(3) Accounted-for Water

The accounted-for water is for the month of August 1994 is equal to 5,522 m^3.

The accounted-for water represents 75.75% of the total monthly production of 7,290 m^3.

(4) Unaccounted-for Water

In the case of TAN-WD, this can be attributed to the frequent flushing conducted in the different points of the distribution system to remedy the high color and turbidity of water.

The total unaccounted-for water in TAN-WD is 1,768 m^3 which is 24.25% of the total monthly production.

(5) Present Water Demand

The present water demand of TAN-WD according to the latest (August 1994) record of the Water District is 235 m^3/d. This includes the unaccounted-for water during average day demand.

10.6.4 Population and Water Demand Projection

(1) Population Projection

The future population of the municipality of Tanza and barangays in the existing service area were projected by the ratio method using historical population data gathered from the National Statistics Office (NSO). An average growth rate of 3.2% is adopted in this study up to the design year (2005). Thus, in the year 2005 the municipal population may reach 54,390.

The present service area includes four (4) barangays namely: Poblacion 1-4. The 1994 served population of these barangays totals 1,397 which is 3.4% of the total municipal population. It is expected that the on-going construction of water system for Bgy Julugan and Biwas will be operational by December 1994. The proposed expansion of service area covers Bgys. Daang Amaya, Mulawin, Sangang Mayor, Biga and Punta. With this development, the increase served population will be 28.7% of the total projected municipal population by year 2005. **Table 10.6.1**, **10.6.2A**, and **10.6.2B** show the population, served population and water demand projection. **Fig. 10.6-2** shows the service area delineation.

The service area population in the design year (2005) is projected to reach 43,952 while the served population is expected to reach 29,827. The design-year (2005) served population and water demand projection is shown in **Table 10.6.2B**.

TABLE 10.6-1

POPULATION PROJECTION
TANZA WATER DISTRICT

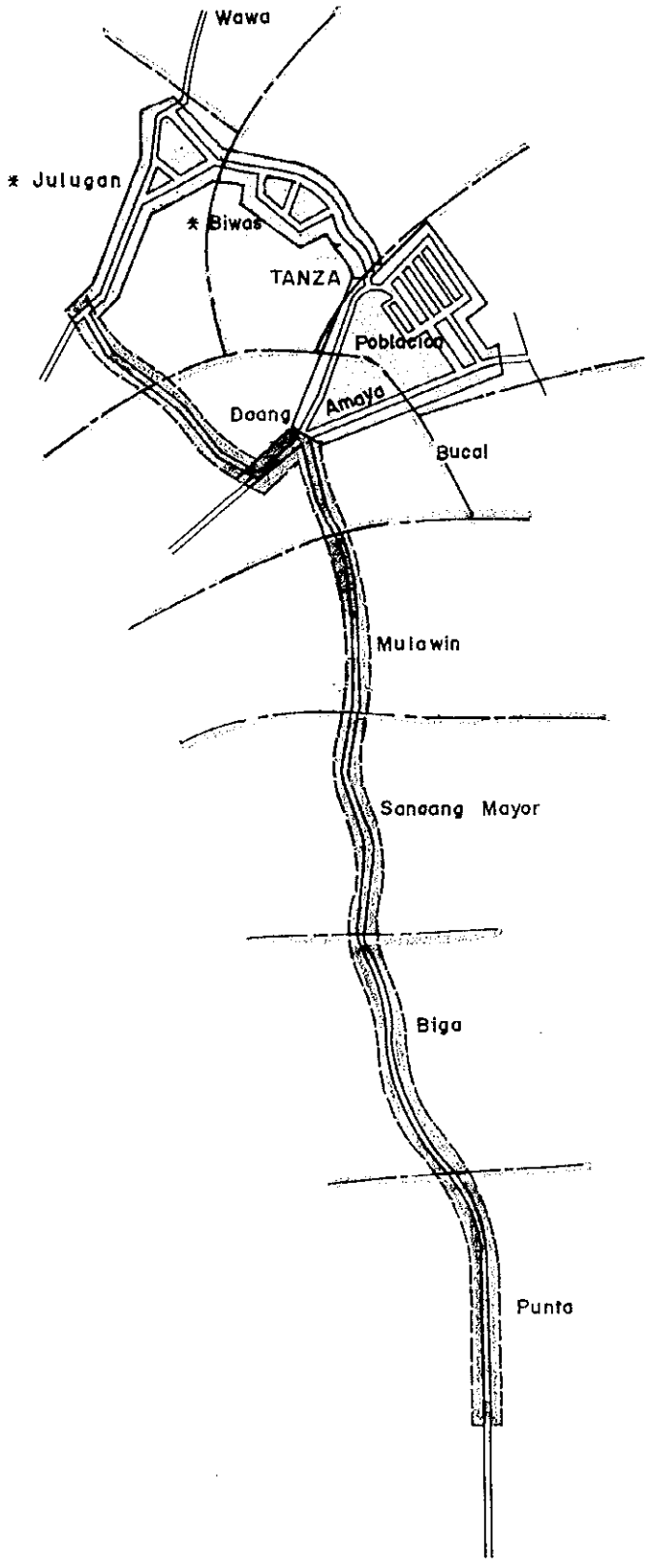
Municipality/ Bgy. in the Service Area	Historical Population			Historical Growth Rates		Projected Growth Rates		Projected Population			
	1975	1980	1990	1975-80	1980-90	1990-2000	2000-2005	1994	1998	2002	2005
TANZA	37,353	43,765	61,785	3.22	3.51	3.52	3.52	70,954	81,485	93,578	103,811
1 Poblacion 1	1,315	1,332	1,245	0.26	-0.67	2.25	1.74	1,361	1,487	1,626	1,695
2 Poblacion 2	1,090	1,133	1,167	0.78	0.30	2.47	2.05	1,287	1,419	1,565	1,649
3 Poblacion 3	1,251	1,222	1,204	-0.47	-0.15	1.95	1.32	1,301	1,406	1,519	1,560
4 Poblacion 4	1,225	1,291	1,457	1.06	1.22	2.59	2.22	1,614	1,788	1,981	2,100
5 Julugan	6,519	8,169	10,600	4.62	2.64	3.49	3.48	12,161	13,953	16,008	17,737
6 Biwas	2,860	3,376	4,403	3.37	2.69	3.41	3.37	5,036	5,760	6,588	7,271
7 Daang Amaya	1,110	1,809	3,882	10.26	7.93	5.38	6.17	4,788	5,906	7,284	8,850
8 Mulawin	300	405	1,830	6.19	16.28	4.78	5.31	2,205	2,658	3,203	3,779
9 Sangang Mayor	1,272	1,400	1,750	1.94	2.26	2.99	2.76	1,969	2,215	2,491	2,692
10 Biga	874	1,100	1,455	4.71	2.84	3.53	3.53	1,671	1,920	2,206	2,448
11 Punta	2,367	2,633	3,304	2.15	2.30	3.06	2.88	3,728	4,206	4,746	5,149
T o t a l	20,183	23,870	32,297					37,122	42,718	49,217	54,930

TABLE 10.6-2A
1998 SERVED POPULATION AND WATER DEMAND PROJECTIONS
TANZA WATER DISTRICT

	BARANGAY	BARANGAY POPULATION	SERVICE AREA POPULATION	DOMESTIC			COMMERCIAL			INSTITUTIONAL		TOTAL			UNACCOUNTED-FOR WATER (cum/d)	AVERAGE DAY DEMAND (cum/d)
				No. of Conn.	Served Pop.	Water Demand	No. of Conn.	Served Pop.	Water Demand	No. of Conn.	Water Demand	No. of Conn.	Served Pop.	Water Demand		
1	Poblacion 1	1,487	1,413	117	631	75.7	1	5	1.0	1	3.0	119	636	79.7	26.3	106.0
2	Poblacion 2	1,419	1,348	109	602	72.2	1	5	1.0	1	3.0	111	607	76.2	25.8	102.0
3	Poblacion 3	1,406	1,336	108	596	71.5	1	5	1.0	1	3.0	110	601	75.5	25.5	101.0
4	Poblacion 4	1,788	1,699	151	755	90.6	2	10	2.0	1	3.0	154	765	95.6	31.4	127.0
5	Julugan	13,953	11,860	1,035	5,277	633.2	12	60	12.0	0	0.0	1,047	5,337	645.2	214.8	860.0
6	Biwas	5,760	4,896	436	2,178	261.4	5	25	5.0	0	0.0	441	2,203	266.4	88.6	355.0
7	Daang Amaya	5,906	2,953	216	1,166	139.9	3	15	3.0	0	0.0	219	1,181	142.9	48.1	191.0
8	Mulawin	2,658	0	0	0	0.0	0	0	0.0	0	0.0	0	0	0.0	0.0	0.0
9	Sangang Mayor	2,215	1,551	125	688	82.6	2	10	2.0	0	0.0	127	698	84.6	28.4	113.0
10	Biga	1,920	1,344	113	600	72.0	1	5	1.0	0	0.0	114	605	73.0	24.0	97.0
11	Punta	4,206	2,944	243	1,310	157.2	3	15	3.0	0	0.0	246	1,325	160.2	53.8	214.0
	Total	42,718	31,344	2,653	13,803	1,656.3	31	155	31.0	4	12.0	2,688	13,958	1,699.3	566.7	2,266.0

TABLE 10.6-2B
2005 SERVED POPULATION AND WATER DEMAND PROJECTIONS
TANZA WATER DISTRICT

	BARANGAY	BARANGAY POPULATION	SERVICE AREA POPULATION	DOMESTIC			COMMERCIAL			INSTITUTIONAL		TOTAL			UNACCOUNTED-FOR WATER (cum/d)	AVERAGE DAY DEMAND (cum/d)
				No. of Conn.	Served Pop.	Water Demand	No. of Conn.	Served Pop.	Water Demand	No. of Conn.	Water Demand	No. of Conn.	Served Pop.	Water Demand		
1	Poblacion 1	1,695	1,610	237	1,278	166.1	2	10	2.0	2	6.0	241	1,288	174.1	57.9	232.0
2	Poblacion 2	1,649	1,567	226	1,244	161.7	2	10	2.0	2	6.0	230	1,254	169.7	56.3	226.0
3	Poblacion 3	1,560	1,482	215	1,181	153.5	1	5	1.0	2	6.0	218	1,186	160.5	53.5	214.0
4	Poblacion 4	2,100	1,995	317	1,586	206.2	2	10	2.0	2	6.0	321	1,596	214.2	71.8	286.0
5	Julugan	17,737	15,076	2,055	10,478	1,362.1	15	75	15.0	2	6.0	2,072	10,553	1,383.1	460.9	1,844.0
6	Biwas	7,271	6,180	859	4,296	558.5	6	30	6.0	2	6.0	867	4,326	570.5	190.5	761.0
7	Daang Amaya	8,850	6,195	683	3,687	479.3	6	30	6.0	2	6.0	691	3,717	491.3	163.7	655.0
8	Mulawin	3,779	2,645	291	1,572	204.4	3	15	3.0	2	6.0	296	1,587	213.4	71.6	285.0
9	Sangang Mayor	2,692	1,884	204	1,120	145.6	2	10	2.0	2	6.0	208	1,130	153.6	51.4	205.0
10	Biga	2,448	1,714	192	1,018	132.3	2	10	2.0	2	6.0	196	1,028	140.3	46.7	187.0
11	Punta	5,149	3,604	397	2,142	278.5	4	20	4.0	2	6.0	403	2,162	288.5	96.5	385.0
	Total	54,930	43,952	5,676	29,602	3,848.2	45	225	45.0	22	66.0	5,743	29,827	3,959.2	1,320.8	5,280.0



LEGEND :

PRESENT SERVICE AREA

PROPOSED SERVICE AREA (2005)

BGY. BOUNDARY

* BGY. JULUGAN & BIWAS WILL BE OPUATIONAL BY DECEMBER 1994

0 200 400 600 1000 2000

CAVITE WATER SUPPLY DEVELOPMENT STUDY	FIGURE : 10.6-2
JAPAN INTERNATIONAL COOPERATION AGENCY	SERVICE AREA DELINEATION TANZA WATER DISTRICT TANZA , CAVITE

(2) Water Demand Projections

Major assumptions adopted here are as follows:

- Domestic unit water consumption is estimated at 0.120 m^3/d in proposed implementation year (1998) and 0.130 m^3/d for the design year (2005) per person and an average of 5.2 person per household (NSO data).
- Commercial unit water consumption is estimated at 1.0 m^3/d.
- Institutional unit water consumption is estimated at 3.0 m^3/connection/d.
- unaccounted-for water is assumed to be 25% of the total water demand after project implementation.

Domestic connections is projected to reach 5,676 in 2005 while commercial and institutional connections is projected to reach 45 and 22 connections, respectively. **Table 10.6.2B** shows the number of connection for each category.

(3) Water Demand Variation

Presented below is the year 2005 water demand variation:

Average-day demand	5,280 m^3/d	(61.1 lps)
Maximum-day demand	6,864 m^3/d	(79.4 lps)
Peak-hour demand	10,560 m^3/d	(122.2 lps)

Table 10.6.3 shows the water demand per type of connection and **Table 10.6.4** shows the annual water demand variation.

10.6.5 Analysis and Evaluation of Alternatives

The basic construction cost at March 1994 price levels and the non-economic aspects of the alternatives are compared coming up with the most ideal system for the area. The alternative with the least cost was adopted as the water supply scheme for TAN-WD.

(1) Considerations

The alternatives presented were considered to be implemented in one stage and take into account the water requirements of the system up to the design year 2005.

TABLE 10.6-3
ANNUAL WATER DEMAND AND NUMBER OF CONNECTIONS
TANZA WATER DISTRICT

YEAR	DOMESTIC		COMMERCIAL		INSTITUTIONAL		TOTAL		UNACCOUNTED-FOR WATER (cumd)	AVERAGE DAY DEMAND (cumd)
	No. of Conn.	Water Demand (cumd)	No. of Conn.	Water Demand (cumd)	No. of Conn.	Water Demand (cumd)	No. of Conn.	Water Demand (cumd)		
1994	248	154.3	5	5.0	1	3.0	254	162.3	54.1	216.4
1995	797	524.6	10	10.3	2	6.0	809	541.0	180.3	721.3
1996	1,346	895.0	16	15.7	3	9.0	1,365	919.6	306.5	1,226.2
1997	1,895	1,265.3	21	21.0	4	12.0	1,920	1,298.3	432.8	1,731.1
1998	2,653	1,656.3	31	31.0	4	12.0	2,688	1,699.3	566.7	2,266.0
1999	2,866	1,846.1	32	31.7	8	23.0	2,905	1,900.8	633.6	2,534.4
2000	3,078	2,035.9	32	32.3	11	34.0	3,122	2,102.2	700.7	2,803.0
2001	3,291	2,225.7	33	33.0	15	45.0	3,339	2,303.7	767.9	3,071.6
2002	4,297	2,687.5	40	40.0	17	51.0	4,354	2,778.5	926.2	3,704.7
2003	4,757	3,074.4	42	41.7	19	56.0	4,817	3,172.1	1,057.4	4,229.4
2004	5,216	3,461.3	43	43.3	20	61.0	5,280	3,565.6	1,188.5	4,754.2
2005	5,676	3,848.2	45	45.0	22	66.0	5,743	3,959.2	1,320.8	5,280.0

TABLE 10.6-4

WATER DEMAND VARIATIONS
TANZA WATER DISTRICT

YEAR	Average Day Demand		Maximum Day Demand		Peak-Hour Demand	
	(cumd)	(L/s)	(cumd)	(L/s)	(cumd)	(L/s)
1994	216	2.5	281	3.3	433	5.0
1995	721	8.3	938	10.9	1,443	16.7
1996	1,226	14.2	1,594	18.4	2,452	28.4
1997	1,731	20.0	2,250	26.0	3,462	40.1
1998	2,266	26.2	2,946	34.1	4,532	52.5
1999	2,534	29.3	3,295	38.1	5,069	58.7
2000	2,803	32.4	3,644	42.2	5,606	64.9
2001	3,072	35.6	3,993	46.2	6,143	71.1
2002	3,705	42.9	4,816	55.7	7,409	85.8
2003	4,229	49.0	5,498	63.6	8,459	97.9
2004	4,754	55.0	6,180	71.5	9,508	110.0
2005	5,280	61.1	6,864	79.4	10,560	122.2

1) Existing Water Supply System Facilities

TAN-WD currently operates water system in Poblacion 1-4. By December 1994, it is expected to expand its water service to Bgy Biwas and Julugan.

Additional five barangays is considered in this study as expansion areas for TAN-WD. Preliminary analysis showed that the existing source and storage facilities is not adequate to meet the design year requirement of the system.

2) Additional Water Sources

Groundwater through deepwells are considered as only possible water source for TAN-WD. Surface water is considered not feasible owing to its poor quality necessitating expensive treatment.

TAN-WD is utilizing a deepwell located in Bgy Daang Amaya. This well which is discharging 30 lps will be utilized to meet the projected water demand. Another well was constructed in Bgy Punta as a Test Well in this study. Result of the test shows that the well is capable of discharging 33 lps.

Since the above two well sources are not enough to meet the projected water requirement of the system by the year 2005, two more deepwells will be constructed.

3) Pressure Zone

Since the elevation in the service area ranges from 1.03 masl to 34.48 masl, a single pressure zone is considered in the whole service area.

4) Storage Location

Location of storage is influenced by the demand in the service area. Preliminary analysis showed that the existing location of the storage tank cannot adequately meet the requirements of the water system. Additional reservoir site shall be chosen to effectively balance the supply particularly during peak hour conditions.

5) Design Criteria

- Well Parameters for Additional Sources

Depth	:	150 m
Borehole Diameter	:	400 mm
Casing Diameter	:	250 mm x 200 mm
Screens	:	200 mm Stainless Steel
Expected Yield	:	15-30 lps
Expected SWL	:	10-20 mbgl

Expected PWL : 30–40 mbgl

- Distribution System

No pipelines will be replaced and the concentration of this study is the expansion area. The pipelines will be laid along the National Highway and in the streets of the municipality. The pipe network layout is generally influenced by the existing roadways and the area to be served while the pipe size configuration is designed at peak hour condition.

- Demand Ratios

The projected water demands of Tanza for the design year (2005) are 6,864 m^3/d for maximum–day and 10,560 m^3/d for peak–hour demand.

- Storage Requirement

During peak–hour water demand conditions and whenever the production capacity of the sources is less than the demand of the system, additional water supply will be provided by the reservoir. Generally the volume of storage must be sufficient to meet the operational, emergency and fire firefighting reserved requirements. **Table 10.6–5** shows the storage capacity requirement of the system up to the year 2005.

The reservoir will be constructed at an elevation such that the required minimum pressure in the distribution system is satisfied.

- System Pressure

The minimum pressure head to be adopted in the system is 7m while the maximum is 70 m. The system pipe network is designed to conform with the pressure requirement even during peak–hour conditions.

- Fire Protection

Full fire protection will be provided to the entire service area.

- Flow Velocity in the Distribution System

The flow velocity in the distribution system is limited to a maximum of 3 m/s at all times and a minimum of 0.3 m/s. However, in order to obtain a good pressure in all parts of the distribution system, it was necessary to allow a velocity flow less than this minimum.

- Computer Analysis

TABLE 10.6-5

STORAGE REQUIREMENT

TANZA WATER DISTRICT

YEAR	Max Day Demand (cumd)	Served Population	Emergency Storage Requirement (cum)	Operational Storage Requirement				
				Max-day (cum)	ID-1.33 (cum)	ID-1.2 (cum)	ID-1.10 (cum)	PKD (cum)
1998	2,946.0	13,958	246	520	215	233	423	129
1999	3,324.4	15,557	278	580	237	256	471	140
2000	3,751.4	17,340	313	647	260	282	524	151
2001	4,233.2	19,327	353	721	286	310	583	164
2002	4,776.9	21,541	398	804	315	341	649	177
2003	5,390.4	24,010	449	897	346	375	723	192
2004	6,082.7	26,761	507	1,000	381	412	804	208
2005	6,864.0	29,827	572	1,116	419	453	895	225

Operational Storage Requirement

Supply rate	Storage Volume	Pump Hours
MD	(0.224 - (0.0416 x @Log(SERVED POP'N/1000))) x MAX-DAY DEMAND	24
ID-1.33	(0.114 - (0.0359 x @Log(SERVED POP'N/1000))) x MAX-DAY DEMAND	18
ID-1.20	(0.125 - (0.0400 x @Log(SERVED POP'N/1000))) x MAX-DAY DEMAND	20
ID-1.10	(0.190 - (0.0406 x @Log(SERVED POP'N/1000))) x MAX-DAY DEMAND	22
PKH	(0.082 - (0.0336 x @Log(SERVED POP'N/1000))) x MAX-DAY DEMAND	16

Emergency Storage Requirement :

2 hours of Max-day demand

Pipe sizes were designed for peak-hour demand condition and only pipes with diameter 50mm and above were included in the analyses.

- Common Items

To simplify the evaluation of alternatives, items common to each scheme such as valves, hydrants, service connections and some pipelines were not included in the analyses.

The operation and maintenance cost of the alternatives were also not considered because of their minimal effects in the result of the evaluation.

(2) Development of Alternatives

Groundwater through additional wells were considered as capable of meeting the increasing demand in the service area. Additional wells are expected to meet the supply requirement of the system by the year 2005.

Optimization of source versus storage analysis is necessary to determine the most economical system for TAN-WD. The following alternatives will give insight to each proposal for the improvement of the main system.

1) Alternative 1 - Maximum Day Supply with Minimum Storage

This alternative proposes the commissioning of test well in Bgy Punta into a production well and the construction of one additional well in Bgy Mulawin to meet the demand of the system. The wells shall be equipped with 30 Hp and 40 Hp submersible pumps and electric motor drives, respectively. A total of 2,155 m of 300 mm, 3,230 m of 250 mm, 400 m of 200 mm pipelines shall be needed for the proposed system.

An additional elevated tank with a volume of 1,436 m^3 shall be constructed.

Table 10.6-6 and **Fig. 10.6-3A** presents the details of this alternative.

2) Alternative 2 - 1.20 MDD Supply with Intermediate Storage

This alternative proposes the commissioning of test well in Bgy Punta into a production well and the construction of two additional wells, one in Bgy Mulawin and the other in Bgy Daang Amaya to meet the demand of the system. The wells shall be equipped with a 20 Hp for Bgy Punta and two 40 Hp submersible pumps and electric motor drives for Bgy Mulawin and Daang Amaya. A total of 550 m of 250 mm, 1,739 mm of 200 mm, 1,375 m of 150 mm, 2,130 m of 100 mm, pipelines shall be needed for the proposed system.

TABLE 10.6-6
Cost Comparison of Alternatives
Tanza Water District

Alternative 1 - MDD Supply with maximum Storage

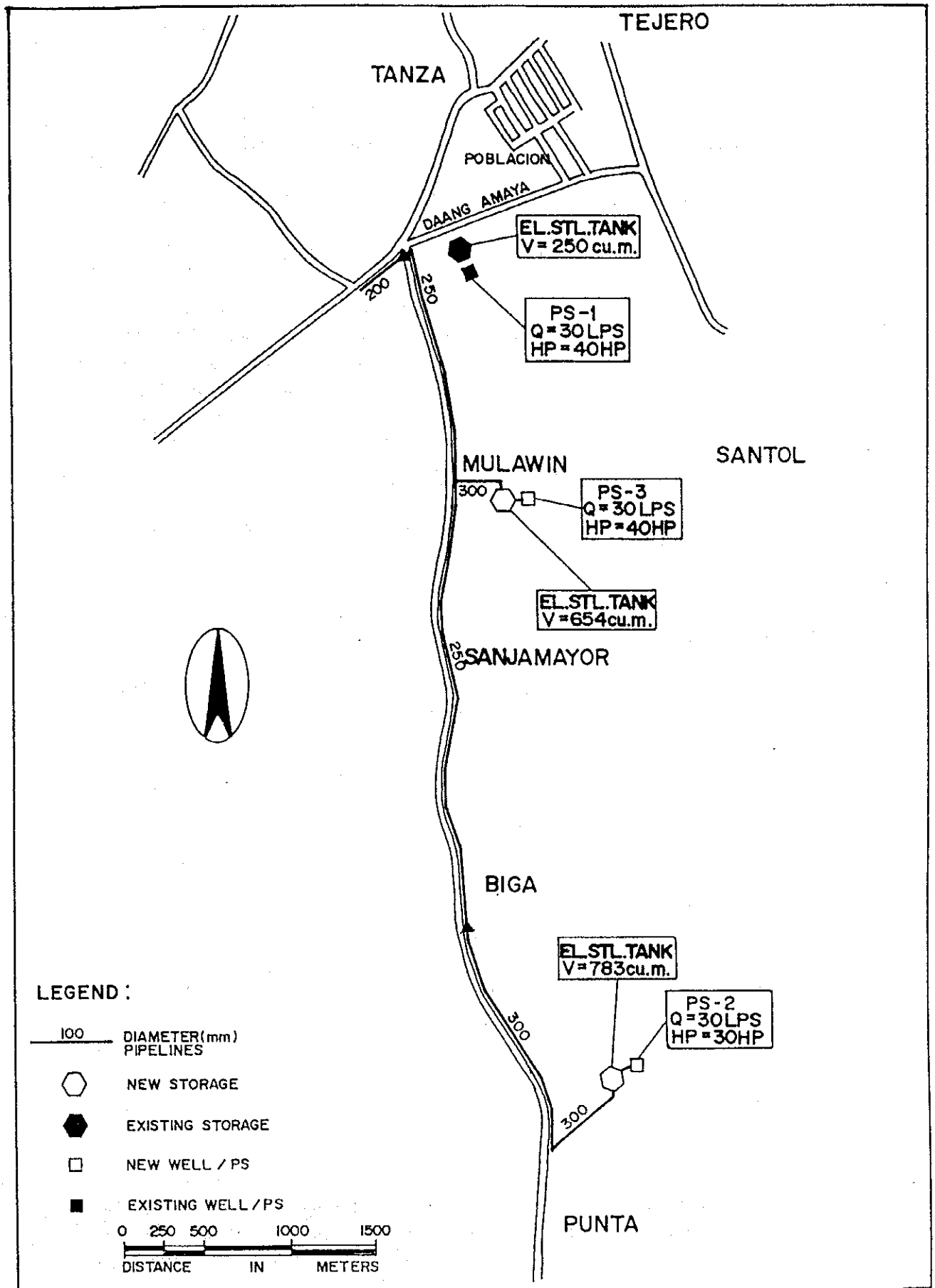
Facilities		Construction Cost (P)
Storage Tank V =	1436 cum	18,668,000.00
Deepwell	(1 @ P1,500,000.00)	1,500,000.00
PS2	30HP	515,340.00
PS3	40HP	572,425.00
Pipelines		12,605,050.00
	P	33,860,815.00

Alternative 2 - 1.20 MDD Supply with Intermediate Storage

Facilities		Construction Cost (P)
Storage Tank V =	775 cum	10,075,000.00
Deepwell	(2 @ P1,500,000.00)	3,000,000.00
PS2	20HP	443,660.00
PS3	40HP	572,425.00
PS4	40HP	572,425.00
Pipelines		5,293,000.00
	P	19,956,510.00

Alternative 3 - 1.10 MDD Supply with Intermediate Storage

Facilities		Construction Cost (P)
Storage Tank V =	1216 cum	15,808,000.00
Deepwell	(2 @ P1,500,000.00)	3,000,000.00
PS2	15HP	299,376.00
PS3	30HP	515,340.00
PS4	40HP	572,425.00
Pipelines		5,293,000.00
	P	25,488,141.00



CAVITE WATER SUPPLY DEVELOPMENT STUDY

JAPAN INTERNATIONAL COOPERATION AGENCY

FIGURE : 10.6-3A
ALTERNATIVE - 1
MDD SUPPLY WITH MAXIMUM STORAGE
TANZA WATER DISTRICT
TANZA, CAVITE

An additional elevated steel tank with a volume of 775 m^3 shall be constructed.

Table 10.6-6 and **Fig. 10.6-3B** presents the details of this alternative.

3) Alternative 3 – 1.10 MDD Supply with Intermediate Storage

This alternative proposes the commissioning of test well in Bgy Punta into a production well and the construction of two additional well, one in Bgy Mulawin and the other in Bgy Daang Amaya to meet the demand of the system. The wells shall be equipped with a 20 Hp for Bgy Punta and a 30 Hp and 40 Hp submersible pumps and electric motor drives for Bgy Mulawin and Daang Amaya, respectively. A total of 550 m of 250 mm, 1,730 m of 200 mm, 1,375 m of 150 mm, 2,130 m of 100 mm pipelines shall be needed for the proposed system.

An additional elevated steel tank with a volume of 1,216 m^3 shall be constructed.

Table 10.6-6 and **Fig. 10.6-3C** present the details of this alternative.

(3) Evaluation of Alternatives

Each of the alternatives was evaluated based on the construction cost at March 1994 price level.

The following table summarizes the cost of each alternative.

	Cost (P)
Alternative 1	33,860,815.00
Alternative 2	19,956,510.00
Alternative 3	25,488,141.00

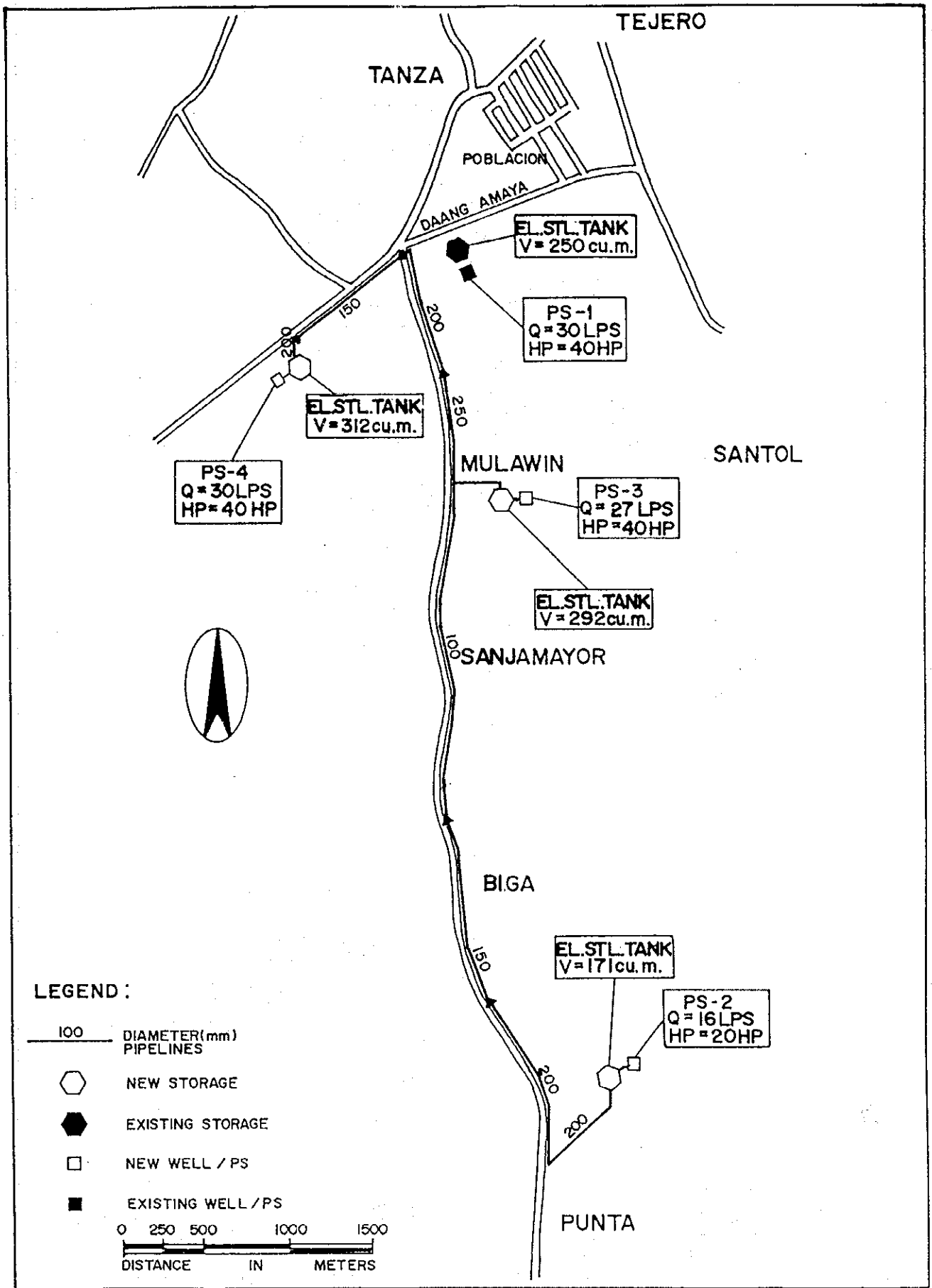
Alternative 2 being the least cost alternative is recommended for the improvement of TAN-WD water supply system.

10.6.6 Recommended Plan

(1) Description of the Scheme

This section describes the construction and development program for the Tanza water supply system. The construction of the water system will be divided into two phases. Phase I is to be implemented in the year 1996-1997 while Phase II follows in the year 2000-2001.

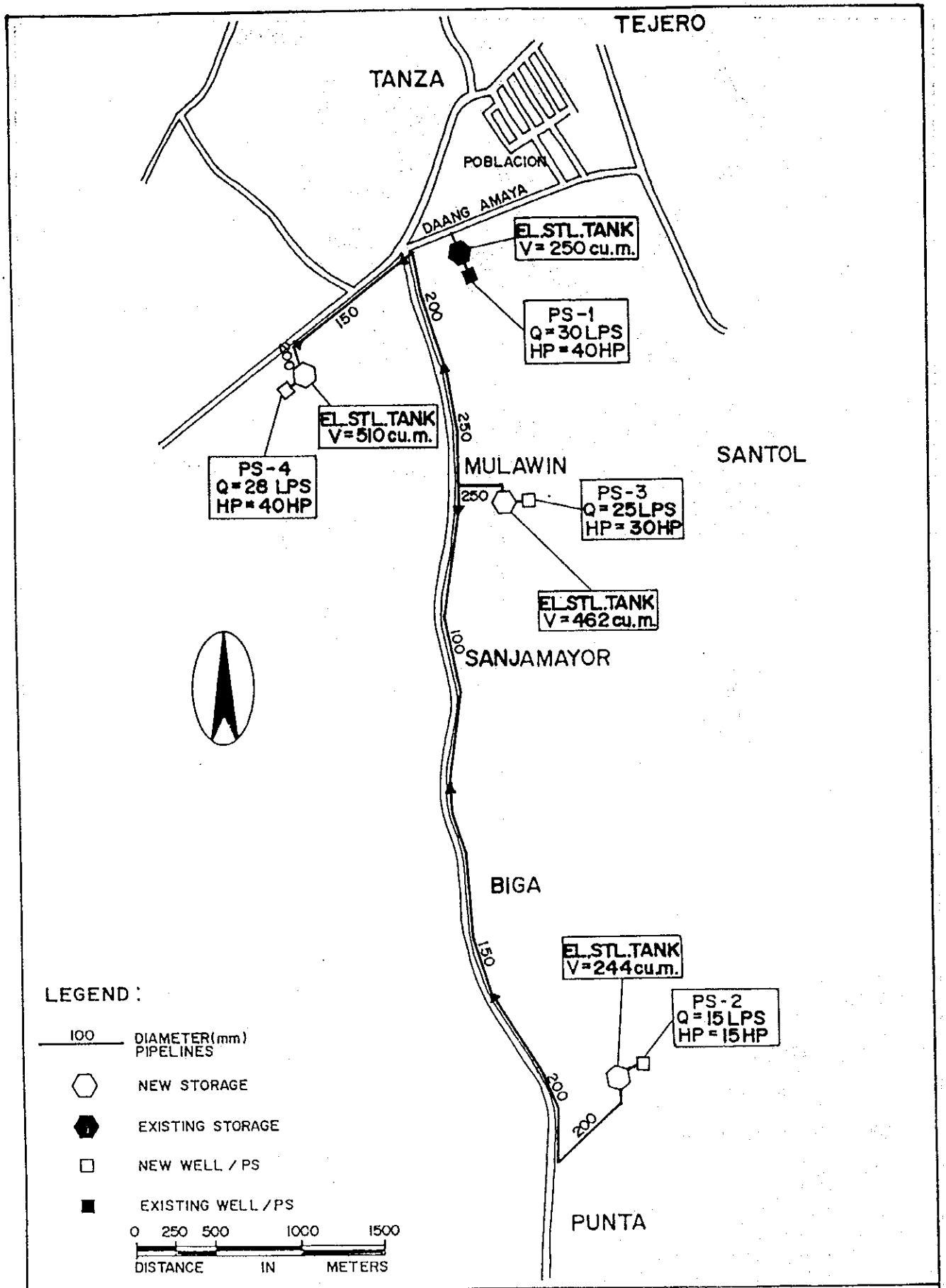
Phase I is the construction of separate water system in Bgy. Sanja Major, Biga and Punta. This will utilize the JICA test well in Bgy. Punta.



CAVITE WATER SUPPLY DEVELOPMENT STUDY

JAPAN INTERNATIONAL COOPERATION AGENCY

FIGURE : 10.6-3B
ALTERNATIVE - 2
1.20 MDD SUPPLY W/ INTERMEDIATE STORAGE
TANZA WATER DISTRICT
TANZA, CAVITE



CAVITE WATER SUPPLY DEVELOPMENT STUDY

JAPAN INTERNATIONAL COOPERATION AGENCY

FIGURE : 10.6-3C
ALTERNATIVE - 3
1.10 MDD SUPPLY W/ INTERMEDIATE STORAGE
TANZA WATER DISTRICT
TANZA, CAVITE

Phase II will be the extension of the water system and construction of additional well sources in Bgy. Mulawin and Daang Amaya.

Fig. 10.6-4 shows the relationship between water supply and demand when the recommended plan shall be implemented.

The proposed water supply system for Phase I and II is shown in **Fig.10.6-5**. The computer print-out of the hydraulic analysis of the system and the schematic nodal diagram of the distribution system are presented in the **S/R**.

(2) Proposed Facilities

The recommended plan for the TAN-WD water supply system is scheduled to be implemented in two stages, Phase I and Phase II. The proposed facilities of Phase I improvement are as follows:

1) Laying 4.935 Km of transmission/distribution lines.

2) Installation of 5 gate valves and 3 units of fire hydrants.

3) Provision for electro-mechanical facilities and housing for production well in Bgy. Punta.

4) Construction of a 171 m^3 elevated steel tank.

5) Installation of 780 service connections.

6) Installation of hypochlorinator in the proposed source.

7) Land acquisition (300 m^2).

The proposed facilities for Phase II are as follows:

1) Laying 3.708 Km of transmission/distribution lines;

2) Installation of 8 additional gate valves and 2 units of fire hydrants. valves.

3) Construction of two additional deepwells. Preliminary well design for proposed wells are shown in **Fig. 10.6-6A** and **10.6-6B**.

4) Provision for electro-mechanical facilities and housing for the proposed deepwells.

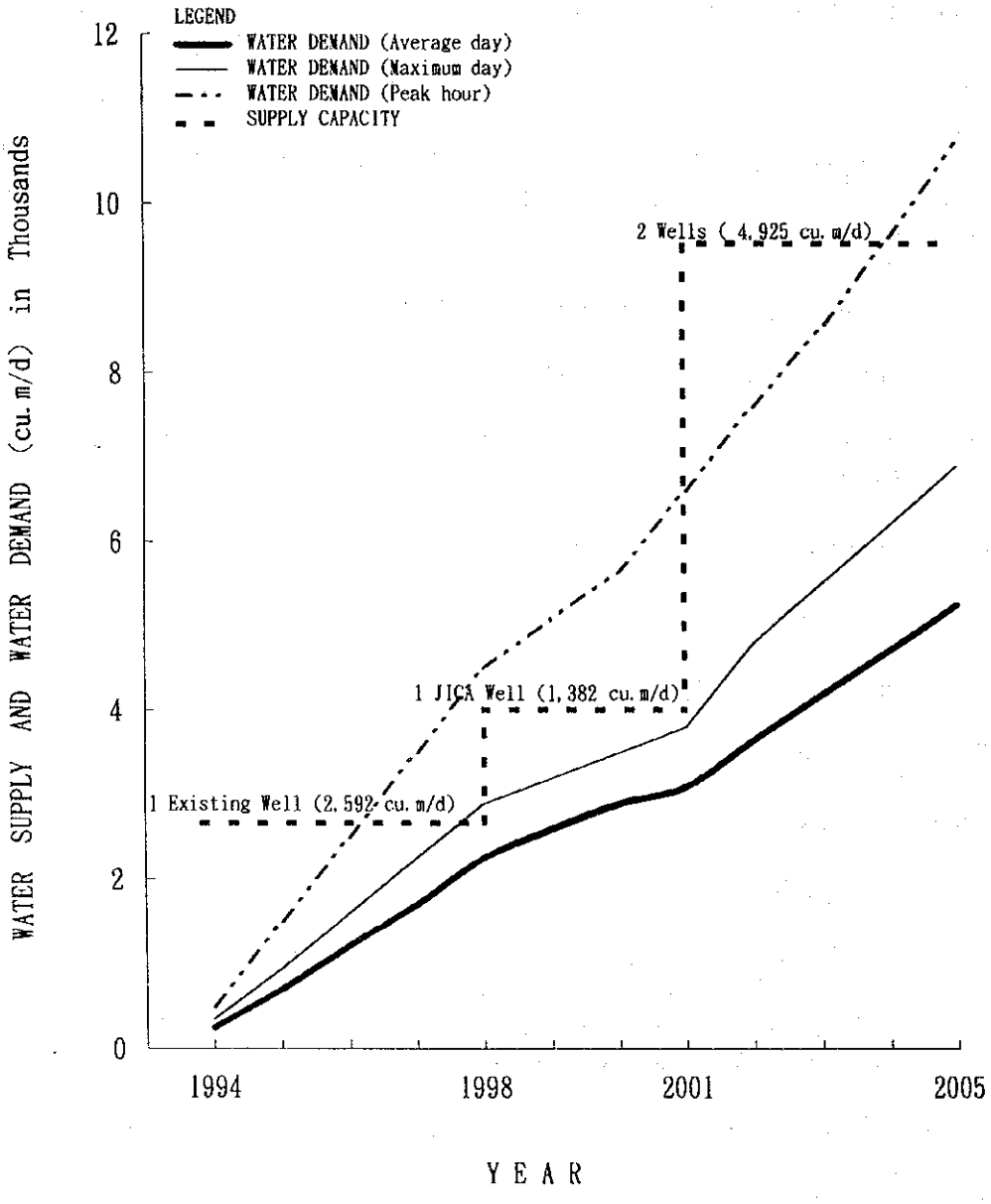
5) Construction of two elevated steel tanks (292 m^3 for Bgy. Mulawin and 312 m^3 for Bgy. Daang Amaya).

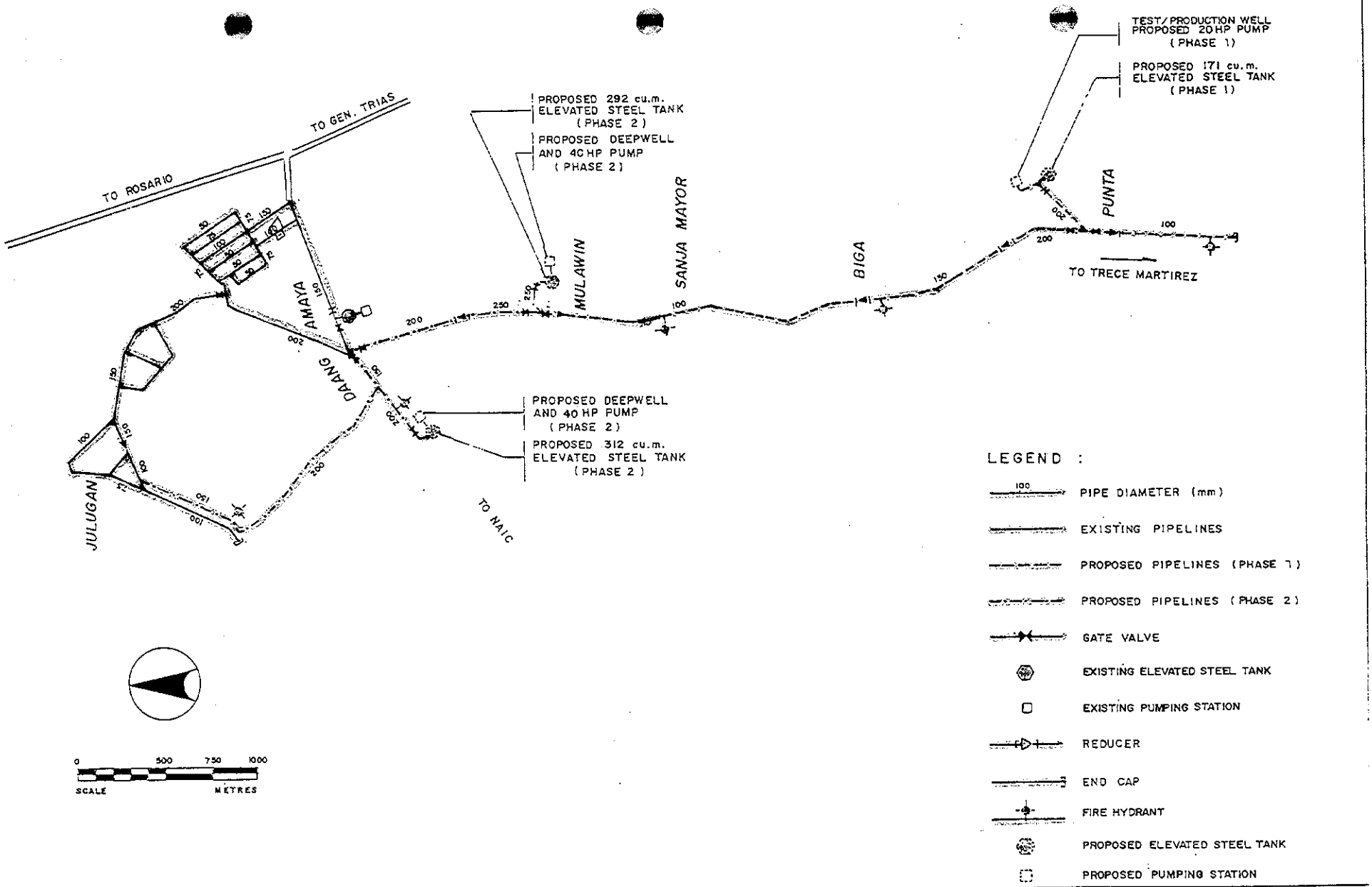
6) Installation of 1,015 service connections.

7) Installation of hypochlorinator in the proposed sources.

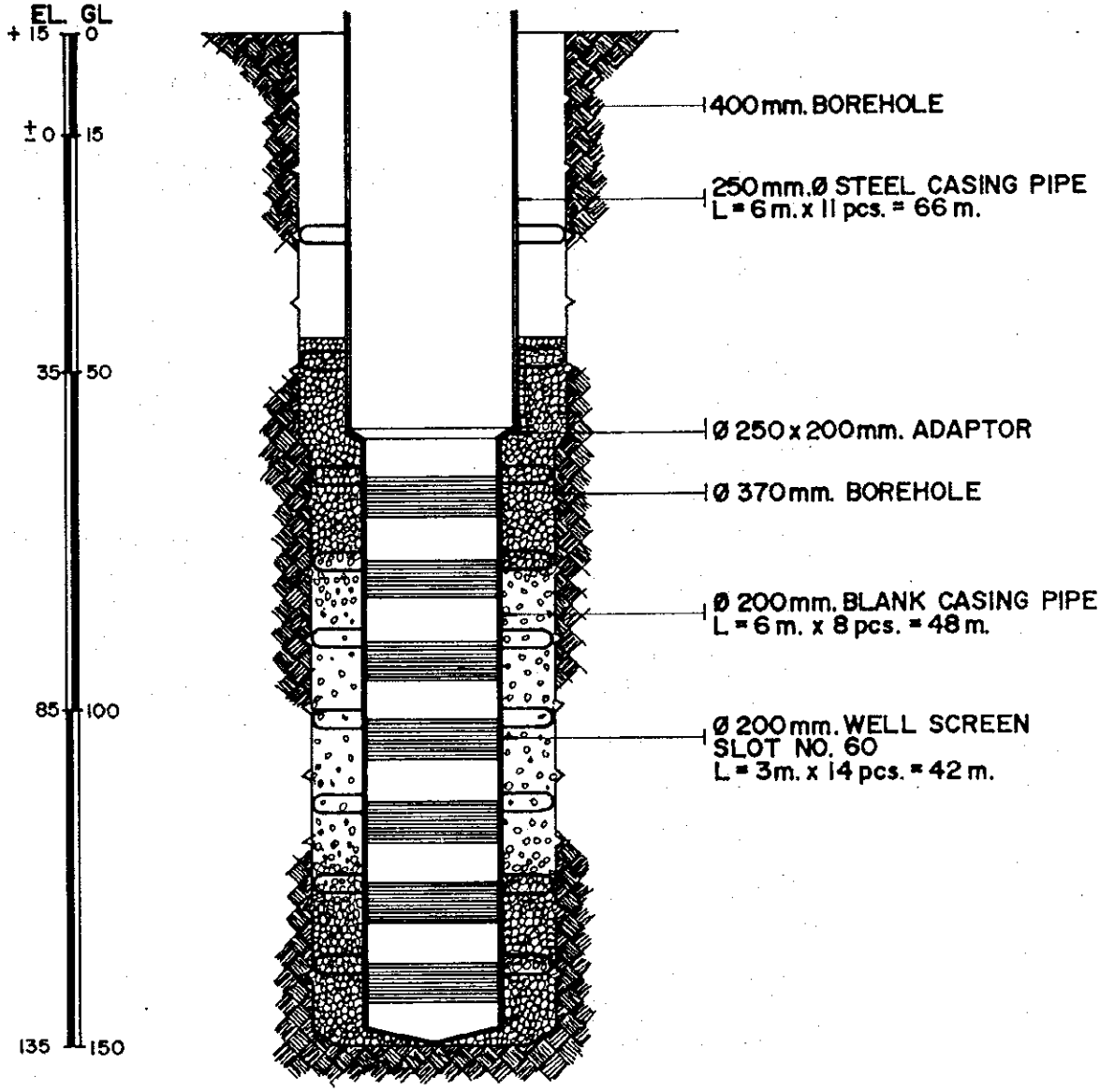
Fig. 10.6-4

WATER SUPPLY VS DEMAND CURVE OF RECOMMENDED PLAN
TANZA

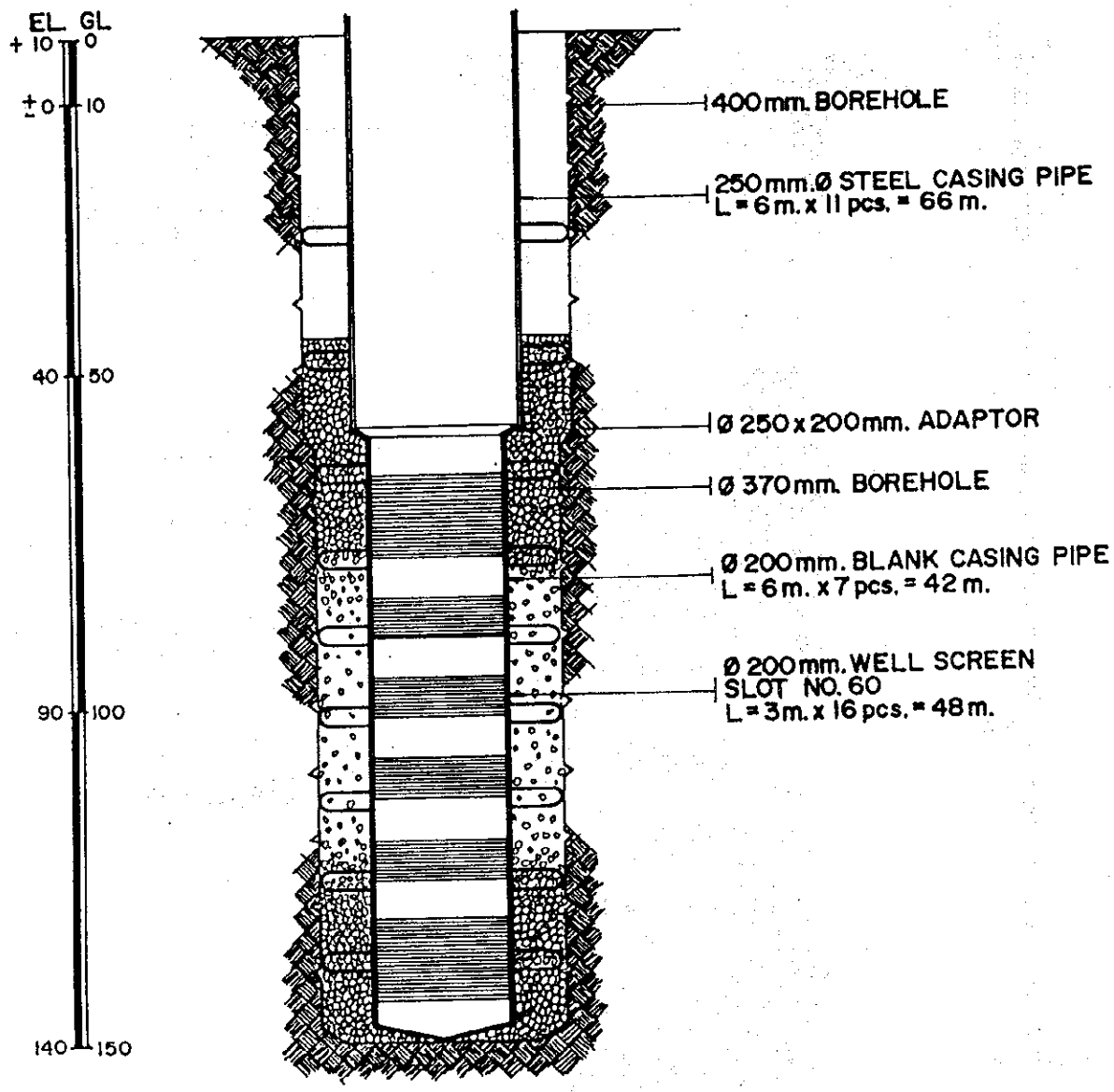




CAVITE WATER SUPPLY DEVELOPMENT STUDY	Fig. 10.6-5 RECOMMENDED WATER SUPPLY SYSTEM TANZA WATER DISTRICT
JAPAN INTERNATIONAL COOPERATION AGENCY	TANZA , CAVITE



CAVITE WATER SUPPLY DEVELOPMENT STUDY	Fig. 10.6-6A PRELIMINARY WELL DESIGN PROPOSED WELL NO. 3
JAPAN INTERNATIONAL COOPERATION AGENCY	TANZA



CAVITE WATER SUPPLY DEVELOPMENT STUDY	Fig. 10.6-6B PRELIMINARY WELL DESIGN PROPOSED WELL No. 4
JAPAN INTERNATIONAL COOPERATION AGENCY	TANZA

8) Land acquisition (600 m^2).

(3) Operation and Maintenance

In Phase I, a separate water system will be constructed to serve Bgy. Sanja Mayor, Biga and Punta. This will utilize the test/production well drilled in Bgy. Punta. A 171 m^3 elevated steel tank will be constructed to meet the storage requirement of the system. This reservoir will be operated on a fill and draw basis.

In Phase II, pipelines will be extended to Bgy. Mulawin and Daang Amaya. Two additional deepwells will be constructed (preferably in Bgy. Mulawin and Bgy. Daang Amaya) to supplement the increasing water demand of the whole system. At this stage, the whole water system of TAN-WD will be operated on one pressure zone. Two elevated steel tanks (292 m^3 and 312 m^3) will be constructed to satisfy the storage requirement of the system. These reservoirs will be operated on a fill and draw basis.

Water from the source will be treated by chlorine using a hypochlorinator. Fire hydrants will be installed in the densely populated areas while valves will be installed for necessary zoning and emergency purposes. The water system is designed to operate for a 24 hour period daily.

CHAPTER 11

EVALUATION OF THE WATER SUPPLY PROJECT FOR THE SELECTED AREAS

CHAPTER 11

EVALUATION OF THE WATER SUPPLY PROJECT FOR THE SELECTED AREAS

The project cost excluding capitalized interest amounts to 36.7 million pesos for G.M.A.(Phase I), 19.8 million pesos for Mendez, 22.6 million pesos for Naic (Phase I), 67.2 million pesos for Tagaytay, and 10.6 million pesos for Tanza (Phase I).

For G.M.A., Mendez, Naic and Tagaytay, 100% of the cost is assumed to be financed by a loan from LWUA, of which 50% is from a regular loan and another 50% is from a soft loan. On the other hand, for Tanza, 90% loan financing, of which 70% is from a regular loan and 30% from a soft loan, is assumed with 10% equity of water district.

The projected income statements for all water districts show that major financial ratios are almost financially sound. Moreover, the projected FIRR indicates the proposed projects are viable even through the sensitivity analysis.

The economic benefits of the projects consist of consumer satisfaction, health benefits and fire protection. For all the water districts, EIRR shows the proposed projects are economically feasible for the base case although the results by the sensitivity analysis for some water districts are below the opportunity cost of capital.

11.1 GENERAL CONDITIONS AND COMMON ASSUMPTIONS FOR PROJECT EVALUATION

11.1.1 Construction Cost

The construction cost for the water supply system facilities is estimated using the current market price as of the 1994 price level.

A standby generator for stable supply and the disinfection facilities for safety measures are considered for all the objective areas.

11.1.2 Cost for Operation and Maintenance

The operation and maintenance costs include all necessary expenses at the production and distribution levels.

1) Personnel Costs

The number of water district employees depends primarily on the total number of service connections according to LWUA's Methodology Manual. In this study, the number of required staff is assumed to be 1 person per 100 service connections.

To compute the personnel costs, the unit average salary per month is assumed to be P4,500 per employee. Except for Tagaytay, the unit average salary per month is assumed to be P 4,000 for year 1994, and increase by P 100 for next two years and by P 150 for succeeding year up to 1998, and P 4,500 per employee after following year.

2) Power Cost
The power cost for the pumping station is calculated at P4.00 per KWH.

3) Chlorination Cost
The average dosage rate and cost of chlorine are assumed to be 2 mg/l and P70.00/kg.

4) Miscellaneous and Maintenance Costs
Miscellaneous and maintenance costs are assumed to be P100 per connection per year.

5) Office Rental
When the existing office is owned by the Water District, the monthly rent for the office is not required.

11.1.3 Financial Analysis

Financial analysis presents the recommended financing plan for the development program for the objective water district as a part of the feasibility study and examines the financial implications not only to the water district but also to the consumers who will ultimately carry the burden of repaying the cost of improving the district's water system.

Existing financial data (financial statements) and other related information, which have been collected at each water district and LWUA until the middle of December, 1994, are utilized for the financial projections.

Although there are the discrepancy between the actual figures of the operation and maintenance costs in 1994 from the existing financial statements and the projected figures based on the LWUA's Methodology Manual, the former ones are used for the financial analysis in 1994.

(1) Development Cost

Development costs include the basic cost of construction, physical and price contingencies, engineering studies, construction supervision, land acquisition, and interest during project implementation since this is capitalized and forms a part of the project costs.

(2) Operating and Maintenance Costs

Operating and maintenance costs include the costs for salaries (administration personnel), power and fuel, chemicals, maintenance and miscellaneous expenses, which are indispensable to operate

and maintain the system. These costs are escalated using inflation rates of 12% for the year 1995 and 10% for the year 1996 onwards.

(3) Financing

Financing by regular loan and soft loan from LWUA is assumed for the projects.

Interest of regular loan will be capitalized during construction plus one year operation period and repayment will start one year after project completion for 26 years.

On the other hand, interest of soft loan is free for five years starting from the initial disbursement. From the 6th to the 10th year, only interest shall be paid. Repayment of the principal shall start on the 11th year to coincide with the remaining repayment years of the regular loan portion.

(4) Method of Analysis

To measure the water district's financial performance as a result of the project, an eleven-year forecast (from 1994 to 2005) of the water district's financial statements will be generated. Major financial ratios such as rate of return and debt service coverage are calculated for the test of financial viability.

Moreover, financial internal rate of return (FIRR) is projected as an indicator of the profitability of the project in terms of utilization of limited financial resources. The total capital requirements (excluding capitalized interest), revenue and operating and maintenance costs are components for calculating this indicator. Period of analysis for FIRR is 30 years.

(5) Assumption for Financial Analysis

The following are assumptions used in the forecast of the financial statements.

a) Other operating revenue is assumed to be 3% of water sales revenue except Tagaytay. For Tagaytay, the actual share against the water sales revenue in 1994 is applied.

b) Allowance of bad debts is 2.5% of water sales.

c) Depreciation is set at 2.5% of average fixed assets in operation.

d) New service connections (as other capital expenditures), which accounts for the cost of installing new connections before and after project implementation, are computed at 1,300 pesos per additional connection.

e) Work-in-progress is assumed to be 70% of investment in the project.

f) Cash reserves (fund reserves) is 3% of the water revenues in 1995–1998 and 10% in 1999 onwards.

g) Accounts receivable are two months of water sales.

h) Inventories are two months of cost of chemicals, miscellaneous and maintenance.

i) Accounts payable is two months of operation and maintenance costs.

11.1.4 Economic Analysis

(1) General

The objective of the economic analysis is to evaluate the social welfare of the community through the proposed project from the perspective of the country as a whole. Since it may not be possible to evaluate all the costs and benefits of the project, only quantifiable ones are included in the analysis.

(2) Methods of Analysis

In order to evaluate the economic feasibility of the project, two basic approaches have been used. Those are the Benefit-Cost Ratio (BCR) method and the Economic Internal Rate of Return (EIRR) method. Both approaches focus on identifying and quantifying the benefits and costs attributable to the project through the concept of the net present value.

The BCR is simply the discounted sum of all project benefits divided by the discounted sum of all project costs. A project is considered economically viable if the BCR is greater than one.

The EIRR method involves the determination of the discount rate that will make the present benefits equal to its present costs over the expected life of the project (30 years). A project is considered economically feasible if the EIRR is higher than the opportunity cost of capital. The opportunity cost of capital for water supply projects is assumed at 15% by LWUA.

(3) Project Benefits

In this analysis, the project's quantified benefits consist of increase in consumer satisfaction through concept of consumer surplus (the economic revenues), health benefits and reduction in fire damage.

Consumer Satisfaction

The economic water rate is assumed to be 1.2 times de-escalated average selling price of water according to the historical experiences by LWUA. This means that the amount of satisfaction,

which a customer should get by connecting to the improved water system, is at least 20% more than what one actually pays.

Health Benefits

Health benefits are based on reduction in economic losses due to water-born diseases. These economic losses are the cost of time due to illness, economic losses due to premature death (not death of baby but of adult before reaching the age of average life expectancy) and the cost of medical expenses. It is assumed, however, that only 20% of the total reduction in economic losses will be attributable to the project.

In computing the cost of time lost due to illness, it is assumed that not all the those afflicted with water-borne diseases are income earners and that 65.0% of the population is economically active. The figure for the cost of time lost due to illness was delivered by taking the economically active portion of those afflicted by water-borne diseases and multiplied by 120-125 pesos and 8 days based on the assumption that workers earning 120-125 pesos per day are unable to work for an average of 8 days per year.

Although the income lost due to premature death is usually estimated in the past feasibility study reports by LWUA, it is not calculated here because the mortality rate by water-borne disease is almost nil in all the objective areas in recent years. The cost of medical expenses was derived by multiplying morbidity rate by served population and by the average annual expenditure for medical expenses of 1,000 pesos.

Fire Protection

The installation of suitable fire hydrants in the service area will reduce fire damages. The overall reduction of the fire damage is assumed to be 0.75% of the value of structures in the service area. The average assessed value of each structure is set at 175,000-250,000 pesos. The number of structure is calculated from the total population in the service area divided by 5.2 or 5.5, which is the average number of residents in each unit. Reduction rate of fire charge due to the project is assumed that the area is served by fire hydrants.

(4) Project Costs

Economic cost, which consist of basic construction costs, engineering costs, contingency, operating and maintenance costs, and replacement costs, are calculated through applying shadow pricing method and excluding transfer items from financial tables. In this analysis, the shadow exchange rate of 1.2 and shadow wage rate of 0.6 are applied on all foreign exchange and unskilled labor costs, respectively.

The replacement cost are the costs incurred in order to replace mechanical equipment and other items that have exceeded their life expectancy schedule.

11.2 PROJECT FOR G.M.A.

11.2.1 Estimation of the Construction Cost and Construction Period

(1) Construction Cost

The basic construction costs of the Phase I improvement for the G.M.A. water supply facilities totals P28.36 million, while the Phase II improvement will cost P11.09 million.

A summary of the estimated project cost is presented in **Table 11.2-1a** and **11.2-1b**, the detailed breakdown is shown in **Table 11.2-2a** and **11.2-2b**.

(2) Construction Period

In accordance with the facility requirement as described in Section 10.2.6, the tentative construction period is presented in **Fig. 11.2-1**.

11.2.2 Organization and Cost for Operation and Maintenance of the Water Supply System

(1) Organization

The G.M.A.-WD presently has 23 personnel headed by the general manager. However, it will be required to increase the size of the G.M.A.-WD in 1997 after the proposed water supply system is implemented.

Based on the number of service connection described in Section 10.2.4, the number of personnel for the G.M.A.-WD from the year 1995 up to 2005 is computed as follows:

Design year	No. of Connection	No. of Employee
1995	4,321	43
1996	4,989	50
1997	5,757	58
1998	8,415	84
1999	8,809	88
2000	9,198	92
2001	9,587	96
2002	9,784	98
2003	9,982	100
2004	10,180	102
2005	10,378	104

TABLE 11.2-1a

COST ESTIMATES (P X 1000)
(1994 Price Level)

PHASE 1
GMA WATER DISTRICT

	FACILITIES	TOTAL COST	LOCAL COMPONENT				FOREIGN EXCHANGE COMPONENT		
			MATERIAL	LABOR SKILLED	LABOR UNSKILLED	TOTAL	DIRECT	INDIRECT	TOTAL
1)	DEEPWELL CONSTRUCTION								
	- Equipment	3,520.0	2,240.0	-	-	2,240.0	-	1,280.0	1,280.0
	- Civil Works	4,480.0	2,160.0	720.0	560.0	3,440.0	-	1,040.0	1,040.0
	- Total	8,000.0	4,400.0	720.0	560.0	5,680.0	-	2,320.0	2,320.0
2)	PUMP STATION								
	- Equipment	4,966.9	611.3	-	-	611.3	4,279.1	76.4	4,355.6
	- Civil Works	2,674.5	1,146.2	687.7	382.1	2,216.0	-	458.5	458.5
	- Total	7,641.3	1,757.5	687.7	382.1	2,827.3	4,279.1	534.9	4,814.0
3)	PIPELINES								
	- Equipment	1,548.5	804.0	59.6	-	863.6	-	684.9	684.9
	- Civil Works	1,429.4	655.1	208.5	119.1	982.7	-	446.7	446.7
	- Total	2,977.9	1,459.2	268.0	119.1	1,846.3	-	1,131.6	1,131.6
4)	TREATMENT FACILITIES								
	- Equipment	268.8	86.4	-	-	86.4	163.2	19.2	182.4
	- Civil Works	211.2	144.0	33.6	14.4	192.0	-	19.2	19.2
	- Total	480.0	230.4	33.6	14.4	278.4	163.2	38.4	201.6
5)	SERVICE CONNECTIONS								
	- Equipment	2,687.1	71.7	-	-	71.7	2,543.8	71.7	2,615.4
	- Civil Works	895.7	394.1	143.3	286.6	824.0	-	71.7	71.7
	- Total	3,582.8	465.8	143.3	286.6	895.7	2,543.8	143.3	2,687.1
6)	VALVES/HYDRANTS								
	- Equipment	187.1	29.1	0.0	0.0	29.1	146.9	11.1	158.0
	- Civil Works	90.3	37.4	18.2	29.3	84.8	0.0	5.5	5.5
	- Total	277.4	66.5	18.2	29.3	113.9	146.9	16.6	163.5
7)	STORAGE FACILITIES								
	- Equipment	3,297.0	87.9	-	-	87.9	3,121.2	87.9	3,209.1
	- Civil Works	1,099.0	483.6	175.8	351.7	1,011.1	-	87.9	87.9
	- Total	4,396.0	571.5	175.8	351.7	1,099.0	3,121.2	175.8	3,297.0
8)	LAND ACQUISITION								
	- Equipment	1,000.0	320.0	-	-	320.0	450.0	230.0	680.0
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	1,000.0	320.0	-	-	320.0	450.0	230.0	680.0
	TOTAL CONSTRUCTION COST								
	- Equipment	17,475.4	4,250.4	59.6	0.0	4,310.0	10,704.2	2,461.2	13,165.4
	- Civil Works	10,880.1	5,020.4	1,987.1	1,743.1	8,750.6	0.0	2,129.5	2,129.5
	- Total	28,355.4	9,270.8	2,046.6	1,743.1	13,060.6	10,704.2	4,590.7	15,294.8

TABLE 11.2-1b

COST ESTIMATES (Px1000)
(1994 Price Level)

PHASE 2
GMA WATER DISTRICT

	FACILITIES	TOTAL COST	LOCAL COMPONENT				FOREIGN EXCHANGE COMPONENT		
			MATERIAL	LABOR		TOTAL	DIRECT	INDIRECT	TOTAL
				SKILLED	UNSKILLED				
1)	DEEPWELL CONSTRUCTION								
	- Equipment	-	-	-	-	-	-	-	-
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	-	-	-	-	-	-	-	-
2)	PUMP STATION								
	- Equipment	-	-	-	-	-	-	-	-
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	-	-	-	-	-	-	-	-
3)	PIPELINES								
	- Equipment	645.6	335.2	24.8	-	360.0	-	285.5	285.5
	- Civil Works	595.9	273.1	86.9	49.7	409.7	-	186.2	186.2
	- Total	1,241.5	608.3	111.7	49.7	769.7	-	471.8	471.8
4)	TREATMENT FACILITIES								
	- Equipment	-	-	-	-	-	-	-	-
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	-	-	-	-	-	-	-	-
5)	SERVICE CONNECTIONS								
	- Equipment	771.2	20.6	-	-	20.6	730.1	20.6	750.7
	- Civil Works	257.1	113.1	41.1	82.3	236.5	-	20.6	20.6
	- Total	1,028.3	133.7	41.1	82.3	257.1	730.1	41.1	771.2
6)	VALVES/HYDRANTS								
	- Equipment	153.0	23.8	0.0	0.0	23.8	120.0	9.2	129.2
	- Civil Works	76.4	30.2	16.2	25.4	71.8	0.0	4.6	4.6
	- Total	229.4	54.0	16.2	25.4	95.7	120.0	13.8	133.7
7)	STORAGE FACILITIES								
	- Equipment	5,994.0	159.8	-	-	159.8	5,674.3	159.8	5,834.2
	- Civil Works	1,998.0	879.1	319.7	639.4	1,838.2	-	159.8	159.8
	- Total	7,992.0	1,039.0	319.7	639.4	1,998.0	5,674.3	319.7	5,994.0
8)	LAND ACQUISITION								
	- Equipment	600.0	192.0	-	-	192.0	270.0	138.0	408.0
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	600.0	192.0	-	-	192.0	270.0	138.0	408.0
	==========								
	TOTAL CONSTRUCTION COST								
	- Equipment	8,163.8	731.4	24.8	0.0	756.3	6,794.4	613.1	7,407.5
	- Civil Works	2,927.4	1,295.5	464.0	796.7	2,556.2	0.0	371.2	371.2
	- Total	11,091.2	2,027.0	488.8	796.7	3,312.4	6,794.4	984.3	7,778.7

TABLE 11.2-2a
BREAKDOWN OF COST ESTIMATES (Phase 1)
GMA Water District
GMA, Cavite

A.	ENGINEERING BASIC COST ITEM					
1.	Pipelines				P	2,977,880.00
	a) 2736 m.	100 mm PVC Pipes C-100 @ P	310.00 /m	848,160.00		
	b) 2938 m.	150 mm PVC Pipes C-100 @ P	520.00 /m	1,527,760.00		
	c) 404 m.	200 mm PVC Pipes C-100 @ P	1,490.00 /m	601,960.00		
2.	Appurtenances					277,400.00
	a) 17 pcs.	Gate Valves (Various Sizes)	8,000.00 /pc	136,000.00		
	b) 7 units	Fire Hydrant	20,200.00 /unit	141,400.00		
3.	Source Development					8,000,000.00
	2 units	Deepwell (300m @ P10,000/m)		6,000,000.00		
	1 unit	Deepwell (200m @ P10,000/m)		2,000,000.00		
4.	Pumping Facilities					7,641,327.00
	3 sets	60 HP Submersible motor	719,862.00 /set	2,159,586.00		
	1 set	25 HP Submersible motor	478,821.00 /set	478,821.00		
	3 units	Generator set (100KVA)	790,560.00 /unit	2,371,680.00		
	1 unit	Generator set (41KVA)	516,240.00 /unit	516,240.00		
	4	20sq.m. Pumphouse	7,500.00 /sq.m	600,000.00		
		Transformer/Powerlines	Lump Sum	1,515,000.00		
5.	Reservoir					4,396,000.00
	292 cum 1	Elevated Steel Tank	13,000.00 /cum	3,796,000.00		
	3 units	Reservoir Rehabilitation	Lump Sum	600,000.00		
6.	Service Connection					
	2756		1,300.00 /s.c	3,582,800.00		3,582,800.00
7.	Disinfection Facility					
	10 units	Hypochlorinator	48,000.00 /unit	480,000.00		480,000.00
			Sub-Total A		P	27,355,407.00
B.	NON-ENGINEERING BASIC COST ITEM					
	Land Acquisition	1,000.00 sq.m.	1,000.00 /sq.m.			1,000,000.00
			Sub-Total B		P	1,000,000.00
			TOTAL PROJECT COST ----------		P	28,355,407.00
					SAY P	28.36 MILLION

TABLE 11.2-2b
BREAKDOWN OF COST ESTIMATES (Phase 2)
GMA Water District
GMA, Cavite

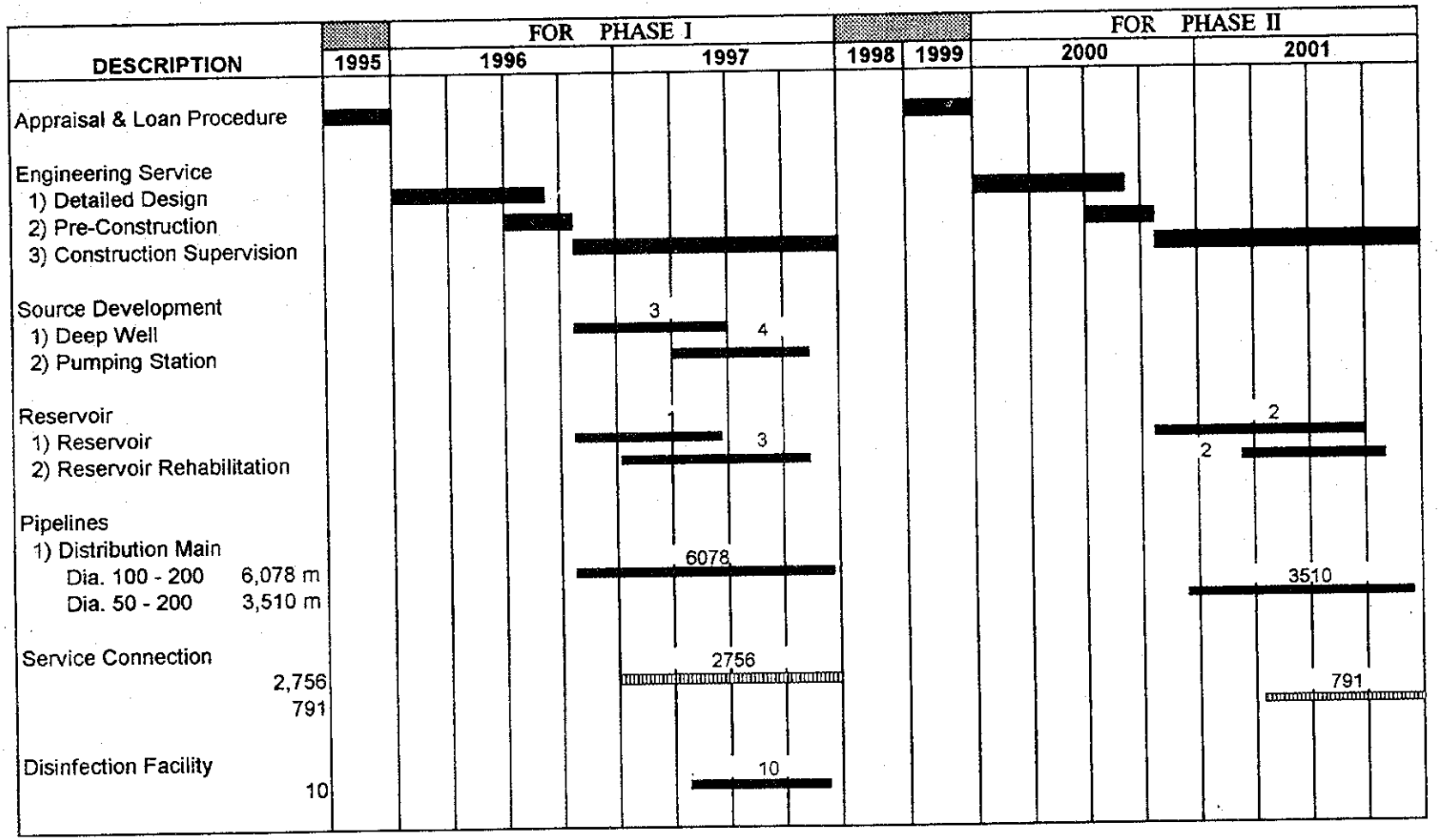
ENGINEERING BASIC COST ITEM

1.	Pipelines				P	1,241,480.00
a)	70 m.	200 mm PVC Pipes C-100 @ P	1,490.00 /m	104,300.00		
b)	552 m.	150 mm PVC Pipes C-100 @ P	520.00 /m	287,040.00		
c)	2326 m.	100 mm PVC Pipes C-100 @ P	310.00 /m	721,060.00		
d)	278 m.	75 mm PVC Pipes C-100 @ P	260.00 /m	72,280.00		
e)	284 m.	50 mm PVC Pipes C-100 @ P	200.00 /m	56,800.00		
2.	Appurtenances					229,400.00
a)	11 pcs.	Gate Valves (Various Sizes)	8,000.00 /pc	88,000.00		
b)	7 units	Fire Hydrant	20,200.00 /unit	141,400.00		
3.	Reservoir					7,992,000.00
	584 cum	1 Elevated Steel Tank	13,000.00 /cum	7,592,000.00		
	2 unit	Reservoir Rehabilitation	Lump Sum	400,000.00		
4.	Service Connection					
	791		1,300.00 /s.c	1,028,300.00		1,028,300.00
			Sub-Total A		P	10,491,180.00

B. NON-ENGINEERING BASIC COST ITEM

Land Acquisition	600.00 sq.m.	1,000.00 /sq.m.			600,000.00
		Sub-Total B		P	600,000.00
		TOTAL PROJECT COST	----------	P	11,091,180.00
				SAY P	11.09 MILLION

FIG. 11.2-1 CONSTRUCTION PERIOD FOR GMA



(2) Cost for Operation and Maintenance of the Water Supply System

A summary of the operation and maintenance costs for the G.M.A. water supply system from the year 1994 up through 2005 is shown in **Table 11.2-3**, and a breakdown of the expenditures is presented in **Table 11.2-4a** to **11.2-4c**.

The same tables above shall be applied for the financial analysis in Section 11.1.3.

11.2.3 Financial Analysis

(1) Financial Background

G.M.A. Water District took over the operation of the water supply system in 1988 from GEMASCO, the local cooperative that claims ownership of the water system. The district has implemented the LWUA approved project loan of 3.02 million pesos from 1991 to 1994 for the development of its water system which consist of well source rehabilitation, pipeline and service connection installation, and provision for disinfection. The district was exempted from the equity contribution since the project was their initial major improvement.

(2) Development Cost

The cost estimates of the required improvements are presented in the preceding Section. A breakdown of the project cost on an annual basis is shown in **Table 11.2-5**.

(3) Operating and Maintenance Costs

Operating and maintenance costs are shown in **Table 11.2-6**. Details are also shown in the preceding section (Section 11.2.2).

(4) Project Financing

100% of the total project cost is assumed to be financed by loans. Computation of the loan is shown below.

Total Project Cost (Phase 1)	36.70 million pesos
Capitalized Interest	6.56 million pesos
Total Loan Amount (regular and soft loan)	43.26 million pesos

50% of the loan is assumed to be at regular loan with interest rates of 10.5% and 12.5% for the first 3.6 million pesos and the excess of 3.6 million pesos, respectively.

Remaining 50% of the loan is to be a soft loan with the terms and conditions described in Section 11.1.3.

TABLE 11.2-3
SUMMARY OF OPERATION AND MAINTENANCE COST
GMA WATER DISTRICT

YEAR	ADMINISTRATION PERSONNEL A)	POWER B)	CHLORINE C)	MISCELLANEOUS & MAINTENANCE D)	OFFICE RENTALS E)	TOTAL
1994	1,345,500.00	2,678,388.75	163,213.40	374,400.00	36,000.00	4,597,502.15
1995	2,515,500.00	3,084,865.09	187,792.50	432,100.00	36,000.00	6,256,257.59
1996	3,451,500.00	3,556,667.99	216,357.40	498,900.00	36,000.00	7,759,425.39
1997	3,393,000.00	4,093,797.44	249,061.40	575,700.00	36,000.00	8,347,558.84
1998	4,914,000.00	6,833,416.26	362,707.80	841,500.00	36,000.00	12,987,624.06
1999	5,148,000.00	7,149,316.28	379,775.20	880,900.00	36,000.00	13,593,991.48
2000	5,382,000.00	7,465,216.30	396,536.00	919,800.00	36,000.00	14,199,552.30
2001	5,616,000.00	7,781,116.33	413,296.80	958,700.00	36,000.00	14,805,113.13
2002	5,733,000.00	7,085,204.66	421,881.60	978,400.00	36,000.00	14,254,486.26
2003	5,850,000.00	7,195,910.99	430,466.40	998,200.00	36,000.00	14,510,577.39
2004	5,967,000.00	7,336,139.00	439,051.20	1,018,000.00	36,000.00	14,796,190.20
2005	6,084,000.00	8,081,561.57	483,508.20	1,037,800.00	36,000.00	15,722,869.77

TABLE 11.2-4a Cost for Operation and Maintenance

A) PERSONNEL

The staff is expected to increase by design year to cope up with growing demand of the water supply system.

Staff = 100 per Connection

Cost = Staff * Average Salary * 13 months

YEAR	Average Salary/month	Conn	Staff	Annual Cost (P)
1994	4,500.00	3,744	23	1,345,500.00
1995	4,500.00	4,321	43	2,515,500.00
1996	4,500.00	4,989	59	3,451,500.00
1997	4,500.00	5,757	58	3,393,000.00
1998	4,500.00	8,415	84	4,914,000.00
1999	4,500.00	8,809	88	5,148,000.00
2000	4,500.00	9,198	92	5,382,000.00
2001	4,500.00	9,587	96	5,616,000.00
2002	4,500.00	9,784	98	5,733,000.00
2003	4,500.00	9,982	100	5,850,000.00
2004	4,500.00	10,180	102	5,967,000.00
2005	4,500.00	10,378	104	6,084,000.00

TABLE 11.2-4b Cost for Operation and Maintenance

B) PUMPING COST

YEAR	ADD (L/s)	HP RATING	KW RATING	SC (L/s)	Demand/ Supply	PHPD (Hr/d)	DEPD (KWH/D)	PUMPING COST (P) Daily	Monthly	Annualy
1994	36.90	160	119.36	66.86	0.55	13.25	1859.99	7,439.97	223,199.06	2,678,388.75
1995	42.50	160	119.36	66.86	0.64	15.26	2142.27	8,569.07	257,072.09	3,084,865.09
1996	49.00	160	119.36	66.86	0.73	17.59	2469.91	9,879.63	296,389.00	3,556,667.99
1997	56.40	160	119.36	66.86	0.84	20.25	2842.91	11,371.66	341,149.79	4,093,797.44
1998	82.20	360	268.56	131.35	0.63	15.02	4745.43	18,981.71	569,451.36	6,833,416.26
1999	86.00	360	268.56	131.35	0.65	15.71	4964.80	19,859.21	595,776.36	7,149,316.28
2000	89.80	360	268.56	131.35	0.68	16.41	5184.18	20,736.71	622,101.36	7,465,216.30
2001	93.60	360	268.56	131.35	0.71	17.10	5403.55	21,614.21	648,426.36	7,781,116.33
2002	96.00	360	268.56	147.95	0.65	15.57	4920.28	19,681.12	590,433.72	7,085,204.66
2003	97.50	360	268.56	147.95	0.66	15.82	4997.16	19,988.64	599,659.25	7,195,910.99
2004	99.40	360	268.56	147.95	0.67	16.12	5094.54	20,378.16	611,344.92	7,336,139.00
2005	109.50	360	268.56	147.95	0.74	17.76	5612.20	22,448.78	673,463.46	8,081,561.57

ADD = Average day demand
SC = Supply Capacity
HP = Pumps Rated Horsepower
Pv = Cost per KWH = 4.00

Em = Pump Efficiency = 85%
Days of Pumping/month = 30 days
PHPD = Pumping hours per day
DEPD = Daily Energy Power Demand

Computations Used:

KW Rating = Rated Hp * .746
Demand/Supply Ratio = ADD/SC
PHPD = 24 Hours * Demand/Supply Ratio
DEPD = PHPD * KW Rating / Pump Efficiency

Power Cost :

Daily = DEPD * Energy Cost
Monthly = Daily Power Cost * 30
Yearly = Monthly Power Cost * 12

TABLE 11.2–4c Cost for Operation and Maintenance

C) CHLORINATION COST

The average annual demand for chlorine is as follows:

A = (365 * Q * D)/1000
Where :
A = Annual Demand of Chlorine (Kg)
Q = Average Daily Water Demand (cumd)
D = Average Chlorine Dosage = 2 mg/l
Cost of Chlorine = 70.00 /kg

YEAR	ADD (CumD)	ADC (Kg)	COST (P)
1994	3,194	2,332	163,213.40
1995	3,675	2,683	187,792.50
1996	4,234	3,091	216,357.40
1997	4,874	3,558	249,061.40
1998	7,098	5,182	362,707.80
1999	7,432	5,425	379,775.20
2000	7,760	5,665	396,536.00
2001	8,088	5,904	413,296.80
2002	8,256	6,027	421,881.60
2003	8,424	6,150	430,466.40
2004	8,592	6,272	439,051.20
2005	9,462	6,907	483,508.20

ADD = Average day demand
ADC = Annual Demand of Chlorine

D) Maintenance and Miscellaneous Expenses

Cost per connection/year = P 100.00 /year

YEAR	Conn	TOTAL (P)
1994	3,744	374,400.00
1995	4,321	432,100.00
1996	4,989	498,900.00
1997	5,757	575,700.00
1998	8,415	841,500.00
1999	8,809	880,900.00
2000	9,198	919,800.00
2001	9,587	958,700.00
2002	9,784	978,400.00
2003	9,982	998,200.00
2004	10,180	1,018,000.00
2005	10,378	1,037,800.00

E) Office Rentals

	Monthly Rentals	Yearly Rentals
1994	3,000.00	36,000.00
1995	3,000.00	36,000.00
1996	3,000.00	36,000.00
1997	3,000.00	36,000.00
1998	3,000.00	36,000.00
1999	3,000.00	36,000.00
2000	3,000.00	36,000.00
2001	3,000.00	36,000.00
2002	3,000.00	36,000.00
2003	3,000.00	36,000.00
2004	3,000.00	36,000.00
2005	3,000.00	36,000.00

TABLE 11.2-5 BREAKDOWN OF PROJECT COST - GMA Water District

Unit: 1000 Pesos

	1995	1996	1997	1998	1999	TOTAL
Basic Construction Cost		6,839	20,517			27,355
Price and Physical Contingencies		1,026	3,077			4,103
Engineering Studies		2,831				2,831
Construction Supervision		315	944			1,258
Land Acquisition		1150				1,150
Total Project Cost	0	12,161	24,538	0		36,698
Less: WD Equity		0	0	0		0
Soft Loan		0	18,349	0		18,349
Regular Loan Disbursements	0	12,161	6,189	0		18,349
Add: Capitalized Interest	0	1,455	2,404	2,704	0	6,563
Regular Loan	0	13,616	8,592	2,704	0	24,912
Total Project Loan	0	13,616	26,942	2,704	0	43,261

TABLE 11.2-6a PROJECTED OPERATION & MAINTENANCE COST (UNESCALATED) - GMA Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SALARIES	1,334	2,516	3,452	3,393	4,914	5,148	5,382	5,616	5,733	5,850	5,967	6,084
POWER	1,635	3,085	3,557	4,094	6,833	7,149	7,465	7,781	7,085	7,196	7,336	8,082
CHEMICALS	100	188	216	249	363	380	397	413	422	430	439	484
MISC. & MAINTENANCE	502	468	535	612	878	917	956	995	1,014	1,034	1,054	1,074
UNESCALATED TOTAL O & M COST	3,571	6,256	7,759	8,348	12,988	13,594	14,200	14,805	14,254	14,511	14,796	15,723

TABLE 11.2-6b PROJECTED OPERATION & MAINTENANCE COST (ESCALATED) - GMA Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SALARIES	1,334	2,817	4,252	4,598	7,325	8,442	9,708	11,143	12,513	14,045	15,758	17,674
POWER & FUEL	1,635	3,455	4,382	5,548	10,187	11,723	13,466	15,439	15,464	17,276	19,374	23,477
CHEMICALS	100	210	267	338	541	623	715	820	921	1,033	1,159	1,405
MISC. & MAINTENANCE	502	524	659	829	1,308	1,504	1,724	1,974	2,214	2,483	2,784	3,119
ESCALATED TOTAL O & M COST	3,571	7,007	9,560	11,313	19,361	22,291	25,613	29,376	31,111	34,837	39,075	45,675

Note:
For financial analysis, operation and maintenance cost in 1994 is mainly based on the financial statements of the district although large parts are projected. Therefore, it is not necessarily equal to the costs shown in Table 11.2-3 through 11.2-4.

The details of the project loan's debt service schedule is presented in **Table 11.2-7.**

(5) Projection of Financial Statements

The water district's projected income statement for the period 1994-2005, as presented in **Table 11.2-8**, shows that annual net income are positive. Major financial ratios derived from the income statement shows as follows;

a) Operating ratio which measures the ability of revenues to cover operating expenses shows that the operating costs are between 71-73% of the operating revenues after the project completion.

b) Return on the average fixed assets, which measures the earning power of the district's facilities, ranges from 14 to 25% after the completion of the project.

The projected cash flow statement for the same period as shown in **Table 11.2-9** indicates the sources and applications of funds. Major highlights from this table are as follows:

a) Increase in working capital is positive throughout the study period.

b) Debt service coverage which shows the ability of the district's internal cash generation to meet its debt services are more than 2.5 1999 onwards. These ratios are higher than LWUA's minimum ratio of 1.3.

The projected balance sheet are presented in **Table 11.2-10.** Major points are shown as follows;

a) Cash balance at the end of the study period (2005) is 30.0 million pesos.

b) A total of 33.9 million pesos is accumulated for cash reserves by the year 2005.

c) Current ratios which measure the ability of the district to meet its short term obligations are almost between 4.2 and 9.4 after the project completion.

d) Debt/equity ratios which indicate the percentage of the long-term debt in the net worth decrease gradually from 67% in 1998 to 37% in 2005.

(6) Financial Internal Rate of Return

As shown in **Table 11.2-11**, the FIRR is 26.7 percent for the base case. The derived FIRR is well above the water district's weighted average cost of capital at 11.9 percent, which is shown in **Table 11.2-12.**

TABLE 11.2-7 DEBT SERVICE SCHEDULE - GMA Water District

REGULAR LOAN (50%)											Unit: 1000 Pesos
First 2 million	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Disbursements	0	0	0	0							
Capitalized Interest	0	0	0	0							
Operational Interest					0	0	0	0	0	0	0
Principal					0	0	0	0	0	0	0
Debt Service					0	0	0	0	0	0	0
Loan Outstanding, year-end	0	0	0	0	0	0	0	0	0	0	0
Next 5 million a/											
Disbursements	0	3,250	0	0							
Capitalized Interest	0	341	0	0							
Operational Interest					377	374	370	366	362	357	352
Principal					30	34	37	41	45	50	55
Debt Service					407	407	407	407	407	407	407
Loan Outstanding, year-end	0	3,591	3,591	3,591	3,561	3,527	3,490	3,449	3,404	3,354	3,298
More than 7 million											
Disbursements	0	8,911	6,189								
Capitalized Interest	0	1,114	2,404	2,704							
Operational Interest					2,665	2,649	2,630	2,610	2,586	2,560	2,531
Principal					131	147	166	186	209	236	265
Debt Service					2,796	2,796	2,796	2,796	2,796	2,796	2,796
Loan Outstanding, year-end	0	10,024	18,617	21,321	21,190	21,043	20,877	20,691	20,482	20,246	19,981
SOFT LOAN (50%)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Disbursements	0	0	18,349	0							
Capitalized Interest	0	0	0								
Operational Interest								2,114	2,114	2,114	2,114
Principal											
Debt Service								2,114	2,114	2,114	2,114
Loan Outstanding, year-end	0	0	18,349	18,349	18,349	18,349	18,349	18,349	18,349	18,349	18,349
DEBT SERVICE SUMMARY	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Disbursements	0	12,161	24,538	0							
Capitalized Interest	0	1,455	2,404	2,704							
Operational Interest					3,042	3,023	3,001	5,090	5,062	5,031	4,997
Principal					161	181	203	227	255	286	320
Debt Service					3,203	3,203	3,203	5,317	5,317	5,317	5,317
Loan Outstanding, year-end	0	13,616	40,557	43,261	43,100	42,919	42,717	42,490	42,235	41,949	41,629

a/ According to the LWUA record, GMA Water District has already received the regular loan at the amount of 3.4 million pesos approximately.

TABLE 11.2-8 PROJECTED INCOME STATEMENT - GMA Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Water Produced ('000 cum)	1,166	1,341	1,545	1,779	2,591	2,713	2,832	2,952	3,013	3,075	3,136	3,454
Water Sold ('000 cum)	933	1,073	1,236	1,423	2,073	2,170	2,266	2,362	2,411	2,460	2,509	2,764
Non-Revenue Water (%)	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Average Water Rate (Effective Water Rate) (cum)	8.24	8.24	9.06	9.97	13.16	14.48	15.92	17.52	18.74	20.06	21.46	22.96
Operating Revenue												
Water Revenues	5,076	8,842	11,205	14,191	27,286	31,417	36,086	41,375	45,186	49,335	53,844	63,462
Other Operating Revenue	152	265	336	426	819	943	1,083	1,241	1,356	1,480	1,615	1,904
Total Operating Revenue	5,228	9,108	11,542	14,617	28,104	32,360	37,169	42,617	46,541	50,816	55,459	65,366
Operating Costs												
Personnel	1,334	2,817	4,252	4,598	7,325	8,442	9,708	11,143	12,513	14,045	15,758	17,674
Chemicals	100	210	267	338	541	623	715	820	921	1,033	1,159	1,405
Power and Fuel	1,635	3,455	4,382	5,548	10,187	11,723	13,466	15,439	15,464	17,276	19,374	23,477
Misc. & Maintenance	502	524	659	829	1,308	1,504	1,724	1,974	2,214	2,483	2,784	3,119
Bad Debts	0	221	280	355	682	785	902	1,034	1,130	1,233	1,346	1,587
Total Operating Cost	3,571	7,228	9,840	11,667	20,043	23,077	26,515	30,410	32,241	36,071	40,421	47,261
Income Before Depreciation	1,657	1,880	1,702	2,949	8,061	9,283	10,654	12,207	14,300	14,745	15,038	18,105
Less: Depreciation	669	364	455	747	1,253	1,540	1,560	1,581	1,599	1,612	1,626	1,642
Operating Income	988	1,516	1,247	2,202	6,808	7,743	9,094	10,626	12,702	13,133	13,412	16,463
Add : Non-operating Income	3											
Less: Interest on Loans	56	51	327	318	315	3,343	3,313	3,279	5,355	5,317	5,280	5,240
NET INCOME (LOSS)	931	1,465	920	1,884	6,493	4,400	5,782	7,346	7,346	7,816	8,132	11,223
Operating Ratio a/	68%	79%	85%	80%	71%	71%	71%	71%	69%	71%	73%	72%
Average Rate Base b/	13,115	14,543	18,207	29,897	50,134	61,607	62,389	63,244	63,942	64,467	65,046	65,684
Rate of Return c/	8%	10%	7%	7%	14%	13%	15%	17%	20%	20%	21%	25%

a/ Total operating cost as a percentage of total revenue
b/ Average net fixed assets in operation
c/ Operating income as a percentage of the average rate base

PROJECTED WATER RATES 1/												
MINIMUM CHARGE (Peso/5 cu.m.)	40.00	40.00	44.00	48.40	63.89	70.28	77.30	85.03	90.99	97.36	104.17	111.46
6 - 10 cu.m. (Peso/cu.m.)	8.00	8.00	8.80	9.68	12.78	14.06	15.46	17.01	18.20	19.47	20.83	22.29
11 - 20 cu.m. (Peso/cu.m.)	8.00	8.00	8.80	9.68	12.78	14.06	15.46	17.01	18.20	19.47	20.83	22.29
Over 21 cu.m. (Peso/cu.m.)	8.00	8.00	8.80	9.68	12.78	14.06	15.46	17.01	18.20	19.47	20.83	22.29
Average low income (Urban)	2,188	2,407	2,647	2,912	3,203	3,524	3,876	4,264	4,690	5,159	5,675	6,242
% of income allocated to minimum water rates	1.83	1.66	1.66	1.66	1.99	1.99	1.99	1.99	1.94	1.89	1.84	1.79
% of income allocated to water rates for 10 cu.m.	3.66	3.32	3.32	3.32	3.99	3.99	3.99	3.99	3.88	3.77	3.67	3.57
% of increase of minimum charge	-	0%	10%	10%	32%	10%	10%	10%	7%	7%	7%	7%

1/ Projected /effective dates of implementation of the projected rates are the first day of January in each year unless otherwise specified.

TABLE 11.2-9 PROJECTED CASH FLOW TABLE (SOURCES AND USE OF FUNDS) - GMA Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SOURCES OF FUNDS												
Income Before Depreciation	1,657	1,880	1,702	2,949	8,061	9,283	10,654	12,207	14,300	14,745	15,038	18,105
Add: Non-operating Income	3											
Internal Cash Generation	1,659	1,880	1,702	2,949	8,061	9,283	10,654	12,207	14,300	14,745	15,038	18,105
Other Paid-in Capital (WD Equity)			0	0	0							
Loans												
Project Loan (LWUA)	0	0	13,616	26,942	2,704	0	0	0	0	0	0	0
Other Loan (LWUA: L.A. #3-447)	2,106	0	0	0	0	0	0	0	0	0	0	0
Total Sources	3,766	1,880	15,317	29,891	10,765	9,283	10,654	12,207	14,300	14,745	15,038	18,105
APPLICATION OF FUNDS												
Project	2,106	0	12,161	24,538	0	0						
Capitalized Interest	1/	0	1,455	2,404	2,704	0						
Other Capital Expenditures	939	750	0	0	2,315	750	814	896	499	552	607	668
Total Capital Expenditures	3,045	750	13,616	26,942	5,019	750	814	896	499	552	607	668
Debt Service												
Interest												
Project Loan (LWUA)	0	0	0	0	0	3,042	3,023	3,001	5,090	5,062	5,031	4,997
Other Loans (LWUA: L.A. #3-447 and others)	56	51	327	318	315	301	290	279	266	254	249	243
Total Interest	56	51	327	318	315	3,343	3,313	3,279	5,355	5,317	5,280	5,240
Amortization												
Project Loan (LWUA)	0	0	0	0	0	161	181	203	227	255	286	320
Other Loans (LWUA: L.A. #3-447 and others)	35	41	77	77	81	90	100	112	125	70	63	69
Total Amortization	35	41	77	77	81	251	281	315	352	325	349	389
Total Debt Service	92	92	404	395	396	3,594	3,594	3,594	5,708	5,642	5,629	5,629
Increase in Working Capital	629	1,037	1,298	2,554	5,350	4,939	6,246	7,717	8,094	8,551	8,802	11,808
Total Applications	3,766	1,880	15,317	29,891	10,765	9,283	10,654	12,207	14,300	14,745	15,038	18,105
Self Financing Ratio a/	31%	100%	0%	0%	46%	100%	100%	100%	100%	100%	100%	100%
Average Self-Financing Ratio b/			0%	0%	15%	7%	37%	109%	68%	85%	110%	110%
Debt Service Ratio	18.11	20.33	4.21	7.46	20.37	2.58	2.96	3.40	2.51	2.61	2.67	3.22

1/ Capitalized interest is included in project expenditures.
a/ annual
b/ calculated on three years average

TABLE 11.2-10 PROJECTED BALANCE SHEET - GMA Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
ASSETS												
Current Assets												
Cash	713	1,581	2,542	4,425	8,002	9,552	11,913	15,178	18,351	21,834	25,136	29,998
Accounts Receivable	1,430	1,474	1,868	2,366	4,549	5,237	6,016	6,897	7,532	8,224	8,976	10,579
Inventory	126	122	154	194	308	354	407	466	523	586	657	754
Cash Reserves	0	265	601	1,027	1,846	4,987	8,596	12,734	17,252	22,186	27,570	33,916
Other Current Assets	0	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	2,269	3,442	5,166	8,012	14,704	20,132	26,931	35,275	43,658	52,830	62,339	75,247
Fixed Assets in Operation	13,431	15,655	20,759	39,036	61,232	61,982	62,796	63,692	64,191	64,743	65,350	66,017
Accumulated Depreciation	1,265	1,628	2,083	2,831	4,084	5,624	7,184	8,765	10,364	11,975	13,602	15,244
Net Fixed Assets in Operation	12,166	14,027	18,675	36,205	57,148	56,357	55,612	54,927	53,827	52,768	51,748	50,774
Add: Work in Progress	1,474	0	8,512	17,176	0	0	0	0	0	0	0	0
Total Fixed Assets	13,641	14,027	27,188	53,382	57,148	56,357	55,612	54,927	53,827	52,768	51,748	50,774
TOTAL ASSETS	15,910	17,470	32,353	61,394	71,852	76,489	82,543	90,202	97,485	105,598	114,087	126,021
LIABILITIES and EQUITY												
Current Liabilities												
Accounts Payable	1,032	1,168	1,594	1,886	3,227	3,716	4,270	4,897	5,186	5,807	6,514	7,614
Customer Deposits	0	0	0	0	0	0	0	0	0	0	0	0
Current Maturities	41	77	77	81	251	281	315	352	325	349	389	435
Total Current Liabilities	1,073	1,245	1,671	1,967	3,479	3,997	4,584	5,249	5,511	6,156	6,903	8,049
Loans Payable - Long Term Debts	3,020	2,943	16,481	43,342	45,795	45,514	45,199	44,847	44,522	44,173	43,784	43,349
Equity												
Capital Contribution (government)	10,998	10,998	10,998	10,998	10,998	10,998	10,998	10,998	10,998	10,998	10,998	10,998
Other Paid-in Capital	239	239	239	239	239	239	239	239	239	239	239	239
Retained Earnings	580	2,044	2,964	4,848	11,341	15,741	21,523	28,869	36,215	44,032	52,163	63,386
Total Equity	11,817	13,282	14,201	16,085	22,578	26,978	32,760	40,106	47,452	55,269	63,400	74,623
TOTAL LIABILITIES & EQUITY	15,910	17,470	32,353	61,394	71,852	76,489	82,543	90,202	97,485	105,598	114,087	126,021
Current Ratio a/	2.11	2.76	3.09	4.07	4.23	5.04	5.87	6.72	7.92	8.58	9.03	9.35
Debt/Equity Ratio /b	20.4%	18.1%	53.7%	72.9%	67.0%	62.8%	58.0%	52.8%	48.4%	44.4%	40.8%	36.7%

a/ The ratio which total current assets divided by the total current liability

b/ Long-term debt as a percentage of the net worth (total liability and equity minus total current liability)

TABLE 11.2-11 FINANCIAL INTERNAL RATE OF RETURN - GMA Water District

(Unit: 1000 Pesos)

YEAR	(a) Base Case				(b) Investment Cost +20%				(c) O & M cost +20%				(d) Revenue -20%			
	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	12,161	-12,161	0	0	14,593	-14,593	0	0	12,161	-12,161	0	0	12,161	-12,161
1997	3,075	1,753	24,538	-23,216	3,075	1,753	29,445	-28,123	3,075	2,104	24,538	-23,566	2,460	1,753	24,538	-23,831
1998	16,563	9,801	2,315	4,446	16,563	9,801	2,778	3,983	16,563	11,762	2,315	2,486	13,250	9,801	2,315	1,134
1999	20,818	12,732	750	7,337	20,818	12,732	900	7,187	20,818	15,278	750	4,790	16,655	12,732	750	3,173
2000	25,627	16,053	814	8,760	25,627	16,053	977	8,597	25,627	19,264	814	5,549	20,502	16,053	814	3,634
2001	31,075	19,816	896	10,363	31,075	19,816	1,075	10,184	31,075	23,779	896	6,400	24,860	19,816	896	4,148
2002	35,000	21,552	499	12,949	35,000	21,552	599	12,849	35,000	25,862	499	8,639	28,000	21,552	499	5,949
2003	39,274	25,278	552	13,445	39,274	25,278	662	13,334	39,274	30,333	552	8,389	31,419	25,278	552	5,590
2004	43,918	29,516	607	13,795	43,918	29,516	728	13,674	43,918	35,419	607	7,892	35,134	29,516	607	5,012
2005	53,824	36,115	668	17,042	53,824	36,115	801	16,908	53,824	43,338	668	9,819	43,060	36,115	668	6,277
2006	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2007	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2008	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2009	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2010	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2011	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2012	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2013	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2014	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2015	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2016	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2017	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2018	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2019	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2020	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2021	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2022	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
2023	53,824	36,115	0	17,709	53,824	36,115	0	17,709	53,824	43,338	0	10,486	43,060	36,115	0	6,944
	FIRR =	26.72%			FIRR =	23.07%			FIRR =	18.37%			FIRR =	12.77%		

TABLE 11.2-12 WEIGHTED AVERAGE OF CAPITAL - GMA Water District

Unit: 1000 Pesos

	AMOUNT	%TOTAL PROJECT LOAN	INTEREST RATE	WEIGHTED COST OF CAPITAL
TOTAL PROJECT LOAN	43,261	100.00%		
COMPOSITION OF LOAN				
A. REGULAR LOAN	24,912	57.59%		
FIRST 2 MILLION	0	0.00%	8.50%	0.00%
NEXT 5 MILLION	3,591	8.30%	10.50%	0.87%
EXCESS OF 7 MILLION	21,321	49.28%	12.50%	6.16%
B. SOFT LOAN	18,349	42.41%		
FIRST 2 MILLION	2,000	4.62%	8.50%	0.39%
NEXT 5 MILLION	5,000	11.56%	10.50%	1.21%
EXCESS OF 7 MILLION	11,349	26.23%	12.50%	3.28%
PRESCRIBED DISCOUNT RATE FOR FIRR COMPUTATION				11.92%

TABLE 11.2-13 INCREASE IN CONSUMER SATISFACTION - GMA Water District

Unit: 1000 Pesos

YEAR	INCREMENTAL ACCOUNTED FOR WATER	PRICE PER CU.M.	ECONOMIC VALUE PER CU.M.	ECONOMIC WATER REVENUE	PRESENT VALUE DISCOUNT RATE AT 15% FACTOR	VALUE
1994	0	8.24	9.89	0	1.000	0
1995	0	7.36	8.83	0	0.870	0
1996	0	7.36	8.83	0	0.756	0
1997	187	7.36	8.83	1,651	0.658	1,086
1998	837	8.83	10.59	8,867	0.572	5,070
1999	934	8.83	10.59	9,894	0.497	4,919
2000	1,030	8.83	10.59	10,910	0.432	4,717
2001	1,126	8.83	10.59	11,926	0.376	4,484
2002	1,174	8.59	10.31	12,104	0.327	3,957
2003	1,224	8.35	10.02	12,267	0.284	3,487
2004	1,273	8.13	9.75	12,412	0.247	3,068
2005	1,528	7.90	9.48	14,489	0.215	3,114
2006	1,528	7.90	9.48	14,489	0.187	2,708
2007	1,528	7.90	9.48	14,489	0.163	2,355
2008	1,528	7.90	9.48	14,489	0.141	2,048
2009	1,528	7.90	9.48	14,489	0.123	1,781
2010	1,528	7.90	9.48	14,489	0.107	1,548
2011	1,528	7.90	9.48	14,489	0.093	1,346
2012	1,528	7.90	9.48	14,489	0.081	1,171
2013	1,528	7.90	9.48	14,489	0.070	1,018
2014	1,528	7.90	9.48	14,489	0.061	885
2015	1,528	7.90	9.48	14,489	0.053	770
2016	1,528	7.90	9.48	14,489	0.046	669
2017	1,528	7.90	9.48	14,489	0.040	582
2018	1,528	7.90	9.48	14,489	0.035	506
2019	1,528	7.90	9.48	14,489	0.030	440
2020	1,528	7.90	9.48	14,489	0.026	383
2021	1,528	7.90	9.48	14,489	0.023	333
2022	1,528	7.90	9.48	14,489	0.020	289
2023	1,528	7.90	9.48	14,489	0.017	252
TOTAL INCREASE IN CONSUMER SATISFACTION				355,326		52,986

1/ The 1996 volume of cu.m. is deducted from the water demand projections annually throughout the study period for the incremental volume.

2/ Price per cu.m. was based on the de-escalated average rate per cu.m. of water.

3/ Economic value per cu.m. was assumed to be 1.2 times the price per cu.m. of water.

(7) Sensitivity Analysis

A sensitivity analysis is conducted to determine the effect of variances in the assumptions to the FIRR. The derived FIRR under selected variances to the base case are as follows:

Scenario	FIRR
Base Case	26.7%
1. 20% increase in Investment Cost	23.1%
2. 20% increase in O & M Cost	18.4%
3. 20% decrease in Revenue	12.8%

The computation of the FIRR under the different scenarios is also shown in **Table 11.2-11.** Results of the sensitivity analysis shows that the FIRR is greatly influenced by the decrease of revenue. The derived FIRR, however, are still more than the water district's weighted average cost of capital.

(8) Recommended Water Rates

The recommended water rates are shown below. The high increase of the rate in 1998 is tallied with the projected year of implementation although an annual increase up to 2005 is also proposed. Restructured water rates "bracketing" for minimum charge from the 1st 5 m^3 to 1st 10 m^3 may be recommended in the future in coordination with LWUA's Regulatory Division. The details are also presented in **Table 11.2-8.**

	Minimum	6-10m^3	11-20m^3	Over 20m^3
1994	40.00	8.00	8.00	8.00
1996	44.00	8.80	8.80	8.80
1998	63.89	12.78	12.78	12.78
2000	77.30	15.46	15.46	15.46
2002	90.99	18.20	18.20	18.20
2005	111.46	22.29	22.29	22.29

These recommended water rates are subject to the following criteria:

a) Minimum charge (First 5 m^3) must not exceed 5% of the average family income of the low income group

b) Any increase must be limited to 60% of the prevailing rates.

As can be seen in **Table 11.2-8,** the recommended rates for the first 5 m^3 do not exceed 5% of the average income of the low income group. The rates of first 10 m^3, which comprises the first 5 m^3 plus the next bracket of 6-10 m^3, does not exceed 5% either. Futher, all rate increases are within the maximum limit of 60%.

(9) Concluding Remarks of Financial Analysis

The proposed development program for G.M.A. Water District is financially viable. However, it must be emphasized that the following conditions should be fulfilled.

a) Water rates as discussed above should be adopted and attained.

b) The project should be implemented in 1996 and completed by the end of 1997.

c) The targeted number of service connections should be attained because the FIRR is the most sensitive in the revenue reduction.

11.2.4 Economic Analysis

(1) Project Benefits

Consumer Satisfaction

Under the assumptions described in Section 11.1.4, the present economic value of water at 15% discount rate is 53.0 million pesos as shown in **Table 11.2-13**.

Based on the small-scale questionnaire survey (only 48 samples) in G.M.A., the average amount of the willingness to pay among respondents is 1.29 times as large as the estimated average actual payments. The assumption of 1.2 times, therefore, seems to be reasonable.

Health Benefits

Morbidity rate of water-born diseases in G.M.A. is 543 out of 100,000 according to the Municipal Socio-economic Profile. When 120 peso per day and 8 days per patient were lost by illness, the present economic value of health benefits at 15% discount rate is 0.35 million pesos as shown in **Table 11.2-14**.

Fire Protection

Under the assumption described in Section 11.1.4, the present economic value of fire protection at 15% discount rate is 22.3 million pesos as shown in **Table 11.2-15**.

(2) Project Costs

The detail of the conversion of financial project cost to economic cost is shown in **Table 11.2-16**. Further, incremental economic operation and maintenance cost is shown in **Table 11.2-17**. The summary of economic costs including the total replacement cost of 13.2 million pesos are shown in **Table 11.2-18**.

TABLE 11.2-14 HEALTH BENEFITS - GMA Water Distict

Unit: 1000 Pesos

YEAR	SERVED POPULATION	COST OF TIME DUE TO ILLNESS	ECONOMIC LOSS DUE TO PREMA-TURE DEATH	COST OF MEDICAL EXPENSES	TOTAL ECONOMIC LOSSES	20% REDUCTION DUE TO PROJECT (Benefit)	PRESENT VALUE DISCOUNT RATE AT 15% FACTOR	VALUE
1994	20,504	0	0	0	0	0	0.000	0
1995	23,679	0	0	0	0	0	0.000	0
1996	27,340	0	0	0	0	0	0.756	0
1997	31,548	0	0	0	0	0	0.658	0
1998	46,151	156	0	251	407	81	0.572	47
1999	48,273	156	0	251	407	81	0.497	40
2000	50,405	156	0	251	407	81	0.432	35
2001	52,537	156	0	251	407	81	0.376	31
2002	53,616	156	0	251	407	81	0.327	27
2003	54,701	156	0	251	407	81	0.284	23
2004	55,786	156	0	251	407	81	0.247	20
2005	56,894	156	0	251	407	81	0.215	17
2006	56,894	156	0	251	407	81	0.187	15
2007	56,894	156	0	251	407	81	0.163	13
2008	56,894	156	0	251	407	81	0.141	12
2009	56,894	156	0	251	407	81	0.123	10
2010	56,894	156	0	251	407	81	0.107	9
2011	56,894	156	0	251	407	81	0.093	8
2012	56,894	156	0	251	407	81	0.081	7
2013	56,894	156	0	251	407	81	0.070	6
2014	56,894	156	0	251	407	81	0.061	5
2015	56,894	156	0	251	407	81	0.053	4
2016	56,894	156	0	251	407	81	0.046	4
2017	56,894	156	0	251	407	81	0.040	3
2018	56,894	156	0	251	407	81	0.035	3
2019	56,894	156	0	251	407	81	0.030	2
2020	56,894	156	0	251	407	81	0.026	2
2021	56,894	156	0	251	407	81	0.023	2
2022	56,894	156	0	251	407	81	0.020	2
2023	56,894	156	0	251	407	81	0.017	1
TOTAL HEALTH BENEFIT						2,116		347

1/ "Cost of Time due to Illness" was computed based on the following formula:
65% x Morbidity Rate x SERVED POP. x 8 days x P120.00

2/ Economic Loss due to Premature Death" was computed based on the following formula:
65% x Mortality Rate x SERVED POP. x P150.000

3/ Cost of Medical Expenses" was computed based on the following formula:
65% x Morbidity Rate x SERVED POP. x P1,000

4/ Morbidity Rate (per 100,000): 543 Ave. Medical Expense : P 1,000.00
Mortality Rate (per 100,000): Nil Weighted Ave. Wage Rate: P 120.00
% of Economic Active Population : 65%

TABLE 11.2-15 REDUCTION IN FIRE DAMAGE - GMA Water District

Unit: 1000 Pesos

YEAR	POPULATION IN THE SER. AREA	NO. OF STRUC-TURES	TOTAL VALUE	0.75% OVERALL REDUCTION IN FIRE DAMAGE	PER-CENTAGE PROTEC-TION	NET REDUCTION IN FIRE DAMAGE (Benefit)	PRESENT VALUE DISCOUNT RATE AT 15% FACTOR	VALUE
1994	53,404	9,710	1,699,218	12,744	0.00%	0	0.000	0
1995	55,540	10,098	1,767,187	13,254	0.00%	0	0.000	0
1996	57,762	10,502	1,837,874	13,784	0.00%	0	0.756	0
1997	60,072	10,922	1,911,389	14,335	0.00%	0	0.658	0
1998	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.572	2,983
1999	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.497	2,594
2000	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.432	2,255
2001	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.376	1,961
2002	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.327	1,705
2003	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.284	1,483
2004	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.247	1,290
2005	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.215	1,121
2006	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.187	975
2007	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.163	848
2008	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.141	737
2009	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.123	641
2010	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.107	558
2011	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.093	485
2012	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.081	422
2013	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.070	367
2014	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.061	319
2015	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.053	277
2016	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.046	241
2017	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.040	210
2018	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.035	182
2019	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.030	158
2020	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.026	138
2021	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.023	120
2022	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.020	104
2023	62,461	11,357	1,987,395	14,905	35.00%	5,217	0.017	91
TOTAL REDUCTION IN FIRE DAMAGE						135,640		22,264

1/ Population in the service area was derived from the Population and Demand projections.

2/ The number of structures was estimated by dividing the service area population by the average number of persons per dwelling unit of 5.5.

3/ The total value is estimated by multiplying the number of structures with the average replacement value of dwelling units in GMA of 175,000 pesos.

4/ Percentage fire protection was based on the area to be served by fire hydrants.

TABLE 11.2-16 CONVERSION OF FINANCIAL PROJECT COST TO ECONOMIC COST - GMA Water District

Unit: 1000 Pesos

	FINANCIAL PROJECT COST	FOREIGN EXCHANGE COMPONENT	DOMESTIC COMPONENT	UNSKILLED LABOR	BALANCE	TAXES (5%)	OTHERS (95%)	SHADOW PRICING FOREX COMPONENT X 1.2	SHADOW PRICING UNSKILLED LABOR X .6	SHADOW PRICING OTHERS X 1.0	TOTAL ECONOMIC COST
CIVIL WORKS											
DEEPWELL CONSTRUCTION	4,480	1,040	3,440	560	2,880	144	2,736	1,248	336	2,736	4,320
PUMP STATION	2,675	459	2,216	382	1,834	92	1,742	550	229	1,742	2,522
PIPELINES	1,429	447	983	119	864	43	820	536	71	820	1,428
TREATMENT FACILITIES	211	19	192	14	178	9	169	23	9	169	200
SERVICE CONNECTIONS	896	72	824	287	537	27	511	86	172	511	769
VALVES/HYDRANTS	90	6	85	29	56	3	53	7	18	53	77
STORAGE FACILITIES	1,099	88	1,011	352	659	33	626	105	211	626	943
TOTAL CIVIL WORKS	10,880	2,130	8,751	1,743	7,007	350	6,657	2,555	1,046	6,657	10,258
EQUIPMENTS											
DEEPWELL CONSTRUCTION	3,520	1,280	2,240	0	2,240	112	2,128	1,536	0	2,128	3,664
PUMP STATION	4,967	4,356	611	0	611	31	581	5,227	0	581	5,807
PIPELINES	1,549	685	864	0	864	43	820	822	0	820	1,642
TREATMENT FACILITIES	269	182	86	0	86	4	82	219	0	82	301
SERVICE CONNECTIONS	2,687	2,615	72	0	72	4	68	3,138	0	68	3,207
VALVES/HYDRANTS	187	158	29	0	29	1	28	190	0	28	217
STORAGE FACILITIES	3,297	3,209	88	0	88	4	84	3,851	0	84	3,934
TOTAL EQUIPMENTS	16,475	12,485	3,990	0	3,990	200	3,790	14,982	0	3,790	18,773
BASIC CONSTRUCTION COST	27,356	14,615	12,741	1,743	10,997	550	10,448	17,538	1,046	10,448	29,031
CONTINGENCY	4,103	2,192	1,911	261	1,650	82	1,567	2,631	157	1,567	4,355
ENGINEERING STUDIES	2,831	1,513	1,319	180	1,138	57	1,081	1,815	108	1,081	3,005
CONSTRUCTION SUPERVISION	1,258	672	586	80	506	25	481	807	48	481	1,335
LAND ACQUISITION	1,150	782	368	0	368	18	350	938	0	350	1,288
TOTAL PROJECT COST	36,698	19,774	16,924	2,265	14,659	733	13,926	23,729	1,359	13,926	39,014

TABLE 11.2-17 INCREMENTAL ECONOMIC OPERATION AND MAINTENANCE COST - GMA Water District

Unit: 1000 Pesos

YEAR	O & M COST (Unescalated)	FOREIGN EXCHANGE COMPONENT	DOMESTIC COMPONENT	TAXES (5%)	OTHERS (95%)	SHADOW PRICING FOREX COMPONENT (X 1.2)	SHADOW PRICING OTHERS (X 1.0)	TOTAL ECONOMIC O & M COST	NET ECONOMIC O & M COST
1994	3,571	700	2,871	144	2,728	840	2,728	3,567	0
1995	6,256	1,226	5,030	251	4,778	1,471	4,778	6,250	0
1996	7,759	1,521	6,238	312	5,926	1,825	5,926	7,751	0
1997	8,348	1,636	6,712	336	6,376	1,963	6,376	8,340	588
1998	12,988	2,546	10,442	522	9,920	3,055	9,920	12,975	5,224
1999	13,594	2,664	10,930	546	10,383	3,197	10,383	13,580	5,829
2000	14,200	2,783	11,417	571	10,846	3,340	10,846	14,186	6,435
2001	14,805	2,902	11,903	595	11,308	3,482	11,308	14,790	7,039
2002	14,254	2,794	11,460	573	10,887	3,353	10,887	14,240	6,489
2003	14,511	2,844	11,667	583	11,084	3,413	11,084	14,496	6,745
2004	14,796	2,900	11,896	595	11,301	3,480	11,301	14,781	7,030
2005	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2006	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2007	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2008	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2009	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2010	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2011	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2012	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2013	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2014	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2015	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2016	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2017	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2018	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2019	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2020	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2021	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2022	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
2023	15,723	3,082	12,641	632	12,009	3,698	12,009	15,707	7,956
TOTAL ECONOMIC OPERATION AND MAINTENANCE COST									196,543

TABLE 11.2-18 SUMMARY OF ECONOMIC COSTS - GMA Water District

Unit: 1000 Pesos

YEAR	ECONOMIC PROJECT COST	REPLACE-MENT COST 1/	NET O & M COST	TOTAL ECONOMIC COST	PRESENT VALUE AT 15% FACTOR	PRESENT VALUE AT 15% VALUE
1994			0	0	0.000	0
1995			0	0	0.000	0
1996	12,973		0	12,973	0.756	9,810
1997	26,041		588	26,630	0.658	17,509
1998			5,224	5,224	0.572	2,987
1999			5,829	5,829	0.497	2,898
2000			6,435	6,435	0.432	2,782
2001			7,039	7,039	0.376	2,646
2002			6,489	6,489	0.327	2,121
2003			6,745	6,745	0.284	1,917
2004			7,030	7,030	0.247	1,738
2005			7,956	7,956	0.215	1,710
2006			7,956	7,956	0.187	1,487
2007			7,956	7,956	0.163	1,293
2008			7,956	7,956	0.141	1,124
2009			7,956	7,956	0.123	978
2010			7,956	7,956	0.107	850
2011		3,299	7,956	11,255	0.093	1,046
2012		9,897	7,956	17,853	0.081	1,443
2013			7,956	7,956	0.070	559
2014			7,956	7,956	0.061	486
2015			7,956	7,956	0.053	423
2016			7,956	7,956	0.046	368
2017			7,956	7,956	0.040	320
2018			7,956	7,956	0.035	278
2019			7,956	7,956	0.030	242
2020			7,956	7,956	0.026	210
2021			7,956	7,956	0.023	183
2022			7,956	7,956	0.020	159
2023			7,956	7,956	0.017	138
TOTAL	39,014	13,196	196,543	248,754		57,704

1/ (a) Deep well: 916 (2011) & 2,748 (2012); (b) Pump station: 1,452 (2011) & 4,356 (2012)
(c) Treatment facilities: 75 (2011) & 226 (2012); (d) Service facilities: 802 (2011) & 2,405 (2012)
(e) Valves/hydrants: 54 (2011) & 163 (2012)

TABLE 11.2-19 ECONOMIC INTERNAL RATE OF RETURN - GMA Water District

Unit: 1000 Pesos

YEAR	TOTAL ECONOMIC BENEFITS	TOTAL ECONOMIC COSTS	NET BENEFIT	PRESENT VALUE AT 15% FACTOR	PRESENT VALUE AT 15% VALUE
1994	0	0	0	0.000	0
1995	0	0	0	0.000	0
1996	0	12,973	-12,973	0.756	-9,810
1997	1,651	26,630	-24,978	0.658	-16,423
1998	14,166	5,224	8,942	0.572	5,112
1999	15,192	5,829	9,363	0.497	4,655
2000	16,208	6,435	9,774	0.432	4,226
2001	17,225	7,039	10,186	0.376	3,829
2002	17,402	6,489	10,913	0.327	3,568
2003	17,565	6,745	10,820	0.284	3,076
2004	17,710	7,030	10,680	0.247	2,640
2005	19,788	7,956	11,831	0.215	2,543
2006	19,788	7,956	11,831	0.187	2,211
2007	19,788	7,956	11,831	0.163	1,923
2008	19,788	7,956	11,831	0.141	1,672
2009	19,788	7,956	11,831	0.123	1,454
2010	19,788	7,956	11,831	0.107	1,264
2011	19,788	11,255	8,532	0.093	793
2012	19,788	17,853	1,934	0.081	156
2013	19,788	7,956	11,831	0.070	831
2014	19,788	7,956	11,831	0.061	723
2015	19,788	7,956	11,831	0.053	629
2016	19,788	7,956	11,831	0.046	547
2017	19,788	7,956	11,831	0.040	475
2018	19,788	7,956	11,831	0.035	413
2019	19,788	7,956	11,831	0.030	359
2020	19,788	7,956	11,831	0.026	313
2021	19,788	7,956	11,831	0.023	272
2022	19,788	7,956	11,831	0.020	236
2023	30,381	7,956	22,425	0.017	389
TOTAL	503,676	248,754	254,922		18,077

(Salvage value is added in 2023.)

ECONOMIC INTERNAL RATE OF RETURN = 24.51%

EIRR OF OTHER CASES (SENSITIVITY ANALYSIS)

Investment Cost: 20% increase =	20.69%
O & M Cost: 20% increase =	21.55%
Revenue: 20% decrease =	16.65%

BENEFIT COST RATIO at 15% discount rate = 1.31

(3) Economic Benefits and Costs Analysis

The summary of quantifiable economic benefits and economic costs for the project is shown below expressed as net present values of a 15% discount rate. Benefit cost ratio (BCR) obtained is 1.31. Salvage value is shown in **Table 11.2-20**.

Increase in Consumer Satisfaction	52.99	million pesos
Health Benefits	0.35	million pesos
Reduction in Fire Damage	22.26	million pesos
Total Benefits (Salvage value is not included.)	75.60	million pesos
Total Project Costs	57.70	million pesos
Benefit Cost ratio (BCR):		1.31

(4) Economic Internal Rate of Return

The results of EIRR are summarized below. EIRR for base case is estimated at 24.5%. Details are shown in **Table 11.2-19**. A sensitivity analysis is conducted to determine the effect of variances in the assumptions to the EIRR. The derived EIRR under selected variances to the base case are as follows:

Scenario	EIRR
Base Case	24.5%
1. 20% increase in Investment Cost	20.7%
2. 20% increase in O & M Cost	21.6%
3. 20% decrease in Revenue	16.7%

For all the scenarios, the EIRR exceed the opportunity cost of capital of 15%.

(5) Concluding Remarks of Economic Analysis

From the results of the preceding analysis, the proposed project for G.M.A. Water District is considered economically feasible.

11.3 PROJECT FOR MENDEZ

11.3.1 Estimation of the Construction Cost and Construction Period

(1) Construction Cost

The basic construction costs of the improvement for the Mendez water supply facilities totals P15.38 million.

TABLE 11.2-20 SALVAGE VALUE IN YEAR 2023 - GMA Water District

Unit: 1000 Pesos

YEAR	50 - YEAR ITEMS			30 - YEAR ITEMS			15 - YEAR ITEMS			TOTAL SALVAGE VALUE
	ECONOMIC VALUE	REMAINING LIFE IN 2023	SALVAGE VALUE	ECONOMIC VALUE	REMAINING LIFE IN 2023	SALVAGE VALUE	ECONOMIC VALUE	REMAINING LIFE IN 2023	SALVAGE VALUE	
1994										
1995										1,205
1996	2,248	46.00%	1,034	1,710	10.00%	171				3,922
1997	6,745	48.00%	3,238	5,131	13.33%	684				0
1998		50.00%			16.67%					0
1999		52.00%			20.00%					0
2000		54.00%			23.33%					0
2001		56.00%			26.67%					0
2002		58.00%			30.00%					0
2003		60.00%			33.33%					0
2004		62.00%			36.67%					0
2005		64.00%			40.00%					0
2006		66.00%			43.33%					0
2007		68.00%			46.67%					0
2008		70.00%			50.00%					0
2009		72.00%			53.33%					0
2010		74.00%			56.67%					0
2011		76.00%			60.00%					0
2012		78.00%			63.33%		3,299	26.67%	880	880
2013		80.00%			66.67%		9,897	33.33%	3,299	3,299
2014		82.00%			70.00%			40.00%		0
2015		84.00%			73.33%			46.67%		0
2016		86.00%			76.67%			53.33%		0
2017		88.00%			80.00%			60.00%		0
2018		90.00%			83.33%			66.67%		0
2019		92.00%			86.67%			73.33%		0
2020		94.00%			90.00%			80.00%		0
2021		96.00%			93.33%			86.67%		0
2022		98.00%			96.67%			93.33%		0
2023		100.00%			100.00%			100.00%		0
SALVAGE VALUE			4,272			855			4,179	9,306
ADD: LAND										1,288
TOTAL SALVAGE VALUE										10,594

A summary of the estimated project cost is presented in **Table 11.3-1** and the detailed breakdown is shown in **Table 11.3-2.**

(2) Construction Period

In accordance with the facility requirement as described in Section 10.3.6, the tentative construction period is presented in **Fig. 11.3.1.**

11.3.2 Organization and Cost for Operation and Maintenance of the Water Supply System

(1) Organization

The MWD presently has 10 personnel headed by the general manager. However, it will be required to increase this number in 1997 after the proposed water supply system is implemented.

Based on the number of service connections described in Section 10.3.4, the number of personnel for the MWD from the year 1995 up to 2005 is computed as follows:

Design year	No. of Connection	No. of Employee
1995	863	10
1996	929	10
1997	998	10
1998	1,134	11
1999	1,282	13
2000	1,449	14
2001	1,638	16
2002	1,853	19
2003	2,096	21
2004	2,370	24
2005	2,684	27

(2) Cost for Operation and Maintenance of the Water Supply System

A summary of operation and maintenance cost for the Mendez water supply system from the year 1994 to 2005 is shown in **Table 11.3-3**, and a breakdown of the expenditures is presented in **Table 11.3-4a** to **11.3-4c**.

TABLE 11.3-1

COST ESTIMATES (P X 1000)
(1994 Price Level)

PHASE 1
MENDEZ WATER DISTRICT

	FACILITIES	TOTAL COST	LOCAL COMPONENT				FOREIGN EXCHANGE COMPONENT		
			MATERIAL	LABOR SKILLED	LABOR UNSKILLED	TOTAL	DIRECT	INDIRECT	TOTAL
1)	PUMP STATION								
	- Equipment	1,838.0	226.2	-	-	226.2	1,583.5	28.3	1,611.8
	- Civil Works	989.7	424.2	254.5	141.4	820.0	-	169.7	169.7
	- Total	2,827.7	650.4	254.5	141.4	1,046.3	1,583.5	197.9	1,781.5
2)	DISTRIBUTION FACILITIES								
	- Equipment	1,672.8	868.6	64.3	-	932.9	-	739.9	739.9
	- Civil Works	1,544.1	707.7	225.2	128.7	1,061.6	-	482.5	482.5
	- Total	3,216.9	1,576.3	289.5	128.7	1,994.5	-	1,222.4	1,222.4
3)	TREATMENT FACILITIES								
	- Equipment	26.9	8.6	-	-	8.6	16.3	1.9	18.2
	- Civil Works	21.1	14.4	3.4	1.4	19.2	-	1.9	1.9
	- Total	48.0	23.0	3.4	1.4	27.8	16.3	3.8	20.2
4)	SERVICE CONNECTIONS								
	- Equipment	341.3	9.1	-	-	9.1	323.1	9.1	332.2
	- Civil Works	113.8	50.1	18.2	36.4	104.7	-	9.1	9.1
	- Total	455.0	59.2	18.2	36.4	113.8	323.1	18.2	341.3
5)	VALVES/HYDRANTS								
	- Equipment	94.0	14.6	0.0	0.0	14.6	74.0	5.5	79.4
	- Civil Works	42.4	19.2	7.5	12.9	39.7	0.0	2.7	2.7
	- Total	136.4	33.8	7.5	12.9	54.3	74.0	8.2	82.1
6)	STORAGE FACILITY								
	- Equipment	5,625.8	150.0	-	-	150.0	5,325.7	150.0	5,475.7
	- Civil Works	1,875.3	825.1	300.0	600.1	1,725.2	-	150.0	150.0
	- Total	7,501.0	975.1	300.0	600.1	1,875.3	5,325.7	300.0	5,625.8
7)	PAVEMENT DEMOLITION/RESTORATION								
	- Equipment	277.4	179.5	-	-	179.5	-	97.9	97.9
	- Civil Works	538.6	367.2	65.3	40.8	473.3	-	65.3	65.3
	- Total	816.0	546.7	65.3	40.8	652.8	-	163.2	163.2
8)	PLUMBING TOOLS & OFFICE EQUIPMENT								
	- Equipment	100.0	32.0	-	-	32.0	45.0	23.0	68.0
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	100.0	32.0	-	-	32.0	45.0	23.0	68.0
9)	LAND ACQUISITION								
	- Equipment	280.0	89.6	-	-	89.6	126.0	64.4	190.4
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	280.0	89.6	-	-	89.6	126.0	64.4	190.4
	TOTAL CONSTRUCTION COST								
	- Equipment	10,256.2	1,578.3	64.3	0.0	1,642.6	7,493.6	1,120.0	8,613.5
	- Civil Works	5,125.0	2,407.9	874.0	961.7	4,243.6	0.0	881.2	881.2
	- Total	15,381.0	3,986.1	938.4	961.7	5,886.2	7,493.6	2,001.2	9,494.8

TABLE 11.3–2

BREAKDOWN OF COST ESTIMATES
MENDEZ Water District
MENDEZ, Cavite

A.	ENGINEERING BASIC COST ITEM							
1.	Pipelines						P	3,216,880.00
a)	996 m.		50 mm PVC Pipes C-100 @ P	200.00 /m	P	199,200.00		
b)	1450 m.		75 mm PVC Pipes C-100 @ P	240.00 /m		348,000.00		
c)	700 m.		100 mm PVC Pipes C-100 @ P	310.00 /m		217,000.00		
d)	900 m.		150 mm PVC Pipes C-100 @ P	520.00 /m		468,000.00		
e)	1332 m.		200 mm PVC Pipes C-100 @ P	1,490.00 /m		1,984,680.00		
2.	Appurtenances							136,400.00
a)	12 pcs.		Gate Valves (Various Sizes)	8,000.00 /pcs		96,000.00		
b)	2 units		Fire Hydrant	20,200.00 /unit		40,400.00		
3.	Pumping Station							2,827,734.00
	75 HP	1	Submersible Pump	1,019,564.00 /set		1,019,564.00		
	1 unit		Generator Set (125 KVA)			883,170.00		
			Power Connections	Lump Sum		775,000.00		
	1	20	sq. m. Pumphouse	7,500.00 /sq.m.		150,000.00		
4.	Reservoir							7,501,000.00
	577 cum	1	Elevated Steel Tank	13,000.00 /cum		7,501,000.00		
5.	Service Connection							
	350			1,300.00 /s.c		455,000.00		455,000.00
6.	Disinfection Facility							
	1 set		Hypochlorinator	48,000.00 /unit		48,000.00		48,000.00
				Sub-Total A			P	14,185,014.00
B.	NON-ENGINEERING BASIC COST ITEM							
	Plumbing Tools and Office Equipment			Lump Sum				100,000.00
	Land Acquisition			Lump Sum				280,000.00
	Demolition/ Restoration							816,000.00
				Sub-Total B			P	1,196,000.00
				TOTAL PROJECT COST			P	15,381,014.00
						SAY	P	15.38 Million

FIG. 11.3-1 CONSTRUCTION PERIOD FOR MENDEZ

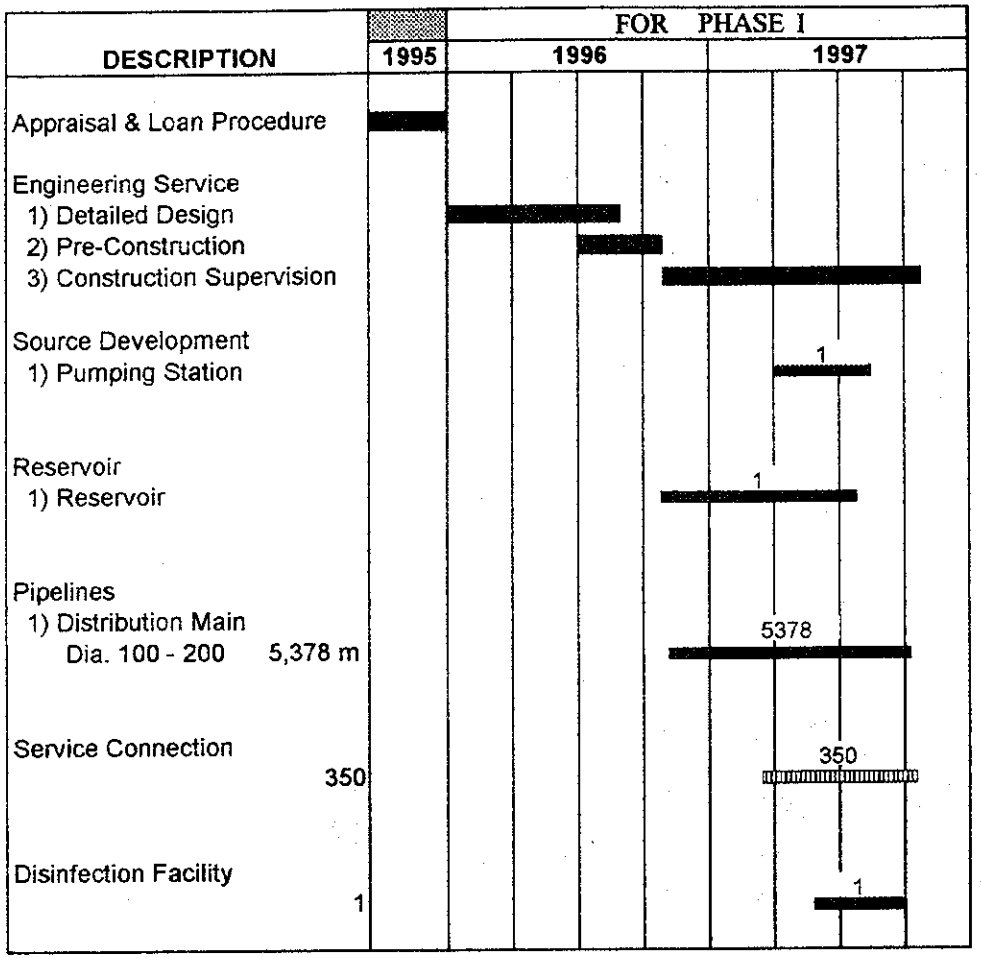


TABLE 11.3-3

SUMMARY OF OPERATION AND MAINTENANCE COST
MENDEZ WATER DISTRICT

YEAR	ADMINISTRATION PERSONNEL A)	POWER B)	CHLORINE C)	MISCELLANEOUS & MAINTENANCE D)	OFFICE RENTALS E)	TOTAL
1994	585,000.00	621,795.39	36,178.80	80,100.00	24,000.00	1,347,074.19
1995	585,000.00	674,875.48	39,091.50	86,300.00	24,000.00	1,409,266.98
1996	585,000.00	727,955.58	42,208.60	92,900.00	24,000.00	1,472,064.18
1997	585,000.00	781,035.67	45,560.76	99,800.00	24,000.00	1,535,396.43
1998	643,500.00	927,276.75	47,216.40	113,400.00	24,000.00	1,755,393.15
1999	760,500.00	1,057,268.81	53,910.50	128,200.00	24,000.00	2,023,879.31
2000	819,000.00	1,204,593.16	61,524.40	144,900.00	24,000.00	2,254,017.56
2001	936,000.00	1,377,915.91	70,262.50	163,800.00	24,000.00	2,571,978.41
2002	1,111,500.00	1,577,237.08	80,227.00	185,300.00	24,000.00	2,978,264.08
2003	1,228,500.00	1,793,890.53	91,571.20	209,600.00	24,000.00	3,347,561.73
2004	1,404,000.00	2,053,874.66	104,550.60	237,000.00	24,000.00	3,823,425.26
2005	1,579,500.00	2,339,857.21	119,369.60	268,400.00	24,000.00	4,331,126.81

TABLE 11.3-4a Cost for Operation and Maintenance

A) PERSONNEL

The staff is expected to increase by design year to cope up with growing demand of the water supply system.

Staff = 100 per Connection

Cost = Staff * Average Salary * 13 months

YEAR	Average Salary/month	Conn	Staff	Annual Cost (P)
1994	4,500.00	801	10	585,000.00
1995	4,500.00	863	10	585,000.00
1996	4,500.00	929	10	585,000.00
1997	4,500.00	998	10	585,000.00
1998	4,500.00	1,134	11	643,500.00
1999	4,500.00	1,282	13	760,500.00
2000	4,500.00	1,449	14	819,000.00
2001	4,500.00	1,638	16	936,000.00
2002	4,500.00	1,853	19	1,111,500.00
2003	4,500.00	2,096	21	1,228,500.00
2004	4,500.00	2,370	24	1,404,000.00
2005	4,500.00	2,684	27	1,579,500.00

TABLE 11.3–4b Cost for Operation and Maintenance

B) PUMPING COST

YEAR	ADD (L/s)	HP RATING	KW RATING	SC (L/s)	Demand/ Supply	PHPD (Hr/d)	DEPD (KWH/D)	PUMPING COST (P) Daily	Monthly	Annualy
1994	8.20	25	18.65	10.00	0.82	19.68	431.80	1,727.21	51,816.28	621,795.39
1995	8.90	25	18.65	10.00	0.89	21.36	468.66	1,874.65	56,239.62	674,875.48
1996	9.60	25	18.65	10.00	0.96	23.04	505.52	2,022.10	60,662.96	727,955.58
1997	10.30	25	18.65	10.00	1.03	24.72	542.39	2,169.54	65,086.31	781,035.67
1998	10.70	100	74.6	35.00	0.31	7.34	643.94	2,575.77	77,273.06	927,276.75
1999	12.20	100	74.6	35.00	0.35	8.37	734.21	2,936.86	88,105.73	1,057,268.81
2000	13.90	100	74.6	35.00	0.40	9.53	836.52	3,346.09	100,382.76	1,204,593.16
2001	15.90	100	74.6	35.00	0.45	10.90	956.89	3,827.54	114,826.33	1,377,915.91
2002	18.20	100	74.6	35.00	0.52	12.48	1095.30	4,381.21	131,436.42	1,577,237.08
2003	20.70	100	74.6	35.00	0.59	14.19	1245.76	4,983.03	149,490.88	1,793,890.53
2004	23.70	100	74.6	35.00	0.68	16.25	1426.30	5,705.21	171,156.22	2,053,874.66
2005	27.00	100	74.6	35.00	0.77	18.51	1624.90	6,499.60	194,988.10	2,339,857.21

ADD = Average day demand
SC = Supply Capacity
HP = Pumps Rated Horsepower
Pv = Cost per KWH = 4.00

Em = Pump Efficiency = 85%
Days of Pumping/month = 30 days
PHPD = Pumping hours per day
DEPD = Daily Energy Power Demand

Computations Used:

KW Rating = Rated Hp * .746
Demand/Supply Ratio = ADD/SC
PHPD = 24 Hours * Demand/Supply Ratio
DEPD = PHPD * KW Rating / Pump Efficiency

Power Cost :

Daily = DEPD * Energy Cost
Monthly = Daily Power Cost * 30
Yearly = Monthly Power Cost * 12

TABLE 11.3–4c Cost for Operation and Maintenance

C) CHLORINATION COST

The average annual demand for chlorine is as follows:

A = (365 * Q * D)/1000
Where :
A = Annual Demand of Chlorine (Kg)
Q = Average Daily Water Demand (cumd)
D = Average Chlorine Dosage = 2 mg/l
Cost of Chlorine = 70.00 /kg

YEAR	ADD (CumD)	ADC (Kg)	COST (P)
1994	708	517	36,178.80
1995	765	558	39,091.50
1996	826	603	42,208.60
1997	892	651	45,560.76
1998	924	675	47,216.40
1999	1,055	770	53,910.50
2000	1,204	879	61,524.40
2001	1,375	1,004	70,262.50
2002	1,570	1,146	80,227.00
2003	1,792	1,308	91,571.20
2004	2,046	1,494	104,550.60
2005	2,336	1,705	119,369.60

ADD = Average day demand
ADC = Annual Demand of Chlorine

D) Maintenance and Miscellaneous Expenses

Cost per connection/year = P 100.00 /year

YEAR	Conn	TOTAL (P)
1994	801	80,100.00
1995	863	86,300.00
1996	929	92,900.00
1997	998	99,800.00
1998	1,134	113,400.00
1999	1,282	128,200.00
2000	1,449	144,900.00
2001	1,638	163,800.00
2002	1,853	185,300.00
2003	2,096	209,600.00
2004	2,370	237,000.00
2005	2,684	268,400.00

E) Office Rentals

	Monthly Rentals	Yearly Rentals
1994	2,000.00	24,000.00
1995	2,000.00	24,000.00
1996	2,000.00	24,000.00
1997	2,000.00	24,000.00
1998	2,000.00	24,000.00
1999	2,000.00	24,000.00
2000	2,000.00	24,000.00
2001	2,000.00	24,000.00
2002	2,000.00	24,000.00
2003	2,000.00	24,000.00
2004	2,000.00	24,000.00
2005	2,000.00	24,000.00

11.3.3 Financial Analysis

(1) Financial Background

Mendez Water District started operations in 1989, when it assumed full control of the administration and management of the turned–over waterworks facilities originally constructed in 1962. In 1991, the Program of Work (POW) of 9.0 million pesos was prepared to determine the technical and financial viability of developing the water supply system at Mendez. In 1994, the partial implementation of POW (2.5 million pesos) was undertaken to provide immediate solution to the prevailing deficiencies of the existing system and to extend water services. The district was exempted from the equity contribution since the project was their initial major improvement.

(2) Development Cost

The cost estimates of the required improvements are presented in the preceding section. A breakdown of the project cost on an annual basis is shown in **Table 11.3–5**.

(3) Operating and Maintenance Costs

Operating and Maintenance cost are shown in **Table 11.3–6**. Details are also shown in the preceding section (Section 11.3.2).

(4) Project Financing

100% of the total project cost is assumed to be financed by loans. Computation of the loan is shown below.

Total Project Cost	19.81 million pesos
Capitalized Interest	2.84 million pesos
Total Loan Amount (regular and soft loan)	22.65 million pesos

Fifty percent (50%) of the loan is assumed to be at regular loan with interest rates of 10.5% and 12.5% for the first 4.1 million pesos and the excess of 4.1 million pesos, respectively.

Remaining 50% of the loan is to be a soft loan with the following and conditions described in Section 11.1.3.

The details of the project loan's debt service schedule is presented in **Table 11.3–7**.

TABLE 11.3-5 BREAKDOWN OF PROJECT COST - Mendez Water District

Unit: 1000 Pesos

	1995	1996	1997	1998	1999	TOTAL
Basic Construction Cost		0	14,185			14,185
Price and Physical Contingencies		0	2,128			2,128
Engineering Studies		1,468				1,468
Construction Supervision		0	653			653
Land Acquisition and Non-engineering Basic Cost		1,375				1,375
Total Project Cost	0	2,844	16,965	0		19,809
Less: Paid-in Capital (WD Equity)		0	0	0		0
Soft Loan		0	9,904	0		9,904
Regular Loan Disbursements	0	2,844	7,061	0		9,904
Add: Capitalized Interest	0	299	1,201	1,343	0	2,843
Regular Loan	0	3,142	8,262	1,343	0	12,747
Total Project Loan	0	3,142	18,166	1,343	0	22,652

TABLE 11.3-6a PROJECTED OPERATION & MAINTENANCE COST (UNESCALATED) - Mendez Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SALARIES	420	585	585	585	644	761	819	936	1,112	1,229	1,404	1,580
POWER	504	675	728	781	927	1,057	1,205	1,378	1,577	1,794	2,054	2,340
CHEMICALS	36	39	42	46	47	54	62	70	80	92	105	119
MISC. & MAINTENANCE	84	110	117	124	137	152	169	188	209	234	261	292
UNESCALATED TOTAL O & M COST	1,044	1,409	1,472	1,535	1,755	2,024	2,254	2,572	2,978	3,348	3,823	4,331

TABLE 11.3-6b PROJECTED OPERATION & MAINTENANCE COST (ESCALATED) - Mendez Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SALARIES	420	655	721	793	959	1,247	1,477	1,857	2,426	2,949	3,708	4,588
POWER & FUEL	504	756	897	1,058	1,382	1,734	2,173	2,734	3,442	4,307	5,424	6,797
CHEMICALS	36	44	52	62	70	88	111	139	175	220	276	347
MISC. & MAINTENANCE	84	124	144	168	205	250	305	373	457	561	689	849
ESCALATED TOTAL O & M COST	1,044	1,578	1,814	2,081	2,617	3,319	4,066	5,103	6,500	8,037	10,097	12,582

Note:
For financial analysis, operation and maintenance cost in 1994 is mainly based on the financial statements of the district although large parts are projected. Therefore, it is not necessarily equal to the costs shown in Table 11.3-3 through 11.3-4.

TABLE 11.3-7 DEBT SERVICE SCHEDULE - Mendez Water District

Unit: 1000 Pesos

REGULAR LOAN (50%)											
First 2 million	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Disbursements	0	0	0	0							
Capitalized Interest	0	0	0	0							
Operational Interest					0	0	0	0	0	0	0
Principal					0	0	0	0	0	0	0
Debt Service					0	0	0	0	0	0	0
Loan Outstanding, year-end	0	0	0	0	0	0	0	0	0	0	0
Next 5 million a/											
Disbursements	0	2,844	575	0							
Capitalized Interest	0	299	390	0							
Operational Interest					431	428	424	419	414	409	403
Principal					35	38	42	47	52	57	63
Debt Service					466	466	466	466	466	466	466
Loan Outstanding, year-end	0	3,142	4,107	4,107	4,073	4,034	3,992	3,945	3,893	3,836	3,773
More than 7 million											
Disbursements	0	0	6,486	0							
Capitalized Interest	0	0	811	1,343							
Operational Interest					1,080	1,073	1,066	1,058	1,048	1,037	1,026
Principal					53	60	67	75	85	96	107
Debt Service					1,133	1,133	1,133	1,133	1,133	1,133	1,133
Loan Outstanding, year-end	0	0	7,297	8,640	8,587	8,527	8,460	8,385	8,300	8,204	8,097
SOFT LOAN (50%)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Disbursements	0	0	9,904	0							
Capitalized Interest	0	0	0					1,058	1,058	1,058	1,058
Operational Interest											
Principal								1,058	1,058	1,058	1,058
Debt Service											
Loan Outstanding, year-end	0	0	9,904	9,904	9,904	9,904	9,904	9,904	9,904	9,904	9,904
DEBT SERVICE SUMMARY	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Disbursements	0	2,844	16,965	0							
Capitalized Interest	0	299	1,201	1,343							
Operational Interest					1,511	1,501	1,490	2,535	2,520	2,504	2,486
Principal					88	98	110	122	137	153	171
Debt Service					1,599	1,599	1,599	2,657	2,657	2,657	2,657
Loan Outstanding, year-end	0	3,142	21,308	22,652	22,564	22,466	22,356	22,234	22,097	21,945	21,774

a/ According to the LWUA record, Mendez Water District has already received the regular loan at the amount of 2.9 million pesos approximately.

(5) Projection of Financial Statements

The Water District's projected income statement for the period 1994–2005, as presented in **Table 11.3–8**, shows that annual net income are positive. Major financial ratios derived from the income statement shows as follows;

a) Operating ratio which measures the ability of revenues to cover operating expenses shows that the operating costs are between 52 – 62% of the operating revenues after the project completion.

b) Return on the average fixed assets, which measures the earning power of the district's facilities, ranges from 9 to 25% after the completion of the project.

The projected cash flow statement for the same period as shown in **Table 11.3–9** indicates the sources and applications of funds. Major highlights from this table are as follows:

a) Increase in working capital is positive throughout the study period.

b) Debt service coverage which shows the ability of the district's internal cash generation to meet its debt services increases from 1.6 in 1999 to 2.7 in 2005. These ratios are higher than LWUA's minimum ratio of 1.3.

The projected balance sheet are presented in **Table 11.3–10**. Major points are shown as follows;

a) Cash balance at the end of the study period (2005) is 15.3 million pesos.

b) A total of 9.5 million pesos is accumulated for cash reserves by the year 2005.

c) Current ratios which measure the ability of the district to meet its short term obligations are almost between 5.4 and 7.2 after the project completion.

d) Debt/equity ratios which indicate the percentage of the long–term debt in the net worth decrease gradually from 84% in 1998 to 49% in 2005.

(6) Financial Internal Rate of Return

As shown in **Table 11.3–11**, the FIRR is 21.3 percent for the base case. The derived FIRR is well above the water district's weighted average cost of capital at 11.3 percent, which is shown in **Table 11.3–12**.

(7) Sensitivity Analysis

A sensitivity analysis is conducted to determine the effect of variances in the assumptions to the FIRR. The derived FIRR under selected variances to the base case are as follows:

TABLE 11.3-8 PROJECTED INCOME STATEMENT - Mendez Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Water Produced ('000 cum)	258	279	301	325	337	385	439	502	573	654	747	853
Water Sold ('000 cum)	194	210	226	244	270	308	351	400	457	522	596	682
Non-Revenue Water (%)	25%	25%	25%	25%	20%	20%	20%	20%	20%	20%	20%	20%
Average Water Rate (Effective Water Rate) (cum)	9.42	11.21	12.33	13.56	18.72	20.59	22.65	24.91	27.41	30.15	30.15	30.15
Operating Revenue												
Water Revenues	1,200	2,349	2,790	3,311	5,045	6,335	7,953	9,976	12,534	15,746	17,979	20,562
Other Operating Revenue	183	70	84	99	151	190	239	299	376	472	539	617
Total Operating Revenue	1,383	2,419	2,874	3,410	5,196	6,525	8,191	10,275	12,910	16,218	18,519	21,179
Operating Costs												
Personnel	420	655	721	793	959	1,247	1,477	1,857	2,426	2,949	3,708	4,588
Chemicals	36	44	52	62	70	88	111	139	175	220	276	347
Power and Fuel	504	756	897	1,058	1,382	1,734	2,173	2,734	3,442	4,307	5,424	6,797
Misc. & Maintenance	84	124	144	168	205	250	305	373	457	561	689	849
Bad Debts	0	59	70	83	126	158	199	249	313	394	449	514
Total Operating Cost	1,044	1,637	1,883	2,164	2,743	3,477	4,265	5,353	6,814	8,431	10,547	13,096
Income Before Depreciation	338	782	991	1,246	2,453	3,048	3,927	4,922	6,096	7,787	7,972	8,083
Less: Depreciation	40	77	119	238	506	672	676	686	698	713	732	756
Operating Income	299	705	872	1,009	1,947	2,377	3,251	4,236	5,398	7,074	7,239	7,327
Add : Non-operating Income	5											
Less: Interest on Loans	0	0	266	263	263	1,771	1,758	1,743	2,784	2,765	2,744	2,721
NET INCOME (LOSS)	304	705	606	745	1,684	605	1,493	2,494	2,614	4,309	4,495	4,605
Operating Ratio a/	76%	68%	66%	63%	53%	53%	52%	52%	53%	52%	57%	62%
Average Rate Base b/	1,584	3,071	4,742	9,502	20,252	26,864	27,042	27,434	27,924	28,535	29,294	30,243
Rate of Return c/	19%	23%	18%	11%	10%	9%	12%	15%	19%	25%	25%	24%

a/ Total operating cost as a percentage of total revenue
b/ Average net fixed assets in operation
c/ Operating income as a percentage of the average rate base

PROJECTED WATER RATES 1/												
MINIMUM CHARGE (Peso/10 cu.m.)	80.00	95.00	104.50	114.95	158.63	174.49	191.94	211.14	232.25	255.48	255.48	255.48
11 - 20 cu.m. (Peso/cu.m.)	9.00	10.00	11.00	12.10	16.70	18.37	20.20	22.23	24.45	26.89	26.89	26.89
21 - 30 cu.m. (Peso/cu.m.)	9.75	10.75	11.83	13.01	17.95	19.75	21.72	23.89	26.28	28.91	28.91	28.91
Over 30 cu.m. (Peso/cu.m.)	10.75	11.75	12.93	14.22	19.62	21.58	23.74	26.11	28.73	31.60	31.60	31.60
Average low income (Urban)	2,188	2,407	2,647	2,912	3,203	3,524	3,876	4,264	4,690	5,159	5,675	6,242
% of income allocated to water	3.66	3.95	3.95	3.95	4.95	4.95	4.95	4.95	4.95	4.95	4.50	4.09
% of increase of minimum charge	-	19%	10%	10%	38%	10%	10%	10%	10%	10%	0%	0%

1/ Projected /effective dates of implementation of the projected rates are the first day of January in each year unless otherwise specified.

TABLE 11.3-9 PROJECTED CASH FLOW TABLE (SOURCE AND USE OF FUNDS) - Mendez Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SOURCES OF FUNDS												
Income Before Depreciation	338	782	991	1,246	2,453	3,048	3,927	4,922	6,096	7,787	7,972	8,083
Add: Non-operating Income	5											
Internal Cash Generation	344	782	991	1,246	2,453	3,048	3,927	4,922	6,096	7,787	7,972	8,083
Paid-in Capital			0	0	0							
Loans												
Project Loan (LWUA)		0	3,142	18,166	1,343	0	0	0	0	0	0	0
Other Loan (LWUA: L.A. #3-487)	2,893	0	0	0	0	0	0	0	0	0	0	0
Total Sources	3,237	782	4,133	19,413	3,797	3,048	3,927	4,922	6,096	7,787	7,972	8,083
APPLICATION OF FUNDS												
Project	2,495	0	2,844	16,965	0	0						
Capitalized Interest	398	0	299	1,201	1,343	0						
Other Capital Expenditures	65	81	86	0	0	6	350	435	545	677	840	1,059
Total Capital Expenditures	2,958	81	3,228	18,166	1,343	6	350	435	545	677	840	1,059
Debt Service												
Interest												
Project Loan	0	0	0	0	0	1,511	1,501	1,490	2,535	2,520	2,504	2,486
Other Loans	0	0	266	263	263	260	257	253	249	245	240	235
Total Interest	0	0	266	263	263	1,771	1,758	1,743	2,784	2,765	2,744	2,721
Amortization												
Project Loan	0	0	0	0	0	88	98	110	122	137	153	171
Other Loans	0	0	30	33	33	36	39	43	47	51	56	61
Total Amortization	0	0	30	33	33	124	137	153	169	188	209	232
Total Debt Service	0	0	296	296	296	1,895	1,895	1,895	2,953	2,953	2,953	2,953
Increase in Working Capital	279	701	609	950	2,157	1,147	1,682	2,592	2,598	4,157	4,179	4,071
Total Applications	3,237	782	4,133	19,413	3,797	3,048	3,927	4,922	6,096	7,787	7,972	8,083
Self Financing Ratio a/	2%	100%	3%	0%	0%	100%	100%	100%	100%	100%	100%	100%
Average Self-Financing Ratio b/			4%	0%	0%	0%	62%	165%	123%	123%	122%	123%
Debt Service Ratio	-	-	3.35	4.21	8.28	1.61	2.07	2.60	2.06	2.64	2.70	2.74

a/ annual

TABLE 11.3-10 PROJECTED BALANCE SHEET - Mendez Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
ASSETS												
Current Assets	78	493	1,032	1,890	3,798	4,321	5,183	6,749	8,052	10,525	13,065	15,276
Cash	100	392	465	552	841	1,056	1,326	1,663	2,089	2,625	2,997	3,428
Accounts Receivable	20	28	33	38	46	56	69	85	105	130	161	199
Inventory	0	70	154	253	405	1,038	1,834	2,831	4,085	5,659	7,457	9,513
Cash Reserves	0	0	0	0	0	0	0	0	0	0	0	0
Other Current Assets												
Total Current Assets	198	983	1,684	2,734	5,089	6,472	8,412	11,328	14,331	18,939	23,680	28,416
Fixed Assets in Operation	2,018	4,124	5,361	13,642	26,861	26,867	27,217	27,652	28,196	28,874	29,714	30,772
Accumulated Depreciation	40	116	235	472	979	1,650	2,326	3,012	3,710	4,424	5,156	5,912
Net Fixed Assets in Operation	1,978	4,007	5,126	13,170	25,882	25,217	24,890	24,640	24,486	24,450	24,557	24,860
Add: Work in Progress	2,025	0	1,990	11,876	0	0	0	0	0	0	0	0
Total Fixed Assets	4,003	4,007	7,117	25,045	25,882	25,217	24,890	24,640	24,486	24,450	24,557	24,860
TOTAL ASSETS	4,202	4,991	8,801	27,779	30,972	31,689	33,302	35,968	38,817	43,388	48,237	53,276
LIABILITIES and EQUITY												
Current Liabilities	229	263	302	347	436	553	678	851	1,084	1,340	1,683	2,097
Accounts Payable	117	166	219	274	383	502	635	786	958	1,153	1,372	1,623
Customer Deposits	0	30	33	33	124	137	153	169	188	209	232	258
Current Maturities												
Total Current Liabilities	346	460	554	654	943	1,192	1,466	1,806	2,230	2,701	3,287	3,978
Loans Payable - Long Term Debts	2,893	2,863	5,972	24,106	25,325	25,188	25,035	24,866	24,678	24,469	24,237	23,979
Equity	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130
Paid-in Capital	-167	538	1,144	1,890	3,573	4,179	5,672	8,166	10,780	15,088	19,583	24,189
Retained Earnings												
Total Equity	963	1,668	2,274	3,020	4,703	5,309	6,802	9,296	11,910	16,218	20,713	25,319
TOTAL LIABILITIES & EQUITY	4,202	4,991	8,801	27,779	30,972	31,689	33,302	35,968	38,817	43,388	48,237	53,276
Current Ratio a/	0.57	2.14	3.04	4.18	5.40	5.43	5.74	6.27	6.43	7.01	7.20	7.14
Debt/Equity Ratio /b	75.0%	63.2%	72.4%	88.9%	84.3%	82.6%	78.6%	72.8%	67.4%	60.1%	53.9%	48.6%

a/ The ratio which total current assets divided by the total current liability

b/ Long-term debt as a percentage of the net worth (total liability and equity minus total current liability)

TABLE 11.3-11 FINANCIAL INTERNAL RATE OF RETURN - Mendez Water District

(a) Base Case | (b) Investment Cost +20% | (c) O & M cost +20% | (d) Revenue -20% | (Unit: 1000 Pesos)

YEAR	INCREMENTAL REVENUE	O & M	PROJECT COSTS	Net	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	2,844	-2,844	0	0	3,412	-3,412	0	0	2,844	-2,844	0	0	2,844	-2,844
1997	536	267	16,965	-16,697	536	267	20,358	-20,090	536	321	16,965	-16,750	429	267	16,965	-16,804
1998	2,322	803	0	1,519	2,322	803	0	1,519	2,322	964	0	1,358	1,858	803	0	1,054
1999	3,651	1,505	6	2,140	3,651	1,505	7	2,139	3,651	1,806	6	1,839	2,921	1,505	6	1,410
2000	5,317	2,252	350	2,715	5,317	2,252	420	2,645	5,317	2,703	350	2,265	4,254	2,252	350	1,652
2001	7,401	3,290	435	3,676	7,401	3,290	522	3,589	7,401	3,948	435	3,018	5,921	3,290	435	2,196
2002	10,035	4,687	545	4,804	10,035	4,687	654	4,695	10,035	5,624	545	3,867	8,028	4,687	545	2,797
2003	13,344	6,223	677	6,443	13,344	6,223	813	6,308	13,344	7,468	677	5,199	10,675	6,223	677	3,775
2004	15,644	8,284	840	6,521	15,644	8,284	1,008	6,353	15,644	9,940	840	4,864	12,516	8,284	840	3,392
2005	18,304	10,768	1,059	6,477	18,304	10,768	1,271	6,266	18,304	12,922	1,059	4,324	14,643	10,768	1,059	2,816
2006	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2007	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2008	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2009	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2010	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2011	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2012	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2013	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2014	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2015	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2016	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2017	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2018	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2019	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2020	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2021	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2022	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
2023	18,304	10,768	0	7,536	18,304	10,768	0	7,536	18,304	12,922	0	5,382	14,643	10,768	0	3,875
	FIRR =	21.31%			FIRR =	18.44%			FIRR =	17.39%			FIRR =	13.18%		

TABLE 11.3-12 WEIGHTED AVERAGE OF CAPITAL - Mendez Water District

Unit: 1000 Pesos

	AMOUNT	%TOTAL PROJECT LOAN	INTEREST RATE	WEIGHTED COST OF CAPITAL
TOTAL PROJECT LOAN	22.652	100.00%		
COMPOSITION OF LOAN				
A. REGULAR LOAN	12,747	56.28%		
FIRST 2 MILLION	0	0.00%	8.50%	0.00%
NEXT 5 MILLION	4,107	18.13%	10.50%	1.90%
EXCESS OF 7 MILLION	8,640	38.14%	12.50%	4.77%
B. SOFT LOAN	9,904	43.72%		
FIRST 2 MILLION	2,000	8.83%	8.50%	0.75%
NEXT 5 MILLION	5,000	22.07%	10.50%	2.32%
EXCESS OF 7 MILLION	2,904	12.82%	12.50%	1.60%
PRESCRIBED DISCOUNT RATE FOR FIRR COMPUTATION				11.34%

TABLE 11.3-13 INCREASE IN CONSUMER SATISFACTION - Mendez Water District

Unit: 1000 Pesos

YEAR	INCREMENTAL ACCOUNTED FOR WATER	PRICE PER CU.M.	ECONOMIC VALUE PER CU.M.	ECONOMIC WATER REVENUE	PRESENT VALUE DISCOUNT RATE AT 15% FACTOR	VALUE
1994	0	9.42	11.30	0	1.000	0
1995	0	10.01	12.01	0	0.870	0
1996	0	10.01	12.01	0	0.756	0
1997	18	10.01	12.01	213	0.658	140
1998	43	12.56	15.07	651	0.572	372
1999	81	12.56	15.07	1,226	0.497	610
2000	125	12.56	15.07	1,881	0.432	813
2001	174	12.56	15.07	2,623	0.376	986
2002	231	12.56	15.07	3,481	0.327	1,138
2003	296	12.56	15.07	4,460	0.284	1,268
2004	370	11.41	13.70	5,070	0.247	1,253
2005	456	10.38	12.45	5,676	0.215	1,220
2006	456	10.38	12.45	5,676	0.187	1,061
2007	456	10.38	12.45	5,676	0.163	922
2008	456	10.38	12.45	5,676	0.141	802
2009	456	10.38	12.45	5,676	0.123	698
2010	456	10.38	12.45	5,676	0.107	607
2011	456	10.38	12.45	5,676	0.093	527
2012	456	10.38	12.45	5,676	0.081	459
2013	456	10.38	12.45	5,676	0.070	399
2014	456	10.38	12.45	5,676	0.061	347
2015	456	10.38	12.45	5,676	0.053	302
2016	456	10.38	12.45	5,676	0.046	262
2017	456	10.38	12.45	5,676	0.040	228
2018	456	10.38	12.45	5,676	0.035	198
2019	456	10.38	12.45	5,676	0.030	172
2020	456	10.38	12.45	5,676	0.026	150
2021	456	10.38	12.45	5,676	0.023	130
2022	456	10.38	12.45	5,676	0.020	113
2023	456	10.38	12.45	5,676	0.017	99
TOTAL INCREASE IN CONSUMER SATISFACTION				127,443		15,277

1/ The 1996 volume of cu.m. is deducted from the water demand projections annually throughout the study period for the incremental volume.

2/ Price per cu.m. was based on the de-escalated average rate per cu.m. of water.

3/ Economic value per cu.m. was assumed to be 1.2 times the price per cu.m. of water.

Scenario	FIRR
Base Case	21.3%
1. 20% increase in Investment Cost	18.4%
2. 20% increase in O & M Cost	17.4%
3. 20% decrease in Revenue	13.2%

The computation of the FIRR under the different scenarios is also shown in **Table 11.3-11**. Results of the sensitivity analysis shows that the FIRR is greatly influenced by the decrease of revenue. The derived FIRR, however, are still more than the water district's weighted average cost of capital.

(8) Recommended Water Rates

The recommended water rates are shown below. The high increase of the rate in 1998 is tallied with the projected year of implementation although an annual increase up to 2003 is also proposed. The water rates in 1995 are effectively implemented in January. The details are also presented in **Table 11.3-8**.

	Minimum	11-20m^3	21-30m^3	Over 31m^3
1994	80.00	9.00	9.75	10.75
1996	104.50	11.00	11.83	12.93
1998	158.63	16.70	17.95	19.62
2000	191.94	20.20	21.72	23.74
2002	232.25	24.45	26.28	28.73
2005	255.48	26.89	28.91	31.60

These recommended water rates are subject to the following criteria:

a) Minimum charge (First 10 m^3) must not exceed 5% of the average family income of the low income group

b) Any increase must be limited to 60% of the prevailing rates.

As can be seen in **Table 11.3-8**, the recommended rates for the first 10 m^3 do not exceed 5% of the average income of the low income group. Also, all rate increases are within the maximum limit of 60%.

(9) Concluding Remarks of Financial Analysis

The proposed development program for Mendez Water District is financially viable. However, it must be emphasized that the following conditions should be fulfilled.

a) Water rates as discussed above should be adopted and attained.

b) The project should be implemented in 1996 and completed by the end of 1997.

c) The targeted number of service connections should be attained because the FIRR is the most sensitive in the revenue reduction.

11.3.4 Economic Analysis

(1) Project Benefits

Consumer Satisfaction

Under the assumption described in Section 11.1.4, the present economic value of water at 15% discount rate is 15.3 million pesos as shown in **Table 11.3-13.**

Health Benefits

Morbidity rate of water-borne disease in Mendez is 1,197 out of 100,000 according to the Provincial Socio-economic Profile of Cavite. When 120 pesos per day and 8 days per patient were lost by illness, the present economic value of health benefits at 15% discount rate is 0.17 million pesos as shown in **Table 11.3-14.**

Fire Protection

Under the assumption described in Section 11.1.4, the present economic value of fire protection at 15% discount rate is 7.7 million pesos as shown in **Table 11.3-15.**

(2) Project Costs

The detail of the conversion of financial project cost to economic cost is shown in **Table 11.3-16.** Further, incremental economic operation and maintenance cost is shown in **Table 11.3-17.** The summary of economic costs including the total replacement cost of 2.7 million pesos are shown in **Table 11.3-18.**

(3) Economic Benefits and Costs Analysis

The summary of quantifiable economic benefits and economic costs for the project is shown below expressed as net present values of a 15% discount rate. Benefit cost ratio (BCR) obtained is 1.07. Salvage value is shown in **Table 11.3-20.**

Increase in Consumer Satisfaction	15.28 million pesos
Health Benefits	0.17 million pesos
Reduction in Fire Damage	7.68 million pesos
Total Benefits (Salvage value is not included.)	23.13 million pesos
Total Project Costs	21.80 million pesos

TABLE 11.3-14 HEALTH BENEFITS - Mendez Water Distict

Unit: 1000 Pesos

YEAR	SERVED POPULATION	COST OF TIME DUE TO ILLNESS	ECONOMIC LOSS DUE TO PREMA-TURE DEATH	COST OF MEDICAL EXPENSES	TOTAL ECONOMIC LOSSES	20% REDUCTION DUE TO PROJECT (Benefit)	PRESENT VALUE DISCOUNT RATE AT 15% FACTOR	VALUE
1994	4,121	0	0	0	0	0	0.000	0
1995	4,444	0	0	0	0	0	0.000	0
1996	4,784	0	0	0	0	0	0.756	0
1997	5,140	0	0	0	0	0	0.658	0
1998	5,835	44	0	70	113	23	0.572	13
1999	6,615	49	0	79	129	26	0.497	13
2000	7,477	56	0	89	145	29	0.432	13
2001	8,452	63	0	101	164	33	0.376	12
2002	9,561	71	0	114	186	37	0.327	12
2003	10,815	81	0	129	210	42	0.284	12
2004	12,229	91	0	146	238	48	0.247	12
2005	13,848	103	0	166	269	54	0.215	12
2006	13,848	103	0	166	269	54	0.187	10
2007	13,848	103	0	166	269	54	0.163	9
2008	13,848	103	0	166	269	54	0.141	8
2009	13,848	103	0	166	269	54	0.123	7
2010	13,848	103	0	166	269	54	0.107	6
2011	13,848	103	0	166	269	54	0.093	5
2012	13,848	103	0	166	269	54	0.081	4
2013	13,848	103	0	166	269	54	0.070	4
2014	13,848	103	0	166	269	54	0.061	3
2015	13,848	103	0	166	269	54	0.053	3
2016	13,848	103	0	166	269	54	0.046	2
2017	13,848	103	0	166	269	54	0.040	2
2018	13,848	103	0	166	269	54	0.035	2
2019	13,848	103	0	166	269	54	0.030	2
2020	13,848	103	0	166	269	54	0.026	1
2021	13,848	103	0	166	269	54	0.023	1
2022	13,848	103	0	166	269	54	0.020	1
2023	13,848	103	0	166	269	54	0.017	1
TOTAL HEALTH BENEFIT						1,260		169

1/ "Cost of Time due to Illness" was computed based on the following formula:
65% x Morbidity Rate x SERVED POP. x 8 days x P120.00

2/ Economic Loss due to Premature Death" was computed based on the following formula:
65% x Mortality Rate x SERVED POP. x P150,000

3/ Cost of Medical Expenses" was computed based on the following formula:
65% x Morbidity Rate x SERVED POP. x P1,000

4/ Morbidity Rate (per 100,000): 1,197 (Cavite) Ave. Medical Expense : P 1,000.00
Mortality Rate (per 100,000): Nil Weighted Ave. Wage Rate: P 120.00
% of Economic Active Population : 65%

TABLE 11.3-15 REDUCTION IN FIRE DAMAGE - Mendez Water District

Unit: 1000 Pesos

YEAR	POPULATION IN THE SER. AREA	NO. OF STRUC-TURES	TOTAL VALUE	0.75% OVERALL REDUCTION IN FIRE DAMAGE	PER-CENTAGE PROTEC-TION	NET REDUCTION IN FIRE DAMAGE (Benefit)	PRESENT VALUE DISCOUNT RATE AT 15% FACTOR	VALUE
1994	7,638	1,469	293,769	2,203	0.00%	0	0.000	0
1995	8,380	1,612	322,324	2,417	0.00%	0	0.000	0
1996	9,195	1,768	353,653	2,652	0.00%	0	0.756	0
1997	10,089	1,940	388,029	2,910	0.00%	0	0.658	0
1998	11,070	2,129	425,769	3,193	46.00%	1,469	0.572	840
1999	11,612	2,233	446,632	3,350	46.00%	1,541	0.497	766
2000	12,181	2,343	468,517	3,514	46.00%	1,616	0.432	699
2001	12,778	2,457	491,474	3,686	46.00%	1,696	0.376	637
2002	13,404	2,578	515,556	3,867	46.00%	1,779	0.327	581
2003	14,061	2,704	540,819	4,056	46.00%	1,866	0.284	530
2004	14,750	2,837	567,319	4,255	46.00%	1,957	0.247	484
2005	15,474	2,976	595,154	4,464	46.00%	2,053	0.215	441
2006	15,474	2,976	595,154	4,464	46.00%	2,053	0.187	384
2007	15,474	2,976	595,154	4,464	46.00%	2,053	0.163	334
2008	15,474	2,976	595,154	4,464	46.00%	2,053	0.141	290
2009	15,474	2,976	595,154	4,464	46.00%	2,053	0.123	252
2010	15,474	2,976	595,154	4,464	46.00%	2,053	0.107	219
2011	15,474	2,976	595,154	4,464	46.00%	2,053	0.093	191
2012	15,474	2,976	595,154	4,464	46.00%	2,053	0.081	166
2013	15,474	2,976	595,154	4,464	46.00%	2,053	0.070	144
2014	15,474	2,976	595,154	4,464	46.00%	2,053	0.061	125
2015	15,474	2,976	595,154	4,464	46.00%	2,053	0.053	109
2016	15,474	2,976	595,154	4,464	46.00%	2,053	0.046	95
2017	15,474	2,976	595,154	4,464	46.00%	2,053	0.040	82
2018	15,474	2,976	595,154	4,464	46.00%	2,053	0.035	72
2019	15,474	2,976	595,154	4,464	46.00%	2,053	0.030	62
2020	15,474	2,976	595,154	4,464	46.00%	2,053	0.026	54
2021	15,474	2,976	595,154	4,464	46.00%	2,053	0.023	47
2022	15,474	2,976	595,154	4,464	46.00%	2,053	0.020	41
2023	15,474	2,976	595,154	4,464	46.00%	2,053	0.017	36
TOTAL REDUCTION IN FIRE DAMAGE						50,936		7,684

1/ Population in the service area was derived from the Population and Demand projections.
2/ The number of structures was estimated by dividing the service area population by the average number of persons per dwelling unit of 5.2.
3/ The total value is estimated by multiplying the number of structures with the average replacement value of dwelling units in Mendez of 200,000 pesos.
4/ Percentage fire protection was based on the area to be served by fire hydrants.

TABLE 11.3-16 CONVERSION OF FINANCIAL PROJECT COST TO ECONOMIC COST - Mendez Water District

Unit: 1000 Pesos

	FINANCIAL PROJECT COST	FOREIGN EXCHANGE COMPONENT	DOMESTIC COMPONENT	UNSKILLED LABOR	BALANCE	TAXES (5%)	OTHERS (95%)	SHADOW PRICING FOREX COMPONENT X 1.2	SHADOW PRICING UNSKILLED LABOR X .6	SHADOW PRICING OTHERS X 1.0	TOTAL ECONOMIC COST
CIVIL WORKS											
PUMP STATION	990	170	820	141	679	34	645	204	85	645	933
DISTRIBUTION FACILITIES	1,544	483	1,062	129	933	47	886	579	77	886	1,542
TREATMENT FACILITIES	21	2	19	1	18	1	17	2	1	17	20
SERVICE CONNECTIONS	114	9	105	36	68	3	65	11	22	65	98
VALVES/HYDRANTS	42	3	40	13	27	1	25	3	8	25	36
STORAGE FACILITIES	1,875	150	1,725	600	1,125	56	1,069	180	360	1,069	1,609
TOTAL CIVIL WORKS	4,586	816	3,771	921	2,850	142	2,707	979	553	2,707	4,239
EQUIPMENTS											
PUMP STATION	1,838	1,612	226	0	226	11	215	1,934	0	215	2,149
DISTRIBUTION FACILITIES	1,673	740	933	0	933	47	886	888	0	886	1,774
TREATMENT FACILITIES	27	18	9	0	9	0	8	22	0	8	30
SERVICE CONNECTIONS	341	332	9	0	9	0	9	399	0	9	407
VALVES/HYDRANTS	94	79	15	0	15	1	14	95	0	14	109
STORAGE FACILITIES	5,626	5,476	150	0	150	8	143	6,571	0	143	6,713
TOTAL EQUIPMENTS	9,599	8,257	1,342	0	1,342	67	1,275	9,909	0	1,275	11,183
BASIC CONSTRUCTION COST	14,185	9,073	5,112	921	4,191	210	3,982	10,888	553	3,982	15,422
CONTINGENCY	2,128	1,361	767	138	629	31	597	1,633	83	597	2,313
ENGINEERING STUDIES	1,468	939	529	95	434	22	412	1,127	57	412	1,596
CONSTRUCTION SUPERVISION	653	417	235	42	193	10	183	501	25	183	709
LAND ACQUISITION & OTHERS	1,375	485	891	47	844	42	801	582	28	801	1,411
TOTAL PROJECT COST	19,809	12,275	7,534	1,244	6,290	315	5,976	14,730	746	5,976	21,452

TABLE 11.3-17 INCREMENTAL ECONOMIC OPERATION AND MAINTENANCE COST - Mendez Water District

Unit: 1000 Pesos

YEAR	O & M COST (Unescalated)	FOREIGN EXCHANGE COMPONENT	DOMESTIC COMPONENT	TAXES (5%)	OTHERS (95%)	SHADOW PRICING FOREX COMPONENT (X 1.2)	SHADOW PRICING OTHERS (X 1.0)	TOTAL ECONOMIC O & M COST	NET ECONOMIC O & M COST
1994	1,044	186	858	43	815	223	815	1,038	0
1995	1,409	251	1,158	58	1,100	301	1,100	1,401	0
1996	1,472	262	1,210	60	1,149	314	1,149	1,464	0
1997	1,535	273	1,262	63	1,199	328	1,199	1,527	63
1998	1,755	312	1,443	72	1,370	375	1,370	1,745	281
1999	2,024	360	1,664	83	1,581	432	1,581	2,013	549
2000	2,254	401	1,853	93	1,760	481	1,760	2,242	778
2001	2,572	458	2,114	106	2,008	549	2,008	2,558	1,094
2002	2,978	530	2,448	122	2,326	636	2,326	2,962	1,498
2003	3,348	596	2,752	138	2,614	715	2,614	3,330	1,866
2004	3,823	680	3,143	157	2,985	817	2,985	3,802	2,338
2005	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2006	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2007	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2008	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2009	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2010	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2011	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2012	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2013	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2014	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2015	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2016	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2017	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2018	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2019	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2020	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2021	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2022	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
2023	4,331	771	3,560	178	3,382	925	3,382	4,307	2,843
TOTAL ECONOMIC OPERATION AND MAINTENANCE COST									62,488

TABLE 11.3-18 SUMMARY OF ECONOMIC COSTS - Mendez Water District

Unit: 1000 Pesos

YEAR	ECONOMIC PROJECT COST	REPLACE-MENT COST 1/	NET O & M COST	TOTAL ECONOMIC COST	PRESENT VALUE AT 15% FACTOR	VALUE
1994			0	0	0.000	0
1995			0	0	0.000	0
1996	3,008		0	3,008	0.756	2,274
1997	18,445		63	18,507	0.658	12,169
1998			281	281	0.572	161
1999			549	549	0.497	273
2000			778	778	0.432	336
2001			1,094	1,094	0.376	411
2002			1,498	1,498	0.327	490
2003			1,866	1,866	0.284	530
2004			2,338	2,338	0.247	578
2005			2,843	2,843	0.215	611
2006			2,843	2,843	0.187	531
2007			2,843	2,843	0.163	462
2008			2,843	2,843	0.141	402
2009			2,843	2,843	0.123	349
2010			2,843	2,843	0.107	304
2011			2,843	2,843	0.093	264
2012		2,696	2,843	5,539	0.081	448
2013			2,843	2,843	0.070	200
2014			2,843	2,843	0.061	174
2015			2,843	2,843	0.053	151
2016			2,843	2,843	0.046	131
2017			2,843	2,843	0.040	114
2018			2,843	2,843	0.035	99
2019			2,843	2,843	0.030	86
2020			2,843	2,843	0.026	75
2021			2,843	2,843	0.023	65
2022			2,843	2,843	0.020	57
2023			2,843	2,843	0.017	49
TOTAL	21,452	2,696	62,488	86,636		21,796

1/ (a) Pump station: 2,149 (2012); (b) Treatment facilities: 30 (2012); (c) Service facilities: 407 (2012); (d) Valves/hydrants: 109 (2012)

TABLE 11.3-19 ECONOMIC INTERNAL RATE OF RETURN - Mendez Water District

Unit: 1000 Pesos

YEAR	TOTAL ECONOMIC BENEFITS	TOTAL ECONOMIC COSTS	NET BENEFIT	PRESENT VALUE AT 15% FACTOR	VALUE
1994	0	0	0	0.000	0
1995	0	0	0	0.000	0
1996	0	3,008	-3,008	0.756	-2,274
1997	213	18,507	-18,294	0.658	-12,028
1998	2,143	281	1,861	0.572	1,064
1999	2,793	549	2,244	0.497	1,116
2000	3,526	778	2,749	0.432	1,188
2001	4,352	1,094	3,258	0.376	1,225
2002	5,297	1,498	3,799	0.327	1,242
2003	6,368	1,866	4,502	0.284	1,280
2004	7,075	2,338	4,736	0.247	1,171
2005	7,783	2,843	4,939	0.215	1,062
2006	7,783	2,843	4,939	0.187	923
2007	7,783	2,843	4,939	0.163	803
2008	7,783	2,843	4,939	0.141	698
2009	7,783	2,843	4,939	0.123	607
2010	7,783	2,843	4,939	0.107	528
2011	7,783	2,843	4,939	0.093	459
2012	7,783	5,539	2,244	0.081	181
2013	7,783	2,843	4,939	0.070	347
2014	7,783	2,843	4,939	0.061	302
2015	7,783	2,843	4,939	0.053	262
2016	7,783	2,843	4,939	0.046	228
2017	7,783	2,843	4,939	0.040	198
2018	7,783	2,843	4,939	0.035	173
2019	7,783	2,843	4,939	0.030	150
2020	7,783	2,843	4,939	0.026	130
2021	7,783	2,843	4,939	0.023	113
2022	7,783	2,843	4,939	0.020	99
2023	14,827	2,843	11,984	0.017	208
TOTAL	186,684	86,636	100,047		1,455

(Salvage value is added in 2023.)

ECONOMIC INTERNAL RATE OF RETURN = 16.33%

EIRR OF OTHER CASES (SENSITIVITY ANALYSIS)

Investment Cost: 20% increase = 13.88%

O & M Cost: 20% increase = 15.02%

Revenue: 20% decrease = 11.81%

BENEFIT COST RATIO at 15% discount rate = 1.07

TABLE 11.3-20 SALVAGE VALUE IN YEAR 2023 - Mendez Water District

Unit: 1000 Pesos

YEAR	50 - YEAR ITEMS ECONOMIC VALUE	50 - YEAR ITEMS REMAINING LIFE IN 2023	50 - YEAR ITEMS SALVAGE VALUE	30 - YEAR ITEMS ECONOMIC VALUE	30 - YEAR ITEMS REMAINING LIFE IN 2023	30 - YEAR ITEMS SALVAGE VALUE	15 - YEAR ITEMS ECONOMIC VALUE	15 - YEAR ITEMS REMAINING LIFE IN 2023	15 - YEAR ITEMS SALVAGE VALUE	TOTAL SALVAGE VALUE
1994										
1995										
1996										
1997	11,793	48.00%	5,661	933	13.33%	124				5,785
1998		50.00%			16.67%					0
1999		52.00%			20.00%					0
2000		54.00%			23.33%					0
2001		56.00%			26.67%					0
2002		58.00%			30.00%					0
2003		60.00%			33.33%					0
2004		62.00%			36.67%					0
2005		64.00%			40.00%					0
2006		66.00%			43.33%					0
2007		68.00%			46.67%					0
2008		70.00%			50.00%					0
2009		72.00%			53.33%					0
2010		74.00%			56.67%					0
2011		76.00%			60.00%					0
2012		78.00%			63.33%					0
2013		80.00%			66.67%		2,696	33.33%	899	899
2014		82.00%			70.00%			40.00%		0
2015		84.00%			73.33%			46.67%		0
2016		86.00%			76.67%			53.33%		0
2017		88.00%			80.00%			60.00%		0
2018		90.00%			83.33%			66.67%		0
2019		92.00%			86.67%			73.33%		0
2020		94.00%			90.00%			80.00%		0
2021		96.00%			93.33%			86.67%		0
2022		98.00%			96.67%			93.33%		0
2023		100.00%			100.00%			100.00%		0
SALVAGE VALUE			5,661			124			899	6,684
ADD: LAND										361
TOTAL SALVAGE VALUE										7,044

Benefit Cost ratio (BCR): 1.07

(4) Economic Internal Rate of Return

The results of EIRR are summarized below. EIRR for base case is estimated at 16.3%. Details are shown in **Table 11.3-19**. A sensitivity analysis is conducted to determine the effect of variances in the assumptions to the EIRR. The derived EIRR under selected variances to the base case are as follows:

Scenario	EIRR
Base Case	16.3%
1. 20% increase in Investment Cost	13.9%
2. 20% increase in O & M Cost	15.0%
3. 20% decrease in Revenue	11.8%

The base case and the scenario with 20% increase in operation and maintenance cost can exceed the opportunity cost of capital of 15%, but other two scenarios can not exceed it.

(5) Concluding Remarks of Economic Analysis

From the results of the preceding analysis, the proposed project for Mendez Water District is considered economically almost feasible although two cases by sensitivity analysis are unfeasible.

11.4 PROJECT FOR NAIC

11.4.1 Estimation of the Construction Cost and Construction Period

(1) Construction Cost

The basic construction costs of the improvement for the Naic water supply facilities totals P17.57 million.

A summary of the estimated project cost is presented in **Table 11.4-1a** and **11.4-1b**, the detailed breakdown is shown in **Table 11.4-2a** and **11.4-2b**.

(2) Construction Period

In accordance with the facility requirement as described in Section 10.4.6, the tentative construction period is presented in **Fig. 11.4.1**.

TABLE 11.4-1a

COST ESTIMATES (P X 1000)
(1994 Price Level)

PHASE 1
NAIC WATER DISTRICT

	FACILITIES	TOTAL COST	LOCAL COMPONENT				FOREIGN EXCHANGE COMPONENT		
			MATERIAL	LABOR SKILLED	LABOR UNSKILLED	TOTAL	DIRECT	INDIRECT	TOTAL
1)	DEEPWELL CONSTRUCTION								
	- Equipment	660.0	420.0	-	-	420.0	-	240.0	240.0
	- Civil Works	840.0	405.0	135.0	105.0	645.0	-	195.0	195.0
	- Total	1,500.0	825.0	135.0	105.0	1,065.0	-	435.0	435.0
2)	PUMP STATION								
	- Equipment	1,949.8	240.0	-	-	240.0	1,679.8	30.0	1,709.8
	- Civil Works	1,049.9	449.9	270.0	150.0	869.9	-	180.0	180.0
	- Total	2,999.7	689.9	270.0	150.0	1,109.9	1,679.8	210.0	1,889.8
3)	STORAGE FACILITIES								
	- Equipment	303.7	151.8	-	-	151.8	-	151.8	151.8
	- Civil Works	3,492.3	2,201.7	189.8	303.7	2,695.2	-	797.2	797.2
	- Total	3,796.0	2,353.5	189.8	303.7	2,847.0	-	949.0	949.0
4)	DEMOLITION/SURFACE RESTORATION								
	- Equipment	371.2	240.2	-	-	240.2	-	131.0	131.0
	- Civil Works	720.6	491.3	87.3	54.6	633.2	-	87.3	87.3
	- Total	1,091.8	731.5	87.3	54.6	873.4	-	218.4	218.4
5)	DISTRIBUTION FACILITIES								
	- Equipment	3,057.9	1,587.8	117.6	-	1,705.4	-	1,352.5	1,352.5
	- Civil Works	2,822.7	1,293.7	411.6	235.2	1,940.6	-	882.1	882.1
	- Total	5,880.6	2,881.5	529.3	235.2	3,646.0	-	2,234.6	2,234.6
6)	TREATMENT FACILITIES								
	- Equipment	53.8	17.3	-	-	17.3	32.6	3.8	36.5
	- Civil Works	42.2	28.8	6.7	2.9	38.4	-	3.8	3.8
	- Total	96.0	46.1	6.7	2.9	55.7	32.6	7.7	40.3
7)	SERVICE CONNECTIONS								
	- Equipment	1,033.5	27.6	-	-	27.6	978.4	27.6	1,005.9
	- Civil Works	344.5	151.8	55.1	110.2	316.9	-	27.6	27.6
	- Total	1,378.0	179.1	55.1	110.2	344.5	978.4	55.1	1,033.5
8)	VALVES/HYDRANTS								
	- Equipment	292.4	45.5	0.0	0.0	45.5	229.8	17.2	247.0
	- Civil Works	137.4	59.0	26.3	43.5	128.8	0.0	8.6	8.6
	- Total	429.8	104.5	26.3	43.5	174.2	229.8	25.8	255.6
9)	PLUMBING TOOLS & OFFICE EQUIPMENT								
	- Equipment	150.0	48.0	-	-	48.0	67.0	35.0	102.0
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	150.0	48.0	-	-	48.0	67.0	35.0	102.0
10)	LAND ACQUISITION								
	- Equipment	250.0	80.0	-	-	80.0	112.5	57.5	170.0
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	250.0	80.0	-	-	80.0	112.5	57.5	170.0
	TOTAL CONSTRUCTION COST								
	- Equipment	8,122.3	2,858 1	117.6	0.0	2,975.7	3,100.1	2,046.5	5,146.6
	- Civil Works	9,449.6	5,081.1	1,181.9	1,005.1	7,268.0	0.0	2,181.6	2,181.6
	- Total	17,571.9	7,939.1	1,299.5	1,005.1	10,243.7	3,100.1	4,228.1	7,328.2

TABLE 11.4-1b

COST ESTIMATES (P X 1000)
(1994 Price Level)

PHASE 2
NAIC WATER DISTRICT

	FACILITIES	TOTAL COST	LOCAL COMPONENT				FOREIGN EXCHANGE COMPONENT		
			MATERIAL	LABOR SKILLED	LABOR UNSKILLED	LABOR TOTAL	DIRECT	INDIRECT	TOTAL
1)	DEEPWELL CONSTRUCTION								
	- Equipment	1,320.0	840.0	-	-	840.0	-	480.0	480.0
	- Civil Works	1,680.0	810.0	270.0	210.0	1,290.0	-	390.0	390.0
	- Total	3,000.0	1,650.0	270.0	210.0	2,130.0	-	870.0	870.0
2)	PUMP STATION								
	- Equipment	1,541.0	189.7	-	-	189.7	1,327.7	23.7	1,351.4
	- Civil Works	829.8	355.6	213.4	118.5	687.5	-	142.2	142.2
	- Total	2,370.8	545.3	213.4	118.5	877.2	1,327.7	166.0	1,493.6
3)	STORAGE FACILITIES								
	- Equipment	453.4	226.7	-	-	226.7	-	226.7	226.7
	- Civil Works	5,214.6	3,287.4	283.4	453.4	4,024.3	-	1,190.3	1,190.3
	- Total	5,668.0	3,514.2	283.4	453.4	4,251.0	-	1,417.0	1,417.0
4)	DEMOLITION/SURFACE RESTORATION								
	- Equipment	98.6	63.8	-	-	63.8	-	34.8	34.8
	- Civil Works	191.4	130.5	23.2	14.5	168.2	-	23.2	23.2
	- Total	290.0	194.3	23.2	14.5	232.0	-	58.0	58.0
5)	DISTRIBUTION FACILITIES								
	- Equipment	1,663.3	863.6	64.0	-	927.6	-	735.7	735.7
	- Civil Works	1,535.3	703.7	223.9	127.9	1,055.5	-	479.8	479.8
	- Total	3,198.6	1,567.3	287.9	127.9	1,983.1	-	1,215.5	1,215.5
6)	TREATMENT FACILITIES								
	- Equipment	53.8	17.3	-	-	17.3	32.6	3.8	36.5
	- Civil Works	42.2	28.8	6.7	2.9	38.4	-	3.8	3.8
	- Total	96.0	46.1	6.7	2.9	55.7	32.6	7.7	40.3
7)	SERVICE CONNECTIONS								
	- Equipment	1,386.4	37.0	-	-	37.0	1,312.5	37.0	1,349.5
	- Civil Works	462.2	203.3	73.9	147.9	425.2	-	37.0	37.0
	- Total	1,848.6	240.3	73.9	147.9	462.2	1,312.5	73.9	1,386.4
8)	VALVES/HYDRANTS								
	- Equipment	81.7	12.7	0.0	0.0	12.7	63.9	5.0	68.9
	- Civil Works	43.3	15.7	10.1	15.1	40.8	0.0	2.5	2.5
	- Total	125.0	28.5	10.1	15.1	53.6	63.9	7.5	71.4
9)	LAND ACQUISITION								
	- Equipment	500.0	160.0	-	-	160.0	225.0	115.0	340.0
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	500.0	160.0	-	-	160.0	225.0	115.0	340.0
	TOTAL CONSTRUCTION COST								
	- Equipment	7,098.2	2,410.8	64.0	0.0	2,474.8	2,961.7	1,661.7	4,623.5
	- Civil Works	9,998.8	5,535.1	1,104.6	1,090.2	7,730.0	0.0	2,268.8	2,268.8
	- Total	17,097.0	7,945.9	1,168.6	1,090.2	10,204.7	2,961.7	3,930.5	6,892.3

TABLE 11.4-2a

BREAKDOWN OF COST ESTIMATES (Phase 1)
Naic Water District
Naic, Cavite

A. ENGINEERING BASIC COST ITEM

1.	Pipelines						P	5,880,670.00
a)	2355 m.	50 mm PVC Pipes C-100 @ P	200.00 /m	P	471,000.00			
b)	898 m.	75 mm PVC Pipes C-100 @ P	240.00 /m		215,520.00			
c)	1935 m.	100 mm PVC Pipes C-100 @ P	310.00 /m		599,850.00			
d)	790 m.	150 mm PVC Pipes C-100 @ P	520.00 /m		410,800.00			
e)	1275 m.	200 mm PVC Pipes C-100 @ P	1,490.00 /m		1,899,750.00			
f)	1125 m.	250 mm PVC Pipes C-100 @ P	2,030.00 /m		2,283,750.00			
2.	Appurtenances							429,800.00
a)	31 pcs.	Gate Valves (Various Sizes)	8,000.00 /pcs		248,000.00			
b)	9 units	Fire Hydrant	20,200.00 /unit		181,800.00			
3.	Deepwell Construction							1,500,000.00
	150 m	1 Deepwell	10,000.00 /m		1,500,000.00			
4.	Pumping Station							2,999,667.00
	50 HP	1 Submersible Pump	12,474.00 /Hp		623,700.00			
	30 HP	1 Turbine Pump	19,168.10 /Hp		575,043.00			
	1 unit	Diesel Engine Drive	210,364.00 /unit		210,364.00			
		Power Connections	Lump Sum		500,000.00			
	1 unit	Generator set (100KVA)	790,560.00 /unit		790,560.00			
	2	20 sq. m. Pumphouse	7,500.00 /sq.m.		300,000.00			
5.	Reservoir							3,796,000.00
	292 cum	1 Elevated Steel Tank	13,000.00 /cum		3,796,000.00			
6.	Service Connection							
	1060		1,300.00 /s.c		1,378,000.00			1,378,000.00
7.	Disinfection Facility							
	2 sets	Hypochlorinator	48,000.00 /unit		96,000.00			96,000.00
			Sub-Total A				P	16,080,137.00

B. NON-ENGINEERING BASIC COST ITEM

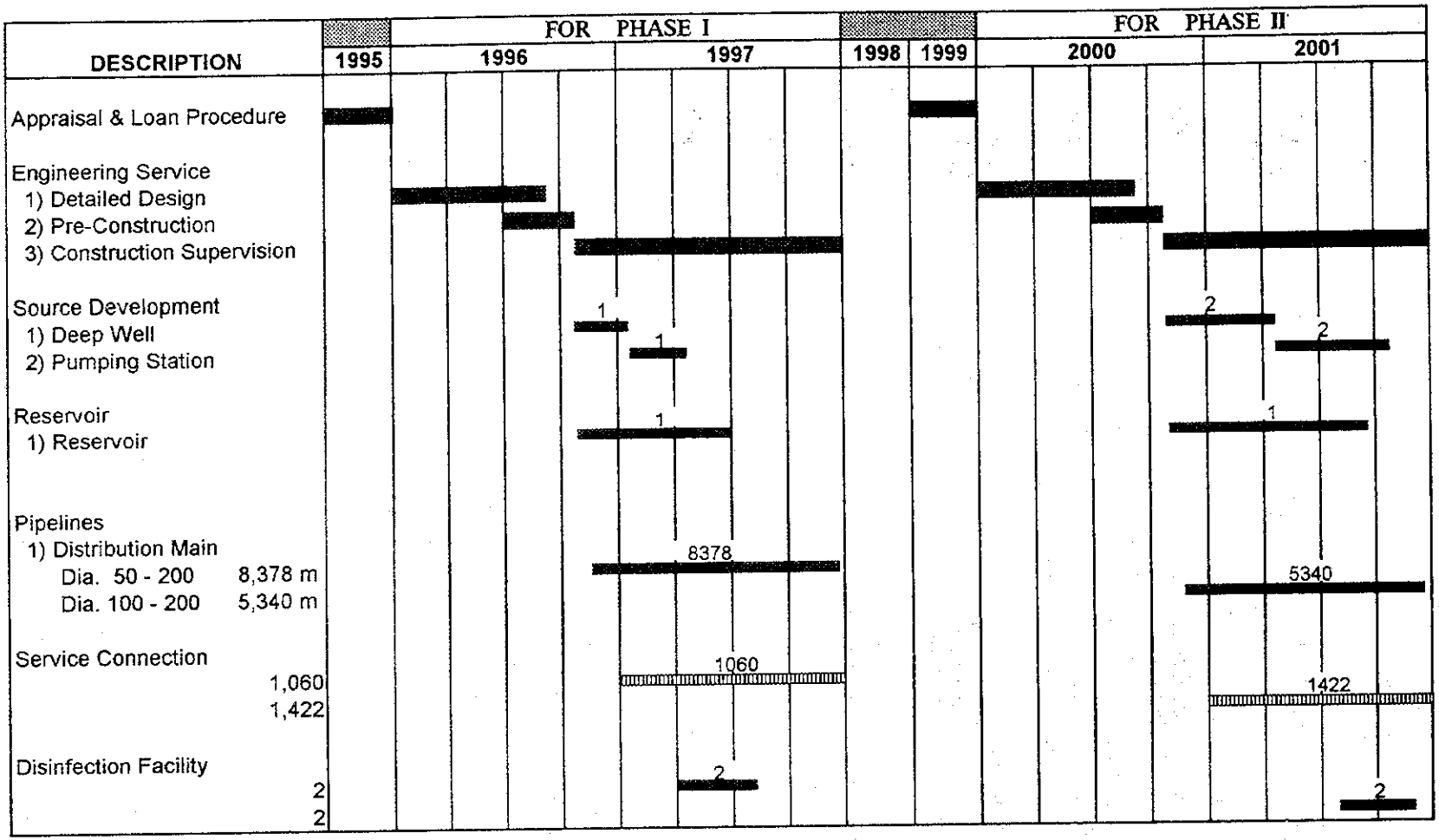
Plumbing Tools and Office Equipment		Lump Sum	150,000.00
Land Acquisition	500 sq.m.	500.00 /sq.m.	250,000.00
Demolition	1,418 sq.m	200.00 /sq.m.	283,600.00
Restoration	213 cum	3,800.00 /cum	808,260.00
		Sub-Total B	P 1,491,860.00
		TOTAL PROJECT COST ----------	P 17,571,997.00
			SAY P 17.57 MILLION

TABLE 11.4-2b

BREAKDOWN OF COST ESTIMATES (Phase 2)
Naic Water District
Naic, Cavite

A.	ENGINEERING BASIC COST ITEM						
1.	Pipelines					P	3,198,600.00
a)	1040 m.	100 mm PVC Pipes C-100 @ P	310.00 /m	322,400.00		
b)	3640 m.	150 mm PVC Pipes C-100 @ P	520.00 /m	1,892,800.00		
c)	660 m.	200 mm PVC Pipes C-100 @ P	1,490.00 /m	983,400.00		
2	Appurtenances						125,000.00
a)	3 pcs.	Gate Valves (Various Sizes)	8,000.00 /pcs	24,000.00		
b)	5 units	Fire Hydrant	20,200.00 /unit	101,000.00		
3.	Deepwell Construction						3,000,000.00
	150 m	2 Deepwell	10,000.00 /m	3,000,000.00		
4.	Pumping Station						2,370,814.00
	30 HP	2 Turbine Pump	19,168.10 /Hp	1,150,086.00		
	2 unit	Diesel Engine Drive	210,364.00	420,728.00		
		Power Connections	Lump Sum	500,000.00		
	2 20	sq. m. Pumphouse	7,500.00 /sq.m.	300,000.00		
5.	Reservoir						5,668,000.00
	436 cum	1 Elevated Steel Tank	13,000.00 /cum	5,668,000.00		
6.	Service Connection						
	1422		1,300.00 /s.c	1,848,600.00			1,848,600.00
7.	Disinfection Facility						
	2 sets	Hypochlorinator	48,000.00 /unit	96,000.00			96,000.00
			Sub-Total A			P	16,307,014.00
B.	NON-ENGINEERING BASIC COST ITEM						
	Land Acquisition	1,000.00 sq.m.	500.00 /sq.m.				500,000.00
	Demolition	500.00 sq.m	200.00 /sq.m.				100,000.00
	Restoration	50.00 cum	3,800.00 /cum				190,000.00
			Sub-Total B			P	790,000.00
			TOTAL PROJECT COST ----------			P	17,097,014.00
						SAY	P 17.10 MILLION

FIG. 11.4-1 CONSTRUCTION PERIOD FOR NAIC



11.4.2 Organization and Cost for Operation and Maintenance of the Water Supply System

(1) Organization

The present organization set-up of the NAIC-WD was newly formed in 1994, and it is very small one having 10 personnel including the general manager. However, it will be necessary to increase the number of personnel in 1997 after the proposed water supply system is implemented.

Based on the above and the projected number of service connection described in Section 10.4.4, the number of personnel for the NAIC-WD from the year 1995 up to 2005 is computed as follows:

Design year	No. of Connection	No. of Employee
1995	558	10
1996	558	10
1997	1,172	12
1998	1,287	13
1999	1,403	14
2000	1,530	15
2001	1,661	17
2002	3,083	31
2003	3,419	34
2004	3,793	38
2005	4,211	42

(2) Cost for Operation and Maintenance of the Water Supply System

A summary of operation and maintenance cost for the Naic water supply system from the year 1994 to 2005 is shown in **Table 11.4-3**, and a breakdown of the expenditures is presented in **Table 11.4-4a** to **11.4-4c**.

For the financial analysis in Section 11.4.3, a summary of operation and maintenance costs and a breakdown of the expenditures for Phase I only are presented in **Table 11.4-5**, and **Table 11.4-6a** to **11.4-6c**, respectively.

11.4.3 Financial Analysis

(1) Financial Background

Naic Water District started its operation in July, 1993. At present, the district is in a transitional period from RWSA to Water District.

TABLE 11.4-3

SUMMARY OF OPERATION AND MAINTENANCE COST
NAIC WATER DISTRICT

YEAR	ADMINISTRATION PERSONNEL A)	POWER B)	CHLORINE C)	MISCELLANEOUS & MAINTENANCE D)	OFFICE RENTALS E)	TOTAL
1994	585,000.00	0.00	0.00	55,800.00	0.00	640,800.00
1995	585,000.00	0.00	0.00	55,800.00	0.00	640,800.00
1996	585,000.00	0.00	0.00	55,800.00	0.00	640,800.00
1997	702,000.00	712,789.84	62,137.60	117,200.00	0.00	1,594,127.44
1998	760,500.00	659,842.77	68,474.00	128,700.00	0.00	1,617,516.77
1999	819,000.00	727,955.58	75,423.60	140,300.00	0.00	1,762,679.18
2000	877,500.00	800,325.43	83,088.60	153,000.00	0.00	1,913,914.03
2001	994,500.00	881,209.38	91,520.10	166,100.00	0.00	2,133,329.48
2002	1,813,500.00	1,738,792.14	171,696.00	308,300.00	0.00	4,032,288.14
2003	1,989,000.00	1,939,937.76	191,676.10	341,900.00	0.00	4,462,513.86
2004	2,223,000.00	2,167,902.79	213,955.70	379,300.00	0.00	4,984,158.49
2005	2,457,000.00	2,418,217.34	238,790.30	421,100.00	0.00	5,535,107.64

TABLE 11.4-4a Cost for Operation and Maintenance

A) PERSONNEL

The staff is expected to increase by design year to cope up with growing demand of the water supply system.

Staff = 100 per Connection

Cost = Staff * Average Salary * 13 months

YEAR	Average Salary/month	Conn	Staff	Annual Cost (P)
1994	4,500.00	558	10	585,000.00
1995	4,500.00	558	10	585,000.00
1996	4,500.00	558	10	585,000.00
1997	4,500.00	1,172	12	702,000.00
1998	4,500.00	1,287	13	760,500.00
1999	4,500.00	1,403	14	819,000.00
2000	4,500.00	1,530	15	877,500.00
2001	4,500.00	1,661	17	994,500.00
2002	4,500.00	3,083	31	1,813,500.00
2003	4,500.00	3,419	34	1,989,000.00
2004	4,500.00	3,793	38	2,223,000.00
2005	4,500.00	4,211	42	2,457,000.00

TABLE 11.4-4b Cost for Operation and Maintenance

B) PUMPING COST

YEAR	ADD (L/s)	HP RATING	KW RATING	SC (L/s)	Demand/ Supply	PHPD (Hr/d)	DEPD (KWH/D)	PUMPING COST (P) Daily	Monthly	Annualy
1994	5.50	0	0	4.30	1.28	0.00	0.00	0.00	0.00	0.00
1995	5.50	0	0	4.30	1.28	0.00	0.00	0.00	0.00	0.00
1996	5.50	0	0	4.30	1.28	0.00	0.00	0.00	0.00	0.00
1997	14.10	50	37.3	30.00	0.47	11.28	494.99	1,979.97	59,399.15	712,789.84
1998	15.50	80	59.68	57.00	0.27	6.53	458.22	1,832.90	54,986.90	659,842.77
1999	17.10	80	59.68	57.00	0.30	7.20	505.52	2,022.10	60,662.96	727,955.58
2000	18.80	80	59.68	57.00	0.33	7.92	555.78	2,223.13	66,693.79	800,325.43
2001	20.70	80	59.68	57.00	0.36	8.72	611.95	2,447.80	73,434.12	881,209.38
2002	38.90	140	104.44	95.00	0.41	9.83	1207.49	4,829.98	144,899.34	1,738,792.14
2003	43.40	140	104.44	95.00	0.46	10.96	1347.18	5,388.72	161,661.48	1,939,937.76
2004	48.50	140	104.44	95.00	0.51	12.25	1505.49	6,021.95	180,658.57	2,167,902.79
2005	54.10	140	104.44	95.00	0.57	13.67	1679.32	6,717.27	201,518.11	2,418,217.34

ADD = Average day demand
SC = Supply Capacity
HP = Pumps Rated Horsepower
Pv = Cost per KWH = 4.00

Em = Pump Efficiency = 85%
Days of Pumping/month = 30 days
PHPD = Pumping hours per day
DEPD = Daily Energy Power Demand

Computations Used:

KW Rating = Rated Hp * .746
Demand/Supply Ratio = ADD/SC
PHPD = 24 Hours * Demand/Supply Ratio
DEPD = PHPD * KW Rating / Pump Efficiency

Power Cost :

Daily = DEPD * Energy Cost
Monthly = Daily Power Cost * 30
Yearly = Monthly Power Cost * 12

TABLE 11.4–4c Cost for Operation and Maintenance

C) CHLORINATION COST

The average annual demand for chlorine is as follows:

A = (365 * Q * D)/1000
Where :
A = Annual Demand of Chlorine (Kg)
Q = Average Daily Water Demand (cumd)
D = Average Chlorine Dosage = 2 mg/l
Cost of Chlorine = 70.00 /kg

YEAR	ADD (CumD)	ADC (Kg)	COST (P)
1994	472	0	0.00
1995	472	0	0.00
1996	472	0	0.00
1997	1,216	888	62,137.60
1998	1,340	978	68,474.00
1999	1,476	1,077	75,423.60
2000	1,626	1,187	83,088.60
2001	1,791	1,307	91,520.10
2002	3,360	2,453	171,696.00
2003	3,751	2,738	191,676.10
2004	4,187	3,057	213,955.70
2005	4,673	3,411	238,790.30

ADD = Average day demand
ACC = Annual Demand of Chlorine

D) Maintenance and Miscellaneous Expenses
Cost per connection/year = P 100.00 /year

YEAR	Conn	TOTAL (P)
1994	558	55,800.00
1995	558	55,800.00
1996	558	55,800.00
1997	1,172	117,200.00
1998	1,287	128,700.00
1999	1,403	140,300.00
2000	1,530	153,000.00
2001	1,661	166,100.00
2002	3,083	308,300.00
2003	3,419	341,900.00
2004	3,793	379,300.00
2005	4,211	421,100.00

E) Office Rentals

	Monthly Rentals	Yearly Rentals
1994	0.00	0.00
1995	0.00	0.00
1996	0.00	0.00
1997	0.00	0.00
1998	0.00	0.00
1999	0.00	0.00
2000	0.00	0.00
2001	0.00	0.00
2002	0.00	0.00
2003	0.00	0.00
2004	0.00	0.00
2005	0.00	0.00

TABLE 11.4-5

SUMMARY OF OPERATION AND MAINTENANCE COST
NAIC WATER DISTRICT

YEAR	ADMINISTRATION PERSONNEL	POWER	CHLORINE	MISCELLANEOUS & MAINTENANCE	OFFICE RENTALS	TOTAL
1994	585,000.00	0.00	0.00	55,800.00	0.00	640,800.00
1995	585,000.00	0.00	0.00	55,800.00	0.00	640,800.00
1996	585,000.00	0.00	0.00	55,800.00	0.00	640,800.00
1997	702,000.00	570,231.87	62,137.60	117,223.74	0.00	1,451,593.21
1998	760,500.00	659,842.77	68,474.00	128,700.00	0.00	1,617,516.77
1999	819,000.00	727,955.58	75,423.60	140,300.00	0.00	1,762,679.18
2000	877,500.00	800,325.43	83,088.60	153,000.00	0.00	1,913,914.03
2001	994,500.00	881,209.38	91,520.10	166,100.00	0.00	2,133,329.48
2002	1,053,000.00	970,607.44	100,820.30	181,300.00	0.00	2,305,727.74
2003	1,170,000.00	1,072,776.64	111,091.40	198,100.00	0.00	2,551,968.04
2004	1,287,000.00	1,179,202.89	122,384.50	216,500.00	0.00	2,805,087.39
2005	1,404,000.00	1,298,400.30	134,801.80	237,052.44	0.00	3,074,254.53

TABLE 11.4-6a Cost for Operatin and Maintenance

A) PERSONNEL

The staff is expected to increase by design year to cope up with growing demand of the water supply system.

Staff = 100 per Connection

Cost = Staff * Average Salary * 13 months

YEAR	Average Salary/month	Conn	Staff	Annual Cost (P)
1994	4,500.00	558	10	585,000.00
1995	4,500.00	558	10	585,000.00
1996	4,500.00	558	10	585,000.00
1997	4,500.00	1,172	12	702,000.00
1998	4,500.00	1,287	13	760,500.00
1999	4,500.00	1,403	14	819,000.00
2000	4,500.00	1,530	15	877,500.00
2001	4,500.00	1,661	17	994,500.00
2002	4,500.00	1,813	18	1,053,000.00
2003	4,500.00	1,981	20	1,170,000.00
2004	4,500.00	2,165	22	1,287,000.00
2005	4,500.00	2,371	24	1,404,000.00

TABLE 11.4–6b Cost for Operation and Maintenance

B) PUMPING COST

YEAR	ADD (L/s)	HP RATING	KW RATING	SC (L/s)	Demand/ Supply	PHPD (Hr/d)	DEPD (KWH/D)	PUMPING COST (P) Daily	Monthly	Annualy
1994	5.50	0	0	4.30	1.28	30.70	0.00	0.00	0.00	0.00
1995	5.50	0	0	4.30	1.28	30.70	0.00	0.00	0.00	0.00
1996	5.50	0	0	4.30	1.28	30.70	0.00	0.00	0.00	0.00
1997	14.10	40	29.84	30.00	0.47	11.28	395.99	1,583.98	47,519.32	570,231.87
1998	15.50	80	59.68	57.00	0.27	6.53	458.22	1,832.90	54,986.90	659,842.77
1999	17.10	80	59.68	57.00	0.30	7.20	505.52	2,022.10	60,662.96	727,955.58
2000	18.80	80	59.68	57.00	0.33	7.92	555.78	2,223.13	66,693.79	800,325.43
2001	20.70	80	59.68	57.00	0.36	8.72	611.95	2,447.80	73,434.12	881,209.38
2002	22.80	80	59.68	57.00	0.40	9.60	674.03	2,696.13	80,883.95	970,607.44
2003	25.20	80	59.68	57.00	0.44	10.61	744.98	2,979.94	89,398.05	1,072,776.64
2004	27.70	80	59.68	57.00	0.49	11.66	818.89	3,275.56	98,266.91	1,179,202.89
2005	30.50	80	59.68	57.00	0.54	12.84	901.67	3,606.67	108,200.02	1,298,400.30

ADD = Average day demand
SC = Supply Capacity
HP = Pumps Rated Horsepower
Pv = Cost per KWH = 4.00

Em = Pump Efficiency = 85%
Days of Pumping/month = 30 days
PHPD = Pumping hours per day
DEPD = Daily Energy Power Demand

Computations Used:

KW Rating = Rated Hp * .746
Demand/Supply Ratio = ADD/SC
PHPD = 24 Hours * Demand/Supply Ratio
DEPD = PHPD * KW Rating / Pump Efficiency

Power Cost :

Daily = DEPD * Energy Cost
Monthly = Daily Power Cost * 30
Yearly = Monthly Power Cost * 12

TABLE 11.4-6c Cost for Operation and Maintenance

C) CHLORINATION COST

The average annual demand for chlorine is as follows:

A = (365 * Q * D)/1000
Where :
A = Annual Demand of Chlorine (Kg)
Q = Average Daily Water Demand (cumd)
D = Average Chlorine Dosage = 2 mg/l
Cost of Chlorine = 70.00 /kg

YEAR	ADD (CumD)	ADC (Kg)	COST (P)
1994	472	0	0.00
1995	472	0	0.00
1996	472	0	0.00
1997	1,216	888	62,137.60
1998	1,340	978	68,474.00
1999	1,476	1,077	75,423.60
2000	1,626	1,187	83,088.60
2001	1,791	1,307	91,520.10
2002	1,973	1,440	100,820.30
2003	2,174	1,587	111,091.40
2004	2,395	1,748	122,384.50
2005	2,638	1,926	134,801.80

ADD = Average day demand
ACC = Annual Demand of Chlorine

D) Maintenance and Miscellaneous Expenses
Cost per connection/year = P 100.00 /year

YEAR	Conn	TOTAL (P)
1994	558	55,800.00
1995	558	55,800.00
1996	558	55,800.00
1997	1,172	117,223.74
1998	1,287	128,700.00
1999	1,403	140,300.00
2000	1,530	153,000.00
2001	1,661	166,100.00
2002	1,813	181,300.00
2003	1,981	198,100.00
2004	2,165	216,500.00
2005	2,371	237,052.44

E) Office Rentals

	Monthly Rentals	Yearly Rentals
1994	0.00	0.00
1995	0.00	0.00
1996	0.00	0.00
1997	0.00	0.00
1998	0.00	0.00
1999	0.00	0.00
2000	0.00	0.00
2001	0.00	0.00
2002	0.00	0.00
2003	0.00	0.00
2004	0.00	0.00
2005	0.00	0.00

(2) Development Cost

The cost estimates of the required improvements are presented in the preceding section. A breakdown of the project cost on an annual basis is shown in **Table 11.4-7.**

(3) Operating and Maintenance Costs

Operating and Maintenance costs are shown in **Table 11.4-8.** Details are also shown in the preceding section (Section 11.4.2).

(4) Project Financing

100% of the total project cost is assumed to be financed by loans. The district will be exempted from the equity contribution since the project is their initial major improvement. Computation of the loan is shown below.

Total Project Cost (Phase 1)	22.61 million pesos
Capitalized Interest	3.71 million pesos
Total Loan Amount (regular and soft loan)	26.32 million pesos

50% of the loan is assumed to be at regular loan with interest rates of 8.5%, 10.5% and 12.5% for the first 2 million pesos, the next 5 million pesos and the excess of 7 million pesos, respectively.

Remaining 50% of the loan is to be a soft loan with the terms and conditions described in Section 11.1.3.

The details of the project loan's debt service schedule is presented in **Table 11.4-9.**

(5) Projection of Financial Statements

The water district's projected income statement for the period 1994-2005, as presented in **Table 11.4-10,** shows that annual net income are positive except in 1995. Major financial ratios derived from the income statement shows as follows;

a) Operating ratio which measures the ability of revenues to cover operating expenses shows that the operating costs are between 48 - 60% of the operating revenues after the project completion.

b) Return on the average fixed assets, which measures the earning power of the district's facilities, ranges from 10 to 20% after the completion of the project.

The projected cash flow statement for the same period as shown in **Table 11.4-11** indicates the sources and applications of funds. Major highlights from this table are as follows:

TABLE 11.4-7 BREAKDOWN OF PROJECT COST - Naic Water District

Unit: 1000 Pesos

	1995	1996	1997	1998	1999	TOTAL
Basic Construction Cost		4,020	12,060			16,080
Price and Physical Contingencies		603	1,809			2,412
Engineering Studies		1,664				1,664
Construction Supervision		185	555			740
Land Acquisition and Non-engineering Basic Cost		1716				1,716
Total Project Cost	0	8,188	14,424	0		22,612
Less: Paid-in Capital (WD Equity)		0	0	0		0
Soft Loan		0	11,306	0		11,306
Regular Loan Disbursements	0	8,188	3,118	0		11,306
Add: Capitalized Interest	0	859	1,341	1,508	0	3,708
Regular Loan	0	9,047	4,459	1,508	0	15,014
Total Project Loan	0	9,047	15,765	1,508	0	26,320

TABLE 11.4-8a PROJECTED OPERATION & MAINTENANCE COST (UNESCALATED) - Naic Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SALARIES	204	585	585	702	761	819	878	995	1,053	1,170	1,287	1,404
POWER	0	0	0	570.	660	728	800	881	971	1,073	1,179	1,298
CHEMICALS	0	0	0	62	68	75	83	92	101	111	122	135
MISC. & MAINTENANCE	20	56	56	117	129	140	153	166	181	198	217	237
UNESCALATED TOTAL O & M COST	224	641	641	1,452	1,618	1,763	1,914	2,133	2,306	2,552	2,805	3,074

TABLE 11.4-8b PROJECTED OPERATION & MAINTENANCE COST (ESCALATED) - Naic Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SALARIES	204	655	721	951	1,134	1,343	1,583	1,973	2,298	2,809	3,399	4,079
POWER & FUEL	0	0	0	773	984	1,194	1,444	1,748	2,118	2,576	3,114	3,772
CHEMICALS	0	0	0	84	102	124	150	182	220	267	323	392
MISC. & MAINTENANCE	20	62	69	159	192	230	276	330	396	476	572	689
ESCALATED TOTAL O & M COST	224	718	789	1,967	2,411	2,890	3,452	4,233	5,032	6,127	7,408	8,931

Note:
For financial analysis, operation and maintenance cost in 1994 is mainly based on the financial statements of the district although large parts are projected. Therefore, it is not necessarily equal to the costs shown in Table 11.4-3 through 11.4-6.

TABLE 11.4-9 DEBT SERVICE SCHEDULE - Naic Water District

REGULAR LOAN (50%) Unit: 1000 Pesos

First 2 million	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Disbursements	0	1,843	0	0							
Capitalized Interest	0	157	0	0							
Operational Interest					170	168	166	164	161	158	155
Principal					23	25	27	30	32	35	38
Debt Service					193	193	193	193	193	193	193
Loan Outstanding, year-end	0	2,000	2,000	2,000	1,977	1,952	1,924	1,895	1,863	1,828	1,790
Next 5 million											
Disbursements	0	4,525	0								
Capitalized Interest	0	475	0	0							
Operational Interest					525	521	516	510	504	498	490
Principal					42	47	52	57	63	70	77
Debt Service					567	567	567	567	567	567	567
Loan Outstanding, year-end	0	5,000	5,000	5,000	4,958	4,911	4,859	4,802	4,739	4,669	4,592
More than 7 million											
Disbursements	0	1,820	3,118								
Capitalized Interest	0	227	1,341	1,508							
Operational Interest					1,002	996	989	981	972	962	951
Principal					49	55	62	70	79	89	100
Debt Service					1,051	1,051	1,051	1,051	1,051	1,051	1,051
Loan Outstanding, year-end	0	2,047	6,506	8,014	7,965	7,910	7,847	7,777	7,699	7,610	7,510

SOFT LOAN (50%)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Disbursements	0	0	11,306	0							
Capitalized Interest	0	0	0	0							
Operational Interest								1,233	1,233	1,233	1,233
Principal											
Debt Service								1,233	1,233	1,233	1,233
Loan Outstanding, year-end	0	0	11,306	11,306	11,306	11,306	11,306	11,306	11,306	11,306	11,306

DEBT SERVICE SUMMARY	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Disbursements	0	8,188	14,424	0							
Capitalized Interest	0	859	1,341	1,508							
Operational Interest					1,697	1,684	1,670	2,888	2,871	2,852	2,830
Principal					115	127	141	157	174	193	214
Debt Service					1,811	1,811	1,811	3,045	3,045	3,045	3,045
Loan Outstanding, year-end	0	9,047	24,812	26,320	26,205	26,078	25,937	25,780	25,606	25,413	25,199

TABLE 11.4-10 PROJECTED INCOME STATEMENT - Naic Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Water Produced ('000 cum)	172	172	172	444	489	539	593	654	720	794	874	963
Water Sold ('000 cum)	129	129	129	333	365	401	441	486	535	591	653	722
Non-Revenue Water (%)	25%	25%	25%	25%	25%	26%	26%	26%	26%	26%	25%	25%
Average Water Rate (Effective Water Rate) (cum)	(3.00)	6.46 (July)	7.75	9.30	14.14	15.55	17.11	18.82	18.82	20.70	20.70	20.70
Operating Revenue												
Water Revenues	201	611	1,002	3,096	5,161	6,239	7,550	9,143	10,077	12,233	13,510	14,945
Other Operating Revenue	40	18	30	93	155	187	226	274	302	367	405	448
Total Operating Revenue	242	629	1,032	3,189	5,316	6,426	7,776	9,417	10,380	12,600	13,916	15,393
Operating Costs												
Personnel	204	655	721	951	1,134	1,343	1,583	1,973	2,298	2,809	3,399	4,079
Chemicals	0	0	0	84	102	124	150	182	220	267	323	392
Power and Fuel	0	0	0	773	984	1,194	1,444	1,748	2,118	2,576	3,114	3,772
Misc. & Maintenance	20	62	69	159	192	230	276	330	396	476	572	689
Bad Debts	0	15	25	77	129	156	189	229	252	306	338	374
Total Operating Cost	224	733	815	2,045	2,540	3,046	3,641	4,461	5,284	6,433	7,746	9,304
Income Before Depreciation	18	-103	217	1,145	2,776	3,380	4,135	4,956	5,095	6,168	6,170	6,089
Less: Depreciation	0	0	41	225	513	658	658	659	665	676	689	705
Operating Income	18	-103	176	919	2,263	2,722	3,477	4,297	4,430	5,492	5,481	5,384
Add : Non-operating Income												
Less: Interest on Loans	0	0	0	0	0	1,697	1,684	1,670	2,888	2,871	2,852	2,830
NET INCOME (LOSS)	18	-103	176	919	2,263	1,025	1,793	2,626	1,542	2,621	2,630	2,554
Operating Ratio a/	93%	116%	79%	64%	48%	47%	47%	47%	51%	51%	56%	60%
Average Rate Base b/	0	0	1,658	9,015	20,517	26,320	26,320	26,369	26,611	27,038	27,554	28,183
Rate of Return c/	-	-	11%	10%	11%	10%	13%	16%	17%	20%	20%	19%

a/ Total operating cost as a percentage of total revenue
b/ Average net fixed assets in operation
c/ Operating income as a percentage of the average rate base

PROJECTED WATER RATES 1/	Flat rate	(July 1)										
MINIMUM CHARGE (Peso/10 cu.m.)	(30.00)	30.00	36.00	43.20	65.66	72.23	79.45	87.40	87.40	96.14	96.14	96.14
11 - 20 cu.m. (Peso/cu.m.)	-	10.00	12.00	14.40	21.89	24.08	26.48	29.13	29.13	32.05	32.05	32.05
21 - 30 cu.m. (Peso/cu.m.)	-	20.00	24.00	28.80	43.78	48.15	52.97	58.27	58.27	64.09	64.09	64.09
Over 30 cu.m. (Peso/cu.m.)	-	20.00	24.00	28.80	43.78	48.15	52.97	58.27	58.27	64.09	64.09	64.09
Average low income (Rural)	2,018	2,220	2,442	2,686	2,954	3,250	3,575	3,932	4,325	4,758	5,234	5,757
% of income allocated to water	1.49	1.35	1.47	1.61	2.22	2.22	2.22	2.22	2.02	2.02	1.84	1.67
% of increase of minimum charge	-	-	20%	20%	52%	10%	10%	10%	0%	10%	0%	0%

1/ Projected /effective dates of implementation of the projected rates are the first day of January in each year unless otherwise specified. Projected water rates in 1995 come from the interview to the Naic Water District.

TABLE 11.4-11 PROJECTED CASH FLOW TABLE (SOURCES AND USE OF FUNDS) - Naic Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SOURCES OF FUNDS												
Income Before Depreciation	18	-103	217	1,145	2,776	3,380	4,135	4,956	5,095	6,168	6,170	6,089
Add: Non-operating Income	0											
Internal Cash Generation	18	-103	217	1,145	2,776	3,380	4,135	4,956	5,095	6,168	6,170	6,089
Government Contributions			0	0	0							
Loans												
Project Loan (LWUA)	0	0	9,047	15,765	1,508	0	0	0	0	0	0	0
Other Loans	0	0	0	0	0	0	0	0	0	0	0	0
Total Sources	18	-103	9,264	16,909	4,284	3,380	4,135	4,956	5,095	6,168	6,170	6,089
APPLICATION OF FUNDS												
Project	0	0	8,188	14,424	0	0	0	0	0	0	0	0
Capitalized Interest	0	0	859	1,341	1,508	0	0	0	0	0	0	0
Other Capital Expenditures	0	0	0	0	0	0	0	99	385	468	564	695
Total Capital Expenditures	0	0	9,047	15,765	1,508	0	0	99	385	468	564	695
Debt Service												
Interest												
Project Loan	0	0	0	0	0	1,697	1,684	1,670	2,888	2,871	2,852	2,830
Other Loans	0	0	0	0	0	0	0	0	0	0	0	0
Total Interest	0	0	0	0	0	1,697	1,684	1,670	2,888	2,871	2,852	2,830
Amortization												
Project Loan	0	0	0	0	0	115	127	141	157	174	193	214
Other Loans	0	0	0	0	0	0	0	0	0	0	0	0
Total Amortization	0	0	0	0	0	115	127	141	157	174	193	214
Total Debt Service	0	0	0	0	0	1,811	1,811	1,811	3,045	3,045	3,045	3,045
Increase in Working Capital	18	-103	217	1,145	2,776	1,568	2,324	3,045	1,666	2,655	2,561	2,349
Total Applications	18	-103	9,264	16,909	4,284	3,380	4,135	4,956	5,095	6,168	6,170	6,089
Self Financing Ratio a/	-	-	0%	0%	0%	-	-	100%	100%	100%	100%	100%
Average Self-Financing Ratio b/			0%	0%	0%	0%	0%	300%	239%	147%	119%	121%
Debt Service Ratio	-	-	-	-	-	1.87	2.28	2.74	1.67	2.03	2.03	2.00

a/ annual
b/ calculated on three years average

a) Increase in working capital is positive throughout the study period except in 1995.

b) Debt service coverage which shows the ability of the district's internal cash generation to meet its debt services are between 1.7 and 2.7 in 1999 – 2005. These ratios are higher than LWUA's minimum ratio of 1.3.

The projected balance sheet are presented in **Table 11.4-12.** Major points are shown as follows;

a) Cash balance at the end of the study period (2005) is 12.5 million pesos.

b) A total of 7.7 million pesos is accumulated for cash reserves by the year 2005.

c) Current ratios, which measure the ability of the district to meet its short term obligations, increase from 5.2 in 1998 to 8.1 in 2005.

d) Debt/equity ratios which indicate the percentage of the long-term debt in the net worth decrease from 89% in 1998 to 58% in 2005.

(6) Financial Internal Rate of Return

As shown in **Table 11.4-13**, the FIRR is 19.7 percent for the base case. The derived FIRR is well above the water district's weighted average cost of capital at 11.1 percent, which is shown in **Table 11.4-14**.

(7) Sensitivity Analysis

A sensitivity analysis is conducted to determine the effect of variances in the assumptions to the FIRR. The derived FIRR under selected variances to the base case are as follows:

Scenario	FIRR
Base Case	19.7%
1. 20% increase in Investment Cost	16.7%
2. 20% increase in O & M Cost	16.1%
3. 20% decrease in Revenue	12.0%

The computation of the FIRR under the different scenarios is also shown in **Table 11.4-13.** Results of the sensitivity analysis shows that the FIRR is greatly influenced by the decrease of revenue. The derived FIRR, however, are still more than the water district's weighted average cost of capital.

(8) Recommended Water Rates

The recommended water rates are shown below. The rates in 1995 is based on the interview to the water district. The high increase of the rate in 1998 is tallied with the projected year of

TABLE 11.4-12 PROJECTED BALANCE SHEET - Naic Water District

Unit: 1000 Pesos

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
ASSETS												
Current Assets												
Cash	15	-96	37	1,275	3,681	4,585	6,094	8,159	8,868	10,202	11,498	12,460
Accounts Receivable	0	102	167	516	860	1,040	1,259	1,524	1,680	2,039	2,252	2,491
Inventory	3	10	11	41	49	59	71	85	103	124	149	180
Cash Reserves	0	18	48	141	296	920	1,675	2,589	3,597	4,820	6,171	7,666
Other Current Assets	0	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	18	34	263	1,973	4,886	6,604	9,098	12,357	14,247	17,185	20,071	22,798
Fixed Assets in Operation	0	0	3,316	14,715	26,320	26,320	26,320	26,419	26,804	27,272	27,836	28,531
Accumulated Depreciation	0	0	41	267	780	1,438	2,096	2,755	3,420	4,096	4,785	5,490
Net Fixed Assets in Operation	0	0	3,274	14,448	25,540	24,882	24,224	23,664	23,384	23,176	23,051	23,041
Add: Work in Progress	0	0	5,732	10,097	0	0	0	0	0	0	0	0
Total Fixed Assets	0	0	9,006	24,545	25,540	24,882	24,224	23,664	23,384	23,176	23,051	23,041
TOTAL ASSETS	18	34	9,269	26,517	30,426	31,486	33,322	36,021	37,631	40,361	43,122	45,839
LIABILITIES and EQUITY												
Current Liabilities												
Accounts Payable	0	120	132	328	402	482	575	706	839	1,021	1,235	1,489
Customer Deposits	0	0	0	368	433	502	578	662	753	854	964	1,088
Current Maturities	0	0	0	0	115	127	141	157	174	193	214	238
Total Current Liabilities	0	120	132	696	949	1,111	1,295	1,524	1,766	2,068	2,414	2,815
Loans Payable - Long Term Debts	0	0	9,047	24,812	26,205	26,078	25,937	25,780	25,606	25,413	25,199	24,961
Equity												
Government Contribution	0	0	0	0	0	0	0	0	0	0	0	0
Retained Earnings	18	-85	90	1,009	3,272	4,297	6,090	8,717	10,259	12,880	15,510	18,063
Total Equity	18	-85	90	1,009	3,272	4,297	6,090	8,717	10,259	12,880	15,510	18,063
TOTAL LIABILITIES & EQUITY	18	34	9,269	26,517	30,426	31,486	33,322	36,021	37,631	40,361	43,122	45,839
Current Ratio a/	-	0.29	2.00	2.83	5.15	5.94	7.03	8.11	8.07	8.31	8.32	8.10
Debt/Equity Ratio /b	0.0%	0.0%	99.0%	96.1%	88.9%	85.9%	81.0%	74.7%	71.4%	66.4%	61.9%	58.0%

a/ The ratio which total current assets divided by the total current liability

b/ Long-term debt as a percentage of the net worth (total liability and equity minus total current liability)

TABLE 11.4-13 FINANCIAL INTERNAL RATE OF RETURN - Naic Water District

YEAR	(a) Base Case				(b) Investment Cost +20%				(c) O & M Cost +20%				(d) Revenue -20%			
	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net	INCREMENTAL REVENUES	O & M	PROJECT COSTS	Net
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	8,188	-8,188	0	0	9,825	-9,825	0	0	8,188	-8,188	0	0	8,188	-8,188
1997	2,157	1,178	14,424	-13,444	2,157	1,178	17,309	-16,329	2,157	1,413	14,424	-13,680	1,726	1,178	14,424	-13,876
1998	4,284	1,622	0	2,662	4,284	1,622	0	2,662	4,284	1,946	0	2,338	3,427	1,622	0	1,805
1999	5,395	2,101	0	3,294	5,395	2,101	0	3,294	5,395	2,521	0	2,873	4,316	2,101	0	2,215
2000	6,745	2,663	0	4,082	6,745	2,663	0	4,082	6,745	3,195	0	3,549	5,396	2,663	0	2,733
2001	8,386	3,443	99	4,843	8,386	3,443	119	4,823	8,386	4,132	99	4,154	6,708	3,443	99	3,166
2002	9,348	4,243	385	4,720	9,348	4,243	462	4,643	9,348	5,092	385	3,871	7,478	4,243	385	2,850
2003	11,569	5,337	468	5,763	11,569	5,337	562	5,670	11,569	6,405	468	4,696	9,255	5,337	468	3,450
2004	12,884	6,618	564	5,702	12,884	6,618	677	5,589	12,884	7,942	564	4,378	10,307	6,618	564	3,125
2005	14,361	8,141	695	5,525	14,361	8,141	834	5,387	14,361	9,769	695	3,897	11,489	8,141	695	2,653
2006	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2007	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2008	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2009	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2010	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2011	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2012	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2013	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2014	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2015	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2016	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2017	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2018	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2019	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2020	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2021	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2022	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
2023	14,361	8,141	0	6,220	14,361	8,141	0	6,220	14,361	9,769	0	4,592	11,489	8,141	0	3,348
	FIRR =	19.72%			FIRR =	16.74%			FIRR =	16.12%			FIRR =	11.97%		

TABLE 11.4-14 WEIGHTED AVERAGE OF CAPITAL - Naic Water District

Unit: 1000 Pesos

	AMOUNT	%TOTAL PROJECT LOAN	INTEREST RATE	WEIGHTED COST OF CAPITAL
TOTAL PROJECT LOAN	26,320	100.00%		
COMPOSITION OF LOAN				
A. REGULAR LOAN	15,014	57.04%		
FIRST 2 MILLION	2,000	7.60%	8.50%	0.65%
NEXT 5 MILLION	5,000	19.00%	10.50%	1.99%
EXCESS OF 7 MILLION	8,014	30.45%	12.50%	3.81%
B. SOFT LOAN	11,306	42.96%		
FIRST 2 MILLION	2,000	7.60%	8.50%	0.65%
NEXT 5 MILLION	5,000	19.00%	10.50%	1.99%
EXCESS OF 7 MILLION	4,306	16.36%	12.50%	2.04%
PRESCRIBED DISCOUNT RATE FOR FIRR COMPUTATION				11.13%

TABLE 11.4-15 INCREASE IN CONSUMER SATISFACTION - Naic Water District

Unit: 1000 Pesos

YEAR	INCREMENTAL ACCOUNTED FOR WATER	PRICE PER CU.M.	ECONOMIC VALUE PER CU.M.	ECONOMIC WATER REVENUE	PRESENT VALUE DISCOUNT RATE AT 15% FACTOR	VALUE
1994	0	3.00	3.60	0	1.000	0
1995	0	5.77	6.92	0	0.870	0
1996	0	6.29	7.55	0	0.756	0
1997	204	6.86	8.24	1,677	0.658	1,103
1998	236	9.49	11.38	2,684	0.572	1,534
1999	272	9.49	11.38	3,095	0.497	1,539
2000	312	9.49	11.38	3,552	0.432	1,536
2001	357	9.49	11.38	4,059	0.376	1,526
2002	406	8.62	10.35	4,204	0.327	1,374
2003	462	8.62	10.35	4,778	0.284	1,358
2004	523	7.84	9.41	4,924	0.247	1,217
2005	593	7.13	8.55	5,068	0.215	1,089
2006	593	7.13	8.55	5,068	0.187	947
2007	593	7.13	8.55	5,068	0.163	824
2008	593	7.13	8.55	5,068	0.141	716
2009	593	7.13	8.55	5,068	0.123	623
2010	593	7.13	8.55	5,068	0.107	542
2011	593	7.13	8.55	5,068	0.093	471
2012	593	7.13	8.55	5,068	0.081	410
2013	593	7.13	8.55	5,068	0.070	356
2014	593	7.13	8.55	5,068	0.061	310
2015	593	7.13	8.55	5,068	0.053	269
2016	593	7.13	8.55	5,068	0.046	234
2017	593	7.13	8.55	5,068	0.040	204
2018	593	7.13	8.55	5,068	0.035	177
2019	593	7.13	8.55	5,068	0.030	154
2020	593	7.13	8.55	5,068	0.026	134
2021	593	7.13	8.55	5,068	0.023	116
2022	593	7.13	8.55	5,068	0.020	101
2023	593	7.13	8.55	5,068	0.017	88
TOTAL INCREASE IN CONSUMER SATISFACTION				125,272		18,952

1/ The 1996 volume of cu.m. is deducted from the water demand projections annually throughout the study period for the incremental volume.

2/ Price per cu.m. was based on the de-escalated average rate per cu.m. of water.

3/ Economic value per cu.m. was assumed to be 1.2 times the price per cu.m. of water.

implementation although an annual increase up to 2003 is also proposed. The details are also presented in **Table 11.4-10.**

	Minimum	11-20m^3	21-30m^3	Over 31m^3
1995	30.00	10.00	20.00	20.00
1996	36.00	12.00	24.00	24.00
1998	65.66	21.89	43.78	43.78
2000	79.45	26.48	52.97	52.97
2002	87.40	29.13	58.27	58.27
2005	96.14	32.05	64.09	64.09

These recommended water rates are subject to the following criteria:

a) Minimum charge (First 10 m^3) must not exceed 5% of the average family income of the low income group

b) Any increase must be limited to 60% of the prevailing rates.

As can be seen in **Table 11.4-10,** the recommended rates for the first 10 m^3 do not exceed 5% of the average income of the low income group. Also, all rate increases are within the maximum limit of 60%.

(9) Concluding Remarks of Financial Analysis

The proposed development program for Naic Water District is financially viable. However, it must be emphasized that the following conditions should be fulfilled.

a) Water rates as discussed above should be adopted and attained.

b) The project should be implemented in 1996 and completed by the end of 1997.

c) The targeted number of service connections should be attained because the FIRR is the most sensitive in the revenue reduction.

11.4.4 Economic Analysis

(1) Project Benefits

Consumer Satisfaction

Under the assumption described in Section 11.1.4, the present economic value of water at 15% discount rate is 19.0 million pesos as shown in **Table 11.4-15.**

Health Benefits

Morbidity rate of water-borne disease in NAIC is 859 out of 100,000 according to the Municipal Socio-economic Profile. When 125 pesos per day and 8 days per patient were lost by illness, the present economic value of health benefits at 15% discount rate is 0.09 million pesos as shown in **Table 11.4-16**.

Fire Protection

Under the assumption described in Section 11.1.4, the present economic value of fire protection at 15% discount rate is 17.8 million pesos as shown in **Table 11.4-17**.

(2) Project Costs

The detail of the conversion of financial project cost to economic cost is shown in **Table 11.4-18**. Further, incremental economic operation and maintenance cost is shown in **Table 11.4-19**. The summary of economic costs including the total replacement cost of 4.6 million pesos are shown in **Table 11.4-20**.

(3) Economic Benefits and Costs Analysis

The summary of quantifiable economic benefits and economic costs for the project is shown below expressed as net present values of a 15% discount rate. Benefit cost ratio (BCR) obtained is 1.49. Salvage value is shown in **Table 11.4-22**.

Increase in Consumer Satisfaction	18.95 million pesos
Health Benefits	0.09 million pesos
Reduction in Fire Damage	17.84 million pesos
Total Benefits (Salvage value is not included.)	36.88 million pesos
Total Project Costs	24.79 million pesos
Benefit Cost ratio (BCR):	1.49

(4) Economic Internal Rate of Return

The results of EIRR are summarized below. EIRR for base case is estimated at 26.0%. Details are shown in **Table 11.4-21**. A sensitivity analysis is conducted to determine the effect of variances in the assumptions to the EIRR. The derived EIRR under selected variances to the base case are as follows:

Scenario	EIRR
Base Case	26.0%
1. 20% increase in Investment Cost	21.9%
2. 20% increase in O & M Cost	24.7%

TABLE 11.4-16 HEALTH BENEFITS - Naic Water Distict

Unit: 1000 Pesos

YEAR	SERVED POPULATION	COST OF TIME DUE TO ILLNESS	ECONOMIC LOSS DUE TO PREMA-TURE DEATH	COST OF MEDICAL EXPENSES	TOTAL ECONOMIC LOSSES	20% REDUCTION DUE TO PROJECT (Benefit)	PRESENT VALUE DISCOUNT RATE AT 15% FACTOR	VALUE
1994	2,950	0	0	0	0	0	0.000	0
1995	2,950	0	0	0	0	0	0.000	0
1996	2,950	0	0	0	0	0	0.756	0
1997	6,376	0	0	0	0	0	0.658	0
1998	7,002	39	0	60	99	20	0.572	11
1999	7,617	39	0	60	99	20	0.497	10
2000	8,310	39	0	60	99	20	0.432	9
2001	9,069	39	0	60	99	20	0.376	7
2002	9,899	39	0	60	99	20	0.327	6
2003	10,816	39	0	60	99	20	0.284	6
2004	11,821	39	0	60	99	20	0.247	5
2005	12,946	39	0	60	99	20	0.215	4
2006	12,946	39	0	60	99	20	0.187	4
2007	12,946	39	0	60	99	20	0.163	3
2008	12,946	39	0	60	99	20	0.141	3
2009	12,946	39	0	60	99	20	0.123	2
2010	12,946	39	0	60	99	20	0.107	2
2011	12,946	39	0	60	99	20	0.093	2
2012	12,946	39	0	60	99	20	0.081	2
2013	12,946	39	0	60	99	20	0.070	1
2014	12,946	39	0	60	99	20	0.061	1
2015	12,946	39	0	60	99	20	0.053	1
2016	12,946	39	0	60	99	20	0.046	1
2017	12,946	39	0	60	99	20	0.040	1
2018	12,946	39	0	60	99	20	0.035	1
2019	12,946	39	0	60	99	20	0.030	1
2020	12,946	39	0	60	99	20	0.026	1
2021	12,946	39	0	60	99	20	0.023	0
2022	12,946	39	0	60	99	20	0.020	0
2023	12,946	39	0	60	99	20	0.017	0
TOTAL HEALTH BENEFIT						516		85

1/ "Cost of Time due to Illness" was computed based on the following formula:
65% x Morbidity Rate x SERVED POP. x 8 days x P125.00

2/ Economic Loss due to Premature Death" was computed based on the following formula:
65% x Mortality Rate x SERVED POP. x P150,000

3/ Cost of Medical Expenses" was computed based on the following formula:
65% x Morbidity Rate x SERVED POP. x P1,000

4/ Morbidity Rate (per 100,000): 859 Ave. Medical Expense : P 1,000.00
Mortality Rate (per 100,000): Nil Weighted Ave. Wage Rate: P 125.00
% of Economic Active Population : 65%

TABLE 11.4-17 REDUCTION IN FIRE DAMAGE - Naic Water District

Unit: 1000 Pesos

YEAR	POPULATION IN THE SER. AREA	NO. OF STRUC-TURES	TOTAL VALUE	0.75% OVERALL REDUCTION IN FIRE DAMAGE	PER-CENTAGE PROTEC-TION	NET REDUCTION IN FIRE DAMAGE (Benefit)	PRESENT VALUE DISCOUNT RATE AT 15% FACTOR	VALUE
1994	6,910	1,329	265,769	1,993	0.00%	0	0.000	0
1995	8,313	1,599	319,720	2,398	0.00%	0	0.000	0
1996	10,000	1,923	384,624	2,885	0.00%	0	0.756	0
1997	12,030	2,314	462,702	3,470	0.00%	0	0.658	0
1998	14,488	2,786	557,231	4,179	100.00%	4,179	0.572	2,389
1999	14,488	2,786	557,231	4,179	100.00%	4,179	0.497	2,078
2000	14,488	2,786	557,231	4,179	100.00%	4,179	0.432	1,807
2001	14,488	2,786	557,231	4,179	100.00%	4,179	0.376	1,571
2002	14,488	2,786	557,231	4,179	100.00%	4,179	0.327	1,366
2003	14,488	2,786	557,231	4,179	100.00%	4,179	0.284	1,188
2004	14,488	2,786	557,231	4,179	100.00%	4,179	0.247	1,033
2005	14,488	2,786	557,231	4,179	100.00%	4,179	0.215	898
2006	14,488	2,786	557,231	4,179	100.00%	4,179	0.187	781
2007	14,488	2,786	557,231	4,179	100.00%	4,179	0.163	679
2008	14,488	2,786	557,231	4,179	100.00%	4,179	0.141	591
2009	14,488	2,786	557,231	4,179	100.00%	4,179	0.123	514
2010	14,488	2,786	557,231	4,179	100.00%	4,179	0.107	447
2011	14,488	2,786	557,231	4,179	100.00%	4,179	0.093	388
2012	14,488	2,786	557,231	4,179	100.00%	4,179	0.081	338
2013	14,488	2,786	557,231	4,179	100.00%	4,179	0.070	294
2014	14,488	2,786	557,231	4,179	100.00%	4,179	0.061	255
2015	14,488	2,786	557,231	4,179	100.00%	4,179	0.053	222
2016	14,488	2,786	557,231	4,179	100.00%	4,179	0.046	193
2017	14,488	2,786	557,231	4,179	100.00%	4,179	0.040	168
2018	14,488	2,786	557,231	4,179	100.00%	4,179	0.035	146
2019	14,488	2,786	557,231	4,179	100.00%	4,179	0.030	127
2020	14,488	2,786	557,231	4,179	100.00%	4,179	0.026	110
2021	14,488	2,786	557,231	4,179	100.00%	4,179	0.023	96
2022	14,488	2,786	557,231	4,179	100.00%	4,179	0.020	83
2023	14,488	2,786	557,231	4,179	100.00%	4,179	0.017	73
TOTAL REDUCTION IN FIRE DAMAGE						108,660		17,836

1/ Population in the service area was derived from the Population and Demand projections.
2/ The number of structures was estimated by dividing the service area population by the average number of persons per dwelling unit of 5.2.
3/ The total value is estimated by multiplying the number of structures with the average replacement value of dwelling units in GMA of 200,000 pesos.
4/ Percentage fire protection was based on the area to be served by fire hydrants.

TABLE 11.4-18 CONVERSION OF FINANCIAL PROJECT COST TO ECONOMIC COST - Naic Water District

Unit: 1000 Pesos

	FINANCIAL PROJECT COST	FOREIGN EXCHANGE COMPONENT	DOMESTIC COMPONENT	UNSKILLED LABOR	BALANCE	TAXES (5%)	OTHERS (95%)	SHADOW PRICING FOREX COMPONENT X 1.2	SHADOW PRICING UNSKILLED LABOR X .6	SHADOW PRICING OTHERS X 1.0	TOTAL ECONOMIC COST
CIVIL WORKS											
DEEPWELL CONSTRUCTION	840	195	645	105	540	27	513	234	63	513	810
PUMP STATION	1,050	180	870	150	720	36	684	216	90	684	990
DISTRIBUTION FACILITIES	2,823	882	1,941	235	1,705	85	1,620	1,059	141	1,620	2,820
TREATMENT FACILITIES	42	4	38	3	36	2	34	5	2	34	40
SERVICE CONNECTIONS	345	28	317	110	207	10	196	33	66	196	296
VALVES/HYDRANTS	137	9	129	44	85	4	81	10	26	81	117
STORAGE FACILITIES	3,492	797	2,695	304	2,391	120	2,272	957	182	2,272	3,411
TOTAL CIVIL WORKS	8,729	2,094	6,635	951	5,684	284	5,400	2,513	570	5,400	8,483
EQUIPMENTS											
DEEPWELL CONSTRUCTION	660	240	420	0	420	21	399	288	0	399	687
PUMP STATION	1,950	1,710	240	0	240	12	228	2,052	0	228	2,280
DISTRIBUTION FACILITIES	3,058	1,353	1,705	0	1,705	85	1,620	1,623	0	1,620	3,243
TREATMENT FACILITIES	54	37	17	0	17	1	16	44	0	16	60
SERVICE CONNECTIONS	1,034	1,006	28	0	28	1	26	1,207	0	26	1,233
VALVES/HYDRANTS	292	247	45	0	45	2	43	296	0	43	340
STORAGE FACILITIES	304	152	152	0	152	8	144	182	0	144	326
TOTAL EQUIPMENTS	7,351	4,744	2,608	0	2,608	130	2,477	5,692	0	2,477	8,169
BASIC CONSTRUCTION COST	16,080	6,838	9,242	951	8,292	415	7,877	8,205	570	7,877	16,653
CONTINGENCY	2,412	1,026	1,386	143	1,244	62	1,182	1,231	86	1,182	2,498
ENGINEERING STUDIES	1,664	708	957	98	858	43	815	849	59	815	1,724
CONSTRUCTION SUPERVISION	740	315	425	44	381	19	362	377	26	362	766
LAND ACQUISITION & OTHERS	1,716	564	1,152	63	1,089	54	1,034	677	38	1,034	1,749
TOTAL PROJECT COST	22,612	9,450	13,162	1,298	11,864	593	11,271	11,340	779	11,271	23,389

TABLE 11.4-19 INCREMENTAL ECONOMIC OPERATION AND MAINTENANCE COST - Naic Water District

Unit: 1000 Pesos

YEAR	O & M COST (Unescalated)	FOREIGN EXCHANGE COMPONENT	DOMESTIC COMPONENT	TAXES (5%)	OTHERS (95%)	SHADOW PRICING FOREX COMPONENT (X 1.2)	SHADOW PRICING OTHERS (X 1.0)	TOTAL ECONOMIC O & M COST	NET ECONOMIC O & M COST
1994	224	54	170	9	162	65	162	226	0
1995	641	154	487	24	463	185	463	647	0
1996	641	154	487	24	463	185	463	647	0
1997	1,452	348	1,104	55	1,048	418	1,048	1,467	819
1998	1,618	388	1,230	61	1,168	466	1,168	1,634	987
1999	1,763	423	1,340	67	1,273	508	1,273	1,781	1,133
2000	1,914	459	1,455	73	1,382	551	1,382	1,933	1,286
2001	2,133	512	1,621	81	1,540	614	1,540	2,154	1,507
2002	2,305	553	1,752	88	1,664	664	1,664	2,328	1,681
2003	2,552	612	1,940	97	1,843	735	1,843	2,578	1,930
2004	2,805	673	2,132	107	2,025	808	2,025	2,833	2,186
2005	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2006	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2007	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2008	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2009	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2010	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2011	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2012	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2013	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2014	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2015	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2016	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2017	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2018	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2019	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2020	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2021	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2022	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
2023	3,074	738	2,336	117	2,219	885	2,219	3,105	2,457
TOTAL ECONOMIC OPERATION AND MAINTENANCE COST									58,217

TABLE 11.4-20 SUMMARY OF ECONOMIC COSTS - Naic Water District

Unit: 1000 Pesos

YEAR	ECONOMIC PROJECT COST	REPLACE-MENT COST 1/	NET O & M COST	TOTAL ECONOMIC COST	PRESENT VALUE AT 15%	
					FACTOR	VALUE
1994			0	0	0.000	0
1995			0	0	0.000	0
1996	8,452		0	8,452	0.756	6,391
1997	14,938		819	15,757	0.658	10,360
1998			987	987	0.572	564
1999			1,133	1,133	0.497	563
2000			1,286	1,286	0.432	556
2001			1,507	1,507	0.376	567
2002			1,681	1,681	0.327	549
2003			1,930	1,930	0.284	549
2004			2,186	2,186	0.247	540
2005			2,457	2,457	0.215	528
2006			2,457	2,457	0.187	459
2007			2,457	2,457	0.163	399
2008			2,457	2,457	0.141	347
2009			2,457	2,457	0.123	302
2010			2,457	2,457	0.107	263
2011		1,150	2,457	3,607	0.093	335
2012		3,450	2,457	5,907	0.081	477
2013			2,457	2,457	0.070	173
2014			2,457	2,457	0.061	150
2015			2,457	2,457	0.053	131
2016			2,457	2,457	0.046	114
2017			2,457	2,457	0.040	99
2018			2,457	2,457	0.035	86
2019			2,457	2,457	0.030	75
2020			2,457	2,457	0.026	65
2021			2,457	2,457	0.023	56
2022			2,457	2,457	0.020	49
2023			2,457	2,457	0.017	43
TOTAL	23,389	4,600	58,217	86,206		24,790

1/ (a) Deep well: 172 (2011) & 515 (2012): (b) Pump station: 570 (2011) & 1,710 (2012)
(c) Treatment facilities: 15 (2011) & 45 (2012): (d) Service facilities: 308 (2011) & 925 (2012)
(e) Valves/hydrants: 85 (2011) & 255 (2012)

TABLE 11.4-21 ECONOMIC INTERNAL RATE OF RETURN - Naic Water District

Unit: 1000 Pesos

YEAR	TOTAL ECONOMIC BENEFITS	TOTAL ECONOMIC COSTS	NET BENEFIT	PRESENT VALUE AT 15%	
				FACTOR	VALUE
1994	0	0	0	0.000	0
1995	0	0	0	0.000	0
1996	0	8,452	-8,452	0.756	-6,391
1997	1,677	15,757	-14,079	0.658	-9,257
1998	6,883	987	5,896	0.572	3,371
1999	7,294	1,133	6,161	0.497	3,063
2000	7,751	1,286	6,465	0.432	2,795
2001	8,258	1,507	6,751	0.376	2,538
2002	8,403	1,681	6,722	0.327	2,197
2003	8,977	1,930	7,047	0.284	2,003
2004	9,123	2,186	6,937	0.247	1,715
2005	9,267	2,457	6,810	0.215	1,464
2006	9,267	2,457	6,810	0.187	1,273
2007	9,267	2,457	6,810	0.163	1,107
2008	9,267	2,457	6,810	0.141	962
2009	9,267	2,457	6,810	0.123	837
2010	9,267	2,457	6,810	0.107	728
2011	9,267	3,607	5,660	0.093	526
2012	9,267	5,907	3,360	0.081	272
2013	9,267	2,457	6,810	0.070	479
2014	9,267	2,457	6,810	0.061	416
2015	9,267	2,457	6,810	0.053	362
2016	9,267	2,457	6,810	0.046	315
2017	9,267	2,457	6,810	0.040	274
2018	9,267	2,457	6,810	0.035	238
2019	9,267	2,457	6,810	0.030	207
2020	9,267	2,457	6,810	0.026	180
2021	9,267	2,457	6,810	0.023	156
2022	9,267	2,457	6,810	0.020	136
2023	16,141	2,457	13,684	0.017	238
TOTAL	241,322	86,206	155,115		12,202

(Salvage value is added in 2023.)

ECONOMIC INTERNAL RATE OF RETURN = 25.99%

EIRR OF OTHER CASES (SENSITIVITY ANALYSIS)

Investment Cost: 20% increase =	21.86%
O & M Cost: 20% increase =	24.67%
Revenue: 20% decrease =	19.55%

BENEFIT COST RATIO at 15% discount rate = 1.49

TABLE 11.4-22 SALVAGE VALUE IN YEAR 2023 - Naic Water District

Unit: 1000 Pesos

YEAR	50 - YEAR ITEMS ECONOMIC VALUE	50 - YEAR ITEMS REMAINING LIFE IN 2023	50 - YEAR ITEMS SALVAGE VALUE	30 - YEAR ITEMS ECONOMIC VALUE	30 - YEAR ITEMS REMAINING LIFE IN 2023	30 - YEAR ITEMS SALVAGE VALUE	15 - YEAR ITEMS ECONOMIC VALUE	15 - YEAR ITEMS REMAINING LIFE IN 2023	15 - YEAR ITEMS SALVAGE VALUE	TOTAL SALVAGE VALUE
1994										
1995										
1996	2,563	46.00%	1,179	450	10.00%	45				1,224
1997	7,690	48.00%	3,691	1,350	13.33%	180				3,871
1998		50.00%			16.67%					0
1999		52.00%			20.00%					0
2000		54.00%			23.33%					0
2001		56.00%			26.67%					0
2002		58.00%			30.00%					0
2003		60.00%			33.33%					0
2004		62.00%			36.67%					0
2005		64.00%			40.00%					0
2006		66.00%			43.33%					0
2007		68.00%			46.67%					0
2008		70.00%			50.00%					0
2009		72.00%			53.33%					0
2010		74.00%			56.67%					0
2011		76.00%			60.00%					0
2012		78.00%			63.33%		1,150	26.67%	307	307
2013		80.00%			66.67%		3,450	33.33%	1,150	1,150
2014		82.00%			70.00%			40.00%		0
2015		84.00%			73.33%			46.67%		0
2016		86.00%			76.67%			53.33%		0
2017		88.00%			80.00%			60.00%		0
2018		90.00%			83.33%			66.67%		0
2019		92.00%			86.67%			73.33%		0
2020		94.00%			90.00%			80.00%		0
2021		96.00%			93.33%			86.67%		0
2022		98.00%			96.67%			93.33%		0
2023		100.00%			100.00%			100.00%		0
SALVAGE VALUE			4,870			225			1,457	6,552
ADD: LAND										322
TOTAL SALVAGE VALUE										6,874

3. 20% decrease in Revenue 19.6%

For all the scenarios, the EIRR exceed the opportunity cost of capital of 15%.

(5) Concluding Remarks of Economic Analysis

From the results of the preceding analysis, the proposed project for Naic Water District is considered economically feasible.

11.5 PROJECT FOR TAGAYTAY CITY

11.5.1 Estimation of the Construction Cost and Construction Period

(1) Construction Cost

The basic construction costs of the recommended plan for the Tagaytay City water supply facilities totals P52.28 million.

A summary of the estimated project cost is presented in **Table 11.5-1** and the detailed breakdown is shown in **Table 11.5-2**.

(2) Construction Period

In accordance with the facilities requirement as described in Section 10.5.6, the construction period is presented in **Fig. 11.5-1**.

11.5.2 Organization and Cost for Operation and Maintenance of the Water Supply System

(1) Organization

The TC-WD presently has 47 regular employees headed by the general manager. This number will be adequate for the years up to 2005 based on the LWUA's Methodology Manual.

Based on the number of service connection described in Section 10.5.4, the number of personnel for the TC-WD from the year 1995 up to 2005 should be as follows:

Design year	No. of Connection	No. of Employee
1995	3,000	47
1996	3,159	47
1997	3,325	47
1998	3,774	38
1999	3,927	39

TABLE 11.5-1

COST ESTIMATES (P X 1000)
(March 1994 Price Level)

TAGAYTAY CITY WATER DISTRICT

			LOCAL COMPONENT				FOREIGN EXCHANGE COMPONENT		
				LABOR					
	FACILITIES	TOTAL COST	MATERIAL	SKILLED	UNSKILLED	TOTAL	DIRECT	INDIRECT	TOTAL
1)	BOOSTER PUMPING STATION								
	- Equipment	4,675.4	1,058.6	-	-	1,058.6	3,528.6	88.2	3,616.8
	- Civil Works	4,146.1	2,205.4	1,058.6	617.5	3,881.5	-	264.6	264.6
	- Total	8,821.6	3,264.0	1,058.6	617.5	4,940.1	3,528.6	352.9	3,881.5
2)	DISTRIBUTION FACILITIES								
	- Equipment	7,239.7	3,759.1	278.5	-	4,037.5	-	3,202.2	3,202.2
	- Civil Works	6,682.8	3,063.0	974.6	556.9	4,594.4	-	2,088.4	2,088.4
	- Total	13,922.5	6,822.0	1,253.0	556.9	8,632.0	-	5,290.6	5,290.6
3)	TRANSMISSION FACILITIES								
	- Equipment	6,044.2	3,138.3	232.5	-	3,370.8	-	2,673.4	2,673.4
	- Civil Works	5,579.3	2,557.2	813.6	464.9	3,835.7	-	1,743.5	1,743.5
	- Total	11,623.5	5,695.5	1,046.1	464.9	7,206.5	-	4,416.9	4,416.9
4)	SERVICE CONNECTIONS								
	- Equipment	437.8	11.7	-	-	11.7	414.4	11.7	426.1
	- Civil Works	145.9	64.2	23.3	46.7	134.3	-	11.7	11.7
	- Total	583.7	75.9	23.3	46.7	145.9	414.4	23.3	437.8
5)	VALVES/HYDRANTS								
	- Equipment	1,420.7	220.2	0.0	0.0	220.2	1,120.1	80.4	1,200.5
	- Civil Works	590.3	298.6	85.5	165.9	550.0	0.0	40.2	40.2
	- Total	2,011.0	518.8	85.5	165.9	770.2	1,120.1	120.7	1,240.8
6)	STORAGE FACILITY								
	- Equipment	7,987.5	213.0	-	-	213.0	7,561.5	213.0	7,774.5
	- Civil Works	2,662.5	1,171.5	426.0	852.0	2,449.5	-	213.0	213.0
	- Total	10,650.0	1,384.5	426.0	852.0	2,662.5	7,561.5	426.0	7,987.5
7)	PAVEMENT DEMOLITION/RESTORATION								
	- Equipment	225.6	146.0	-	-	146.0	-	79.6	79.6
	- Civil Works	438.0	298.6	53.1	33.2	384.9	-	53.1	53.1
	- Total	663.6	444.6	53.1	33.2	530.9	-	132.7	132.7
8)	PLUMBING TOOLS & OFFICE EQUIPMENT								
	- Equipment	-	-	-	-	-	-	-	-
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	-	-	-	-	-	-	-	-
9)	LAND ACQUISITION								
	- Equipment	4,000.0	1,280.0	-	-	1,280.0	1,800.0	920.0	2,720.0
	- Civil Works	-	-	-	-	-	-	-	-
	- Total	4,000.0	1,280.0	-	-	1,280.0	1,800.0	920.0	2,720.0
	TOTAL CONSTRUCTION COST								
	- Equipment	32,030.9	9,826.0	510.9	0.0	10,337.8	14,424.7	7,268.5	21,693.2
	- Civil Works	20,244.9	9,658.5	3,434.7	2,737.2	15,830.4	0.0	4,414.5	4,414.5
	- Total	52,275.9	19,485.3	3,945.7	2,737.2	26,168.1	14,424.7	11,683.1	26,107.7

TABLE 11.5-2
BREAKDOWN OF COST ESTIMATES
Tagaytay City Water District

A. ENGINEERING BASIC COST ITEM

1.	**Pipelines**							
	1) Transmission						P	11,623,468.00
	a)	2710 m.	300 mm Steel Pipe Sch. 20 @ P	Lump Sum	P	6,010,968.00		
	b)	340 m.	300 mm Steel Pipe Sch. 40 @ P	Lump Sum		1,200,000.00		
	c)	592 m.	300 mm Steel Pipe Sch. 60 @ P	Lump Sum		2,850,000.00		
	d)	1 set	Pressure Protection Device	Lump Sum		1,562,500.00		
	2) Distribution							13,922,540.00
	d)	2382 m.	250 mm PVC Pipes C-100 @ P	2,030.00 /m		4,835,460.00		
	e)	1201 m.	200 mm PVC Pipes C-100 @ P	1,490.00 /m		1,789,490.00		
	f)	6629 m.	150 mm PVC Pipes C-100 @ P	520.00 /m		3,447,080.00		
	g)	4849 m.	100 mm PVC Pipes C-100 @ P	310.00 /m		1,503,190.00		
	h)	6863 m.	75 mm PVC Pipes C-100 @ P	240.00 /m		1,647,120.00		
	i)	3501 m.	50 mm PVC Pipes C-100 @ P	200.00 /m		700,200.00		
2.	Appurtenances							2,011,000.00
	a)	20 pcs.	Gate Valves (Various Sizes)	8,000.00 /pcs		160,000.00		
	b)	10 sets	Valves for Transmission Lines	Lump Sum		1,750,000.00		
	c)	5 units	Fire Hydrant/Blow-off Valves	20,200.00 /unit		101,000.00		
3.	Pumping Station							8,821,588.00
			3 Multi-stage Turbine Pump	34,312.50 /Hp		1,372,500.00		
	375 HP		3 Turbine Pump	64,875.00 /Hp		1,297,500.00		
	7.5 Hp		1 Centrifugal Pump			301,588.00		
			Power Connections	Lump Sum		500,000.00		
	1		20 sq. m. Pumphouse	7,500.00 /sq.m.		150,000.00		
	500 KVA		1 Generator Set	Lump Sum		5,200,000.00		
4.	Reservoir							10,650,000.00
	300 cum		1 Elevated Steel Tank	13,000.00 /cum		3,900,000.00		
	250		1 Concrete Ground Reservoir	10,000.00 /cum		2,500,000.00		
	100		2 Concrete Ground Reservoir	10,000.00 /cum		2,000,000.00		
	50		3 Concrete Ground Reservoir	10,000.00 /cum		1,500,000.00		
	25		1 Concrete Ground Reservoir	10,000.00 /cum		250,000.00		
	1 unit		Reservoir Rehabilitation	Lump Sum		500,000.00		
5.	Service Connection							
	449			1,300.00 /s.c		583,700.00		583,700.00
				Sub-Total A			P	47,612,296.00

B. NON-ENGINEERING BASIC COST ITEM

Land Acquisition	2,000 sq.m.	2,000.00 /sq.m.		4,000,000.00
Demolition	1,418 sq.m	200.00 /sq.m.		283,600.00
Restoration	100 cum	3,800.00 /cum		380,000.00
		Sub-Total B	P	4,663,600.00
		TOTAL PROJECT COST ----------	P	52,275,896.00
			SAY P	52.28 MILLION

FIG. 11.5-1 CONSTRUCTION PERIOD FOR TAGAYTAY