d) Disinfection facilities

NaClO generation equipment
- capacity : 36 kg Cl2/day x 2 sets
- storage tank : 2.7 m^3 x 2 tanks
- feeding pump : 1.9 l/min x 3 sets with constant feeding device

e) Clear water reservoir
- volume : 588 m^3
- detention time : 1 hr

(3) Transmission facilities

Transmission pump : 4.8 m^3/min x 20 m x 30 kw x 3 sets

Transmission pipe : 500 m/m x 5,000 m
350 m/m x 1,900 m

(4) Distribution facilities

Manohara (A) reservoir
- capacity : 6,300 m^3/day
- volume : 1,850 m^3
- detention time : 7 hr
- distribution pump : 8.8 m^3/min x 20 m x 45 kw x 3 sets
- booster pump : 2.5 m^3/min x 10 m x 7.5 kw x 3 sets

Manohara (B) reservoir
- capacity : 6,300 m^3/day
- volume : 1,850 m^3
- detention time : 7 hr
- distribution pump : 8.8 m^3/min x 20 m x 45 kw x 3 sets
- booster pump : 2.5 m^3/min x 10 m x 7.5 kw x 3 sets

3.2.9 Balkhu system

The water supply area is the southwest part of the city of Kathmandu. A conventional water treatment plant should be constructed for the surface water abstracted at W802 in the Balkhu Khola through a new run-off-river intake. The treated water should be sent into two new water distribution reservoirs of 1,850 m^3, each of which serves 6,300 m^3/day by gravity flow and the same quantity from the other reservoir by booster pump.

Contents of the facilities for the system are shown as follows:

(1) Intake facility

Run-off-river intake on the Balkhu Khola (W802)
- Capacity : 14,300 m^3/day
- Intake pipe : 400 m/m
- Grit chamber
  - volume : 130 m^3/basin x 2 basins
  - detention time : 13 min

Intake pump : 5 m^3/min x 10 m x 15 kw x 3 sets
Conveyance pipe : 400 m/m x 20 m

(2) Water treatment plant

a) Coagulo-sedimentation basin

Capacity : 13,000 m^3/day

Receiving well and mixing basin
volume : 34 m^3/basin x 1 basin
detention time : 3.8 min
mixing type : fall gravity type

Flocculation basin
volume : 145 m^3/basin x 2 basins
detention time : 32 min
type : vertical baffling type

Sedimentation basin
volume : 813 m^3/basin x 2 basins
detention time : 3 hr
flow rate : 0.38 m/min
type : plane-shape of latitudinal-flow type

Sludge removal equipment
type : hopper type
number of hopper : 15 pits/basin
volume : 4.4 m^3/pit
sludge valve : 300 m/m

c) Rapid sand filter

Capacity : 13,000 m^3/day
Rapid sand filter
filtration area : 17.4 m^2/basin x 6 basins
filtration rate : max 150 m/day
type : self-washing type (by valve)

Raw water distribution equipment
: 0.9 m wide square weir and 250 m/m valve

Backwashing equipment
backwashing rate : 0.6 m/min x 8 min
drainage device : 450 m/m x 450 m/m gate
make-up pump : 3.5 m^3/min x 7 m x 7.5 kw x 1 set
3.5 m^3/min x 20 m x 11 kw x 1 set
drain trough : l= 3.2 m, 3 sets/basin

Surface washing equipment
type : fixed type
surface washing rate : 0.2 m/min x 5 min
surface washing pump : 3.5 m^3/min x 20 m x 11 kw x 2 sets
surface washing pipe : 200 m/m
surface washing valve : 200 m/m

Filter control equipment : 1.5 m wide square weir 5 sets

Filter layer (silica sand)
effective diameter : 0.6 m/m
uniformity coefficient : 1.8
depth of layer : 0.6 m

Supporting layer (gravel)
grain size : 2 - 20 m/m
depth of layer : 0.2 m

Underdrain System
type : porous block type

c) Chemical feeding facilities

PAC (Poly aluminum chloride)

solution tank	: 0.5 x 2 tanks
transport pump	: 20 l/min x 2 sets
storage tank	: 0.8 x 2 tanks
feeding pump	: 0.36 l/min x 3 sets with constant feeding device

Ca(OH)2

solution tank	: 0.6 x 2 tanks
transport pump	: 30 l/min x 2 sets
storage tank	: 0.7 x 2 tanks
feeding pump	: 0.45 l/min x 3 sets with constant feeding device

d) Disinfection facilities

NaClO generation equipment

capacity	: 36 kg Cl2/day x 2 sets
storage tank	: 2.7 x 2 tanks
feeding pump	: 1.9 l/min x 3 sets with constant feeding device

e) Clear water reservoir

volume	: 588
detention time	: 1 hr

(3) Transmission facilities

Transmission pump	: 4.8 /min x 40 m x 45 kw x 3 sets
Transmission pipe	: 350 m/m x 1,800 m 250 m/m x 2,300 m

(4) Distribution facilities

Balkhu (A) reservoir

capacity	: 6,300 /day
volume	: 1,850
detention time	: 7 hr

Balkhu (B) reservoir

capacity	: 6,300 /day
volume	: 1,850
detention time	: 7 hr
distribution pump	: 8.8 /min x 20 m x 45 kw x 3 sets
booster pump	: 2.5 /min x 10 m x 7.5 kw x 3 sets

3.3 Optimum Implementation Plan

For implementing the systems of water supply facilities described in section 3.2, the following implementation order by schemes is recommendable so that the increasing water supply amount by implementing the schemes shall be in balanced with the planned water supply amount up to the year 2001 without any reduction or disturbance to the water supply amount by existing water supply facilities.

Order	Name of Scheme	Systems included
1st	Mahankal Chaur scheme	Mahankal Chaur
2nd	Bansbari - Maharajganj scheme	Bansbari, Maharajganj
3rd	Shaibhu scheme	Shaibhu
4th	Balaju - Lambagar scheme	Balaju, Lambagar
5th	Sundarijal scheme	Sundarijal
6th	Manohara scheme	Manohara
7th	Balkhu scheme	Balkhu

The above optimum implementation order was decided as the results of comparative examination of possible implementation plans based on the following basic concepts.

(1) Quality Improvement :

Improvement of a scheme which use groundwater, causing problems in terms of both water quality and quantity, shall in principle take precedence of all other schemes. Following schemes are classified into this category:

a) Mahankal Chaur scheme
b) Bansbari - Maharajganj scheme

(2) Rehabilitation :

A scheme with an existing water treatment plant which dose not fully function because of deterioration should be rehabilitated or reconstructed quickly. Following schemes are classified into this category:

a) Balaju - Lambagar scheme
b) Sundarijal scheme
c) Shaibhu scheme

(3) New Scheme :

An implementation of new scheme shall follow that of the schemes with quality improvement or rehabilitation/reconstruction of existing facilities. Following schemes are classified into this category:

a) Manohara scheme
b) Balkhu scheme

(4) Scheduling of schemes :

Implementation schedule of schemes are finally adjusted to meet the increasing demand by 2001, with assessing the economical and financial aspects. If periods for survey, design and fund procurement are taken into consideration, these schemes will be implemented from the year 1992 corresponding in the order given above.

Upon executing the foregoing implementation plan, the monthly water

supply from the proposed systems to meet demand up to the year 2001, should be as shown in Table J-3.1. The daily average water supply from each resource is shown in Fig.J-3.3. The relationship between the planned water supply (annual maximum) and water supply capacity under the optimum implementation plan, should also be as shown in Table J-3.2 and Fig.J-3.4.

4 COST ESTIMATES

4.1 Project Cost

The project cost for the proposed construction plan mentioned above was estimated for the following conditions.

1) Price : January, 1990
2) Foreign exchange rates : US$1.00 = NRs.30.00 = Yen150.00
3) Conditions on procurement of the main construction materials and equipment :
   Local
   - Construction materials (cement, sand, gravel, brick).
   Foreign
   - Construction materials (reinforcement bar, form, support and scaffolding materials, chemicals of water proofing).
   - Construction equipment.
   - Plant materials and equipment.
4) Costs for freight, insurance and inland transportation : included in the project cost.
5) Cost for import tax : excluded in the project cost.
6) Engineering service : 8% of the direct cost.
7) The unit price for land acquisition : estimation according to precedents around the project site.
8) Physical contingency : 10% of the direct cost and engineering service.
9) Price contingency for annual inflation :
   - 4% for foreign currency portion.
   - 8% for local currency portion.

The total project cost and disbursement schedule for each scheme is given in Table J-4.1. A summary of these total project costs is as follows:

Unit: US$ Thousand

SCHEME	F/C	L/C	Total
1. Mahankal Chaur	14,030	4,300	18,330
2. Bansbari	11,599	3,816	15,415
3. Shaibhu	3,579	1,346	4,925
4. Balaju	4,271	973	5,244
5. Lambagar	8,201	3,052	11,253
6. Sundarijal	11,118	4,452	15,570
7. Manohara	12,746	5,988	18,734
8. Balkhu	11,230	5,790	17,020
TOTAL	76,774	29,717	106,491

The direct cost and engineering service is summarized as follows:

Unit: US$ Thousand

SCHEME	F/C	L/C	Total
1. Mahankal Chaur	11,180	2,795	13,975
2. Bansbari	8,888	2,313	11,201
3. Shaibhu	2,744	882	3,626
4. Balaju	3,146	591	3,626
5. Lambagar	6,043	1,436	7,479
6. Sundarijal	7,874	1,664	9,538
7. Manohara	8,352	2,226	10,578
8. Balkhu	6,802	1,840	8,642
TOTAL	55,029	13,747	68,776

The disbursement schedule of the project cost in accordance with the implementation plan is as shown in Table J-4.2.

4.2 Operation and Maintenance Cost

The operation and maintenance costs required pursuant to implementing this plan consist of personnel costs, power costs, chemical costs and equipment replacement costs for the intake facilities, wells, water treatment plants and water distribution reservoirs, and any other operation and maintenance cost. Each of the operation and maintenance cost mentioned was estimated for the following conditions:

(1) Personnel cost

Contents of the operation and maintenance for the water intakes, well pumps, water treatment plants and distribution reservoir and also the man power required are as follows:

(a) Water intake

Contents of operation and maintenance

a) Operation and maintenance of intake pumps.
b) Cleaning of water intake pipes.
c) Replacement of sediments from grit chamber.
d) Maintenance of intake weir.
e) Maintenance of electric facilities.

Manpower

a) Inspection and maintenance : 1 person x 3 shifts
b) Operator of pumping equipment : 2 persons x 3 shifts

(b) Well pump

Contents of operation and maintenance

a) Operation and maintenance of well pump.
b) Inspections of discharge rate and water level.

Manpower

a) Operator of well pump : 1 person x 3 shifts

(c) Water treatment plant with bio-filter

Contents of operation and maintenance

a) Flow control (inflow, transmission)
b) Operation and control of chemical dosage.
   solution of coagulant and lime.
   control of chemical dosage rate (Jar test).
   chemical dosage.
c) Replacement of sludge from coagulo-sedimentation basin.
d) Operation of rapid sand filter.
e) Operation of bio-filter.
f) Operation and Maintenance of disinfection facilities.
   operation and maintenance of NaClO generation equipment.
   control of NaClO feeding.
g) Operation and maintenance of transmission pumps.
h) Operation and maintenance of electric facilities.
i) Control of water quality.

Manpower

a) Plant manager	: 1 person
b) Administration	: 2 persons
c) Maintenance	
(inspection and maintenance)	
chief engineer	: 1 person
electrical engineer	: 2 persons
mechanical engineer	: 2 persons
civil engineer	: 2 persons
(cleaning and maintenance)	
chief	: 1 person
assistant	: 4 persons
d) Water quality control	: 5 persons
e) Operation and maintenance	
chief	: 1 person x 3 shifts
chemical dosage	: 2 persons x 3 shifts
disinfection	: 2 persons x 3 shifts
bio-filter	: 2 persons x 3 shifts
coagulo-sedimentation	: 1 person x 3 shifts
rapid sand filter	: 1 person x 3 shifts
transmission pump	: 1 person x 3 shifts

(d) Conventional water treatment plant

Contents of operation and maintenance

a) Flow control (inflow, transmission)
b) Operation and control of chemical dosage.
   solution of coagulant and lime.
   control of chemical dosage rate (Jar test).

chemical dosage.
c) Replacement of sludge from coagulo-sedimentation basin.
d) Operation of rapid sand filter.
e) Operation and Maintenance of disinfection facilities.
operation and maintenance of NaClO generation equipment.
control of NaClO feeding.
f) Operation and maintenance of transmission pumps.
g) Operation and maintenance of electric facilities.
h) Control of water quality.

Manpower

a) Plant manager	: 1 person
b) Administration	: 2 persons
c) Maintenance	
(inspection and maintenance)	
chief engineer	: 1 person
electrical engineer	: 2 persons
mechanical engineer	: 2 persons
civil engineer	: 1 persons
(cleaning and maintenance)	
chief	: 1 person
assistant	: 4 persons
d) Water quality control	: 5 persons
e) Operation and maintenance	
chief	: 1 person x 3 shifts
chemical dosage	: 1 persons x 3 shifts
disinfection	: 2 persons x 3 shifts
coagulo-sedimentation	: 1 person x 3 shifts
rapid sand filter	: 1 person x 3 shifts
transmission pump	: 1 person x 3 shifts
intake pump	: 1 person x 3 shifts

(e) Distribution reservoir

Contents of operation and maintenance

a) Flow control (transmission, distribution).
b) Operation and maintenance of booster and distribution pumps.
c) Maintenance of reservoir.

Manpower

a) Operator of pumping equipment	: 3 persons x 3 shifts
b) Inspection and maintenance	: 1 person x 3 shifts

(f) Shaibhu reservoir

Contents of operation and maintenance

a) Flow control (inflow, distribution).
b) Operation and Maintenance of disinfection facilities.
operation and maintenance of NaClO generation equipment.
control of NaClO feeding.
c) Operation of simple sand filter

Manpower

a) Chief	: 1 person x 3 shifts
b) Disinfection	: 2 persons x 3 shifts
c) Simple filter	: 1 person x 3 shifts

d) Assistant : 1 person x 3 shifts

The operation and maintenance cost for the personnel expenses are summarized in Table J-4.3.

(2) Power cost

Unit rate of the power charge shall be 5.7 NRs./month/kw as a basic charge and 0.75 NRs./kwh. The power costs shall be estimated based on the annual water supply amount shown in Table J-4.4, and the power cost for each system is given in Table J-4.5.

(3) Chemical cost

Chemicals such as coagulant, lime and salt (for NaClO generation equipment)shall be used in the water treatment plants.

a) PAC (contains 30% of Al2O3 and to be imported) shall be used as a coagulant. the unit rate including a transport cost shall be at US$2,120/t.

b) Lime (local) shall be used as an alkalinity. the unit rate shall be NRs.2,000/t.

c) To generate 1 kg available chlorine gas, 2.6kg salt is consumed. The unit rate of salt shall be NRs.1,650/t.

The chemical costs shall be estimated based on the water supply amount for each system shown in Table J-4.6, and the power cost for each system is given in Table J-4.7.

(4) Facility replacement cost

Facilities such as pumps, electrodes of NaClO generation equipment and chemical feeding pumps shall be replaced. For the pumps, one third parts shall be replaced per 5 years. Electrodes of NaClO generation equipment shall be replaced per 4 years completely.

The cost of replacement and maintenance of the facilities are given in Table J-4.8.

(5) Office maintenance cost

Office maintenance cost shall consist of building maintenance cost, facility maintenance cost, stationary cost, fuel cost for vehicles, etc. The office maintenance cost shall be estimated as at 7% of the personnel expenses mentioned above. The costs are given in Table J-4.9.

The operation, maintenance and replacement cost for each system shall be summarized on Table J-4.10.

TABLES

Table J-1.1 PLANNED WATER SUPPLY AMOUNT (MONTHLY & AVERAGE)

(UNIT: m3/d)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGE
1990	51,865	53,955	58,994	63,172	65,938	67,720	68,150	67,904	66,429	62,927	57,273	52,787	61,466
1991	55,594	57,833	63,234	67,714	70,678	72,588	73,049	72,786	71,205	67,450	61,390	56,582	65,879
1992	56,600	58,880	64,379	68,939	71,957	73,902	74,371	74,103	72,493	68,671	62,501	57,606	67,079
1993	59,019	61,397	67,131	71,886	75,033	77,061	77,550	77,270	75,592	71,606	65,173	60,068	69,942
1994	61,610	64,092	70,077	75,041	78,326	80,443	80,954	80,662	78,910	74,749	68,033	62,705	73,011
1995	65,237	67,865	74,203	79,459	82,937	85,179	85,720	85,411	83,556	79,150	72,039	66,396	77,315
1996	69,111	71,895	78,610	84,178	87,863	90,238	90,811	90,483	88,518	83,851	76,317	70,340	81,907
1997	73,627	76,593	83,747	89,679	93,604	96,134	96,745	96,396	94,302	89,330	81,304	74,936	87,252
1998	78,376	81,533	89,148	95,462	99,641	102,334	102,984	102,613	100,384	95,091	86,547	79,768	92,888
1999	83,504	86,868	94,981	101,709	106,161	109,030	109,723	109,327	106,953	101,313	92,211	84,988	98,964
2000	89,539	93,146	101,845	109,059	113,833	116,909	117,652	117,228	114,682	108,634	98,874	91,130	106,112
2001	96,020	99,888	109,217	116,953	122,072	125,372	126,168	125,713	122,983	116,498	106,031	97,726	113,792
RATIO	84.4	87.8	96.0	102.8	107.3	110.2	110.9	110.5	108.1	102.4	93.2	85.9	100.0

Table J-2.1 (1/3) RESULTS OF TREATMENT TEST (SUNDARIJAL T.P.)

- SUNDARIJAL TREATMENT PLANT -

	pH	EC ms/cm	DO mg/l	Color deg.	Turbid deg.	Alkali mg/l	KMnO4 mg/l	SS mg/l	TDS mg/l	Fe mg/l	Mn mg/l	PO4 mg/l	NH4-N mg/l	NO2 mg/l	NO3 mg/l
Raw Water	6.7	20	8.5	40	25	9	7.0	17.5	70	0.3	0.06	0.2	0.2	<0.02	<0.1
Case-1	7.3	26	8.0	2	0.5	7	2.2	6.0	65	0.1	0.05	<0.1	0.2	0.02	0.7
Case-2	4.5	74	8.1	10	5	<1	4.7	8.5	58	0.8	0.06	<0.1	0.2	<0.02	0.9
Case-3	5.3	71	8.0	20	14	<1	5.2	9.0	70	0.3	0.06	<0.1	0.1	<0.02	0.8
Case-4	6.6	43	8.0	4	3	9	1.9	5.5	100	0.2	0.04	<0.1	<0.02	<0.02	1.9
Case-5	7.4	59	8.1	10	5	11	0.9	7.5	128	0.26	0.04	<0.1	<0.02	<0.02	2.5
Case-6	7.2	49	7.9	4	2	9	13	5.0	65	0.18	0.04	0.1	0.1	<0.02	2.3

Note Case-1: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l
Case-2: NaOH dosage 0 mg/l, pH= 6.7, Alum dosage 20 mg/l
Case-3: NaOH dosage 10 mg/l, pH= 9.3, Alum dosage 30 mg/l
Case-4: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l, Cl2 dosage 5 mg/l
Case-5: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l, Cl2 dosage 10 mg/l
Case-6: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l, Cl2 dosage 5 mg/l
and treated by sand filter

Case 1 to 3 are the optimum results among the rates of PAC (10 to 35mg/l) and Alum (10 to 70mg/l) dosage.

Table J-2.1 (2/3) RESULTS OF TREATMENT TEST (BALAJU T.P.)

- BALAJU TREATMENT PLANT -

	pH	EC ms/cm	DO mg/l	Color deg.	Turbid deg.	Alkali mg/l	KMnO4 mg/l	SS mg/l	TDS mg/l	Fe mg/l	Mn mg/l	PO4 mg/l	NH4-N mg/l	NO2 mg/l	NO3 mg/l
Raw Water	7.2	42	8.5	15	8	21	4.9	13.0	34	0.3	0.06	0.1	0.2	<0.02	<0.1
Case-1	7.2	50	8.0	3	1	18	1.2	2.0	30	0.13	0.05	<0.1	0.1	<0.02	1.8
Case-2	4.6	94	8.1	12	3	<1	2.4	12.0	95	0.3	0.05	0.2	0.2	<0.02	1.7
Case-3	6.6	87	8.1	3	1	16	1.7	0.5	30	0.09	0.06	<0.1	0.2	<0.02	1.1
Case-4	7.0	68	8.1	3	1	19	1.1	1.0	35	0.19	0.05	0.1	0.08	<0.02	2.0
Case-5	7.3	82	8.1	<2	0.5	22	0.3	0.5	35	0.14	0.05	<0.1	0.06	<0.02	2.5
Case-6	7.3	66	7.8	<2	0.5	18	0.6	1.0	28	0.04	0.04	0.1	0.1	<0.02	1.7

Note Case-1: NaOH dosage 0 mg/l, pH= 7.2, PAC dosage 15 mg/l
Case-2: NaOH dosage 0 mg/l, pH= 7.2, Alum dosage 20 mg/l
Case-3: NaOH dosage 10 mg/l, pH= 9.1, Alum dosage 30 mg/l
Case-4: NaOH dosage 0 mg/l, pH= 7.2, PAC dosage 15 mg/l, Cl2 dosage 5 mg/l
Case-5: NaOH dosage 0 mg/l, pH= 7.2, PAC dosage 15 mg/l, Cl2 dosage 10 mg/l
Case-6: NaOH dosage 0 mg/l, pH= 7.2, PAC dosage 15 mg/l, Cl2 dosage 5 mg/l
and treated by sand filter

Case 1 to 3 are the optimum results among the rates of PAC (10 to 35mg/l) and Alum (10 to 70mg/l) dosage.

Table J-2.1 (3/3) RESULTS OF TREATMENT TEST (MAHARAJGANJ T.P.)

- MAHARAJGANJ TREATMENT PLANT -

	pH	EC ms/cm	DO mg/l	Color deg.	Turbid deg.	Alkali mg/l	KMnO4 mg/l	SS mg/l	TDS mg/l	Fe mg/l	Mn mg/l	PO4 mg/l	NH4-N mg/l	NO2 mg/l	NO3 mg/l
Raw Water	6.7	29	8.5	7	4	13	6.2	7.5	83	0.28	0.04	0.2	<0.02	0.03	<0.1
Case-1	6.8	33	6.0	4	2	11	2.4	0.5	90	0.05	0.02	0.1	<0.02	0.03	<0.1
Case-2	4.6	69	8.4	8	3	<1	2.9	3.5	118	0.09	0.02	0.2	<0.02	<0.02	<0.1
Case-3	4.5	139	8.5	8	4	<1	2.9	4.0	155	0.10	0.03	0.2	<0.02	<0.02	<0.1
Case-4	6.7	50	8.5	4	1	16	0.8	1.0	88	0.06	0.04	<0.1	<0.02	<0.02	1.4
Case-5	7.0	60	8.6	4	1	18	0.7	0.5	98	0.05	0.03	0.1	<0.02	<0.02	3.0
Case-6	6.7	54	8.2	5	1	14	0.5	0.5	78	0.04	0.04	<0.1	<0.02	<0.02	1.2

Note Case-1: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l
Case-2: NaOH dosage 0 mg/l, pH= 6.7, Alum dosage 20 mg/l
Case-3: NaOH dosage 10 mg/l, pH= 9.0, Alum dosage 70 mg/l
Case-4: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l, Cl2 dosage 5 mg/l
Case-5: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l, Cl2 dosage 10 mg/l
Case-6: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l, Cl2 dosage 5 mg/l
and treated by sand filter

Table J-2.2 RESULTS OF BIOLOGICAL FILTRATION EXPERIMENT

	pH	EC ms/cm	DO mg/l	Alkali mg/l	KMnO4 mg/l	NH4-N mg/l	Fe mg/l	Mn mg/l	Color deg.	Turbid deg.	SS mg/l	TDS mg/l	PO4 mg/l	NO3 mg/l	NO2 mg/l
DK5 WELL															
Raw Water	6.7	155	7.9	59	7.7	3.1	4.1	0.09	40	20	18.5	135	0.5	1	0.02
Filtered Water															
-porous ceramic	7.3	307	5.8	132	22.2	0.09	3.3	0.07	40	15	11.0	275	0.1	8.2	11.5
-quarts sand	7.4	284	6.9	136	9.1	2.7	1.7	0.03	30	12	6.5	240	<0.1	<1.0	2.1
-pumice sand	7.5	317	8.9	136	24.5	0.03	5.2	0.09	50	15	18.0	273	0.1	6.2	11.9
BANSBARI RESERVOIR															
Raw Water	6.3	174	0.8	78	14.9	1.7	1.6	0.02	10	2	-	-	0.5	<1.0	0.04
Filtered Water															
-porous ceramic	7.4	189	7.1	88	18.7	0.2	1.3	0.02	10	2	-	-	0.8	1.6	4.0
-quarts sand	7.5	186	7.1	88	12.1	1.3	1.3	<0.02	15	2	-	-	0.9	<1.0	0.55
-pumice sand	7.4	180	6.3	83	5.0	0.1	2.1	0.02	15	5	-	-	0.7	<1.0	4.8

Table J-2.3 (1/4) RESULTS OF TREATMENT TEST (BAGMATI)

- BAGMATI -

	pH	EC ms/cm	DO mg/l	Color deg.	Turbid deg.	Alkali mg/l	KMnO4 mg/l	SS mg/l	TDS mg/l	Fe mg/l	Mn mg/l	PO4 mg/l	NH4-N mg/l	NO2 mg/l	NO3 mg/l
Raw Water	6.9	52	3.3	48	32	15	14.0	21.5	150	2.2	0.06	0.2	-	-	-
Case-1	6.8	44	7.5	4	1	0	3.1	1.0	38	0.03	0.03	0.2	-	-	-
Case-2	6.3	134	7.7	16	8	22	3.9	10.0	90	0.28	0.12	0.3	-	-	-
Case-3	6.6	98	7.7	4	1	23	2.6	1.5	70	0.08	0.04	0.1	-	-	-
Case-4	6.7	144	7.6	4	0.5	23	2.2	0.5	110	0.04	0.05	0.06	-	-	-
Case-5	6.8	72	7.9	4	1	19	2.6	0.5	70	0.08	0.07	0.1	-	-	-
Case-6	6.5	80	7.9	6	1	20	4.0	1.5	75	0.13	0.03	<0.02	-	-	-
Case-7	6.8	76	7.9	4	0.5	15	2.8	0.5	68	0.10	0.05	0.1	-	-	-

Note Case-1: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l
Case-2: NaOH dosage 0 mg/l, pH= 6.7, Alum dosage 60 mg/l
Case-3: NaOH dosage 15 mg/l, pH= 9.2, Alum dosage 20 mg/l
Case-4: NaOH dosage 30 mg/l, pH=10.0, Alum dosage 40 mg/l
Case-5: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l, Cl2 dosage 5 mg/l
Case-6: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l, Cl2 dosage 10 mg/l
Case-7: NaOH dosage 0 mg/l, pH= 6.7, PAC dosage 15 mg/l, Cl2 dosage 5 mg/l
and treated by sand filter

Case 1 to 4 are the optimum results among the rates of PAC (10 to 35mg/l) and Alum (10 to 70mg/l) dosage.

Table J-2.3 (2/4) RESULTS OF TREATMENT TEST (MANOHARA)

- MANOHARA -

	pH	EC ms/cm	DO mg/l	Color deg.	Turbid deg.	Alkali mg/l	KMnO4 mg/l	SS mg/l	TDS mg/l	Fe mg/l	Mn mg/l	PO4 mg/l	NH4-N mg/l	NO2 mg/l	NO3 mg/l
Raw Water	6.4	32	7.5	240	160	8	11.9	1100	384	8.4	0.18	<0.1	1.2	0.04	<1.0
Case-1	6.7	52	7.3	4	0.5	4	6.0	1.5	33	0.06	0.10	<0.1	0.2	<0.02	1.1
Case-2	4.5	105	7.2	8	2	<1	5.2	1.5	50	0.13	0.12	<0.1	0.3	<0.02	1.6
Case-3	4.8	108	7.3	4	0.5	<1	3.2	2.0	53	0.08	0.10	<0.1	0.3	0.02	1.2
Case-4	5.9	68	7.2	5	1	6	2.8	4.0	305	0.10	0.09	<0.1	0.2	<0.02	2.0
Case-5	6.3	88	7.8	2	2	8	1.8	0.5	213	0.14	0.12	<0.1	<0.02	<0.02	2.7
Case-6	6.4	78	7.7	2	<0.5	9	3.5	2.5	170	0.07	0.09	<0.1	<0.02	<0.02	2.2

Note Case-1: NaOH dosage 0 mg/l, pH= 6.4, PAC dosage 15 mg/l
Case-2: NaOH dosage 0 mg/l, pH= 6.4, Alum dosage 60 mg/l
Case-3: NaOH dosage 10 mg/l, pH= 8.8, Alum dosage 20 mg/l
Case-4: NaOH dosage 0 mg/l, pH= 6.4, PAC dosage 60 mg/l, Cl2 dosage 5 mg/l
Case-5: NaOH dosage 0 mg/l, pH= 6.4, PAC dosage 60 mg/l, Cl2 dosage 10 mg/l
Case-6: NaOH dosage 0 mg/l, pH= 6.4, PAC dosage 60 mg/l, Cl2 dosage 5 mg/l
and treated by sand filter

Case 1 to 3 are the optimum results among the rates of PAC (10 to 60mg/l) and Alum (10 to 70mg/l) dosage.

Table J-2.3 (3/4) RESULTS OF TREATMENT TEST (BISNUMATI)

- BISNUMATI -

	pH	EC ms/cm	DO mg/l	Color deg.	Turbid deg.	Alkali mg/l	KMnO4 mg/l	SS mg/l	TDS mg/l	Fe mg/l	Mn mg/l	PO4 mg/l	NH4-N mg/l	NO2 mg/l	NO3 mg/l
Raw Water	6.9	58	7.8	320	400	22	10.1	400	446	9.1	0.19	<0.1	1.4	0.03	<1.0
Case-1	6.5	76	7.6	2	1	17	3.6	3.5	100	0.12	0.10	<0.1	0.1	<0.02	1.5
Case-2	6.1	89	7.6	4	1	3	2.7	4.5	203	0.12	0.10	<0.1	0.2	<0.02	0.8
Case-3	6.7	114	7.5	4	1	15	3.5	5.0	170	0.17	0.10	<0.1	0.1	<0.02	1.0
Case-4	7.1	93	7.6	5	1	19	3.4	4.0	118	0.22	0.10	<0.1	0.03	<0.02	1.9
Case-5	7.2	112	7.8	4	1	21	3.1	7.0	105	0.23	0.10	<0.1	0.04	<0.02	2.2
Case-6	7.2	94	7.8	<2	<0.5	20	3.5	2.5	88	0.09	0.07	<0.1	0.2	0.05	1.4

Note Case-1: NaOH dosage 0 mg/l, pH= 6.9, PAC dosage 50 mg/l
Case-2: NaOH dosage 0 mg/l, pH= 6.9, Alum dosage 20 mg/l
Case-3: NaOH dosage 10 mg/l, pH= 9.0, Alum dosage 30 mg/l
Case-4: NaOH dosage 0 mg/l, pH= 6.9, PAC dosage 50 mg/l, Cl2 dosage 5 mg/l
Case-5: NaOH dosage 0 mg/l, pH= 6.9, PAC dosage 50 mg/l, Cl2 dosage 10 mg/l
Case-6: NaOH dosage 0 mg/l, pH= 6.9, PAC dosage 50 mg/l, Cl2 dosage 5 mg/l
and treated by sand filter

Case 1 to 3 are the optimum results among the rates of PAC (10 to 35mg/l) and Alum (10 to 70mg/l) dosage.

Table J-2.3 (4/4) RESULTS OF TREATMENT TEST (NAKHU)

- NAKHU KHOLA -

	pH	EC ms/cm	DO mg/l	Color deg.	Turbid deg.	Alkali mg/l	KMnO4 mg/l	SS mg/l	TDS mg/l	Fe mg/l	Mn mg/l	PO4 mg/l	NH4-N mg/l	NO2 mg/l	NO3 mg/l
Raw Water	8.6	160	4.5	10	5	76.0	2.8	22	128	0.63	0.09	-	<0.1	-	-
Case-1	6.7	193	7.8	<2	1	44.4	0.9	11	120	<0.1	0.02	-	<0.02	-	-
Case-2	6.6	193	7.7	<2	2	39.0	1.1	11	128	<0.1	0.03	-	<0.02	-	-
Case-3	7.2	210	7.6	<2	0.5	82.3	0.8	6.0	112	<0.1	0.01	-	<0.02	-	-
Case-4	7.2	214	7.6	<2	0.5	74.8	0.9	6.0	108	<0.1	0.01	-	<0.02	-	-
Case-5	7.3	228	7.7	<2	0.5	83.4	0.9	5.5	134	<0.1	0.01	-	<0.02	-	-
Case-6	7.6	240	7.8	2	0.5	89.3	0.5	3.5	132	<0.1	0.02	-	<0.02	-	-
Case-7	7.2	205	7.6	<2	0.5	62.5	1.9	3.5	96	0.1	0.09	-	0.03	-	-

Note Case-1: NaOH dosage 0 mg/l, pH= 8.3, Alum dosage 50 mg/l
Case-2: NaOH dosage 0 mg/l, pH= 8.3, Alum dosage 60 mg/l
Case-3: NaOH dosage 10 mg/l, pH= 9.0, Alum dosage 20 mg/l
Case-4: NaOH dosage 10 mg/l, pH= 9.0, Alum dosage 30 mg/l
Case-5: NaOH dosage 10 mg/l, pH= 9.0, Alum dosage 20 mg/l, Cl2 dosage 5 mg/l
Case-6: NaOH dosage 10 mg/l, pH= 9.0, Alum dosage 20 mg/l, Cl2 dosage 10 mg/l
Case-7: NaOH dosage 10 mg/l, pH= 9.0, Alum dosage 20 mg/l, Cl2 dosage 5 mg/l
and treated by sand filter

Case 1 to 3 are the optimum results among the rates of PAC (10 to 35mg/l) and Alum (10 to 70mg/l) dosage.

Table J-3.1 (1/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1990)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	600	600	600	600	0	0
2. LAMBAGAR	-	-	-	-	-	-	-	-	-	-	-	-
3. MAHARAJGANJ	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
4. BANSBARI												
-Shivapuri	-	-	-	-	-	-	-	-	-	-	-	-
-Bisnumati	-	-	-	-	-	-	-	-	-	-	-	-
-Groundwater	3,583	1,000	2,500	4,500	6,300	7,500	7,500	7,500	7,500	7,500	6,500	4,000
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	-	-	-	-	-	-	-	-	-	-	-	-
-Dhobi khola	-	-	-	-	-	-	-	-	-	-	-	-
-Groundwater	3,582	1,000	4,000	6,000	6,200	7,500	7,500	7,500	7,500	7,500	6,400	4,087
7. SHAIBHU												
-Surface water	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700
-Groundwater	0	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	0	0
8. MANOHARA	-	-	-	-	-	-	-	-	-	-	-	-
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	51,865	48,600	53,700	57,700	59,700	61,800	61,800	61,800	61,800	61,800	57,200	52,787

Table J-3.1 (2/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1991)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	600	600	600	600	0	0
2. LAMBAGAR	-	-	-	-	-	-	-	-	-	-	-	-
3. MAHARAJGANJ	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
4. BANSBARI												
-Shivapuri	-	-	-	-	-	-	-	-	-	-	-	-
-Bisnumati	-	-	-	-	-	-	-	-	-	-	-	-
-Groundwater	4,000	1,000	2,500	4,500	6,300	7,500	7,500	7,500	7,500	7,500	6,500	4,000
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	-	-	-	-	-	-	-	-	-	-	-	-
-Dhobi khola	-	-	-	-	-	-	-	-	-	-	-	-
-Groundwater	4,000	1,000	4,000	6,000	6,200	7,500	7,500	7,500	7,500	7,500	6,400	4,500
7. SHAIBHU												
-Surface water	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700
-Groundwater	0	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	0	0
8. MANOHARA	-	-	-	-	-	-	-	-	-	-	-	-
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	52,700	48,600	53,700	57,700	59,700	61,800	61,800	61,800	61,800	61,800	57,200	53,200

Table J-3.1 (3/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1992)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	600	600	600	600	0	0
2. LAMBAGAR	-	-	-	-	-	-	-	-	-	-	-	-
3. MAHARAJGANJ	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
4. BANSBARI												
-Shivapuri	-	-	-	-	-	-	-	-	-	-	-	-
-Bisnumati	-	-	-	-	-	-	-	-	-	-	-	-
-Groundwater	4,000	1,000	2,500	4,500	6,300	7,500	7,500	7,500	7,500	7,500	6,500	4,000
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	-	-	-	-	-	-	-	-	-	-	-	-
-Dhobi khola	-	-	-	-	-	-	-	-	-	-	-	-
-Groundwater	4,000	1,000	4,000	6,000	6,200	7,500	7,500	7,500	7,500	7,500	6,400	4,500
7. SHAIBHU												
-Surface water	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700
-Groundwater	0	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	0	0
8. MANOHARA	-	-	-	-	-	-	-	-	-	-	-	-
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	52,700	48,600	53,700	57,700	59,700	61,800	61,800	61,800	61,800	61,800	57,200	53,200

Table J-3.1 (4/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1993)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	600	600	600	600	0	0
2. LAMBAGAR	-	-	-	-	-	-	-	-	-	-	-	-
3. MAHARAJGANJ	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
4. BANSBARI												
-Shivapuri	-	-	-	-	-	-	-	-	-	-	-	-
-Bisnumati	-	-	-	-	-	-	-	-	-	-	-	-
-Groundwater	4,000	1,000	2,500	4,500	6,300	7,500	7,500	7,500	7,500	7,500	6,500	4,000
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	-	-	-	-	-	-	-	-	-	-	-	-
-Dhobi khola	-	-	-	-	-	-	-	-	-	-	-	-
-Groundwater	4,000	1,000	4,000	6,000	6,200	7,500	7,500	7,500	7,500	7,500	6,400	4,500
7. SHAIBHU												
-Surface water	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700
-Groundwater	0	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	0	0
8. MANOHARA	-	-	-	-	-	-	-	-	-	-	-	-
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	52,700	48,600	53,700	57,700	59,700	61,800	61,800	61,800	61,800	61,800	57,200	53,200

Table J-3.1 (5/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1994)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	0	0	0	0	0	0
2. LAMBAGAR	-	-	-	-	-	-	-	-	-	-	-	-
3. MAHARAJGANJ	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
4. BANSBARI												
-Shivapuri	-	-	-	-	-	-	-	-	-	-	-	-
-Bisnumati	-	-	-	-	-	-	-	-	-	-	-	-
-Groundwater	-	-	-	-	-	-	-	-	-	-	-	-
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	12,600	10,060	0	0	0	4,190	12,600	12,600	12,600	12,600	12,600	12,600
-Dhobi khola	7,724	7,550	5,870	5,870	6,710	10,900	12,600	12,600	12,600	12,600	10,648	5,319
-Groundwater	0	0	8,370	8,370	8,370	8,370	7,040	8,262	8,751	4,882	0	0
7. SHAIBHU												
-Surface water	11,286	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700
-Groundwater	0	0	2,900	2,900	2,900	2,900	2,900	2,900	0	0	0	0
8. MANOHARA	-	-	-	-	-	-	-	-	-	-	-	-
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	61,610	62,310	62,440	62,440	63,280	71,260	79,440	80,662	78,251	74,382	67,548	62,619

Table J-3.1 (6/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1995)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	-	-	-	-	-
-Groundwater	0	0	600	600	600	600	0	-	-	-	-	-
2. LAMBAGAR	-	-	-	-	-	-	-	9,000	9,000	9,000	8,000	7,246
3. MAHARAJGANJ	-	-	-	-	-	-	-	-	-	-	-	-
4. BANSBARI												
-Shivapuri	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
-Bisnumati	2,280	0	0	0	0	0	12,600	12,600	12,600	8,380	7,526	3,350
-Groundwater	0	4,155	10,827	8,489	10,127	11,000	0	0	0	0	0	0
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	12,600	10,060	0	0	0	4,190	12,600	12,600	12,600	12,600	12,600	12,600
-Dhobi khola	5,657	6,050	5,870	5,870	6,710	10,900	9,320	8,411	6,556	6,370	1,113	0
-Groundwater	0	0	9,306	10,000	11,000	4,389	0	0	0	0	0	0
7. SHAIBHU												
-Surface water	14,700	14,700	14,700	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600
-Groundwater	0	2,900	2,900	2,900	2,900	2,900	0	0	0	0	0	0
8. MANOHARA	-	-	-	-	-	-	-	-	-	-	-	-
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	65,237	67,865	74,203	79,459	82,937	85,179	85,720	85,411	83,556	79,150	72,039	66,396

Table J-3.1 (7/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1996)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	-	-	-	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	-	-	-	600	600	600	0	0	0	0	0	0
2. LAMBAGAR	10,801	11,085	12,000	6,710	6,710	12,600	12,600	12,600	12,600	10,000	8,500	3,410
3. MAHARAJGANJ	-	-	-	-	-	-	-	-	-	-	-	-
4. BANSBARI												
-Shivapuri	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
-Bisnumati	2,510	0	0	0	0	0	8,000	8,000	8,000	7,000	4,017	2,730
-Groundwater	0	0	6,640	7,498	8,743	7,848	0	0	0	0	0	0
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	12,600	10,060	0	0	0	4,190	12,600	12,600	12,600	12,600	12,600	12,600
-Dhobi khola	0	7,550	5,870	5,870	6,710	10,900	6,411	6,083	4,118	3,051	0	0
-Groundwater	0	0	8,000	9,000	10,600	0	0	0	0	0	0	0
7. SHAIBHU												
-Surface water	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600
-Groundwater	0	0	2,900	2,900	2,900	2,900	0	0	0	0	0	0
8. MANOHARA	-	-	-	-	-	-	-	-	-	-	-	-
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	69,111	71,895	78,610	84,178	87,863	90,238	90,811	90,483	88,518	83,851	76,317	70,340

Table J-3.1 (8/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1997)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	0	0	0	0	0	0
2. LAMBAGAR	7,057	8,157	7,550	6,710	6,710	12,600	12,600	12,600	12,600	12,600	8,000	7,386
3. MAHARAJGANJ	-	-	-	-	-	-	-	-	-	-	-	-
4. BANSBARI												
-Shivapuri	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
-Bisnumati	1,761	0	0	0	0	0	10,000	10,000	10,000	8,380	8,380	3,350
-Groundwater	0	0	7,415	10,714	12,216	6,693	0	0	0	0	0	0
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	12,600	10,060	0	0	0	4,190	12,600	12,600	12,600	12,600	12,600	12,600
-Dhobi khola	7,057	7,349	5,870	5,870	6,710	10,900	10,345	9,996	7,902	5,150	1,124	0
-Groundwater	0	0	7,812	11,285	12,868	7,051	0	0	0	0	0	0
7. SHAIBHU												
-Surface water	15,152	21,027	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600
-Groundwater	0	0	2,900	2,900	2,900	2,900	0	0	0	0	0	0
8. MANOHARA	-	-	-	-	-	-	-	-	-	-	-	-
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	73,627	76,593	83,747	89,679	93,604	96,134	96,745	96,396	94,302	89,330	81,304	74,936

Table J-3.1 (9/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1998)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	0	0	0	0	0	0
2. LAMBAGAR	8,137	8,380	7,550	6,710	6,710	12,600	12,600	12,600	12,600	12,600	10,000	9,000
3. MAHARAJGANJ	-	-	-	-	-	-	-	-	-	-	-	-
4. BANSBARI												
-Shivapuri	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
-Bisnumati	2,030	0	0	0	0	0	12,600	12,600	12,600	8,380	8,380	3,350
-Groundwater	0	1,043	10,046	13,530	15,156	9,712	1,384	1,013	0	0	0	0
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	12,600	10,060	0	0	0	4,190	12,600	12,600	12,600	12,600	12,600	12,600
-Dhobi khola	8,137	7,550	5,870	5,870	6,710	10,900	12,600	12,600	11,384	10,311	4,367	3,218
-Groundwater	0	0	10,582	14,252	15,965	10,232	0	0	0	0	0	0
7. SHAIBHU												
-Surface water	17,472	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600
-Groundwater	0	2,900	2,900	2,900	2,900	2,900	0	0	0	0	0	0
8. MANOHARA	-	-	-	-	-	-	-	-	-	-	-	-
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	78,376	81,533	89,148	95,462	99,641	102,334	102,984	102,613	100,384	95,091	86,547	79,768

Table J-3.1 (10/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 1999)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	0	0	0	0	0	0
2. LAMBAGAR	6,438	7,638	7,550	6,710	6,710	12,600	12,600	12,600	12,600	12,600	9,000	8,000
3. MAHARAJGANJ	-	-	-	-	-	-	-	-	-	-	-	-
4. BANSBARI												
-Shivapuri	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
-Bisnumati	1,606	0	0	0	0	0	12,600	12,600	12,600	8,380	8,380	3,350
-Groundwater	0	0	7,578	11,264	12,614	6,838	0	0	0	0	0	0
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	12,600	10,060	0	0	0	4,190	12,600	12,600	12,600	12,600	12,600	12,600
-Dhobi khola	6,438	6,882	5,870	5,870	6,710	10,900	8,123	7,727	5,353	3,933	0	0
-Groundwater	0	0	7,983	11,865	13,287	7,202	0	0	0	0	0	0
7. SHAIBHU												
-Surface water	13,822	19,688	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600
-Groundwater	0	0	2,900	2,900	2,900	2,900	0	0	0	0	0	0
8. MANOHARA	12,600	12,600	10,900	10,900	11,740	12,600	12,600	12,600	12,600	12,600	11,031	9,438
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	83,504	86,868	94,981	101,709	106,161	109,030	109,723	109,327	106,953	101,313	92,211	84,988

Table J-3.1 (11/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 2000)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	0	0	0	0	0	0
2. LAMBAGAR	7,810	8,380	7,550	6,710	6,710	12,600	12,600	12,600	12,600	12,600	10,000	9,000
3. MAHARAJGANJ	-	-	-	-	-	-	-	-	-	-	-	-
4. BANSBARI												
-Shivapuri	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
-Bisnumati	1,949	0	0	0	0	0	12,600	12,600	12,600	8,380	8,380	3,350
-Groundwater	0	56	10,921	14,843	16,387	10,675	0	0	0	0	0	0
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	12,600	10,060	0	0	0	4,190	12,600	12,600	12,600	12,600	12,600	12,600
-Dhobi khola	7,810	7,550	5,870	5,870	6,710	10,900	12,600	12,600	12,600	11,254	5,694	4,580
-Groundwater	0	0	11,504	15,636	17,186	11,244	3,452	3,028	482	0	0	0
7. SHAIBHU												
-Surface water	16,770	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600
-Groundwater	0	2,900	2,900	2,900	2,900	2,900	0	0	0	0	0	0
8. MANOHARA	12,600	12,600	10,900	10,900	11,740	12,600	12,600	12,600	12,600	12,600	11,000	10,000
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	-
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	89,539	93,146	101,845	109,059	113,833	116,909	117,652	117,228	114,682	108,634	98,874	91,130

Table J-3.1 (12/12) WATER SUPPLY AMOUNT FROM EACH SYSTEM (YEAR 2001)

(UNIT: m3/d)

SYSTEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1. BALAJU												
-Surface water	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	0	0	600	600	600	600	0	0	0	0	0	0
2. LAMBAGAR	6,419	7,924	7,550	6,710	6,710	12,600	12,600	12,600	12,600	12,600	10,000	9,000
3. MAHARAJGANJ	-	-	-	-	-	-	-	-	-	-	-	-
4. BANSBARI												
-Shivapuri	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
-Bisnumati	1,601	0	0	0	0	0	12,600	12,600	12,600	8,380	8,380	3,350
-Groundwater	0	0	10,021	14,197	15,471	8,660	0	0	0	0	0	0
5. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	17,600	17,600	17,600	17,600	17,600	17,600	18,000
6. MAHANKAL CHAUR												
-Sundarijal	12,600	10,060	0	0	0	4,190	12,600	12,600	12,600	12,600	12,600	12,600
-Dhobi khola	6,419	7,139	5,870	5,870	6,710	10,900	11,968	11,513	8,783	6,518	1,851	1,176
-Groundwater	0	0	10,556	14,956	16,281	9,122	0	0	0	0	0	0
7. SHAIBHU												
-Surface water	13,781	20,425	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600
-Groundwater	0	0	2,900	2,900	2,900	2,900	0	0	0	0	0	0
8. MANOHARA	12,600	12,600	10,900	10,900	11,740	12,600	12,600	12,600	12,600	12,600	11,000	10,000
9. BALKHU	12,600	11,740	9,220	9,220	10,060	12,600	12,600	12,600	12,600	12,600	11,000	10,000
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
TOTAL	96,020	99,888	109,217	116,953	122,072	125,372	126,168	125,713	122,983	116,498	106,031	97,726

Table J-3.2 SUPPLY CAPACITY OF EACH SYSTEM AND PLANNED WATER SUPPLY

(UNIT: m3/d)

SYSTEM	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1. MAHANKAL CHAUR												
-Surface water	-	-	-	-	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700
-Groundwater	(7,500)	(7,500)	(7,500)	(7,500)	17,200	17,200	17,200	17,200	17,200	17,200	17,200	17,200
2. Bansbari												
-Surface water	-	-	-	-	-	4,400	4,400	4,400	4,400	4,400	4,400	4,400
-Groundwater	(7,500)	(7,500)	(7,500)	(7,500)	(7,500)	16,400	16,400	16,400	16,400	16,400	16,400	16,400
3. MAHARAJGANJ	(2,000)	(2,000)	(2,000)	(2,000)	(2,000)	-	-	-	-	-	-	-
4. SHAIBHU												
-Surface water	14,700	14,700	14,700	14,700	14,700	21,600	21,600	21,600	21,600	21,600	21,600	21,600
-Groundwater	1,900	1,900	1,900	1,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900
5. BALAJU												
-Surface water	(8,400)	(8,400)	(8,400)	(8,400)	(8,400)	(8,400)	8,400	8,400	8,400	8,400	8,400	8,400
-Groundwater	(600)	(600)	(600)	(600)	(600)	(600)	600	600	600	600	600	600
6. LAMBAGAR	-	-	-	-	-	-	12,600	12,600	12,600	12,600	12,600	12,600
7. SUNDARIJAL	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
8. MANOHARA	-	-	-	-	-	-	-	-	-	12,600	12,600	12,600
9. BALKHU	-	-	-	-	-	-	-	-	-	-	-	12,600
10. OTHERS	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
Capacity of Supply												
-Surfafe water	44,700	44,700	44,700	44,700	59,400	68,700	81,300	81,300	81,300	93,900	93,900	106,500
-Groundwater	17,500	17,500	17,500	17,500	28,200	37,100	37,100	37,100	37,100	37,100	37,100	37,100
TOTAL	62,200	62,200	62,200	62,200	87,600	105,800	118,400	118,400	118,400	131,000	131,000	143,600
Planned Water Supply *1	68,150	73,049	74,371	77,550	80,954	85,720	90,811	96,745	102,984	109,723	117,652	126,168

NOTE *1 : Annual maximum
( ): No treatment or insufficient treatment
Supply capacity mentioned is the value during the period that groundwater is used maximum.

Table J-4.1 (1/8) PROJECT COST FOR EACH SYSTEM

- MAHANKAL CHAUR - (UNIT: US$1,000)

DESCRIPTION	TOTAL			1992			1993		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	278	278	0	278	278	0	0	0
(2) Direct Cost	10,145	2,795	12,940	6,522	2,094	8,616	3,623	701	4,324
	576	689	1,265	370	516	886	206	173	379
(3) Engineering Service	1,035	0	1,035	689	0	689	346	0	346
(2) x 8%	1,035	0	1,035	689	0	689	346	0	346
(4) Sub-Total	11,180	2,795	13,975	7,211	2,094	9,305	3,969	701	4,670
(2) + (3)	1,611	689	2,300	1,059	516	1,575	552	173	725
(5) Physical Contingency	1,118	279	1,397	721	209	930	397	70	467
(4) x 10%	161	69	230	106	52	158	55	17	72
(6) Sub-Total	12,298	3,352	15,650	7,932	2,581	10,513	4,366	771	5,137
(1)+(4)+(5)	1,772	758	2,530	1,165	568	1,733	607	190	797
(7) Price Contingency	1,732	948	2,680	990	670	1,660	742	278	1,020
	248	216	464	145	148	293	103	68	171
(8) TOTAL	14,030	4,300	18,330	8,922	3,251	12,173	5,108	1,049	6,157
	2,020	974	2,994	1,310	716	2,026	710	258	968

NOTE Lower line: Personnel expenses

Table J-4.1 (2/8) PROJECT COST FOR EACH SYSTEM

- BANSBARI - (UNIT: US$1,000)

DESCRIPTION	TOTAL			1993			1994		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	213	213	0	213	213	0	0	0
(2) Direct Cost	8,059	2,313	10,372	5,198	1,769	6,967	2,861	544	3,405
	488	509	997	315	389	704	173	120	293
(3) Engineering Service	829	0	829	557	0	557	272	0	272
(2) x 8%	829	0	829	557	0	557	272	0	272
(4) Sub-Total	8,888	2,313	11,201	5,755	1,769	7,524	3,133	544	3,677
(2) + (3)	1,317	509	1,826	872	389	1,261	445	120	565
(5) Physical Contingency	889	231	1,120	576	177	753	313	54	367
(4) x 10%	132	51	183	87	39	126	45	12	57
(6) Sub-Total	9,777	2,757	12,534	6,331	2,159	8,490	3,446	598	4,044
(1)+(4)+(5)	1,449	560	2,009	959	428	1,387	490	132	622
(7) Price Contingency	1,822	1,059	2,881	1,075	778	1,853	747	281	1,028
	269	216	485	163	154	317	106	62	168
(8) TOTAL	11,599	3,816	15,415	7,406	2,937	10,343	4,193	879	5,072
	1,718	776	2,494	1,122	582	1,704	596	194	790

NOTE Lower line: Personnel expenses

Table J-4.1 (3/8) PROJECT COST FOR EACH SYSTEM

- SHAIBHU - (UNIT: US$1,000)

DESCRIPTION	TOTAL			1993			1994		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	0	0	0	0	0	0	0	0
(2) Direct Cost	2,475	882	3,357	1,621	662	2,283	854	220	1,074
	160	176	336	105	132	237	55	44	99
(3) Engineering Service	269	0	269	183	0	183	86	0	86
(2) x 8%	269	0	269	183	0	183	86	0	86
(4) Sub-Total	2,744	882	3,626	1,804	662	2,466	940	220	1,160
(2) + (3)	429	176	605	288	132	420	141	44	185
(5) Physical Contingency	274	88	362	180	66	246	94	22	116
(4) x 10%	43	17	60	29	13	42	14	4	18
(6) Sub-Total	3,018	970	3,988	1,984	728	2,712	1,034	242	1,276
(1)+(4)+(5)	472	193	665	317	145	462	155	48	203
(7) Price Contingency	561	376	937	337	262	599	224	114	338
	88	75	163	54	52	106	34	23	57
(8) TOTAL	3,579	1,346	4,925	2,321	990	3,311	1,258	356	1,614
	560	268	828	371	197	568	189	71	260

NOTE Lower line: Personnel expenses

Table J-4.1 (4/8) PROJECT COST FOR EACH SYSTEM

- BALAJU - (UNIT: US$1,000)

DESCRIPTION	TOTAL			1994			1995		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	0	0	0	0	0	0	0	0
(2) Direct Cost	2,869	591	3,460	1,821	453	2,274	1,048	138	1,186
	172	179	351	113	138	251	59	41	100
(3) Engineering Service	277	0	277	182	0	182	95	0	95
(2) x 8%	277	0	277	182	0	182	95	0	95
(4) Sub-Total	3,146	591	3,737	2,003	453	2,456	1,143	138	1,281
(2) + (3)	449	179	628	295	138	433	154	41	195
(5) Physical Contingency	314	59	373	200	45	245	114	14	128
(4) x 10%	45	18	63	30	14	44	15	4	19
(6) Sub-Total	3,460	650	4,110	2,203	498	2,701	1,257	152	1,409
(1)+(4)+(5)	494	197	691	325	152	477	169	45	214
(7) Price Contingency	811	323	1,134	477	234	711	334	89	423
	115	97	212	70	71	141	45	26	71
(8) TOTAL	4,271	973	5,244	2,680	732	3,412	1,591	241	1,832
	609	294	903	395	223	618	214	71	285

NOTE Lower line: Personnel expenses

Table J-4.1 (5/8) PROJECT COST FOR EACH SYSTEM

- LAMBAGAR - (UNIT: US$1,000)

DESCRIPTION	TOTAL			1994			1995		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	467	467	0	467	467	0	0	0
(2) Direct Cost	5,489	1,436	6,925	3,543	1,091	4,634	1,946	345	2,291
	333	318	651	215	241	456	118	77	195
(3) Engineering Service	554	0	554	371	0	371	183	0	183
(2) x 8%	554	0	554	371	0	371	183	0	183
(4) Sub-Total	6,043	1,436	7,479	3,914	1,091	5,005	2,129	345	2,474
(2) + (3)	887	318	1,205	586	241	827	301	77	378
(5) Physical Contingency	604	144	748	391	109	500	213	35	248
(4) x 10%	89	32	121	59	24	83	30	8	38
(6) Sub-Total	6,647	2,047	8,694	4,305	1,667	5,972	2,342	380	2,722
(1)+(4)+(5)	976	350	1,326	645	265	910	331	85	416
(7) Price Contingency	1,554	1,005	2,559	933	782	1,715	621	223	844
	228	174	402	140	124	264	88	50	138
(8) TOTAL	8,201	3,052	11,253	5,238	2,449	7,687	2,963	603	3,566
	1,204	524	1,728	785	389	1,174	419	135	554

NOTE Lower line: Personnel expenses

Table J-4.1 (6/8) PROJECT COST FOR EACH SYSTEM

- SUNDARIJAL - (UNIT: US$1,000)

DESCRIPTION	TOTAL			1995			1996		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	940	940	0	940	940	0	0	0
(2) Direct Cost	7,167	1,664	8,831	4,572	1,263	5,835	2,595	401	2,996
	434	400	834	278	303	581	156	97	253
(3) Engineering Service	707	0	707	467	0	467	240	0	240
(2) x 8%	707	0	707	467	0	467	240	0	240
(4) Sub-Total	7,874	1,664	9,538	5,039	1,263	6,302	2,835	401	3,236
(2) + (3)	1,141	400	1,541	745	303	1,048	396	97	493
(5) Physical Contingency	788	166	954	504	126	630	284	40	324
(4) x 10%	115	40	155	75	30	105	40	10	50
(6) Sub-Total	8,662	2,770	11,432	5,543	2,329	7,872	3,119	441	3,560
(1)+(4)+(5)	1,256	440	1,696	820	333	1,153	436	107	543
(7) Price Contingency	2,456	1,682	4,138	1,471	1,367	2,838	985	315	1,300
	356	271	627	218	195	413	138	76	214
(8) TOTAL	11,118	4,452	15,570	7,014	3,696	10,710	4,104	756	4,860
	1,612	711	2,323	1,038	528	1,566	574	183	757

NOTE Lower line: Personnel expenses

Table J-4.1 (7/8) PROJECT COST FOR EACH SYSTEM

- MANOHARA - (UNIT: US$1,000)

DESCRIPTION	TOTAL			1997			1998		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	740	740	0	740	740	0	0	0
(2) Direct Cost	7,568	2,226	9,794	4,959	1,699	6,658	2,609	527	3,136
	429	464	893	281	354	635	148	110	258
(3) Engineering Service	784	0	784	533	0	533	251	0	251
(2) x 8%	784	0	784	533	0	533	251	0	251
(4) Sub-Total	8,352	2,226	10,578	5,492	1,699	7,191	2,860	527	3,387
(2) + (3)	1,213	464	1,677	814	354	1,168	399	110	509
(5) Physical Contingency	835	223	1,058	549	170	719	286	53	339
(4) x 10%	121	46	167	81	35	116	40	11	51
(6) Sub-Total	9,187	3,189	12,376	6,041	2,609	8,650	3,146	580	3,726
(1)+(4)+(5)	1,334	510	1,844	895	389	1,284	439	121	560
(7) Price Contingency	3,559	2,799	6,358	2,227	2,220	4,447	1,332	579	1,911
	516	452	968	330	331	661	186	121	307
(8) TOTAL	12,746	5,988	18,734	8,268	4,829	13,097	4,478	1,159	5,637
	1,850	962	2,812	1,225	720	1,945	625	242	867

NOTE Lower line: Personnel expenses

Table J-4.1 (8/8) PROJECT COST FOR EACH SYSTEM

- BALKHU - (UNIT: US$1,000)

DESCRIPTION	TOTAL			1999			2000		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	620	620	0	620	620	0	0	0
(2) Direct Cost	6,162	1,840	8,002	3,991	1,406	5,397	2,171	434	2,605
	352	382	734	228	292	520	124	90	214
(3) Engineering Service	640	0	640	432	0	432	208	0	208
(2) x 8%	640	0	640	432	0	432	208	0	208
(4) Sub-Total	6,802	1,840	8,642	4,423	1,406	5,829	2,379	434	2,813
(2) + (3)	992	382	1,374	660	292	952	332	90	422
(5) Physical Contingency	680	184	864	442	141	583	238	43	281
(4) x 10%	99	38	137	66	29	95	33	9	42
(6) Sub-Total	7,482	2,644	10,126	4,865	2,167	7,032	2,617	477	3,094
(1)+(4)+(5)	1,091	420	1,511	726	321	1,047	365	99	464
(7) Price Contingency	3,748	3,146	6,894	2,336	2,511	4,847	1,412	635	2,047
	546	504	1,050	349	372	721	197	132	329
(8) TOTAL	11,230	5,790	17,020	7,201	4,678	11,879	4,029	1,112	5,141
	1,637	924	2,561	1,075	693	1,768	562	231	793

NOTE Lower line: Personnel expenses

Table J-4.2 (1/2) PROJECT COST IN EACH YEAR

(UNIT: US$1,000)

DESCRIPTION	TOTAL			1992			1993			1994			1995		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	3,258	3,258	0	278	278	0	213	213	0	467	467	0	940	940
(2) Direct Cost	49,934	13,747	63,681	6,522	2,094	8,616	10,442	3,132	13,574	9,079	2,308	11,387	7,566	1,746	9,312
	2,944	3,117	6,061	370	516	886	626	694	1,320	556	543	1,099	455	421	876
(3) Engineering Service	5,095	0	5,095	689	0	689	1,086	0	1,086	911	0	911	745	0	745
(2) x 8%	5,095	0	5,095	689	0	689	1,086	0	1,086	911	0	911	745	0	745
(4) Sub-Total	55,029	13,747	68,776	7,211	2,094	9,305	11,528	3,132	14,660	9,990	2,308	12,298	8,311	1,746	10,057
(2) + (3)	8,039	3,117	11,156	1,059	516	1,575	1,712	694	2,406	1,467	543	2,010	1,200	421	1,621
(5) Physical Contingency	5,502	1,374	6,876	721	209	930	1,153	313	1,466	998	230	1,228	831	175	1,006
(4) x 10%	805	311	1,116	106	52	158	171	69	240	148	54	202	120	42	162
(6) Sub-Total	60,531	18,379	78,910	7,932	2,581	10,513	12,681	3,658	16,339	10,988	3,005	13,993	9,142	2,861	12,003
(1)+(4)+(5)	8,844	3,428	12,272	1,165	568	1,733	1,883	763	2,646	1,615	597	2,212	1,320	463	1,783
(7) Price Contingency	16,243	11,338	27,581	990	670	1,660	2,154	1,318	3,472	2,381	1,411	3,792	2,426	1,679	4,105
	2,366	2,005	4,371	145	148	293	320	274	594	350	280	630	351	271	622
(8) TOTAL	76,774	29,717	106,491	8,922	3,251	12,173	14,835	4,976	19,811	13,369	4,416	17,785	11,568	4,540	16,108
	11,210	5,433	16,643	1,310	716	2,026	2,203	1,037	3,240	1,965	877	2,842	1,671	734	2,405

NOTE Lower line: Personnel expenses

Table J-4.2 (2/2) PROJECT COST IN EACH YEAR

(UNIT: US$1,000)

DESCRIPTION	1996			1997			1998			1999			2000		
	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL	F/C	L/C	TOTAL
(1) Land Acquisition	0	0	0	0	740	740	0	0	0	0	620	620	0	0	0
(2) Direct Cost	2,595	401	2,996	4,959	1,699	6,658	2,609	527	3,136	3,991	1,406	5,397	2,171	434	2,605
	156	97	253	281	354	635	148	110	258	228	292	520	124	90	214
(3) Engineering Service	240	0	240	533	0	533	251	0	251	432	0	432	208	0	208
(2) x 8%	240	0	240	533	0	533	251	0	251	432	0	432	208	0	208
(4) Sub-Total	2,835	401	3,236	5,492	1,699	7,191	2,860	527	3,387	4,423	1,406	5,829	2,379	434	2,813
(2) + (3)	396	97	493	814	354	1,168	399	110	509	660	292	952	332	90	422
(5) Physical Contingency	284	40	324	549	170	719	286	53	339	442	141	583	238	43	281
(4) x 10%	40	10	50	81	35	116	40	11	51	66	29	95	33	9	42
(6) Sub-Total	3,119	441	3,560	6,041	2,609	8,650	3,146	580	3,726	4,865	2,167	7,032	2,617	477	3,094
(1)+(4)+(5)	436	107	543	895	389	1,284	439	121	560	726	321	1,047	365	99	464
(7) Price Contingency	985	315	1,300	2,227	2,220	4,447	1,332	579	1,911	2,336	2,511	4,847	1,412	635	2,047
	138	76	214	330	331	661	186	121	307	349	372	721	197	132	329
(8) TOTAL	4,104	756	4,860	8,268	4,829	13,097	4,478	1,159	5,637	7,201	4,678	11,879	4,029	1,112	5,141
	574	183	757	1,225	720	1,945	625	242	867	1,075	693	1,768	562	231	793

NOTE Lower line: Personnel expenses

Table J-4.3 OPERATION AND MAINTENANCE COST (PERSONNEL EXPENSES)

(UNIT: 1000 Rs.)

SYSTEM	1994	1995	1996	1997	1998	1999	2000	2001
1. Mahankal Chaur	228.4	228.4	228.4	228.4	228.4	228.4	228.4	228.4
2. Bansbari	-	200.8	200.8	200.8	200.8	200.8	200.8	200.8
3. Shaibhu	-	57.6	57.6	57.6	57.6	57.6	57.6	57.6
4. Balaju	-	-	91.2	91.2	91.2	91.2	91.2	91.2
5. Lambagar	-	-	110.4	110.4	110.4	110.4	110.4	110.4
6. Sundarijal	-	-	-	158.4	158.4	158.4	158.4	158.4
7. Manohara	-	-	-	-	-	134.4	134.4	134.4
8. Balku	-	-	-	-	-	-	-	134.4
TOTAL	228.4	486.8	688.4	846.8	846.8	981.2	981.2	1,115.6

Table J-4.4 WATER SUPPLY AMOUNT FOR EXISTING AND PROPOSED FACILITIES

(UNIT: 1,000 m3)

SYSTEM	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<EXISTING SYSTEM>												
1. Mahankal Chaur	2,102	2,128	2,128	2,128	-	-	-	-	-	-	-	-
2. Bansbari	2,014	2,027	2,027	2,027	0	-	-	-	-	-	-	-
3. Shaibhu	5,885	5,885	5,885	5,885	5,978	-	-	-	-	-	-	-
4. Maharajganj	730	730	730	730	730	-	-	-	-	-	-	-
5. Balaju	3,213	3,213	3,213	3,213	2,628	0	-	-	-	-	-	-
6. Sundarijal	6,497	6,497	6,497	6,497	6,497	6,497	6,497	-	-	-	-	-
7. Others	584	584	584	584	584	584	584	584	584	584	584	584
Sub-Total	21,025	21,064	21,064	21,064	16,417	7,081	7,081	584	584	584	584	584
<PROPOSED SYSTEM>												
1. Mahankal Chaur	-	-	-	-	8,917	8,360	6,775	7,525	8,212	7,502	8,454	7,915
2. Bansbari	-	-	-	-	-	4,683	3,038	3,428	4,040	3,452	4,186	3,908
3. Shaibhu	-	-	-	-	-	8,096	6,778	7,305	7,820	7,174	7,800	7,336
4. Balaju	-	-	-	-	-	-	3,140	3,140	3,140	3,140	3,140	3,140
5. Lambagar	-	-	-	-	-	-	3,084	3,368	3,611	3,304	3,601	3,395
6. Sundarijal	-	-	-	-	-	-	-	6,497	6,497	6,497	6,497	6,497
7. Manohara	-	-	-	-	-	-	-	-	-	4,469	4,469	4,469
8. Balku	-	-	-	-	-	-	-	-	-	-	-	4,290
Sub-Total	0	0	0	0	8,917	21,139	22,815	31,263	33,320	35,538	38,147	40,950
TOTAL	21,025	21,064	21,064	21,064	25,334	28,220	29,896	31,847	33,904	36,122	38,731	41,534

Table J-4.5 (1/8) POWER COST FOR EACH SYSTEM

- MAHANKAL CHAUR -

FACILITY	1994	1995	1996	1997	1998	1999	2000	2001
1. INTAKE FACILITY								
- Intake pump	549.3	541.8	440.4	482.6	518.9	473.1	528.9	486.6
2. TREATMENT PLANT								
- Surface washing P.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
- Water supply P.	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
- Drain pump	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
- Blower pump	222.7	135.5	90.8	135.5	135.5	135.5	135.5	135.5
- Transmission P. (1)	253.4	237.5	192.5	213.8	233.3	213.2	240.2	224.9
- Transmission P. (2)	-	-	-	-	-	-	-	-
3. PRODUCTION WELL								
- Well pump	502.4	383.3	169.7	279.9	366.1	289.3	398.6	365.2
4. DISTRIBUTION								
- Distribution P. (1)	-	-	-	-	-	-	-	-
- Booster P. (1)	-	-	-	-	-	-	-	-
- Distribution P. (2)	-	-	-	-	-	-	-	-
- Booster P. (2)	-	-	-	-	-	-	-	-
- Distribution P. (3)	-	-	-	-	-	-	-	-
- Booster P. (3)	-	-	-	-	-	-	-	-
5. CHLORINATION								
- Chlorinator	64.7	58.5	43.8	51.0	57.2	51.2	59.4	55.4
TOTAL (1,000 Kwh)	1,605.4	1,369.5	950.1	1,175.7	1,323.9	1,175.2	1,375.5	1,280.5
Unit Rate (Rs./Kwh)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Basic Charge(1,000 Rs.)	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6
AMOUNT (1,000 Rs.)	1,229	1,052	737	906	1,018	906	1,056	985

Table J-4.5 (2/8) POWER COST FOR EACH SYSTEM

- BANSBARI -

FACILITY	1994	1995	1996	1997	1998	1999	2000	2001
1. INTAKE FACILITY								
- Intake pump	-	541.5	416.4	470.4	540.6	465.9	552.9	510.6
2. TREATMENT PLANT								
- Surface washing P.	-	1.8	1.8	1.8	1.8	1.8	1.8	1.8
- Water supply P.	-	5.5	5.5	5.5	5.5	5.5	5.5	5.5
- Drain pump	-	3.7	3.7	3.7	3.7	3.7	3.7	3.7
- Blower pump	-	244.2	113.9	135.5	135.5	135.5	135.5	135.5
- Transmission P. (1)	-	133.1	86.3	97.4	114.8	98.1	118.9	111.0
- Transmission P. (2)	-	-	-	-	-	-	-	-
3. PRODUCTION WELL								
- Well pump	-	900.0	385.5	473.5	631.9	489.8	675.8	618.4
4. DISTRIBUTION								
- Distribution P. (1)	-	-	-	-	-	-	-	-
- Booster P. (1)	-	-	-	-	-	-	-	-
- Distribution P. (2)	-	-	-	-	-	-	-	-
- Booster P. (2)	-	-	-	-	-	-	-	-
- Distribution P. (3)	-	-	-	-	-	-	-	-
- Booster P. (3)	-	-	-	-	-	-	-	-
5. CHLORINATION								
- Chlorinator	-	39.9	23.1	26.7	32.4	27.0	33.9	31.5
TOTAL (1,000 Kwh)	-	1,869.7	1,036.2	1,214.5	1,466.2	1,227.3	1,528.0	1,418.0
Unit Rate (Rs./Kwh)	-	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Basic Charge(1,000 Rs.)	-	24.0	24.0	24.0	24.0	24.0	24.0	24.0
AMOUNT (1,000 Rs.)	-	1,426	801	935	1,124	944	1,170	1,088

Table J-4.5 (3/8) POWER COST FOR EACH SYSTEM

- SHAIBHU -

FACILITY	1994	1995	1996	1997	1998	1999	2000	2001
1. INTAKE FACILITY								
- Intake pump	-	-	-	-	-	-	-	-
2. TREATMENT PLANT								
- Surface washing P.	-	-	-	-	-	-	-	-
- Water supply P.	-	-	-	-	-	-	-	-
- Drain pump	-	-	-	-	-	-	-	-
- Blower pump	-	-	-	-	-	-	-	-
- Transmission P. (1)	-	-	-	-	-	-	-	-
- Transmission P. (2)	-	-	-	-	-	-	-	-
3. PRODUCTION WELL								
- Well pump	-	105.3	85.7	85.7	105.3	85.7	105.3	85.7
4. DISTRIBUTION								
- Distribution P. (1)	-	-	-	-	-	-	-	-
- Booster P. (1)	-	-	-	-	-	-	-	-
- Distribution P. (2)	-	-	-	-	-	-	-	-
- Booster P. (2)	-	-	-	-	-	-	-	-
- Distribution P. (3)	-	-	-	-	-	-	-	-
- Booster P. (3)	-	-	-	-	-	-	-	-
5. CHLORINATION								
- Chlorinator	-	47.4	39.6	42.8	45.8	42.0	45.6	42.9
TOTAL (1,000 Kwh)	-	152.7	125.3	128.5	151.1	127.7	150.9	128.6
Unit Rate (Rs./Kwh)	-	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Basic Charge(1,000 Rs.)	-	3.5	3.5	3.5	3.5	3.5	3.5	3.5
AMOUNT (1,000 Rs.)	-	118	97	100	117	99	117	100

Table J-4.5 (4/8) POWER COST FOR EACH SYSTEM

- BALAJU -

FACILITY	1994	1995	1996	1997	1998	1999	2000	2001
1. INTAKE FACILITY								
- Intake pump	-	-	-	-	-	-	-	-
2. TREATMENT PLANT								
- Surface washing P.	-	-	1.6	1.6	1.6	1.6	1.6	1.6
- Water supply P.	-	-	1.4	1.4	1.4	1.4	1.4	1.4
- Drain pump	-	-	-	-	-	-	-	-
- Blower pump	-	-	-	-	-	-	-	-
- Transmission P. (1)	-	-	-	-	-	-	-	-
- Transmission P. (2)	-	-	-	-	-	-	-	-
3. PRODUCTION WELL								
- Well pump	-	-	17.0	17.0	17.0	17.0	17.0	17.0
4. DISTRIBUTION								
- Distribution P. (1)	-	-	-	-	-	-	-	-
- Booster P. (1)	-	-	-	-	-	-	-	-
- Distribution P. (2)	-	-	-	-	-	-	-	-
- Booster P. (2)	-	-	-	-	-	-	-	-
- Distribution P. (3)	-	-	-	-	-	-	-	-
- Booster P. (3)	-	-	-	-	-	-	-	-
5. CHLORINATION								
- Chlorinator	-	-	18.3	18.3	18.3	18.3	18.3	18.3
TOTAL (1,000 Kwh)	-	-	38.3	38.3	38.3	38.3	38.3	38.3
Unit Rate (Rs./Kwh)	-	-	0.75	0.75	0.75	0.75	0.75	0.75
Basic Charge(1,000 Rs.)	-	-	5.3	5.3	5.3	5.3	5.3	5.3
AMOUNT (1,000 Rs.)	-	-	34	34	34	34	34	34

Table J-4.5 (5/8) POWER COST FOR EACH SYSTEM

- LAMBAGAR -

FACILITY	1994	1995	1996	1997	1998	1999	2000	2001
1. INTAKE FACILITY								
- Intake pump	-	-	154.2	168.4	180.6	165.2	180.1	169.8
2. TREATMENT PLANT								
- Surface washing P.	-	-	1.1	1.1	1.1	1.1	1.1	1.1
- Water supply P.	-	-	3.3	3.3	3.3	3.3	3.3	3.3
- Drain pump	-	-	1.8	1.8	1.8	1.8	1.8	1.8
- Blower pump	-	-	-	-	-	-	-	-
- Transmission P. (1)	-	-	328.4	358.4	384.4	351.5	383.2	361.3
- Transmission P. (2)	-	-	652.9	713.3	764.6	699.8	762.7	719.0
3. PRODUCTION WELL								
- Well pump	-	-	-	-	-	-	-	-
4. DISTRIBUTION								
- Distribution P. (1)	-	-	47.4	52.0	55.4	50.8	55.4	52.4
- Booster P. (1)	-	-	-	-	-	-	-	-
- Distribution P. (2)	-	-	-	-	-	-	-	-
- Booster P. (2)	-	-	-	-	-	-	-	-
- Distribution P. (3)	-	-	-	-	-	-	-	-
- Booster P. (3)	-	-	-	-	-	-	-	-
5. CHLORINATION								
- Chlorinator	-	-	18.0	19.7	21.2	19.4	21.0	19.8
TOTAL (1,000 Kwh)	-	-	1,207.1	1,318.0	1,412.4	1,292.9	1,408.6	1,328.5
Unit Rate (Rs./Kwh)	-	-	0.75	0.75	0.75	0.75	0.75	0.75
Basic Charge(1,000 Rs.)	-	-	38.0	38.0	38.0	38.0	38.0	38.0
AMOUNT (1,000 Rs.)	-	-	943	1,027	1,097	1,008	1,094	1,034

Table J-4.5 (6/8) POWER COST FOR EACH SYSTEM

- SUNDARIJAL -

FACILITY	1994	1995	1996	1997	1998	1999	2000	2001
1. INTAKE FACILITY								
- Intake pump	-	-	-	203.0	203.0	203.0	203.0	203.0
2. TREATMENT PLANT								
- Surface washing P.	-	-	-	2.9	2.9	2.9	2.9	2.9
- Water supply P.	-	-	-	2.9	2.9	2.9	2.9	2.9
- Drain pump	-	-	-	2.3	2.3	2.3	2.3	2.3
- Blower pump	-	-	-	-	-	-	-	-
- Transmission P. (1)	-	-	-	-	-	-	-	-
- Transmission P. (2)	-	-	-	-	-	-	-	-
3. PRODUCTION WELL								
- Well pump	-	-	-	-	-	-	-	-
4. DISTRIBUTION								
- Distribution P. (1)	-	-	-	109.0	109.0	109.0	109.0	109.0
- Booster P. (1)	-	-	-	43.1	43.1	43.1	43.1	43.1
- Distribution P. (2)	-	-	-	109.0	109.0	109.0	109.0	109.0
- Booster P. (2)	-	-	-	43.1	43.1	43.1	43.1	43.1
- Distribution P. (3)	-	-	-	66.3	66.3	66.3	66.3	66.3
- Booster P. (3)	-	-	-	32.3	32.3	32.3	32.3	32.3
5. CHLORINATION								
- Chlorinator	-	-	-	38.0	38.0	38.0	38.0	38.0
TOTAL (1,000 Kwh)	-	-	-	651.9	651.9	651.9	651.9	651.9
Unit Rate (Rs./Kwh)	-	-	-	0.75	0.75	0.75	0.75	0.75
Basic Charge(1,000 Rs.)	-	-	-	13.0	13.0	13.0	13.0	13.0
AMOUNT (1,000 Rs.)	-	-	-	502	502	502	502	502

Table J-4.5 (7/8) POWER COST FOR EACH SYSTEM

- MANOHARA -

FACILITY	1994	1995	1996	1997	1998	1999	2000	2001
1. INTAKE FACILITY								
- Intake pump	-	-	-	-	-	223.5	223.5	223.5
2. TREATMENT PLANT								
- Surface washing P.	-	-	-	-	-	1.1	1.1	1.1
- Water supply P.	-	-	-	-	-	3.3	3.3	3.3
- Drain pump	-	-	-	-	-	1.8	1.8	1.8
- Blower pump	-	-	-	-	-	-	-	-
- Transmission P. (1)	-	-	-	-	-	-	-	-
- Transmission P. (2)	-	-	-	-	-	-	-	-
3. PRODUCTION WELL								
- Well pump	-	-	-	-	-	-	-	-
4. DISTRIBUTION								
- Distribution P. (1)	-	-	-	-	-	107.2	107.2	107.2
- Booster P. (1)	-	-	-	-	-	42.3	42.3	42.3
- Distribution P. (2)	-	-	-	-	-	107.2	107.2	107.2
- Booster P. (2)	-	-	-	-	-	42.3	42.3	42.3
- Distribution P. (3)	-	-	-	-	-	-	-	-
- Booster P. (3)	-	-	-	-	-	-	-	-
5. CHLORINATION								
- Chlorinator	-	-	-	-	-	26.1	26.1	26.1
TOTAL (1,000 Kwh)	-	-	-	-	-	554.8	554.8	554.8
Unit Rate (Rs./Kwh)	-	-	-	-	-	0.75	0.75	0.75
Basic Charge(1,000 Rs.)	-	-	-	-	-	21.9	21.9	21.9
AMOUNT (1,000 Rs.)	-	-	-	-	-	438	438	438

Table J-4.5 (8/8) POWER COST FOR EACH SYSTEM

- BALKHU -

FACILITY	1994	1995	1996	1997	1998	1999	2000	2001
1. INTAKE FACILITY								
- Intake pump	-	-	-	-	-	-	-	214.5
2. TREATMENT PLANT								
- Surface washing P.	-	-	-	-	-	-	-	1.1
- Water supply P.	-	-	-	-	-	-	-	3.3
- Drain pump	-	-	-	-	-	-	-	1.8
- Blower pump	-	-	-	-	-	-	-	-
- Transmission P. (1)	-	-	-	-	-	-	-	-
- Transmission P. (2)	-	-	-	-	-	-	-	-
3. PRODUCTION WELL								
- Well pump	-	-	-	-	-	-	-	-
4. DISTRIBUTION								
- Distribution P. (1)	-	-	-	-	-	-	-	102.9
- Booster P. (1)	-	-	-	-	-	-	-	40.6
- Distribution P. (2)	-	-	-	-	-	-	-	-
- Booster P. (2)	-	-	-	-	-	-	-	-
- Distribution P. (3)	-	-	-	-	-	-	-	-
- Booster P. (3)	-	-	-	-	-	-	-	-
5. CHLORINATION								
- Chlorinator	-	-	-	-	-	-	-	25.1
TOTAL (1,000 Kwh)	-	-	-	-	-	-	-	389.3
Unit Rate (Rs./Kwh)	-	-	-	-	-	-	-	0.75
Basic Charge(1,000 Rs.)	-	-	-	-	-	-	-	20.5
AMOUNT (1,000 Rs.)	-	-	-	-	-	-	-	312

Table J-4.6 (1/3) ANNUAL WATER SUPPLY AMOUNT FOR EACH SYSTEM (ANNUAL)

(UNIT: 1,000 m3)

SYSTEM	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1. BALAJU												
-Surface water	3,066	3,066	3,066	3,066	2,554	0	3,066	3,066	3,066	3,066	3,066	3,066
-Groundwater	147	147	147	147	74	0	74	74	74	74	74	74
2. LAMBAGAR	0	0	0	0	0	0	3,084	3,368	3,611	3,304	3,601	3,395
3. MAHARAJGANJ	730	730	730	730	730	0	0	0	0	0	0	0
4. BANSBARI												
-Shivapuri	0	0	0	0	0	730	730	730	730	730	730	730
-Bisnumati	0	0	0	0	0	1,805	1,388	1,568	1,802	1,553	1,843	1,702
-Groundwater	2,014	2,027	2,027	2,027	0	2,148	920	1,130	1,508	1,169	1,613	1,476
5. SUNDARIJAL	6,497	6,497	6,497	6,497	6,497	6,497	6,497	6,497	6,497	6,497	6,497	6,497
6. MAHANKAL CHAUR												
-Sundarijal	0	0	0	0	3,117	3,117	3,117	3,117	3,195	3,117	3,232	3,117
-Dhobi khola	0	0	0	0	3,662	3,612	2,936	3,217	3,459	3,154	3,526	3,244
-Groundwater	2,102	2,128	2,128	2,128	2,138	1,631	722	1,191	1,558	1,231	1,696	1,554
7. SHAIBHU												
-Surface water	5,366	5,366	5,366	5,366	5,260	7,661	6,424	6,951	7,385	6,820	7,365	6,982
-Groundwater	519	519	519	519	534	435	354	354	435	354	435	354
8. MANOHARA	0	0	0	0	0	0	0	0	0	4,469	4,469	4,469
9. BALKHU	0	0	0	0	0	0	0	0	0	0	0	4,290
10. OTHERS	584	584	584	584	584	584	584	584	584	584	584	584
TOTAL	21,025	21,064	21,064	21,064	25,150	28,220	29,896	31,847	33,904	36,122	38,731	41,534

Table J-4.6 (2/3) ANNUAL WATER SUPPLY AMOUNT FOR EACH SYSTEM (WET SEASON)

(UNIT: 1,000 m3)

SYSTEM	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1. BALAJU												
-Surface water	1,546	1,546	1,546	1,546	1,546	0	1,546	1,546	1,546	1,546	1,546	1,546
-Groundwater	110	110	110	110	37	0	37	37	37	37	37	37
2. LAMBAGAR	0	0	0	0	0	0	1,813	1,966	2,095	1,967	2,107	2,041
3. MAHARAJGANJ	368	368	368	368	368	0	0	0	0	0	0	0
4. BANSBARI												
-Shivapuri	0	0	0	0	0	368	368	368	368	368	368	368
-Bisnumati	0	0	0	0	0	1,419	1,128	1,268	1,460	1,271	1,507	1,414
-Groundwater	1,343	1,343	1,343	1,343	0	1,294	527	579	761	596	828	739
5. SUNDARIJAL	3,251	3,251	3,251	3,251	3,251	3,251	3,251	3,251	3,251	3,251	3,251	3,251
6. MAHANKAL CHAUR												
-Sundarijal	0	0	0	0	1,676	1,676	1,676	1,676	1,754	1,676	1,791	1,676
-Dhobi khola	0	0	0	0	2,085	2,085	1,762	1,915	2,044	1,916	2,133	1,990
-Groundwater	1,340	1,340	1,340	1,340	1,399	854	308	610	802	628	870	778
7. SHAIBHU												
-Surface water	2,705	2,705	2,705	2,705	2,705	3,974	3,421	3,684	3,904	3,685	3,925	3,812
-Groundwater	350	350	350	350	357	177	177	177	177	177	177	177
8. MANOHARA	0	0	0	0	0	0	0	0	0	2,292	2,292	2,292
9. BALKHU	0	0	0	0	0	0	0	0	0	0	0	2,240
10. OTHERS	294	294	294	294	294	294	294	294	294	294	294	294
TOTAL	11,307	11,307	11,307	11,307	13,718	15,392	16,308	17,371	18,493	19,704	21,126	22,655

Table J-4.6 (3/3) ANNUAL WATER SUPPLY AMOUNT FOR EACH SYSTEM (DRY SEASON)

(UNIT: 1,000 m3)

SYSTEM	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1. BALAJU												
-Surface water	1,520	1,520	1,520	1,520	1,008	0	1,520	1,520	1,520	1,520	1,520	1,520
-Groundwater	37	37	37	37	37	0	37	37	37	37	37	37
2. LAMBAGAR	0	0	0	0	0	0	1,271	1,402	1,516	1,337	1,494	1,354
3. MAHARAJGANJ	362	362	362	362	362	0	0	0	0	0	0	0
4. BANSBARI												
-Shivapuri	0	0	0	0	0	362	362	362	362	362	362	362
-Bisnumati	0	0	0	0	0	386	260	300	342	282	336	288
-Groundwater	671	684	684	684	0	854	393	551	747	573	785	737
5. SUNDARIJAL	3,246	3,246	3,246	3,246	3,246	3,246	3,246	3,246	3,246	3,246	3,246	3,246
6. MAHANKAL CHAUR												
-Sundarijal	0	0	0	0	1,441	1,441	1,441	1,441	1,441	1,441	1,441	1,441
-Dhobi khola	0	0	0	0	1,577	1,527	1,174	1,302	1,415	1,238	1,393	1,254
-Groundwater	762	788	788	788	739	777	414	581	756	603	826	776
7. SHAIBHU												
-Surface water	2,661	2,661	2,661	2,661	2,555	3,687	3,003	3,267	3,481	3,135	3,440	3,170
-Groundwater	169	169	169	169	177	258	177	177	258	177	258	177
8. MANOHARA	0	0	0	0	0	0	0	0	0	2,177	2,177	2,177
9. BALKHU	0	0	0	0	0	0	0	0	0	0	0	2,050
10. OTHERS	290	290	290	290	290	290	290	290	290	290	290	290
TOTAL	9,718	9,757	9,757	9,757	11,432	12,828	13,588	14,476	15,411	16,418	17,605	18,879

Table J-4.7 (1/8) CHEMICAL REAGENT COST FOR EACH SYSTEM

- MAHANKAL CHAUR -

ITEMS	1994	1995	1996	1997	1998	1999	2000	2001
1. SUPPLY AMOUNT (1,000m3)								
a) Surface water								
- Wet season	3,761	3,761	3,438	3,591	3,798	3,592	3,924	3,666
- Dry season	3,018	2,968	2,615	2,743	2,856	2,679	2,834	2,695
b) Groundwater	2,138	1,631	722	1,191	1,558	1,231	1,696	1,554
2. CHEMICAL REAGENT								
a) PAC								
- Quantity (t)	27.3	25.9	21.4	23.5	25.5	23.5	26.3	24.6
- Unit rate (Rs./t)	63,600	63,600	63,600	63,600	63,600	63,600	63,600	63,600
- Amount (1,000 Rs.)	1,736	1,647	1,361	1,495	1,622	1,495	1,673	1,565
b) LIME								
- Quantity (t)	152.7	136.1	99.0	117.5	133.5	118.3	139.7	129.9
- Unit rate (Rs./t)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
- Amount (1,000 Rs.)	305	272	198	235	267	237	279	260
c) SALT								
- Quantity (t)	43.1	39.0	29.2	34.0	38.1	34.1	39.6	36.9
- Unit rate (Rs./t)	1,650	1,650	1,650	1,650	1,650	1,650	1,650	1,650
- Amount (1,000 Rs.)	71	64	48	56	63	56	65	61
TOTAL AMOUNT (1,000 Rs.)	2,112	1,983	1,607	1,786	1,952	1,788	2,017	1,886

Table J-4.7 (2/8) CHEMICAL REAGENT COST FOR EACH SYSTEM

- BANSBARI -

ITEMS	1994	1995	1996	1997	1998	1999	2000	2001
1. SUPPLY AMOUNT (1,000m3)								
a) Surface water								
- Wet season	-	1,787	1,496	1,636	1,828	1,639	1,875	1,782
- Dry season	-	748	622	662	704	644	698	650
b) Groundwater	-	2,148	920	1,130	1,508	1,169	1,613	1,476
2. CHEMICAL REAGENT								
a) PAC								
- Quantity (t)	-	14.1	9.5	10.7	12.5	10.8	12.9	12.1
- Unit rate (Rs./t)	-	63,600	63,600	63,600	63,600	63,600	63,600	63,600
- Amount (1,000 Rs.)	-	897	604	681	795	687	820	770
b) LIME								
- Quantity (t)	-	103.3	58.4	67.6	83.1	68.8	87.2	80.9
- Unit rate (Rs./t)	-	2,000	2,000	2,000	2,000	2,000	2,000	2,000
- Amount (1,000 Rs.)	-	207	117	135	166	138	174	162
c) SALT								
- Quantity (t)	-	26.6	15.4	17.8	21.6	18.0	22.6	21.0
- Unit rate (Rs./t)	-	1,650	1,650	1,650	1,650	1,650	1,650	1,650
- Amount (1,000 Rs.)	-	44	25	29	36	30	37	35
TOTAL AMOUNT (1,000 Rs.)	-	1,148	746	845	997	855	1,031	967

Table J-4.7 (3/8) CHEMICAL REAGENT COST FOR EACH SYSTEM

- SHAIBHU -

ITEMS	1994	1995	1996	1997	1998	1999	2000	2001
1. SUPPLY AMOUNT (1,000m3)								
a) Surface water								
- Wet season	-	3,974	3,421	3,684	3,904	3,685	3,925	3,812
- Dry season	-	3,687	3,003	3,267	3,481	3,135	3,440	3,170
b) Groundwater	-	435	354	354	435	354	435	354
2. CHEMICAL REAGENT								
a) PAC								
- Quantity (t)	-	-	-	-	-	-	-	-
- Unit rate (Rs./t)	-	-	-	-	-	-	-	-
- Amount (1,000 Rs.)	-	-	-	-	-	-	-	-
b) LIME								
- Quantity (t)	-	-	-	-	-	-	-	-
- Unit rate (Rs./t)	-	-	-	-	-	-	-	-
- Amount (1,000 Rs.)	-	-	-	-	-	-	-	-
c) SALT								
- Quantity (t)	-	31.6	26.4	28.5	30.5	28.0	30.4	28.6
- Unit rate (Rs./t)	-	1,650	1,650	1,650	1,650	1,650	1,650	1,650
- Amount (1,000 Rs.)	-	52	44	47	50	46	50	47
TOTAL AMOUNT (1,000 Rs.)	-	52	44	47	50	46	50	47

Table J-4.7 (4/8) CHEMICAL REAGENT COST FOR EACH SYSTEM

- BALAJU -

ITEMS	1994	1995	1996	1997	1998	1999	2000	2001
1. SUPPLY AMOUNT (1,000m3)								
a) Surface water								
- Wet season	-	-	1,546	1,546	1,546	1,546	1,546	1,546
- Dry season	-	-	1,520	1,520	1,520	1,520	1,520	1,520
b) Groundwater	-	-	74	74	74	74	74	74
2. CHEMICAL REAGENT								
a) PAC								
- Quantity (t)	-	-	9.9	9.9	9.9	9.9	9.9	9.9
- Unit rate (Rs./t)	-	-	63,600	63,600	63,600	63,600	63,600	63,600
- Amount (1,000 Rs.)	-	-	630	630	630	630	630	630
b) LIME								
- Quantity (t)	-	-	37.8	37.8	37.8	37.8	37.8	37.8
- Unit rate (Rs./t)	-	-	2,000	2,000	2,000	2,000	2,000	2,000
- Amount (1,000 Rs.)	-	-	76	76	76	76	76	76
c) SALT								
- Quantity (t)	-	-	12.2	12.2	12.2	12.2	12.2	12..2
- Unit rate (Rs./t)	-	-	1,650	1,650	1,650	1,650	1,650	1,650
- Amount (1,000 Rs.)	-	-	20	20	20	20	20	20
TOTAL AMOUNT (1,000 Rs.)	-	-	726	726	726	726	726	726

Table J-4.7 (5/8) CHEMICAL REAGENT COST FOR EACH SYSTEM

- LAMBAGAR -

ITEMS	1994	1995	1996	1997	1998	1999	2000	2001
1. SUPPLY AMOUNT (1,000m3)								
a) Surface water								
- Wet season	-	-	1,813	1,966	2,095	1,967	2,107	2,041
- Dry season	-	-	1,271	1,402	1,516	1,337	1,494	1,354
b) Groundwater	-	-	-	-	-	-	-	-
2. CHEMICAL REAGENT								
a) PAC								
- Quantity (t)	-	-	10.0	10.9	11.7	10.8	11.7	11.1
- Unit rate (Rs./t)	-	-	63,600	63,600	63,600	63,600	63,600	63,600
- Amount (1,000 Rs.)	-	-	636	693	744	687	744	706
b) LIME								
- Quantity (t)	-	-	39.2	42.7	45.6	42.2	45.7	43.5
- Unit rate (Rs./t)	-	-	2,000	2,000	2,000	2,000	2,000	2,000
- Amount (1,000 Rs.)	-	-	78	85	91	84	91	87
c) SALT								
- Quantity (t)	-	-	12.0	13.1	14.1	12.9	14.0	13.2
- Unit rate (Rs./t)	-	-	1,650	1,650	1,650	1,650	1,650	1,650
- Amount (1,000 Rs.)	-	-	20	22	23	21	23	22
TOTAL AMOUNT (1,000 Rs.)	-	-	734	800	858	792	858	815

Table J-4.7 (6/8) CHEMICAL REAGENT COST FOR EACH SYSTEM

- SUNDARIJAL -

ITEMS	1994	1995	1996	1997	1998	1999	2000	2001
1. SUPPLY AMOUNT (1,000m3)								
a) Surface water								
- Wet season	-	-	-	3,251	3,251	3,251	3,251	3,251
- Dry season	-	-	-	3,246	3,246	3,246	3,246	3,246
b) Groundwater	-	-	-	-	-	-	-	-
2. CHEMICAL REAGENT								
a) PAC								
- Quantity (t)	-	-	-	20.5	20.5	20.5	20.5	20.5
- Unit rate (Rs./t)	-	-	-	63,600	63,600	63,600	63,600	63,600
- Amount (1,000 Rs.)	-	-	-	1,304	1,304	1,304	1,304	1,304
b) LIME								
- Quantity (t)	-	-	-	78.0	78.0	78.0	78.0	78.0
- Unit rate (Rs./t)	-	-	-	2,000	2,000	2,000	2,000	2,000
- Amount (1,000 Rs.)	-	-	-	156	156	156	156	156
c) SALT								
- Quantity (t)	-	-	-	25.3	25.3	25.3	25.3	25.3
- Unit rate (Rs./t)	-	-	-	1,650	1,650	1,650	1,650	1,650
- Amount (1,000 Rs.)	-	-	-	42	42	42	42	42
TOTAL AMOUNT (1,000 Rs.)	-	-	-	1,502	1,502	1,502	1,502	1,502

Table J-4.7 (7/8) CHEMICAL REAGENT COST FOR EACH SYSTEM

- MANOHARA -

ITEMS	1994	1995	1996	1997	1998	1999	2000	2001
1. SUPPLY AMOUNT (1,000m3)								
a) Surface water								
- Wet season	-	-	-	-	-	2,292	2,292	2,292
- Dry season	-	-	-	-	-	2,177	2,177	2,177
b) Groundwater	-	-	-	-	-	-	-	-
2. CHEMICAL REAGENT								
a) PAC								
- Quantity (t)	-	-	-	-	-	14.1	14.1	14.1
- Unit rate (Rs./t)	-	-	-	-	-	63,600	63,600	63,600
- Amount (1,000 Rs.)	-	-	-	-	-	897	897	897
b) LIME								
- Quantity (t)	-	-	-	-	-	58.7	58.7	58.7
- Unit rate (Rs./t)	-	-	-	-	-	2,000	2,000	2,000
- Amount (1,000 Rs.)	-	-	-	-	-	117	117	117
c) SALT								
- Quantity (t)	-	-	-	-	-	17.4	17.4	17.4
- Unit rate (Rs./t)	-	-	-	-	-	1,650	1,650	1,650
- Amount (1,000 Rs.)	-	-	-	-	-	29	29	29
TOTAL AMOUNT (1,000 Rs.)	-	-	-	-	-	1,043	1,043	1,043

Table J-4.7 (8/8) CHEMICAL REAGENT COST FOR EACH SYSTEM

- BALKHU -

ITEMS	1994	1995	1996	1997	1998	1999	2000	2001
1. SUPPLY AMOUNT (1,000m3)								
a) Surface water								
- Wet season	-	-	-	-	-	-	-	2,240
- Dry season	-	-	-	-	-	-	-	2,050
b) Groundwater	-	-	-	-	-	-	-	-
2. CHEMICAL REAGENT								
a) PAC								
- Quantity (t)	-	-	-	-	-	-	-	13.6
- Unit rate (Rs./t)	-	-	-	-	-	-	-	63,600
- Amount (1,000 Rs.)	-	-	-	-	-	-	-	865
b) LIME								
- Quantity (t)	-	-	-	-	-	-	-	52.2
- Unit rate (Rs./t)	-	-	-	-	-	-	-	2,000
- Amount (1,000 Rs.)	-	-	-	-	-	-	-	104
c) SALT								
- Quantity (t)	-	-	-	-	-	-	-	16.7
- Unit rate (Rs./t)	-	-	-	-	-	-	-	1,650
- Amount (1,000 Rs.)	-	-	-	-	-	-	-	28
TOTAL AMOUNT (1,000 Rs.)	-	-	-	-	-	-	-	997

Table J-4.8 (1/4) REPLACEMENT AND MAINTENANCE COST OF FACILITIES

(Unit: US$1,000)

SYSTEM	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1. Mahankal Chaur	0.0	0.0	0.0	137.2	116.7	0.0	0.0	137.2	0.0	312.7
	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
2. Bansbari	-	0.0	0.0	0.0	122.7	97.1	0.0	0.0	122.7	0.0
	-	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
3. Shaibhu	-	0.0	0.0	0.0	87.7	6.8	0.0	0.0	87.7	0.0
	-	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4. Balaju	-	-	0.0	0.0	0.0	59.3	12.6	0.0	0.0	59.3
	-	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
5. Lambagar	-	-	0.0	0.0	0.0	73.7	105.5	0.0	0.0	73.7
	-	-	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
6. Sundarijal	-	-	-	0.0	0.0	0.0	87.7	170.8	0.0	0.0
	-	-	-	6.3	6.3	6.3	6.3	6.3	6.3	6.3
7. Manohara	-	-	-	-	-	0.0	0.0	0.0	73.7	128.8
	-	-	-	-	-	5.7	5.7	5.7	5.7	5.7
8. Balkhu	-	-	-	-	-	-	-	0.0	0.0	0.0
	-	-	-	-	-	-	-	4.7	4.7	4.7

NOTE Upper line: Replacement cost
Lower line: Maintenance cost

Table J-4.8 (2/4) REPLACEMENT AND MAINTENANCE COST OF FACILITIES

(Unit: US$1,000)

SYSTEM	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1. Mahankal Chaur	0.0	137.2	0.0	0.0	116.7	137.2	0.0	0.0	0.0	449.9
	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
2. Bansbari	252.5	0.0	122.7	0.0	0.0	97.1	122.7	0.0	0.0	0.0
	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
3. Shaibhu	10.0	0.0	87.7	0.0	0.0	6.8	87.7	0.0	0.0	0.0
	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4. Balaju	0.0	12.6	0.0	59.3	0.0	0.0	12.6	59.3	0.0	0.0
	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
5. Lambagar	0.0	275.3	0.0	73.7	0.0	0.0	105.5	73.7	0.0	0.0
	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
6. Sundarijal	87.7	0.0	315.0	0.0	87.7	0.0	0.0	170.8	87.7	0.0
	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
7. Manohara	0.0	0.0	73.7	0.0	348.1	0.0	73.7	0.0	0.0	128.8
	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
8. Balkhu	73.7	97.1	0.0	0.0	73.7	0.0	255.3	0.0	73.7	0.0
	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7

NOTE Upper line: Replacement cost
Lower line: Maintenance cost

Table J-4.8 (3/4) REPLACEMENT AND MAINTENANCE COST OF FACILITIES

(Unit: US$1,000)

SYSTEM	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1. Mahankal Chaur	0.0	0.0	0.0	137.2	116.7	0.0	0.0	137.2	0.0	312.7
	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
2. Bansbari	375.2	0.0	0.0	0.0	122.7	97.1	0.0	0.0	122.7	0.0
	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
3. Shaibhu	97.8	0.0	0.0	0.0	87.7	6.8	0.0	0.0	87.7	0.0
	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4. Balaju	0.0	71.9	0.0	0.0	0.0	59.3	12.6	0.0	0.0	59.3
	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
5. Lambagar	0.0	349.1	0.0	0.0	0.0	73.7	105.5	0.0	0.0	73.7
	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
6. Sundarijal	0.0	0.0	402.7	0.0	0.0	0.0	87.7	170.8	0.0	0.0
	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
7. Manohara	73.7	0.0	0.0	0.0	421.9	0.0	0.0	0.0	73.7	128.8
	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
8. Balkhu	0.0	97.1	73.7	0.0	0.0	0.0	329.0	0.0	0.0	0.0
	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7

NOTE Upper line: Replacement cost
Lower line: Maintenance cost

Table J-4.8 (4/4) REPLACEMENT AND MAINTENANCE COST OF FACILITIES

(Unit: US$1,000)

SYSTEM	2024	2025	2026	2027	2028	2029	2030	AVERAGE*
1. Mahankal Chaur	-	-	-	-	-	-	-	74.9
	-	-	-	-	-	-	-	8.0
2. Bansbari	252.5	-	-	-	-	-	-	63.6
	6.7	-	-	-	-	-	-	6.7
3. Shaibhu	10.0	-	-	-	-	-	-	22.1
	2.0	-	-	-	-	-	-	2.0
4. Balaju	0.0	12.6	-	-	-	-	-	16.4
	2.5	2.5	-	-	-	-	-	2.5
5. Lambagar	0.0	275.3	-	-	-	-	-	55.3
	4.7	4.7	-	-	-	-	-	4.7
6. Sundarijal	87.7	0.0	315.0	-	-	-	-	69.0
	6.3	6.3	6.3	-	-	-	-	6.3
7. Manohara	0.0	0.0	73.7	0.0	348.1	-	-	64.9
	5.7	5.7	5.7	5.7	5.7	-	-	5.7
8. Balkhu	73.7	97.1	0.0	0.0	73.7	0.0	255.3	52.4
	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7

NOTE Upper line: Replacement cost
Lower line: Maintenance cost
*: Average within the project life (30 years)

Table J-4.9 OFFICE MAINTENANCE COST

(UNIT: Rs.1000)

SYSTEM	1994	1995	1996	1997	1998	1999	2000	2001
1. Mahankal Chaur	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
2. Bansbari	-	14.1	14.1	14.1	14.1	14.1	14.1	14.1
3. Shaibhu	-	4.0	4.0	4.0	4.0	4.0	4.0	4.0
4. Balaju	-	-	6.4	6.4	6.4	6.4	6.4	6.4
5. Lambagar	-	-	7.7	7.7	7.7	7.7	7.7	7.7
6. Sundarijal	-	-	-	11.1	11.1	11.1	11.1	11.1
7. Manohara	-	-	-	-	-	9.4	9.4	9.4
8. Balkhu	-	-	-	-	-	-	-	9.4
TOTAL	16.0	34.1	48.2	59.3	59.3	68.7	68.7	78.1

NOTE: 7% of the personnel expenses

Table J-4.10 (1/8) OPERATION, MAINTENANCE AND REPLACEMENT COST FOR EACH SYSTEM

- MAHANKAL CHAUR -

YEAR	OPERATION, MAINTENANCE AND REPLACEMENT COST						TOTAL
	Personnel expenses	Office maintenance	Chemical reagent	Electoric energy	Facility maintenance	Facility replacement	(US$1000)
1994	7.6	0.5	70.4	41.0	8.0	74.9	202
1995	7.6	0.5	66.1	35.1	8.0	74.9	192
1996	7.6	0.5	53.6	24.6	8.0	74.9	169
1997	7.6	0.5	59.5	30.2	8.0	74.9	181
1998	7.6	0.5	65.1	33.9	8.0	74.9	190
1999	7.6	0.5	59.6	30.2	8.0	74.9	181
2000	7.6	0.5	67.2	35.2	8.0	74.9	193
2001	7.6	0.5	62.9	32.8	8.0	74.9	187
2002	7.6	0.5	62.9	32.8	8.0	74.9	187
2003	7.6	0.5	62.9	32.8	8.0	74.9	187
2004	7.6	0.5	62.9	32.8	8.0	74.9	187
2005	7.6	0.5	62.9	32.8	8.0	74.9	187
2006	7.6	0.5	62.9	32.8	8.0	74.9	187
2007	7.6	0.5	62.9	32.8	8.0	74.9	187
2008	7.6	0.5	62.9	32.8	8.0	74.9	187
2009	7.6	0.5	62.9	32.8	8.0	74.9	187
2010	7.6	0.5	62.9	32.8	8.0	74.9	187
2011	7.6	0.5	62.9	32.8	8.0	74.9	187
2012	7.6	0.5	62.9	32.8	8.0	74.9	187
2013	7.6	0.5	62.9	32.8	8.0	74.9	187
2014	7.6	0.5	62.9	32.8	8.0	74.9	187
2015	7.6	0.5	62.9	32.8	8.0	74.9	187
2016	7.6	0.5	62.9	32.8	8.0	74.9	187
2017	7.6	0.5	62.9	32.8	8.0	74.9	187
2018	7.6	0.5	62.9	32.8	8.0	74.9	187
2019	7.6	0.5	62.9	32.8	8.0	74.9	187
2020	7.6	0.5	62.9	32.8	8.0	74.9	187
2021	7.6	0.5	62.9	32.8	8.0	74.9	187
2022	7.6	0.5	62.9	32.8	8.0	74.9	187
2023	7.6	0.5	62.9	32.8	8.0	74.9	187

Table J-4.10 (2/8) OPERATION, MAINTENANCE AND REPLACEMENT COST FOR EACH SYSTEM

- BANSBARI -

YEAR	OPERATION, MAINTENANCE AND REPLACEMENT COST						TOTAL
	Personnel expenses	Office maintenance	Chemical reagent	Electoric energy	Facility maintenance	Facility replacement	(US$1000)
1995	6.7	0.5	38.3	47.5	6.7	63.6	163
1996	6.7	0.5	24.9	26.7	6.7	63.6	129
1997	6.7	0.5	28.2	31.2	6.7	63.6	137
1998	6.7	0.5	33.2	37.5	6.7	63.6	148
1999	6.7	0.5	28.5	31.5	6.7	63.6	138
2000	6.7	0.5	34.4	39.0	6.7	63.6	151
2001	6.7	0.5	32.2	36.3	6.7	63.6	146
2002	6.7	0.5	32.2	36.3	6.7	63.6	146
2003	6.7	0.5	32.2	36.3	6.7	63.6	146
2004	6.7	0.5	32.2	36.3	6.7	63.6	146
2005	6.7	0.5	32.2	36.3	6.7	63.6	146
2006	6.7	0.5	32.2	36.3	6.7	63.6	146
2007	6.7	0.5	32.2	36.3	6.7	63.6	146
2008	6.7	0.5	32.2	36.3	6.7	63.6	146
2009	6.7	0.5	32.2	36.3	6.7	63.6	146
2010	6.7	0.5	32.2	36.3	6.7	63.6	146
2011	6.7	0.5	32.2	36.3	6.7	63.6	146
2012	6.7	0.5	32.2	36.3	6.7	63.6	146
2013	6.7	0.5	32.2	36.3	6.7	63.6	146
2014	6.7	0.5	32.2	36.3	6.7	63.6	146
2015	6.7	0.5	32.2	36.3	6.7	63.6	146
2016	6.7	0.5	32.2	36.3	6.7	63.6	146
2017	6.7	0.5	32.2	36.3	6.7	63.6	146
2018	6.7	0.5	32.2	36.3	6.7	63.6	146
2019	6.7	0.5	32.2	36.3	6.7	63.6	146
2020	6.7	0.5	32.2	36.3	6.7	63.6	146
2021	6.7	0.5	32.2	36.3	6.7	63.6	146
2022	6.7	0.5	32.2	36.3	6.7	63.6	146
2023	6.7	0.5	32.2	36.3	6.7	63.6	146
2024	6.7	0.5	32.2	36.3	6.7	63.6	146

Table J-4.10 (3/8) OPERATION, MAINTENANCE AND REPLACEMENT COST FOR EACH SYSTEM

- SHAIBHU -

YEAR	OPERATION, MAINTENANCE AND REPLACEMENT COST						TOTAL
	Personnel expenses	Office maintenance	Chemical reagent	Electoric energy	Facility maintenance	Facility replacement	(US$1000)
1995	1.9	0.1	1.7	3.9	2.0	22.1	32
1996	1.9	0.1	1.5	3.2	2.0	22.1	31
1997	1.9	0.1	1.6	3.3	2.0	22.1	31
1998	1.9	0.1	1.7	3.9	2.0	22.1	32
1999	1.9	0.1	1.5	3.3	2.0	22.1	31
2000	1.9	0.1	1.7	3.9	2.0	22.1	32
2001	1.9	0.1	1.6	3.3	2.0	22.1	31
2002	1.9	0.1	1.6	3.3	2.0	22.1	31
2003	1.9	0.1	1.6	3.3	2.0	22.1	31
2004	1.9	0.1	1.6	3.3	2.0	22.1	31
2005	1.9	0.1	1.6	3.3	2.0	22.1	31
2006	1.9	0.1	1.6	3.3	2.0	22.1	31
2007	1.9	0.1	1.6	3.3	2.0	22.1	31
2008	1.9	0.1	1.6	3.3	2.0	22.1	31
2009	1.9	0.1	1.6	3.3	2.0	22.1	31
2010	1.9	0.1	1.6	3.3	2.0	22.1	31
2011	1.9	0.1	1.6	3.3	2.0	22.1	31
2012	1.9	0.1	1.6	3.3	2.0	22.1	31
2013	1.9	0.1	1.6	3.3	2.0	22.1	31
2014	1.9	0.1	1.6	3.3	2.0	22.1	31
2015	1.9	0.1	1.6	3.3	2.0	22.1	31
2016	1.9	0.1	1.6	3.3	2.0	22.1	31
2017	1.9	0.1	1.6	3.3	2.0	22.1	31
2018	1.9	0.1	1.6	3.3	2.0	22.1	31
2019	1.9	0.1	1.6	3.3	2.0	22.1	31
2020	1.9	0.1	1.6	3.3	2.0	22.1	31
2021	1.9	0.1	1.6	3.3	2.0	22.1	31
2022	1.9	0.1	1.6	3.3	2.0	22.1	31
2023	1.9	0.1	1.6	3.3	2.0	22.1	31
2024	1.9	0.1	1.6	3.3	2.0	22.1	31

Table J-4.10 (4/8) OPERATION, MAINTENANCE AND REPLACEMENT COST FOR EACH SYSTEM

- BALAJU -

YEAR	OPERATION, MAINTENANCE AND REPLACEMENT COST						TOTAL
	Personnel expenses	Office maintenance	Chemical reagent	Electoric energy	Facility maintenance	Facility replacement	(US$1000)
1996	3.0	0.2	24.2	1.1	2.5	16.4	47
1997	3.0	0.2	24.2	1.1	2.5	16.4	47
1998	3.0	0.2	24.2	1.1	2.5	16.4	47
1999	3.0	0.2	24.2	1.1	2.5	16.4	47
2000	3.0	0.2	24.2	1.1	2.5	16.4	47
2001	3.0	0.2	24.2	1.1	2.5	16.4	47
2002	3.0	0.2	24.2	1.1	2.5	16.4	47
2003	3.0	0.2	24.2	1.1	2.5	16.4	47
2004	3.0	0.2	24.2	1.1	2.5	16.4	47
2005	3.0	0.2	24.2	1.1	2.5	16.4	47
2006	3.0	0.2	24.2	1.1	2.5	16.4	47
2007	3.0	0.2	24.2	1.1	2.5	16.4	47
2008	3.0	0.2	24.2	1.1	2.5	16.4	47
2009	3.0	0.2	24.2	1.1	2.5	16.4	47
2010	3.0	0.2	24.2	1.1	2.5	16.4	47
2011	3.0	0.2	24.2	1.1	2.5	16.4	47
2012	3.0	0.2	24.2	1.1	2.5	16.4	47
2013	3.0	0.2	24.2	1.1	2.5	16.4	47
2014	3.0	0.2	24.2	1.1	2.5	16.4	47
2015	3.0	0.2	24.2	1.1	2.5	16.4	47
2016	3.0	0.2	24.2	1.1	2.5	16.4	47
2017	3.0	0.2	24.2	1.1	2.5	16.4	47
2018	3.0	0.2	24.2	1.1	2.5	16.4	47
2019	3.0	0.2	24.2	1.1	2.5	16.4	47
2020	3.0	0.2	24.2	1.1	2.5	16.4	47
2021	3.0	0.2	24.2	1.1	2.5	16.4	47
2022	3.0	0.2	24.2	1.1	2.5	16.4	47
2023	3.0	0.2	24.2	1.1	2.5	16.4	47
2024	3.0	0.2	24.2	1.1	2.5	16.4	47
2025	3.0	0.2	24.2	1.1	2.5	16.4	47

Table J-4.10 (5/8) OPERATION, MAINTENANCE AND REPLACEMENT COST FOR EACH SYSTEM

- LAMBAGAR -

YEAR	OPERATION, MAINTENANCE AND REPLACEMENT COST						TOTAL
	Personnel expenses	Office maintenance	Chemical reagent	Electoric energy	Facility maintenance	Facility replacement	(US$1000)
1996	3.7	0.3	24.5	31.4	4.7	55.3	120
1997	3.7	0.3	26.7	34.2	4.7	55.3	125
1998	3.7	0.3	28.6	36.6	4.7	55.3	129
1999	3.7	0.3	26.4	33.6	4.7	55.3	124
2000	3.7	0.3	28.6	36.5	4.7	55.3	129
2001	3.7	0.3	27.2	34.5	4.7	55.3	126
2002	3.7	0.3	27.2	34.5	4.7	55.3	126
2003	3.7	0.3	27.2	34.5	4.7	55.3	126
2004	3.7	0.3	27.2	34.5	4.7	55.3	126
2005	3.7	0.3	27.2	34.5	4.7	55.3	126
2006	3.7	0.3	27.2	34.5	4.7	55.3	126
2007	3.7	0.3	27.2	34.5	4.7	55.3	126
2008	3.7	0.3	27.2	34.5	4.7	55.3	126
2009	3.7	0.3	27.2	34.5	4.7	55.3	126
2010	3.7	0.3	27.2	34.5	4.7	55.3	126
2011	3.7	0.3	27.2	34.5	4.7	55.3	126
2012	3.7	0.3	27.2	34.5	4.7	55.3	126
2013	3.7	0.3	27.2	34.5	4.7	55.3	126
2014	3.7	0.3	27.2	34.5	4.7	55.3	126
2015	3.7	0.3	27.2	34.5	4.7	55.3	126
2016	3.7	0.3	27.2	34.5	4.7	55.3	126
2017	3.7	0.3	27.2	34.5	4.7	55.3	126
2018	3.7	0.3	27.2	34.5	4.7	55.3	126
2019	3.7	0.3	27.2	34.5	4.7	55.3	126
2020	3.7	0.3	27.2	34.5	4.7	55.3	126
2021	3.7	0.3	27.2	34.5	4.7	55.3	126
2022	3.7	0.3	27.2	34.5	4.7	55.3	126
2023	3.7	0.3	27.2	34.5	4.7	55.3	126
2024	3.7	0.3	27.2	34.5	4.7	55.3	126
2025	3.7	0.3	27.2	34.5	4.7	55.3	126

Table J-4.10 (6/8) OPERATION, MAINTENANCE AND REPLACEMENT COST FOR EACH SYSTEM

- SUNDARIJAL -

YEAR	OPERATION, MAINTENANCE AND REPLACEMENT COST						TOTAL
	Personnel expenses	Office maintenance	Chemical reagent	Electoric energy	Facility maintenance	Facility replacement	(US$1000)
1997	5.3	0.4	50.1	16.7	6.3	69.0	148
1998	5.3	0.4	50.1	16.7	6.3	69.0	148
1999	5.3	0.4	50.1	16.7	6.3	69.0	148
2000	5.3	0.4	50.1	16.7	6.3	69.0	148
2001	5.3	0.4	50.1	16.7	6.3	69.0	148
2002	5.3	0.4	50.1	16.7	6.3	69.0	148
2003	5.3	0.4	50.1	16.7	6.3	69.0	148
2004	5.3	0.4	50.1	16.7	6.3	69.0	148
2005	5.3	0.4	50.1	16.7	6.3	69.0	148
2006	5.3	0.4	50.1	16.7	6.3	69.0	148
2007	5.3	0.4	50.1	16.7	6.3	69.0	148
2008	5.3	0.4	50.1	16.7	6.3	69.0	148
2009	5.3	0.4	50.1	16.7	6.3	69.0	148
2010	5.3	0.4	50.1	16.7	6.3	69.0	148
2011	5.3	0.4	50.1	16.7	6.3	69.0	148
2012	5.3	0.4	50.1	16.7	6.3	69.0	148
2013	5.3	0.4	50.1	16.7	6.3	69.0	148
2014	5.3	0.4	50.1	16.7	6.3	69.0	148
2015	5.3	0.4	50.1	16.7	6.3	69.0	148
2016	5.3	0.4	50.1	16.7	6.3	69.0	148
2017	5.3	0.4	50.1	16.7	6.3	69.0	148
2018	5.3	0.4	50.1	16.7	6.3	69.0	148
2019	5.3	0.4	50.1	16.7	6.3	69.0	148
2020	5.3	0.4	50.1	16.7	6.3	69.0	148
2021	5.3	0.4	50.1	16.7	6.3	69.0	148
2022	5.3	0.4	50.1	16.7	6.3	69.0	148
2023	5.3	0.4	50.1	16.7	6.3	69.0	148
2024	5.3	0.4	50.1	16.7	6.3	69.0	148
2025	5.3	0.4	50.1	16.7	6.3	69.0	148
2026	5.3	0.4	50.1	16.7	6.3	69.0	148

Table J-4.10 (7/8) OPERATION, MAINTENANCE AND REPLACEMENT COST FOR EACH SYSTEM

- MANOHARA -

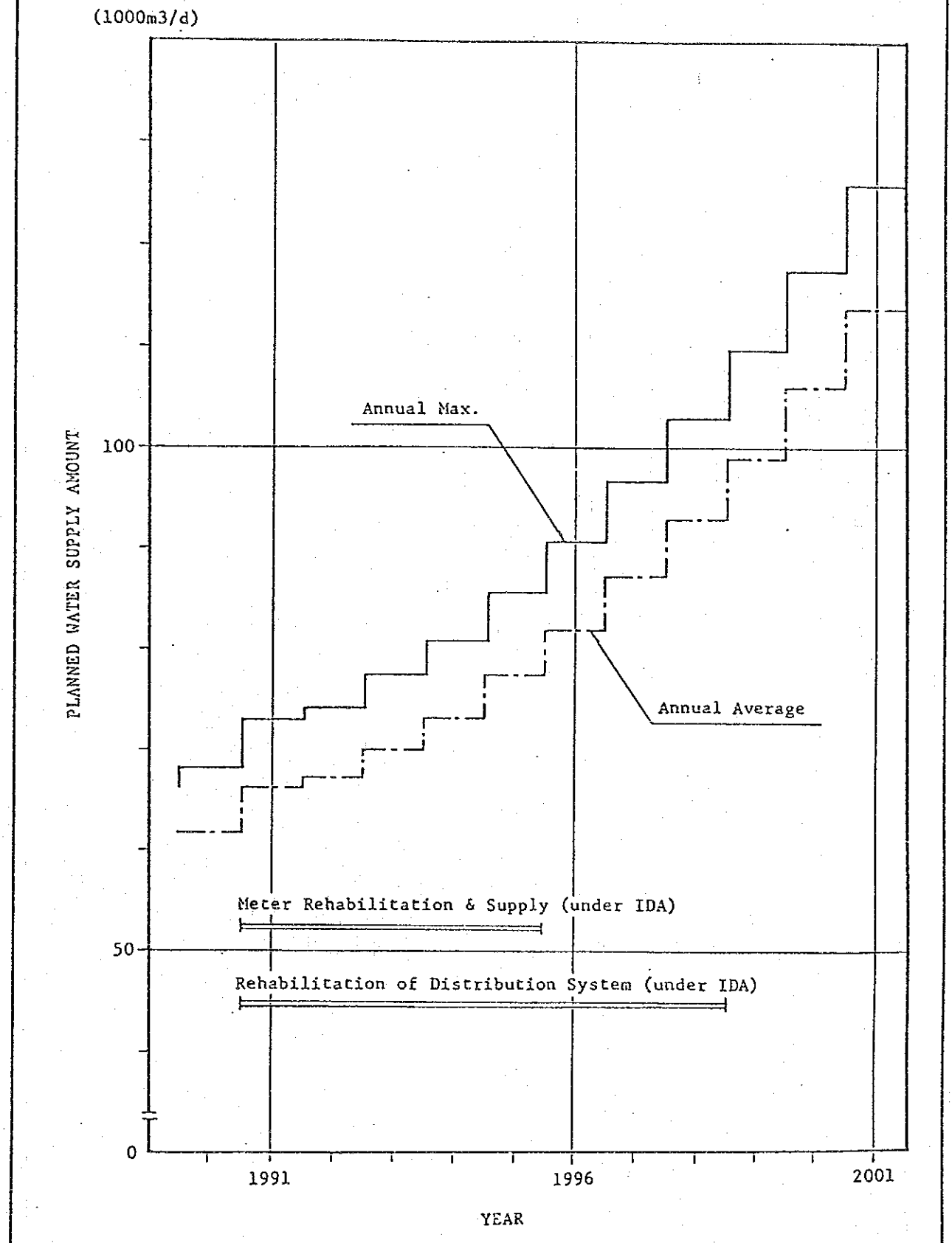
YEAR	OPERATION, MAINTENANCE AND REPLACEMENT COST						TOTAL
	Personnel expenses	Office maintenance	Chemical reagent	Electoric energy	Facility maintenance	Facility replacement	(US$1000)
1999	4.5	0.3	34.8	14.6	5.7	64.9	125
2000	4.5	0.3	34.8	14.6	5.7	64.9	125
2001	4.5	0.3	34.8	14.6	5.7	64.9	125
2002	4.5	0.3	34.8	14.6	5.7	64.9	125
2003	4.5	0.3	34.8	14.6	5.7	64.9	125
2004	4.5	0.3	34.8	14.6	5.7	64.9	125
2005	4.5	0.3	34.8	14.6	5.7	64.9	125
2006	4.5	0.3	34.8	14.6	5.7	64.9	125
2007	4.5	0.3	34.8	14.6	5.7	64.9	125
2008	4.5	0.3	34.8	14.6	5.7	64.9	125
2009	4.5	0.3	34.8	14.6	5.7	64.9	125
2010	4.5	0.3	34.8	14.6	5.7	64.9	125
2011	4.5	0.3	34.8	14.6	5.7	64.9	125
2012	4.5	0.3	34.8	14.6	5.7	64.9	125
2013	4.5	0.3	34.8	14.6	5.7	64.9	125
2014	4.5	0.3	34.8	14.6	5.7	64.9	125
2015	4.5	0.3	34.8	14.6	5.7	64.9	125
2016	4.5	0.3	34.8	14.6	5.7	64.9	125
2017	4.5	0.3	34.8	14.6	5.7	64.9	125
2018	4.5	0.3	34.8	14.6	5.7	64.9	125
2019	4.5	0.3	34.8	14.6	5.7	64.9	125
2020	4.5	0.3	34.8	14.6	5.7	64.9	125
2021	4.5	0.3	34.8	14.6	5.7	64.9	125
2022	4.5	0.3	34.8	14.6	5.7	64.9	125
2023	4.5	0.3	34.8	14.6	5.7	64.9	125
2024	4.5	0.3	34.8	14.6	5.7	64.9	125
2025	4.5	0.3	34.8	14.6	5.7	64.9	125
2026	4.5	0.3	34.8	14.6	5.7	64.9	125
2027	4.5	0.3	34.8	14.6	5.7	64.9	125
2028	4.5	0.3	34.8	14.6	5.7	64.9	125

Table J-4.10 (8/8) OPERATION, MAINTENANCE AND REPLACEMENT COST FOR EACH SYSTEM

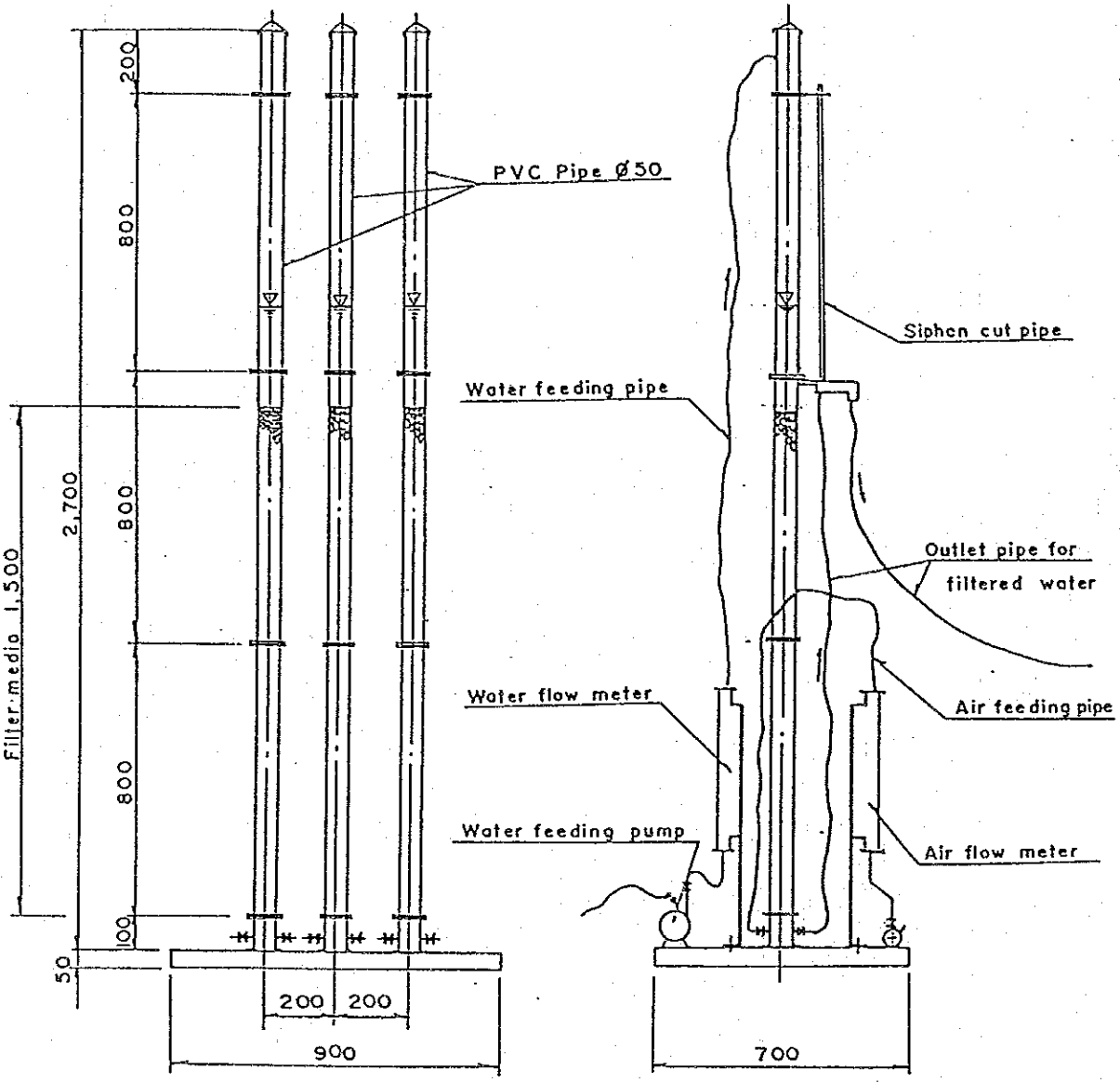
- BALKHU -

YEAR	OPERATION, MAINTENANCE AND REPLACEMENT COST						TOTAL
	Personnel expenses	Office maintenance	Chemical reagent	Electoric energy	Facility maintenance	Facility replacement	(US$1000)
2001	4.5	0.3	33.2	10.4	4.7	52.4	106
2002	4.5	0.3	33.2	10.4	4.7	52.4	106
2003	4.5	0.3	33.2	10.4	4.7	52.4	106
2004	4.5	0.3	33.2	10.4	4.7	52.4	106
2005	4.5	0.3	33.2	10.4	4.7	52.4	106
2006	4.5	0.3	33.2	10.4	4.7	52.4	106
2007	4.5	0.3	33.2	10.4	4.7	52.4	106
2008	4.5	0.3	33.2	10.4	4.7	52.4	106
2009	4.5	0.3	33.2	10.4	4.7	52.4	106
2010	4.5	0.3	33.2	10.4	4.7	52.4	106
2011	4.5	0.3	33.2	10.4	4.7	52.4	106
2012	4.5	0.3	33.2	10.4	4.7	52.4	106
2013	4.5	0.3	33.2	10.4	4.7	52.4	106
2014	4.5	0.3	33.2	10.4	4.7	52.4	106
2015	4.5	0.3	33.2	10.4	4.7	52.4	106
2016	4.5	0.3	33.2	10.4	4.7	52.4	106
2017	4.5	0.3	33.2	10.4	4.7	52.4	106
2018	4.5	0.3	33.2	10.4	4.7	52.4	106
2019	4.5	0.3	33.2	10.4	4.7	52.4	106
2020	4.5	0.3	33.2	10.4	4.7	52.4	106
2021	4.5	0.3	33.2	10.4	4.7	52.4	106
2022	4.5	0.3	33.2	10.4	4.7	52.4	106
2023	4.5	0.3	33.2	10.4	4.7	52.4	106
2024	4.5	0.3	33.2	10.4	4.7	52.4	106
2025	4.5	0.3	33.2	10.4	4.7	52.4	106
2026	4.5	0.3	33.2	10.4	4.7	52.4	106
2027	4.5	0.3	33.2	10.4	4.7	52.4	106
2028	4.5	0.3	33.2	10.4	4.7	52.4	106
2029	4.5	0.3	33.2	10.4	4.7	52.4	106
2030	4.5	0.3	33.2	10.4	4.7	52.4	106

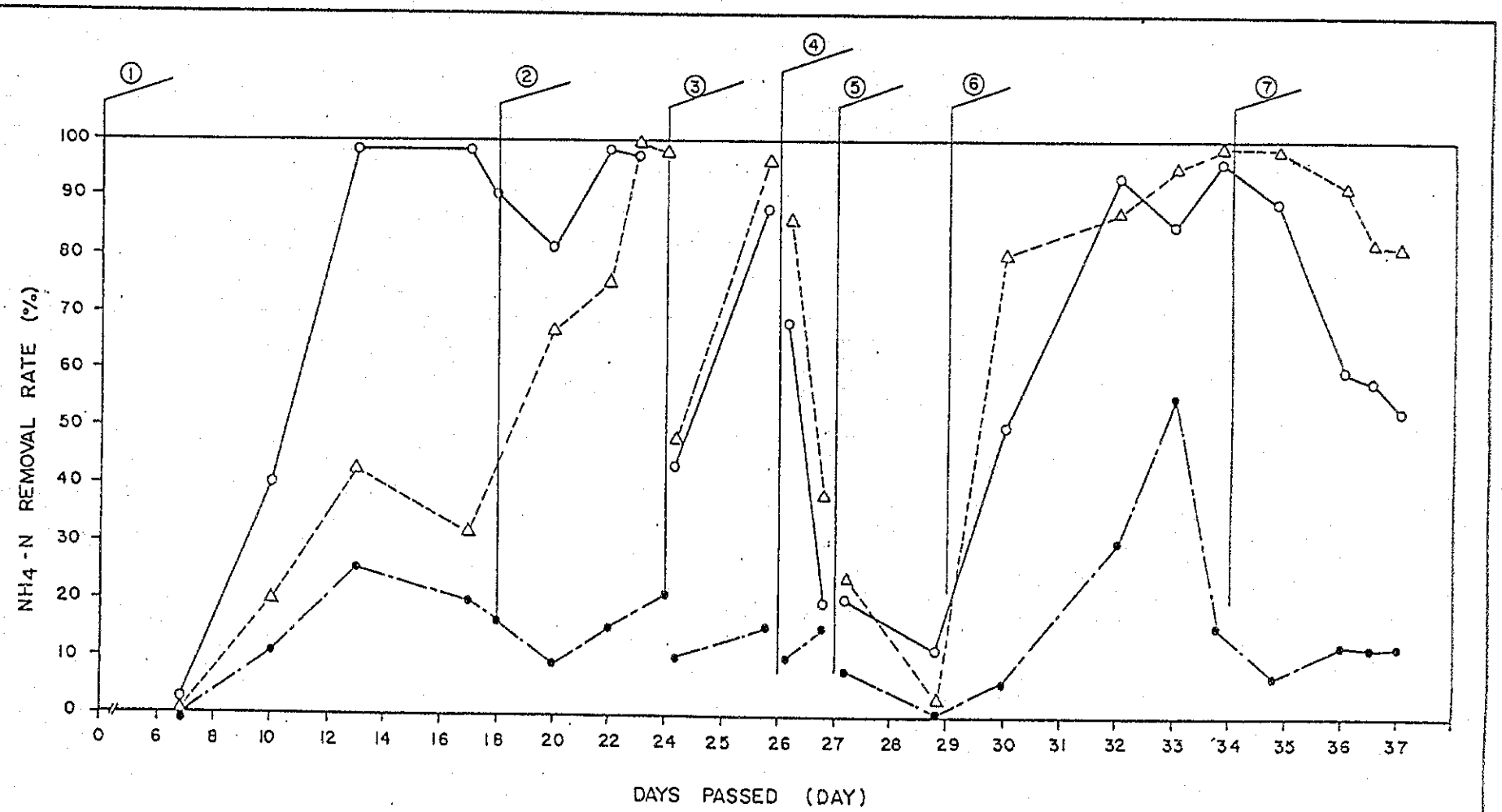
FIGURES



HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-1.1	PLANNED WATER SUPPLY AMOUNT (ANNUAL MAX AND AVERAGE)



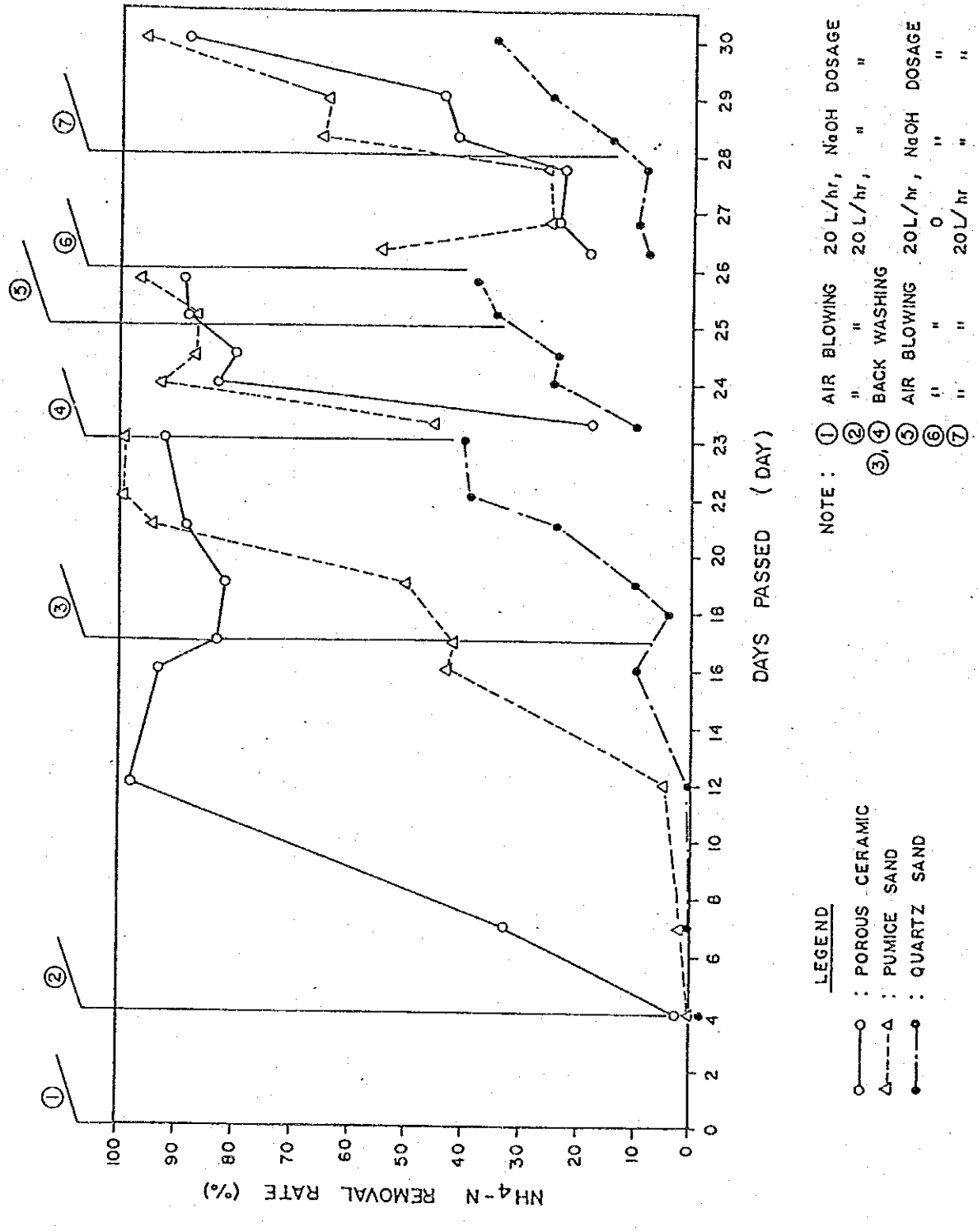
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-2.1	EQUIPMENT OF BIOLOGICAL FILTRATION EXPERIMENT



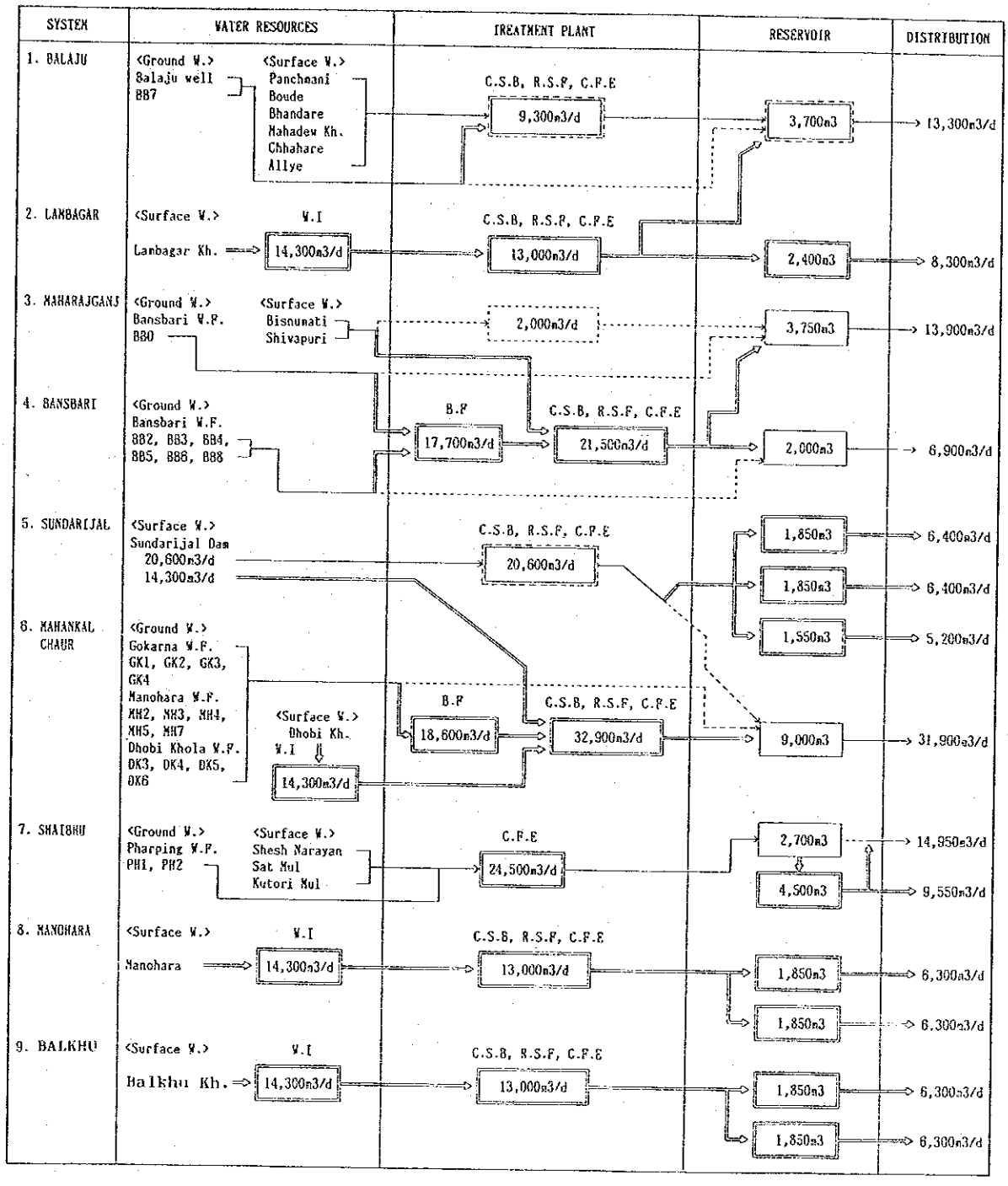
HIS MAJESTY'S GOVERNMENT OF NEPAL
GROUND WATER MANAGEMENT PROJECT
IN THE KATHMANDU VALLEY
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. J-2.2 (1/2)

VARIATION IN NH4-N REMOVAL RATE (DK5)

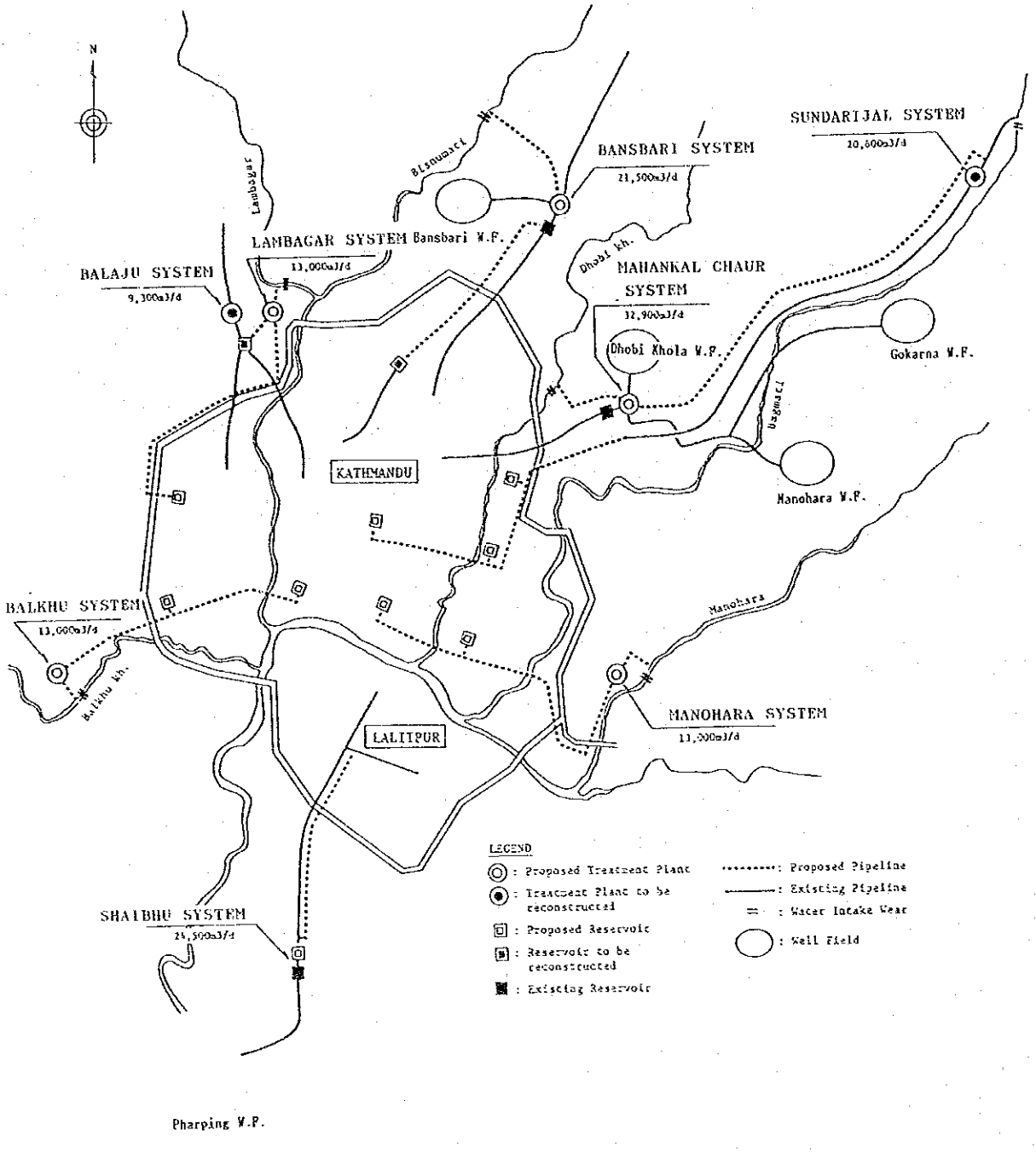


HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-2.2 (2/2)	VARIATION IN NH4-N REMOVAL RATE (BANSBARI RESREVOIR)



HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.1	EXISTING AND PROPOSED WATER SUPPLY SYSTEM

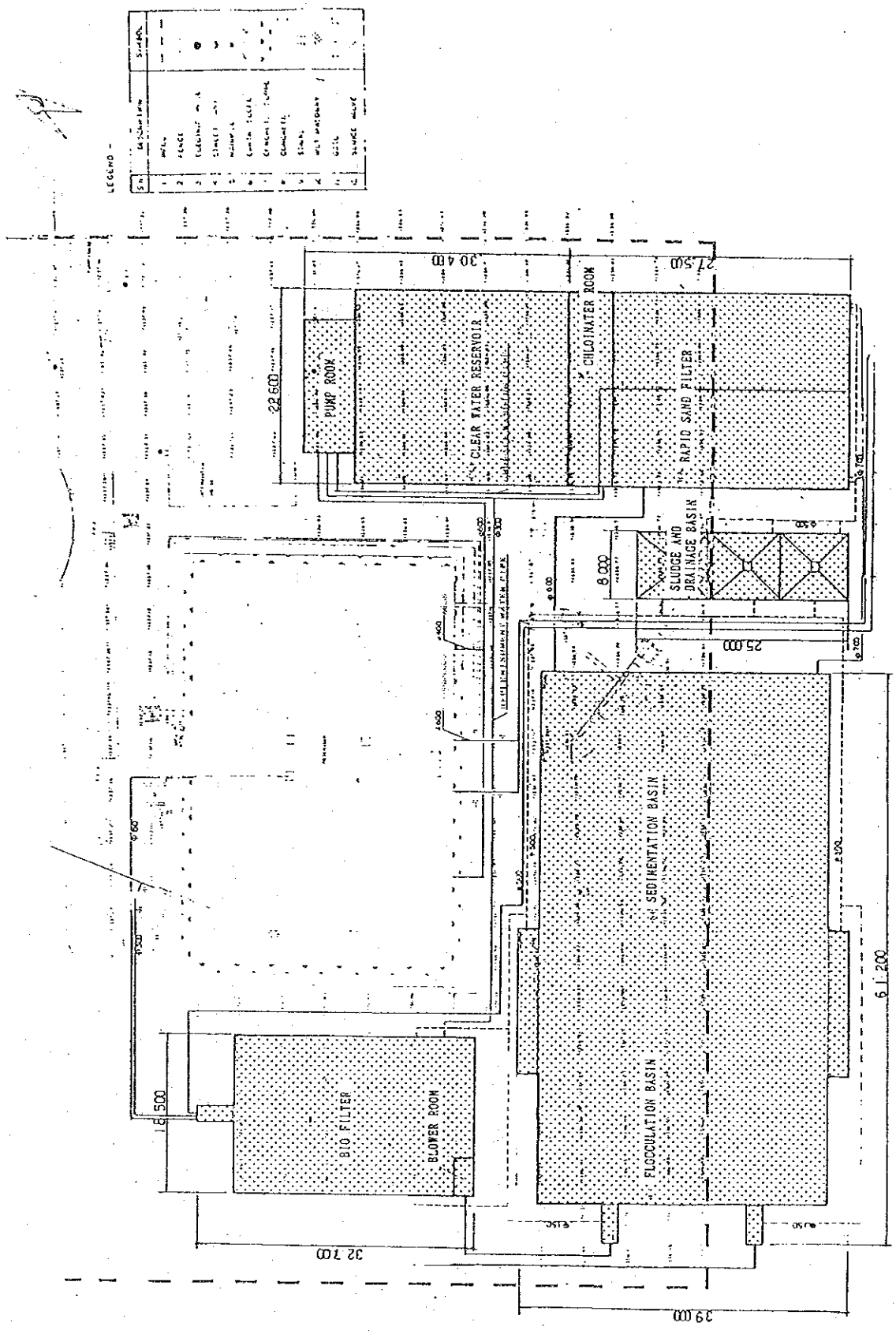
PROPOSED WATER SUPPLY SYSTEM



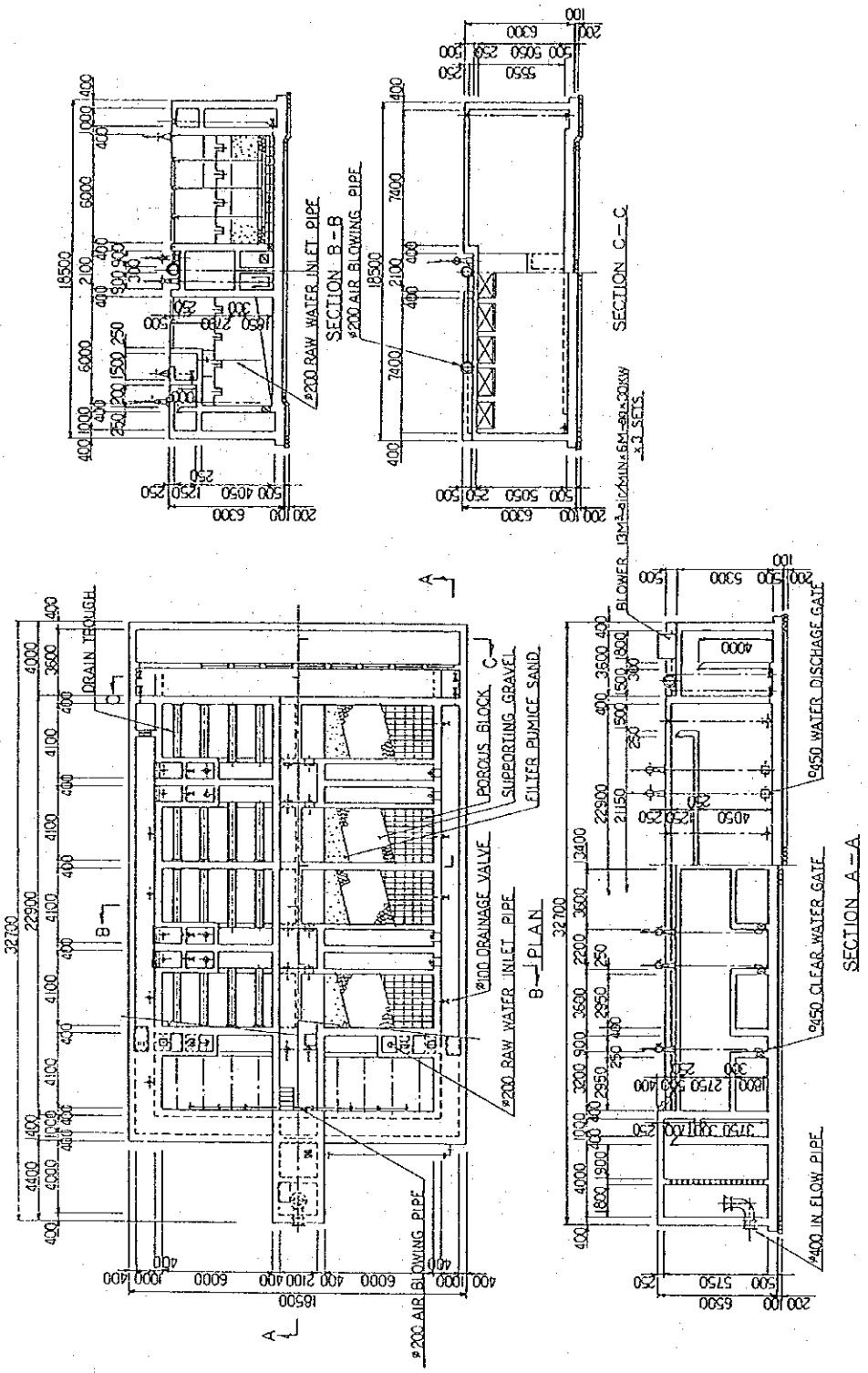
SCALE

0 5km

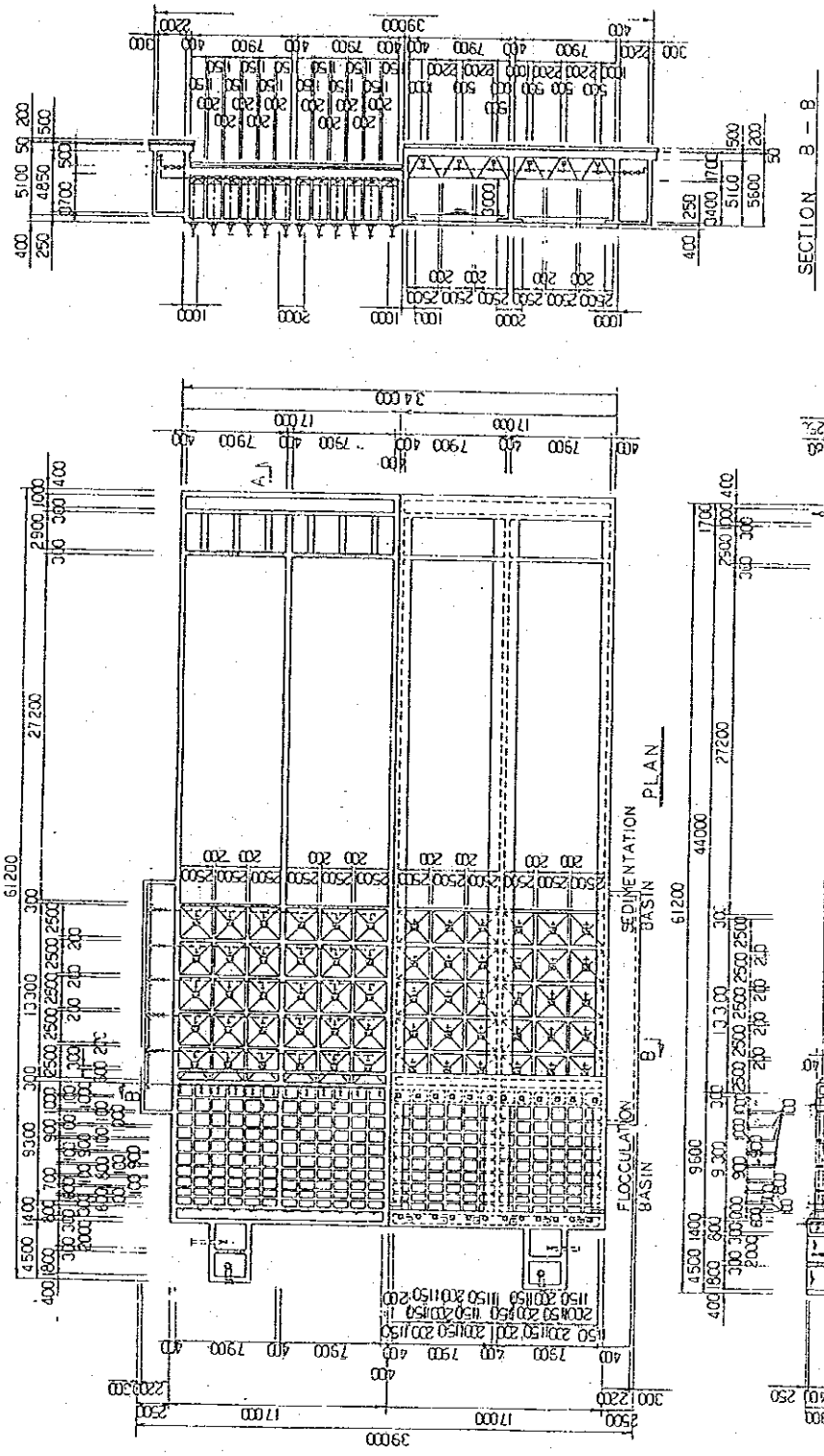
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.2	LAYOUT OF PROPOSED WATER SUPPLY SYSTEM



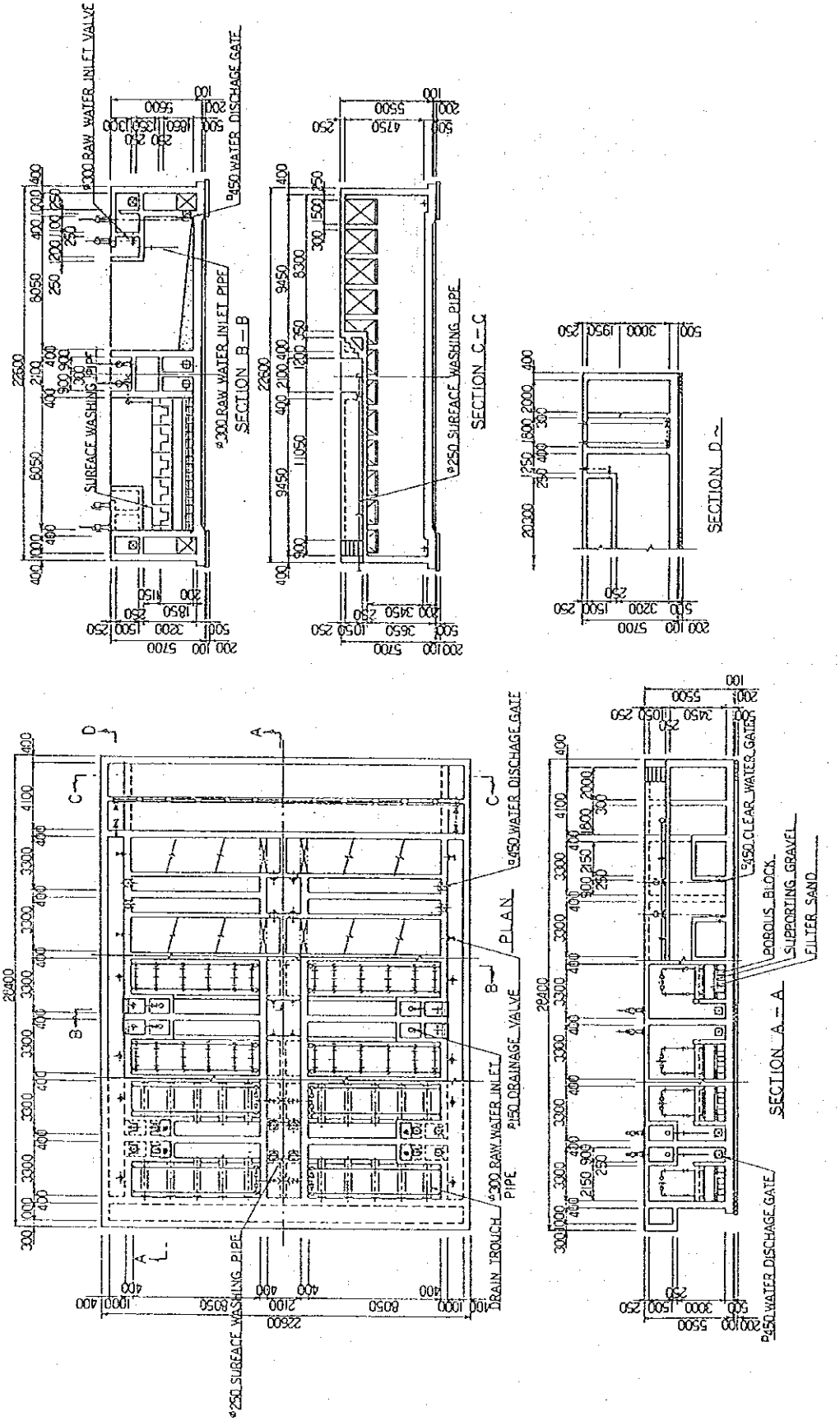
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (1-1)	LAYOUT OF WATER TREATMENT PLANT (MAHANKAL CHAUR)



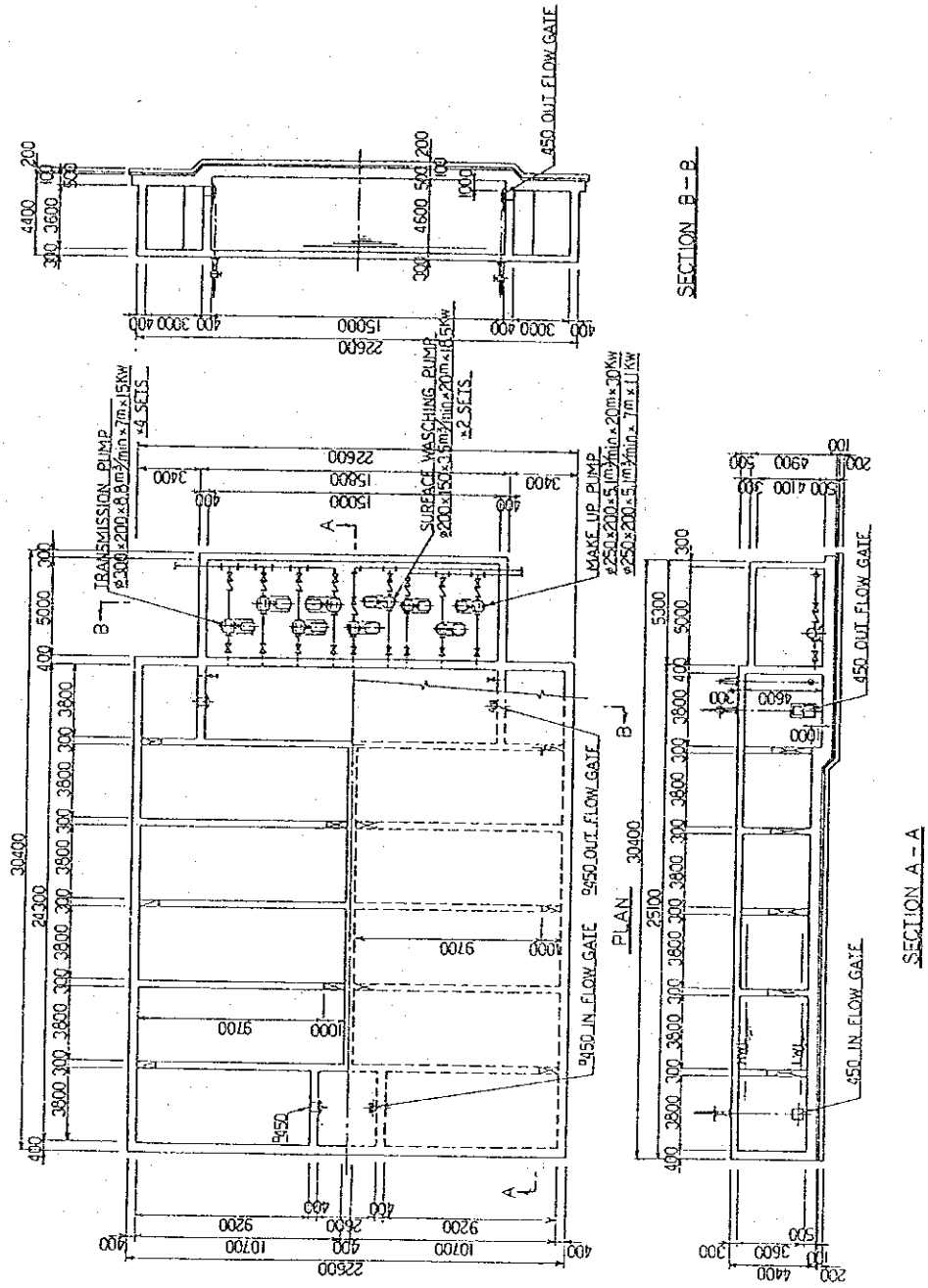
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (1-2)	BIO-FILTER (MAHANKAL CHAUR)



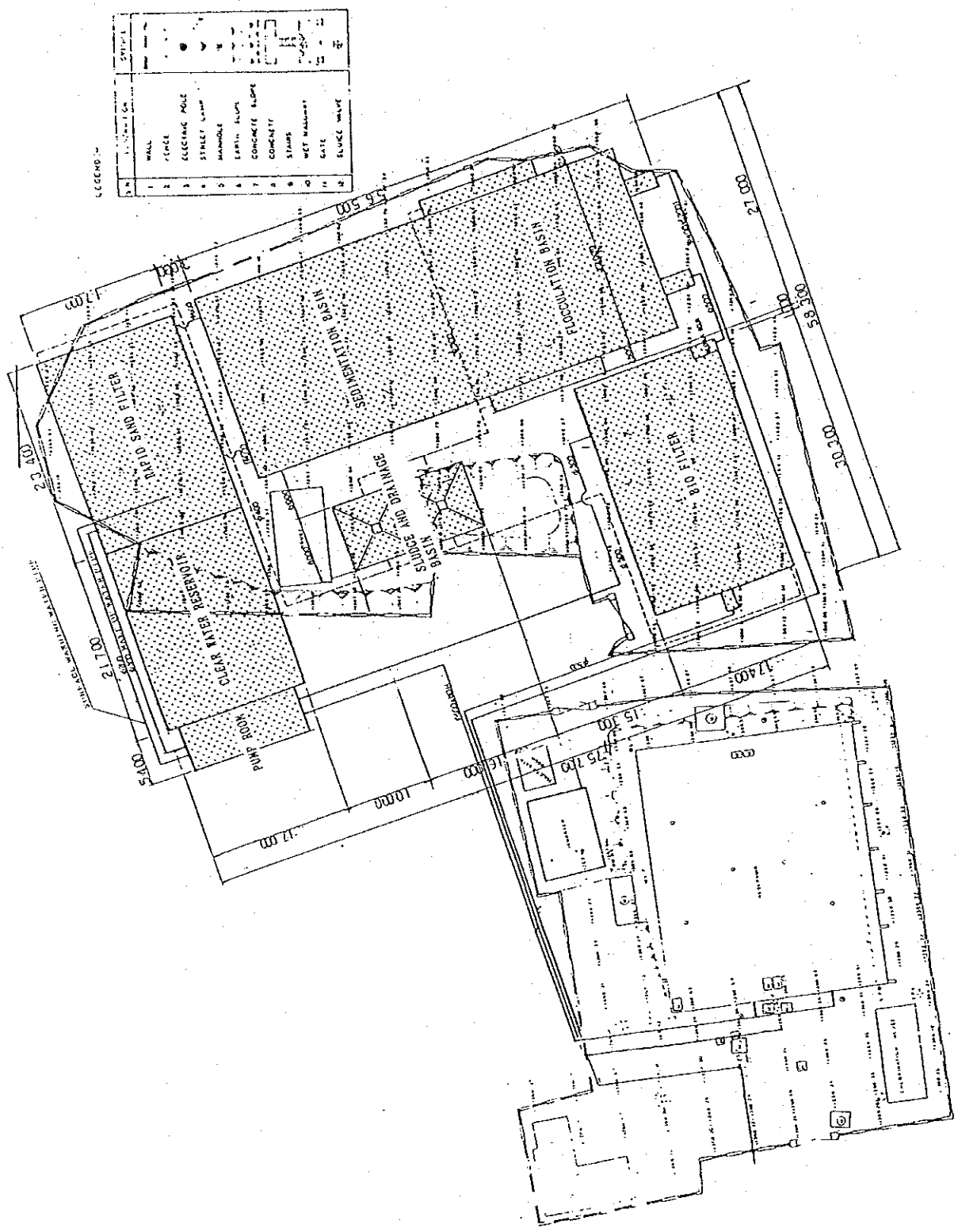
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (1-3)	COAGULO-SEDIMENTATION BASIN (MAHANKAL CHAUR)



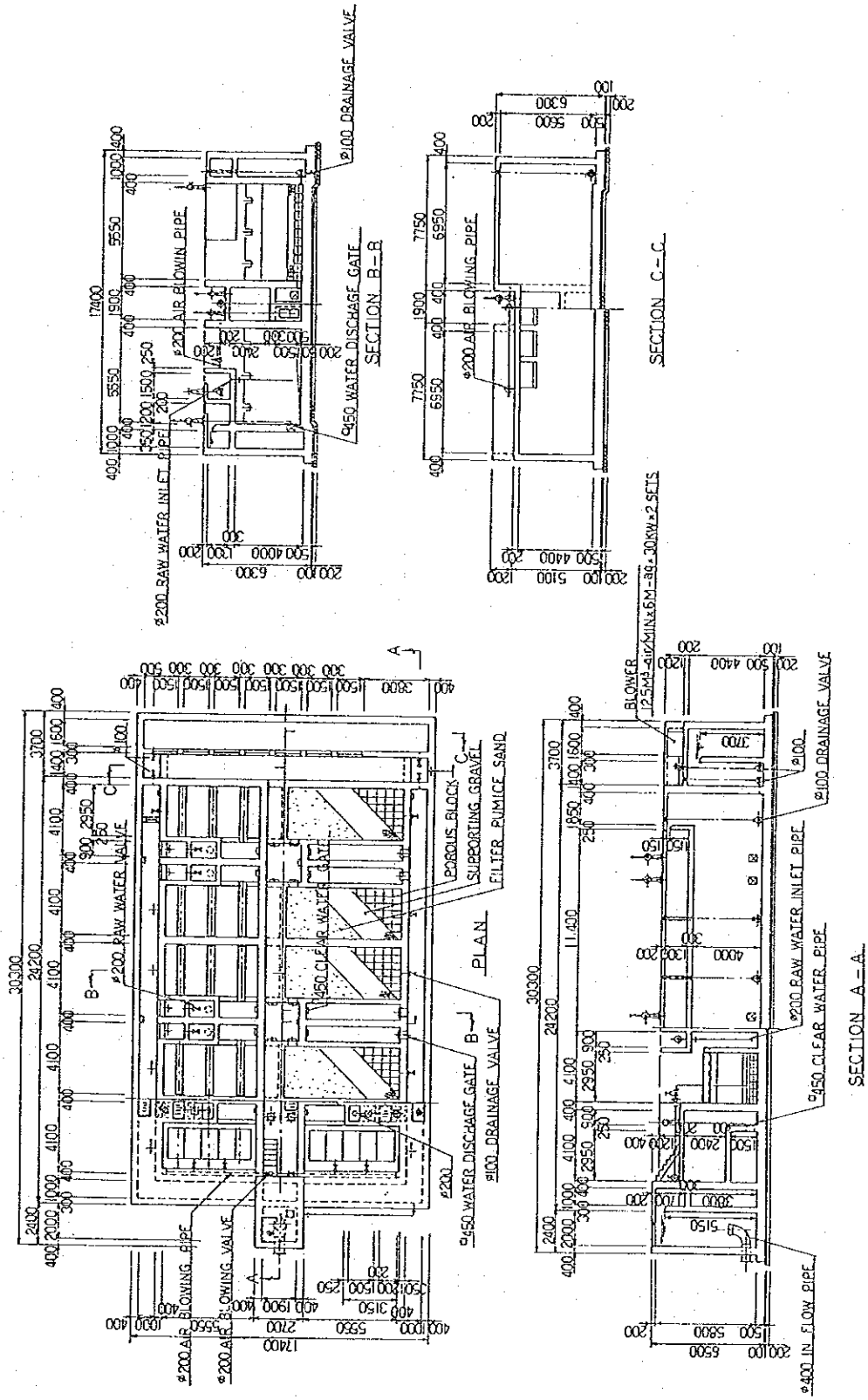
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (1-4)	RAPID SAND FILTER (MAHANKAL CHAUR)



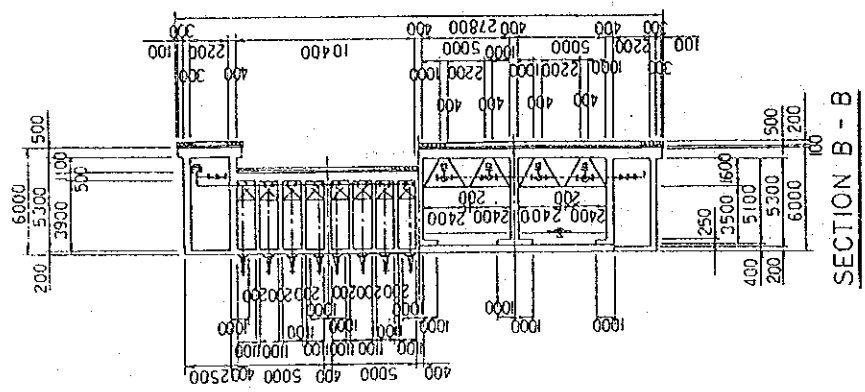
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (1-5)	CLEAR WATER RESERVOIR (MAHANKAL CHAUR)

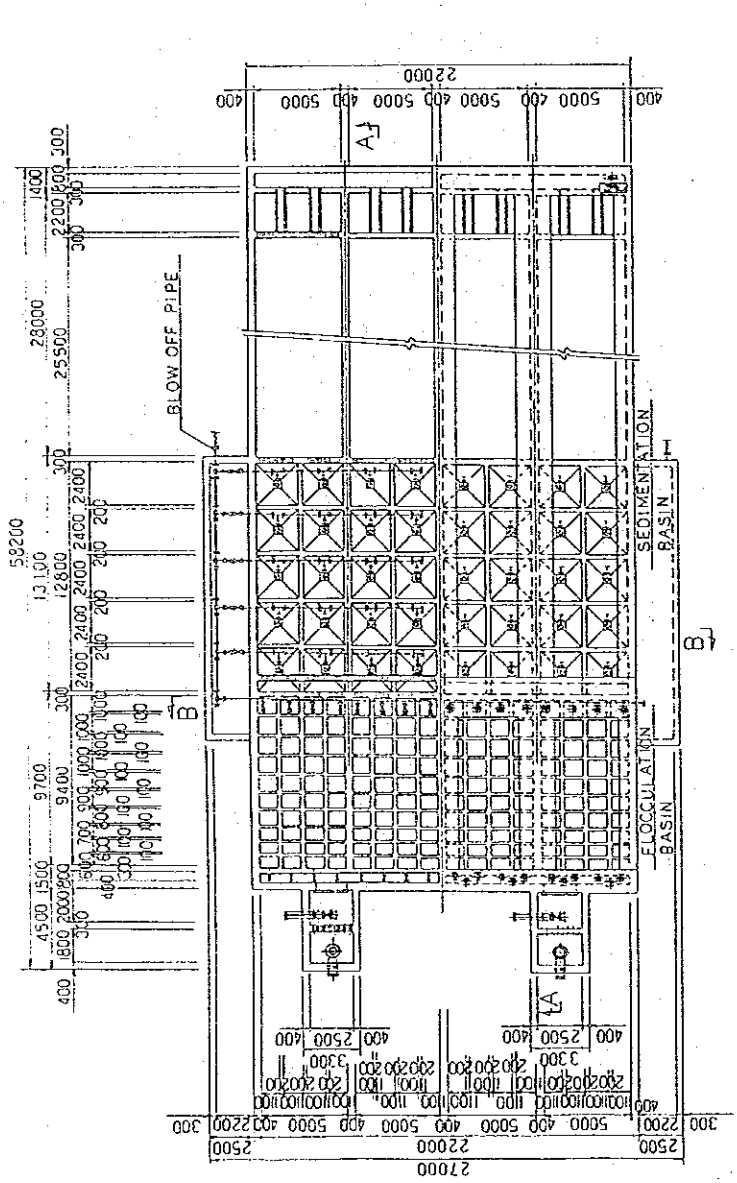


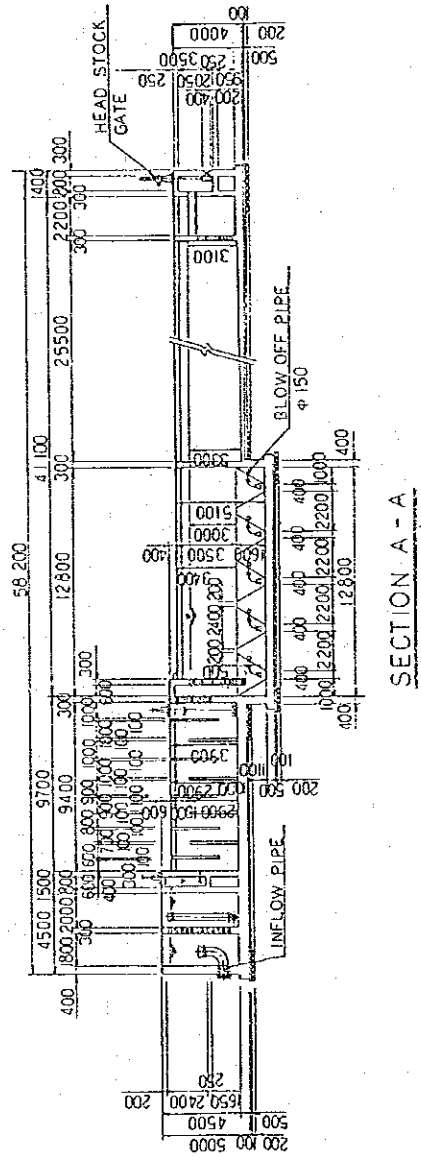
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (2-1)	LAYOUT OF WATER TREATMENT PLANT (BANSBARI)



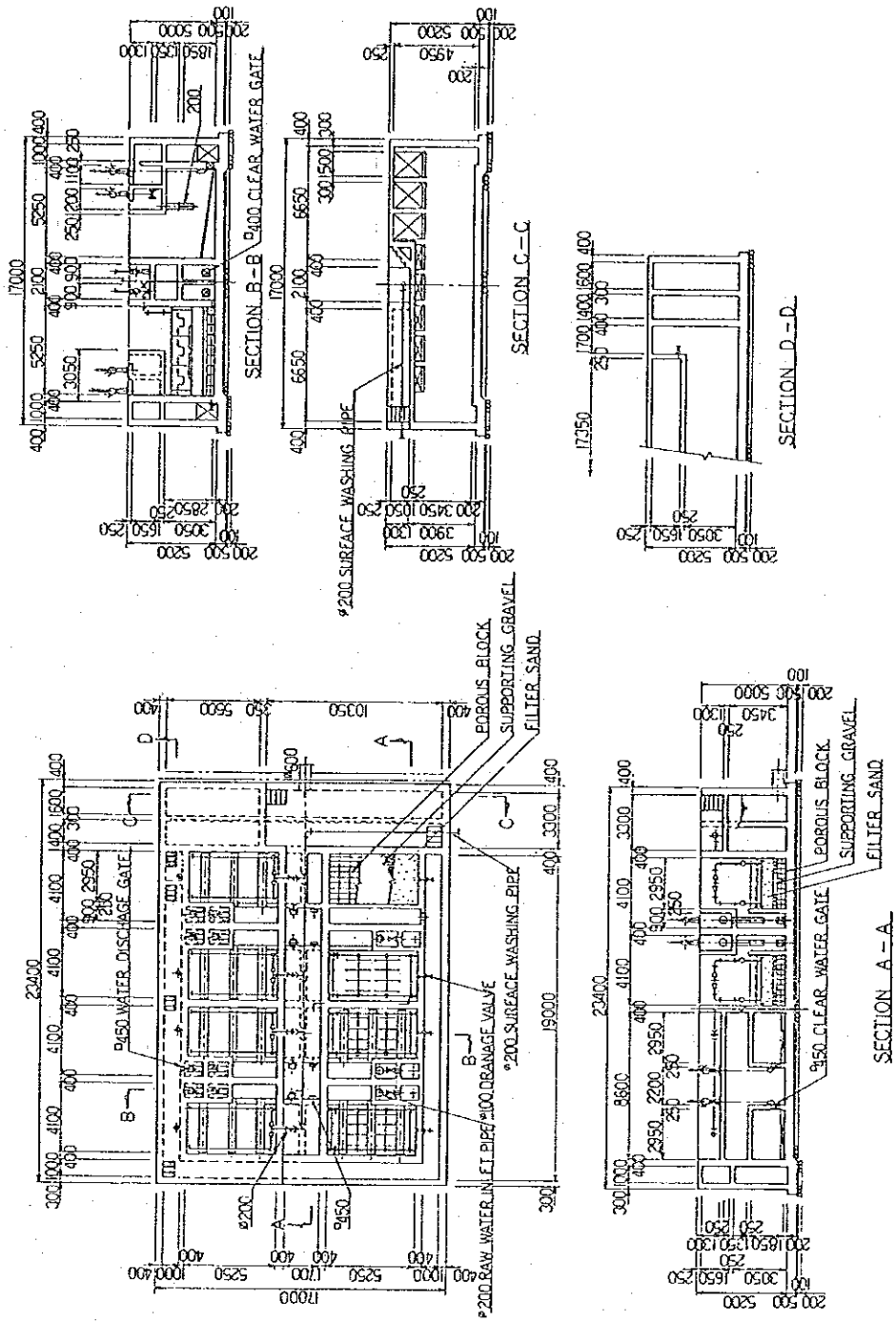
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (2-2)	BIO-FILTER (BANSBARI)



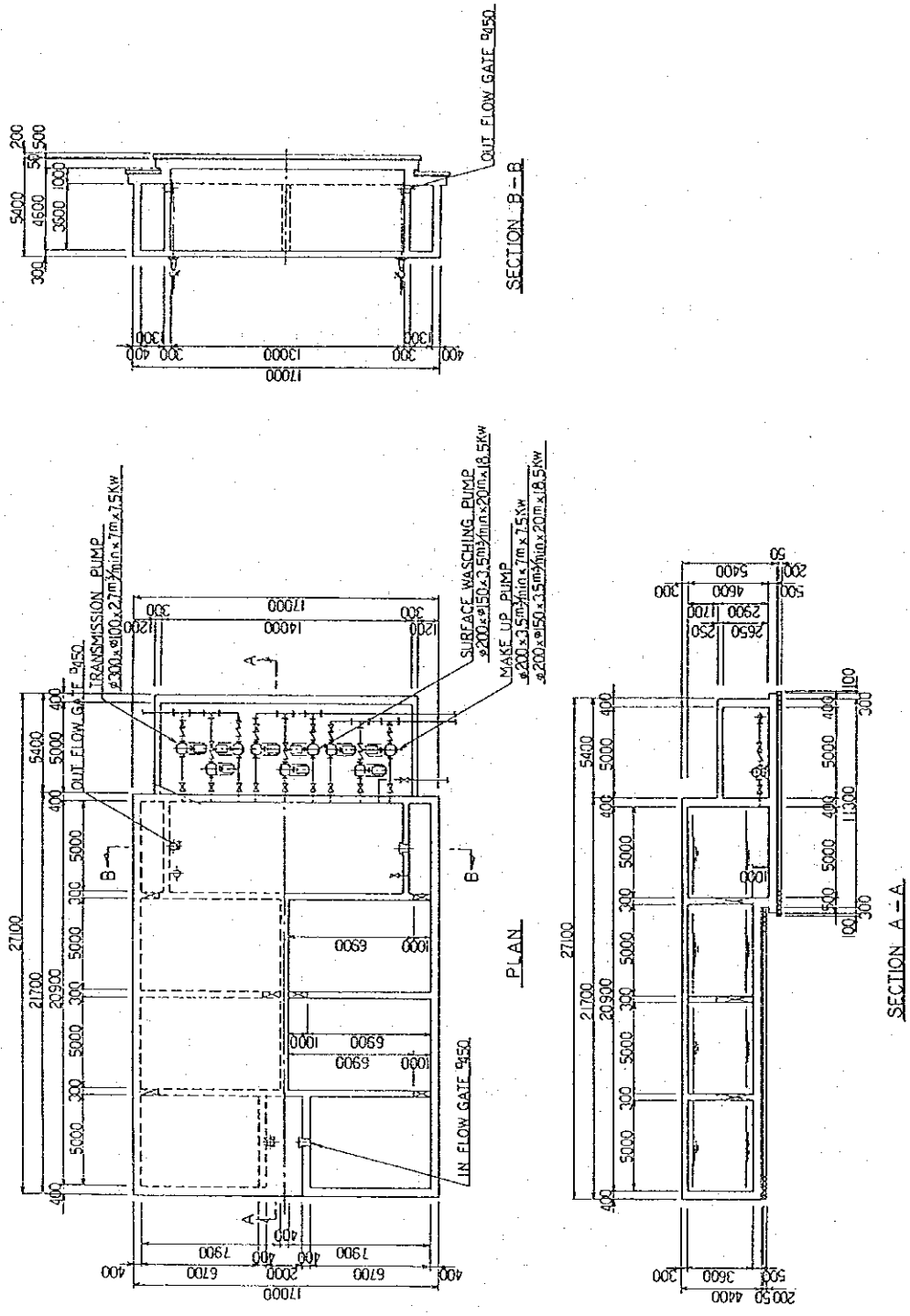




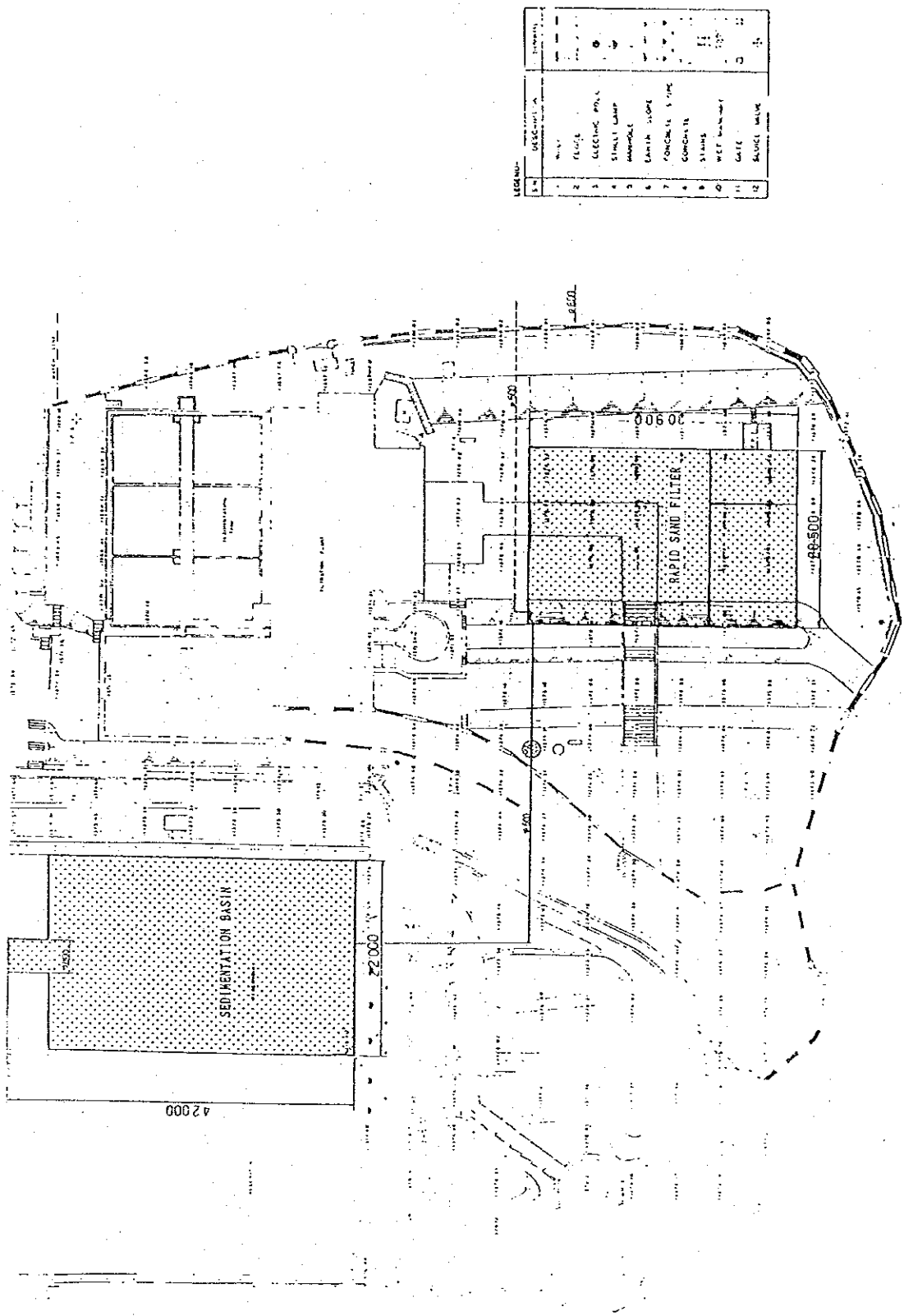
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (2-3)	COAGULO-SEDIMENTATION BASIN (BANSBARI)



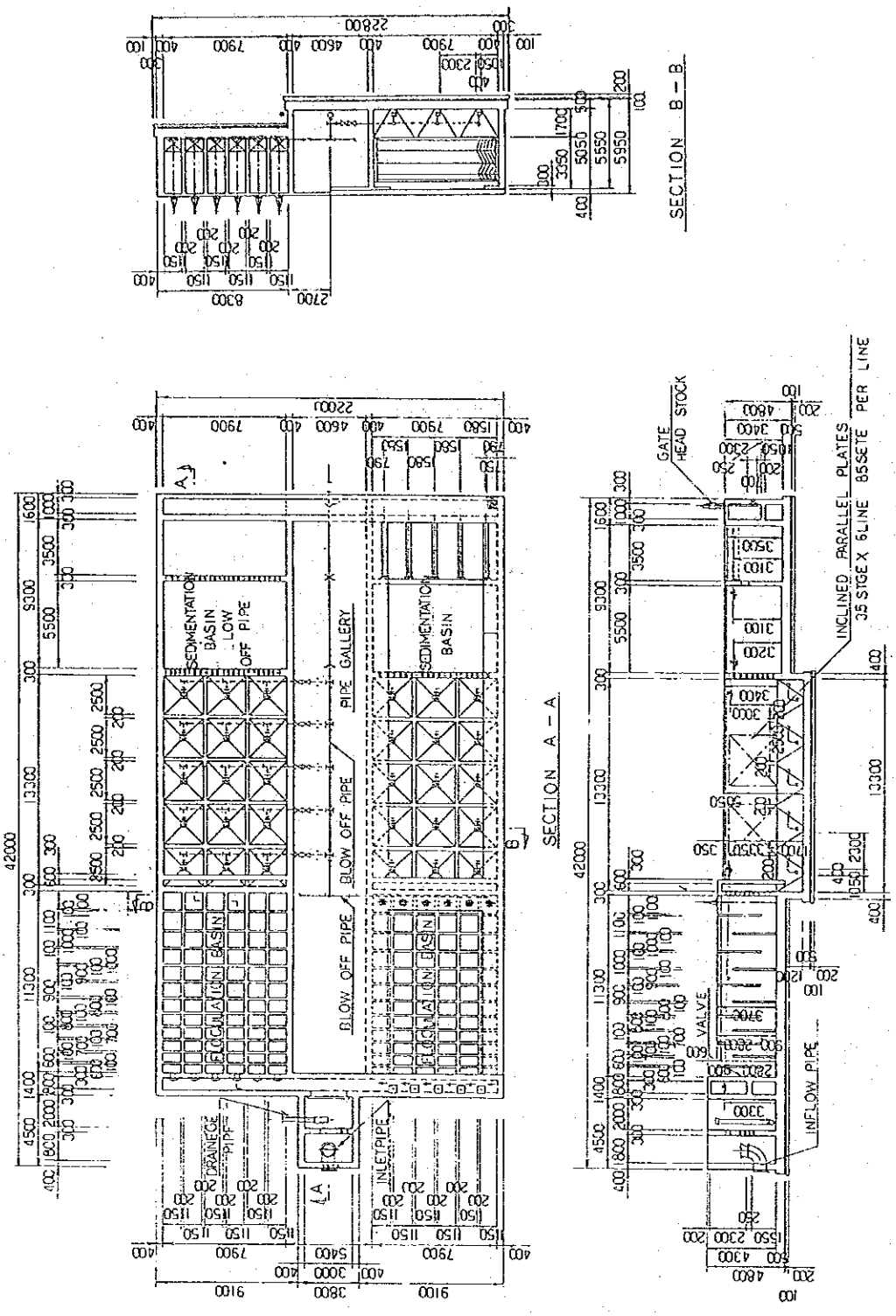
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (2-4)	RAPID SAND FILTER (BANSBARI)



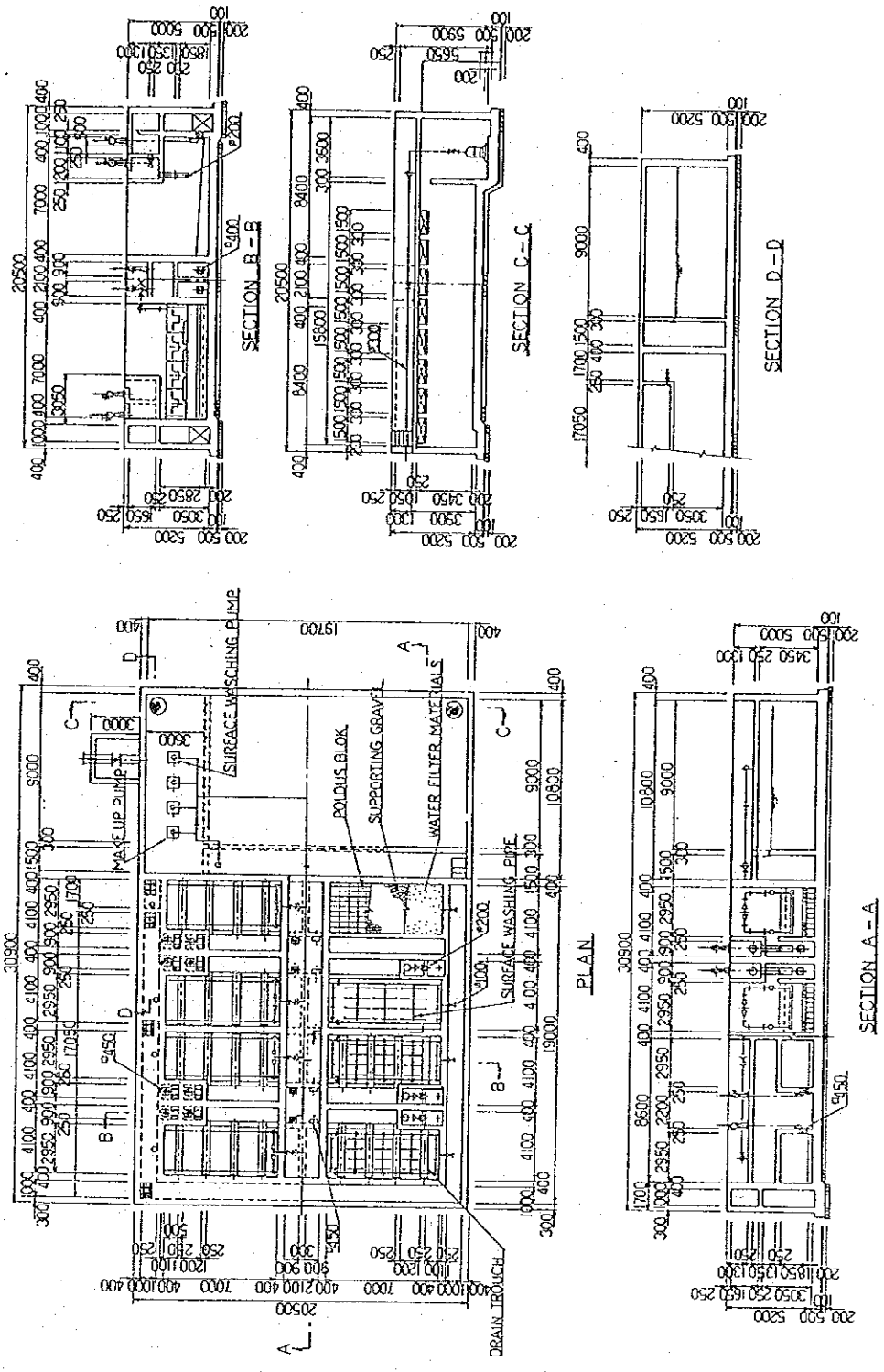
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (2-5)	CLEAR WATER RESERVOIR (BANSBARI)



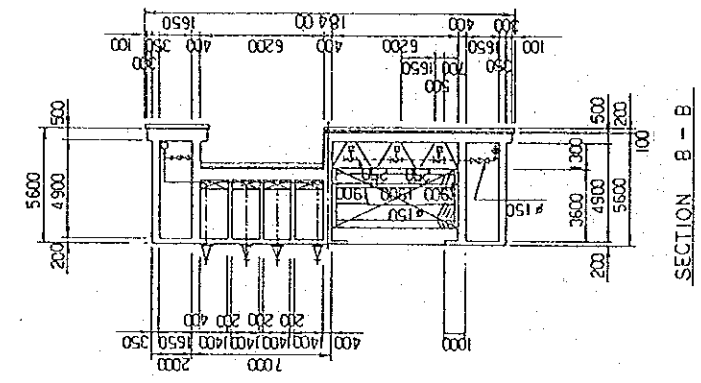
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (3-1)	LAYOUT OF WATER TREATMENT PLANT (SUNDARIJAL)

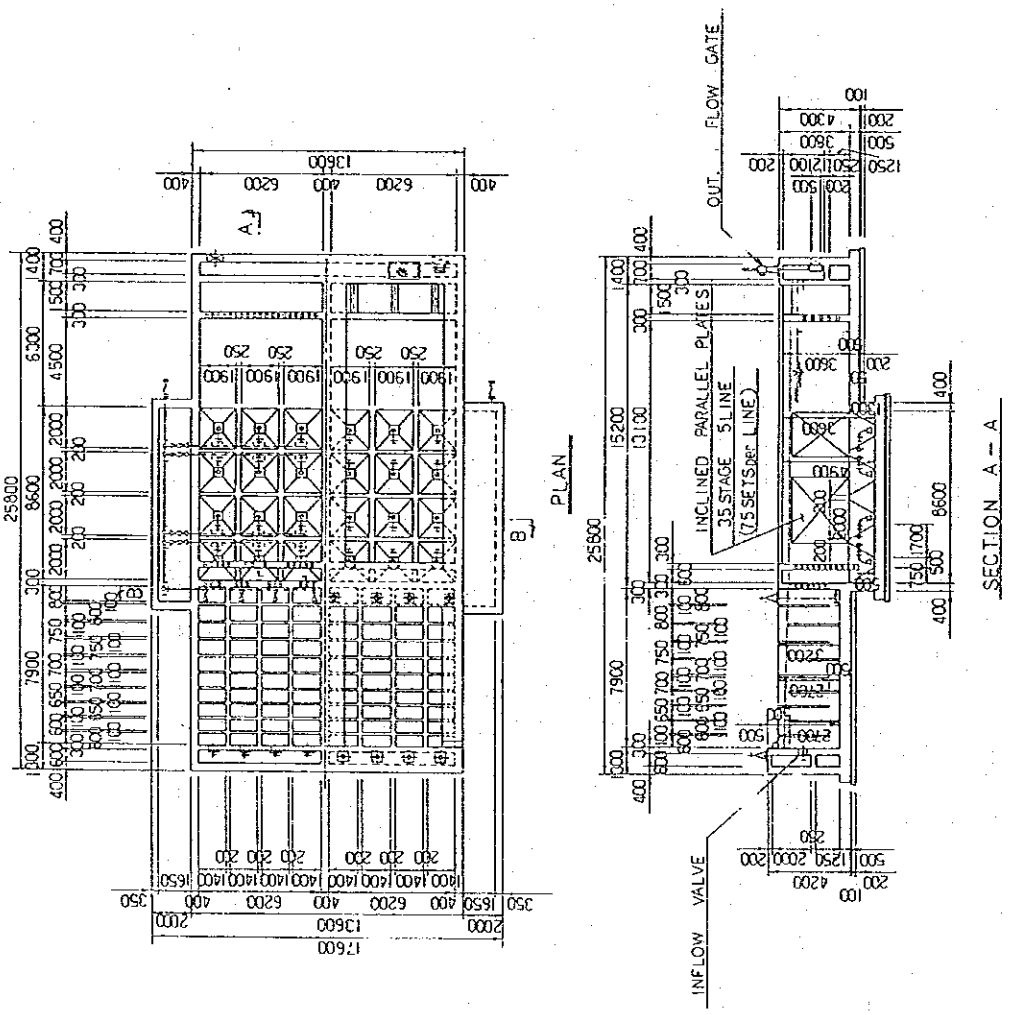


HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (3-2)	COAGULO-SEDIMENTATION BASIN (SUNDARIJAL)

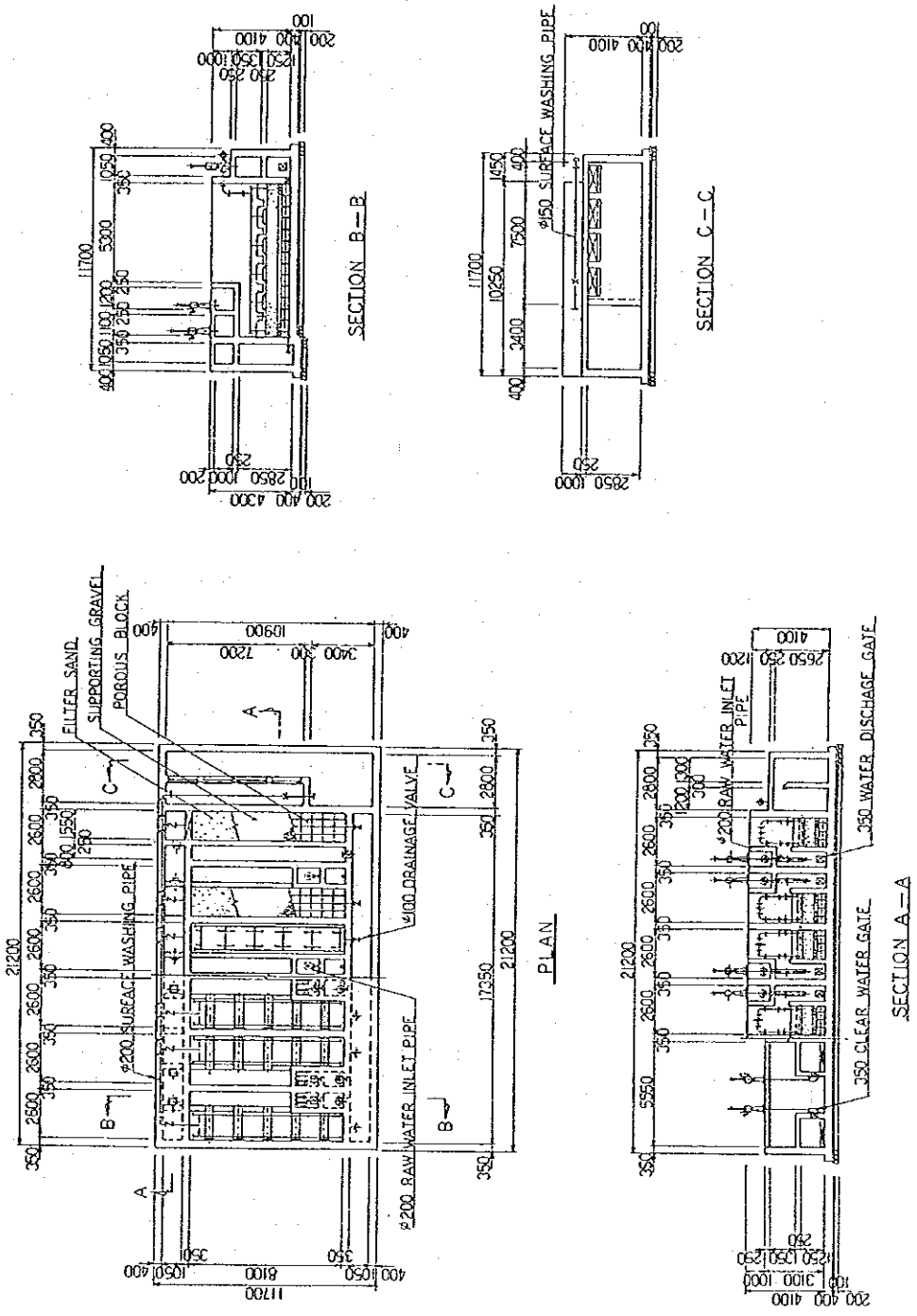


HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (3-3)	RAPID SAND FILTER (SUNDARIJAL)

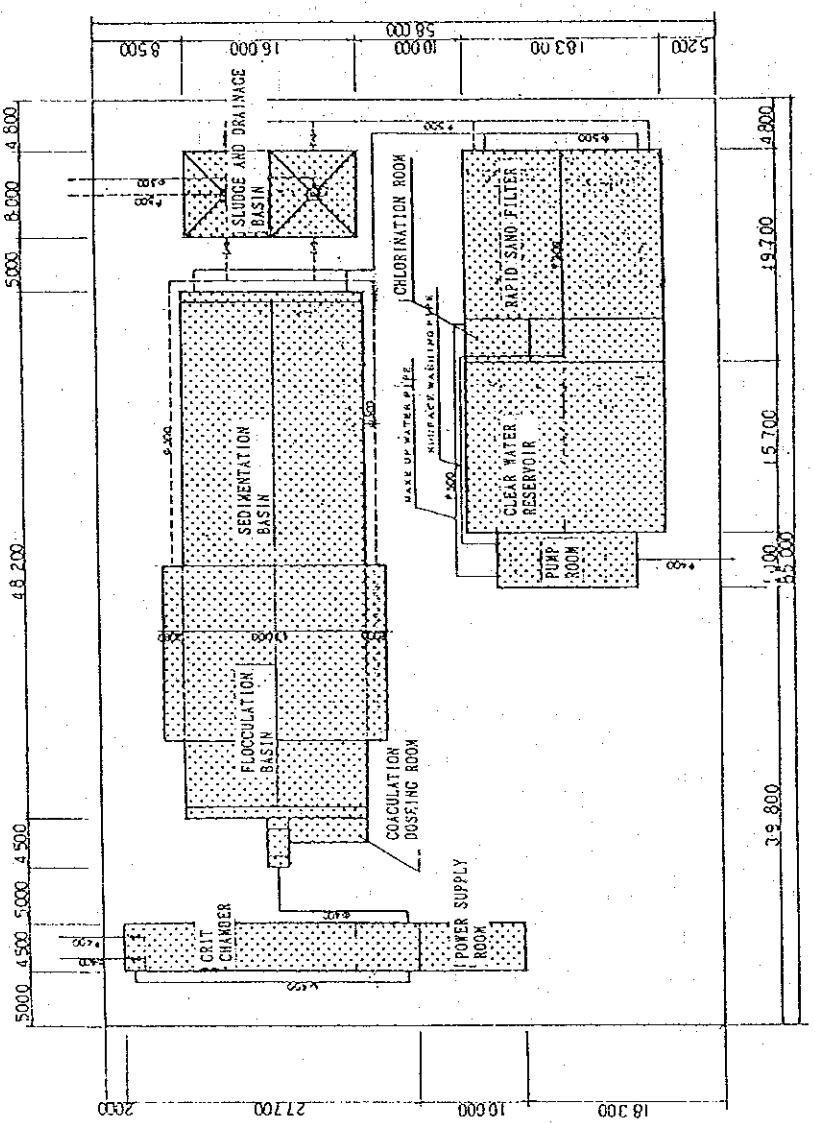




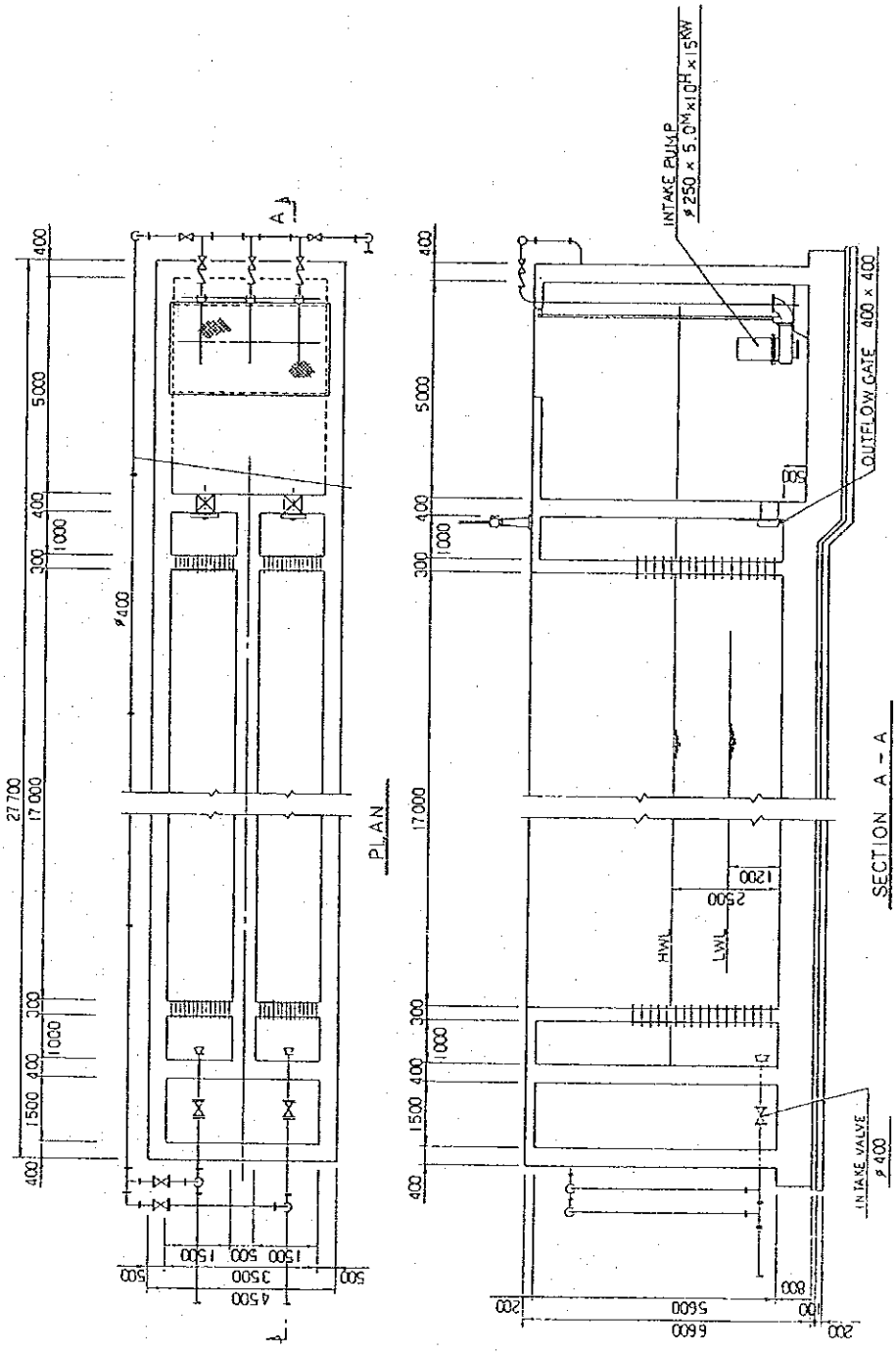
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (4-1)	COAGULO-SEDIMENTATION BASIN (BALAJU)



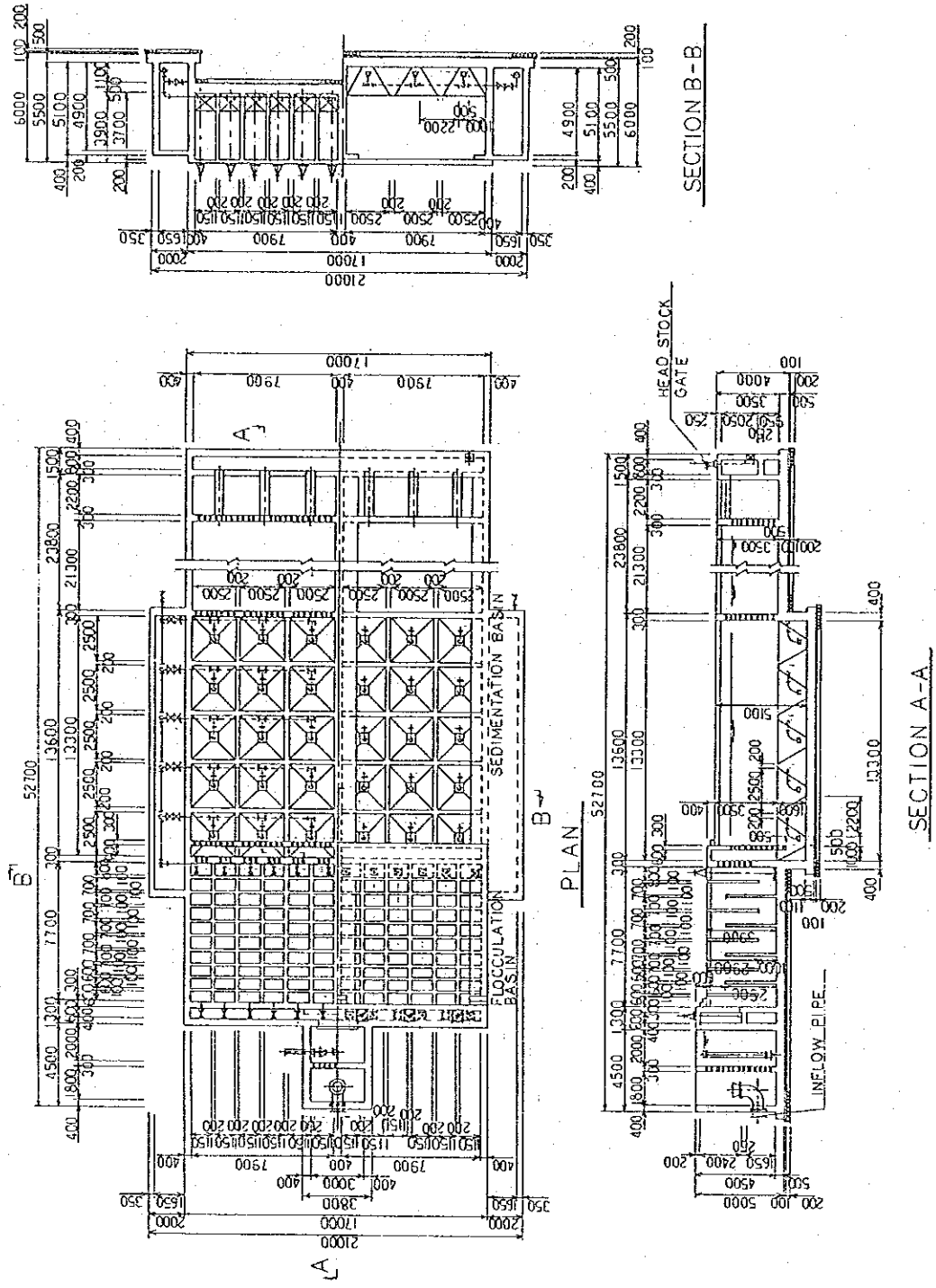
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (4-2)	RAPID SAND FILTER (BALAJU)



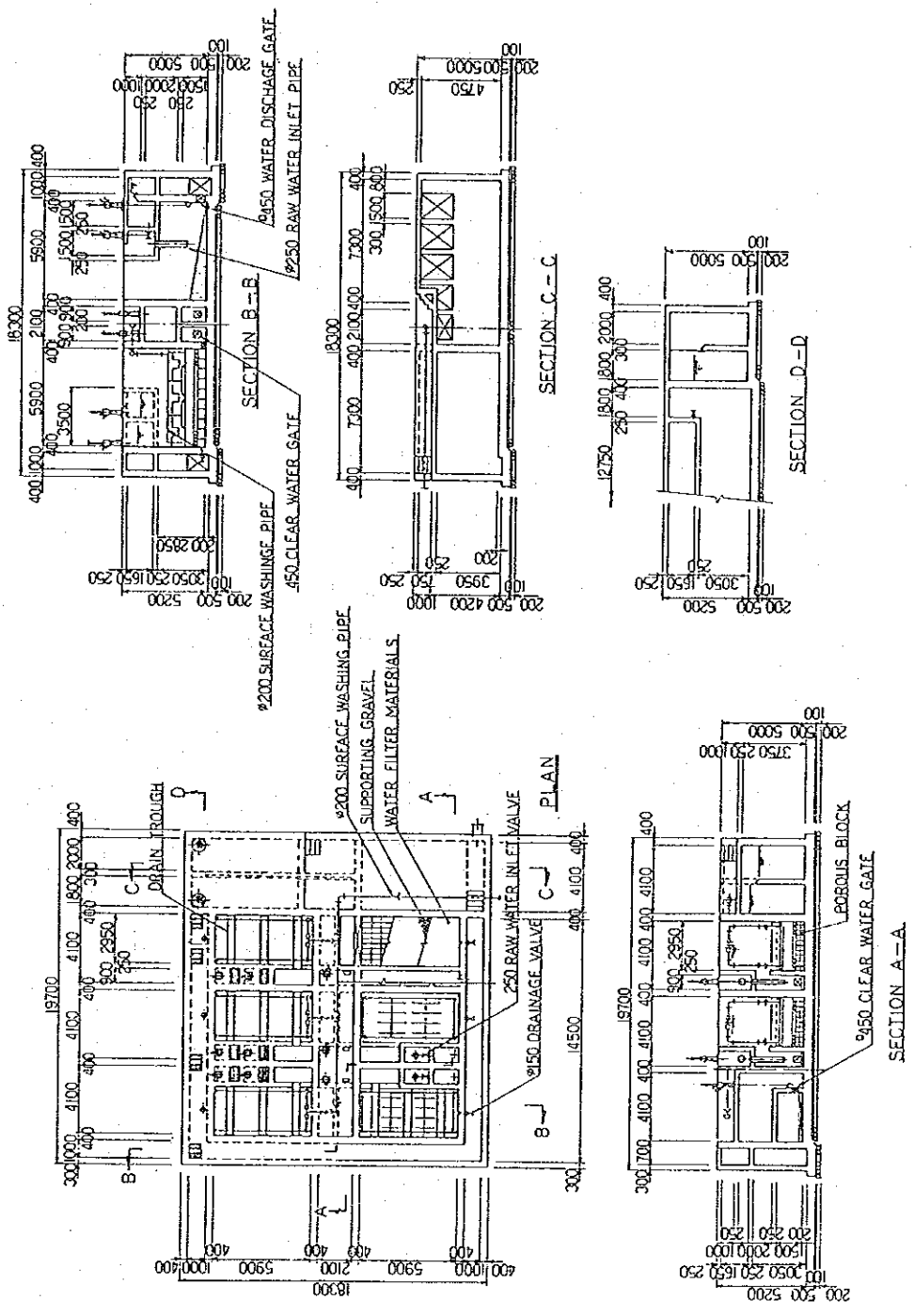
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (5-1)	LAYOUT OF WATER TREATMENT PLANT (LAMBAGAR, MANOHARA, BALKHU)



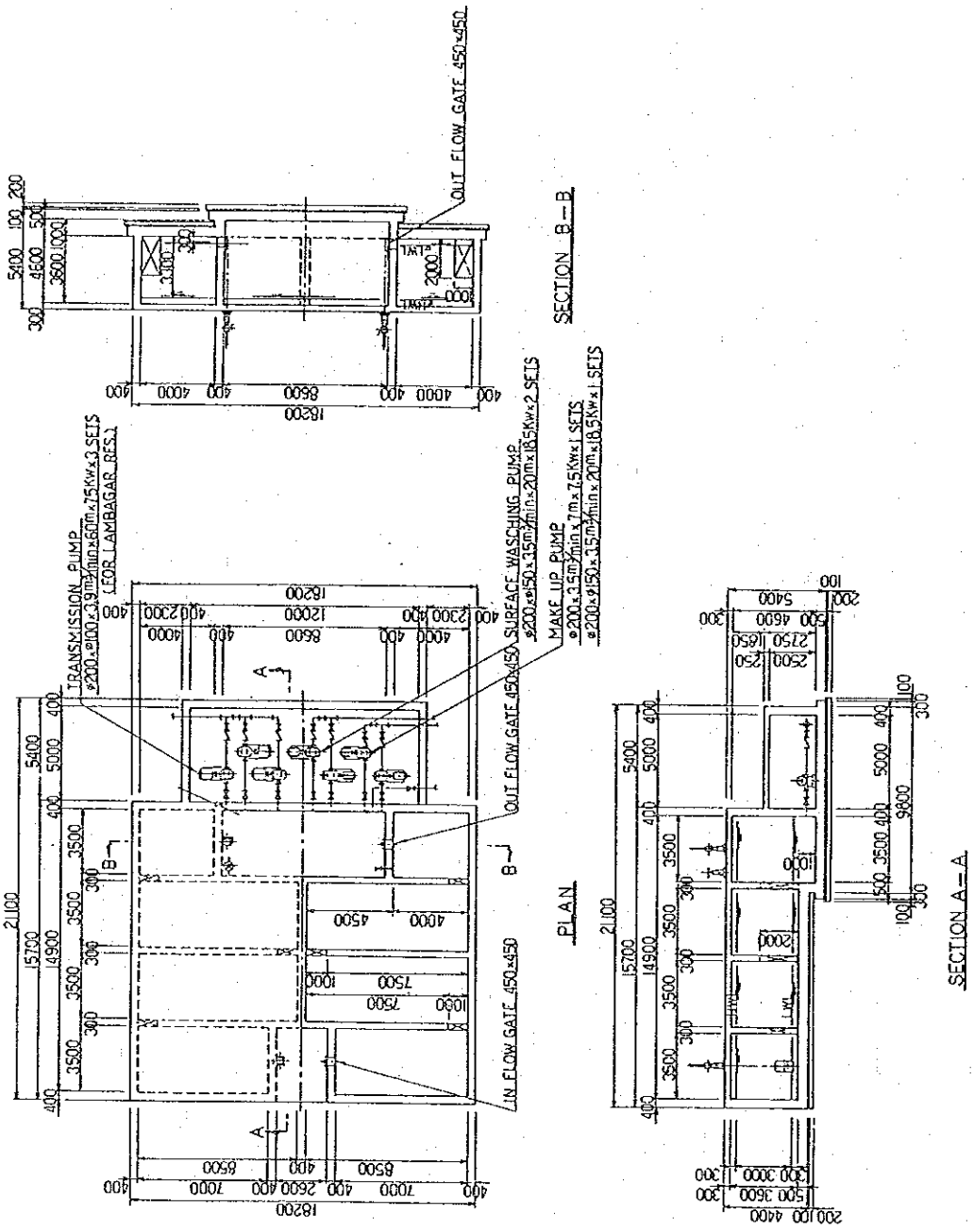
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (5-2)	GRIT CHAMBER (LAMBAGAR, MANOHARA, BALKHU, MAHANKAL CHAUR, BANSBARI)



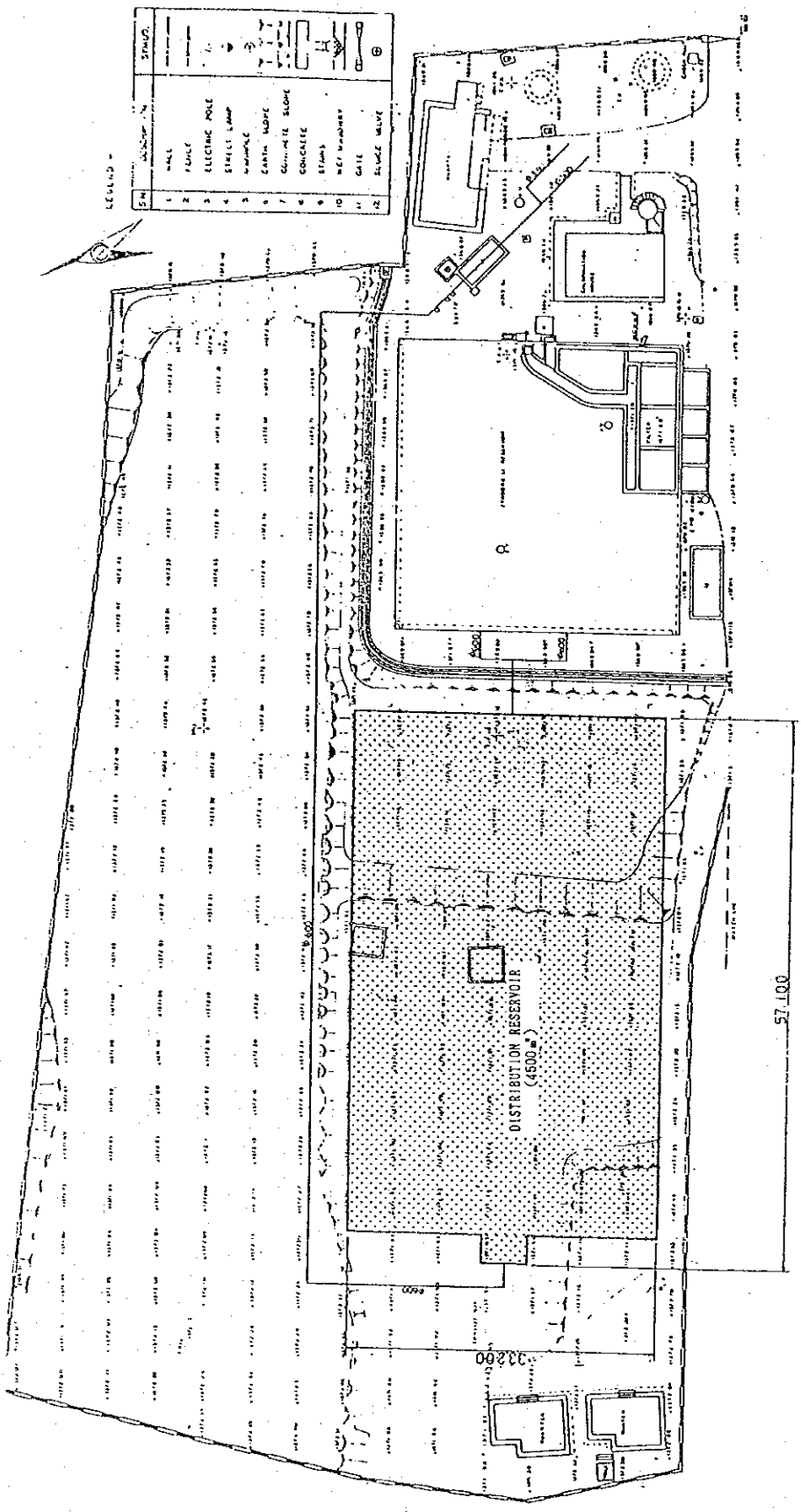
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (5-3)	COAGULO-SEDIMENTATION BASIN (LAMBAGAR, MANOHARA, BALKHU)



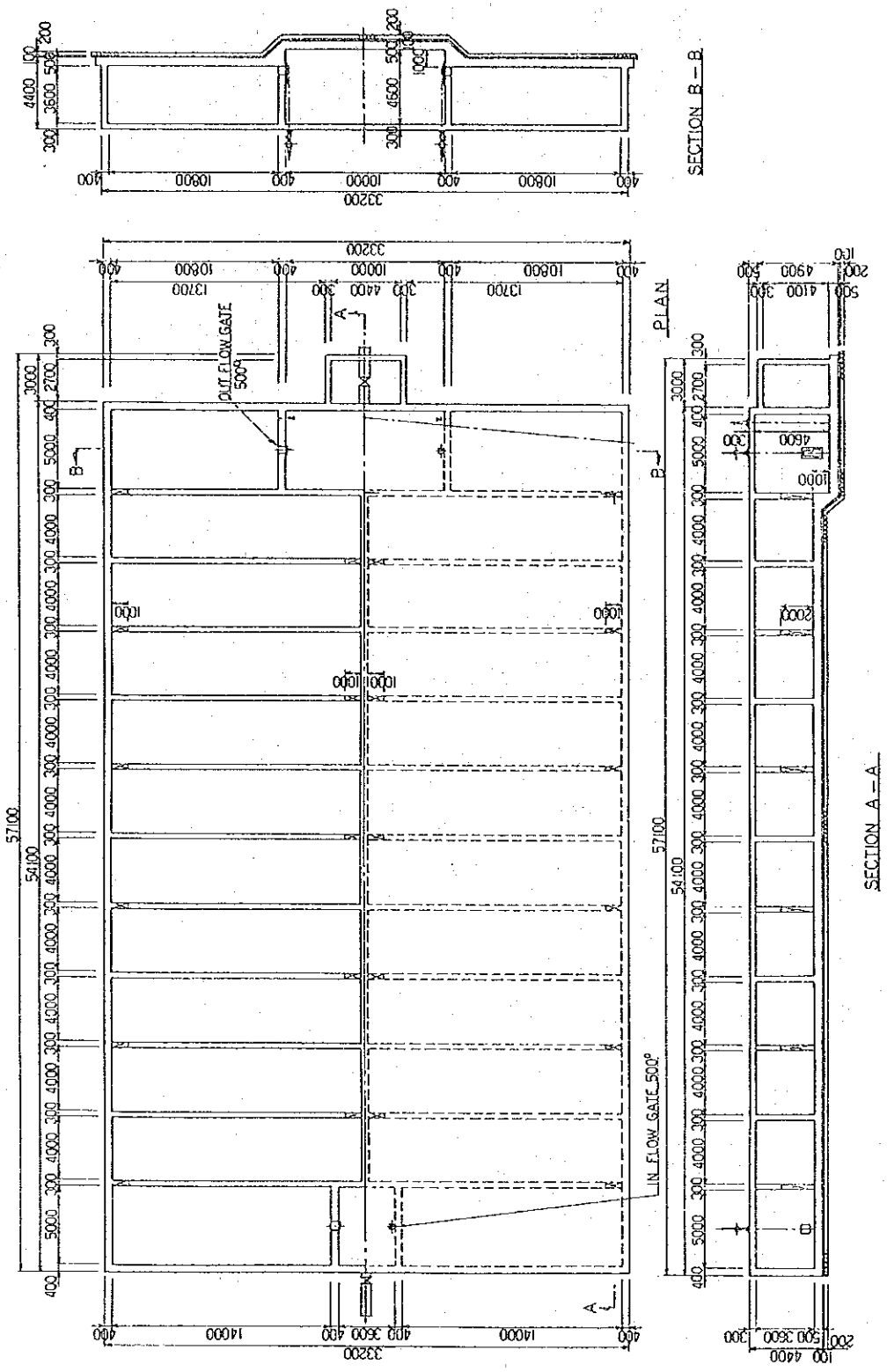
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (5-4)	RAPID SAND FILTER (LAMBAGAR, MANOHARA, BALKHU)



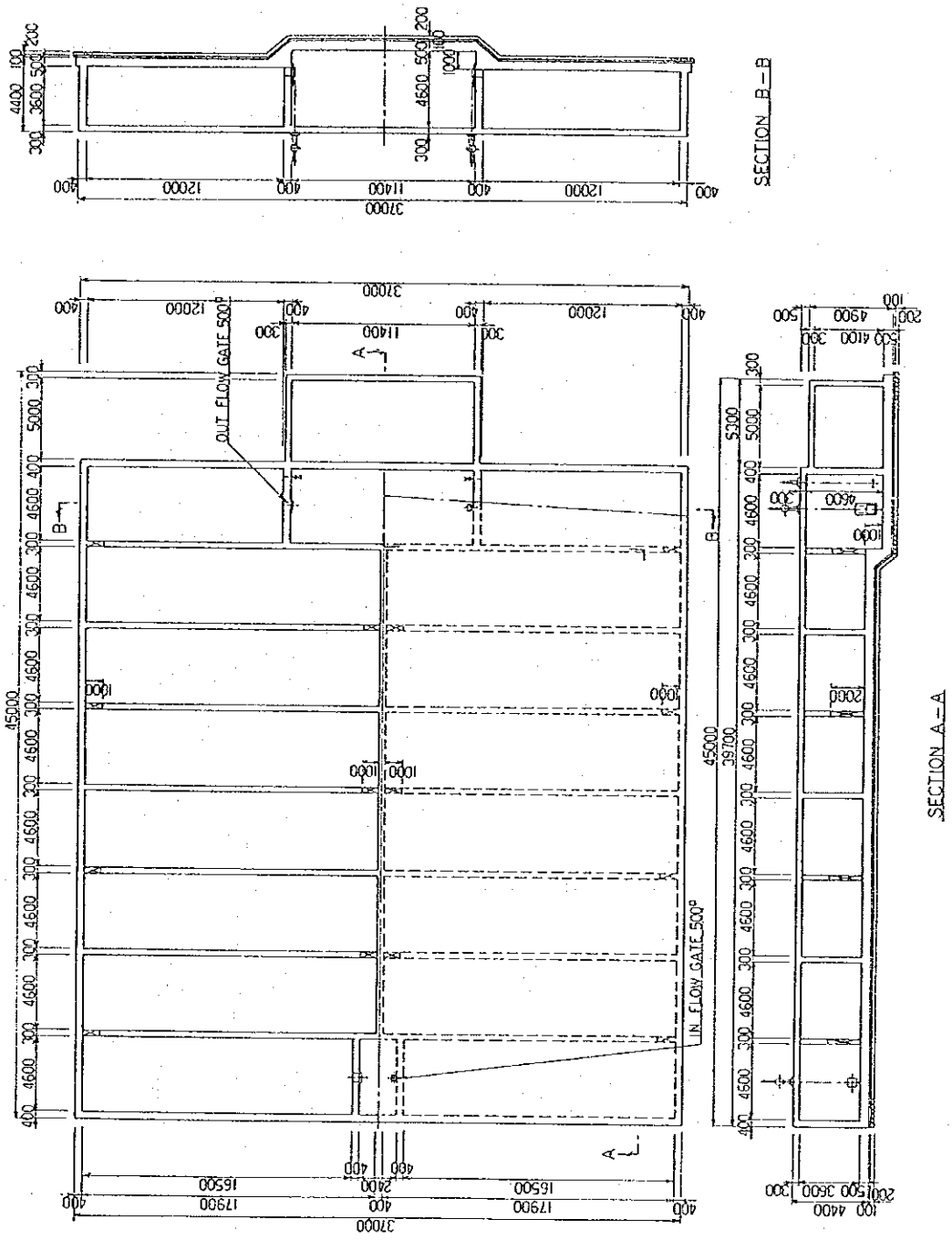
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (5-5)	CLEAR WATER RESERVOIR (LAMBAGAR, MANOHARA, BALKHU)



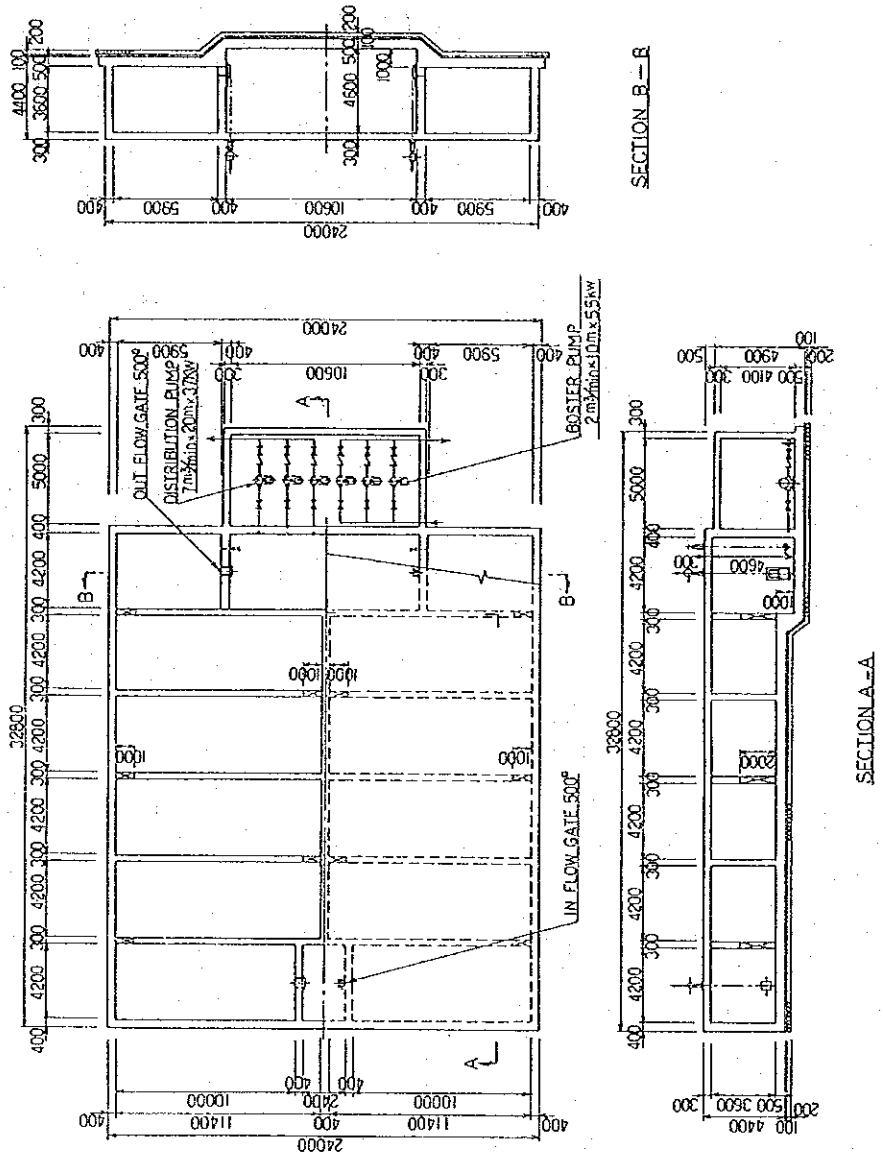
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (6-1)	LAYOUT OF DISTRIBUTION RESERVOIR (SHAIBHU)



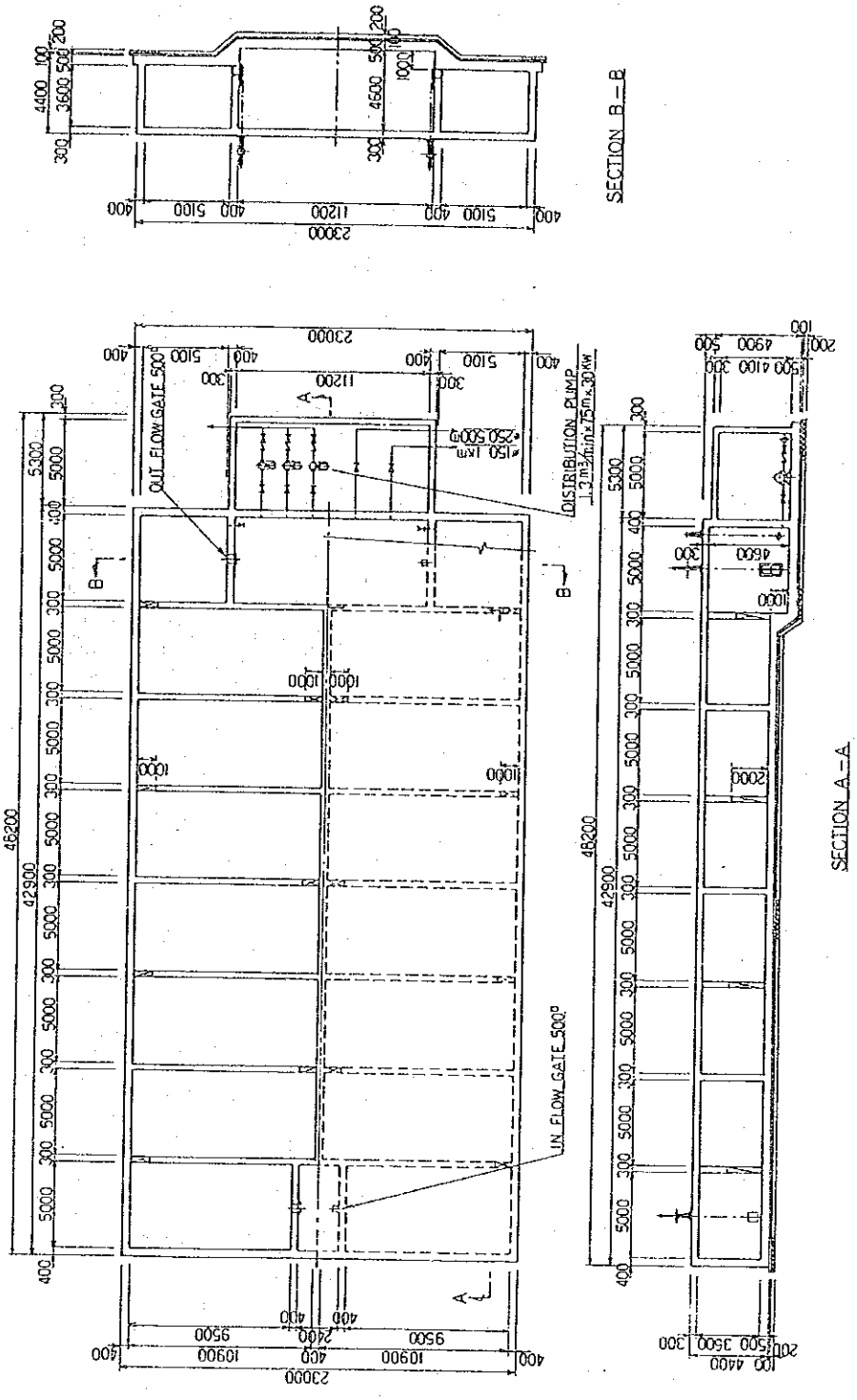
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (6-2)	DISTRIBUTION RESERVOIR 4,500 m3 (SHAIBHU)



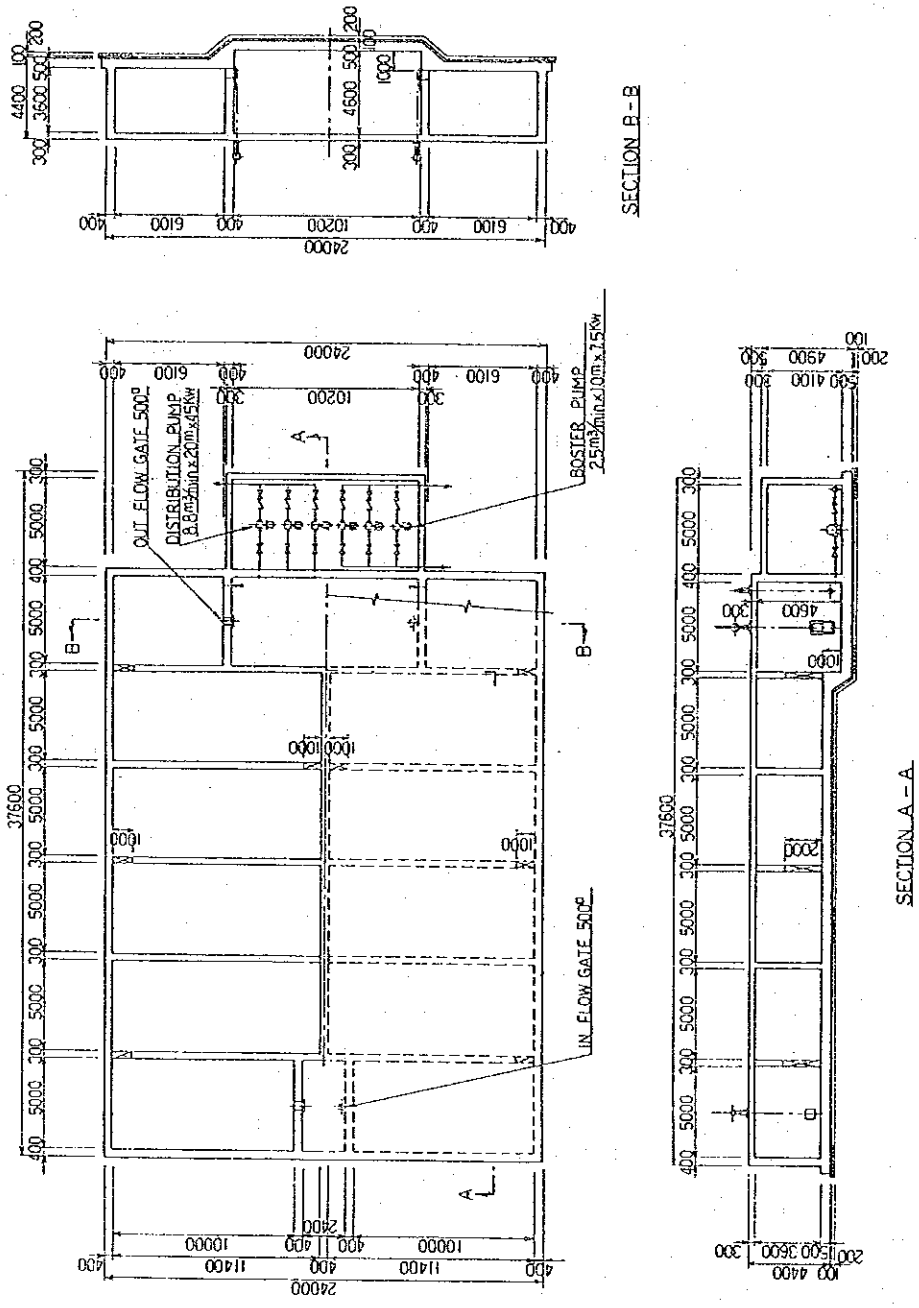
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (6-3)	DISTRIBUTION RESERVOIR 3,750 m3 (MAHARAJGANJ)



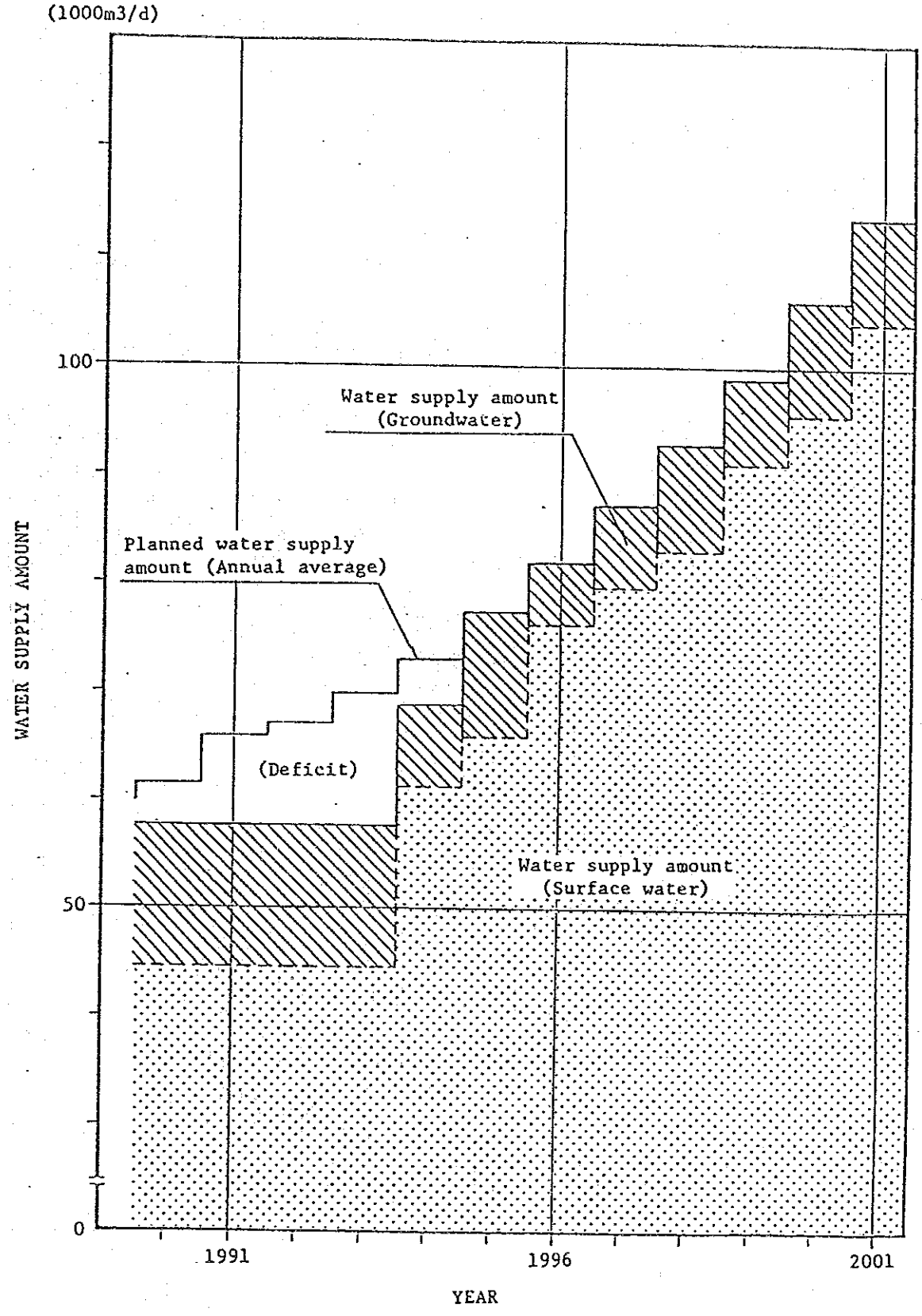
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (6-4)	DISTRIBUTION RESERVOIR 1,550 m3 (SUNDARIJAL)



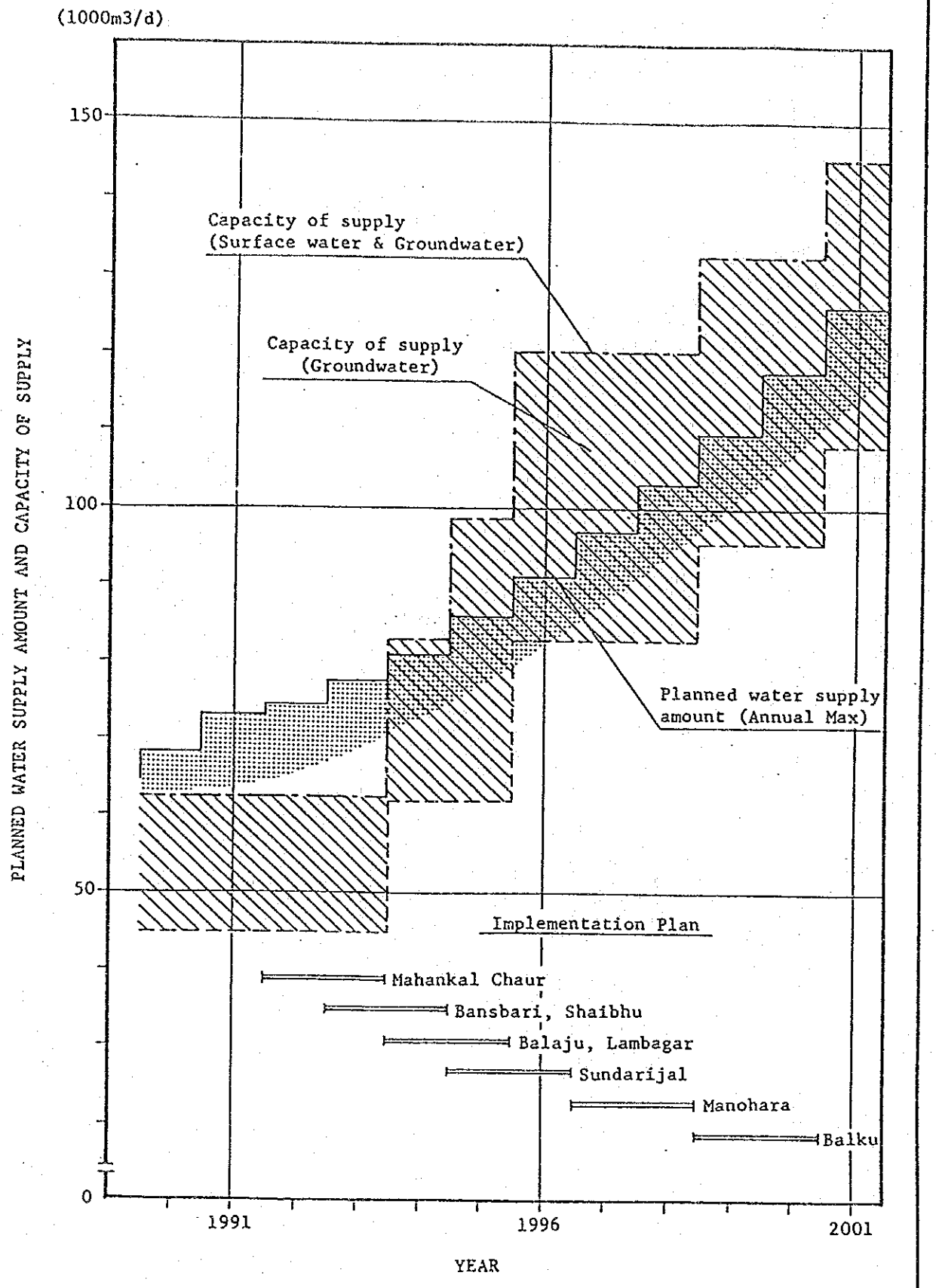
HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (6-5)	DISTRIBUTION RESERVOIR 2,400 m3 (LAMBAGAR)



HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.3 (6-6)	DISTRIBUTION RESERVOIR 1,850 m3 (SUNDARIJAL, MANOHARA, BALKHU)



HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.4	ANNUAL AVERAGE WATER SUPPLY



HIS MAJESTY'S GOVERNMENT OF NEPAL GROUND WATER MANAGEMENT PROJECT IN THE KATHMANDU VALLEY JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. J-3.5	PLANNED WATER SUPPLY (ANNUAL MAX) AND CAPACITY OF SUPPLY FACILITIES.