". Under this scheme the GOI

will loan 60% of total project costs to the SWE, repayable in Local currency at the terms stated above. The exact amount of this loan will not be known until project completion and final payments are made. The remaining 40% of project costs will be considered as a purchase of "equity" with the GOI represented by the DSF retaining a voice in the management of the SWE. If , at some later date, the SWE desires to purchase the equity of the GOI, it may do so at the stated face value of the equity. Such purchase of equity would give the local utility complete autonomy from the DSF.

The GOI has agreed that the costs of the two proposed studies to be financed by the loan i.e. the groundwater study and the impact study would not be included in the calculation of "total project costs." Since these studies involve local currency costs which USAID has agreed to pay, authorization is requested as a part of the loan authorization to permit dollar conversion of loan funds by the USAID and make payment to the contractors on behalf and at the request of the GOI.

D. Summary Findings

The project is based upon the pre-feasibility study prepared by Howard Humphrey & Sons, Consulting Engineers in association with Marwick, Mitchel & Co., Management Consultants, published in December 1971 (HH&S). Designs and further studies are presently being finalized by the joint venture of Burns and McDonnell Engineering Company, Inc. and Trans Asia Engineering Associates, Inc. (BM/TA). These reports cover the organization, operation, and management of the present water utility and the needs for potable water, drainage, sewerage, and solid waste disposal in Surakarta. Construction plans, specifications, and cost estimates for the water facilities have been prepared by BM/TA and are presently being reviewed by the City of Surakarta, Cipta Karya, and USAID.

The USAID concludes that the Analysis as presented in this paper is complete, reasonable and valid, that the project is the least cost solution of providing additional potable water to the city and that payment of the proposed water charges are within the capability of the anticipated customers. The Project should have high health, economic (IRR of 19%) and social Benefits. The enviromental impact will be minor but on the whole positive. Implementation on the schedule contained in Part IV - Section B is practical and possible. The project meets all applicable statutory criteria including the Mission Director's 611(e) certificate concerning the country's capability to maintain and effectively use the project (see Annexes).

E. Project Issues

1. In the PPP approval (see Annex A) it was requested that the relationship of this project to public health be addressed and that

consideration be given, in the documentation to evaluating health effects. The health aspects are addressed in Part III A and Annex B. 1. Annex B. 8 describes a proposed health impact study which will evaluate the health effects over a three year period.

2. During review of the proposed project with the DSE, intensive discussions took place relating to the amount of technical assistance and training to be provided. The GOI has agreed in principle to the recruitment of better qualified personnel for the three key management positions and the training program outlined in the PRP has been upgraded to include OJT at a more modern water utility in another country in S.E. Asia. It is the opinion of the USAID and the DSE that adequate technical services are now provided for in the proposed program. This topic is described and further discussed in Part II B. Inputs, Part III B. and Part IV A.2.

3. The PRP approval also requested that the PP contain a Plan showing the financial viability of the Project. The financial viability of the Project including the new water Enterprise is discussed in Part III C. This section also includes a discussion of the proposed second step loan. This loan arrangement is based on present World Bank and ADB funding procedures for potable water projects in Indonesia. The requested financial statements are found in Annex B. 3.

4. Excreta disposal will be assisted by the project but is not totally resolved. Existing public latrines will be rehabilitated and supplied with dependable water service and the public baths to be constructed will include water closet facilities. Beyond these measures there has been no intent to advance this project as a resolution to excreta disposal. The city has taken several measures to improve drainage and will continue to do so. See project issues. An evaluation of latrines, public water faucets and public taps will be made as part of the Health Impact study. See Annex B. 8.

5. USAID feels that the issues noted in the PRP Approval Message and those uncovered during preparation of the PP have been addressed within this paper. The only unresolved "issues" concern:

a. The possibilities for lowering the cost of water for users of the public faucets. See Annex B. 2. for description of problem
b. The financial semi-autonomy of the new utility. See Part III C.
c. A commitment from the city to continue on with the improvements in drainage as recommended by HH&S. See Annex B. 2.
d. An agreed to program to prevent further erosion of the stream bed of the Kali Pusu. See Part III B. 3.

The GOI agrees in principle with USAID on these matters but the administrative details have not been worked out. They will be resolved by the time the loan agreement is signed or a condition precedent to disbursement will be included to cover these points. See Part IV D.

Part II. PROJECT BACKGROUND AND DETAILED DESCRIPTION

A. Background

1. Description of Surakarta:

Surakarta, also known as Solo, is located in the Province of Central Java, and is on the west bank of the upper reaches of the Solo River, the longest river in Java. The population of Surakarta is presently estimated at around 460,000 people living on a land area of 4,345 hectares (16.78 square miles). The city is administratively a municipality governed by a major with an advisory board. The municipality is further divided into five major political subdivisions, Kecamatans, each of which is headed by a Camat. The five kecamatans are in turn divided into a total of 51 Kelurahans, each of which is headed by a Lurah. Solo is the commercial center of the Surakarta ex-karesidenan, a rich agricultural area approximately 5,700 square kilometers (2201 sq. mi.) with a population of over four and half million people. The city is located on major rail and road links between Jakarta, Yogyakarta, and Surabaya. Daily air service has recently been inaugurated between Surakarta and Jakarta.

Most of the city lies on a gently sloping plain falling from about 105 meters (344 ft.) to about 85 meters (282 ft.) above sea level. In the northern section of the city above Kali Anyer, a tributary to the Solo River, the terrain becomes hilly and rises in some places above 135 meters (442 ft.). This section is sparsely settled and is not served by the present water distribution system. Provided that an adequate supply of water can be found in this area with the ground water investigations, the city looks to this area as the locale for future residential development.

Surakarta was founded in 1743 and was the seat of a Sultanate until 1945. It is a typical Javanese city in many respects except that the presence of the Sultan of Solo, who ruled a large area surrounding the city for so many generations created a richer than normal cultural and educational heritage. The city remains an important center of traditional Javanese theater and music. Nightly performances of the Wayang are presented in the city's Park and in neighbourhood theaters and musical concerts are common. Even the major industry of the city, textiles, particularly Batik, has grown out of the traditional arts and crafts that have developed over the years.

Early this year (1976) a new National University was established in the city. Solo has provided a very substantial number of men who have risen to high office in the government and institutions of Indonesia. It is the location of the internationally recognised rehabilitation center for crippled persons founded by the late Dr. Suharso.

2. Economy and Employment

The city's inhabitants can be categorized into the following primary occupational groups: Commerce and trade, manufacturing, construction and transportation, service (including civil servants, educators, military and others) and finally those outside the labor force. Interestingly only 25% of the city's population is in the labor force as compared to 42% in the United States. In 1972, 47.8% of Surakarta's population was under 19 years old. Humprey and Sons estimated the level of unemployed at 17% of the population and 36% of the workforce. The mandatory retirement age of both civilian and military at 55 years also makes the percentage of pensioners quite high. Various estimates range from 10 - 13% of the population.

Recent surveys by the consultant of both domestic consumers and non-users of the municipal water system present an interesting profile of the present and potential beneficiaries of the proposed project. In general the present users are more apt to be merchants and have a significantly higher income but more people per family than the non-users who are more apt to be laborers in the service, manufacturing or construction and transportation industries. Both groups reported a high percentage of "retireds" and unemployed. The average monthly income for a family of 6.8 people for the present user was US $102 versus US $45 for a non-user family of 5.9 people. See Part II D and E and Annex B 8 for further economic and social analyses and the results of the consultant's surveys.

3. Historical Central Water System

Shallow wells have in the past and continue at present to be the source of water used by the larger part of the population in Surakarta. They can be readily dug in most parts of the urban area with good prospects of obtaining water at depths less than four meters. In 1889 the first deep well was drilled in the town and over the following six years nine more were put into service. In 1911 and 1916 two more borehole wells more added to the system. All but one of these twelve city wells were artesian flowing, having yields that range from 1-10 liters per second (l/s), with the average being somewhat less than 5 l/s. These sources appear to have satisfied the needs of the town until 1929 when the present day gravity transmission main was laid from a spring at Cokrotulung, some

20 kilometers to the west. At this time an extensive distribution system was installed and a service reservoir of 2,700 m3 capacity was constructed at Jebres on the North East outskirt of the town. See map Annex B 2. The capacity of the trunk main was around 150 1/s but it was not until some thirty years after construction that the demand exceeded this supply.

3. Current Water Supply System

The current municipal water system is essentially based on the transmission storage and distribution system constructed in 1929 as described above. An exception is that of the original 12 wells only two are now in use for public supply. Their total output does not exceed 5 1/s which is insignificant in relation to the total supply. A number of private concerns and the military have drilled deep wells for their use, and over 85% of the city's inhabitants are not served by the municipal system. As indicated above, most of these residents rely on shallow wells which give a reasonably reliable supply in most years. Unfortunately, a great number of these wells are contaminated, a situation that can only get worse as population grows. Furthermore in some areas high salinity and seasonal shortages restrict the use of such shallow wells, forcing some of the less fortunate of the populace to use river water which is highly contaminated following its multi-purpose use. Even the river has been known to go dry in some years causing severe hardships for the city. While it appears that the tolerance threshold of the population to contaminated water is high, several potentially lethal or debilitating waterborne diseases including cholera, typhoid, dengue fever and enteritis are endemic. See Part III A and Annex B 1 and B 8 for a more complete discussion of the health aspects and proposed methods to measure the impact of the proposed project on improved health.

4. Efforts to Increase Supply

Available data suggests that the public water supply from the Cokrotulung Springs had become fully absorbed by the late 1950's and it has been reported by authorities that the first serious problems with shortage in supply began in the early 1960's. From 1965 no further service connections have been permitted with the exception of official connections. By 1970 the lack of potable water had reached crisis proportions and the British Government was requested to assist in the development of an Emergency Project. In 1971, the British Overseas Development Administration retained Howard Humpreys and Sons, and Peat Marwick, Mitchell & Co., Management Consultants, to study the potable water supply, waste water, and drainage problems in Surakarta.

Howard Humpreys and Sons prepared two reports. The first, dated September 1971, was "Surakarta Water Supply, Review of the Emergency Project" which described a least cost approach to doubling the city's potable water supply. The second report, "Surakarta Water Supply and Drainage, Pre-Feasibility Study", is dated December 1971. It proposed long term development programs for potable water, drainage, and waste water, but it also reiterated the need for an immediate additional water supply and improvements in the present system including management, operation and maintenance and in the rate structure. The additional supply of the "Emergency Project" was to provide sufficient water to the existing system to enable it to maintain acceptable service and pressure on a twenty-four hour a day basis. Their proposed program was not considered as meeting the total needs of the city, but was an expedient and financially justified solution to a crisis situation which would assist the Surakarta water works in providing a more adequate supply of potable water while investigations for additional sources of water necessary to meet the city's growing needs were conducted. Howard Humpreys and Sons felt that these additional needs could be met from ground water resources available in the immediate area. The recommendations in these reports are the foundation of the proposed project.

USAID became involved in the Surakarta Water project in April 1972, when the British Embassy and USAID discussed the possibility of USAID financing further endeavors towards improving the Surakarta water works. In August 1972, at a joint meeting between representatives of Cipta Karya, the British Embassy, and USAID, it was agreed that the British, due to over commitment of assistance funds, would refrain from providing further assistance to the Surakarta water works, and that USAID would consider providing loan funds for design and construction of the immediate improvements called for in the two reports prepared by Howard Humpreys and Sons.

Long range planning studies and feasibility studies for potable water for Semarang and Surabaya were also being considered for funding assistance by USAID in 1972. At USAID's recommendation, the three projects were combined into what was known as the "Three Cities Water Project". After initiating the procedure for selection of a consultant for the "Three Cities Water Project", it was decided within USAID that the scope of the Surabaya and Semarang studies should be expanded to include sewerage and drainage. At a cost of nearly a year's delay in the schedule, the scope of work was expanded and the project readvertised. Recognizing that the expanded work caused some feeling that projects were not reasonable distributed among consultants (expanded size plus possible follow-up work), and that having a single contract with parts administered by different regional engineers from Cipta Karya could cause difficulties, the Surakarta design work was combined with the Semarang planning and feasibility studies (Central Java) to form one project while the Surabaya planning and feasibility studies (East Java) were made a separate project.

HH&S prepared two reports. The first, dated September 1971, was "Surakarta Water Supply, Review of the Emergency Project" which described a least cost approach to doubling the city's potable water supply. The second report, "Surakarta Water Supply and Drainage, Pre-Feasibility Study", is dated December 1971. It proposed long-term development programs for potable water, drainage, and waste water, but it also reiterated the need for an immediate additional water supply and improvements in the present system including management, operation and maintenance and in the rate structure. The additional supply of the "Emergency Project" was to provide sufficient water to the existing system to enable it to maintain acceptable service and pressure on a twenty-four hour a day basis. Their proposed program was not considered as meeting the total needs of the city, but was an expedient and financially justified solution to a crisis situation which would assist the Surakarta water works in providing a more adequate supply of potable water while investigations for additional sources of water necessary to meet the city's growing needs were conducted. HH&S felt that these additional needs could be met from ground water resources available in the immediate area. The recommendations in these reports are the foundation of the proposed project.

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In June 1975, the joint venture of Burns & McDonnell Engineering Company, Inc. and Trans-Asia Engineering Associates, Inc. (the Consultant) signed a contract with Cipta Karya calling for the preparation and final design for Surakarta, additional studies for Surakarta, and master planning and feasibility studies for Semarang. After signing of the contract, the joint venture immediately began work on the design of improvements to the Surakarta water system without waiting for the opening of a letter of credit which followed several months later. They have now completed the preparation of plans for the proposed transmission main and distribution system improvements, and a scope of work for the investigation of the ground water potential in and around Surakarta. The plans have been submitted to Cipta Karya and USAID for their review and approval. The contract also called for a System Analysis and Linkage Report, Social/ Economic Surveys and Review of the Management and Operation of the Surakarta Water Enterprise. These reports are in final draft and abridged versions are in the annexes of this paper. The full reports are available at USAID and in AID/W by July of this year.

5. Projected Growth in Water Demand and Supply

A population census was held in 1930, 1961 and in 1971. In addition the city government annually counts the population from their own sources of statistics. Howard Humprey and Sons analyzed the data and determined that the most likely population growth rate for Surakarta will be 2.7 percent over the next 30 years. If the rate of urbanization and industrialization were to increase substantially, this rate may increase to 3 percent per year. Alternatively, other factors may predominate and reduce the rate but it is unlikely to fall below 2.3 percent for the next 10 years or 2.0 percent thereafter. Given these upper and lower limits to the assumed 2.7 percent growth rate, the projected population of Surakarta is as follows:

Year	Assumed Pop.	Upper Limit	Lower Limit
1975	460,000		
1981	540,000	550,000	527,000
1991	705,000	738,000	650,000
2001	920,000	992,000	792,000

The existing system covers 49,680 people or 11% of the present population. By 1981 the proposed project will serve at least 188,000 people or about 35% of the assumed population. Since most of the existing distribution system and all of the planned extensions under the proposed project serve the more densely developed areas, the percentage of people served who live

where contamination of shallow groundwater is a problem, is actually higher than the above percentage indicates.

The projected water usage of the city, assuming the project follows the implementation schedule as described in Part IV B, indicates there will be shortage beginning in 1985 see table - Annex B 2. It is expected that the additional sources of supply found through the ground water investigations will be taped in time to meet the immediate needs of 1985. To project beyond this time period, the GOI intends to contract with a firm for the development of a masterplan which would estimate the long range demands of the city and show phased development of the water supply system. At present it is contemplated that the GOI will request funds for this master plan from the new technical consulting loan #497-T-040 which is presently being negotiated. This plan should outline a program of investment assuming availability of finance at the optimum level and at levels less than that required for an optimum program but still sufficient to meet the general needs through the year 2000. The new Surakarta Water Enterprise has adopted as a goal for the year 2001 the recommendation of Howard Humprey and Sons that they should strive to supply 50 percent of the population by service connections including yard hydrants, 30 percent from public fountains and 20 percent would remain outside the public system relying on wells and other private sources.

B. Logical Framework Narrative

1. Program or Sector Goal

The Goal of this Project is to improve the health and sanitary conditions in Indonesia. For Repelita II the GOI has established a goal for a national increase of from 350 MGD to 662 MGD* in the supply of potable water available to urban users. The proposed Surakarta project is part of this Plan.

Discussion

A thorough search of the literature done by AID and the World Bank, recently showed that there is at least an association between improved quality and, particularly, increased quantity of water and a reduced incidence of waterborne and other enteric disease which are endemic in the LDC's. Although many diseases are waterborne, many more are what can be termed "water washed". The leading disease in this category are skin diseases and those transmitted from hand to mouth, that with proper bathing and hand washing, could be avoided. In fact, improved sanitary living conditions and better health, two vital prerequisites for enjoying a long and productive life, are the main extra-financial benefits of water supply investments. However, the above men-

* 1.32 million m3/day to 2.5 million m3/day.

tioned search of current literature also revealed that much more information is needed about (1) the magnitude of benefits that may be expected from incremental increases in the quality and quantity of water supply; (2) the additional conditions, beyond improved water supply which are needed to enhance the expected sanitary and health benefits of such projects; and (3) how to design a water and supply project so as to maximize the benefits to the lower income families, the really poor and the destitute. It is expected that the proposed project will contribute substantially toward goal achievement and toward the general body of knowledge which will benefit the people of Surakarta and may have worldwide applicability. For a discussion of the specific health problems in Surakarta and the possible impact of the proposed project see Part III Section A, and Annexes B-1 and B-8.

2. Project Purpose

The proposed project, as emphasized above, is a health-oriented project. As such it has three purposes: (1) To increase the amount, reliability and quality of the potable water delivered to present users in Surakarta; (2) To extend the availability of such water as much as possible to lower income families, providing water and sanitary facilities, including latrines and bath houses with paramedical health care units to the really poor and the destitute; and (3) To evaluate periodically the special, economic and health impact of project outputs over a three year period.

End of Project Status

By Project Completion the following conditions and improvements are expected to be achieved:

(a) Water Supply -- The current potable water supply of 153 liters/sec will have been increased to 400 liters/sec. This increase as well as other planned improvements in the system will make service more reliable and available twenty-four hours a day. The city's health department will have installed an ongoing program of inspection to ensure that the city's water supply is indeed safe. Beyond the present customers, this increased supply will flow to the lower income families, the poor and the destitute. A groundwater study will have found additional sources of water adequate for the long-range needs of the city. A new rate structure will insure that this new supply is not wasted. An improved O&M capability will reduce losses.

(b) Distribution System -- A new transmission main and distribution system will be in operation and the old system upgraded. The integrated network will be providing water on a twenty-four hour basis to all customers, all of whom will be metered. The number of people served will have increased from 49,680, or 11% of the present population to 188,000, or 35% of the projected 1981 population.

(c) Focus on the urban poor and the destitute - Up to 13,000 metered yard hydrants will be provided to the urban poor in the most congested areas of the city as a low cost alternative to contaminated wells. To reach the really poor and the destitute, 200 public water taps and ten public bath houses will also be constructed. These bath houses will have a room attached for paramedical health care purposes including, for example, first aid and the provision of soap, eye and skin ointments, diarrhea, cold, headache medicines etc. In addition the 147 existing public latrines will be upgraded and provided with water on a twenty-four hour a day basis. To insure that the urban poor will benefit, the city will continue the present policy of no new industrial, commercial or residential service connections until additional water supply sources are located and brought into the system for that purpose.

(d) Surakarta Water Enterprise - A financial sound semi-autonomous new utility will be operating and maintaining the new system. Three key individuals will be especially trained to manage the SWE; a General Manager, a Chief Financial Officer and a Chief of the Technical Division. Additionally the staff will have received considerable on-the-job training in the use of leak detection equipment, meter repair and general O&M.

(e) Water Rates - A new and improved system of water rates will be in effect. These rates will put the new utility on financially solid ground and will be based on ability to pay. They will encourage the use of potable water up to a certain level, charge a reasonable amount to a higher level and encourage conservation after that level. The rate structure will be constantly evaluated to ensure that the desired effect is produced and to see that the SWE can meet its financial obligations.

(f) Evaluation - The project will have been continually evaluated during implementation and the first year of operation by a local research contractor in cooperation with the SWE and the Surakarta City Health Department. The evaluation will be similar in design to the ongoing "Health and Economic Impact Study of Improved Water Supply System in Five Cities of the Philippines."

Assumption for End of Project Status Achievements

(1) The Mayor of the City of Surakarta and his advisory board will agree to continue the "no new service connections" policy for industrial, commercial and residential customers, until such time as additional sources are found.

(2) Cross-connections which may contaminate the municipal water supply can be eliminated.

(3) The Surakarta Water Enterprise can enforce the "no new service connections" policy.

(4) The Enterprise can effectively manage, operate, and maintain the new system.

(5) The Haalth, Social, andEconomic Impact Study will be useful to correct deficiencies in the project as well as have beneficial influence on other water supply projects in Indonesia and the other LDC's.

Discussion

(1) As a condition precedent to disbursement the GOI and USAID will agree to a general implementation plan that will describe in detail the proposed upgrading of the new utility, the project beneficiaries, and rate structure and the financial arrangements between the city and the utility.

(2) A reliable and adequate supply of water under proper pressure will make cross-connections an unnecessary expense for the consumer and they should rapidly disappear after project completion. An ongoing program of surveilance should eliminate the remainder.

(3) Fortunately, most of the really influential people and the powerful organizations, i.e., the military or the big industrial or commercial firms are either already on the public system or have developed private sources of water. Many of these "potential" customers are located outside of the present and planned distribution system anyway, so that a hookup would still be impossible even if it was desired. Then, too, it is hoped, with reasonable expectations, that alternate sources of water will be found before further shortages make water for the poor an impracticality.

(4) USAID and the GOI have discussed the deficiencies of the present city water works several times. The Training Program included as part of the project has also been worked out with the GOI. They have accepted in principle, as necessary to project success, the recruitment of better qualified individuals for the three key managerial positions. A covenant to the loan agreement calling for a plan to upgrade the Surakarta Water Enterprise will formalize this understanding. It is felt that these measures are sufficient to achieve the described end of project status.

(5) See description of Impact Study annex B.8.

Linkage to Project Goal

As discussed above it has been established by AID and World Bank researchers that there is a linkage between the proposed project purpose and the goal. By targeting as much as possible the urban poor and the destitute, USAID and the GOI are attempting to maximize the impact and strengthen this linkage. Furthermore, this particular linkage will be the central theme and focus of the health impact study which is incorporated as an integral part of the project.

3. Outputs

Transmission main

A second transmission main will be constructed from a new water intake structure already completed at Cokrotulung Spring to the newly constructed water reservoir at Kartosuro a distance of 14.3 km. Both of these new structures have been recently built by Cipta Karya in anticipation of the USAID Loan. From Kartosuro a further new main will be constructed 13 km to the Jebres Reservoir located on the northeast outskirts of Surakarta which has served the system by means of the old main since 1927. The new water main will be constructed of ductile iron pipe, have a total length of 27.3 km, an approximate weight of four million kilograms and will require an open storage area of 27,000 m2 during construction. To obtain a gravity flow of 400 1/s at a standard pressure of 61.8 psi, the consultant recommends a coefficient of friction of 130 (Hazen-Williams) and pipe size varying between 450 mm and 600 mm depending upon the gradient. See engineering analyses Part III B. Size and length of pipe recommended are:

Pipe Size	Length to be installed
450 mm (18 in)	10.0 km
500 mm (20 in)	9.2 km
600 mm (24 in)	6.1 km
Total	27.3 km (16.96 mi)

Included in this portion of the project are the necessary fittings and valves to connect the new pipeline to the two reservoirs, and water metering installations and communication equipment to facilitate operation and control of the system. The quality of the water coming from the spring is nearly chemically and bacteriologically excellent so that no treatment

is required. However, chlorination equipment will be provided so that a chlorine residual can be maintained throughout the system to provide some protection against contamination entering the distribution system.

Distribution System

A total of 51.5 km (32 mi) of new water main will be installed in the distribution system in order to stabilize total system pressure, provide adequate service pressure and continuous service to all new and existing customers. A leak detection, maintenance and repair program will become operational to upgrade the old network and maintain the new integrated system.

Pipe Size	Est. Length to be installed
100 mm (4 in)	35.5 km
150 mm (6 in)	1.5 km
200 mm (8 in)	2.3 km
300 mm (12 in)	12.2 km
Total	51.5 km (32 mi)

Services & Meters

An estimated 1,800 water meters presently in the system are unrepairable and will be replaced. Meters will be required for the 13,000 new yard hydrants which will be installed. In addition, meters will also be placed on all public faucets, public latrines, and public bath houses. This means a total requirement of 15,157 meters. To enable the water enterprise to maintain its meters, the meter shop, will be equipped with proper meter testing facilities and tools and the staff will be trained. See inputs.

Yard Hydrants

To achieve a maximum health impact, the proposed project will seek to replace contaminated wells with yard hydrants. Current design calls for up to 13,000 of these terminals to be installed in the most congested areas of the city. The health impact study will determine the relative mix between yard hydrants and public fountains and the exact number and location of each. There is ample time in the project implementation schedule to perform this analysis before installation of these terminals. Yard hydrants have been installed in other Indonesian cities under either donor Projects (10,000 in Denpasar, 200 in Bogor) and the GOI is interested in using this approach in other areas.

Public Faucets, Baths and Latrines

At present there are no public water faucets in the city. The project will install up to 200 of them which are anticipated to serve a minimum of 60,000 people. Ten public bathing facilities, which will also include water closets, and an additional room for paramedical health care, will also be constructed. In addition, the existing 147 public latrines will be given a facelifting and provided with water twenty-four hours a day.

Groundwater Study

To insure that the benefits of this project flow to the lower income families and the destitute, the central and city governments have agreed to continue the present policy that there will be no more industrial, commercial, or house connections to the city system until additional water supply sources are located and brought into the system for that purpose. Therefore, the proposed groundwater studies have been incorporated into the project as a necessary measure to enable continuance of the present policy by providing for an immediate search for such additional sources of water supply. See Annex B-7 for a description of the proposed investigations. It is proposed that in the area north of the Kali Anjer, six four-inch holes be bored and logged to obtain underground geological data. It is estimated that at least four of these holes will be expanded to twelve inches in diameter and tested for drawdown, yield and quality. They will be capped for future integration into the system. It is further proposed that in the area in and around Solo, twelve four-inch holes be bored and logged as above, except that two of the holes may be drilled to as deep as 500 feet to obtain geological data below that currently available. It is estimated that six of these wells will be enlarged to 12 inches in diameter. No prediction is made at this time about the quantity of water which will be found and made available to the city from these investigations. Since the water found would allow new service connections, the water flows from these proposed wells are not considered as part of the proposed project.

Fortunately most of the large industrial and commercial firms as well as the military have their own water supply from deep wells so the GOI is confident that with the inclusion of the groundwater studies as in integral part of the project, the present "no new connections" policy can be continued. There is also ample time in the project implementation schedule to complete the groundwater studies before construction of the new system is completed so that allocation of the new water supply to the urban poor will not become an impracticality.

Health, Social and Economic Impact Study

Since improved health is the project goal and so little is actually known about the health effects of such a project beyond a general association between improved quality and particularly, increased quantity of water and a reduced incidence of waterborne or "waterwashed" diseases a study is proposed to continually evaluate the health, economic and social impact of the project. Since none of the above terminal facilities can be built until the new water main and distribution system is constructed, there will be ample time to launch the impact study which will determine exactly how many and where these terminals will be built to maximize the social, economic and health benefits to the urban poor. The study design will follow in general similar studies being conducted in the Philippines. This study will be conducted by a local research contractor in cooperation with the SWE and the Surakarta Health Service. See Annex B-8.

Assumption for achieving outputs

The major assumptions for achieving the outputs included (a) adequate construction capability exists in Indonesia, (b) the SWE will be able to locate and repair leaks as well as manage, operate and maintain the new system, (c) the yard hydrants will effectively replace shallow wells in large areas of the city, (d) public faucets and bathhouses will be used by and adequately serve the needs of the very poor, (e) the groundwater investigations will locate sufficient additional sources of water which will be feasible to incorporate into the city system in time to meet medium-term and long-range needs, and (f) a local research institute is capable of working with the city effectively on a three-year evaluation/impact study.

Linkage of outputs to project purposes

1. The increased amount, reliability and quality of water delivered to the present users will be achieved with the construction of the new water main, and distribution system and with the improvements in the present system, including the repair of leaks, installation of meters, and the elimination of cross-connections.

2. The availability of such water to lower income families, the poor and the destitute will be achieved by the installation of yard hydrants, public faucets, baths and latrines. The continued availability over the long-range to these people will be practically possible only if alternate sources of water are found in time to

meet demand. The Consultant feels it is a reasonable expectation that the groundwater study will locate these sources.

3. The project outputs will be evaluated periodically during project implementation and for one year after project completion by means of the health, social and economic impact study.

4. Inputs (detailed financial plan is found in Part III C)

Technical Assistance and Training: Expatriate engineers will be retained under the proposed loan as consultants to assist the GOI with the procurement of materials and construction supervision of the project. To upgrade the new Surakarta Water Enterprise, the GOI has agreed in principle to the recruitment of more qualified individuals for the three key management positions. See Part IV A.1. As a condition precedent to disbursement there will be an agreed upon implementation plan that will formalize this agreement. It is envisioned that the Training component of this plan will include a short period of OJT for the three new managers at a more modern water utility at another major city in South East Asia, (Singapore, Kualalumpur or Penang). In addition considerable technical assistance and training will be provided to the staff in leak detection, operation and maintenance, and meter repair. The management services started under the design contract will be continued and coordinated with Cipta Karya's Management Section. During the construction period, expatriate assistance will also be made available to further assist and train the employees of the water enterprise in the conduct of leakage surveys and in the repair of water facilities. It is expected that this effort will reduce the unaccounted for water to at least thirty percent by 1982. To assist the meter repairshop an experienced meter repairman will be retained for up to three months to assist in setting up the new equipment, to instruct the meter shop personnel, and to assist in implementing proper record keeping.

Materials: The materials for the transmission main are expected to come from the U.S. and will be funded from the proposed loan. Asbestos cement and plastic pipe suitable for distribution piping and service lines will be procured locally so these materials will be available before the transmission main is constructed as will fittings for the distribution piping. These items will be purchased by Cipta Karya with GOI funds. Water meters and service fittings are not available from Indonesian manufacturers and will be purchased from Code 941 sources. Valves for the distribution system are also anticipated to come from Code 941 countries with loan funding.

Construction: Construction will be by Indonesian contractors. All excavation is expected to be by hand, and the installation of distribution piping will utilize little or no equipment. The pipe for the transmission main is expected to be handled by equipment due to its weight, but this is the only major use of equipment anticipated. The necessary equipment is available in country and will be provided for in the engineering services contract. Construction supervision will be performed primarily by Cipta Karya assisted by expatriate engineers under host country contract to Cipta Karya.

Assumption for providing inputs: (1) That the Governor of Central Java will grant in writing an additional allocation of 100 l/s to the city of Surakarta for a total allotment of 400 l/s from the Cokrotulung Spring. This will be a condition precedent to disbursement; (2) That technical assistance can be recruited and candidates for training will be found; (3) That the materials will be provided on time and in sufficient quality and quantity; and (4) That the local contractors are sufficiently skilled to do the job provided they are properly supervised.

Linkage of inputs to outputs: The funds to be provided by AID and the GOI should be sufficient to obtain the stated outputs. An inflation factor for foreign exchange costs of 7% per year and for local currency costs of 20%, 15%, 10%, 7%, 7% and 7% for the years 1976-1981 was included in the cost estimates in addition to a 10% contingency factor.

Part III. Project Analyses

A. Health Aspects

1. General State of the Art*

National and international agencies have traditionally made water supply investments in less developed countries on the faith that these investments return substantial extra-financial and non-quantifiable benefits to individuals affected and to society at large. The benefits are most often thought to lie in the field of public health. This faith is based partially on theories of the ways disease is transmitted, and partially on speculation of the value of improvements in health. These supportive theories have not been subjected to rigorous well-designed research and remain largely untested. The valuation of the benefits from water supply projects remain speculative due to uncertainty of just what the benefits are and a lack of consensus on a methodology of valuation.

One reason for the lack of research is that in most of the developed world it is seen as a given right that man is entitled to receive a safe and adequate supply of water. In fact, in most countries of the developed world, established law requires that the citizens are provided with water supply that is both bacteriologically and chemically safe.

It is in the allotment of scarce resources to the developing world that the questions of benefits and returns have arisen. Both Donor agencies and the LDC's are asking, what real return is gained by providing potable water in developing countries. As implied above, this is a question which today is seldom answered in the planning and construction of new systems or expansion of old systems in the developed world. The ability to pay plus the desire for potable water are usually the only consideration in developed countries. Even the ability to pay is downgraded in the United States through the provision of grants and/or low interest loans for the construction of potable water systems. The Western World then assumes that potable water is a social necessity; perhaps even a social right. Because of competing priorities in the developing world, however, we are more hesitant to recognize this social necessity or right unless the benefits are clearly defined. What then is known about the health benefits of such projects?

Two recently completed papers summarize and assess studies on the impact of water supply investments. One is IBRD's Village Water Supply and Sanitation in Less Developed Countries by R. J. Saunders

* This first section has been extracted almost verbatim from "The Health and Economic Impact of Improved Water Supply Systems on Provincial Cities, 1976-79, a Proposed plan of Work," submitted by the Institute of Philippine Culture, Antenyo de Manila University to USAID/Manila on October 24, 1975

and J. J. Warford; the other is Judith Ree's paper on domestic water supply in the Ford Foundation's Infrastructure Problems of the Cities of Developing Countries. Both combine extensive reviews of relevant literature with economic analysis to describe the state of knowledge about the effects of water supply and to point out inadequacies in what is known for purposes of rational decision-making on investments. Read together, the two are striking for their similarity in identifying issues and evaluating existing research.

Saunders and Warford found the major nonfinancial justification offered for water supply investments in rural areas has been the expected health benefits. Improved quality and increased quantity of water are expected to affect favorably the morbidity incidence of any or all of the following diseases, among others:

Ascariasis
Trichuriasis
Whipworm
Hookwork
Paratyphoid Fever
Salmonellosis
Scabies
Bacillary Dysentery
Malaria
Onchocerciasis
Pargonimiasis
Rift Valley Fever
Yellow Fever
Trachoma
Typhus
Cholera
Infectious hepatitis
Leptospirosis
Typhoid Fever
Amebiasis
West Nile Fever
Loaiasis
Schistosomiasis
Dracontiasis
Echinococcosis
Dengue
Clonorchiasis
Diphyllobothriasis
Encephalitis
Filariasis

Because of ease of detection or unusual importance, only a few of these diseases, mainly, the diarrheal diseases, have been subjects of extensive epidemiological studies where water supply conditions entered explicitly into the research design.

Although many of the studies reviewed suffered from poor conceptualization or inadequate implementation, taken as a whole, the studies represent significant evidence that improved water supply is associated with decreased incidence of enteric disease. Further, for most diarrheal diseases and skin infections, incidence is inversely related to volume of water used. Households that have more convenient sources of water and have more facilities for use of water (indoor latrines, showers, baths, basins) have lower infection rates. These findings confirm conclusions that many have arrived at by intuition or common sense. These previous studies do not provide a basis for estimating incremental health benefits that can be expected from incremental investments in water supply systems. Nor do the studies give any indication of what pre-existing conditions or what complementary changes, if any, are needed to realize the expected health benefits.

Saunders and Warford reviewed several studies which have attempted to value health improvements, including one study estimating health benefits due to improved water supply. Theoretical welfare economics contains little to aid these efforts. Essentially, two approaches have been chosen for lack of any better and because of their appeal to reason. One approach is to estimate the present worth of individuals' more healthful and lengthened lives. The method is to discount changes in expected lifetime earnings due to improved health. The second is to estimate costs incurred due to morbidity and mortality. Included in these costs have been expenditures in giving birth, rearing and burying children who die before becoming productive adults; costs incurred in medically treating disease, in terms of hospital charges, drugs, medical attention, and income lost by family members caring for the ill; and income lost due to forced absence from work while sick or due to decreased productivity while working. Neither of these approaches is based on firm theoretical foundations. Nor is there a concensus on which of these is best to value human life and health. One justification of using one or the other of these approaches is a negative one: that the alternative is to conclude human life is either completely worthless or infinitely precious. The rationale for a valuation of health benefits is to be able to compare quantified benefits with the costs of improving health. The Pyatt and Rogers study made these calculations for a Puerto Rican water supply project and estimated a benefit-cost ratio that approached unity at some time over the life of the project, depending on what discount rate was used. The benefits were conservatively estimated as those resulting solely from decline in incidence of three groups of disease.

The paper on domestic water supply by Judith Rees in the Ford Foundation study differs from Saunders and Warford's mainly in its recommendations for further research. The author feels that more research is needed in the following areas:

1. The relationship between levels of service and health benefits: much research suggests a relation between quantity of water used and improved health, but the shape of the function relating increments in health benefits to increments in water consumed is completely unknown.

2. The relationship between real costs to users of obtaining water and demand for water. This relationship can be broken into two parts: relating increments in water used to decrements in distance water has to be carried for households without house connections, and relating increments in water used to decrements in unit price for connected households.

3. The relationship between the provision of improved water supply and the provision of complementary improvements in public health,

such as, solid waste disposal or health education.

4. The interaction of diseases directly affected by water supply with those which are not, such as, malnutrition or respiratory diseases.

The author also suggest a form of research:

> "A full study would introduce different water systems in similar areas, giving families different quantities and forms of supply, while adding improvements in sewerage, medical care, or education, as well as pure water."

The major conclusions to be drawn from these two studies and their review of the literature on the impact of water supply investments are:

1. Health effects are the main extra-financial benefits of water supply investments.

2. Little is known about the health effects beyond a general association between improved quality and, particularly, increased quantity of water and a reduced incidence of enteric disease.

3. For the purpose of rational investment decisions, more information is needed about the effect on health of the design of water projects and about the social, cultural, economic, and educational environment for which projects are designed.

2. Indonesian Health Conditions

The best information available on Indonesian mortality indicates a relatively high crude death rate of 17-19 per 1000 population and infant mortality rate of 125 per 1000 live births. A 1972 Department of Health study lists diarrhea and enteritis in children under age two as the leading cause of mortality. 50% of deaths are among pre-school children. While the diarrhea-enteritis complex is caused by a variety of socio-economic and other determinants, the quantity and quality of water supply is an important variable. For this reason, one of the top five health priorities of the Second Five-Year Development Plan is to increase environmental sanitation facilities.

In terms of morbidity, recent surveys show that 5%-6% of the population was ill within the last two weeks and 8%-9% of pre-schoolers were ill within the last two weeks. Amongh those ill, 47% either sought no treatment or practised self treatment. Therefore, clinic and hospital records provide incomplete measures of morbidity. Only the most severe cases of diarrhea and enteritis come to the attention

of medical personnel. These cases constitute 5% of total clinic outpatient visits and about 12% of hospital patient morbidity. However, these morbidity estimates are felt to be low and not representative of the true disease prevalence patterns of the population.

The Ministry of Health has dedicated itself to an extensive program of rural sanitation aimed at improving the health and wellbeing of its people. This program is being provided assistance by UNICEF and WHO. USAID presently has pending a proposed loan which would assist in training personnel for implementing this program. The Ministry of Public Works has been active in improving the water supply of the municipalities throughout Indonesia. This program continues to be actively pursued with foreign assistance being provided by the World Bank, the Asian Development Bank, and the governments of Great Britain, Australia, Germany, Switzerland, Japan, and France. USAID has provided technical assistance for three cities: Semarang, Surabaya, and Surakarta. The proposed loan for Surakarta is the first proposed USAID assistance for construction of potable water facilities. Even with extensive assistance, the need for water supply facilities is far greater than what can be provided, both in the urban and rural areas.

3. Surakarta Health Conditions

The statistics for Surakarta show a high mortality rate among infants (see chart A-1 Annex 3 1(b).

Charts A-2, A-3, and A-4 show reported incidence of water-borne diseases in Surakarta, Semarang, and Surabaya. It can be seen from these charts that water-borne diseases are endemic in these cities, and are accepted as being endemic throughout Indonesia. Howard Humphrey and Sons found in their study of the numerous shallow wells throughout the city a very direct, positive relationship between population density and contamination. Most of the wells in areas having over 200 people per hectare showed positive coliform counts. Coliform bacteria is indicative of contamination by human excreta, and it is from man, by way of excreta, back to man, that water-borne diseases are transmitted. As Surakarta becomes more populated, the rate of contamination is bound to increase, thus increasing the probability of epidemics of water-borne diseases. One must look not only at what the problem is today, by what it will become in the future if no action is taken.

The proposed program realizes that potable water is not the sole answer to the control of disease. Excreta disposal is also important, for it is through excreta that cholera and other harmful bacteria pass from man to his environment. If excreta can be kept from the

water supply, much of the battle would be won. However, excreta must also be kept from flies or the bacteria may be spread to food, dishes, and utensils by the flies. At present, the city of Surakarta has 147 public latrines of which 79 have water a few hours each day. All these facilities will be supplied with water from the improved system on a twenty-four hour a day basis. This will assist in properly disposing of excreta within the city.

Another need of water for proper sanitation is bathing. The proposed improvements will include the construction of ten new public baths. This is admittedly an experimental program to see how the public baths are accepted in the community. Public baths have been proposed for several cities in Indonesia, but as yet none have been constructed. Three questions arise wherever public baths are proposed. First, will they be acceptable to the people; second, how are they to be operated and who is to operate them; and third, should there be a charge for the use of the public baths? Initially, it is proposed that the Surakarta Water Enterprise operate the baths. At present, they are operating the public latrines and this would just be an expansion of their present responsibilities. It may be that the city will later transfer the responsibility for the latrines and public baths to the city's health department or perhaps the city's department of public works.

To be effective, a potable water system should serve as much of the population as possible. To attempt to do this several design features have been incorporated into the proposed project. (1) The present no new service connections policy for industrial, commercial, and residential consumers will be continued until alternate, additional sources of water are located, (2) Up to 13,000 yard hydrants will be installed in the most congested kampongs as a low cost alternative to contaminated wells, (3) Up to 200 public faucets and ten public bathhouses will be constructed, and (4) The present 147 latrines will be rehabilitated and supplied with water 24 hours a day.

To obtain maximum health benefits, a water supply project should be accompanied by a health education and personal hygiene campaign and the consumer should be encouraged to use potable water for all purposes related to health such as drinking, food preparation, bathing, etc. To attempt to do this two proposals are being discussed with the GOI. First, the Director of the Surakarta Health Department, Dr. Rohali has expressed interest in both a health education campaign and the possibilities of a paramedical health unit attached to each bathhouse. It is envisioned that these units would be an extra stall manned by a healthworker who would dispense health and sanitation literature, soap, eye and skin ointments, diarrhea, cold and headache pills, etc., to the very poor and destitute people

on the city's social register. He has agreed to request personnel and funds for these two programs in his annual budget requests a year prior to project completion. This understanding will be written into the loan agreement as a covenant. Secondly, discussions are being held with the GOI in an attempt to lower the cost of water to the poor from the public faucets. The GOI is very interested with the concept in principle, but the administrative mechanism has not been worked out as yet. See discussion of water use from public faucets, Annex B-2.

Part III

B. Engineering Analysis

1. Potable Water Source

Although the City of Surakarta is on the upper reaches of the Solo River, the longest river on Java, the river is not a reliable source of water for it has in recent times gone dry during the dry season. Use of the Solo would require upstream storage or off-stream storage. HH&S did not find any reservoir sites in the vicinity of the city. Any upstream storage would require a dam, a pipeline longer than the proposed new transmission main, and a water treatment plant, and can be ruled out as being more costly than using the Cokrotulung Spring. HH&S ruled out off-stream storage due to the large quantity of water which would have to be stored which would make this approach too costly. The one possible competitive source found by HH&S was groundwater. Although there are good indications that groundwater is present, and very likely in adequate quantities and quality to meet the city's present needs, this source remains unprove. Even assuming that groundwater is present, HH&S determined that the Cokrotulung Spring provided a more economical solution for the additional 150 liters per second. Annex B-2 has updated this analysis using the present additional allotment of 250 liters per second and the Consultant's cost data. The result remains as found by HH&S, that Cokrotulung Spring is the most economical source for additional water supply for the City of Surakarta.

This spring flows at an almost constant rate of 1,500 liters per second and is the source of practically all water for the present municipal distribution system. The Governor of Central Java agreed at the time of the Humphrey's study that the city could have an additional 150 liters per second from the spring. During design of the present project, the Governor agreed orally to increase the allotment to the city by an additional 100 liters per second for a total allotment of 400 liters per second. The Governor's formal approval in writing is expected shortly. If a copy is not furnished USAID prior to signing of the loan agreement, it will be included as a condition precedent to disbursement of any funds under the proposed loan. See Part IV D.

2. Water Quality

It was determined by substantive testing under the Humphrey study, that the quality of water from Cokrotulung Spring is excellent physically, chemically, and bacteriologically. The consultant also concurs that no treatment is necessary to make this water potable. But the consultant has recommended that the water be chlorinated, in order to provide protection against possible contamination which may

the
enter/transmission and distribution system. The practice recommended is one of safeguarding the system and its customers and should be followed.

3. Water Intake Structures

The original intake structure, which will remain to serve the old transmission main, is constructed over the principal area where the spring bubbles from the ground. This water is retained within the structure and feeds directly into the inlet to the transmission main with the overflow going out into a stone-pitched pool of crystal clear spring water surrounding the structure. In anticipation of the construction of the new transmission main, Cipta Karya has designed and constructed a new intake structure to feed the new transmission main. This structure is within the same pool of water over another area where the pure spring water bubbles forth from beneath the ground. The new main will be fed from this structure so that no additional intake facilities will be required for this project. The water level within the pool is maintained by removable wooden weir boards. The excess flow of the Spring drains almost immediately into the Pusur River, a tributary of the Solo River.

The original pipeline went from the intake structure across the Kali Pusur to a grit chamber. This structure was installed to remove any possible sand or grit which came from the spring into the pipeline. Experience has shown that this operation is not required as the water from the spring is free from sand and grit. On the basis of this past experience, a grit chamber will not be installed on the new transmission main.

During the last year, the Kali Pusur has eroded the area where the existing pipeline crosses causing the pipeline to break. This section has been replaced and Cipta Karya has taken steps to protect the area against further erosion. The consultant has also recommended construction of additional works to protect against further damage from erosion. The consultants recommendations are currently undergoing review by the Cipta Karya and USAID. If agreement is not reached on a program to protect both the existing transmission and the new transmission main against possibility of damage due to further erosion of the stream bed of the Kali Pusur including assurance of GOI funding by the time the proposed loan agreement is signed, such a program will become a condition precedent to disbursement. See project issues.

4. Transmission Main

a. Existing Main

The existing gravity transmission main constructed in 1929 runs from Cokrotulung Springs (elevation 208.1 meters) to Jebres Resevoir (high water level of 115.5 meters) by way of the Kartosuro break pressure

Tank (HWL of 149.0 meters). The main is constructed of 400 to 450 mm (15.75 to 17.72 in) steel pipe with lead joints. The pipe is protected externally with a jute reinforced coating but despite this precaution, the pipe has shown some damage due to external corrosion. The consultant has found some of the soil along the pipeline route aggressive towards steel. In 1952 a short section of about 36 meters of this main within the city required replacement because of such corrosion. In 1971 a further section of about one kilometer in the same area was replaced by concrete-lined ductile iron pipe. Clearly this main will be subject to ever increasing trouble. Once the proposed new main is installed, and better still if ground water is found, some flexibility will exist to shut down the old main long enough for a major overhaul.

b. Proposed new main

The proposed new gravity main has been designed to carry 250 liters per second and will also go from Cokrotulung Spring to Kartosuro and then onto Jebres Reservoir. The route was selected by the consultant after analyzing several possible alternatives. It is approximately the same route as proposed by Howard Humprey & Son and it has been approved by Cipta Karya. This route has been determined to be more economical than following the route of the existing pipeline. Environmental effects, were also considered. See item 10 below and Annex C. The Consultant attempted to keep the two pipes separated wherever possible to assure that a possible rupture in one would not cause both mains to go out of service which would cut the city out of water.

Ductile iron pipe has been recommeded by the consultant as the most suitable material for the new transmission main. The consultant has investigated and is familiar with various materials. Cast Iron was ruled out for it would be more costly because of freight, have less strength, and be more difficult to handle due to weight than ductile iron which possesses the corrosion resistant properties of Cast Iron. Steel has been ruled out due to the anticipated problems in providing an external protection for the pipe. It is felt that, with the handling the pipe would receive during shipping, the integrity of any coating would cease to exist before it arrived at the job site. Installation of a protective coating as placed would require expatriate supervision and most likely technicians, and equipment would have to be imported to wrap the pipe. The soil was found to be too corrosive for a simple coal tar enamel external coating. Further, if the greatest pipe life is to be obtained from a steel main, it should be concrete lined. If this were done at the factory, it is anticipated that the lining would be damaged during shipping. It is doubtful that backfilling during installation could be economically controlled to assure that excessive deflection did not occur. This could cause damage to factory

placed concrete lining. There is no equipment in-country which can line the steel pipe in-place, a better practice for this type of line. Steel has therefore been ruled out. Asbestos cement (AC) pipe does not offer the safety and security desired in a major pipeline as here being constructed. The sizes required are not available in-country. The cost delivered in Indonesia of asbestos cement water pipe is comparable to that for ductile iron pipe. The lack of significant cost savings attributable to AC pipe, the greater strength and reliability of ductile iron, and the longer life of ductile iron support the selection of ductile iron pipe over AC pipe. Prestressed concrete pipe manufacturers have indicated that the proposed project is too small for them to import a plant and manufacture pipe. Weight would cause shipping costs to be excessive for importation of this pipe making it more costly than other materials.

Plans have been prepared for the new transmission main but have not yet been formally approved by Cipta Karya of USAID. Formal approval will of course be required prior to the ordering of any materials for the new transmission main.

5. Storage

In 1929, when the transmission main was laid from Cokrotulung Spring to the city, Jebres Reservoir was constructed. It is a covered concrete structure and has a capacity of 2700 m^3 (0.7 million gallons) with a top water elevation of 115.5 meters above sea level and a bottom water level of 111.5 meters. This reservoir was designed with an inlet and outlet pipework so arranged as to permit a self regulating "floating storage system". Because of the present high demand for water it is not being operated in this manner. However, an attempt is made to fill it once a week.

On the recommendation of Howard Humprey and Sons, Cipta Karya has constructed a new reservoir adjacent to the present break pressure tank at Kartosuro with a capacity of 4,679 m^3 (1.24 million gallons). This reservoir will be placed in service when the new transmission main is installed and will provide additional flexibility in the operation of the water system.

The project includes the necessary fittings to connect the new Kartosuro Reservoir to the new transmission main and the installation of appropriate metering devices at Kartosuro Reservoir and the replacement of inoperative metering devices at the old Jebres Reservoir.

6. Distribution System

The distribution system which is fed directly from the trunk main covers the older part of town and includes about 106 kilometers of pipeline with diameters varying from 150 mm to 60 mm. See map

ANNEX B-2

Almost all the existing pipes in the distribution system are believed to be made of cast iron with lead joints. Both HH&S and the consultant found them to be in generally good condition and determined that there was considerable life left in these pipes which were examined. In 1972, approximately 35 km of the distribution piping were lined with cement under a New Zealand air project. This should have increased the integrity of the system in some areas. However, it has not been possible to establish positively the design pressure of this pipework. HH&S estimated that the present wall thickness is approximately 75% of Class A British Standard Pipe which has a maximum test pressure at site of 61 meters (86.6 psi) or a factory test pressure of 92 meters (130.6 psi). With these test pressures it appears that it would be undesirable to increase the distribution pressure in the city system above fifty to sixty psi. Present system designs have been prepared with this fact in mind.

While it would be optimal to construct a distribution system which would provide high pressure at the most remote part of the piping network, every hour of every day, regardless of the demands, such a system is substantially more expensive to build than one in which lower (but safe) pressure at the extremities of the piping is tolerated. The Surakarta water system is designed for this lower but acceptable pressure. Basically,the system will permit adequate pressure for all two-story buildings in the city. For higher elevations pumping will be required.

The lower elevation of the city is in the range of 85 meters above sea level. The maximum static pressure from Kartosuro Reservoir is approximately 92 psi in the present distribution system. If such pressures do in fact come to exist in the low usage periods of the night, considerable damage could be caused to the older pipes in the system. Normal operation and water usage is expected to keep the pressure considerably below this level, with Jebres Reservoir providing the hydraulic control for the system. The maximum static pressure fromJebres Reservoir is anticipated to be under fifty pounds per square inch. There appears to be no justification to install pipes capable of providing service pressures greater than 100 psi.

The design choice for distribution pipe material should be made on the overall cost comparison between the materials suitable for the pipe function. With the opening of a new joint venture, both plastic and asbestos cement pipe will be available in suitable quality and quantity in Indonesia by July of this year. Since it is felt that production of pipe and other water-works material in Indonesia should be encouraged and since the cost of locally produced plastic or asbestos cement pipe is anticipated to be less than imported pipe, it is proposed that all distribution piping, except that required for bridge crossings of water courses bemade from one of these two

materials. The locally produced plastic pipes are of good quality, made to international standards with slip-on rubber gasketed joints. The asbestos cement pipe also will be manufactured to international standards by a well known and respected firm, the James Hardie Company of Australia which has entered into a joint venture at a site located west of Jakarta. They plan to pressure test each length of pipe produced and to conduct distructive testson 2% of production. Since this firm will be manufacturing pipe to international standards and not to American standards, compatible fittings and valves will not be available from the United States. P.T. James Hardie Indonesia has been working with local foundries, assisting them in setting up to produce pipe fittings. They also intend to monitor production to assure quality. Valves will have to be imported. Compatible valves are available from Code 941 countries within Southeast Asia.

Asbestos cement pipe does require proper installation or breakage due to beam failure will occur. Imported asbestos cement pipe has been installed successfully in Indonesia, however, to assure proper installation procedures, competent technical assistance will be provided by the Consultant and supplemented by the pipe manufacturer. Installation will be under the inspection of personnel from Cipta Karya with assistance from the city and from the Consultant. It is expected that the GOI will purchase all locally produced pipe as part of their contribution to the project. See part III. c.

7. Service Connections

It is known that many of the services to houses are in need of being replaced. Existing services observed by Howard Humphreys & Sons and the Consultant were noticed to have deteriorated. Most services are galvanized pipe and have been in place for many years. Repairs have been made by wrapping with rubber and placing mortar around the patch. When the new transmission main is placed in service, the increased pressures in the system are expected to rupture many of these repairs. It is expected that, upon inspection, it will be found advisable to replace the service piping rather than repair a badly deteriorated service pipe. Material for these repairs and replacements are included in the project.

The additional water to be supplied by the new transmission main will enable the installation of 200 public water faucets, ten public baths and an estimated 13,000 new private yard hydrants. All will require new service piping which is to be provided under this project. Service piping will be plastic tubing manufactured in Indonesia to international standards. This material is satisfactory for use as service piping. Plastic tubing is expected to be purchased

with GOI funds. Service fittings are not manufactured in Indonesia and will be purchased with the proposed loan funds.

8. Water Meters

It is estimated that 1,800 meters need to be replaced on existing services. These meters are old and beyond repair. New meters will also be required for 147 latrines, 200 public faucets, and 10 public baths. Meters will be installed on the 13,000 yard hydrants for installation. This gives a total of 15,157 new meters to be purchased with loan funds.

The present meter testing facilities are inadequate to allow a proper testing program. A new meter test bench will be provided under the loan to enable proper testing of the meters. Other necessary tools, equipment and parts will be purchased to assure that meters can be properly maintained. An experienced meter repair expert is provided for in the training plan to assist for up to three months in the set up of the new meter testing facilities, instruct the meter shop personnel in proper maintenance procedures including keeping meter records, and assist the water enterprise in the initial operation of the new maintenance program. As an alternative the tender for meters might possibly require that the supplier furnish this expertise.

9. Reduction of Leakage

The Consultant has conducted a leakage survey as part of his contract and has located considerable leakage in the system. It was impossible to do a complete survey of the system, which was beyond the scope of his contract responsibilities, for there are areas where the pressure was not sufficient to enable leakage to be detected. The benefits of such a survey in Surakarta are evident in the fact that the consultant found twenty seven leaks which, when combined, accounted for 25.5 liters per second water loss. This is 16.6 percent of the present capacity of the transmission main. These leaks are to be repaired by the Surakarta Water Enterprise. See Annex B-2 for Consultant's Report.

As stated above, pressures throughout the system will be increased when the proposed project is completed. This increased pressure will cause the aged pipes to fail in spots where corrosion has occurred and will rupture some of the leaks which have been repaired using bands of rubber and home made steel holding bands. This increased leakage will

be particularly evident at the service connection and should occur almost immediately after the new facilities are put in service. Since much of this leakage will not be detectable by surface observation, a continuing program of leakage detection is a necessity. This increased leakage could consume a major portion of the increased supply if the leaks are not promptly detected and properly repaired.

Cipta Karya will turn over to the Water Enterprise the leakage detection equipment purchased under the design contract and the city will continue a leakage detection program with the personnel trained by the Consultant during the current design contract. If USAID is not satisfied with the efforts of the GOI to initiate a leak detection and repairs program by the signing of loan agreement a condition precedent to disbursement will be include to obtain such a program.

10. Environmental Assessment

Since the primary purpose of the project is to increase the potable water supply for Surakarta, the project is expected to have a favorable environmental impact on the city's residents. A detailed discussion of the environmental considerations is presented in Annex C.

The most significant contribution of this project to the environmental well being of the people will be the expected improvements in health and sanitation including gradual reduction of the high incidence rate of water-borne diseases in the areas served by the improved water system. The health benefits are discussed in Part II B, Part III A and Annex B 1.

Environmental concerns for the short term are directed to possible damage or inconvenience caused during the construction phase of the project. The consultant has been instructed to provide for proper control of construction and detrimental effects to the city's environment should be insignificant and of short duration.

The longer term concerns are related to the integral relationship of water systems and waste water disposal including the use of public water facilities. In siting the facilities, care is being taken to insure that there is adequate drainage. In addition, the city is moving forward with drainage projects primarily in agreement with the recommendations contained in the report of Howard Humphreys and Sons.

It is concluded that the project as proposed will enhance the environment of Surakarta.

11. Summary Conclusion and 611(a)(b) Finding

The pre-feasibility report of HH&S as prepared in December 1971 is the basis for the project to be financed by the proposed loan. The present consultant, BM/TA, has completed construction plans for the proposed transmission main and distribution system improvements, and a scope of work for the investigation of the groundwater potential in and around Surakarta.

The USAID has reviewed the cost estimates and considers them as being reasonably firm estimates of the cost of the proposed project and of the cost to the U.S. Government, after sufficient allowance for inflation was added. The maximum cost of the proposed project to the U.S. Government is set at the amount of the proposed loan with any overruns being the sole responsibility of the Government of Indonesia.

Cipta Karya and USAID will approve all construction plans, specifications and bidding documents prior to commencement of any construction to be funded under the proposed loan.

The internal rate of return, based on cost estimates and numbers of service connections used in this PP, is estimated at 19%.

The USAID concludes that the project is technically sound as presented herein, that adequate engineering, financial, and other plans have been made to carry out this project, that a reasonably firm estimate of the cost to the U.S. Government has been made and that a computation of benefits and costs has been made. Therefore, Section 611(a) and (b) have been met.

PART III

C. FINANCIAL ANALYSIS

1. Alternative Sources of Financing

This project is part of the U.S. Government contribution to the IGGI non-food assistance to Indonesia through GOI fiscal year 1976-77. The GOI has specifically requested AID assistance for this health project. See Annex H. Alternative financing is not now available from other donors. Exim Bank has expressed no interest in financing this project.

2. Financial Requirements - Project Costs

The Summary Cost Estimate table I shows the AID loan of $6,800,000 financing 64% and the GOI contribution of the equivalent of $3,800,000 financing 36% of the total project costs of $10,600,000. All of the AID loan would be used for foreign exchange costs except $368,000 which would be converted to local currency for payment to Indonesian consulting firms for service performed concerning the proposed impact study and the ground water study.

Materials and equipment costs are based on 1975 prices, provisions are made for contingencies and inflation. An allowance for contingencies and inflation is built into each of the major cost items for services.

Tables II and III set forth the estimated schedule of disbursements for US dollar costs and local currency respectively.

3. Arrangement for Provision of Funds

The term of this loan to the GOI will be forty years with a ten year grace period. Interest during the grace period will be at two percent per year and there after at three percent per year. Principal and interest will be payable in U.S. dollars in level semi-annual installments.

Local currency, with the exception of the equivalent of US$368,000 for the impact study and the ground water study, will be made available to the Cipta Karya for implementation of this project. USAID/Indonesia will convert US$368,000 to local currency for payment of the costs of these studies which will be performed by an Indonesian firms. Direct Reimbursement Authority will be required to accomplish this type of disbursement.

4. Financial Viability of Water Authority

a. Water Rates

Water rates which are now in effect should remain as established until such time as improved service is operational. Benefits to the existing consumer should be realized in CY 1981 at which time new services will be extended to consumers utilizing yard hydrants as well as expanded service to public bathhouses, public faucets and public latrines.

Effective January 1, 1981 water rate tariffs must be revised to include the new customers as well as existing and be established at levels to reflect the consumers ability to pay for the costs of the service with a requirement to generate adequate revenues to provide for a) O&M expenses, b) taxes or tax equivalents, c) capital improvements funded from revenues and d) debt service.

Proposed rates establish a monthly charge plus a base rate for normal water consumption by four catagories of customers e.g. social, residential, commercial and industrial. The proposed water rates for CY 1981, 1982 and 1983 must be in effect to generate adequate revenue to assure financial viability of the Water Authority. Effective January 1, 1984, through the life of the second step loan from the GOI to the Water Authority, the monthly charge must be increased ten percent per year and the water rates must be increased seven percent per year. See Annex B.4 for Consultant's preliminary findings and recommendations regarding present and future water rates in Surakarta.

b. Revenue and Expenditures

Table IV sets forth the projected revenues and expenditures of the Water Authority for the period CY 1977 through 1988.

i. Revenues

Revenue generation is based on the proposed rates as discussed above with all revenues obtained from the sale of water and related services.

ii. Expenditures

Labor Costs

Labor costs are based on a wage survey conducted in the area. These costs have been escalated 10% per year through CY 1988. With the expansion of the plant additional employees will be required, this has been considered in projection of these costs.

Material, Electricity & Chemical Costs

The consultant, Burns and McDonnell, has prepared these cost estimates based on plant requirements through CY 1988.

Minor Capital Improvements

Costs are based on $20,000 per annum escalated at 10% per year. Minor capital improvements will not be capitalized.

Depreciation

Depreciation is computed on a straight line basis during the useful life of the assets.

Debt Service

The second step loan to the Water Authority will be on the terms as described under item 5 below. Costs are based on the equivalent of a US$6 million loan with an effective date of January 1, 1977.

iii. Net Income

The assets of the Surakarta Water Works, as presently structured and organized, consists of property only. Upon creation of the Surakarta Water Authority it will acquire all assets and operate on revenues generated from the sale of water and related services. Table IV reflects net losses for CY 1977 through 1979. The losses are because of depreciation during these years. From a cash flow projection the Authority can continue to function. The loss carry forward should be applied to the net income generated in CY 1980 prior to distribution of net income as stipulated in the Surakarta Second Level Region Major Decree No. 33/Kep/B.4/1976 dated February 16, 1976. Starting with CY 1980 revenues are more than adequate to provide for all costs including debt service which start in CY 1983.

5. Second Step Loan

The GOI through the Directorate General of Housing, Building, Planning and Urban Development (Cipta Karya) will lend to the Surakarta Municipal Water Enterprise an amount in Rupiah equivalent to be an estimated US dollar six (6) million (computed at a rate of exchange of US$1 equals Rp. 415) in exchange for the transfer to the Enterprise

of all physical assets after completion of the AID financed project as described under Part II of this paper above.

The structure of this second step Loan Agreement shall be similar to that used by the GOI and the cities having water supply projects funded with assistance from the World Bank. A copy of such a sample loan agreement can be found in Annex B.4 of this paper.

Principal Amount of the Loan

The principal amount of the loan is estimated to be the equivalent of US dollar six million.

Repayment of the Loan

The Enterprise shall repay in Rupiah the principal amount of the loan in forty-eight (48) equal semi-annual installments of principal and interest combined; the first payment shall be made on January 1, 1983.

Interest

The loan shall bear interest at the rate of nine percent (9%) on the principal amount of the loan outstanding from time to time after January 1, 1983.

Payment Dates

Payment of principal and interest on the loan shall be made on January 1st and June 30th of each year during the repayment period of the loan.

Audits

At the end of each fiscal year the SWT will have its accounts and financial statements (balance sheets, statement of income and expenses and other related statements) for the year audited in accordance with appropriate auditing principles consistently applied, by independent auditors acceptable to the central government of Indonesia. As soon as available but in any case not later than six months after the end of each year, certified copies of its financial

Table II
SURAKARTA POTABLE WATER
Schedule of Disbursements
Foreign Exchange (US dollars)
(In Thousands)

Description	Project Costs	1977 1st	1977 2nd	1977 3rd	1977 4th	1978 1st	1978 2nd	1978 3rd	1978 4th	1979 1st	1979 2nd	1979 3rd	1979 4th	1980 1st	1980 2nd	1980 3rd	1980 4th	1981 1st	1981 2nd	1981 3rd	1981 4th	1982 1st	1982 2nd	1982 3rd	1982 4th	Total
Transmission	3218					3218																				3218
Distribution System	83					82		1																		83
Service Connections	1003					85								437				481								1003
Tools & Equipment	105					85							20													105
Sub-Total	4409					3470		1					20	437				481								4409
Engineering Services	427	42	32	32	26	26	26	59	26	26	26	33	26	26	21											427
Training	140					10	10	20	20	30	30	10	10													140
Ground Water Study	364		50	50	50	75	75	50	14																	364
Impact Study	150								40		15		15		20		20		30	10						150
Sub-Total	5490	42	82	82	76	3581	111	130	100	56	71	43	71	463	41		20	481	30	10						5490
Contingencies	441					347		1					2	44				47								441
Sub-Total	5931	42	82	82	76	3928	111	131	100	56	71	43	73	507	41		20	528	30	10						5931
Inflation	864					521							6	140				197								864
Total	6795	42	82	82	76	4449	111	131	100	56	71	43	79	647	41		20	725	30	10						6795

statements for the year and the report of the audit by the auditors of such scope and in such detail as the central government of Indonesia will have specified will be furnished to the central government of Indonesia and to USAID. The SWE will further agree to furnish to the central government of Indonesia and to the USAID such other information concerning its accounts and financial statements and the audit thereof as such Party shall from time to time reasonably request.

6. Summary Opinion

Based on the preliminary findings of the Consultant in his management and rate studies, and on the Consultant's plans and cost estimates, it is concluded that the AID loan and GOI contribution will be adequate to finance the project as described herein and that the Surakarta Water Enterprise will generate enough revenue to be able to repay its loan to the GOI and operate and maintain the new integrated system.

Table III
SURAKARTA POTABLE WATER
Schedule of Disbursements
Local Currency
(In Thousand/Equivalent US Dollars)

Description	GOI Costs	1977 1st	1977 2nd	1977 3rd	1977 4th	1978 1st	1978 2nd	1978 3rd	1978 4th	1979 1st	1979 2nd	1979 3rd	1979 4th	1980 1st	1980 2nd	1980 3rd	1980 4th	1981 1st	1981 2nd	1981 3rd	1981 4th	1982 1st	1982 2nd	1982 3rd	1982 4th	Total
Transmission Main:																										
In Country Handling	386					386																				386
Installation	400						50	50	50	50	50	50	50	50												400
Distribution System:																										
Asbestos Cement Pipe	469		190				190				89															469
Fittings	121		22				52				17															121
In Country Handling	58		20	10			20				8															58
Installation	268		18	18	19	19	19	19	19	19	29	29	30	30												268
Service Connections:																										
Service Piping	117					7								53				57								117
In Country Handling	111					11								38				62								111
Installation	124						2	2	2	2				10	10	12	12	13	13	13	13	13	7			124
Public Bathhouses	80														20	20	20	20								80
Public Latrines	10															5	5									10
Public Faucets	12														4	4	4									12
Tools & Equipment	12					10							2													12
Engineering Services	113	9	9	9	5	5	5	11	9	9	9	11	9	9	4											113
Training	24					2	2	4	4	4	3	3	2													24
Ground Water Supply	122		10	15	20	25	25	20	7																	122
Contingencies	214		28	3	2	43	33	7	7	7	19	8	8	18	3	4	4	15	1	1	1	1	1			214
Inflation	1152		74	9	7	181	150	35	37	41	118	52	50	123	26	29	31	133	11	12	12	13	8			1152
TOTAL	3793	9	401	64	53	689	548	148	135	132	342	153	151	331	67	74	76	300	25	26	26	27	16			3793

TABLE IV

SURAKARTA POTABLE WATER ENTERPRISE

Revenue/Expenditure Projections CY 1977 thru 1988

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Revenue	154248	154248	15424	518160	781260	1011960	1234272	1316316	1411512	1513680	1623336	1741032
Expenditures												
Operations & Maintenance												
Labor Costs	53002	58265	64280	90120	104241	120338	138554	159036	174650	192000	211200	232200
Material Costs	26106	28717	31590	78393	98506	124048	155550	194699	233639	280675	331196	390812
Electricity & Chemical Costs	-	-	-	30330	34880	40110	46128	53046	61002	70152	82780	97680
Other Costs	630	660	690	725	761	800	840	882	925	970	1150	1350
Minor Capital Improvements	20000	22000	24200	266?0	2? 282	32210	35431	38975	42872	47159	51874	57062
Depreciation	87234	87234	87234	87234	87234	247809	247809	247809	247809	247809	224159	224159
Debt Service							525626	525626	525626	525626	525626	525626
Total Expenditures	186972	196876	207994	313422	354904	565315	1149938	1220073	1286523	1364391	1427985	1528889
Net Income/(loss	(32724)	(42628)	(53746)	204738	426356	446645	84334	96243	124989	149289	195351	212143
Distribution of Net Income Based on Decree 33/Kep/B.4/1976												
Loss Carry Forward				129098								
Regional Development Fund		30%		22692	127907	133994	25300	28873	37497	44787	58065	63643
Regional Budget		25%		18910	106589	111661	21084	24061	31247	37322	48838	53036
Retained By Enterprise (Reserves, Pension Funds & Donations)		45%		34038	191860	200990	37950	43309	56245	67180	87908	95464
Interest Earned					3063	23669	64219	111834	167632	233514	238146	324332

Table I

Summary Cost Estimate and Financial Plan

Description	Loan Funds US Dollars (Thousands)	GOI Rupiah (Millions)	Cost Equivalent US Dollars (Thousands)	Total Project Costs US Dollars (Thousands)
1. Transmission Main	3218	326	786	4004
2. Distribution System	83	380	916	999
3. Service Connections	1003	146	352	1355
4. Public Bathhouses (10)		33	80	80
5. Public Latrines		4	10	10
6. Public Faucets		5	12	12
7. Tools & Equipment	105	5	12	117
Sub-Total	4409	899	2168	6577
8. Engineering Services	427	47	113	540
9. Training	140	10	24	164
10. Ground Water Study	364	51	122	486
11. Impact Study	150	-	-	150
Sub-Total	5490	1007	2427	7917
*Contingencies	441	89	214	655
Sub- Total	5931	1096	2641	8572
Inflation	864	478	1152	2016
Total Costs	6795	1574	3793	10588
% of Total Costs	64.2%		35.8%	

Inflation Factors

Base Year 1975 (US Dollars)

Inflation 1st Quarter 1977	7%
Inflation 1st Quarter 1978	15%
Inflation 4th Quarter 1979	30%
Inflation 1st Quarter 1980	32%
Inflation 1st Quarter 1981	41%
(Rupiah) Inflation Factor	53.41%

* Note: This sum is for the first seven items. Items 8-11 have contingencies included.

PART III

D. ECONOMIC ANALYSIS

The virtual impossibility of carrying out quantitative economic analysis for health, education, or urban water supply projects is well known. Basically the obstacle to analysis of such projects is that, while the costs can be quantified, assigning a quantitative value to the benefits is generally not feasible. The alternative approach that must be followed in most instances is to carry out a least cost analysis. Such an analysis is presented in annex B. 2 and demonstrates that, of the two technically feasible alternatives, utilization of Cokrotulung Spring is economically preferable.

In the case of this project, it is possible to go somewhat beyond the above least cost analysis. The consultant to the project has carried out several economic surveys directed toward ascertaining which income strata are currently being served by the public water system, how this compares with nonusers of public water, and what users and non-users say they would be prepared to pay for a reliable supply of public water. On the basis of these surveys it is possible to make a first approximation of a quantitative analysis of the economic benefits to consumers of the proposed project. See Annex B.6 for the results of the surveys.

In September 1975, the average effective charges per cubic meter of water consumption were as follows:

Residential	Rp/m3	m3 consumed	
A-I	11.3	35,081 m3	
A-II	13.9	90,842	
A-III	17.7	61,168	
A-IV	22.2	9,497	
Sub-total	14.8 (average)	196,588	
Non-residential	27.2 "	65,422	
Total metered sales	17.9 "	262,011	(65%)
Leaks & Losses	0	140,072	(35%)
Total Water production		402,083	(100%)

The consultant surveyed current water users to determine how much existing charges could be increased without resulting in decreased purchases, if a reliable supply of water were available. The results of the surveys are shown as follows:

Percent Increase in Water Rate	Percent of Consumers who would either consume more (if available) or not decrease their water utilization	
	Residential	Non-Residential
300%	-	52%
200%	46%	61%
100%	58%	68%
50%	76%	77%
25%	86%	-

Using the above data for residential consumers and making the not unreasonable assumption that it is the wealthier, higher volume consumers who are prepared to pay most for reliable water supplies, one can calculate that on the average current residential consumers say they would be prepared to accept an increase in their water charge to Rp. 36.7/m3 from the current average of Rp. 14.8/m3. Current non-residential consumers would be prepared to pay Rp. 78.7/m3 versus the current average rate of Rp. 27.2/m3.

The consultant's / survey of the portion of the population not currently connected to the water system indicated that they say they would be prepared to pay the following amounts for a supply of water sufficient for drinking and food washing only (estimated at 15 liters per capita daily).

Percent of Current non-users	Amount prepared to pay monthly
11%	less than Rp. 150
60%	Rp. 150 - 300
16%	Rp. 300 - 500
10%	Rp. 500 - 1,000
3%	above Rp. 1,000
100%	weighted average = Rp. 320

Based on a family size of six, 15/lpcd corresponds to 2.7 m3/mo for a family which yields an estimated rate of Rp. 120/m3.

The above illustrates the relatively high value placed on the initial minimum quantity of water consumed for basic purposes. In fact, all of the above figures probably significantly underestimate the actual value placed on water by the population. For example, it is known that water vendors buy their water at Rp. 250/m3 and retail it at up to Rp. 1,200/m3 to people who have no alternate supply and are purchasing only about 15/lpcd for their basic needs. Recognizing that all of the above figures, except the last, probably understate the value that

people actually place on water, one can arrive at a minimum estimate of the benefits of the proposed water project to consumers by using the above data.

In estimating the benefits of the proposed water system project to new consumers, a rate of Rp. 1,000/m3 was used for the first 15 lpcd for drinking and food washing, and Rp. 36.7/m3 for all new residential consumption above 15 lpcd. The benefits to existing/metered/consumers from additional consumption are also estimated at Rp. 36.7 times additional residential consumption. The rate of Rp. 78.7/m3 estimated above is used for additional non-residential consumption. The additional value of a reliable supply for existing consumption has not been included in the calculation of benefits due to uncertainty regarding the value to be placed on the existing quality of service.

With regard to the quantity and categories of utilization, the following table shows what is projected:

Surakarta Water Usage

	Before Project (1979)	After Project (1982)
1. Domestic Connections (pop. served)	49,680	49,680
Consumption (m3/daily)	6,310	7,450
2. Public Faucets (pop. served)	0	60,000
Consumption (m3/daily)	0	901
3. Yard Hydrants (pop. served)	0	78,000
Consumption (m3/daily)	0	5,178
4. Public Latrines	0	147
Consumption (m3/daily)	0	147
5. Public Bathhouses	0	10
Consumption (m3/daily)	0	120
6. Total Domestic (m3/daily)	6,310	1,795
7. Other Usage (m3/daily)	3,600	4,699
8. Unaccounted for (m3/daily)	3,310	9,792
9. Total (m3/daily)	13,220	28,286

Based on the above projections, the value to consumers of the proposed increase in reliable water supply, as measured by consumer statements is $1.99 million annually. Annual O&M expenses and minor capital improvements are projected at $76,000. Given estimated project costs, this yields an internal rate of return of 19%. If it were possible to assign a quantitative value to the general community benefits, the estimated internal rate of return would be higher. (For example, in the case of health benefits this would be from reduced medical costs and

increased worker productivity.) It is worth noting that the relatively high economic IRR for this project is due to the project's concentration on expanding the number of people receiving water for basic needs. If priority were given to expanding the type of residential connections that now exist with relatively high per capita rates of utilization, the IRR would only be about 10%.

Project Beneficiaries

The consultant carried out income surveys for both users and non-users of public water in Surakarta. He found that the average per capita monthly incomes for user and non-users were Rp. 6,270 and Rp. 3,215 respectively. However, it is believed that there was substantial under-reporting of income in both categories. Indeed, such would appear to be the case since the weighted average income for users and non-users combined is Rp. 3,900 based on the consultant's report while the 1975 Java urban average per capita monthly income is estimated at Rp. 5,600 (43% above the consultant's weighted average income). Although data are not available to enable a fully accurate correction to be made to the consultant's data (presumably the degree of under-reporting varied with level of income), a first approximation can be obtained by increasing all the reported incomes in the consultant's survey by 43%.

If this adjustment to the data is made, it would appear that the bottom 25% of the existing metered residential users of public water come from the bottom 35% of the overall income strata and that the bottom 50% of these water users come from the lower 66% of the overall income distribution. No increase in existing metered residential consumers is expected, although an 18% increase in their total water consumption is projected. The projected 138,000 new customers who will be using yard hydrants and public faucets are considered likely to be representative of the population distribution as a whole. In other words, two-thirds of the new water users will come from the bottom two-thirds of the overall income distribution.

PART III

E. Social Soundness Analysis

1. Socio-cultural Feasibility

(a) Social Landscape

To understand the problems confronting the city of Surakarta, the total environment must be conceptualized. This teaming city is situated in about the center of the most densely populated island in the world. The island of Java is about the same size as the state of New York but contains roughly 90 million people. The great pressure on the agricultural lands to support this mass has brought even greater pressure on the cities to house, clothe, feed, wash, employ and maintain order among its inhabitants. The 1930 census of Surakarta showed a population of 163,000. Since then much of the population increase has been due to the tremendous influx of the rural poor and their offspring who have been squeezed off the farms in the overpopulated surrounding countryside. They have fled to the city like lemmings seeking food, shelter, clothing and employment but possessing none of the skills required to successfully compete for these scarce commodities.

The casual visitor to Surakarta sees wide streets, and many modern buildings with stores and movie houses full of clean looking, well-dressed, presumably well fed people who appear to have money to spend. In the center of town is the residence of the former Sultans and the Museum full of the relics of a rich cultural heritage. On the outskirts of town are several large factories, textile, cigarette, jute, food processing etc. But if the visitor wanders behind the storefronts into the kampongs, a different world is revealed. Here are the shanty towns inhabited by squatters, living in squalor, six people per one-room shack, underfed, undernourished, with latrines, laundry and bath facilities all in close proximity to kitchens and shallow wells. An analysis of the 51 sub-districts of the city show 15 with population densities greater than 100 people per hectare, 24 with densities greater than 200 per hectare and one with a density of 427 people/ha. Other cities in the world might approach these densities but only with the provision of high rise, low income housing which is non-existent in Surakarta. See map Annex B 6 showing population density and location of areas having contaminated wells.

Finally at the very bottom of the social scene are the homeless people of the street. These are the people we would really rather not think about, the blind, the deformed, the diseased, all dirty, hungry, wretched beggars. But they are people just the same, people of both sexes and all ages and they desperately need help.

(b) Description of Target Group

The primary beneficiaries of the proposed project will be the present users of the municipal water supply system and those who will use the additional water supplied. Obviously since the present system supplies only 10% of the city's inhabitants the present customers must be in the upper social/economic strata. But who are they? Where are they? Most importantly, how can the project reach the lower and lowest social/economic layers of the city? Both Howard Humpreys and Sons and the present consultant have analyzed this target group through an examination of the records of the municipal water utility and through surveys. The latest surveys of both present and potential users of the system conducted in the fall of 1975 by the consultant are compiled in Annex B 6.

Present Domestic Consumers

The present users of the system can be divided into domestic and non-domestic users. Of 7,877 total connections in September of 1975, 7,213 or 92% were residential. These domestic consumers used a total of 196,588 m3 or 75% of the total volume of water sold that month.

In order to obtain a profile of these domestic consumers, the consultant picked 390 names of customers at random from the recorded list of the Surakarta water department. The water department divides its residential customers into four categories based upon type of housing with A 1 being the least affluent up to A IV the most affluent, so the consultant's sample was also picked proportionally to the number of customers in each rate classification. These costumers were interviewed by some 20 University students who were trained and supervised by the consultant. As can be seen in Table 3 of Annex B 6 nearly half of the domestic consumers (48.1%) surveyed were engaged in commerce and trade. A look at their names reveal that approximately 35% of this group are ethnic Chinese. The next largest group of domestic consumers surveyed (25.7%) were involved in the service industries. Of this group, those who worked for the Government which includes civil servants, teachers, military and police comprised 12% of the total samples in the survey. This group and the rest of the customers are predominantly ethnic Indonesians of whom 90% are thought to be Moslem. The next largest group are the pensioners (or retired people). Ten percent of the total domestic consumers surveyed indicated that they were receiving pensions. Finally of less significance numerically are the workers in the manufacturing industries (8.3%). The workers in construction, telecommunication, transportation (4.6%) and all others including "no response obtained" (3.3%). The survey found that the average number of persons who reside in a household connected to the city water system is 6.8. This figure appears to be rather high compared to the average number of household members per

dwelling for the city as a whole. This may be explained by the presence of domestic servants and the live-in employees of the shopkeepers. The survey shows a median reported monthly income per household of the domestic water users to be Rp.30,400. That is, half of the respondents reportedly earned less than Rp.30,000 per month and the other half earned more. The reported mode income was Rp.15,000 - Rp.25,000. About 23% of the total respondents reported a monthly income falling within this range. It is felt that the above median and mode income figures are downward-biased. It is a well known fact that people are inclined to give lower income figures than is true, especially to government conducted surveyors. This fact was borne out in the survey in that the proportion of respondents who refused to give more data to the interviewers rose steadily and rather sharply as their obvious level of income increased. The pattern of personal income distribution for the domestic users of city water is best shown on a Lorenz curve. This curve (see Annex B 6) shows that the distribution of income even among this rather affluent group is very unequal. The fact that the mean (average) income of Rp.42,646 is substantially higher than the median is another indication of rather unequal distribution.

Present Non-Domestic Consumers

There are five classifications of present non-domestic city water users. They are:

1. class B, entertainment and recreation
2. class C, business enterprises
3. class D, government and private offices
4. class E, social institutions such as hospitals, schools, etc.
5. class F, religious institutions

There were 664 of these non-domestic service connections in September 1975, or 8% of the total present customers. Together they consumed 65,424 m3 or 25% of the water sold that month. The consultant picked 82 or 13% of these customers at random and in proportion to the total number of customers in each classification. It is estimated from the survey of these users that the average number of employees per non-domestic connection was 61 workers. This figure is, however, distorted by one unusually large state plantation which employs 1,800 workers. If this sample is excluded from the survey, the average number of workers employed by the non-domestic water users is 39. The total number of employees served by the non-domestic connections is estimated to be 27,666. (664 x 39 + 1,800) = 27,666.

Present non-users of the Municipal Water System

The consultant visited all 51 administrative subdistricts of Surakarta and chose random samples from the register books. A total of 889 interviews with non-users of the public water system were conducted by 20 college students over a period of twelve days. The occupational composition of Surakarta residents who do not have water service connections is quite different from that of the domestic water users. The proportion of population in this group who are engaged in trade and commerce (15.2%) is substantially lower than that of domestic consumers (48.1%). Secondly, a higher proportion of non-users (45.0%) is employed in service related jobs, as compared to domestic consumers (25.7%). This difference can be explained by the fact that a large number of common laborers is found among non-users of the public water system. Thirdly, a proportionally larger number of non-users work in manufacturing industries, the textile industry in particular. This implies that many of the non-domestic consumers do not have water connections at home. Forthly,a substantially higher proportion of non-users is found among workers in the construction, telecommunication and transportation industries. Finally, 14.7% of non-users are either retired or unemployed, as compared to 11.6% of the domestic consumers.

The survey indicated that on the average (mean) 5.9 people reside in each household not connected to the city water system. The median monthly income per household of the non-users was reported at Rp.13,660 far short of the median income reported for the domestic water consumers. The monthly mean income of the non-users was Rp.18,970. About one third of the non-users earn less than Rp.10,000 per month. The pattern of personal income distribution is depicted in the Lorenz curve. From the shape of the curve it is readily apparent that there is considerable inequality of income distribution among the non-users of public water in the city of Surakarta. The Lorenz curve and a table showing the occupational profile of the non-users of public water in the city are found in Annex B 6. The proposed project expects to reach 13,000 x 6 = 78,000 of these people through the installation of yard hydrants.

The consultants survey of non-users was based upon residence registration records so that only people living in legally constructed dwellings were interviewed. Unfortunately this method did not reach the lowest income families living in illegal, squatter shacks or the people of the street. The proposed Health, Social and Economic Impact Study will have to gather base data and evaluate the impact of the project on these people. It is expected that the project will reach about 60,000 of these people through the installation of public faucets plus many thousands more will use the bath-houses and latrines.

In summary the target group is the 49,860 present domestic consumers plus the approximate 27,660 employees of the present non-domestic consumers plus the estimated 78,000 people who will be served by yard hydrants plus the estimated 60,000 who will use the public faucets plus many more who will use the public bathhouses and latrines. Eliminating the employees, many of whom do not have connections at home, the total number of beneficiaries will be at least 187,860 people or 35 percent of the projected 1982 population.

(c) The Target Group's Perception of the Problem and the Project's Benefits

The survey of present domestic customers found that 76% were in one way or another irritated by the irregular, intermittent flow of water throughout the day. At least 10% of these domestic users had complaints relating to their water, 5% reported water leakage in the water system within the house and 2% reported that even though they have a service connection, they do not receive water at all. While 47% stated that they receive enough water, the balance expressed a desire to obtain more water. According to the consultant's estimate the domestic consumers as a whole wish to consume 54,000 m^3 per month more water than what they are currently using. This amounts to 28% of the current water sold them. The survey of the non-domestic consumers found that 51% reported that they have enough water for their establishment, 33% said they would like to have more water and 10% did not respond to this question. According to the consultants estimate those customers would like to have an additional monthly allotment of 13,737 m^3 or 22% more than they are currently using.

The survey of the non-users found as expected that 85% were dependent upon the shallow wells for water and another 14% relied on their neighbours for water. Those who did not have access to the municipal water were asked if they would like to have a house connection if it was made available. The possibility of a yard hydrant was not mentioned. It was also made clear that there would be an appropriate charge. Not very surprisingly, only 17% of the 889 samples surveyed gave a positive response. The remaining 83% gave negative answers to this question. This low overall expressed demand for house connections is probably due to the fact that most of the houses in the kampongs do not have internal plumbing so that a house connection was perceived as both beyond their requirements and their ability to pay. However, it is noteworthy that even given the lack of internal plumbing and the low income levels, in the very crowded subdistricts having a high concentration of contaminated wells, the positive responses increased, approaching 50% in some areas. Of the domestic non-users who expressed no interest in having piped in potable water, 69% cited as their reason the availability of other sources of water such as a well. They appeared to be reluctant to pay for an additional source of water, even though the public water would be more sanitary and more convenient. The inability to pay was given by another 29% of those interviewed as another reason for the unwillingness to have access to the public water.

When the non-users were asked whether they would be willing to use public hydrants, if they were located near their houses, the responses were generally more enthusiastic. About 33% of the respondents said

they would be inclined to use such facilities and 23% showed an interest in public bath houses. The consultant has made recommendations from his survey on the areas which would most benefit from the installation of public faucets. He was able to calculate the number of potential users of public faucets and the intensity of utilization as measured by the number of potential users of public faucets per hectare of land for each subdistrict.

It appears from the results of the survey that there is a considerable lack of understanding among many of the potential beneficiaries of the proposed project of the value of potable water for better health and improved sanitation. Obviously much work will have to be done in the area of health education if this project is to achieve maximum impact. There will be ample time to carry-out a focused health educated campaign before project completion.

(d) Local Support for the Project

Besides the need for health education cited above, the preliminary findings of the consultant has indicated no evidence of any social, political or religious impediments to the project. On the contrary it is felt that people at all social levels in the city will welcome the project and enthusiastically support it. One of the best indicators of this support is expressed willingness to pay. In the survey of present domestic customers it was found that a 25% water rate increase would have virtually no effect on water consumption. Even given a 100% increase, 58% of the domestic consumers polled indicated they would still use as much or more water than what they consume at present. The consultant felt that at least a 200% increase would be necessary to effect a notable change in the water consumption pattern of these people. The non domestic present customers were even less sensitive to rate increase. Even with a rate increase of 300%, more than half (52%) of the non-domestic users indicated that they would make no change to usage or consume more water if available.

Among non-users, even given their extremely low income, and the perceptions noted above the interviews found some willingness to pay for piped-in water. Among this group 18% of respondents mentioned 0.1% - 1% of family income, 38% of them started 1.1% to 2%, 18% of the respondents would spend 2.1 to 3% and 13% of the respondents would be willing to pay 3.1 to 4% of their monthly family income. Again it should be noted that these are probably understatements. Stated in actual local currency amounts they represent sums below what is required for house connections but not for yard hydrants provided. the connection fee can be eliminated or amortized over a period of several years.

(e) Existence of Groups outside the Target Group who could divert or appropriate the benefits

There are certainly many high income, politically influential people representing themselves or commercial or industrial firms who would like

to use city water. One such group lives in the area designated for new development, the "Modjosongo subdistrict." Fortunately for the project purpose this area is far from the existing distribution system and its average elevation (135 m) would require a pumping system and additional storage. This area has been given high priority for the ground water investigations and the people understand that they will have to wait until such additional sources of water are found.

Another possible group would be the non-domestic non-users particularly the firms and industries not now supplied with city water. It appears that presently almost all medium and large enterprises are non-users. This fact alone indicates that alternate sources have already been developed to satisfy their needs. Of the 159 known business firms who are presently not connected to the city water system, the consultant selected 54 samples distributed among the various categories of industry roughly in proportion to the number of firms in each category. The survey of these firms showed that they had an average of 1.9 wells per firm. Most of these wells are operated by machine pumps and some have a depth of 100 meters or more. Most of the firms did not know how much water they are consuming, but many had installed water storage facilities with an average capacity of 12 m3.

However, 70% of the firms surveyed indicate that they have enough water for their business operation and 30% state otherwise. Most of the latter respondents point out that they are short of water in the dry season of the year. Because of the water shortage, they have had to reduce production and even cancel expansion plans. Even if there is enough water for business uses, the poor quality of well water has caused damage to boiler tanks and lowered the quality of their products. One respondent also complained that his employees sometimes became sick from drinking well water in his factory. For these reasons, most of the firms canvassed (78%) express the desire to have water service connections. However, the high percentage of firms which show interest in water service connections does not assure that they will become industrial water customers when additional potable water is provided. Many of these firms disclose that they intend to use public water only as drinking water. And, only if the cost of public water is lower than water from their wells will, the public water be used for business purposes. Since the investment in wells and pumps is already amortized by these business firms, such cost comparisons will consider only additional operating costs such as utility and fuel expenses plus the repair costs of fixed equipment.

(f) Communication Strategy

The Mayor and the Director of the City Health Department were asked about the problem of communicating to the urban poor the benefits of the proposed project and the methods of teaching these people modern health and sanitation practices that would make the project a success. The Director of the City Health Department stated that they already have an ongoing health education program which teaches selected representatives of the kampongs who return and pass on the information to their neighbours.

He would be willing to expand this program and concentrate the efforts on the areas which will benefit from the project. He also expressed interest in the proposed para-medical units which would be added to the both houses. He thought these might also be used for educational purposes.

These gentlemen listed several other groups besides schools which may be effective conduits of information in Surakarta. Among them were the association of newspaper reporters, "Persatuan Wartawan Indonesia"; the national youth organization, "Komite Negara Pemuda Indonesia"; the local women's club, "Gabungan Organisasi Wanita Surakarta", and the Muslim Educational Group, "Majelis Ulama". In addition the city has an office where poor people go for assistance, "The Badan Koordinasi Yayasan Sosial." This office could be used to reach and teach the really poor and it might for example assist in a program to rehabilitate the latrines.

2. Spread Effects

a. Previous Project design and execution

The consultant, the GOI Cipta Karya Staff and the USAID staff who worked on the design of the proposed project are all very familiar with and interested in the other water supply projects being carried out in other cities of Indonesia with other donor assistance. Several features of the proposed project are being included because they have been successfully introduced in other similar projects. These other projects will continue to be studied carefully as they progress and the lessons learned will be incorporated as much as possible into the Surakarta project.

b. Distribution of Benefits

There is obviously a finite quantity of water to distribute so it will be difficult if not impossible to spread the primary benefits

beyond the immediate recipients of the water. However, the proposed project has been designed as much as possible within practical limits to reduce losses through leak detection, maintenance, system rehabilitation etc., to reduce wastage through a progressive rate structure and to spread this conserved water to the target group specifically to the lower income families, the really poor and the destitute. These design features are spelled out in the project description. See Part II.B. above.

c. The Diffusion of Innovation

Most of the design features of the proposed project have been introduced previously elsewhere in Indonesia. But no other prior project has deliberately declared the intention of specifically using these features to target the urban poor. The degree to which the project purpose is successful will be carefully measured and evaluated as will the impact this project has on the health, social and economic status of the target group. The findings of this impact study will hopefully influence the design of other water supply projects and thus diffuse the innovative techniques.

3. Social Consequences

a. Benefit Incidence

The primary benefits of the proposed project are the health benefits. These have been discussed at great length in part III A above. Most of them are centered around increased productivity of the beneficiaries over longer time periods at reduced cost. It is assumed that the proposed project will have such a significant measurable health impact on the target group. This will be evaluated in the proposed impact study see Annex B.8.

b. The Role of Women

The women of Surakarta will benefit from the proposed project primarily as family members of the present domestic consumers and the urban poor who comprise the target group. They will enjoy the benefits of an increased supply of clean, potable water which will make them and their families healthier. They will also enjoy some incidental conveniences that will lighten their daily chores of washing, bathing and food preparation. It will be to them and through them to their children that the health education program will convey the importance of potable water

as well as general sanitation and nutrition practices. The women will be an important link for it will be up tc them to insure that potable water is utilized in food preparation, for drinking and for other essential things such as personal hygiene.

Women in Surakarta do not make up a major element of the work force. The consultant found in houses connected to the city system that the higher the family income, the less the likelihood that female members participate. The ratio for male to female workers for women of A-I classification is 68:32, for A-II classification 70:30 for A-III 78:22 and for A-IV households 80:20. Humpreys and Son's also point out that births are running at about 8,000 per year so that as many as 40,000 women may be unable to work as a result of either childbirth or having to care for preschool age children. The consultant speculated that the reason for the low number of women in the work force was the high general level of unemployment which means a lack of employment opportunities for many women who therefore have withdrawn into the homes.

However, there will be considerable labor involved in the installation of the transmission main and distribution network. On other public works projects in the area, women represent a large proportion of the labor force. This is generally true throughout Java and it is expected that women will make up a significant percentage of the work force on this project.

There are no indications at this time that women will be in anyway adversely affected by the project.

Part IV. Implementation Planning

A. Analysis of GOI and AID Administrative Arrangements

1. General

The primary responsibility for the execution of construction of the proposed project will be vested in the Directorate of Sanitary Engineering (DSE), one of four directorates in the Cipta Karya (Directorate General of Housing, Planning, Building, and Urban Planning). Cipta Karya, in turn, is one of four Directorates General composing the Ministry of Public Works and Electric Power. All offshore procurement of goods and expatriate consulting services will be constructed for by Cipta Karya. However, in accordance with the standard operational procedures of Cipta Karya, the daily administration and control of project implementation will be delegated to the DSE. The DSE has a regional representative for Central Java located, with staff at Semarang, and a local representative at Surakarta. The local representative, assisted by consultants, will supervise construction and monitor all elements of project implementation under the supervision of the regional representative. The regional representative of the DSE for Central Java, normally is delegated authority to enter into local construction and procurement contracts. But for projects built with foraign aid funds, the DSE in Jakarta retains contracting authority.

Upon completion and acceptance of the project, all works will be transferred to the Surakarta Water Enterprise for operation and maintenance, in accordance with GOI procedures. DSE is presently executing other municipal water supply projects in this manner, including all foreign-donor-assisted projects. See the PRP for a description of other-donor activity.

2. Cipta Karya/DSE

Almost all potable water development projects for the urban areas of Indonesia have been accomplished through the efforts of Cipta Karya with the DSE having responsibility for daily administration and control of implementation. In order to carry out its monitoring and supervisory responsibilities, the DSE presently has thirty-eight fully qualified engineers, holders of Ir. Degree(five-year program), plus thirty-seven graduates of the three-year B.S.E. programs. To support and assist this engineering staff are eleven social science graduates (five Drs., five-year programs; and six B.A., three-year programs), twenty-seven technicians who are graduates of technical high schools, plus secretaries and various other nontechnical employees. The present organization of DSE can be seen in Annex B-2. The regional office of the DSE in Semarang has two sanitary engineers and two civil

engineers, all with Ir. degrees (five-year program), plus five B.S.E. civil engineers and fifteen technical high school graduates, including draftsmen. The Surakarta office has one B.S.E. civil engineer and a small office staff.

The World Bank included in its first Seven Cities Study a National Level Study which made recommendations regarding the organization of the DSE and the training of its staff so that it might more effectively implement water supply projects. The World Bank is continuing to fund in-country training programs for the DSE so that it is not required under this project. It should be mentioned, however, that the regional representative of the DSE in Semarang has recently left for the United States for two months of observational training with Burns & McDonnell Engineering Company, at Kansas City, as part of their consultant services contract and that the Director of the Surakarta Public Works Department who provides engineering assistance to the SWE, will depart this month on a similar trip. In order to further upgrade its staff, the DSE is commencing a program in conjunction with the Bandung Institute of Technology whereby present employees with a B.S.E. degree can upgrade themselves to fully qualified (Ir. degree) engineers. Twenty-four of the present thirty-seven B.S.E.s have been determined eligible for this program, which will extend over the next four years.

During the execution of the proposed project, DSE will assign personnel to Semarang and Surakarta, as necessary, to augment the responsible field staffs. These individuals will report directly to the DSE regional engineer for Central Java. Expatriate engineering assistance for this proposed project has also been provided for in the budget. A procurement **specialist will provide up to six man/months of assistance in the procurement of commodities, and an engineer will be retained for up to 39 man/months to assist in supervision of construction. These will be host-country contractors, working directly for the DSE.**

3. Management Support to Local Water Utilities from Cipta Karya

Instead of a national utility like PLN has become for electricity, the GOI has decided to foster the development of decentralized, semiautonomous local water utilities throughout Indonesia. In keeping with this policy, the GOI has begun converting local city waterworks into independent water enterprises, and to improve the management and operation of these local enterprises. The current program is an outgrowth of the Seven Cities Project which was assisted by the World Bank. Included as part of the Seven Cities Program was an overall national view of the management and organization requirements to meet the potable water needs of Indonesia, and recommendations for management and operational systems for municipal water-works. These recommendations were prepared by SyCip, Gorres, Velayo & Co., in 1973.

The DSE prepared three booklets for use by local waterworks as guides in organization, management, and accounting. These booklets blend the recommendation of SyCip, Gorres, Velayo & Co. with Indonesian practice. The booklets have been used as the text of a series of management seminars which DSE has conducted for water utility management and accounting personnel. With the experience gained from exchanges with local water utility personnel at these seminars, and from assisting in reorganizations of local waterworks, DSE has just completed a revised and expanded guide, "Manual for Implementation of Accounting Systems for Water Enterprises", for use by local water utilities. The booklets and the manual have also been used by the DSE and local waterworks as a guide during reorganization.

The DSE is also conducting an on-the-job training program at selected local water utilities. Under this program, a member of the DSE's staff works with the employees of the selected water utility in installing and implementing the standard operational and management systems and procedures. The Surakarta Water Enterprise is one of the utilities selected for this coming year's program.

A permanent in-service training program for local water utility personnel is anticipated to be implemented by DSE with GOI funding beginning in IFY 1977. A consultant will be hired for a three-year period to assist in developing this ongoing effort. The program is to be concerned initially with increasing management and financial capabilities of staffs of the local water utilities. The management training course is anticipated to include two periods of training. The first would be for a period of approximately three months. At the completion of this session, the employee would each return to his or her own utility where he or she would be expected to utilize the standard methods and procedures taught in the course. After a period back at the utility, the employee would return for a second short session where problems would be discussed and further guidance given.

Two other in-service training courses are being given by the DSE. The first is a course in water treatment, and is primarily for upgrading water treatment plant operators. The second covers operation and maintenance of the distribution system, piping and pumps.

4. Surakarta Water Enterprise

Included in the AID assisted design and consulting services contract for Surakarta was the requirement that the consultant conduct an analysis of the operation and management of the existing water utility and make recommendations for establishing a new semiautonomous Surakarta Water Enterprise in keeping with the national policy as described above. This analysis was conducted during the period September 1975

through May 1976. The report is in the final states of preparation and will be available in July or August of this year. However, USAID has been in close contact with the consultant and was able to discuss the findings and get a rough draft of the final report. These findings are summarized below. An abridged version of the rough draft of the final report is included in Annex B-5. In summary, the consultant found that the Surakarta waterworks was a subordinate unit under the city's Department of Local Revenue. This "Water Supply Division" was not in control of either its revenues or or its expenditures and its budget was subject to modification and approval both by the Director of Local Revenue and the Mayor's office. The waterworks was considered to be a business operated by the City for the purpose of raising revenue to support the City. Unlike most business, however, no financial records were kept. The records available, budgetary records, indicated an apparent lack of understanding of business records. No distinction was made between operating expenses and capital expenditures; surplus and reserves were held in non-interest bearing accounts. The Water Supply Division was relying upon other city departments for billing, collecting, and personnel management.

Consequently, it was concluded by the GOI that an independent water enterprise should be established as a completely self contained and separate entity. In November and December of 1975, the Governor of Central Java issued three policy letters which authorized and encourage the establishment of independent water enterprises within the province. The city of Surakarta is presently completing the necessary actions to establish the Surakarta Water Enterprise. Annex B-5 contains the proposed organization chart for the new independent organization. In anticipation of the reorganization, the waterworks has been restructured as shown on this chart and has assumed complete responsibility for all operation associated with the supply, billing, maintenance, and management of the waterworks. The new organizational structure provides for about a 50% increase in personnel to a total of about 150 employees. Its funds will be kept separate from those of all other organizations. According to standard provisions used by Cipta Karya for SWE second step loan arrangements, the will have its accounts and financial statements for each fiscal year audited, by independent auditors acceptable to the Government. See Part III C above. A decree will be issued soon by the Mayor establishing the new Enterprise. A copy of a proposed decree is included in Annex B-5. If necessary, a condition precedent to disbursement will be included in the loan agreement requesting a statement from Cipta Karya that the Surakarta Water Enterprise has been legally established with separate financial accounts acceptable to the central government for the purposes of executing the second step loan agreement. This statement will be accompanied by official copies of

he decree establishing the utility, an official organization chart and sample blank financial forms which will be used for annual statements.

The consultant's report also includes a section on the present operation and maintenance procedures followed by the Surakarta waterworks. This report reveals several areas of deficiency in leak detection, repair, and maintenance and makes recommendations for improvement including training. The consultant's recommendations as to management systems and operation and maintenance are valid and will be utilized by the enterprise in conjunction with the standard operational systems and procedures developed by the DSE to improve the present organization.

As mentioned above, the DSE will be providing direct assistance to the Surakarta Water Enterprise through its on-the-job assistence program. To be better able to implement these new procedures, both the manager and chief financial officer for the Enterprise have attended the management/financial seminar offered by the DSE. All problems are not solved, but the city's leadership and the Enterprise are working hard to make the Enterprise a viable organization. To assist further in this regard, the proposed project will provide for a management advisor to be available during the time the DSE's staff are assisting the utility in implementing their standard procedures and system. Sufficient funding is included to permit this advisor to make up to two additional trips to review progress and assist in resolving difficulties encountered by the Enterprise in implementing the new organization, systems, and procedures. A total of seven man/months of advisory services are felt to be sufficient. See Training, Part II, B-4. The DSE wishes to utilize its own staff in this area as much as possible and has indicated that the proposed approach is the one they would like to utilize.

5. A.I.D.

No unusual administrative requirements are anticipated. Review of plans and specifications for all construction will require the services of an environmental engineer. A.I.D. has already committed itself to this in the design contract. There will be the normal processing of letters of commitment, contracts, and monitoring of the progress of the project. It is estimated that the project will require up to one quarter of the work schedule of an A.I.D. direct hire staff member during the first three years. Additional support, such as legal and financial, would be provided by USAID staff officers as required.

/(civil or environmental engineer)

B. Implementation Plan

1. General

It is expected that the proposed loan will be authorized by June 30, 1976, that the loan will be signed by the end of October 1976 and that conditions precedent to disbursement will be met by the end of February 1977. During this period USAID and the GOI will work closely together with the consultant to have ready approved final designs, specifications, invitations for bid and a contract acceptable to AID with a U.S. consulting firm for the technical services. The present consultant's contract does not expire until October of this year so there will be ample time to complete all this work. As soon as the conditions precedent are met, the procurement specialist will immediately begin to assist the GOI in the procurement of offshore commodities.

The entire procurement process from time of issuance of IFB's to delivery of materials and equipment is estimated to require one year. Therefore, following the above implementation schedule, construction of the transmission main can commence in April of 1978. Estimates of installation time required for the new main have varied from one to two years depending on the size of the construction crew and the amount of equipment available. For planning purposes USAID has adopted the more conservative estimate of two years.

If the new main is installed by April 1980 new customers can and will be added to the system. Again there is a debate as to how many new yard hydrants can be installed in one year. The most recent comparable project, completed this past April in Denpasar, involved the installation of ten thousand yard hydrants, of which the last seven thousand were installed in one year. USAID feels that there are several factors which would make a slower installation rate seem more reasonable. Our best estimate would be three thousand in 1980, six thousand more in 1981 and the last four thousand in the first six months of calendar year 1982. These would be installed with GOI project funds as shown in Part III.C. The consulting services contract would end with the completion of the main. The groundwater studies would be completed by 1979. The impact study would be completed by July of 1982 and all other expenditures of loan funds would be made well before the PDD of October 1982. See Implementation chart Annex B 2 and PERT Network chart Annex E.

Construction of the new distribution main is independent of the transmission main and does not require major procurement of foreign material except valves (see Part II. B.4 and Part III. B.6 above). It is anticipated that

materials for the distribution system will be ordered shortly after the DSE receives authorization to make expenditures from next year's budget and that construction should also be completed around April of 1980. Therefore, both systems will be constructed simultaneously. A delay in the completion of one of the systems would not affect progress on the other.

Management and meter maintenance programs are also independent of the system improvements. These programs will commence during the early stages of the project and will be completed prior to completion of construction.

2. Construction

The Government of Indonesia utilizes a system of prequalification for construction contractors. When it is desired to award a contract for construction, four or more prequalified contractors are requested to bid on the proposed work. After submission of closed bids, the awarding authority calls in the apparent low bidder and reviews his bid with him. From this review-negotiation, a contract is usually awarded. If, however, the contractor and awarding agency cannot agree on a contract, the next low bidder is called in for review-negotiation.

There are five contractors who have experience in installing large diameter pipe such as will be used for the new transmission main. There are over ten contractors capable of installing the proposed distribution piping and service connections. Although asbestos cement pipe has been used in Indonesia, not all pipe laying contractors are familiar with the proper techniques for installing this type of pipe. To reduce installation difficulties to a minimum, an expatriate technical advisor experienced in the installation of asbestos cement pipe will be retained to assist and instruct the contractor's personnel in the proper methods of installation.

Installation will be by labor intensive methods in so far as practical. All excavation is expected to be by hand. It is estimated that over 109,000 man days will be required just for the excavation and backfilling of the transmission main. Installation of the large diameter ductile iron pipe is / expected to require the use of some equipment due to the weight of the pipe. This equipment will be supplied by the contractor. Suitable equipment exists in country and can / be rented if the successful contractor does not already own it. The 51.5 km of distribution piping are estimated to require over 55,000 man days for excavation and backfilling. During the two year construction period, the project will substantially contribute to the employment of the manual laboring class providing an average daily employment of more than 200 workers, many of whom will be women. (See Part II.E above). As the Consultant's study indicates that there is at least twelve percent unemployment in Surakarta plus significant underemployment, there should not be any difficulty in the contractors obtaining their required labor

force from the immediate area. The contractors will have to recruit skilled staff such as foremen, pipefitters, and equipment operators from other areas of Java, but this should prove no problem.

The Consultant has proposed that the distribution work be broken into four contracts to provide some of the smaller contractors an opportunity to bid on the work. The Consultant has broken the installation of the new transmission main into six parts. It is estimated that a contractor capable of doing this work could do up to three sections. Construction of the new transmission main will be accomplished with two or more contractors.

3. Reduction of Unaccounted-for-Water

Two programs under the proposed project aim at the reduction of unaccounted-for-water, i.e. metering upgrading and a leakage survey. The responsibility for the execution of both of these programs and the necessary follow-up repair programs primarily rests with the Water Enterprise. They will have enough funds generated from revenues to carry out these programs. (See Part III. C above). New water meters will be ordered to replace non-working meters presently in the system. This will be done during the same period that the distribution and transmission mains are being installed. To enable the Water Enterprise to maintain its meters, new testing facilities will be obtained under the loan and training in meter maintenance will be conducted. This too will be accomplished during the early stages of the project so that the Water Enterprise will benefit as early as possible from more accurate accounting of the water it delivers. New services will not be installed until shortly before the transmission main is placed in service. The water system is unable to serve its present customers and adding additional customers before increasing available supply would only increase operational problems.

During its design investigations, the Consultant trained employees of the water enterprise in the proper procedures for conducting leakage studies. The consultant has recommended that this work be continued. Equipment was obtained for this work under the design contract and will be turned over to the Water Enterprise by Cipata Karya. The Water Enterprise will install a program of leakage surveying and continue this program as part of its normal operating procedure. All of these points have been discussed with and agreed to by the GOI and will be further covered with a condition precedent to disbursement. (See Part IV. D below).

4. Management

To assist the Water Enterprise in implementing the management procedures recommended by the consultant, a management consultant will review, at approximately yearly intervals, the progress of the Enterprise in

implementing new procedures and in improving its overall operation. In addition, the management advisory section of DSE will provide management consulting services to the Water Enterprise throughout the duration of the project.

5. Equipment

Two types of equipment are to be purchased under this project. The first type will be light equipment and tools to assist in the installation of the new facilities. The second type will also be light equipment, tools and materials to assist the Water Enterprise in its operation and maintenance of the system. Those items utilized in construction will be turned over to the Water Enterprise upon completion of the construction and in turn will be used by the Enterprise in its operation, maintenance, and in future construction.

6. Engineering Services and other Technical Assistance

It is anticipated that Cipta Karya will enter into a host country contract with a single firm to provide the engineering services and other technical assistance as described in Part II E. 4. Another alternative would be separate contracts for engineering services, leak detection and management with the metering expert provided by the supplier of the meters. Cipta Karya has expressed a preference for the single firm approach but not for any particular firm.

C. Evaluation Plan

The evaluation of construction of the proposed project will be continuous during the installation of the pipelines. Before acceptance, the Contractor will be required to pressure test the new installations to insure that they do not have excessive leakage and that bends and hydrants have been properly braced. The Health, Social and Economic impact study as described in Annex B 8 will be the primary device for evaluating the proposed project purposes. During the course of project, USAID will conduct an annual review of the project status to detect any difficulties in carrying out the project as envisioned in the PP.

D. Conditions and Covenants

The following represent conditions and covenants as they may appear in the loan agreement. These requirements have been discussed with, and approved orally by, the appropriate official within Cipta Karya. This official and USAID feel that one or more of them will be met before the loan agreement is signed. These CP's and covenants are descriptive and actual wording may be subject to negotiation. Furthermore as previously stated in this paper, some CP's and covenants may be added or deleted depending on work accomplished before the signing of the Loan Agreement.

Conditions Precedent to Initial Disbursement

1. The conditions precedent for initial disbursement shall include the standard conditions as follows:

a. legal opinion
b. authorized representative
c. assurances of GOI financial support of the project
d. draft contracts acceptable to AID for consultant services, the groundwater study and the impact study.

2. The following conditions precedent for initial disbursement unique for this project are as follows:

a. A written decision from the appropriate authority of the Government of Indonesia granting an additional allocation of water from the Cokrotulung Spring to the municipality of Surakarta of 100 liters/second, for a total allocation of 400 liters/second.

b. Written assurances from the appropriate authority of the Government of Indonesia that all land rights and rights-of-way have been or will be obtained necessary for the installation of the systems prior to commencement of construction.

c. A statement from the Directorate General of Cipta Karya that the Surakarta Water Enterprise has been legally established and that the financial accounts of the Enterprise are being kept separate from other units of the municipal government. This statement will be accompanied by official copies of the decree establishing the utility, an organization chart, and sample blank financial forms which will be used for annual statements.

d. A copy of the signed loan agreement, acceptable to AID, between the Borrower and the Surakarta Water Enterprise.

e. An implementation plan, acceptable to AID, that will describe the project in more detail than is possible in the AID-GOI loan agreement. This plan will include (1) a description of the intended beneficiaries of the proposed project and how they will be reached (2) a discussion of a proposed water rate structure which would make the Enterprise financially viable, help conserve water but make the rates more equitable for the urban poor and (3) a course of action that will result in an improved Surakarta Water Enterprise.

f. A statement from the Manager of the Surakarta Water Enterprise that he (1) has received the necessary leak detection equipment used by the consultant from Cipta Karya; (2) has received a copy of the leak detection report from Cipta Karya as prepared by the consultant and translated into Bahasa Indonesia; (3) is actively using this equipment: and (4) has an ongoing program of repair which will fix all leaks detected.

3. The loan agreement shall contain the covenants essentially as follows:

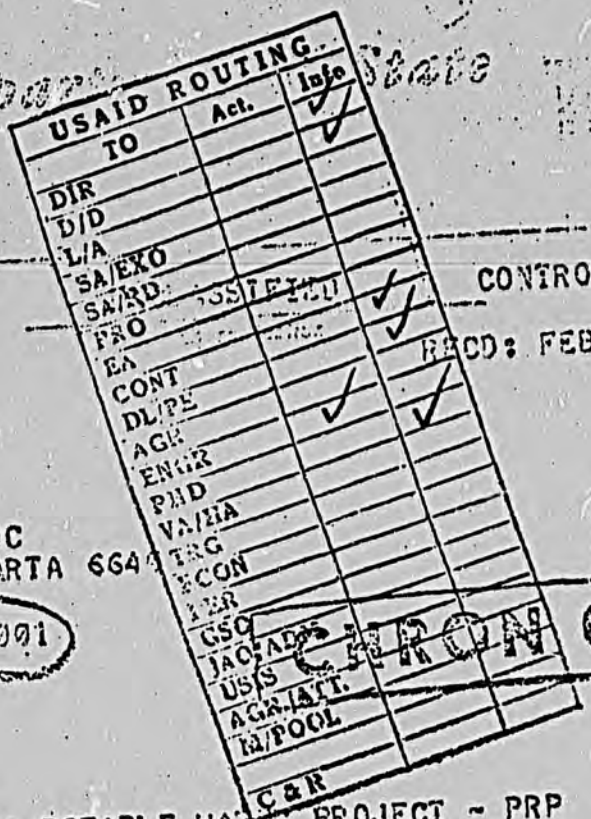
a. The standard provisions concerning AID's approval of all contracts, contractors and construction plans, bid documents, etc., and all equipment to be financed by the loan. A training plan including the names of participants must be approved by AID before loan funds can be used to finance any portion of a training activity.

b. Any appropriate recommendations made by the consultant or the impact study will be incorporated as mutually agreed into the final project design.

c. The city will provide land for the public faucets and bathhouses in general agreement with the sites recommended in the impact study.

d. The Director of the City Health Department will request funds and, if necessary, personnel in his annual budget request commencing one year before project completion and continuing thereafter to (1) conduct a health and sanitation education program, and (2) to staff and suitably equip the para-medical units constructed as part of the bathhouses.

ANNEX A



Surakarta

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TAGS:
SUBJECT:SURAKARTA POTABLE WATER PROJECT - PRP

1. SUBJECT PRP APPROVED AT EA PROJECT ADVISORY COMMITTEE MEETING HELD JAN 27. FOLLOWING ISSUES SHOULD BE ADDRESSED IN PP.

2. IMPACT ON HEALTH CONSIDERED TO BE PRIMARY BENEFIT OF SUBJECT PROJECT AND PROVIDES BASIS FOR INCLUSION OF ACTIVITY WITHIN AID'S EMPHASIS CATEGORY OF POPULATION PLANNING AND HEALTH. WHILE PRP DOES INDICATE IN GENERAL WAY THAT HEALTH BENEFITS ACCRUE FROM PROVISION POTABLE WATER, PP SHOULD PLACE MUCH GREATER EMPHASIS AND PROVIDE MORE DETAIL ON LINKAGE OF THIS PROJECT TO HEALTH PROBLEMS IN SURAKARTA AREA. WE RECOGNIZE DIFFICULTY IN IDENTIFYING AND QUANTIFYING SPECIFIC BENEFITS THESE TYPE PROJECTS. HOWEVER, BELIEVE THROUGH EXAMPLES AND EXPERIENCE SIMILAR TYPE PROJECTS IN INDONESIA AND/OR OTHER COUNTRIES, LIKELY BENEFITS CAN BE MORE PRECISELY SHOWN. DISCUSSION SHOULD IDENTIFY SPECIFIC HEALTH PROBLEMS TO BE ADDRESSED IN SURAKARTA AND, TO EXTENT POSSIBLE, ATTRIBUTE ROLE OF IMPROVED WATER SUPPLY TOWARD MEETING THESE PROBLEMS.

3. RELATED TO ABOVE IS NEED TO INCLUDE IN PP PROCEDURE TO EVALUATE IMPACT OF PROJECT ON IMPROVING PUBLIC HEALTH.

MISSION SHOULD INDICATE HOW IT WILL PROCEED TO DEVELOP BASELINE DATA PRIOR TO IMPLEMENTATION OF THE PROJECT. FOR FURTHER GUIDANCE THIS ISSUE SEE PHILIPPINES PROVINCIAL WATER LOAN PAPER WHICH GIVEN TO VAN RAALTE. VAN RAALTE ALSO HAS COPY PROPOSAL IMPACT STUDY DEVELOPED BY CONSULTANT FOR THE PHILIPPINE PROJECT.

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4. QUESTION RAISED ON ADEQUACY OF TECHNICAL ASSISTANCE PROPOSED P7, PARA (F), ESPECIALLY FOR O AND M AND MANAGEMENT NEEDS SHOULD BE CAREFULLY ANALYZED IN PP AND SUFFICIENT TA PROVIDED UNDER LOAN OR, IF TO BE PROVIDED ELSEWHERE, INDICATE SOURCE.

5. PP SHOULD CONTAIN PLAN SHOWING FINANCIAL VIABILITY OF PROJECT INCLUDING CASH FLOW, INCOME STATEMENT AND BALANCE SHEET PROJECTIONS. TO EXTENT DATA NOT AVAILABLE AT TIME PP IS DUE (E.G. RATE STUDY UNDER BURNS AND MACDONNEL CONTRACT) BEST ESTIMATES ARE TO BE USED, POSSIBLY CONSIDERING OTHER SIMILAR PROJECTS UNDER WORLD BANK FINANCING.

6. PP MAKES STATEMENT ON PS RELATING DISPOSAL HUMAN WASTE WITH SAFE WATER AS FUNDAMENTAL TO HEALTH IMPROVEMENT. PP SHOULD DISCUSS PROVISIONS BEING MADE TO MEET PROBLEM OF HUMAN WASTE DISPOSAL CONNECTED WITH SURAKARTA SYSTEM.

7. FINAL COST BREAKDOWN IN PP SHOULD SPECIFY EXACT COMPONENTS OF PROJECT TO BE FINANCED BY AID. KISSINGER ET

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ANNEX B-I
FIGURE 1

INCIDENCE OF DISEASE IN SURABAYA

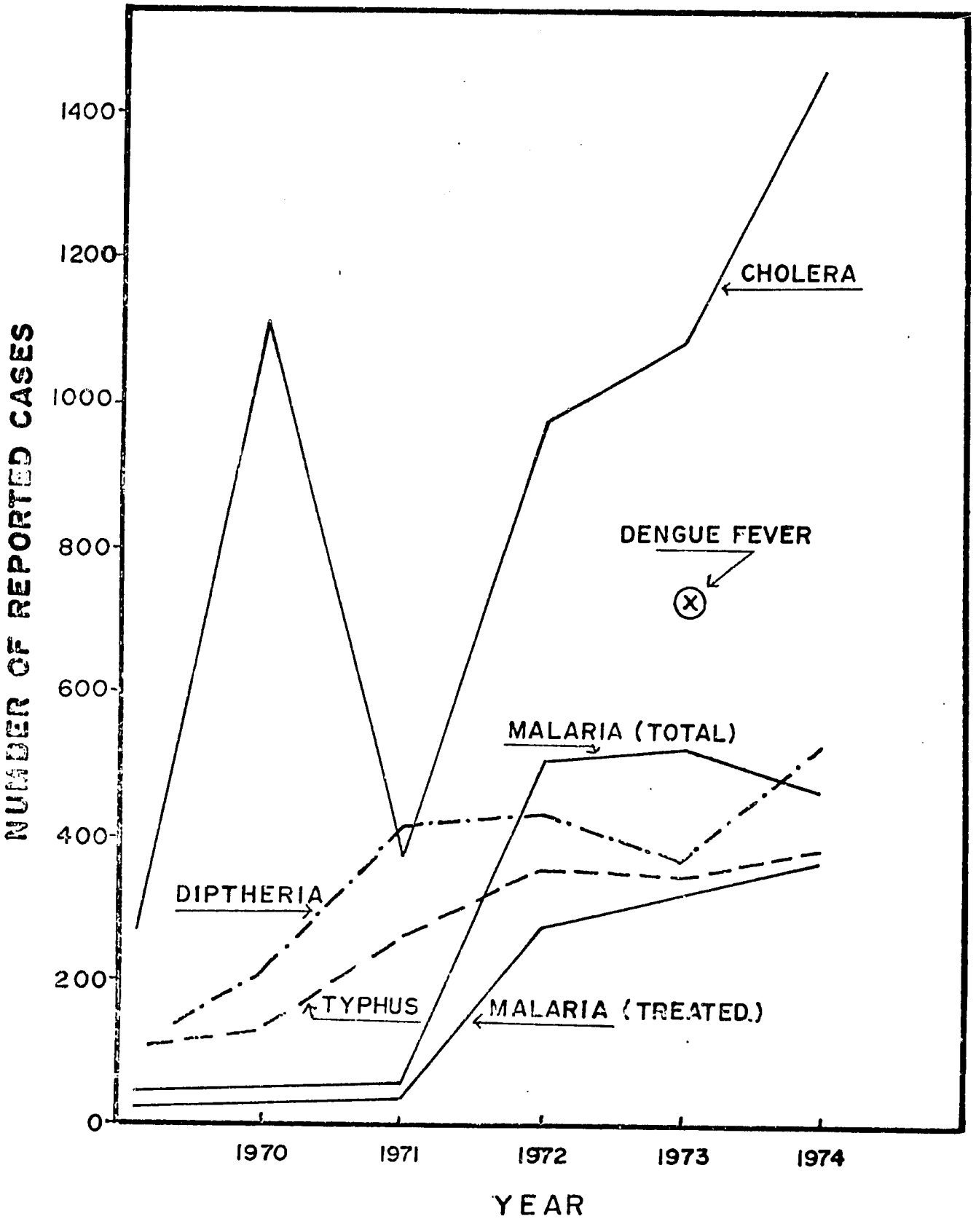


FIGURE 1

ANNEX B-1
TABLE I

TABLE I

CHARACTERISTICS AND CONTROL OF WATER- AND FOOD-BORNE DISEASES AND VECTOR CARRIED FEVERS

DISEASE	RESERVOIR	DEPOSITORIES OF INFECTICUS MATERIALS CONTAMINATED			VECTORS		* CONTROL MEASURES
		WATER	FOOD	SEWAGE	FLIES	MOSQUITOES	
CHOLERA	Vomitus Bowel discharges Carries	X	X	X	X		Immunize
TYPHOID PARATYPHOID	Feces and Urine of Patient or Carrier	X	X	X	X		Immunize
DYSENTERY (BACILLARY & AMEBIC)	Bowel discharges of Man or Animal	X	X	X	X		
POLIOMYELITIS	Discharges of Patient or Carrier	X	X	X	X		Immunize
HEPATITUS	Discharges of Infected Persons	X	X	X	X		
DIPHTHERIA	Respiratory tract Patient Carrier		X				Immunize
DENGUE (D.H.F)	Infected Person, Animal or Mosquito					X	Eliminate breeding areas of Mosquito Vector by Drainage Filling or other Methods
MALARIA	Infected Person, Animal or Mosquito					X	

* In general the incidents of all listed diseases in table can be effectively reduced by a safe water supply-sanitary sewage disposal - solid wastes management - improved sanitation - good food handling practices - screening - fly, mosquito and rodent control - and when available, immunization

TABLE 2

INCIDENCE OF CHOLERA IN SURAKARTA[1]

YEAR	No. of Cases	No. of Deaths	Positive after treatment[3]
1975	411	23	87
1974	333	44	N.A.[2]
1973	754	41	5
1972	556	80	N.A.

1. Source, Surakarta Health Department.
2. N.A. - Not available.
3. Positive stools after recovery - possible carrier.

TABLE 3

COMMUNICABLE DISEASES IN SEMARANG

(WATER AND FOOD RELATED)

Y E A R	1967	1968	1969	1970	1971	1972	1973	1974
CHOLERA								
Total Cases	137	165	133	267	931	1110	1140	971
Total Deaths	12	8	2	20	94	74	20	33
Case Rate	22.49	26.95	21.05	41.69	151.56	171.69	170.49	140.31
Death Rate	1.97	1.30	0.32	3.12	15.30	11.45	2.99	4.77
TYPHOID FEVER								
Total Cases	179	215	234	194	231	762	545	842
Total Deaths	5	11	17	2	6	28	7	[illegible]
Case Rate	29.73	34.91	37.03	30.29	37.61	117.86	81.51	1 [illegible]
Death Rate	0.48	1.79	2.69	1.87	0.98	5.88	1.05	3.61
PARATYPHOID FEVER								
Total Cases			6					
Total Deaths			1					
Case Rate	None Reported		0.95	None Reported				
Death Rate			0.16					
DYSENTERY								
Total Cases		None Reported						
POLIOMYELITIS								
Total Cases								1
Total Deaths								0
Case Rate		None Reported						0.14
Death Rate								0
HEPATITUS								
Total Cases	31	25	22	59	132	137	132	231
Total Deaths	5	3	2	1	7	5	5	7
Case Rate	5.40	4.06	3.48	9.21	21.49	21.19	19.74	33.38
Death Rate	0.82	0.49	0.32	0.16	1.14	0.77	0.75	1.01
D.H.F. (DENGUE)								
Total Cases			3	22	86	430	2606	304
Total Deaths			3	2	7	40	50	14
Case Rate	None Reported		0.47	3.43	14	66.51	389.74	43.93
Death Rate			0.47	0.31	1.14	6.19	7.46	2.02
MALARIA								
Total Cases			20	11	3	0	276	69
Total Deaths			0	0	0	0	0	0
Case Rate	None Reported		3.10	1.72	0.49	0	41.28	9.97
Death Rate			0	0	0	0	0	0
DIPHTHERIA								
Total Cases	152	61	74	35	56	108	124	190
Total Deaths	5	6	12	9	8	12	10	27
Case Rate	49.99	9.90	11.71	5.46	8.44	16.71	18.54	27.45
Death Rate	1.65	0.81	1.90	1.25	0.49	1.90	1.50	3.90
POPULATION (100,000)	6.09	6.16	6.32	6.40	6.14	6.46	6.69	6.97

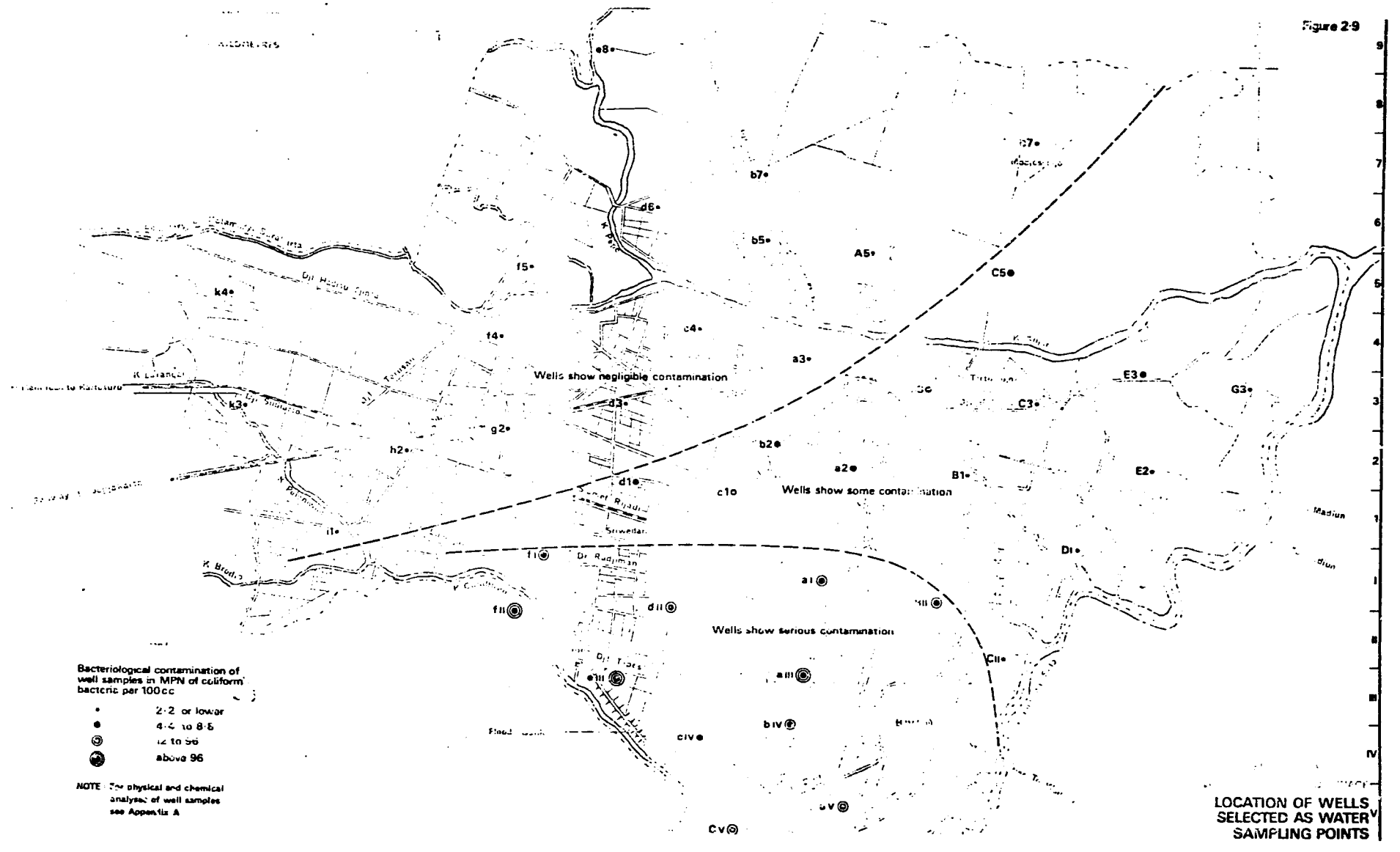
No reported cases of Smallpox since 1968. Vaccination program is apparently effective.

Case and Death Rates/100,000 Population.

From: City Health Department Record:.

ANNEX B-1
TABLE 3

Figure 2·9


Wells show negligible contamination
Wells show some contamination
Wells show serious contamination
Bacteriological contamination of well samples in MPN of coliform bacteria per 100 cc
2·2 or lower
4·4 to 8·8
above 96
NOTE: For physical and chemical analyses of well samples see Appendix A
LOCATION OF WELLS SELECTED AS WATER SAMPLING POINTS

BACTERIOLOGICAL SAMPLES FROM WELL AND BOREHOLE WATER

Type of Source	Testing Laboratory	Laboratory Ref No	Date	Sample Location	Presumptive Test 10 ml	Presumptive Test 1 ml	Presumptive Test 0.1 ml	Confirmatory Test	M P N /100 ml	Bacteria Count/ml	pH	Remarks
Public Supply	Departemen Kesehatan R.I. Laboratorium Kesehatan Tehnik Jogjakarta	508	17/7/71	Dj. Slamet Rijadi 205	0/5	0/1	0/1	–	0	17	6.8	Acceptable
		509	17/7/71	Dj. Hanggowongso 80A	0/5	0/1	0/1	–	0	15	6.8	Acceptable
		510	17/7/71	Dj. Komodor Jos Sudarso 24	0/5	0/1	0/1	–	0	19	6.8	Acceptable
		511	17/7/71	Dj. Ronggowarsito 2	0/5	0/1	0/1	–	0	20	6.8	Acceptable
		512	17/7/71	Dj. Gadjah mada 122	0/5	0/1	0/1	–	0	62	6.8	Acceptable
		513	17/7/71	Dj. Slamet–Rijadi 10	0/5	0/1	0/1	–	0	56	6.8	Acceptable
		514	17/7/71	Dj. Major Sunarjo	0/5	0/1	0/1	–	0	7	6.8	Acceptable
Wells		517	7/7/71	a Va (For locations of wells see figure 2.8)	5/5	1/1	1/1	3 1 0	12	14 000	6.8	Not Acceptable
		518	7/7/71	a V	5/5	1/1	1/1	3 1 1	16	14 000	6.7	Not Acceptable
		519	7/7/71	B IV	5/5	1/1	1/1	6 1 0	240	14 000	7.0	Not Acceptable
		520	7/7/71	b IV	5/5	1/1	1/1	4 1 1	27	161 000	7.1	Not Acceptable
		521	7/7/71	c IV	5/5	1/1	1/1	2 1 0	7.6	308 000	6.8	Not Acceptable
		522	7/7/71	e III	5/5	1/1	1/1	5 1 1	>240	8 600	6.8	Not Acceptable
		523	7/7/71	d II	5/5	1/1	1/1	4 1 1	27	344 800	6.7	Not Acceptable
		524	7/7/71	f I	5/5	1/1	1/1	3 1 0	12	2 000	6.5	Not Acceptable
		525	7/7/71	f II	5/5	1/1	1/1	6 1 1	>240	158 000	6.9	Not Acceptable
		526	7/7/71	a III	5/5	1/1	1/1	5 [illegible] 1	>240	144 000	6.9	Not Acceptable
		527	7/7/71	e I	5/5	1/1	1/1	4 1 0	20	11 000	7.0	Not Acceptable
		527	8/7/71	B II	5/5	1/1	1/1	4 0 0	16	646 000	6.9	Not Acceptable
		528	8/7/71	C II	5/5	1/1	1/1	1 0 0	2.2	82 600	7.1	Not Acceptable
		529	8/7/71	B I	5/5	1/1	1/1	1 0 0	2.2	782 000	7.3	Not Acceptable
		530	8/7/71	D I	5/5	1/1	1/1	0 0 0	<2	400 000	7.5	Fair
		531	8/7/71	E 2	5/5	1/1	1/1	0 0 0	<2	228 600	6.9	Fair
Wells	Laboratorium Kesehatan Tehnik Jogjakarta	532	8/7/71	G3 (For Location of wells see figure 2.8)	5/5	1/1	1/1	0 0 0	<2	80 000	6.8	Fair
		533	8/7/71	E3	5/5	1/1	1/1	1 1 1	6.7	417 000	6.7	Not acceptable
		534	8/7/71	C3	5/5	1/1	1/1	0 0 0	<2	1 000 000	6.8	Fair
		535	8/7/71	C6	5/5	1/1	1/1	2 0 0	5	72 000	6.8	Not acceptable
		536	8/7/71	C7	5/5	1/1	1/1	0 0 0	<2	310 000	6.8	Fair
		537	8/7/71	B3	5/5	1/1	1/1	3 0 0	8.8	794 000	6.9	Not acceptable
		538	8/7/71	a2	5/5	1/1	1/1	2 0 0	5	188 000	6.8	Not acceptable
		539	9/7/71	a3	5/5	1/1	1/1	0 0 0	<2	419 000	6.8	Fair
		540	9/7/71	a6	5/5	1/1	1/1	0 0 0	<2	6 880 000	6.8	Fair
		541	9/7/71	b6	5/5	1/1	1/1	0 0 0	<2	276 000	6.8	Fair
		542	9/7/71	b7	5/5	1/1	1/1	0 0 0	<2	880 000	6.7	Fair
		543	9/7/71	A5	5/5	1/1	1/1	1 0 0	2.2	46 000	6.8	Not acceptable
		544	9/7/71	d6	5/5	1/1	1/1	0 0 0	<2	25 840	6.8	Fair
		545	9/7/71	d8	5/5	1/1	1/1	0 0 0	<2	88 000	6.8	Fair
		546	9/7/71	f5	5/5	1/1	1/1	1 0 0	2.2	128 000	6.7	Not acceptable
		547	9/7/71	f4	5/5	1/1	1/1	0 0 0	<2	882 020	7.1	Fair
		548	9/7/71	h2	5/5	1/1	1/1	1 0 0	2.2	28 800	6.8	Not acceptable
		549	9/7/71	h4	5/5	1/1	1/1	0 0 0	<2	19 800	6.8	Fair
		550	9/7/71	h3	5/5	1/1	1/1	0 0 0	<2	40 800	6.8	Fair
		551	10/7/71	i1	5/5	1/1	1/1	0 0 0	<2	28 800	6.7	Fair
		552	10/7/71	g2	5/5	1/1	1/1	1 0 0	2.2	75 800	6.7	Not acceptable
		553	10/7/71	c1	5/5	1/1	1/1	3 0 0	8.8	9 800	7.1	Not acceptable
		554	10/7/71	b2	5/5	1/1	1/1	2 0 0	5.0	62 000	6.8	Not acceptable
		555	10/7/71	d1	5/5	1/1	1/1	2 0 0	5	33 000	6.8	Not acceptable
		556	10/7/71	d3	5/5	1/1	1/1	0 0 0	<2	78 000	6.7	Fair
Pumped from covered well	Laboratorium Penjelidikan Tehnik Jogjakarta	557	17/7/71	ATMI Kenangan Roof Tank	5/5	1/1	0/1	0 0 0	<2	14 000	6.7	
Borehole	Laboratorium Tehnik Penjelidikan Djakarta	A	24/8/71	Borehole (from tank)		+		+	33	14 400		
		B	24/8/71	Kepatihan borehole, (pipe outlet from tank)		+		+	33	41 300		
		C	24/8/71	Borehole (pipe to warehouse)		+		+	33	39 400		
		D	24/8/71	Dj. Sono, Dalagan RT 18 a IV		+		+	2400	80 100		
Wells	Laboratorium Tehnik Penjelidikan Bandung	451	1/8/71	Dj. Tentara 21	5/5	1/1	1/1	positive	>240	–	3.8	
		452	17/8/71	Dj. Gurah 9	5/5	1/1	1/1	positive	>240	–	7.1	
		453	1/8/71	Dj. Gurah 9	5/5	1/1	1/1	positive	>240	–	7.1	
		454	1/8/71	Dj. Slamet Rijadi 205	0/5	0/1	0/1	negative	–	–	7.1	
		455	1/8/71	Dj. Tjokroaminoto 61	5/5	1/1	0/1	positive	240	–	4.7	
		456	1/8/71	ATMI	1/5	0/1	0/1	positive	2.2	–	6.8	
Borehole	Laboratorium Kesehatan Daerah di Semarang	198/Ba	11/69	Sari Petodjo Ice Factory	3/5	0/1	0/1	0 0 0	2	196	3.8	

Estimations of Water Use

1. General

Since the submission of the PRP more research has been done by USAID, World Bank and ADB consultants on water usage at the various service levels i.e. house connections, private yard hydrants, public water faucets, latrines and bathhouses. This has resulted in a revision in several of the estimates for water usage which has apparently caused some confusion in AID/W. Below is a table presenting the difference between estimated water usage for the various service levels in the PRP and the PP:

	PRP	PP
1. House Connections usage	100 Lpcd	150 Lpcd
2. Public Faucets		
a. usage	20 Lpcd	15 Lpcd
b. number of people served	650/faucet	300/faucet

In the remainder of this essay the current state of knowledge regarding each service level will be presented in the hopes of disspelling some of this confusion.

2. Water Consumption from House Connections

The PRP figure of 100 lpcd which has been used as a planning figure for many years and was recommended by Howard Humphreys and Sons, is not in agreement with the current water usage data in Indonesia. Based on recent studies in Semarang and Surabaya on water usage by domestic customers, the water allotment per person has been increased 50% over that used in the PRP. In Surabaya it was found that water usage varied from about 130 lpcd to 240 lpcd. In Semarang the usage was determined to be 138 lpcd. The average usage in Surakarta is about 130 lpcd. The GOI, World Bank, ADB and the Australians are all using a 150 lpcd figure for house connections. This is based on the assumption that, when adequate, water pressure is available on a twenty-four hour a day basis, the usage will increase. This agrees with the usual course of events when pressure and service are improved. On the other hand, the new customers who will be connecting to the system will be from a lower economic strata and thus should have a tendency to use less water per capita than the higher income groups. Counteracting this will be the general long term increase in water consumption as the overall standard of living of the community improves. It is felt that the use of 150 lpcd is a realistic planning figure based on current data.

Indonesia is the five rupiah piece while the most prevalent way to carry water is on a yoke with a five gallon can on each end (19 liters per can). This places the cost of water at Rp. 125/m3. In comparison, the individual in Surakarta connected to the system and in the lowest billing category is billed Rp. 150 for the first 15/m3 or Rp. 10/m3 and Rp. 18.75 per additional cubic meter. Semarang and Surabaya have raised their unit cost per additional cubic meter of water to public faucet operators to Rp. 30 & 40 respectfully in order to absorb some of the high markup by the operators. However, this is defeating the primary purpose of public faucets which is intended to provide potable water to the poor at a reduced, or at least no higher rate than to customers connected to the system. A restructuring of the charges for water from public faucets is necessary to meet this end. One of the suggested means of lowering costs to the consumers would be to start a system of paper slips or coupons to be sold by the city at the rate of Rp. 100/100 coupons. A book of coupons would last the average family more than a month and reduce his effective rate to Rp. 25/m3 which is comparable to the general rate for house connections. The GOI has expressed interest in this idea. See project issues.

In various system plans, the number of people served per faucet has been assumed to be as much as a thousand persons per public faucet. In the PRP a figure of six hundred fifty per public faucet was used. Again at that time there was no reliable data or experience in Indonesia. The consultants in Surabaya found that the public faucets in that city served a hundred thirty three persons on the average, while in Semarang it was found that 370 persons per faucet was the average use. In Surakarta USAID has assumed that there will be three hundred persons served per faucet on the average.

The PRP estimated that 64,000 people would be served from a hundred public faucets. In order to keep from drastically reducing this service level, the number of public faucets has been doubled. It is expected that the anticipated two hundred public faucets will serve 60,000 of the lower income individuals.

3. Water from Public Faucets

The PRP estimate for public faucets has been assumed in potable water system demand studies for many years. It is an ideal figure based upon what is felt to be essential requirements. This figure is not, however, automatically transferable from one locality to another. At the time the PRP was prepared, little data was available on actual water use from public hydrants in Indonesian water systems. Recently, consultants working on USAID assisted projects in Semarang and Surabaya have examined the water usage from public faucets. The usage was found to depend on several factors, primarily distance from a public faucet and availability of other sources of water. In Surabaya, in areas where the alternative is salty water, consumption was found to be about 30 liters per capita per day and constituted total consumption. However, in this same city where the alternate source was fresh ground water, the consumption was found to be about 5 lpcd, while at the same time total water used in the household increased to 80 lpcd. In Semarang, the average consumption from public faucets was found to be a little over 9 lpcd. In looking at the above figures, one must keep in mind that neither system is operated with adequate pressure and distribution and that this could decrease the quantity of water used.

Surakarta at present has no public faucet. The expected consumption from this source can only be estimated from comparison to other areas where data is available. Surakarta does possess shallow, fresh groundwater in adequate quantities over the majority of the city. Although often contaminated, this source has served to provide water to the vast majority of the people of Surakarta. It will, in all probability, continue to be used as a supplemental source, i.e. bathing, laundry and probably food preparation and dish washing. Water usage of five liters per capita for example, as found in some areas of Surabaya, is considered very low and below what is probably needed for drinking, food preparation and dishwashing. In the PP a figure of 15 lpcd has been assumed in the analysis of the water usage for the city. The actual usage should be checked shortly after the total improvements have been completed as part of the impact study, again approximately two years after the first check. This data would be helpful to the Indonesian Government in planning other systems.

Another factor, although not analyzed in the Semarang and Surabaya studies, which is bound to have an effect on the quantity of water used from public faucets is the cost of the water. In both the Semarang and Surabaya studies it was found that the most expensive water was water from public faucets. The rate structure of the water utilities in both cities charged its highest rate to operators of the public faucets. The rate at the public faucets is basically restricted to 5 rupiah for forty liters. The lowest denomination of money commonly available in

4. Consumption from Public Baths & Latrines

There is still no reliable data on the water usage of public baths and latrines in Indonesia. There is also no data on the utilization of these facilities. Both have been considered good innovations from a social point of view; benefiting primarily the lower income levels. The public latrines currently existing in Surakarta appear to be utilized for both excreta disposal and bathing. It may well be that public baths will not be required in certain area . There appears to be a preference for individual family bathing facilities. Such private facilities are definitely more convenient and seem to increase the status of the individual.

As there is a question on just how acceptable the use of public baths will be in Surakarta, it has therefore been proposed to construct only ten public baths in the initial stage of the project. On the basis of general acceptance of these facilities, the city will decide if they should proceed with the installation of additional baths or if additional latrines or improved latrines will better serve the sanitary needs of the lower income population. The impact study will make recommendations concerning the relative mix of public bathhouses and latrines.

With the lack of firm figures on water usage, an estimation was made of possible usage of public baths and latrines. It was concluded from the analysis that the figure of one cubic meter per day for latrines and twelve cubic meters per day for public baths were reasonable. These figures are problematical at best. However, the usage of latrines and public baths is very small in the overall consumption patterns and even an error of 100% would have insignificant effects on the overall usage patterns.

5. Other Demands for Consumption of Water

It has been assumed that increased water usage from the potable water system for major commercial and industrial use will be prohibited until such time as additional sources are found. There is apparently ample groundwater available. Howard Humphrey and Sons recommended that heavy users be encouraged to develop their own source of supply. If costs which were obtained by the consultant in a survey in Surakarta are reasonably accurate, it will be considerably less expensive for major users to develop their own supply. Any increase in allotment to industry of the city's limited potable water supply would only decrease the supply available to the people and create the potential for a water shortage. See Part III. E. above.

6. Unaccountable Water

The present unaccountable water usage is estimated at 37%. An exact figure is impossible to arrive at due to the methods of estimating billings for non registering meters and unmetered usage. Within this figure is the water used for filling the Tirtomodo swimming pool which accounts for approximately two percent of the city's total water usage.

Leakage of 25.5 lps was found in twenty seven leaks detected during the consultants' leakage survey. By repairing these leaks, the city could reduce their current losses from 37% to less than 25%. As the system is old and many of the former leaks have been superficially repaired, this reduction would most likely be temporary. However, it is possible for the city to improve on its losses to unaccountable water by continuing a proper leakage survey, systematically repairing the identified leaks, and improving its facilities for the maintenance, repair and replacement of meters. A reasonable expectation is that the unaccountable water losses will be reduced to 25 to 30 percent of the total water delivered to the system in the period between the present and completion of improvements to the system. A condition precedent in the loan agreement should produce the desired action.

When the improvements to the system are completed, Jebres Reservoir will float on the system causing an increase in pressure throughout the distribution system. The new transmission main and major local distribution piping will help to distribute this pressure throughout the system. The increased pressure will undoubtedly cause increased leakage in the older pipes and will most likely cause many of the poorly repaired leaks to rupture. It is estimated that this increase will raise the unaccounted for water to 45 percent of the water delivered to the system. A fair share of this leakage will be self evident and should be subject to repair during the first year of operation of the improved system provided the leak survey personnel are utilized and proper repair parts are available.

The other normal major source of unaccounted for water is meter error. The present meter shop is very poorly equipped. The consultant has calculated that it would take seventy-nine years for the water works to repair the water meters at its present rate of operation. Much of this is due to the fact that meters must be individually tested rather than tested in series. Spare parts are also a major concern. Meters are now normally repaired by cannibalizing parts from other meters. Meters are presently replaced only if they become inoperative and if new meters are available. If the water works is to bill fairly and operate as a self sufficient utility, then the whole system of meter maintenance has to be revised. The utility will have to have an adequate supply of meters to enable it to install new meters on all present unmetered connections and

all new connections, to replace existing unoperative meters, and to provide meters for anticipated connections for at least the next year after completion of the project. In addition, adequate meter repair facilities will have to be provided and installed, and the meter repair personnel of the water works will have to be instructed in the proper use and maintenance of this equipment. A record keeping system will have to be established to facilitate the meter maintenance system.

SURAKARTA POTABLE WATER ENTERPRISE WATER USAGE

(In Thousands Cubic Meters)

		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Plant Cpacity		4825	4825	4825	12615	12615	12615	12615	12615	12615	12615	12615
Maximum Days (1.25% of average)		-	-	-	9671	12598	12598	12598	12599	12599	12599	12599
Water Delivered thru System		4825	4825	4825	7737	10078	10078	10078	10079	10079	10079	10079
% Unaccounted for Water		30%	25%	25%	45%	38%	33%	30%	30%	30%	30%	30%
Water Sales (metered)		3378	3619	3619	4255	6248	6752	7055	7055	7055	7055	7055
Consumers (1977 - 1979)												
Residential Connections	75%	2533	2715	2715								
Hotels	6%	203	217	217								
Enterprises	1%	34	36	36								
Factories	3%	101	108	108								
Government Offices	10%	338	362	362								
Private Offices	1%	34	36	36								
Schools and Hospitals	3%	101	109	109								
Places of Warships	1%	34	36	36								
Consumers (1980 - 1987)												
Residential Connections					2720	2720	2720	2720	2720	2720	2720	2720
Yard Hydrants					246	1478	1890	1890	2135	2135	2135	2135
Sub-Total					2966	4198	4610	4610	4855	4855	4855	4855
Social												
Public Faucets					164	329	329	329	329	329	329	329
Public Latrines					54	54	54	54	54	54	54	54
Public Bath-house					22	44	44	44	44	44	44	44
Schools, Hospitals, Places of Workship												
Sub-Total					170	250	270	282	282	282	282	282
Commercial					410	677	697	709	709	709	709	709
Industrial					778	1272	1242	1524	1279	1279	1279	1279
					128	187	203	212	212	212	212	212

DRAINAGE

It is fairly certain that a skeletal drainage system existed in the late 19th century in the Kraton area (Palace district). Stormwater drainage and flood prevention measures have developed steadily since the beginning of the 20th century with the following major works being completed:

1. The construction of levees between the southeast section of the city and the Solo River,

2. The construction of a new channel, the Kali Anjar to divert flood flows from the Kali Pepe away from the city,

3. The construction of a new channel, Kali Tanggul, outside the flood levee to divert the flow of the Kali Jenes to the south of the levee, and

4. The construction of a weir, "Gemungung Dam," on the Kali Pepe at the head of the Kali Anjar, and sluice gates at both ends of the Kali Pepe at Tirtonadi and Demangan.

The above works provide the city protection against flooding from water originating outside of the city. It does not, however, provide adequate drainage of heavy rains falling upon the city when the flood sluice gate at Demangan, junction of the Kali Pepe and the Bengawan Solo, is closed due to the Solo being in flood stage.

HHS recommended that a new pump station be installed at Demangan so that internal drainage could be pumped from the Kali Pepe into the Bengawan Solo when the Solo was in flood stage. All internal drainage was to be directed to the pump station. This proposed pump station is presently under construction, and is expected to be completed before the next rainy season. The city is also engaged in a long overdue maintenance and upgrading of its drainage channels. The channel along the city's main street in the western section of the city is being paved and the city is cleaning the accumulation of sediment and debris in the more restricted channels. This program should fairly well eliminate the internal drainage problem which has plagued the southeast section of the city.

PRELIMINARY REPORT FOR LEAKAGE SURVEY

The daily water shortages and, in fact complete outages which occur in some areas of Surakarta, while due primarily to inadequate transmission and distribution facilities, are aggravated by and contributed to by loss by leakage from transmission, distribution, and customer supply, piping. This loss is referred to as unaccounted for water and exists to some degree in all water systems. In well managed systems this loss is acceptable if within the limits of 15% or less of the water produced. Failure to contain the losses within these limits results in either costly expansion of facilities or water shortages, or both. If improvements become necessary because of this loss, the cost must be charged to the consumer through increased rates and imposes an unfair burden upon the consumer.

Unaccounted for water through loss from leakage in Surakarta has been estimated by various sources as being from as low as 2% to a high of 45%. The current survey, due to existing conditions such as lack of water and pressure in the mains, inoperable or inaccessible main, service control valves and meters, will not determine the exact percentage of loss by leakage, but should provide an approximate percentage close enough to determine if it is or is not within acceptable limits.

The program in Surakarta is being carried out by Mr. Kuran of BM/TA, with the assistance of the following designated personnel:

Mr. Tridjaja - Cipta Karya representative appointed by Mr. Romli, Chief Engineer for Cipta Karya in Surakarta.

Mr. Soedarto - Head of Water Department Technical.

Mr. Soeranto - Assistant to Mr. Soedarto.

Four workmen from the Water Department.

Mr. Tridjaja and Mr. Soeranto are participating in all phases of the program and special efforts have been made to train them in the use and techniques of all equipment and procedures being used. They have exhibited much interest and demonstrated their ability to learn to the extent that they are now, in the consultant's opinion, well qualified to use, and train others in the use of, the equipment and techniques employed in this program. This will enable them to carry on a continuous leakage abatement program in the future in accordance with well managed Water Works practice.

To date, the program in Surakarta is approximately 75% complete, and has consisted of the following:

1. A complete visual inspection of all facilities at the source of supply.

2. A complete visual inspection of the entire route of the transmission main and all appurtenances from the source of supply to and including the Jebres reservoir. Sonic leak detection equipment was also utilized in conjunction with the visual inspection and readings were taken at every accessible point of contact along the entire length of the transmission main. Pipe detection equipment was utilized to locate lost drain lines and connections for distribution mains and services.

3. Approximately 75% of the distribution system has been surveyed with leak detection equipment and visual inspection. As stated previously, inadequate transmission and distribution mains are capable of providing a supply of water during the daylight hours to only a portion of the city. The balance of the city receives a water supply only during the night hours. In these areas surveys could be conducted only at night, and consisted primarily of visual inspection, with closer investigation during the day of any unusual conditions observed during the night.

4. Operational procedures have been observed and incorporated into the survey and has resulted in recommendations for alterations in these procedures which, he believes, will provide immediate and future benefits to both the consumer and the department.

Results of survey:

1. <u>Source of supply</u>

   During inspection of the grit chamber, it was noted that the water level was such that approximately 75gpm-100gpm was flowing into the overflow pipe. A blind flange was installed on the overflow pipe and resulted in an increase of approximately 4" head at the intake to the transmission main. It was also noted that once each week the head in the grit chamber is lowered by opening 2mm-150mm drain lines for a period of 15 minutes to clear the chamber on both sides of the weir wall wall of accumulated sand. Since there is no accumulation, this flushing results only in reduced flow to the city, and it has been recommended this practice be eliminated.

2. Transmission Main sta. 0.00 to sta. 14.330

The survey of this main from the spring (sta. 0.000) to the Kartosuro Break Tank (sta. 14.330) revealed no leaks in the approximately 2.25 km of ∅ 450 mm and 12.08 km of ∅ 400 mm pipe. The pipe was visually inspected at every point accessible and appears to be in good condition with no indication of external corrosion. All valves located were visually inspected and tested with leak detection equipment, with the following results:

Sta. 2.286 Service connected to blow-off valve leaking.

Sta. 5.70 Service to Delanggu Factory leaking at meter pit 4".

Sta. 6.35 Connection to main leaking. Water Department has no record of this connection and further investigation will be made. Total leakage 2.1 liters/second.

Sta. 7.450 Sonic and pressure tests indicate this main line valve is partially closed. The Water Department attempted to operate the valve and found it to be inoperable. Repair or removal of the gates has been recommended as a means or providing some additional water immediately to the city.

Sta. 9.37 Air valve covered and inaccessible under pavement.

Sta. 12.58 Air valve covered and inaccessible under pavement.

Kartosuro Break Tank Sta. 14.330

Volumetric flow tests were conducted to determine the amount and rate of flow being delivered to this tank from the spring. The test determined the rate of flow to be 127 liters per second. This is less than the 150 liters per second shown in the Humphrey report of 1971, and may be due to the partially closed valve at Sta. 7.450. Pipe locating equipment was utilized to determine if existing piping would allow by-passing of the tank in order to increase downstream pressures. Such piping does not exist and is recommended for futute installation. Total consumption

from the spring to the break tank is approximately 12 liters per second. Total estimated leakage 2.1 liters per second.

Transmission Main - Sta. 14.330 to 29.400

Sta. 14.65 to 15.08 paving cuts in this section of line indicate previous repairs. Leaks were located and repaired. Examination of the pipe during repairs revealed pitting and damaged coating at each point of leakage. The soil surrounding the pipe was examined by Mr. Parkes, Project Geologist, and is, in his opinion, of an aggressive nature. Further soil analysis should be made in this area to determine if cathodic protection is required.

Sta. 16.240 Blow-off valve and line covered by paving location unknown

Located with pipe locator. Main line valves are covered by paving and are inaccessible at stations 17.99-18.50-18.70-20.395, and 21.000. Visual and sonic equipment survey of balance of transmission main disclosed only one leak at Slamet Riyadi in front of the museum. Visual inspection at all accessible points does not disclose any serious exterior corrosion of the pipe and aside from the section of main between sta. 14.65 and 15.08, aappears to be in sound condition. At present, pressures are extremely low from the break tank to the reservoir, and, in fact, during the day, some higher parts of the main is only partially filled with water. As future improvements are completed and higher pressures result, more leaks will develop, and the present method of repairing leaks will not be adequate to contain leaks at higher pressures. It is therefore recommended that improved methods and leak repair material be used.

Distribution mains

Survey of the distribution system has been conducted by visual inspection of areas during periods of maximum pressures. This required considerable nighttime inspection. In order to distribute the limited supply to all areas, some 52 valves are opened at 5 a.m. and closed at 5 p.m. each day. The leak survey crew accompanied the Water Department crew during two of these operations and tested each valve operated with leak detection equipment. All indications of leaks were thoroughly investigated to determine if the indication was caused by a leak or was the result of partially closed valves. In many cases, this proved to be the cause and no leak was found to exist. Once each week on Monday, valves are operated starting at 7 p.m. in order to force water into the Jebres Reservoir. The leak survey crew participated in this operation also and tested approximately 25 valves during the operation. Again, all indications of leaks

were investigated to a final conclusion. All blow-off valves were investigated and no leaks were found. Survey of the distribution system to date has revealed the following:

27 leaks flowing from 5gpm to 25gpm. Average 15gpm.
Total leakage detected 405gpm or 25.5 liters/second.

The location of all leaks detected have been listed and given to Mr. Soedarto. As repairs are made, the pipe will be inspected to determine the external and internal condition.

Summary and Recommendations

Estimated total leakage detected to date:

Transmission Main-sta. 0.00 to Break Tank:	2.1 liters/second
Transmission Main-Break Tank to Reservoir:	2.2 liters/second
Distribution System :	25.5 liters/second
Total leakage :	29.8 liters/second

This is equivalent to 23.4% of the 127 liters/second available at the break tank, and, when repairs are complete, should bring the unaccounted for water within acceptable limits. However, repair of these leaks will result in some increase in pressure and produce additional leaks. It is therefore, essential that a continuous leak detection and abatement program be established.

All valves should be located, made accessible, and operated. Transmission main valves should be operated twice yearly and distribution valves once yearly. Air valves should operate automatically and inspected monthly to assure continuous operation. Valves which are now inoperable or will not completely close should be repaired or replaced as soon as possible. A valve record system should be started and kept current.

All leaks should be repaired immediately. The existing method used to repair leaks in not satisfactory to contain leakage under the future higher pressures, and improved methods and materials should be used.

Time has not permitted a complete survey of services inside customer premises, and it is intended that this phase of the survey can be completed within the next two weeks. From observation, it is apparent the unreliable water supply encourages the consumer to leave fixtures open at all times to fill reserve tanks and reservoirs when water is available. When these reserves became full, they are allowed to overflow and the water is wasted. Elimination of this waste would contribute materially to the volume of water available to the consumer and will be the object of our survey in the immediate future.

LEAST COST ANALYSIS OF WATER SOURCE

A. Howard Humphreys & Sons

Howard Humphreys & Sons (HHS) investigated the possible sources of water for Surakarta and concluded that surface water was not available. The Solo River which flows past the city of Surakarta goes dry periodically and does not offer a firm water supply for the city. HHS also determined that there are no nearby sites where a dam could be economically constructed to impound water.

HHS did find two possible sources which would be economically developed to supply water to Surakarta; groundwater and the Cokrotulung Spring. HHS concluded that the source having the least cost, both capital and discounted costs, was the Cokrotulung Spring.

B. Burns & Donnell/Trans Asia's Analysis.

With USAID financial assistance, Cipta Karya retained the firms of Burns and McDonnell and Trans-Asia Engineering Associates, Inc. (BM/TA) to design HHS's proposed program for delivering an additional 250 liters per second of water to Surakarta and to prepare a scope of work for further ground water studies. BM/TA confirmed the probability of ground water being available in sufficient quantity and quality to supply Surakarta. In addition to the area proposed by HHS for exploratory drilling, BM/TA proposed that three additional areas he investigated. The development of the other areas would cost at least as much as the area proposed by HHS. In two cases, the source areas are farther removed from the city and the third area is anticipated to produce less water per well and calls for a greater depth of well and pumping.

C. Updating of Cost for Groundwater

HHS had made the following assumptions in their cost analysis for developing groundwater:

1. Average well production of 1,300 m3/day (0.34 MGD).
2. Effective period of pumping restricted to 15 hours.
3. Pumping rate of 24 liters per second (380 gal/min) per well.
4. Two out of three wells drilled would be successful
5. 30% standby capacity would be provided.

Data received and reviewed since the HHS study does not justify any changes in assumptions 3, 4 or 5. It is felt that with the improved electrical distribution presently being installed, pumping could be increased to 18 hours. The hours from 6:00 p.m. to midnight still

being discounted due to the rate schedule and restriction on the use of power. This revises assumptions 1 & 2 as follows:

1. 1,555 m3/day
2. Effective period of pumping 18 hours.

BM/TA has estimated the cost of a production well at $32,675 and a non productive well at $21,190. Using HHS assumption that one in every three wells will not be a productive well gives a cost per productive well at $43,270.

HHS used, as a basis for comparison, 150 1/sec. or 12,960 m3 per day, the additional allotment received from the spring. Surakarta will actually receive an additional supply of 250 1/sec. or 21,600 m3 per day. This will require 13.9 wells, or allowing 30% extra capacity, 18.1 wells. This figure has been rounded to 18 wells as the required number of wells to produce a firm water supply of 250 1/sec. The cost for these 18 wells would be $778,860 (18 wells x $43,270/well).

The estimated cost of the new transmission main from Cokrotulung Spring to Kartosuro Reservoir is $1,878,005. HHS assumed that the main from Kartosuro to Jebres would have to be constructed, even if wells were used, in order to provide for storage and distribution. Utilizing this same assumption it was determined that including capitalized power costs at the interest rates of 8%, 12% and 16%, Cokrotulung Spring still is more economical (see following table). This analysis is probably conservative for it is felt that there will be increases in the cost of power in the near future. Also, the availability of groundwater in adequate quantity and quality has not been proven. Lastly, the spring feeds the water system by gravity and with the two transmission mains the city is virtually assured that it will always have a supply of water. Certainly the water supply will not be dependent upon the unpredictable power in Indonesia.

D. Conclusion

Cokrotulung Spring is the least cost solution to supplying an additional 250 liters per second of potable water to Surakarta.

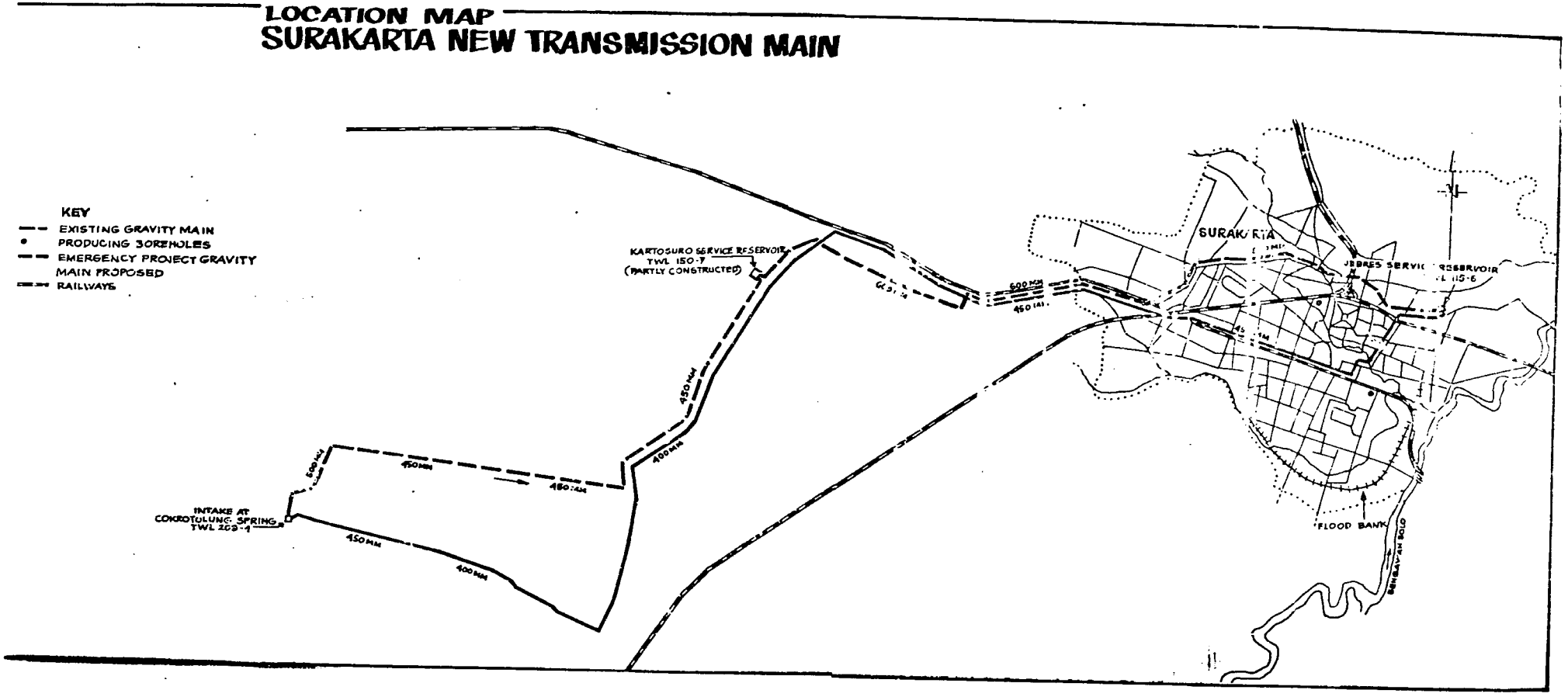
COSTS OF ALTERNATIVE SCHEMES TO SUPPLY
150 l/s TO KARTOSURO RESERVOIR
AS DETERMINED BY HOWARD HUMPHREYS & SON

SCHEME	ASSUMED DATE OF CONSTRUCTION	DESCRIPTION	COST IN MILLIONS OF RUPIAH (MILLION DOLLARS)				
			ANNUAL RECURRENT COST	CAPITAL COST	COST DISCOUNTED TO 1973 AT		
					8%	12%	16%
A GRAVITY MAIN	1973	Construct intake at Cokrotulung Spring and provide and lay gravity pipeline from Cokrotulung to Kartosuro Reservoir - 2.20 km of 500 mm dia. pipe, 5.70 km of 400 mm dia., 4.27 km of 350 mm dia. of steel or ductile iron pipes.		399 (0.96)	399 (0.96)	399 (0.96)	399 (0.96)
		TOTAL COST OF SCHEME A		399 (0.96)	399 (0.96)	399 (0.96)	399 (0.96)
B BOREHOLES	1973	Drill, test and equip 13 boreholes, and construct pipelines and power lines.		325 (0.78)	325 (0.78)	325 (0.78)	325 (0.78)
	1999	Replace 13 pumps		59 (0.14)	19 (0.05)	11 (0.03)	6 (0.01)
	2003	Replace 13 pumps		59 (0.14)	6 (0.01)	2	1
	1973 - 2013	Power, maintenance, and staff costs additional to those for Scheme A	15.0		179 (0.43)	124 (0.30	83 (0.20)
		TOTAL COST OF SCHEME B		443 (1.06)	529 (1.27)	462 (1.11)	415 (1.00)

CURRENT COSTS OF ALTERNATIVE SCHEMES TO SUPPLY
250 l/s TO KARTOSURO RESERVOIR

SCHEME	DESCRIPTION	COST IN DOLLARS				
		ANNUAL RECURRENT COST	CAPITAL COST	COST DISCOUNTED		
				8%	12%	16%
A GRAVITY MAIN	Gravity Water Main from Cokrotulung Spring.		1,878,005	1,878,005	1,878,005	1,878,005
			1,878,005	1,878,005	1,878,005	1,878,005
B BOREHOLES	1. Drill 18 Producing Wells.		778,860	778,860	778,860	778,860
	2. Equip 18 wells with Pumps & Chlorinators.		315,000	315,000	315,000	315,000
	3. Install Electric Service		108,000	108,000	108,000	108,000
	4. Replace 18 Pumps after 15 years.		225,000	70,929	41,107	24,284
	5. Replace 18 Pumps after 30 years.		225,000	22,360	7,510	2,621
	6. Power.	125,239		1,493,426	1,032,442	780,667
			1,651,860	2,788,575	2,282,919	2,009,442

LOCATION MAP
SURAKARTA NEW TRANSMISSION MAIN



ILLUSTRIOUS LIST OF TOOLS, EQUIPMENT, & REPAIR MATERIALS

	Item	Quantity	Unit Cost	Amount
1.	Meter Test Bench, Complete	1	$2,400	$2,400
2.	Tools For Meter Shop	1 set	1,200	1,200
3.	Air Compressor for Shop, electric	1	700	700
4.	Pipe Threading Machine, Elect. for Shop	1	1,200	1,200
5.	Drill Press w/accessories for Shop	1	800	800
6.	Tapping Machine (wet tap) ½" to 2"	4	1,000	4,000
7.	Tapping Machine for use w/saddles	4	800	3,200
8.	Pipe Saw, gasoline driven	2	600	1,200
9.	Pipe Cutter, hydraulic	4	425	1,700
10.	Pipe Tongs, various sizes	-	-	4,600
11.	Pressure Test Pump	2	1,000	1,000
12.	Pipe Threader, Ratchet Type	4	200	800
13.	Ratchet Wrencher, various	-	-	800
14.	Various Hand Tools	4 sets	600	2,400
15.	Recording Pressure Gage, Stationary	5	400	2,000
16.	Recording Pressure Gage, portable	3	400	1,200
17.	Gas Driven Ditch Pump	2	900	1,800
18.	Air Driven Ditch Pump	2	1,000	2,000
19.	Trailer Mounted Air Compressor	2	11,000	22,000
	MATERIAL FOR MAIN REPAIRS			
20.	Repair Clamps, various sizes	-	-	25,000
21.	Couplings, Compression Type	-	-	5,000
				85,000
	Shipping, Packing			20,000
	TOTAL			105,000

SURAKARTA POTABLE WATER
Depreciation Expense
Period CY 1977-

CY 1977 thru CY 1981

Per Annum		
Transmission Mains	60,000	
Distribution System	23,180	
Reservoir, Intake & Pressure T nk	2,667	
Reservoir & Water Intake	1,387	87,234

CY 1982 thru CY 1986

Per Annum		
Distribution System	23,180	
Reservoir, Intake & Pressure T nk	2,667	
Reservoir, W ter Intake	1,387	
Transmission Mains	99,654	
Distribution System	16,303	
Service Connections	75,322	
Public Baths & Faucets	5,646	
Equipment	23,650	247,809

CY 1987 thru CY 2007

Per Annum		
Distribution System	23,180	
Reservoir, Intake & Pressure Tank	2,667	
Reservoir, Water Intake	1,387	
Transmission Mains	99,654	
Distribution System	16,303	
Service Connections	75,322	
Public Baths & Faucets	5,646	224,159

SURAKARTA POTABLE WATER
Assets
December 31, 1975

Fixed Assets

System Constructed In 1929

Transmission Mains - 27 kilometers	3,000,000	
Allowance for Depreciation	2,640,000	360,000
Distribution System - 106 kilometers	1,738,400	
Allowance for Depreciation	1,043,040	695,360
Reservoir, Spring Intake & Break Pressure Tank	200,000	
Allowance for Depreciation	120,000	80,000

System Expansion Constructed In 1974

Reservoir and Water Intake	104,000	
Allowance for Depreciation	1,387	102,613
Total Fixed Assets		1,237,973

Depreciation Schedule

Asset	Useful Life	Depreciation Per Annum
Transmission Main	50 yrs	60,000
Distribution System	75 yrs	23,180
Reservoir, Intake, Pressure Tank	75 yrs	2,667
Reservoir & Water Intake	75 yrs	1,387

SURAKARTA POTABLE WATER
Assets Acquired From Project
As of December 31, 1981

Fixed Assets

Transmission Main

Base Project Costs	4,004,000	
Inflation 1978 15% - US Dols	482,700	
Inflation 1978 53% Rupiah	174,200	
Contingencies 10% of Base Dollars	321,800	4,982,700

Distribution System

Base Project Costs	999,000	
Inflation 1978 15% - US Dols	12,450	
Inflation 1978 53.41% Rupiah	202,950	
Contingencies 10% of Base Dollars	8,300	1,222,700

Service Connections

Base Project Costs	1,355,000	
Inflation 1978 15% US Dols	12,750	
Inflation 1980 32% US Dols	140,000	
Inflation 1981 41% US Dols	197,000	
Inflation - 53.41% Rupiah	78,000	
Contingencies 10% of Base Dollars	100,300	1,883,050

Public Bathhouses & Faucets

Base Project Costs	92,000	
Inflation 53.41% Rupiah	49,150	141,150

Equipment

Base Project Costs	100,000	
Inflation 1978 15% - US Dols	12,750	
Inflation 1979 30% - US Dols	3,000	
Inflation 53.41% Rupiah	2,500	118,250

Depreciation Schedule

	Useful Life	Depreciation Per Annum
Transmission Mains	50 yrs	99,654
Distribution System	75 yrs	16,303
Service Connections	25 yrs	75,322
Public Baths & Faucets	25 yrs	5,646
Equipment	5 yrs	23,650

SURAKARTA POTABLE WATER
NET ASSETS

Period 1975 through 1987

Fixed Assets	1975	1976	1977
System Constructed In 1929			
Transmission Mains	360,000	300,000	240,000
Distribution System	695,360	672,181	649,002
Reservoir, Spring Intake and Break Pressure Tank	80,000	77,333	74,666
System Constructed In 1974			
Reservoir and Water Intake	104,000	102,613	101,226
System Constructed In 1980			
Transmission Mains			
Distribution System			
Service Connections			
Public Bathhouse & Faucets			
Equipment			
Net Income Returned By Enterprise	-0-	-0-	-0-
Funds Carry Forward Plus Interest at 9% PA			
	1,239,360	1,152,127	1,064,894

1978	1979	1980	1981	1982	1983
180,000	120,000	60,000	-0-		
625,823	602,644	579,465	556,286	533,107	509,928
71,999	69,332	66,665	63,998	61,331	58,664
99,839	98,452	97,065	95,678	94,291	92,904
			4,982,700	4,883,046	4,783,392
			1,222,700	1,206,397	1,190,094
			1,883,050	1,807,728	1,732,406
			141,150	135,504	129,858
			118,250	94,600	70,950
-0-	-0-	34,038	191,860	200,990	37,950
			37,101	249,567	491,107
977,661	890,428	803,195	9,292,773	9,266,561	9,097,253

1984	1985	1986	1987	1988
486,749	463,570	440,391	417,212	394,031
55,997	53,330	50,663	47,996	45,329
94,291	92,904	91,517	90,130	88,743
4,683,738	4,584,084	4,484,430	4,384,776	4,285,122
1,173,791	1,157,488	1,141,185	1,124,882	1,108,579
1,657,084	1,581,762	1,506,440	1,431,118	1,355,796
124,212	118,566	112,920	107,274	101,628
47,300	23,650	-0-		
43,309	56,245	67,180	87,908	95,464
576,672	675,779	797,906	869,718	1,043,812
8,943,143	8,807,378	8,692,632	8,561,014	8,518,504

Solo Water
Debt Service
Loan Rps. 2,490,000,000 - 48 Installments
Interest at 9%/year

Outstanding Loan Amount	Semi-Annual Interest (9%)
Rps	Rps
2,490,000,000	112,050,000
2,438,125,000	109,715,625
2,386,250,000	107,381,250
2,334,375,000	105,046,875
2,282,500,000	102,712,500
2,230,625,000	100,378,125
2,178,750,000	98,043,750
2,126,875,000	95,709,375
2,075,000,000	93,375,000
2,023,125,000	91,040,625
1,971,250,000	88,706,250
1,919,375,000	86,371,875
1,867,500,000	84,037,500
1,815,625,000	81,703,125
1,763,750,000	79,368,750
1,711,875,000	77,034,375
1,660,000,000	74,700,000
1,608,125,000	72,365,625
1,556,250,000	70,031,250
1,504,375,000	67,696,875
1,452,500,000	65,362,500
1,400,625,000	63,028,125
1,348,750,000	60,693,750
1,296,875,000	58,359,375
1,245,000,000	56,025,000
1,193,125,000	53,690,625
1,141,250,000	51,356,250
1,089,375,000	49,021,875
1,037,500,000	46,687,500
985,625,000	44,353,125
933,750,000	42,018,750
881,875,000	39,684,375
830,000,000	37,350,000
778,125,000	35,015,625
726,250,000	32,681,250
674,375,000	30,346,875
622,500,000	28,012,500
570,625,000	25,678,125
518,750,000	23,343,750
466,875,000	21,009,375
415,000,000	18,675,000
363,125,000	16,340,625
311,250,000	14,006,250
259,375,000	11,671,875
207,500,000	9,337,500
155,625,000	7,003,125
103,750,000	4,668,750
51,875,000	2,334,375
-"-	-"-
TOTAL	2,745,225,000

Equal Installments of Interest	Rp. 57,192,188
Equal Installments of Principal	51,875,000
Each 6 month Installment	109,067,188
In US Dollars Semi Annually	$ 262,813
In US Dollars Annually	525,626

Project Started 1977 Loan Effective 1/1/77

2nd Step Loan US$ 6,000,000 Equivalent

Six Year Since principal & interest.

ANALYSIS OF WATER CONSUMPTION AND WATER CHARGES BY CONSUMER CLASSIFICATION, SURAKARTA, SEPTEMBER, 1975

	Number of Conn.	Minimum Cons. (M^3)	Excess Cons. (M^3)	Total Cons. (M^3)	Charge for Minimum Cost	Charge for Excess	Total Charge	Charge per M^3	Per Conn Water Charge	Meter Rent	Total Charge per Conn.
A I	1,987	29,805	5,276	35,081	298,050	98,250	396,975	11.32	199,79	62,50	263.29
A II	3,506	70,120	20,722	90,842	876,500	388,538	1,265,238	13.93	360.82	62.50	423.32
A III	1,560	39,000	22,168	61,168	585,000	498,780	1,083,780	17.72	694.73	62.50	757.23
A IV	160	4,800	4,697	9,497	93,200	117,425	210,625	22.18	1,316.41	62.50	1,378.91
TOTAL	7,213	143,725	52,863	196,588	1,852,750	1,102,993	2,955,743	15.04	409.78	62.50	472.28
Per Connection (A I - A IV)		19.9	7.3	27.2	257	153	410				
C I	209	10,450	5,602	16,052	261,250	210,075	471,325	29.36	2,255.14	125	2,380.14
C II	20	1,200	2,510	3,710	45,000	156,875	201,875	54.41	10,093.75	250	10,343.75
C III	1	100	7,622	7,722	2,500	285,825	288,325	37.34	288,325.00	250	288,575.00
TOTAL	230	11,750	15,734	27,484	308,750	652,775	961,525	34.98	4,180.54	136.41	4,316.95
Per Conn. (C I - C III)		51.1	68.4	119.5	1,342	2,838	4,181				
D I	225	4,500	21,994	26,494	56,250	549,850	606,100	22.88	2,693.78	62.50	2,751.28
D II	50	1,000	2,086	3,086	18,750	78,225	96,975	31.42	1,939.50	62.50	2,002.00
Total	275	5,500	24,080	29,580	75,000	628,075	703,075	23.77	2,556.64	62.50	2,619.14
Per Conn (D I - D II)		20.0	87.6	107.6	273	2,284	2.55				
E	118	5,900	721	6,621	44.250	10,815	55,065	8.32	466.65	62.50	529.15
F	41	1,230	508	1,738	7,688	6,350	14,038	8.08	342.39	62.50	404.89
GRAND TOTAL	7,877	168.105	93,906	262,011	2,288,438	2,401,008	4,689,441	17.90	595.33	(65)	(660)

MONTH OF SEPTEMBER, 1975

ANNEX B.6

ABILITY OF THE COMMUNITY TO PAY
FOR DOMESTIC WATER USED IN SURAKARTA

		1	2	3	4	5	6	7	8	9	10	11	12	13
		A I	A II	A III	A IV	C I	C II	C III	D I	D II	E	F	TOTAL	AI - AIV
1	Monthly water bill for minimum cons. per conn.	99.17	250.00	375.00	582.50	1,250	2,250	2,500	250	375	375		374.32	
2	Monthly water bill for excess cons. per conn.	74.95	110.04	319.73	733.91	1,435.77	10,843.75	285,826	2,443.78	1,564.50	91.65		329.94	
3	Total Bill from water sale	174.12	360.02	694.73	1,316.41	2,685.77	13,093.75	288,326	2,693.78	1,939.50	466.65		704.26	263.78
4	Rent for meter	62.50	62.50	62.50	62.50	125	250	250	62.50	62.50	62.50	62.50	64.66	62.50
5	Total monthly bill per conn.	236.62	422.52	757.23	1,378.91	2,810.77	13,343.75	288,576	2,756.28	2,002	529.15		768.92	326.28
6	Monthly family income if cost equals 2% of income	11,831.00	21,126	37,861.50	68,945.50									16,314
7	Estimated % of nonuser families with income in 1975 in excess of (8) (%)	58.9	27.8	10.8	2.4									39.6
8	50% Rate increase	354.93	633.78	1,135.85	2,068.37									489.4
9	Monthly family income if cost equals 2% of income	17,746.50	31,689.00	56,792.50	103,418.50									24,471
10	Estimated % of nonuser families with income in 1975 in excess of (9) (%)	35.6	14.5	3.8	a									24.0
11	100% Rate increase	473.24	845.04	1,514.46	2,757.82									652.56
12	Monthly family income if cost equals 2% of income	23,662	42,252	75,723	137,891									32,628
13	Estimate % of nonusers with income in 1975 in excess of (12)	24.9	8.4	1.9	a									14.0

GROUNDWATER INVESTIGATION

Purpose:

I. Determine if there is sufficient groundwater of acceptable quality available in the area north of Kali Anjar to economically provide water for projected development on an interim or long term bases.

II. Determine if there is sufficient groundwater of acceptable quality available within the city or its environs to economically provide water for the additional, current needs of Surakarta and its projected future needs through the year 2000.

Estimated Program North of Kali Anjar

1. Bore and log six, four-inch holes to obtain underground geological data. Average estimated depth is taken at ± 200 ft (60 m).

2. Estimated that at least Four of the above holes will be expanded to 12 inches in diameter and constructed and developed in accordance with good practice.

Estimated Program In and Around Solo

1. Bore and log twelve, four-inch holes to obtain underground geological data. Average estimated depth is taken at 100 m (328 ft). Two of the holes are assumed to be drilled to 500 ft (152 m) to obtain geological data below that currently available to ascertain availability of groundwater below depth of presently utilized aquifers.

2. Estimate that six wells will be enlarged to 12 inches in diameter and constructed and developed in accordance with good drilling practice.

Summary Costs Estimate

Exploratory Drilling	$125,000
Develope Test Wells	183,000
Technical Assistance	177,000
	$485,000

Impact Study

Purpose:

Since improved health is the project goal and so little is actually known about the health effects of such a project beyond a general association between improved quality and particularly, increased quantity of water and reduced incidence of waterborne or "water washed" diseases, a study is proposed to continually evaluate the health, economic and social impact of the project.

End of Project Status:

At the completion of the study the following information is expected to be known:

(1) A complete before and after project analysis of the general health, social and economic conditions of five distinct users of the city system (1) people served by house connections (2) people served by private yard hydrants (3) people served by public faucets (4) people served by public latrines and bath houses and (5) users of shallow wells in a representative, non project "test" area.

(2) The relationship between the above five levels of service and the relative health benefits gained. The final report will describe the shape of the function relating increments in health benefits to increments in water consumed among the five test groups. For this purpose the benefits will be quantified as studied in items 5 and 6 below.

(3) The relationship between real costs for water and water demand. The final report will describe two or more aspects of this relationships. For examples:

(1) how is demand influenced by the distance water has to be carried from the public fountains or the distance to public latrines and bath houses and (2) how is demand influenced by increased unit costs for house connections, private yard hydrants and vendored water carried from public faucets?

(4) The relationship between the provision of improved water supply and the provision of complementary improvements in public health, sanitation or personal hygiene. Indicators may be, for example, improvements in solid waste disposal, health education, increase in sales of tooth paste etc.

(5) The impact of the project on the morbidity and mortality of children under age 5 in the five service groups.

(6) The impact of the project on the morbidity and mortality of at least seven specific diseases in the general project area as reported to the City Health Department. Presently there is data being kept on cholera, dengue fever, malaria, typhus, diptheria, dysentary (both bacillary and amebic) and hepatitus.

(7) The impact and usage of private yard hydrants, public faucets, latrines and bath houses in Surakarta. The final report will include recommendations concerning relative mix, numbers, location, design, etc. to maximize this impact both for the proposed project and for the anticipated master plan.

Assumptions for Achievement of End of Project Status

(1) A study can be designed to find out the desired information.
(2) A research institution exists in Indonesia capable of conducting a professionally acceptable study.
(3) Baseline data can be obtained prior to completion of the new physical system.
(4) The GOI can be convinced of the importance of conducting such a study.

Outputs

1. A professionally designed three or four phase study similar to the study now being conducted with AID assistance in the Philippines.

2. A contract with a local research institution to conduct the impact study.

3. Motivation and adequate technical competence on the part of the staff of the City Health Department who will assist the researchers.

Inputs

1. Technical Assistance: A short term consultant will be retained under the proposed study to assist in the design of the study and to return semi-annually for short periods of review and evaluation.

2. Training: Three Indonesians, one from the research team, one from the City Health Department and one official of Cipta Karya will be given a 10 day trip to study the ongoing impact study being conducted in the Philippines. In addition, the consultant will conduct some initial training sessions with the research team and the City Health Department.

3. Materials and support: The contract will provide for all necessary materials and support for the research team.

4. Funding: AID will fund 100% of the costs of the study under the loan.

Methodology

The overall strategy for the three year project calls for three phases of activity in a "before-after" comparative study design, namely: (1) preparation of the research design and a base line survey (1978); (2) interim monitoring of significant events and changes 1978-81 and (3) the follow-up evaluation survey 1981. If it is decided that further follow-up is necessary AID will provide grant money for this purpose. Just prior to phase one, three Indonesians representing Cipta Karya, the Surakarta Health Department and the Local Research Contractor will be given a 10 day trip to observe the Philippine Impact Study.

Phase One: Preparation of the study design and base line survey (3 months April 1 - June 1978). This entails a review of the existing information, statistical and descriptive of the Health, Social and Economic situation of Surakarta and a review of the available literature on the relation of water supply systems to people and community welfare. Significant attention will be given to valid measures of impact and meaningful categories of investigation. The basic study design will be developed over the course of six weeks with assistance from a consultant familiar with the Philippine Impact Study.

The base line survey will follow immediately. This entails an assessment of the situation before the installation of the water supply system through a sample survey of the five service groups as outlined above. In addition, the design of phase two, Interim Monitoring will be presented, including a description of guidelines, recording procedures and supervisory-administrative activities entailed.

Phase Two: Interim Monitoring, 1978-81. Between the completion of base line data gathering (Spring of 1978) and the beginning of data gathering for the follow-up evaluation survey (Spring of 1981), the Research Contractor assisted by the Surakarta Health Department will carry on monitoring activities. These persons will record significant events and changes in the community which might later be associated with the impact measures of the water supply system. The research team will also keep track of the progress of the water system installation and related events at various stages. This participant-observation approach will allow more meaningful explanations as to why certain results have or have not emerged by 1981. It will also indicate any fluctuations in response during the interim period.

The results of Phase Two will be presented in a report.

Phase Three: Follow-up evaluation survey, Spring 1981. The same surveys and other forms of investigation undertaken during the base line phase will be repeated three years later when the new water supply system has been installed and its impact presumably felt in the community. This will result in a report assessing the health and economic impact of new water supply systems on the people and community of the participating provincial cities.

Cost Analysis

	Item	Unit	Unit/Cost	Amount
1.	Consultant	7 mm	$8,600/m	$ 60,200
2.	Surveyors/Monitors	7,200 md	$ 2.50/md	$ 18,000
3.	Supervisor	360 md	$ 7.50/md	$ 2,700
4.	Obs Trips	3x10 days	$3,000/trip	$ 9,000
5.	Contractors Support	(materials, local transport, printing, etc.)		$ 10,000
			Sub-Total	$100,900
			Inflation	38,000
			Contingencies	10,000
			Total	$148,900
			Say	$150,000

Environmental Assessment

On an overall basis, the project will have very little effect on the ecology and environment of the area involved. The few environmental concerns, related to construction, drainage and wastewater disposal, are identified and discussed below.

The supply and distribution of potable water for the city of Surakarta will involve the installation of a transmission main from the existing source of supply, Cokrotulung Spring, to the city reservoir, a network of distribution mains, customer service connections and meters, fire hydrants, public faucets and public bath houses. Intake facilities at the Spring have already been constructed. A new reservoir has been constructed at Kartosuro. The old city reservoir at Jebres has been in existence and functioning for many years. These facilities do not present any environmental problems. The transmission and distribution mains generally will follow roads and streets and other existing right-of-way. All pipes will be installed below ground level in trenches and the surface restored to existing conditions. The water reaches the reservoir via gravity flow and the distribution system also operates by gravity, thus eliminating any need for pumping equipment with accompanying noise or air pollution.

Therefore, in general, any damage to the environment or inconvenience to the public through the actual construction and installation operations associated with the supply and distribution of water will be of only a temporary and minor nature. The consultant is taking into consideration any potential adverse effects of the construction activities in both the design of the water system and the program for construction supervision.

The many benefit to public health from an expanded and more effective water system have already been elaborated upon elsewhere in this paper. Of concern there are the potential hazards due to the generation of greater wastewater flow than at present. Such an increase in wastewater flows are expected as a result of increased water use and more dependable distribution.

In Surakarta, the issues of wastewater disposal and drainage are closely allied. In many countries, the construction of a comprehensive water borne sewerage system for waste water disposal is deemed to be of high priority in the prevention of epidemics and in pursuance of a general increase in the standard of living; the prevention of minor flood nuisance is considered of secondary importance. In Surakarta, the position is reversed because of the particular conditions existing there: the provision of a water borne sewerage scheme is considered to be much less important than the reduction of the annual stormwater flooding.

Situated on the Solo River, at the confluence of several tributaries, much of the city of Surakarta is relatively low lying and, in past times, has been periodically inundated by high river flows. Stormwater drainage and flood prevention measures have developed steadily since 1900 and the resultant works have provided protection within the city from external floods but have not yet fully dealt with the annual stromwater flooding. As a result, portions of the city undergo annual stormwater flooding with polluted water from watercourses that are in general use as latrines. It must, however, be observed that considerable efforts are now being made by the Municipality to remedy the situation. Drains are being improved and cleaned, additional drainage pumping facilities are being constructed. The additional wastewater generated by this project will be insignificant by comparison with stormwater run-off in terms of being a burden to the existing surface drainage facilities. On the other hand, the provision of round-the-clock dependable water supply to the existing 147 public latrines should render major assistance to efforts to clean up the open storm channels.

There already exists an elementary sewerage system in Surakarta for wastewater disposal. The condition of the system is structurally sound and the system functions reasonably efficiently to outfalls to the rivers. The system basically consists of a network of secondary sewers fed at the upper end by a continual flow of "flushing water" from intakes on the various rivers and discharging generally into stormwater channels and watercourses. There is no record of the number of properties connected to the sewerage system but as a general policy those properties within 100 m of a secondary sewer are supposed to have connections, in the higher class residential areas this distance is reduced to 70m. The remaining properties in the city are served by individual septic tanks, pit latrines or discharge directly into open channels. The consultant reports that septic tanks and pit latrines are causing no general offence although evidence suggests that they contribute to the contamination of well water in the more densely populated areas of the city. The provision of piped water into such areas, under this project, will be a major step in correcting this health hazard. In addition, the present water distribution system is subject to contamination by infiltration owing to spasmodic negative pressures in the lines. Under the new improved distribution system, the water supply will be under sufficient pressure to prevent infiltration and the incidence of waterborne disease should consequently decline.

In view of the availability of an elementary sewerage system and steps being taken by the city to cope with the stormwater flooding, there is no reason

to anticipate that the additional wastewater expected to be generated under this proposed project will lead to public health problems in the near future.

Sewage disposal may become a problem over the long term and may precipitate adverse environmental conditions. Such developments will work to force attention on a solution. It is anticipated that, with the expected improvement in the country's general economic situation, Surakarta will ultimately be able to afford a comprehensive sewerage system and also a sewage treatment works.

Therefore, on balance, the long term benefits to be derived from an increased, dependable supply of potable water, furnished under sufficient pressure to large numbers of the city's residents, clearly outweigh the potential for any negative benefits due to increased wastewater disposal.

Department of State **TELEGRAM**

UNCLASSIFIED 1776

PAGE 01 JAKART 05068 2906522

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ACTION AID-50

INFO OCT-01 EA-09 IGA-02 EB-07 L-03 /081 W
058499

P 2906172 APR 76
FM AMEMBASSY JAKARTA
TO SECSTATE WASHDC PRIORITY 4124

UNCLAS JAKARTA 5068

AIDAC

E.O. 11652:N/A
SUBJ: SURAKARTA AND SURABAYA WATER PROJECTS

REF: STATE 093332

1. PROJECT AS ORIGINALLY CONCEIVED BY GOI AND DESCRIBED IN HUMPHREY AND SONS REPORT FOUR YEARS AGO WAS INTENDED TO ADDRESS A SHORTAGE OF WATER IN SURAKARTA WHICH WAS THEN AND STILL IS NOW ACUTE. FAC THAT PROJECT DEVELOPMENT SLIPPED IS MOSTLY DUE TO AID'S LENGTHY ADVERTISING PROCEDURES COMBINED WITH ILL ADVISED DECISION TO ADVERTISE SURAKARTA WITH TWO OTHER SIMILAR PROJECTS THAT WERE LESS URGENT AND LESS ADVANCED. IT DOES NOT REFLECT ON THE CONTINUED URGNCY OF SURAKARTA'S WATER SUPPLY PROBLEMS. GOI HAS PROCEEDED WITH OWN FUND CONSTRUCTING NEW WATER INTAKE STRUCTURE AT COKROTULUNG SPRING AND NEW RESERVOIR AT KARTASURA, BOTH IN HUMPHREY'S RECOMMENDATIONS. PROPOSED LOAN WOULD SIGNIFICANTLY RELEIVE WATER SHORTAGE BY INCREASING WATER SUPPLY FORM EXISTING SPRING WHILE ALLOWING GOI TO PROCEED WITH GROUND WATER DEVELOPMENT FOR FUTURE SUPPLY.

2. BEING A STOPGAP PROJECT, SURAKARTA PROJECT DOES NOT PRETEND TO ADDRESS ALL WATERNEEDS FOR ALL PEOPLE MUCH LESS ALL POOR PEOPLE IN CITY. NEVERTHELESS, WITH REVISED WATER AVAILABILITY OF 400 1/S, PROJECT AS NOW DESIGNED WILL (A) BRING WATER TO SOME 130,000 PERSONS, OR 24 PERCENT OF CITY'S PROJECTED 1980 POPULATION, AS COMPARED TO 10

UNCLASSIFIED

FORM

PERCENT OF PRESENT POPULATION HAVING CLEANWATER NOW; (B) ESTABLISH A VIABLE WATER UTILITY; (C) ASSIST IN BRINGING ABOUT GENERALLY IMPROVED SANITATION; AND (D) MAKE A SIGNIFICANT START IN MEETING WATER REQUIREMENTS OF THE LOWERINCOME GROUPS.

3. SPECIFICALLY, PRESENT PLANS ARE TO INSTALL SOME 200 PUBLIC WATER TAPS (DOUBLE THE NUMBER ESTIMATED IN PRP) WHERE NONE REPEAT NONE EXIST NOW. NUMBER OF PERSONS TO BE SERVEDBY EACH HYDRANT UNCERTAIN BUT TAKING USAID AND CIPTA KARYA ESTIMATE OF 300, NEWLY INSTALLED WATER TAPS WOULD DELIVER WATER TO SOME 60,000 PERSONS WHO DO NOT NOW HAVE ACCESS TO A SANITARY WATER SUPPLY. ADDITIONALLY, AT LEAST FIVE PUBLIC BATHS WILL BE BUILT. CONSULTANT'S ESTIMATE IS THAT MEDIAN MONTLY PER CAPITA INCOME OF THE BENEFICIARIES SERVED BY PUBLIC WATER OUTLETS IS ABOUT $5.58 WHICH COMPARES WITH $11,00 FOR THE JAVA URBAN AVERAGE EVEN ASSUMING SUBSTANTIAL UNDERREPORTING OF INCOME IN THE CONSULTANT'S SURVEY OF SURAKARTA, IT IS CLEAR THAT THE MAJORITY OF THE USERS OF PUBLIC WATER TAPS ARE POOR BY ANY DEFINITION.

4. IN ADDITON TO WATER TAPS AND OHER PUBLIC FACILITIES, PROJECT WILL PERMIT SURAKARTA TO INSTALL 3,500 HOUSE CONNECTIONS. REDUCTION FROM 9,500 ESTIMATED IN PRP IS DUE TO INCREASED ESTIMATED PER CAPITA CONSUMPTION OF 150 LPCD. FYI, USAID-ASSISTED STUDIES IN SEMARANG AND SURABAYA, AND CUSTOMER SURVEY IN SURAKARTA INDICATE 150 LPCD IS CLOSER TO ACTUAL CONSUMPTION THAN 100 LPCD ASSUMED IN PRP WHEN A RELIABLE WATER SYSTEM IS INSTALLED. THIS USAGE IS DOMESTIC AND DOES NOT INLCUDE COMMERTCAL OR INDUSTRIAL USE; HOWEVER, SOME SERVICES CLASSIFIED AS RESIDENTIAL SERVE HOMES PLUS SMALL SHOPS OR SMALL COTTAGE INDUSTRIES. CIPTA KARYA ALSO FEELS THAT 150 LPCD A MORE REALISTIC FIGURE. END FYI, TAKING CONSULTANT'S ESTIMAE OF 5.8 PERSONS PER HOUSEHOLD WITHMETERED CONNECTIONS, AN ADDITIONAL 70,620 PERSONS WILL BE SERVED BY CONNECTIONS. CONSULTANT ESTIMATES MEDIAN MONTLY PER CAPITAINCOME OF THESE BENEFICIARIES TO BE IN RANGE OF $10-11, SAME AS JAVA-WIDE FIGURE FOR URBAN POPULATION. EVEN IF IT ASSUMED THAT ONLY HAFL OF INCOME

OF WATER USERS WAS REPORTED IN SURAKARTA CONULTANT'S SURVEY, IT STILL THE CASE THAT ONE FOURTH OF POPULATION WITH WATER CONNECTIONSHAVE LESS THAN JAVA URBAN MEDIAN INCOME.

5. RE PARA 2 AND 3(A) REFTEL, DECREASE IN THE ESTIMATED NUMBER OF BENEFICIARIES IS DUE TO REVISED PER CAPITA CONSUMPTON FIGURES AND NOT REPEAT NOT TO INCREASED COMMERCIAL & INDUSTRIAL USE. NOTE ALSO THAT EFFECT OF HIGHER PER CAPITA CONSUMPTION ESTIMATES ON NUMBER OF BENEFICIARIES PARTIALLY OFFSET BY INCREASED WATERAVAILABILITY OF 400 LPS AS COMPARED TO PRP ESTIMATE OF 300LPS.

6. RE PARA 3(B) USAID AND CONSULTANT WILL SUGGEST INVERSE RATE STRUCTURE UNDER WHICH PER UNIT COST OF WATER INCREASES WITH GREATER USAGE. THIS, HOWEVER, NOT YET AGREED TO BY GOI AND NOT EXPECTED TO HAVE SIGNIFICANT EFFECT ON WATER ALLOCATION. RATES WOULD HAVE TO BE INCREASED SOME 200 PERCENT TO HAVE SIGNIFICANT DETERRENT EFFECT ON WATERPUSE. AS NOTED ABOVE, PROJECT DESIGN HAS ALREADY BEEN MODIFIED TO SERVE URBAN POOR BY INCLUSSION OF 200 TAPS, 5 BATHHOUSES AND IMPROVED WATER SUPPLY TO PUBLIC LATRINES. GOI AND MUNICIPALITY INDICATE THEY WILL ACCEPT 200 PUBLIC TAPS AND FIVE BATHHOUSE FACILITIES BUT DOUBT GOI WOULD AGREE TO ADDITIONAL DESIGN OR POLICY CHANGES FAVORING THE POOR IN THIS STOPGAP PROJECT WITHOUT AT LEAST SOME EXPERIENCE IN OPERATION AND UTILIZATION OF THESE FACILITIES. MISSION HAS CONSIDERED POSSIBILITY OF INCREASING PUBLOC BATHS TO TOTAL OF TEN BUT UNCERTAIN WHETHER THIS CONCEPT WILL PORVE TO BE MORE ECONOMICAL AND POPULAR THAN PESENTLY EXISTING LATRINES WHICHPALSO ARE USED FOR BATHING. FOR SAME REASON NO INCREASE PRSENTLY PLANNED IN 147 EXISTING LATRINES. IN THIS REGARED, AGREE WITHGOI THAT NEED MORE EXPERIENCE BEFORE DECIDING ON HOW TO REACH EVEN LARGER SEGMENT OF LOW INCOME POPULTION. FYI APPEARS FAIRLY CERTAIN THAT THERE WILL BE WATER CHARGES BUT DOUBTFUL THAT LEVEL, STRUCTURE AND ADMINISTRATION WILL BE DECIDED BEFORE SUBMISSION PP.END FYI.

1. CONSULTANT HAS PEPFORMED FIRST THEREE TASKS LISTED PARA 3(D) REFTEL. ANTHROPOLIGIST WOULD BE NEEDED TO ADDRESS

PAGE 04 JAKART 05068 29Ø652Z

CONCERNS RAISED PARA 3(D)4 AND WE QUESTION WHETHER TIME AVAILABLE SUFFICIENT TO PERMIT THOROUGH TREATMENT OF THESE QUESTIONS. CONSULTANT HAS CONSIDERED BUT NOT RESOLVED PROBLEM NOTED PARA 3(D) 5. APPEARS TO MISSION THAT UTILIZING CONSULTANT'S ECONOMIST WHO CONDUCTED INITIAL INVESTIGATIONS AND HIS INDONESIAN COUNTERPART COULD ADDRESS THIS QUESTION. CONSULTANT PROJECT MANAGER AGREEABLE.

8. ON BALANCE MISSIONFEELS SURAKARTA WATER PROJECT AS RESPONSIVE TO MANDATE CONCERN WITH URBAN POORAS CAN REASONABLY BE EXPECTED GIVEN ITS ORIGINAL OBJECTIVE OF ADDRESSING WATER SUPPLY SHORTAGE OF EMERGENCY PROPORTIONS AND GIVEN URGENCY OF ITS IMPLEMENTATION. A MORE SYSTEMATIC AND FOCUSED EFFORT TO REACH THE VERY POOR SHOULD AWAIT THE EXPERIENCE WAIVED UNDER THIS PROJECT. SURARAKAT WILL CONFRONT ANOTHER MAJOR WATER SHORTAGE IN DIR OR 85. GOI AWARE OF THIS AND INDENDS PROCEED WITH GROUND WATER INVESTIGATION, MASTER PLANNING, AND CONSTRUCTION OF NEW FACILITIES TO MEET FUTURE REQUIREMENTS.

9. CONCUR PARA 4 REFTEL THWT FY 76 AUTHORIZATION SORABAYA WATER DESIGN PROJET NOT FEASIBLE.

10. URGENTLY NEED GUIDANCEPROMISED PAA 5 REFTEL.
NEWSOM

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : Project Committee

DATE: April 30, 1976

FROM : ASIA/PD, Robert Queener

SUBJECT: INDONESIA - Proposed Surakarta Water Supply Loan

REFS: (A) JAKARTA 5068 (attached)
(B) STATE 093332

There will be a Project Committee Meeting on Monday, May 3 at 2:00 p.m. in the 6th Floor Conference room, Rosslyn Plaza, to discuss subject project and additional information presented in REF A.

Your participation is invited.

Project Committee:
ASIA/PD:J. R. McCabe
ASIA/PD/EA:M. M. Pehl
ASIA/TR:I. Jackson
SER/ENG:J. Neave
ASIA/EAA/I:B. Dupuis
ASIA/DP:W. Sherwin
GC/ASIA:C. Stephenson
PPC/DPRE:H. Sharlach

Attachment: a/s

LOAN AUTHORIZATION

A. I. D. Loan No.: _____

Provided under : Section 104;
Population Planning
and Health

For: Indonesia Surakarta Potable Water Project

Pursuant to the authority vested in the Administrator, Agency for International Development ("A.I.D."), by the Foreign Assistance Act of 1961, as amended ("Act") and the delegations of authority issued thereunder, I hereby authorize the establishment of a Loan pursuant to Section 104 of said Act to the Government of the Republic of Indonesia ("Borrower") of not to exceed six million, eight hundred thousand United States dollars ($6,800,000) to assist in financing the United States dollar and local currency costs of a potable water project for the city of Surakarta, the Loan to be subject to the following terms and conditions:

1. Terms of Repayment and Interest Rate

Borrower shall repay the Loan to A.I.D. in United States dollars within forty (40) years from the date of the first disbursement under the Loan, including a grace period of not to exceed ten (10) years. Borrower shall pay to A.I.D. in United States dollars interest at the rate of two percent (2%) per annum during the grace period and three percent (3%) per annum thereafter on the outstanding disbursed balance of the loan and on any due and unpaid interest accrued thereon.

2. Other Terms and Conditions

a. Except as A.I.D. may otherwise agree in writing:

(1) Goods and services financed under the Loan shall have their source and origin in Indonesia and countries included in A.I.D. Geographic Code 941;

(2) The Borrower shall agree, by condition precedent, covenant, or both, to provide on a timely basis its portion of project financing at levels, under arrangements and on timing acceptable to A.I.D.

(3) Appropriate provision shall be made in the loan agreement concerning the following:

a) Establishment and operation of the Surakarta Water Enterprise

b) Agreement on a rate structure that will assure equitable rates for lower-income consumers

b. The loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

Administrator

Date

Project Description for Loan Agreement

The Loan provides assistance to the Ministry of Public Works and Electric Power and the Surakarta Water Enterprise in the carrying out of the Surakarta Potable Water Project.

The Project shall consist of: (1) the construction and equipping of a 27 kilometer transmission main from the Cokrotulung Spring to water reservoirs serving Surakarta; (2) construction of a distribution system of approximately 51 kilometers and establishment of a leak detection, maintenance and repair program; (3) supplying approximately 16,200 water meters and meter shop equipment; (4) installation of approximately 13,000 yard hydrants; (5) construction of approximately 200 public faucets, ten public bathing facilities and rehabilitation of the existing 147 public latrines; (6) groundwater exploration studies, including drilling up to 18 test wells, to search for additional sources of water supply; (7) a study, undertaken by a local research group in connection with the Surakarta Health Service to assess the health, economic and social impact of the Project; (8) staff training; and (9) consultant advisory services.

Surakarta Municipal Water Supply

LOGICAL FRAMEWORK MATRIX

I. A. Program or Sector Goal	B. Measures of Goal Achievement	C. Means of Verification	D. Assumption
1) Improve the health and sanitary conditions in Indonesia	1) Reduction of morbidity and mortality from water-borne diseases in Indonesia	1) Provincial and National Health statistics of GOI	1) GOI data is available and reliable
2) Contribute to the GOI Repelita II goal of a national increase of from 350 MGD to 662 MGD in the supply of potable water available to urban users	2) Reduction of mortality and morbidity among children in Indonesia in the age group 0-5	2) Health Impact Study of Surakarta Project	2) Impact Study will be effective
	3) Increase in life span of average Indonesian	3) GOI Repelita II reports and evaluation	3) Priority of goal in Repelita II is maintained
	4) Increase of potable water available to urban users in Indonesia		

A. Project Purpose	B. End of Project Status	C. Means of Verification	D. Assumptions
1) To increase the amount, reliability and quality of the potable water delivered to present users in Surakarta	1) Water Supply increased from 153 l/s to 400 l/s. Reliable service 24 hrs/day. Ongoing program to insure water is safe. As much as possible of increased supply will flow to urban poor. A groundwater study will have found additional sources of water adequate for the long range needs of the city. A new rate structure will insure that this new supply is not wasted. An improved O&M capability will reduce losses.	1) Capacity test of installed transmission line 2) Water taste 3) Data from Surakarta Water Enterprise 4) Contractors Evaluation 5) Count of new connections and census of city 6) Evaluation Reports of local Research Team	1) The Mayor of Surakarta will agree to continue the "no new service connections" policy for industrial, commercial and residential customers until such time as additional sources are found
2) To extend the availability of such water as much as possible to lower income families, providing free water, sanitary facilities including paramedical health care units to the really poor and the destitute	2) Distribution System - A new transmission main and distribution system will be in operation and the old system upgraded. The integrated network will be providing water to 188,000 people or 93% of the projected 1981 population (vs. 49,860 people or 11% of the present population).		2) All present cross-connections and auxilliary pumps which may contaminate the municipal water supply can be eliminated
3) To evaluate periodically the social, economic and health impact of project outputs over a five year period	3) Service to Urban Poor - Up to 13,000 metered yard hydrants will be provided to the urban poor in the most congested areas of the city to replace contaminated wells. 200 free public water taps and ten public bathhouses will be serving needs of very poorest people. Bathhouses will have extra room attached for paramedical health care. 147 existing latrines will be upgraded and provided free water/ 24 hrs/day. 4) Surakarta Water Enterprise - A financially sound semi-autonomous, new utility will be operating and maintaining new system. 5) Evaluation - The project will have been continually evaluated throughout implementation and 1st yr of operation by local Indon. Research Team.		3) The Surakarta Water Enterprise can inforce the Mayor's stated policy 4) The Enterprise can manage, operate and maintain the new system 5) The Health, Social and Economic Impact Study will be useful to correct deficiencies in the project as well as have beneficial influence on other water supply projects in Indonesia and other LDC's

A. Outputs	B. Magnitude of Outputs	C. Means of Verification	D. Assumptions
1) Transmission Main - From Cokrotulung Spring to Kartosuro reservoir and on to Jebres reservoir - total distance 27.3 km. Necessary fittings, valves, meters and communication equipment to operate main plus chlorination equipment.	1) Iron ductile pipe Size — Length 450 mm (18 in) — 10.0 km 500 mm (20 in) — 9.2 km 600 mm (24 in) — 8.1 km total — 27.3 km	1) Contractors reports 2) Consultants reports 3) GOI reports 4) Surakarta Water Enterprise Data 5) Site inspections 6) Impact Study reports	1) Adequate construction capability exists in the areas
2) Distribution System - 51.5 km of new water main will be installed. Leak detection, maintenance and repair program will become operational to upgrade old network and maintain new reticulation.	2) Pipe size — Length 100 mm (4 in) — 35.5 km 150 mm (6 in) — 1.5 km 200 mm (8 in) — 2.3 km 300 mm (12 in) — 12.2 km total — 51.5 km		2) Surakarta Water Enterprise will be able to locate leaks and upgrade old system
3) Services and Meters - Unrepairable meters in present system will be replaced and meters will be installed on all public faucets, latrines, bathhouses, swimming pools etc. as well as on all new yard hydrants installed.	3) 15,157 meters		3) Yard hydrants will effectively replace shallow wells
4) New Service Connections - Construction of yard hydrants, public faucets and bathhouses. Water supplied to existing latrines.	4) 13,000 yard hydrants 200 public faucets 10 bathhouses 147 latrines		4) Public faucets and bathhouses will be used by and adequately serve needs of very poor
5) Groundwater Study - Additional source of water supply located sufficient enough to meet long range needs of city.	5) 10 boreholes		5) The groundwater investigations will locate sufficient additional sources of water to meet the medium term and long range needs of the city
6) Health, Social and Economic Impact Study	6) Continuous Evaluations		6) A local University is capable of conducting an accurate, meaningful and useful study

IV. A. Inputs

AID Financing

1) Construction transmission main, fittings, valves, meters, communication and chlorination equipment

2) New distribution mains, service connections, meters and associated appurtenances

3) Materials cost of yard hydrants, public faucets, bathhouses and upgrading of latrines

4) 75% of Groundwater Study

5) 100% of Impact Study

6) Expatriate Supervision of Construction

7) Technical Assistance and Training

GOI Financing

1) Labor costs of installation of transmission main and distribution system
2) Upgrading of old distribution system
3) Labor cost of construction of yard hydrants, public faucets, bathhouses and upgrading of latrines
4) 25% of Groundwater Study

B. Implementation

Disbursements
(millions US$)

1)

Year	AID	GOI	TOTAL
FY77	282	527	809
FY78	4791	1510	6311
FY79	249	778	1027
FY80	708	548	1256
FY81	765	377	1142
FY82	-	43	43

(See Implementation Plan for added details)

C. Means of Verification

1) GOI Reports

2) AID Monitoring

3) Consultants Reports

4) Vouchers

D. Assumptions

1) That the Governor of Central Java will grant in writing an additional allocation of 250 l/s to the city of Surakarta from the Cokrotulung Spring

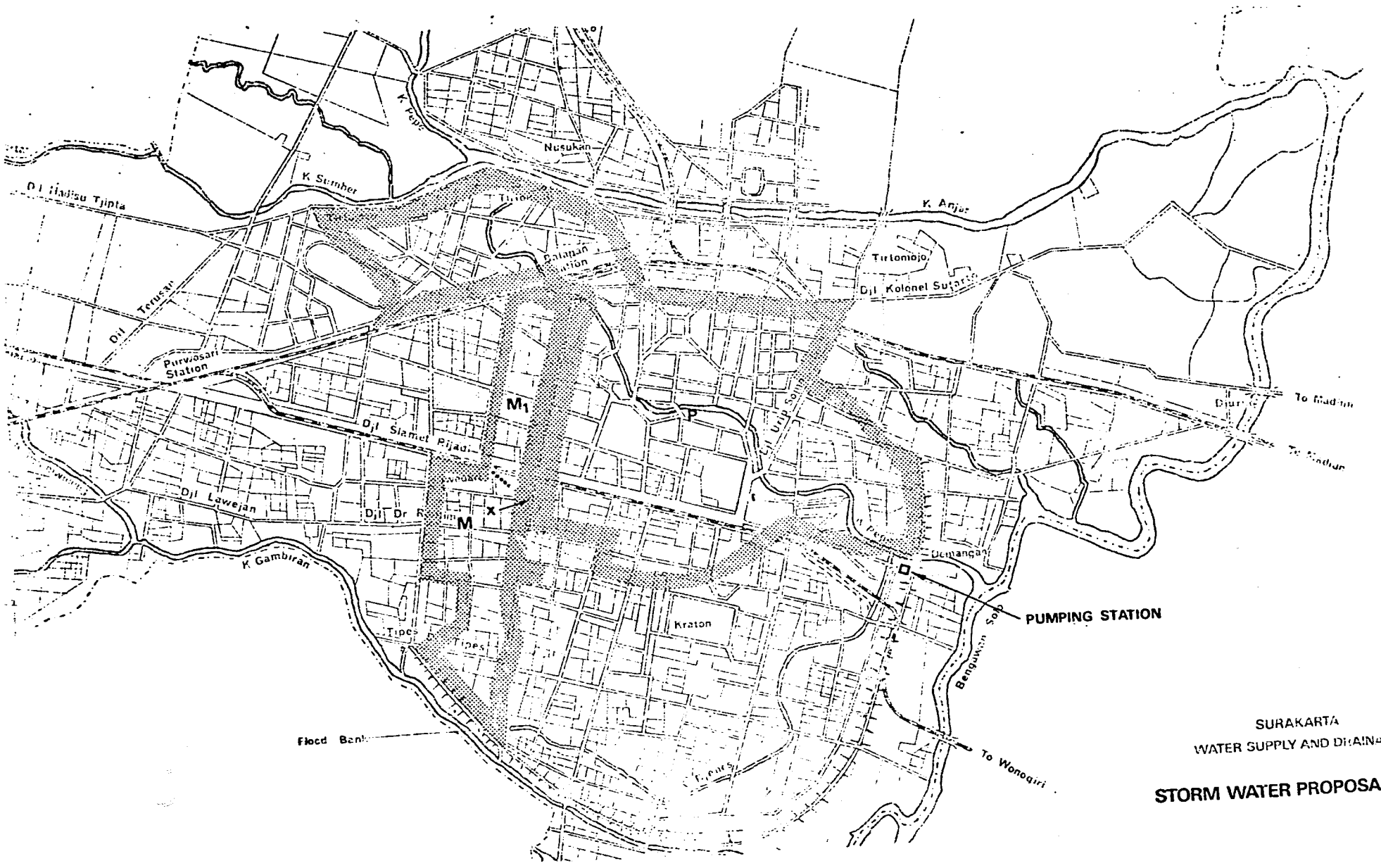
2) That TA can be recruited and candidates for training will be found

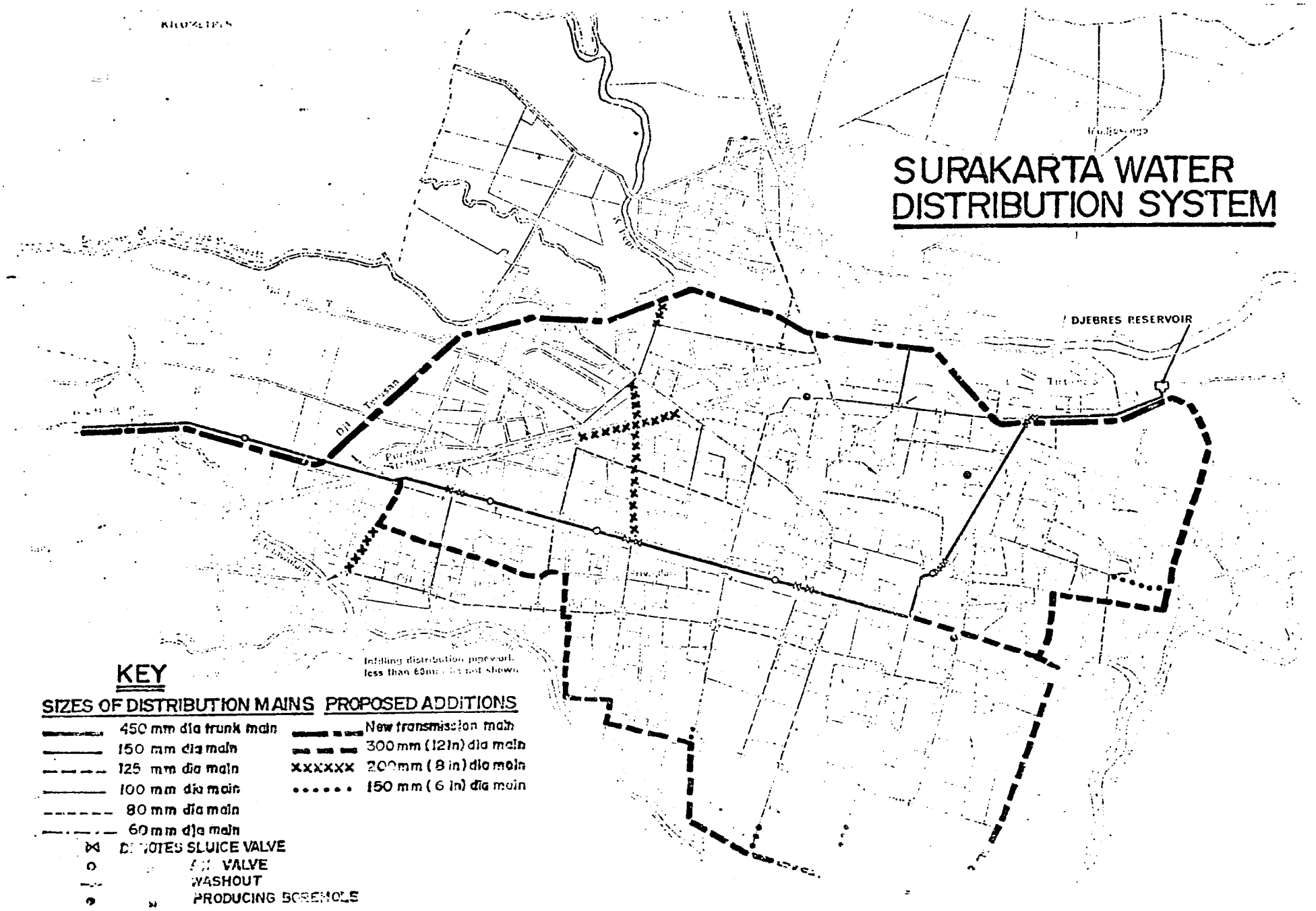
3) That the materials will be provided on time and in sufficient quality and quantity

4) That the local contractors are sufficiently skilled to do the job under supervision

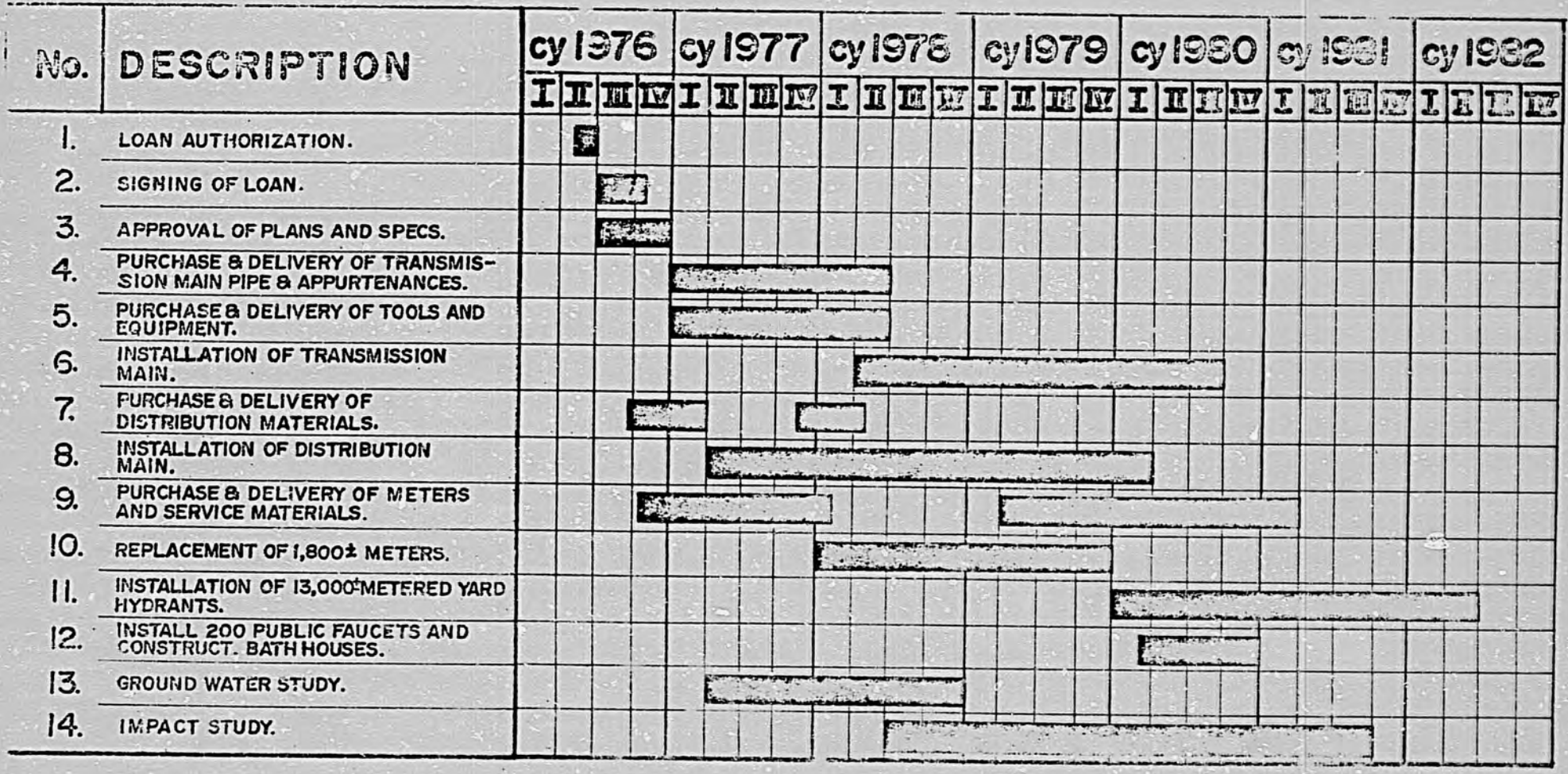
5) GOI makes budget provisions for and provides other inputs on a timely basis

Note:
Assumption 1 will be a CP for disbursement


K. Pepe
Nusukan
K. Sumber
Jl. Hadisu Tjipta
K. Anjar
Tirtonirojo
Jl. Kolonel Sutarto
Jl. Terusan
Purwosari Station
Jl. Slamet Rijadi
M1
P
Jl. Urip Sumoharjo
To Madiun
Jl. Lawejan
M
X
K. Gambiran
Demangan
PUMPING STATION
Kraton
Bengawan Solo
To Wonogiri
Flood Bank
SURAKARTA
WATER SUPPLY AND DRAINAGE
STORM WATER PROPOSALS


SURAKARTA WATER
DISTRIBUTION SYSTEM
DJEBRES RESERVOIR
Jl. Tawangsari
Pumping Station
KEY
SIZES OF DISTRIBUTION MAINS
450 mm dia trunk main
150 mm dia main
125 mm dia main
100 mm dia main
80 mm dia main
60 mm dia main
DENOTES SLUICE VALVE
VALVE
WASHOUT
PRODUCING BOREHOLE
PROPOSED ADDITIONS
New transmission main
300 mm (12in) dia main
200mm (8 in) dia main
150 mm (6 in) dia main

ED PRO EDULE


No.
DESCRIPTION
cy 1976
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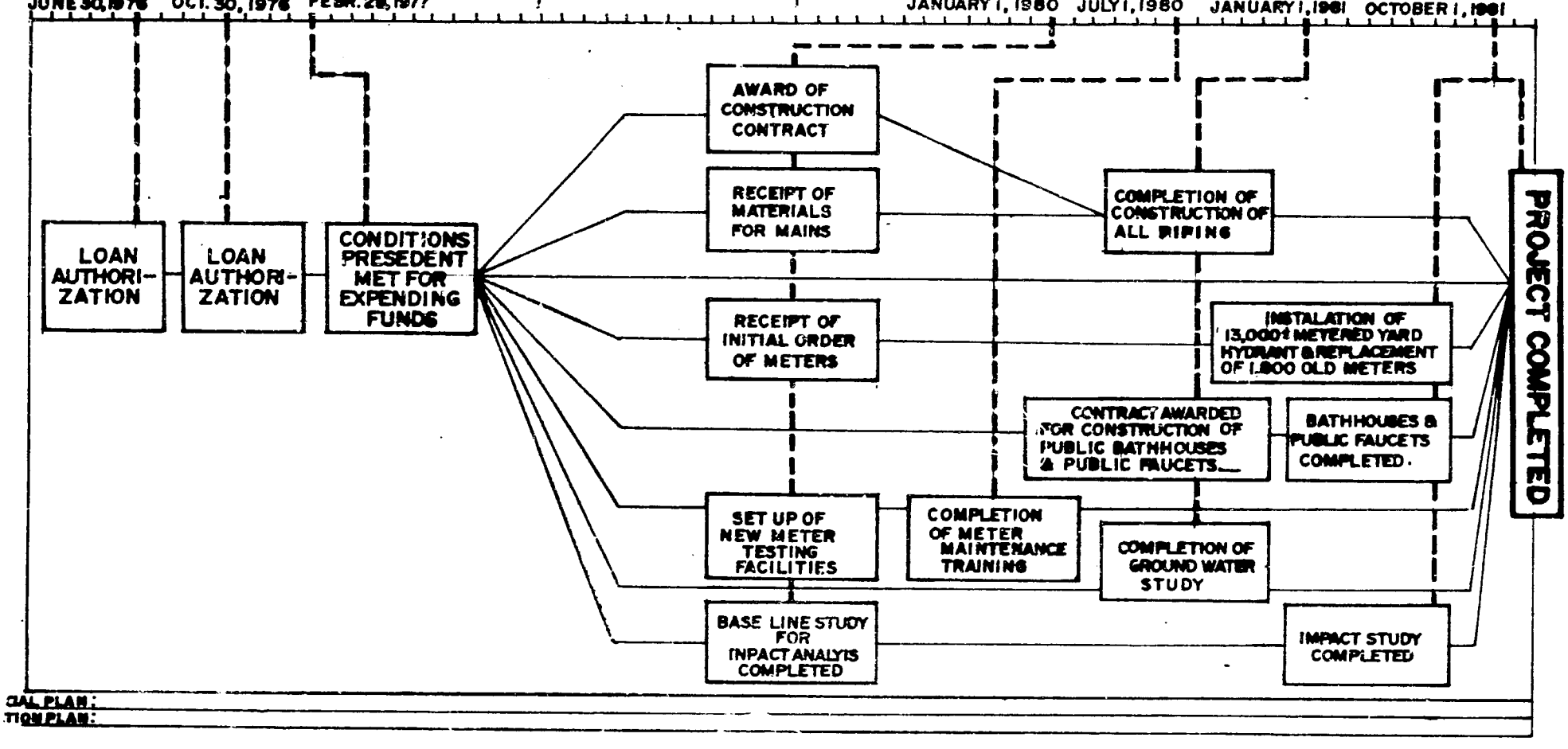
I II III IV I II III IV I II III IV I II III IV I II III IV I II III IV I II III IV
1. LOAN AUTHORIZATION.
2. SIGNING OF LOAN.
3. APPROVAL OF PLANS AND SPECS.
4. PURCHASE & DELIVERY OF TRANSMISSION MAIN PIPE & APPURTENANCES.
5. PURCHASE & DELIVERY OF TOOLS AND EQUIPMENT.
6. INSTALLATION OF TRANSMISSION MAIN.
7. PURCHASE & DELIVERY OF DISTRIBUTION MATERIALS.
8. INSTALLATION OF DISTRIBUTION MAIN.
9. PURCHASE & DELIVERY OF METERS AND SERVICE MATERIALS.
10. REPLACEMENT OF 1,800± METERS.
11. INSTALLATION OF 13,000± METERED YARD HYDRANTS.
12. INSTALL 200 PUBLIC FAUCETS AND CONSTRUCT. BATH HOUSES.
13. GROUND WATER STUDY.
14. IMPACT STUDY.

PROJECT PERFORMANCE TRACKING (PPT) SYSTEM

COUNTRY: INDONESIA	PROJECT No.:	PROJECT TITLE: SURAKARTA POTABLE WATER	DATE:	/ X / ORIGINAL / / REVISION	PPT. APPR.



CAL PLAN:
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ANNEX G

INDONESIA - SURAKARTA POTABLE WATER PROJECT

CERTIFICATION PURSUANT TO SECTION 611(e) OF
THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Kenneth M. Kauffman, the principal officer of the Agency for International Development in Indonesia, having taken into account among other things the experience of the Government of Indonesia in association with multilateral and bilateral donors, including AID, in implementing programs directed to the construction, rehabilitation, operation and maintenance of municipal water systems; do hereby certify that in my judgment Indonesia has the financial and human resources capability to implement, maintain and utilize effectively the Surakarta Potable Water Project.

Kenneth M. Kauffman
Acting Director, USAID Indonesia

June 3, 1976
Date

NATIONAL DEVELOPMENT PLANNING AGENCY
REPUBLIC OF INDONESIA
2, JALAN TAMAN SUROPATI
JAKARTA — INDONESIA

Cable : Bappenas
Jakarta
Phone : 52966
52961 - 52965

No. : /D.I./VI/1976 JAKARTA, June 2 19 76

Encl :

Mr. Thomas C. Niblock
Director
U.S. Agency for International Development
Jalan Medan Merdeka Selatan 3
J a k a r t a

Dear Mr. Niblock,

The Government of Indonesia requests from the Government of the United States of America a Loan of up to six million eight hundred thousand U.S. dollars ($. 6,800,000) to finance the foreign exchange and part of the local currency costs for the Surakarta Potable Water Project.

The primary purpose of the loan is to assist the Government in its health and sanitation program by increasing the supply of potable water available to the residents of the city of Surakarta and extending the availability of such water as much as possible to the lower income families and the poor through the installation of private yard hydrants, public faucets and public baths.

The estimated total cost of the Project is US $ 10.58 million. Of this amount, approximately $ 6.6 million represents the foreign exchange costs of goods and services. The remaining $ 4.0 million represents local currency costs.

As you know, the Government places a very high priority on the national potable water supply program. Our Repelita II goal is to increase potable water for urban users from 350 MGD before Repelita II began to 662 MGD by the end of the plan. The Surakarta Water Supply Project is an important part of the national program. Therefore, it is very important that we begin implementation as soon as possible.

Other sources of financing for this project are not available to the Government of Indonesia at present nor are they anticipated in the near future. Funds available from other donor countries have been allocated or are planned to be allocated to other priority water supply projects within the framework of Repelita II.

We hope that .....

NATIONAL DEVELOPMENT PLANNING AGENCY
REPUBLIC OF INDONESIA
2, JALAN TAMAN SUROPATI
JAKARTA — INDONESIA

Cable : Bappenas
Jakarta
Phone : 52966
52961 - 52965

No. :

Encl :

JAKARTA, ... 19 .....

We hope that this information will be useful and sufficient for you to proceed with the consideration of this loan application as soon as possible.

Sincerely yours,

Widjojo Nitisastro
Deputy Chairman

Cc. :

1. Planning Bureau
   Dept. of Public Works
   and Electric Power,
2. Director General of
   Cipta Karya.