JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DIRECTORATE GENERAL OF HUMAN SETTLEMENTS
MINISTRY OF PUBLIC WORKS
AND
JAKARTA WATER SUPPLY ENTERPRISE

THE STUDY ON THE REVISE OF JAKARTA WATER SUPPLY DEVELOPMENT PROJECT

FINAL REPORT

Volume 4

ANNEX (2)

MAY 1997

NIHON SUIDO CONSULTANTS CO., LTD.
NIPPON KOEI CO., LTD

No.

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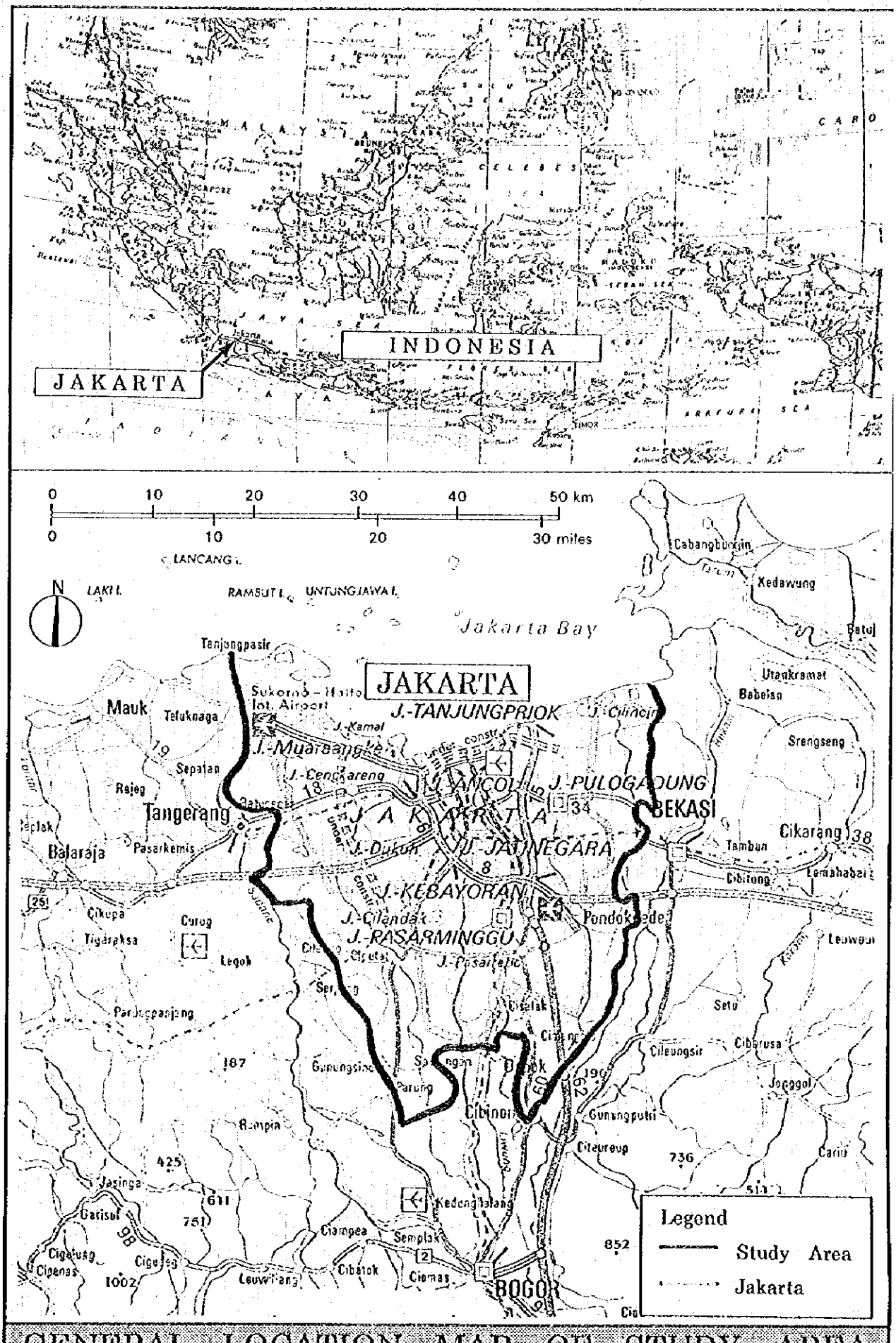

GENERAL LOCATION MAP OF STUDY AREA

DIRECTORATE GENERAL OF HUMAN SETTLEMENTS
MINISTRY OF PUBLIC WORKS
AND
JAKARTA WATER SUPPLY ENTERPRISE

FINAL REPORT

OF
THE STUDY ON
THE REVISE OF
JAKARTA WATER SUPPLY DEVELOPMENT PROJECT

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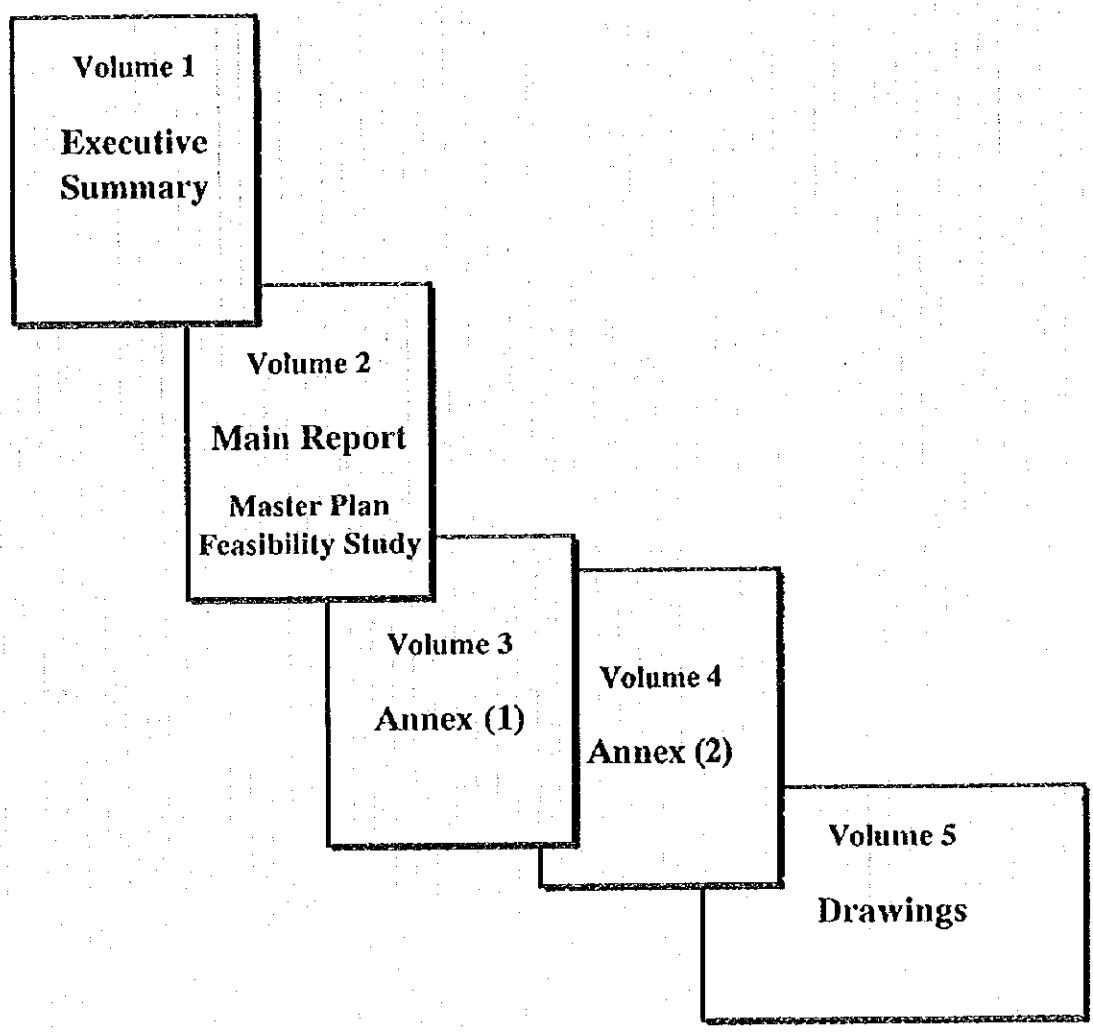
ABBREVIATIONS

BAPEDAL	Badan Pengendalian Dampak Lingkungan Environmental Impact Management Agency
BAPPENAS	Badan Perencanaan Pembangunan Nasional National Development Planning Board
BOOT	Build Own Operate Transfer
BOTABEK	BOgor, TAngerang and BEKasi
Cabang	Branch (of an organization)
Cipta Karya	Directorate General of Human Settlements, MPW
Daerah	A region
DGWRD	Directorate General of Water Resources Development (within MPW)
DJCK, DGHS	Direktorat Jenderal Cipta Karya Directorate General of Human Settlements (within MPW)
DKI	Daerah Khusus Ibu Kota Indonesia City of Jakarta(Special Capital District of Jakarta)
EIA	Environmental Impact Assessment
GOI	Government of Indonesia
GOJ	Government of Japan
GRDP	Gross Regional Domestic Product
HRD	Human Resources Development
IBRD	International Bank for Reconstruction and Development(The World Bank)
IEE	Initial Environmental Examination
JABOTABEK	JAkarta, BOgor, TAngerang and BEKasi
JICA	Japan International Cooperation Agency
JMDPR	JABOTABEK Metropolitan Development Plan Review
JUDP	JABOTABEK Urban Development Project
JWRMS	JABOTABEK Water Resources Management Study
JWSDP-MP	Jakarta Water Supply Development Project (Master Plan)
JWSSP	Jakarta Water Supply Sector Project
Kabupaten	District-administrative subdivision of a province
Kecamatan	District-administrative subdivision of a kabupaten
Kelurahan	District-administrative subdivision of a kecamatan
KEPPRES	Keputusan Presiden, Presidential Degree
MOF	Ministry of Finance
MOH	Ministry of Health
MOHA	Ministry of Home Affairs
MOU	Memorandum of Understanding
MPW	Ministry of Public Works
NRW	Non-Revenue Water
NWSSP	National Water Supply Sector Project
OECF	Overseas Economic Cooperation Fund, Japan
PAM JAYA	Jakarta Water Supply Enterprise
PC	Primary Cell (Water Distribution Network)
PDAM	Perusahaan Daerah Air Minum, Local Government Water Enterprise

PDM	Primary Distribution Main (Water Distribution Network)
PERUMNAS	Perumahan Nasional, National Housing Authority
PIU	Project Implementation Unit
PJSIP	PAM JAYA System Improvement Project
POJ	Perum Otorita Jatiluhur
PSP	Private Sector Participation
S/W	Scope of Works
TOR	Terms of Reference
UFW	Unaccounted-For Water
USAID	US Agency for International Development
Wilayah	Area or region
WTC	West Tarum Canal
WTP	Water Treatment Plant

The Study on the Revise of
Jakarta Water Supply Development Project

Compilation of the Report



ANNEX-37

WATER SUPPLY FACILITIES

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1. ZONAL DEMAND

1.1 Day-Average Water Demand of Each Kecamatan in 1995

Kotamadya			East			West		
		Kecamatan	zone 2	zone 3	zone 6	zone 1	zone 4	zone 5
[71]	JAKARTA SELATAN							
	[010]	KEBAYORAN LAMA	0	0	0	3	3	23
	[011]	PESANGGRAHAN	0	0	0	0	0	0
	[020]	CILANDAK	0	0	0	0	0	29
	[030]	PASAR MINGGU	0	0	0	0	0	29
	[031]	JAGAKARSA	0	0	0	0	0	0
	[040]	MAMPANG PRAPATAN	0	0	0	3	0	27
	[041]	PANCORAN	0	0	0	0	0	30
	[050]	KEBAYORAN BARU	0	0	0	33	0	131
	[060]	SETIA BUDI	0	0	0	30	0	0
	[070]	TEBET	0	0	0	88	0	0
[72]	JAKARTA TIMUR							
	[010]	PASAR REBO	0	0	12	0	0	0
	[011]	CIRACAS	0	0	10	0	0	0
	[012]	CIPAYUNG	0	0	0	0	0	0
	[020]	KRAMAT JATI	0	0	64	0	0	0
	[021]	MAKASAR	0	0	21	0	0	0
	[030]	JATINEGARA	0	0	145	0	0	0
	[031]	DUREN SAWIT	0	0	124	0	0	0
	[040]	MATRAMAN	111	0	0	0	0	0
	[050]	PULO GADUNG	201	0	0	0	0	0
	[060]	CAKUNG	131	0	0	0	0	0
[73]	JAKARTA PUSAT							
	[010]	TANAH ABANG	0	0	0	183	0	0
	[020]	MENTENG	0	0	0	127	0	0
	[030]	SENEN	47	0	0	0	0	0
	[040]	CEMPAKA PUTIH	160	0	0	0	0	0
	[041]	JOHAR BARU	48	0	0	0	0	0
	[050]	KEMAYORAN	142	61	0	0	0	0
	[060]	SAWAH BESAR	34	34	0	103	0	0
	[070]	GAMBIR	0	0	0	300	0	0
[74]	JAKARTA BARAT							
	[010]	KEBON JERUK	0	0	0	0	62	0
	[011]	KEMBANGAN	0	0	0	0	55	6
	[020]	CENGKARENG	0	0	0	0	91	0
	[021]	KALI DERES	0	0	0	0	92	0
	[030]	GROGOL PETAMBURAN	0	0	0	37	86	0
	[031]	PALMERAH	0	0	0	82	0	0
	[040]	TAMBORA	0	0	0	285	0	0
	[050]	TAMAN SARI	0	0	0	227	0	0
[75]	JAKARTA UTARA							
	[010]	PENJARINGAN	0	0	0	119	119	0
	[011]	PADEMANGAN	0	195	0	195	0	0
	[020]	TANJUNG PRIOK	0	519	0	0	0	0
	[030]	KOJA	0	213	0	0	0	0
	[031]	KELAPA GADING	230	25	0	0	0	0
	[040]	CILINCING	76	114	0	0	0	0
	[050]	KEPULAUAN SERIBU	0	0	0	0	0	0
Sub-total			1,179	1,163	375	1,815	509	275
[03]	BOGOR							
	[150]	CIMANGGIS	0	0	0	0	0	0
	[200]	SAWANGAN	0	0	0	0	0	0
	[201]	LIMO	0	0	0	0	0	0
	[720]	BEJI	0	0	0	0	0	0
[18]	BEKASI							
	[010]	PONDOK GEDE	0	0	0	0	0	0
	[011]	JATIASIH	0	0	0	0	0	0
	[100]	TARUMAJAYA	0	0	0	0	0	0
	[730]	BEKASI BARAT	0	0	0	0	0	0
[19]	TANGERANG							
	[050]	CIPUTAT	0	0	0	0	0	0
	[051]	PAMULANG	0	0	0	0	0	0
	[070]	PONDOK AREN	0	0	0	0	0	0
	[160]	TELUKNAGA	0	0	0	0	0	0
	[161]	KOSAMBI	0	0	0	0	0	0
[75]	Kotamadya TANGERANG							
	[010]	CILEDUG	0	0	0	0	0	0
	[020]	CIPONDOH	0	0	0	0	0	0
	[050]	BATU CEPER	0	0	0	0	0	0
	[050]	BENDA	0	0	0	0	0	0
Sub-Total			0	0	0	0	0	0
Total			1,179	1,163	375	1,815	509	275

1.2 Day-Average Water Demand of Each Kecamatan in 2000

Kotamadya		East			West		
	Kecamatan	zone 2	zone 3	zone 6	zone 1	zone 4	zone 5
[71]	JAKARTA SELATAN						
	[010] KEBAYORAN LAMA	0	0	0	14	14	115
	[011] PESANGGRAHAN	0	0	0	0	0	66
	[020] CILANDAK	0	0	0	0	0	108
	[030] PASAR MINGGU	0	0	0	0	0	134
	[031] JAGAKARSA	0	0	0	0	0	0
	[040] MAMPANG PRAPATAN	0	0	0	12	0	104
	[041] PANCORAN	0	0	0	0	0	95
	[050] KEBAYORAN BARU	0	0	0	48	0	192
	[060] SETIA BUDI	0	0	0	87	0	0
	[070] TEBET	0	0	0	167	0	0
[72]	JAKARTA TIMUR						
	[010] PASAR REBO	0	0	92	0	0	0
	[011] CIRACAS	0	0	98	0	0	0
	[012] CIPAYUNG	0	0	0	0	0	0
	[020] KRAMAT JATI	0	0	155	0	0	0
	[021] MAKASAR	0	0	84	0	0	0
	[030] JATINEGARA	0	0	251	0	0	0
	[031] DUREN SAWIT	0	0	256	0	0	0
	[040] MATRAMAN	163	0	0	0	0	0
	[050] PULO GADUNG	314	0	0	0	0	0
	[060] CAKUNG	382	0	0	0	0	0
[73]	JAKARTA PUSAT						
	[010] TANAH ABANG	0	0	0	249	0	0
	[020] MENTENG	0	0	0	185	0	0
	[030] SENEN	95	0	0	0	0	0
	[040] CEMPAKA PUTIH	163	0	0	0	0	0
	[041] JOHAR BARU	86	0	0	0	0	0
	[050] KEMAYORAN	183	78	0	0	0	0
	[060] SAWAH BESAR	45	45	0	138	0	0
	[070] GAMBIR	0	0	0	371	0	0
[74]	JAKARTA BARAT						
	[010] KEBON JERUK	0	0	0	0	189	0
	[011] KEMBANGAN	0	0	0	0	130	14
	[020] CENGKARENG	0	0	0	0	300	0
	[021] KALI DERES	0	0	0	0	184	0
	[030] GROGOL PETAMBURAN	0	0	0	65	152	0
	[031] PALMERAH	0	0	0	175	0	0
	[040] TAMBORA	0	0	0	355	0	0
	[050] TAMAN SARI	0	0	0	280	0	0
[75]	JAKARTA UTARA						
	[010] PENJARINGAN	0	0	0	178	178	0
	[011] PADEMANGAN	0	222	0	222	0	0
	[020] TANJUNG PRIOK	0	607	0	0	0	0
	[030] KOJA	0	271	0	0	0	0
	[031] KELAPA GADING	280	31	0	0	0	0
	[040] CILINCING	99	149	0	0	0	0
	[050] KEPULAUAN SERIBU	0	0	0	0	0	0
Sub-total		1,811	1,404	937	2,548	1,148	828
[03]	BOGOR						
	[150] CIMANGGIS	0	0	0	0	0	0
	[200] SAWANGAN	0	0	0	0	0	0
	[201] LIMO	0	0	0	0	0	0
	[720] BEJI	0	0	0	0	0	0
[18]	BEKASI						
	[010] PONDOK GEDE	0	0	0	0	0	0
	[011] JATIASIH	0	0	0	0	0	0
	[100] TARUMAJAYA	0	0	0	0	0	0
	[730] BEKASI BARAT	0	0	0	0	0	0
[19]	TANGERANG						
	[050] CIPUTAT	0	0	0	0	0	0
	[051] PAMULANG	0	0	0	0	0	0
	[070] PONDOK AREN	0	0	0	0	0	0
	[160] TELUKNAGA	0	0	0	0	0	0
	[161] KOSAMBI	0	0	0	0	0	0
[75]	Kotamadya TANGERANG						
	[010] CILEDUG	0	0	0	0	0	0
	[020] CIPONDOH	0	0	0	0	0	0
	[050] BATU CEPER	0	0	0	0	0	0
	[060] BENDA	0	0	0	0	0	0
Sub-Total		0	0	0	0	0	0
Total		1,811	1,404	937	2,548	1,148	828

1.3 Day-Average Water Demand of Each Kecamatan in 2005

Kotamadya / Kecamatan		East zone 2	East zone 3	East zone 6	West zone 1	West zone 4	West zone 5
[71] JAKARTA SELATAN							
[010]	KEBAYORAN LAMA	0	0	0	27	27	215
[011]	PESANGGRAHAN	0	0	0	0	0	153
[020]	CILANDAK	0	0	0	0	0	207
[030]	PASAR MINGGU	0	0	0	0	0	253
[031]	JAGAKARSA	0	0	0	0	0	1
[040]	MAMPANG PRAPATAN	0	0	0	21	0	197
[041]	PANCORAN	0	0	0	0	0	168
[050]	KEBAYORAN BARU	0	0	0	64	0	255
[060]	SETIA BUDI	0	0	0	152	0	0
[070]	TEBET	0	0	0	245	0	0
[72] JAKARTA TIMUR							
[010]	PASAR REBO	0	0	197	0	0	0
[011]	CIRACAS	0	0	214	0	0	0
[012]	CIPAYUNG	0	0	0	0	0	0
[020]	KRAMAT JATI	0	0	244	0	0	0
[021]	MAKASAR	0	0	164	0	0	0
[030]	JATINEGARA	0	0	355	0	0	0
[031]	DUREN SAWIT	0	0	407	0	0	0
[040]	MATRAMAN	210	0	0	0	0	0
[050]	PULO GADUNG	435	0	0	0	0	0
[060]	CAKUNG	725	0	0	0	0	0
[73] JAKARTA PUSAT							
[010]	TANAH ABANG	0	0	0	318	0	0
[020]	MENTENG	0	0	0	248	0	0
[030]	SENEN	145	0	0	0	0	0
[040]	CEMPAKA PUTIH	175	0	0	0	0	0
[041]	JOHAR BARU	118	0	0	0	0	0
[050]	KEMAYORAN	223	95	0	0	0	0
[060]	SAWAH BESAR	59	59	0	176	0	0
[070]	GAMBIR	0	0	0	445	0	0
[74] JAKARTA BARAT							
[010]	KEBON JERUK	0	0	0	0	339	0
[011]	KEMBANGAN	0	0	0	0	233	26
[020]	CENGKARENG	0	0	0	0	543	0
[021]	KALI DERES	0	0	0	0	299	0
[030]	GROGOL PETAMBURAN	0	0	0	95	222	0
[031]	PALMERAH	0	0	0	271	0	0
[040]	TAMBORA	0	0	0	424	0	0
[050]	TAMAN SARI	0	0	0	333	0	0
[75] JAKARTA UTARA							
[010]	PENJARINGAN	0	0	0	247	247	0
[011]	PADEMANGAN	0	249	0	249	0	0
[020]	TANJUNG PRIOK	0	701	0	0	0	0
[030]	KOJA	0	328	0	0	0	0
[031]	KELAPA GADING	336	37	0	0	0	0
[040]	CILINCING	126	189	0	0	0	0
[050]	KEPULAUAN SERIBU	0	0	0	0	0	0
Sub-total		2,552	1,659	1,581	3,314	1,911	1,475
[03] BOGOR							
[150]	CIMANGGIS	0	0	0	0	0	0
[200]	SAWANGAN	0	0	0	0	0	0
[201]	LIMO	0	0	0	0	0	0
[720]	BEJI	0	0	0	0	0	0
[18] BEKASI							
[010]	PONDOK GEDE	0	0	0	0	0	0
[011]	JATIASIH	0	0	0	0	0	0
[100]	TARUMAJAYA	0	0	0	0	0	0
[730]	BEKASI BARAT	0	0	0	0	0	0
[19] TANGERANG							
[050]	CIPUTAT	0	0	0	0	0	0
[051]	PAMULANG	0	0	0	0	0	0
[070]	PONDOK AREN	0	0	0	0	0	0
[160]	TELUKNAGA	0	0	0	0	0	0
[161]	KOSAMBI	0	0	0	0	0	0
[75] Kotamadya TANGERANG							
[010]	CILEDUG	0	0	0	0	0	0
[020]	CIPONDOH	0	0	0	0	0	0
[050]	BATU CEPER	0	0	0	0	0	0
[060]	BENDA	0	0	0	0	0	0
Sub-Total		0	0	0	0	0	0
Total		2,552	1,659	1,581	3,314	1,911	1,475

1.4 Day-Average Water Demand of Each Kecamatan in 2010

Kotamadya	Kecamatan	East zone 2	East zone 3	East zone 6	West zone 1	West zone 4	West zone 5
[71]	JAKARTA SELATAN						
[010]	KEBAYORAN LAMA	0	0	0	41	41	326
[011]	PESANGGRAHAN	0	0	0	0	0	253
[020]	CILANDAK	0	0	0	0	0	322
[030]	PASAR MINGGU	0	0	0	0	0	410
[031]	JAGAKARSA	0	0	0	0	0	157
[040]	MAMPANG PRAPATAN	0	0	0	30	0	271
[041]	PANCORAN	0	0	0	0	0	244
[050]	KEBAYORAN BARU	0	0	0	80	0	322
[060]	SETIA BUDI	0	0	0	218	0	0
[070]	TEBET	0	0	0	328	0	0
[72]	JAKARTA TIMUR						
[010]	PASAR REBO	0	0	320	0	0	0
[011]	CIRACAS	0	0	360	0	0	0
[012]	CIPAYUNG	0	0	143	0	0	0
[020]	KRAMAT JATI	0	0	341	0	0	0
[021]	MAKASAR	0	0	265	0	0	0
[030]	JATINEGARA	0	0	460	0	0	0
[031]	DUREN SAWIT	0	0	569	0	0	0
[040]	MATRAMAN	261	0	0	0	0	0
[050]	PULO GADUNG	569	0	0	0	0	0
[060]	CAKUNG	1,170	0	0	0	0	0
[73]	JAKARTA PUSAT						
[010]	TANAH ABANG	0	0	0	390	0	0
[020]	MENTENG	0	0	0	310	0	0
[030]	SENEN	199	0	0	0	0	0
[040]	CEMPAKA PUTIH	185	0	0	0	0	0
[041]	JOHAR BARU	151	0	0	0	0	0
[050]	KEMAYORAN	265	114	0	0	0	0
[060]	SAWAH BESAR	72	72	0	215	0	0
[070]	GAMBIR	0	0	0	519	0	0
[74]	JAKARTA BARAT						
[010]	KEBON JERUK	0	0	0	0	510	0
[011]	KEMBANGAN	0	0	0	0	365	41
[020]	CENGKARENG	0	0	0	0	810	0
[021]	KALI DERES	0	0	0	0	449	0
[030]	GROGOL PETAMBURAN	0	0	0	127	297	0
[031]	PALMERAH	0	0	0	370	0	0
[040]	TAMBORA	0	0	0	498	0	0
[050]	TAMAN SARI	0	0	0	385	0	0
[75]	JAKARTA UTARA						
[010]	PENJARINGAN	0	0	0	323	323	0
[011]	PADEMANGAN	0	277	0	277	0	0
[020]	TANJUNG PRIOK	0	799	0	0	0	0
[030]	KOJA	0	384	0	0	0	0
[031]	KELAPA GADING	392	44	0	0	0	0
[040]	CILINCING	156	234	0	0	0	0
[050]	KEPULAUAN SERIBU	0	0	0	0	0	0
Sub-total		3,420	1,923	2,458	4,112	2,795	2,345
[03]	BOGOR						
[150]	CIMANGGIS	0	0	0	0	0	0
[200]	SAWANGAN	0	0	0	0	0	0
[201]	LIMO	0	0	0	0	0	8
[720]	BEJI	0	0	0	0	0	0
[18]	BEKASI						
[010]	PONDOK GEDE	0	0	0	0	0	0
[011]	JATIASIH	0	0	0	0	0	0
[100]	TARUMAJAYA	0	0	0	0	0	0
[730]	BEKASI BARAT	0	0	0	0	0	0
[19]	TANGERANG						
[060]	CIPUTAT	0	0	0	0	0	0
[061]	PAMULANG	0	0	0	0	0	0
[070]	PONDOK AREN	0	0	0	0	0	0
[160]	TELUKNAGA	0	0	0	0	0	0
[161]	KOSAMBI	0	0	0	0	0	0
[75]	Kotamadya TANGERANG						
[010]	CILEDUG	0	0	0	0	449	0
[020]	CIPONDOH	0	0	0	0	371	0
[050]	BATU CEPER	0	0	0	0	0	0
[060]	BENDA	0	0	0	0	0	0
Sub-Total		0	0	0	0	820	8
Total		3,420	1,923	2,458	4,112	3,615	2,353

1.5 Day-Average Water Demand of Each Kecamatan in 2015

Kotamadya		East			West		
	Kecamatan	zone 2	zone 3	zone 6	zone 1	zone 4	zone 5
[71]	JAKARTA SELATAN						
	[010] KEBAYORAN LAMA	0	0	0	56	56	446
	[011] PESANGGRAHAN	0	0	0	0	0	373
	[020] CILANDAK	0	0	0	0	0	472
	[030] PASAR MINGGU	0	0	0	0	0	576
	[031] JAGAKARSA	0	0	0	0	0	546
	[040] MAMPANG PRAPATAN	0	0	0	39	0	354
	[041] PANCORAN	0	0	0	0	0	312
	[050] KEBAYORAN BARU	0	0	0	99	0	396
	[060] SETIA BUDI	0	0	0	290	0	0
	[070] TEBET	0	0	0	410	0	0
[72]	JAKARTA TIMUR						
	[010] PASAR REBO	0	0	470	0	0	0
	[011] CIRACAS	0	0	522	0	0	0
	[012] CIPAYUNG	0	0	530	0	0	0
	[020] KRAMAT JATI	0	0	450	0	0	0
	[021] MAKASAR	0	0	385	0	0	0
	[030] JATINEGARA	0	0	567	0	0	0
	[031] DUREN SAWIT	0	0	745	0	0	0
	[040] MATRAMAN	311	0	0	0	0	0
	[050] PULO GADUNG	712	0	0	0	0	0
	[060] CAKUNG	1,691	0	0	0	0	0
[73]	JAKARTA PUSAT						
	[010] TANAH ABANG	0	0	0	455	0	0
	[020] MENTENG	0	0	0	379	0	0
	[030] SENEN	258	0	0	0	0	0
	[040] CEMPAKA PUTIH	196	0	0	0	0	0
	[041] JOHAR BARU	181	0	0	0	0	0
	[050] KEMAYORAN	310	133	0	0	0	0
	[060] SAWAH BESAR	85	85	0	256	0	0
	[070] GAMBIR	0	0	0	594	0	0
[74]	JAKARTA BARAT						
	[010] KEBON JERUK	0	0	0	0	696	0
	[011] KEMBANGAN	0	0	0	0	526	58
	[020] CENGKARENG	0	0	0	0	1,312	0
	[021] KALI DERES	0	0	0	0	639	0
	[030] GROGOL PETAMBURAN	0	0	0	161	376	0
	[031] PALMERAH	0	0	0	457	0	0
	[040] TAMBORA	0	0	0	572	0	0
	[050] TAMAN SARI	0	0	0	434	0	0
[75]	JAKARTA UTARA						
	[010] PENJARINGAN	0	0	0	412	412	0
	[011] PADEMANGAN	0	308	0	308	0	0
	[020] TANJUNG PRIOK	0	901	0	0	0	0
	[030] KOJA	0	440	0	0	0	0
	[031] KELAPA GADING	453	50	0	0	0	0
	[040] CILINCING	191	287	0	0	0	0
	[050] KEPULAUAN SERIBU	0	0	0	0	0	0
Sub-total		4,388	2,205	3,669	4,943	3,818	3,533
[03]	BOGOR						
	[150] CIMANGGIS	0	0	0	0	0	0
	[200] SAWANGAN	0	0	0	0	0	0
	[201] LIMO	0	0	0	0	0	10
	[720] BEJI	0	0	0	0	0	0
[18]	BEKASI						
	[010] PONDOK GEDE	0	0	86	0	0	0
	[011] JATIASIH	0	0	10	0	0	0
	[100] TARUMAJAYA	0	0	0	0	0	0
	[730] BEKASI BARAT	0	0	0	0	0	0
[19]	TANGERANG						
	[060] CIPUTAT	0	0	0	0	0	452
	[061] PAMULANG	0	0	0	0	0	253
	[070] PONDOK AREN	0	0	0	0	0	215
	[160] TELUKNAGA	0	0	0	0	0	0
	[161] KOSAMBI	0	0	0	0	0	0
[75]	Kotamadya TANGERANG						
	[010] CILEDUG	0	0	0	0	818	0
	[020] CIPONDOH	0	0	0	0	799	0
	[050] BATU CEPER	0	0	0	0	0	0
	[060] BENDA	0	0	0	0	0	0
Sub-Total		0	0	96	0	1,617	930
Total		4,388	2,205	3,765	4,943	5,435	4,463

1.6 Day-Average Water Demand of Each Kecamatan in 2019

Kotamadya		East			West		
	Kecamatan	zone 2	zone 3	zone 6	zone 1	zone 4	zone 5
[71]	JAKARTA SELATAN						
[010]	KEBAYORAN LAMA	0	0	0	59	59	469
[011]	PESANGGRAHAN	0	0	0	0	0	404
[020]	CILANDAK	0	0	0	0	0	544
[030]	PASAR MINGGU	0	0	0	0	0	627
[031]	JAGAKARSA	0	0	0	0	0	645
[040]	MAMPANG PRAPATAN	0	0	0	41	0	371
[041]	PANCORAN	0	0	0	0	0	324
[050]	KEBAYORAN BARU	0	0	0	107	0	427
[060]	SETIA BUDI	0	0	0	314	0	0
[070]	TEBET	0	0	0	422	0	0
[72]	JAKARTA TIMUR						
[010]	PASAR REBO	0	0	528	0	0	0
[011]	CIRACAS	0	0	550	0	0	0
[012]	CIPAYUNG	0	0	651	0	0	0
[020]	KRAMAT JATI	0	0	476	0	0	0
[021]	MAKASAR	0	0	430	0	0	0
[030]	JATINEGARA	0	0	588	0	0	0
[031]	DUREN SAWIT	0	0	779	0	0	0
[040]	MATRAMAN	321	0	0	0	0	0
[050]	PULO GADUNG	747	0	0	0	0	0
[060]	CAKUNG	1,788	0	0	0	0	0
[73]	JAKARTA PUSAT						
[010]	TANAH ABANG	0	0	0	488	0	0
[020]	MENTENG	0	0	0	402	0	0
[030]	SENEN	270	0	0	0	0	0
[040]	CEMPAKA PUTIH	204	0	0	0	0	0
[041]	JOHAR BARU	188	0	0	0	0	0
[050]	KEMAYORAN	322	138	0	0	0	0
[060]	SAWAH BESAR	90	90	0	270	0	0
[070]	GAMBIR	0	0	0	635	0	0
[74]	JAKARTA BARAT						
[010]	KEBON JERUK	0	0	0	0	740	0
[011]	KEMBANGAN	0	0	0	0	601	67
[020]	CENGKARENG	0	0	0	0	1,161	0
[021]	KALI DERES	0	0	0	0	734	0
[030]	GROGOL PETAMBURAN	0	0	0	168	391	0
[031]	PALMERAH	0	0	0	484	0	0
[040]	TAMBORA	0	0	0	597	0	0
[050]	TAMAN SARI	0	0	0	459	0	0
[75]	JAKARTA UTARA						
[010]	PENJARINGAN	0	0	0	440	440	0
[011]	PADEMANGAN	0	325	0	325	0	0
[020]	TANJUNG PRIOK	0	937	0	0	0	0
[030]	KOJA	0	453	0	0	0	0
[031]	KELAPA GADING	501	56	0	0	0	0
[040]	CILINCING	211	316	0	0	0	0
[050]	KEPULAUAN SERIBU	0	0	0	0	0	0
Sub-total		4,641	2,315	4,013	5,211	4,125	3,878
[03]	BOGOR						
[150]	CIMANGGIS	0	0	0	0	0	0
[200]	SAWANGAN	0	0	0	0	0	0
[201]	LIMO	0	0	0	0	0	14
[720]	BEJI	0	0	0	0	0	0
[18]	BEKASI						
[010]	PONDOK GEDE	0	0	139	0	0	0
[011]	JATIASIH	0	0	33	0	0	0
[100]	TARUMAJAYA	0	0	0	0	0	0
[730]	BEKASI BARAT	0	0	0	0	0	0
[19]	TANGERANG						
[050]	CIPUTAT	0	0	0	0	0	904
[061]	PAMULANG	0	0	0	0	0	507
[070]	PONDOK AREN	0	0	0	0	0	445
[160]	TELUKNAGA	0	0	0	0	0	0
[161]	KOSAMBI	0	0	0	0	0	0
[75]	Kotamadya TANGERANG						
[010]	CILEDUG	0	0	0	0	1,206	0
[020]	CIPONDOH	0	0	0	0	1,178	0
[050]	BATU CEPER	0	0	0	0	0	0
[050]	BENDA	0	0	0	0	0	0
Sub-Total		0	0	152	0	2,384	1,872
Total		4,641	2,315	4,165	5,211	6,509	5,751

2. ORIGINAL ALTERNATIVE STUDY

Totally five alternatives as shown in **Figure-OA1** were conceptually considered for Master Plan of Jakarta Water Supply System based on the basic policies mentioned above. Making of alternatives was closely related to water resources development as mentioned in **Section 3.6**. Alternative plans were prepared based on the conditions as follows.

i) Additional total treatment capacity in 2019 is 30 m3/sec.
ii) Additional distribution capacity for each zone is same, which is shown on Figure-372.3 as the balance.
iii) Locations of expected treatment plants and/or distribution centers are same.
iv) Hydraulic calculation of treated water transmission pipeline is based on same conditions as follows.
   - Hazen-Williams Formula with C value of 120 is applied.
   - Necessary transmission pumping head is set at about 40m to 50m.
   - Velocity is about 1.5 to 2.5 m/s

It is also noted that treated water from treatment plants considered in each alternative could not be transmitted by gravity for all alternative cases with appropriate pipe diameter and velocity at the target year 2019.

Construction of Buaran III Treatment Plant (5,000 l/sec) which will receive raw water from the West Tarum Canal (WTC) after upgrading is common option to all alternatives, because there is no expectation of new water source other than the WTC until 2006, that is, next water source development, the Karian-Serpong Conveyance System (KSCS), will complete.

Features of five alternatives are summarized as follows.

Alternative 1 is that raw water taken from the KSCS and the Conveyance 2 for future demand will be treated at existing Cisadane Treatment Plant and new East Treatment Plant at the south of Zone 6, respectively.

Alternative 2 is that required water demand in east area and west area of Jakarta and Tangerang area (Zone 7) will be covered by respective treatment plant at the south of Zone 6 (new East Treatment Plant), the south of Zone 5 (new West Treatment Plant), and existing Cisadane Treatment Plant. To convey raw water for each treatment plant, additional raw water

transmission pipeline from both of the KSCS and the Conveyance 2 to West Treatment Plant will be needed.

Alternative 3 is that required water demand in Jakarta will be covered by one treatment plant at the south of Zone 5 (new West Treatment Plant), and water demand in Tangerang (Zone 7) will be covered by extension of existing Cisadane Treatment Plant. West Treatment Plant should, therefore, receive raw water from the KSCS and the Conveyance 2.

Alternative 4 is that required water demand in east area of Jakarta will be covered by new East Treatment Plant at the south of Zone 6, and remaining raw water taken from the Conveyance 2 will be transmitted and treated at another new plant, new West Treatment Plant, located at the south of Zone 5 for a part of west area of Jakarta. All raw water from the KSCS will be treated at existing Cisadane Treatment Plant for Tangerang area and a part of west area of Jakarta.

Alternative 5 is that raw water taken from the KSCS and the Conveyance 2 will be treated at existing Cisadane Treatment Plant and new West Treatment Plant at the south of Zone 5, respectively. Difference between Alternative 1 and 5 is the location of new treatment plants in Jakarta, at east or at west.

Usually, alternatives are compared each other items of land acquisition cost, construction cost, and operation and maintenance cost. In this study, however, only the construction cost are compared because of the following reasons.

Land acquisition cost of proposed new treatment plants is considered to be almost same among alternatives if total treatment capacity is same for all alternatives. Operation and maintenance cost such as chemical costs and raw water charges is also considered to be almost same if treatment amount is same. Difference of Operation and Maintenance cost among alternatives will be electric charge for treatment plants, distribution centers, and raw water transmission pump stations. The electric charge for each alternative is estimated based on the required pump capacity at each facility, however, order of the electric cost resulted in the same as the estimated construction costs. Therefore, operation and maintenance cost is not considered and is not added to total costs for alternative comparison.

Therefore, cost of alternatives for Water Supply System was compared based on the construction cost.

It should be noted that construction costs of raw water transmission pipeline/canal of the KSCS to Serpong in Tangerang and of the Conveyance 2 to the southeast of Jakarta are not included in the construction cost of each alternative. However, additional raw water transmissions from Serpong to the southwest of Jakarta and/or additional raw water transmission from the southeast to the southwest of Jakarta are necessary to be included in costs for the alternatives except Alternative 1 which does not require additional raw water transmission.

The result of cost comparison is summarized in **Table-OA1** and its details are attached hereinafter. Comparative study other than cost factor is evaluated as shown in **Table-OA2.** From a point of view of raw water and treated water management, Alternatives 1 and 4 are comparatively simple system for water supply system.

As the results, Alternative 1 is, therefore, the least cost alternative and is judged to be a recommendable system for Master Plan of Jakarta Water Supply System.

(3) Plan of System Expansion

As mentioned above, it is recommended for Master Plan to employ Alternative 1, for future expansion of the existing Jakarta Water Supply System. **Figure-OA2** shows overall system including existing treatment plants and distribution centers, required new/expansion treatment plants and distribution centers, and its treated water transmission systems, and more detailed proposed system expansion plan are attached hereinafter. **Table-OA3** shows the summary of proposed new system.

Existing Buaran Treatment Plant necessary to be expanded with capacity of 5,000 l/sec taking raw water from the upgraded WTC; the new plant is called tentatively Buaran III. Treated water will be transmitted to Distribution Center R1 for Zone 3 and also distributed to Zone 2. Total treatment capacity of Buaran Treatment Plant will be 10,000 l/sec.

New treatment plant which is tentatively named East Treatment Plant will be constructed with total capacity of 15,000 l/sec by two construction stages at the south of Zone 6, and will receive raw water from the Conveyance 2. Treated water will be transmitted to Distribution Centers R3 at Zone 5, R4 at Zone 4, and R6 at Zone 1, and directly distributed to Zone 6.

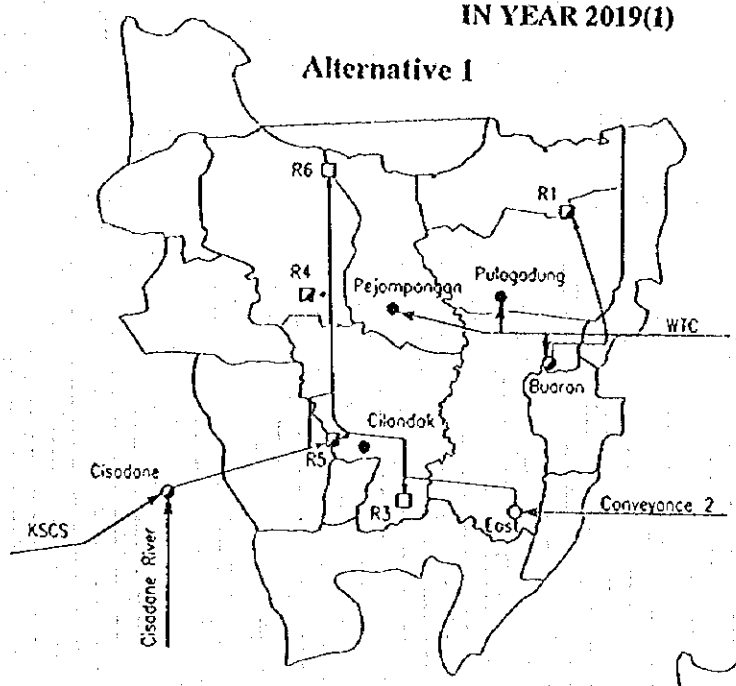
Existing Cisadane Treatment Plant will be also expanded with capacity of 10,000 l/sec by two construction stages, and its raw water will be taken from the KSCS. Treated water will be transmitted to Distribution Centers R4 at Zone 4, R5 at Zone 5, and R6 at Zone 1, and directly distributed to Zone 7 which covers Tangerang area in the service area. Total treatment capacity of Cisadane Treatment Plant will be, therefore, 13,000 l/sec.

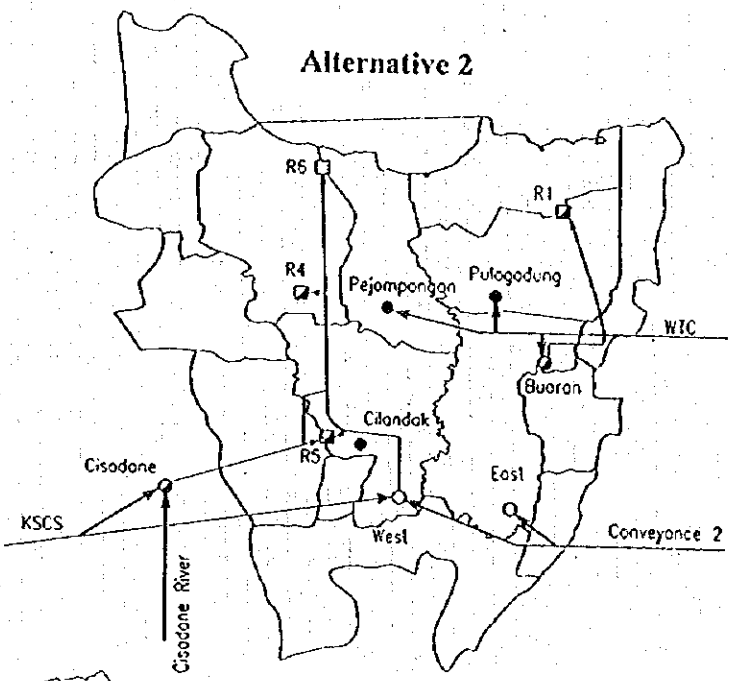
Raw water sources for Jakarta Water Supply System in 2019 will be the upgraded West Tarum Canal for Pejompongan, Pulogadung, and Buaran Treatment Plants, the Conveyance 2 for East Treatment Plant, the Karian-Serpong Conveyance System and the existing Cisadane River for Cisadane Treatment Plant, and the Krukut River for Cilandak Treatment Plant.

Distribution Centers R4 and R6 will receive treated water from both of East and Cisadane Treatment Plants. Water supply to Water Front City will be covered from Distribution Centers R1 and R6. Existing mini plants besides Cilandak Treatment Plant will not be expected for future water supply System in 2019.

Figure-OA3 shows a relation between Day-Maximum Water Demand and Treatment Capacity with timing of construction of proposed treatment plants. Construction schedule of proposed treatment plants, distribution centers, and treated water transmission pipeline with timing of completion of Water Resources Development is shown in **Figure-OA4**.

Figure-OA1 ALTERNATIVE PLANS OF WATER SUPPLY SYSTEM IN YEAR 2019(1)





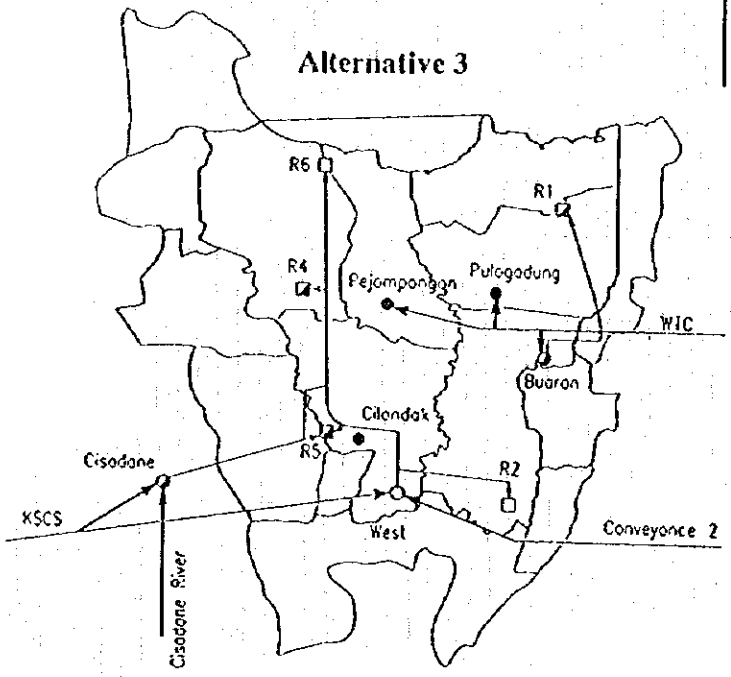
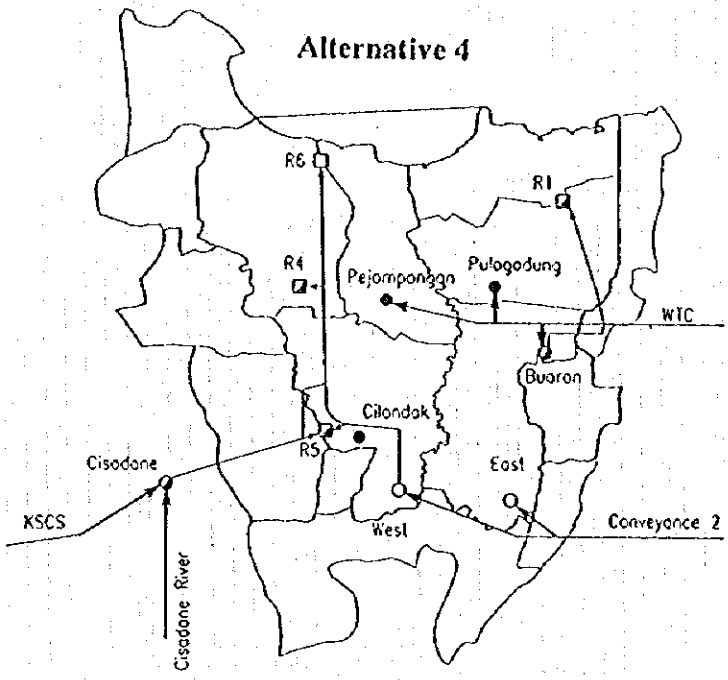
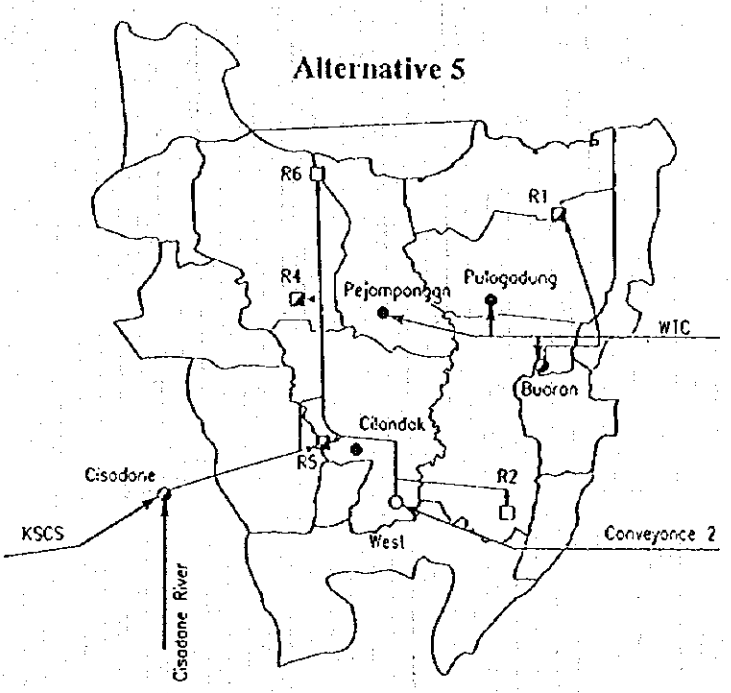


Figure-OA1 ALTERNATIVE PLANS OF WATER SUPPLY SYSTEM IN YEAR 2019(2)





LEGEND :

- Expansion of Treatment Plant
- Proposed Treatment Plant
- Existing Treatment Plant
- Expansion of Distribution Center
- Proposed Distribution Center
- Raw Water
- Treated Water Transmission

Table-OA1 SUMMARY OF COST COMPARISON

(X 1,000,000)

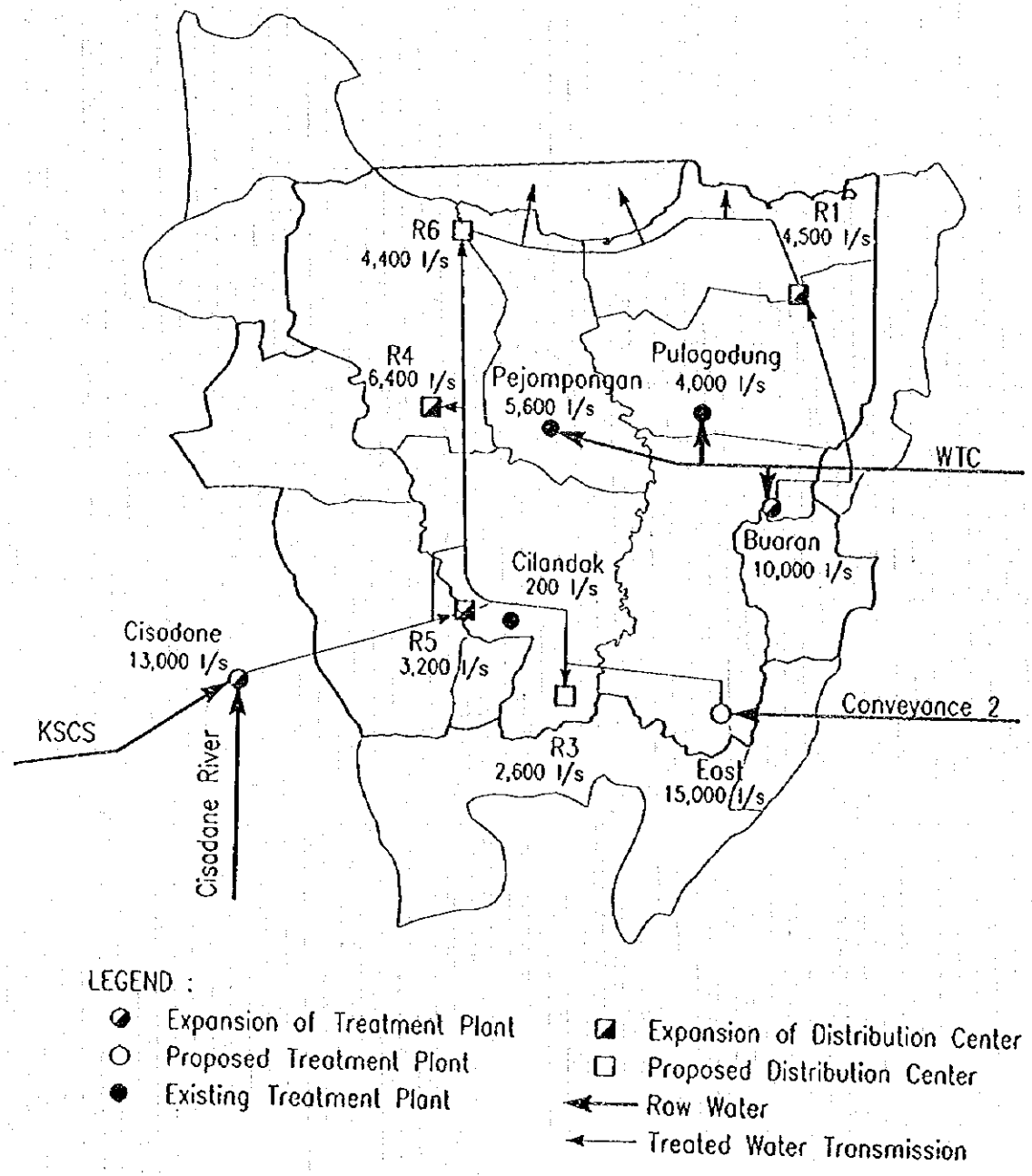
	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	¥	Rp.	¥	Rp.	¥	Rp.	¥	Rp.	¥	Rp.
Treatment Plant	26,780	602,551	28,088	631,969	26,780	602,551	28,088	631,969	26,780	602,551
Distribution Center	3,255	229,092	2,534	178,335	3,313	233,207	2,534	178,335	3,313	233,207
Transmission Pipe	33,025	146,327	24,402	114,475	27,732	129,281	25,767	117,783	26,021	120,188
Raw Water Transmission	0	0	15,157	115,331	17,883	141,093	8,366	72,077	11,092	97,839
Total Cost	63,060	977,969	70,181	1,040,111	75,709	1,106,132	64,754	1,000,165	67,206	1,053,785
Equivalent Yen	106,525		116,408		124,870		109,206		114,041	
Present Cost	51,021	444,999	56,763	470,281	61,104	496,963	52,150	448,842	54,137	474,045
Equivalent Yen	**70,798**		**77,664**		**83,192**		**72,099**		**75,206**	
Lank	**1**		**4**		**5**		**2**		**3**	

Note : Construction costs which would be disbursed in future were estimated based on 1996 price. Factor of price escalation was not included. Value of the "Present Cost" dose not mean total required cost for construction and these costs are for comparison only.

Table-OA2 COMPARISON OF ALTERNATIVES

ASPECTS	REMARKS	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3		ALTERNATIVE 4		ALTERNATIVE 5	
1. Land Acquisition			RANK		RANK		RANK		RANK		RANK
a. Location of New Treatment Plant	Land acquisition in the southeast area is easier than in the southwest area.	Southeast	1	Southeast & Southwest	2	Southwest	4	Southeast & Southwest	2	Southwest	4
b. Number of New Plant	Smaller number is easier to acquire.	1 no	1	2 nos.	4	1 no	1	2 nos.	4	1 no	1
c. Raw Water Pump Station		Not required	1	2 nos.	4	2 nos.	4	1 no	2	1 no	2
2. Treated Water Transmission between Western and Eastern Sector		Yes	3	No	1	Yes	3	No	1	Yes	3
3. Water Management				Yes, from		Yes, from		Yes, from		Yes, from	
a. Raw Water	Additional raw water transmission pipeline is required.	No	1	KSCS & Conveyance 2	4	KSCS & Conveyance 2	4	Conveyance 2	2	Conveyance 2	2
b. Treated Water	Reverse flow of treated water, (treated water flows to upstream of raw water.)	No	1	No	1	Yes	4	No	1	Yes	4
4. Operation & Maintenance											
	Smaller number of new WTP, easier operation, and smaller manpower.	1 no	1	2 nos.	4	1 no	1	2 nos.	4	1 no	1
5. Flexibility in the Emergency Cases											
a. Raw Water Source	Plural source system has higher flexibility.	1 no	4	3 nos.	1	2 nos.	2	2 nos.	2	1 no	4
b. New Treatment Plant	Plural plant system has higher flexibility.	1 no	3	2 nos.	1	1 no	3	2 nos.	1	1 no	3
c. Transmission System	Is there transmission main between eastern and western sector ?	Yes	1	No	4	Yes	1	No	4	Yes	1
6. Construction Workability											
a. Raw Water Conveyance System	Whether is there any additional construction or not ?	No	1	KSCS & Conveyance 2	4	KSCS & Conveyance 2	4	Conveyance 2	2	Conveyance 2	2
b. Treatment Plant	Depend on its numbers.	3 nos.	1	4 nos.	4	3 nos.	1	4 nos.	4	3 nos.	1
c. Transmission Main	Depend on installation length.	133.0 km	5	104.5 km	1	120.0 km	4	106.0 km	2	110.5 km	3
d. Distribution Center	Depend on its number.	5 nos.	3	4 nos.	1	5 nos.	3	4 nos.	1	5 nos.	3
TOTAL RANKING POINTS		27		36		39		32		34	
RANK		1		4		5		2		3	

Figure-OA2 PLAN OF PROPOSED WATER SUPPLY SYSTEM



Tabel-OA3 LIST OF PROPOSED FACILITIES

Proposed Facilities	Capacity / Length
Buaran III Treatment Plant	5,000 l/sec
East I Treatment Plant	5,000 l/sec
East II Treatment Plant	10,000 l/sec
Cisadane II Treatment Plant	5,000 l/sec
Cisadane III Treatment Plant	5,000 l/sec
R1 II Distribution Center	1,500 l/sec
R3 I Distribution Center	1,300 l/sec
R3 II Distribution Center	1,300 l/sec
R4 II Distribution Center	2,600 l/sec
R4 III Distribution Center	2,600 l/sec
R5 II Distribution Center	1,600 l/sec
R6 I Distribution Center	2,000 l/sec
R6 II Distribution Center	2,400 l/sec
Treated Water Transmission, R1 - R6	ϕ 1,350 26.0 km
Treated Water Transmission, Cisadane II - R5,R4	ϕ 1,800 7.5 km
	ϕ 1,650 14.0 km
	ϕ 1,350 1.0 km
	ϕ 1,200 7.0 km
	ϕ 900 2.0 km
Treated Water Transmission, East I - R3,R6	ϕ 1,800 13.5 km
	ϕ 1,350 17.5 km
	ϕ 1,200 10.0 km
	ϕ 1,000 2.0 km
Treated Water Transmission, East II - R3,R4,R5,R6	ϕ 1,800 38.5 km
	ϕ 1,350 10.0 km
	ϕ 1,100 1.0 km
	ϕ 700 1.5 km
	ϕ 600 2.0 km

Figure-OA3 DAY-MAXIMUM WATER DEMAND AND TREATMENT CAPACITY

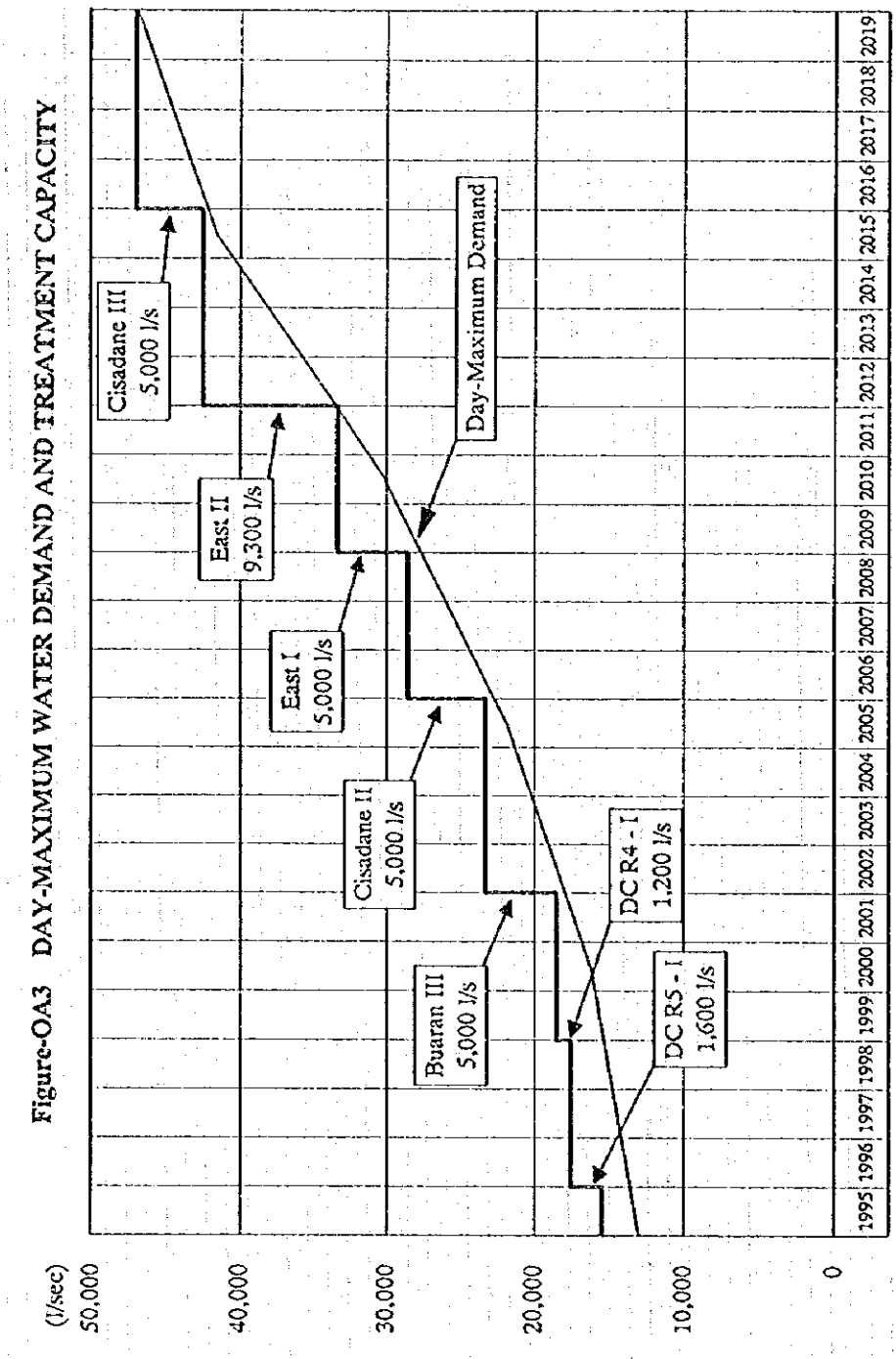
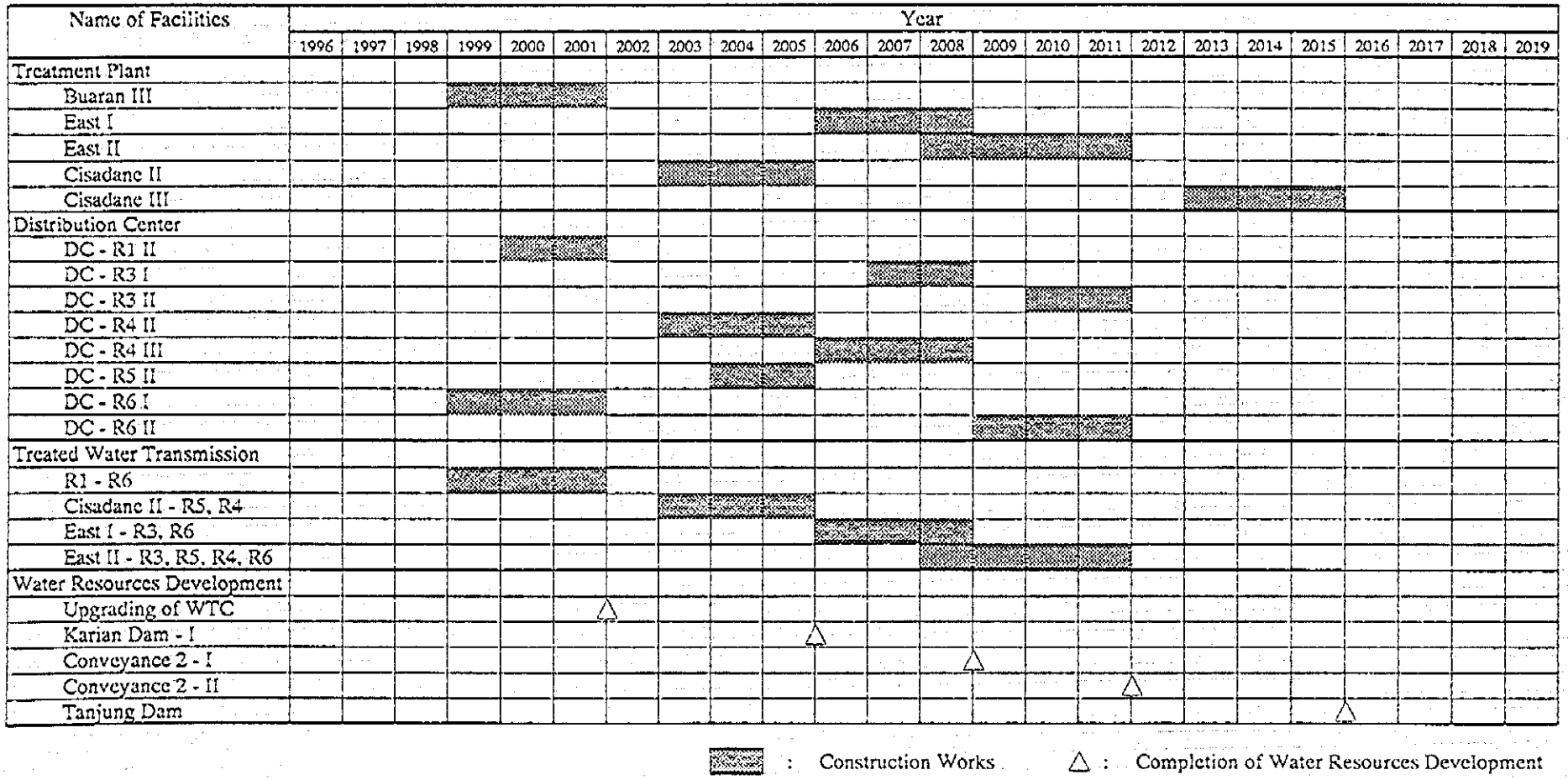


Figure-OA4 CONSTRUCTION SCHEDULE



2.1 Estimated Construction Costs for Alternative Study

Capacity	Construction Cost		Construction Period
	Foreign	Local	
l/sec	million ¥	million Rp.	Years
Water Treatment Plant			
4,000	3,940	88,657	3
5,000	4,687	105,451	3
6,000	5,400	121,508	3
7,000	6,088	136,978	3
7,500	6,423	144,525	3
10,000	8,033	180,747	4
Distribution Center			
500	97	6,859	2
1,200	234	16,462	2
1,500	292	20,577	2
1,600	312	21,949	2
2,000	390	27,436	3
2,400	468	32,923	3
2,500	487	34,295	3
3,000	585	41,154	3
4,000	780	54,872	3
Raw Water Transmission Pump Station			
5,000	974	22,863	3
10,000	1,949	45,727	3

2.2 Hydraulic Calculation for Transmission Pipeline,

Alternative 1

2006		Cisadane	R4+1	R6
Length	km	28.5	10.0	
Flow Rate	m3/sec	5.0	2.0	
Diameter	mm	1,800	1,200	
C value		120	120	
dh	m	48.56	22.53	
v	m/sec	1.96	1.77	
W. level	m	34.0	-14.6	-37.1
Elevation	m	38.0		3.0

		R4+1	R4
Length	km	1.0	
Flow Rate	m3/sec	3.0	
Diameter	mm	1,200	
C value		120	
dh	m	4.77	
v	m/sec	2.65	
W. level	m	-14.6	-19.3
Elevation	m		10.0

2009		East	R3+1	R4
Length	km	13.5	26.0	
Flow Rate	m3/sec	5.0	2.5	
Diameter	mm	1,650	1,350	
C value		120	120	
dh	m	35.14	49.88	
v	m/sec	2.34	1.75	
W. level	m	54.0	18.9	-31.0
Elevation	m	58.0		10.0

		R3+1	R3
Length	km	2.0	
Flow Rate	m3/sec	2.5	
Diameter	mm	1,200	
C value		120	
dh	m	6.81	
v	m/sec	2.21	
W. level	m	18.9	12.1
Elevation	m		58.0

2012		East	R3+1	R5+1	R6
Length	km	13.5	12.0	23.0	
Flow Rate	m3/sec	5.2	4.0	2.4	
Diameter	mm	1,800	1,500	1,350	
C value		120	120	120	
dh	m	24.73	32.88	40.92	
v	m/sec	2.04	2.26	1.68	
W. level	m	54.0	29.3	-3.6	-44.5
Elevation	m	58.0			3.0

		R3+1	R3	R5+1	R5
Length	km	2.0		1.5	
Flow Rate	m3/sec	1.2		1.6	
Diameter	mm	800		900	
C value		120		120	
dh	m	12.62		9.08	
v	m/sec	2.39		2.52	
W. level	m	29.3	16.6	-3.6	-12.7
Elevation	m		58.0		29.0

2.3 Hydraulic Calculation for Transmission Pipeline,

Alternative 2

2006		West	R4+1	R6
Length	km	27.0	10.0	
Flow Rate	m3/sec	5.0	2.0	
Diameter	mm	1,650	1,200	
C value		120	120	
dh	m	70.28	22.53	
v	m/sec	2.34	1.77	
W. level	m	54.0	-16.3	-38.8
Elevation	m	58.0		3.0

2012		West	R6
Length	km	37.0	
Flow Rate	m3/sec	2.4	
Diameter	mm	1,350	
C value		120	
dh	m	65.82	
v	m/sec	1.68	
W. level	m	54.0	-11.8
Elevation	m	58.0	3.0

		R4+1	R4
Length	km	1.0	
Flow Rate	m3/sec	3.0	
Diameter	mm	1,200	
C value		120	
dh	m	4.77	
v	m/sec	2.65	
W. level	m	-16.3	-21.1
Elevation	m		10.0

2009		West	R5+1	R4
Length	km	14.0	14.0	
Flow Rate	m3/sec	4.1	2.5	
Diameter	mm	1,500	1,200	
C value		120	120	
dh	m	40.15	47.67	
v	m/sec	2.32	2.21	
W. level	m	54.0	13.8	-33.8
Elevation	m	58.0		10.0

		R5+1	R5
Length	km	1.5	
Flow Rate	m3/sec	1.6	
Diameter	mm	900	
C value		120	
dh	m	9.08	
v	m/sec	2.52	
W. level	m	13.8	4.8
Elevation	m		29.0

2.4 Hydraulic Calculation for Transmission Pipeline,

Alternative 3

2006		West	R4+1	R6
Length	km	27.0	10.0	
Flow Rate	m3/sec	5.0	2.0	
Diameter	mm	1,650	1,200	
C value		120	120	
dh	m	70.28	22.53	
v	m/sec	2.34	1.77	
W. level	m	54.0	-16.3	-38.8
Elevation	m	58.0		3.0

		R4+1	R4
Length	km	1.0	
Flow Rate	m3/sec	3.0	
Diameter	mm	1,200	
C value		120	
dh	m	4.77	
v	m/sec	2.65	
W. level	m	-16.3	-21.1
Elevation	m		10.0

2009		West	R5+1	R4
Length	km	14.0	14.0	
Flow Rate	m3/sec	4.1	2.5	
Diameter	mm	1,500	1,200	
C value		120	120	
dh	m	40.15	47.67	
v	m/sec	2.32	2.21	
W. level	m	54.0	13.8	-33.8
Elevation	m	58.0		10.0

		R5+1	R5
Length	km	1.5	
Flow Rate	m3/sec	1.6	
Diameter	mm	900	
C value		120	
dh	m	9.08	
v	m/sec	2.52	
W. level	m	13.8	4.8
Elevation	m		29.0

2012		West	R6
Length	km	37.0	
Flow Rate	m3/sec	2.4	
Diameter	mm	1,350	
C value		120	
dh	m	65.82	
v	m/sec	1.68	
W. level	m	54.0	-11.8
Elevation	m	58.0	3.0

		West	R2
Length	km	15.5	
Flow Rate	m3/sec	4.0	
Diameter	mm	1,500	
C value		120	
dh	m	42.47	
v	m/sec	2.26	
W. level	m	54.0	11.5
Elevation	m	58.0	58.0

2.5 Hydraulic Calculation for Transmission Pipeline,

Alternative 4

2006		Cisadane	R4+1	R6
Length	km	28.5	10.0	
Flow Rate	m3/sec	5.0	2.0	
Diameter	mm	1,800	1,200	
C value		120	120	
dh	m	48.56	22.53	
v	m/sec	1.96	1.77	
W. level	m	34.0	-14.6	-37.1
Elevation	m	38.0		3.0

2012		West	R6
Length	km	37.0	
Flow Rate	m3/sec	2.4	
Diameter	mm	1,350	
C value		120	
dh	m	65.82	
v	m/sec	1.68	
W. level	m	54.0	-11.8
Elevation	m	58.0	3.0

		R4+1	R4
Length	km	1.0	
Flow Rate	m3/sec	3.0	
Diameter	mm	1,200	
C value		120	
dh	m	4.77	
v	m/sec	2.65	
W. level	m	-14.6	-19.3
Elevation	m		10.0

2009		West	R5+1	R4
Length	km	14.0	14.0	
Flow Rate	m3/sec	4.1	2.5	
Diameter	mm	1,500	1,200	
C value		120	120	
dh	m	40.15	47.67	
v	m/sec	2.32	2.21	
W. level	m	54.0	13.8	-33.8
Elevation	m	58.0		10.0

		R5+1	R5
Length	km	1.5	
Flow Rate	m3/sec	1.6	
Diameter	mm	900	
C value		120	
dh	m	9.08	
v	m/sec	2.52	
W. level	m	13.8	4.8
Elevation	m		29.0

2.6 Hydraulic Calculation for Transmission Pipeline,

Alternative 5

2006		Cisadane	R4+1	R6
Length	km	28.5	10.0	
Flow Rate	m3/sec	5.0	2.0	
Diameter	mm	1,800	1,200	
C value		120	120	
dh	m	48.56	22.53	
v	m/sec	1.96	1.77	
W. level	m	34.0	-14.6	-37.1
Elevation	m	38.0		3.0

		R4+1	R4
Length	km	1.0	
Flow Rate	m3/sec	3.0	
Diameter	mm	1,200	
C value		120	
dh	m	4.77	
v	m/sec	2.65	
W. level	m	-14.6	-19.3
Elevation	m		10.0

2009		West	R4
Length	km	28.0	
Flow Rate	m3/sec	2.5	
Diameter	mm	1,200	
C value		120	
dh	m	95.33	
v	m/sec	2.21	
W. level	m	54.0	-41.3
Elevation	m	58.0	10.0

2012		West	R5+1	R6
Length	km	13.5	12.0	
Flow Rate	m3/sec	4.0	2.4	
Diameter	mm	1,500	1,100	
C value		120	120	
dh	m	36.99	57.88	
v	m/sec	2.26	2.53	
W. level	m	54.0	17.0	-40.9
Elevation	m	58.0		3.0

		R5+1	R5
Length	km	2.0	
Flow Rate	m3/sec	1.2	
Diameter	mm	800	
C value		120	
dh	m	12.62	
v	m/sec	2.39	
W. level	m	17.0	4.4
Elevation	m		29.0

		West	R2
Length	km	15.5	
Flow Rate	m3/sec	4.0	
Diameter	mm	1,500	
C value		120	
dh	m	42.47	
v	m/sec	2.26	
W. level	m	54.0	11.5
Elevation	m	58.0	58.0

2.7 Cost for Transmission Pipeline of Alternative 1

Year	dia.	Unit Cost x 1,000 /m		Length	Cost x 1,000,000	
		¥	Rp.	km	¥	Rp.
2006	1,800	283	1,082	28.5	8,071	30,848
	1,650	248	1,020	0.0	0	0
	1,200	154	818	11.0	1,690	9,002
					9,761	**39,851**
2009	1,650	248	1,020	13.5	3,353	13,770
	1,500	215	955	0.0	0	0
	1,350	182	888	26.0	4,742	23,088
	1,200	154	818	2.0	307	1,637
	900	98	671	0.0	0	0
					8,403	**38,495**
2012	1,800	283	1,082	13.5	3,823	14,612
	1,500	215	955	12.0	2,578	11,462
	1,350	182	888	23.0	4,195	20,424
	900	98	671	1.5	148	1,006
	800	83	618	2.0	166	1,236
					10,909	**48,741**

2.8 Cost for Transmission Pipeline of Alternative 2

Year	dia.	Unit Cost x 1,000 /m		Length	Cost x 1,000,000	
		¥	Rp.	km	¥	Rp.
2006	1,800	283	1,082	0.0	0	0
	1,650	248	1,020	27.0	6,707	27,540
	1,200	154	818	11.0	1,690	9,002
					8,396	**36,542**
2009	1,650	248	1,020	0.0	0	0
	1,500	215	955	14.0	3,007	13,373
	1,350	182	888	0.0	0	0
	1,200	154	818	14.0	2,150	11,458
	900	98	671	1.5	148	1,006
					5,305	**25,837**
2012	1,800	283	1,082	0.0	0	0
	1,500	215	955	0.0	0	0
	1,350	182	888	37.0	6,749	32,856
	900	98	671	0.0	0	0
	800	83	618	0.0	0	0
					6,749	**32,856**

2.9 Cost for Transmission Pipeline of Alternative 3

Year	dia.	Unit Cost x 1,000 /m		Length	Cost x 1,000,000	
		¥	Rp.	km	¥	Rp.
2006	1,800	283	1,082	0.0	0	0
	1,650	248	1,020	27.0	6,707	27,540
	1,200	154	818	11.0	1,690	9,002
					8,396	**36,542**
2009	1,650	248	1,020	0.0	0	0
	1,500	215	955	14.0	3,007	13,373
	1,350	182	888	0.0	0	0
	1,200	154	818	14.0	2,150	11,458
	900	98	671	1.5	148	1,006
					5,305	**25,837**
2012	1,800	283	1,082	0.0	0	0
	1,500	215	955	15.5	3,329	14,806
	1,350	182	888	37.0	6,749	32,856
	900	98	671	0.0	0	0
	800	83	618	0.0	0	0
					10,078	**47,662**

2.10 Cost for Transmission Pipeline of Alternative 4

Year	dia.	Unit Cost x 1,000 /m		Length	Cost x 1,000,000	
		¥	Rp.	km	¥	Rp.
2006	1,800	283	1,082	28.5	8,071	30,848
	1,650	248	1,020	0.0	0	0
	1,200	154	818	11.0	1,690	9,002
					9,761	**39,851**
2009	1,650	248	1,020	0.0	0	0
	1,500	215	955	14.0	3,007	13,373
	1,350	182	888	0.0	0	0
	1,200	154	818	14.0	2,150	11,458
	900	98	671	1.5	148	1,006
					5,305	**25,837**
2012	1,800	283	1,082	0.0	0	0
	1,500	215	955	0.0	0	0
	1,350	182	888	37.0	6,749	32,856
	900	98	671	0.0	0	0
	800	83	618	0.0	0	0
					6,749	**32,856**

2.11 Cost for Transmission Pipeline of Alternative 5

Year	dia.	Unit Cost x 1,000 /m		Length	Cost x 1,000,000	
		¥	Rp.	km	¥	Rp.
2006	1,800	283	1,082	28.5	8,071	30,848
	1,650	248	1,020	0.0	0	0
	1,200	154	818	11.0	1,690	9,002
					9,761	**39,851**
2009	1,650	248	1,020	0.0	0	0
	1,500	215	955	0.0	0	0
	1,350	182	888	0.0	0	0
	1,200	154	818	28.0	4,301	22,915
	900	98	671	0.0	0	0
					4,301	**22,915**
2012	1,800	283	1,082	0.0	0	0
	1,500	215	955	29.0	6,229	27,701
	1,100	134	770	12.0	1,613	9,245
	900	98	671	0.0	0	0
	800	83	618	2.0	166	1,236
					8,008	**38,182**

2.12 Hydraulic Calculation and Estimated Cost for Raw Water Transmission Pipeline

		Cisadane	West
Length	km	21.0	
Flow Rate	m3/sec	5.0	
Diameter	mm	2,000	
C value		120	
dh	m	21.42	
v	m/sec	1.59	
W. level	m	34.0	12.6
Elevation	m	38.0	58.0

		East	West
Length	km	15.5	
Flow Rate	m3/sec	5.0	
Diameter	mm	1,650	
C value		120	
dh	m	40.35	
v	m/sec	2.34	
W. level	m	54.0	13.7
Elevation	m	58.0	58.0

		East	West
Length	km	15.5	
Flow Rate	m3/sec	10.0	
Diameter	mm	2,200	
C value		120	
dh	m	35.83	
v	m/sec	2.63	
W. level	m	54.0	18.2
Elevation	m	58.0	58.0

dia.	Unit Cost (1,000)		Length	Cost (million)	
	¥	Rp.	km	¥	Rp.
1650	207	850	15.5	3,209	13,175
2000	277	971	21.0	5,817	20,391
2200	320	1037	15.5	4,960	16,074

2.13 Estimated Payment Condition of Construction Work

	Yen			Rp.		
Advance Payment	10 %			20 %		
Progress Payment	80 %			75 %		
Retention Money	10 %			5 %		
Construction Period	2 years					
1st year	10	40	50	20	35	55
2nd year	10	40	50	5	40	45
Construction Period	3 years					
1st year	10	20	30	20	20	40
2nd year		40	40		35	35
3rd year	10	20	30	5	20	25
Construction Period	4 years					
1st year	10	15	25	20	10	30
2nd year		25	25		25	25
3rd year		25	25		25	25
4th year	10	15	25	5	15	20

2.14 Cost Estimate of Alternative 1, Foreign Portion

Alternative 1

	Equivalent Yen	Present Cost	Factor	Total	Treatment Plant					Distribution Center								Transmission Pipeline				Raw Water Transmission					
					Huaran III	East I	East II	Cisadane II	Cisadane III	R1 II	R3 I	R3 II	R4 II	R4 III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
			2.055%		5,000	5,000	10,000	5,000	5,000	1,500	2,500	1,200	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	¥	¥		¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥
	51,021	51,021		63,060	4,687	4,687	8,033	4,687	4,687	292	487	234	585	487	312	390	468	3,952	9,761	8,403	10,909	0	0	0	0	0	0
1996	0	0	1.0000	0																							
1997	0	0	0.9799	0																							
1998	0	0	0.9601	0																							
1999	2,548	2,548	0.9408	2,709	1,406											117		1,186									
2000	3,464	3,464	0.9219	3,758	1,875					146						156		1,581									
2001	2,579	2,579	0.9033	2,855	1,406					146						117		1,186									
2002	0	0	0.8851	0																							
2003	3,911	3,911	0.8673	4,510				1,406					175						2,928								
2004	5,110	5,110	0.8498	6,013				1,875					234						3,904								
2005	3,755	3,755	0.8327	4,510				1,406					175						2,928								
2006	3,443	3,443	0.8160	4,219		1,406					146			146						2,521							
2007	4,498	4,498	0.7995	5,626		1,875					195			195						3,361							
2008	7,016	7,016	0.7834	8,955		1,406	2,008				146			146						2,521	2,727						
2009	3,743	3,743	0.7677	4,876			2,008										140				2,727						
2010	3,908	3,908	0.7522	5,196			2,008					117			156		187				2,727						
2011	3,795	3,795	0.7371	5,149			2,008					117			156		140				2,727						
2012	0	0	0.7222	0																							
2013	995	995	0.7077	1,406					1,406																		
2014	1,300	1,300	0.6934	1,875					1,875																		
2015	955	955	0.6795	1,406					1,406																		
2016	0	0	0.6658	0																							
2017	0	0	0.6524	0																							
2018	0	0	0.6393	0																							
2019	0	0	0.6264	0																							

2.15 Cost Estimate of Alternative 1, Local Portion

Alternative 1

	Equivalent Yen	Present Cost	Factor	Total	Treatment Plant					Distribution Center								Transmission Pipeline				Raw Water Transmission					
	22.50		8.277%		Buaran III	East I	East II	Cisadane II	Cisadane III	R1 II	R3 I	R3 II	R4 II	R4 III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
					5,000	5,000	10,000	5,000	5,000	1,500	2,500	1,200	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	Y	Rp.		Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.
	19,778	444,999		977,969	105,451	105,451	180,747	105,451	105,451	20,577	34,295	16,462	41,154	34,295	21,949	27,436	32,923	19,240	39,851	38,495	48,741	0	0	0	0	0	0
1996	0	0	1.0000	0																							
1997	0	0	0.9236	0																							
1998	0	0	0.8530	0																							
1999	2,130	47,935	0.7878	60,851	42,180											10,974		7,696									
2000	2,088	46,971	0.7275	64,562	36,908					11,317						9,603		6,734									
2001	1,412	31,776	0.6719	47,291	26,363					9,260						6,859		4,810									
2002	0	0	0.6206	0																							
2003	1,900	42,744	0.5731	74,582				42,180					16,462						15,940								
2004	1,535	34,542	0.5293	65,260				36,908					14,404						13,948								
2005	1,013	22,787	0.4888	46,614				26,363					10,289						9,963								
2006	1,706	38,382	0.4515	85,014		42,180					13,718			13,718						15,398							
2007	1,379	31,017	0.4170	74,388		36,908					12,003			12,003						13,473							
2008	2,088	46,973	0.3851	121,980		26,363	54,224				8,574			8,574						9,624	14,622						
2009	1,115	25,088	0.3556	70,541			45,187										13,169				12,185						
2010	1,314	29,568	0.3285	90,021			45,187					9,054			12,072		11,523				12,185						
2011	963	21,663	0.3034	71,413			36,149					7,408			9,877		8,231				9,748						
2012	0	0	0.2802	0																							
2013	485	10,914	0.2587	42,180					42,180																		
2014	392	8,820	0.2390	36,908					36,908																		
2015	259	5,818	0.2207	26,363					26,363																		
2016	0	0	0.2038	0																							
2017	0	0	0.1882	0																							
2018	0	0	0.1739	0																							
2019	0	0	0.1606	0																							

2.16 Cost Estimate of Alternative 2, Foreign Portion

Alternative 2

	Equivalent Ycn	Present Cost	Factor	Total	Treatment Plant						Distribution Center						Transmission Pipeline				Raw Water Transmission					
					Buaran III	East	West I	West II	West III	Cisadane II	R1 II	R4 II	R4 III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
			2.055%		5,000	4,000	5,000	5,000	5,000	6,000	1,500	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	56,763	56,763		70,181	4,687	3,940	4,687	4,687	4,687	5,400	292	585	487	312	390	468	3,952	8,396	5,305	6,749	974	974	974	5,817	3,209	3,209
1996	0	0	1.0000	0																						
1997	0	0	0.9799	0																						
1998	0	0	0.9601	0																						
1999	2,548	2,548	0.9408	2,709	1,406										117		1,186									
2000	3,464	3,464	0.9219	3,758	1,875						146				156		1,581									
2001	2,579	2,579	0.9033	2,855	1,406						146				117		1,186									
2002	0	0	0.8851	0																						
2003	5,323	5,323	0.8673	6,138			1,406					175						2,519			292			1,745		
2004	6,955	6,955	0.8498	8,184			1,875					234						3,359			390			2,327		
2005	5,111	5,111	0.8327	6,138			1,406					175						2,519			292			1,745		
2006	3,589	3,589	0.8160	4,399				1,406					146						1,592			292			963	
2007	4,814	4,814	0.7995	6,021				1,875					195	156					2,122			390			1,283	
2008	3,568	3,568	0.7834	4,555				1,406					146	156					1,592			292			963	
2009	4,612	4,612	0.7677	6,008		1,182			1,406							140				2,025			292			963
2010	6,026	6,026	0.7522	8,011		1,576			1,875							187				2,700			390			1,283
2011	4,428	4,428	0.7371	6,008		1,182			1,406							140				2,025			292			963
2012	0	0	0.7222	0																						
2013	1,147	1,147	0.7077	1,620						1,620																
2014	1,498	1,498	0.6934	2,160						2,160																
2015	1,101	1,101	0.6795	1,620						1,620																
2016	0	0	0.6658	0																						
2017	0	0	0.6524	0																						
2018	0	0	0.6393	0																						
2019	0	0	0.6264	0																						

2.17 Cost Estimate of Alternative 2, Local Portion

Alternative 2

	Equivalent	Present	Factor	Total	Treatment Plant						Distribution Center						Transmission Pipeline				Raw Water Transmission					
	Yen	Cost			Buaran III	East	West I	West II	West III	Cisadane II	R1 II	R4 II	R4 III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
	22.50		8.277%		5,000	4,000	5,000	5,000	5,000	6,000	1,500	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	Y	Rp.		Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.
	20,901	470,281		1,040,111	105,451	88,657	105,451	105,451	105,451	121,508	20,577	41,154	34,295	21,949	27,436	32,923	19,240	36,542	25,837	32,856	22,863	22,863	22,863	20,391	13,175	13,175
1996	0	0	1.0000	0																						
1997	0	0	0.9236	0																						
1998	0	0	0.8530	0																						
1999	2,130	47,935	0.7878	60,851	42,180										10,974		7,696									
2000	2,088	46,971	0.7275	64,562	36,908						11,317				9,603		6,734									
2001	1,412	31,776	0.6719	47,291	26,363						9,260				6,859		4,810									
2002	0	0	0.6206	0																						
2003	2,307	51,902	0.5731	90,561			42,180					16,462						14,617			9,145			8,156		
2004	1,864	41,942	0.5293	79,241			36,908					14,404						12,790			8,002			7,137		
2005	1,230	27,669	0.4888	56,601			26,363					10,289						9,136			5,716			5,098		
2006	1,618	36,411	0.4515	80,648				42,180					13,718						10,335			9,145			5,270	
2007	1,531	34,457	0.4170	82,639				36,908					12,003	12,072					9,043			8,002			4,611	
2008	1,032	23,214	0.3851	60,282				26,363					8,574	9,877					6,459			5,716			3,294	
2009	1,871	42,098	0.3556	118,370		35,463			42,180							13,169				13,142			9,145			5,270
2010	1,512	34,020	0.3285	103,574		31,030			36,908							11,523				11,500			8,002			4,611
2011	997	22,442	0.3034	73,981		22,164			26,363							8,231				8,214			5,716			3,294
2012	0	0	0.2802	0																						
2013	559	12,576	0.2587	48,603						48,603																
2014	452	10,163	0.2390	42,528						42,528																
2015	298	6,704	0.2207	30,377						30,377																
2016	0	0	0.2038	0																						
2017	0	0	0.1882	0																						
2018	0	0	0.1739	0																						
2019	0	0	0.1606	0																						

2.18 Cost Estimate of Alternative 3, Foreign Portion

Alternative 3

	Equivalent Yen	Present Cost	Factor	Total	Treatment Plant					Distribution Center							Transmission Pipeline				Raw Water Transmission					
					Buaran III	West I	West II	West III	Cisadane II	R1 II	R2	R4 II	R4 III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
			2.055%		5,000	5,000	5,000	10,000	5,000	1,500	4,000	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	¥	¥		¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥	¥
	61,104	61,104		75,709	4,687	4,687	4,687	8,033	4,687	292	780	585	487	312	390	468	3,952	8,396	5,305	10,078	974	974	1,949	5,817	3,209	4,960
1996	0	0	1.0000	0																						
1997	0	0	0.9799	0																						
1998	0	0	0.9601	0																						
1999	2,548	2,548	0.9408	2,709	1,406										117		1,186									
2000	3,464	3,464	0.9219	3,758	1,875					146					156		1,581									
2001	2,579	2,579	0.9033	2,855	1,406					146					117		1,186									
2002	0	0	0.8851	0																						
2003	5,323	5,323	0.8673	6,138		1,406						175						2,519			292			1,745		
2004	6,955	6,955	0.8498	8,184		1,875						234						3,359			390			2,327		
2005	5,111	5,111	0.8327	6,138		1,406						175						2,519			292			1,745		
2006	3,589	3,589	0.8160	4,399			1,406						146						1,592			292			963	
2007	4,814	4,814	0.7995	6,021			1,875						195	156					2,122			390			1,283	
2008	7,116	7,116	0.7834	9,082			1,406	2,008					146	156					1,592	2,520		292			963	
2009	5,354	5,354	0.7677	6,975				2,008			234					140				2,520			585			1,488
2010	5,860	5,860	0.7522	7,790				2,008			312					187				2,520			780			1,984
2011	5,141	5,141	0.7371	6,975				2,008			234					140				2,520			585			1,488
2012	0	0	0.7222	0																						
2013	995	995	0.7077	1,406					1,406																	
2014	1,300	1,300	0.6934	1,875					1,875																	
2015	955	955	0.6795	1,406					1,406																	
2016	0	0	0.6658	0																						
2017	0	0	0.6524	0																						
2018	0	0	0.6393	0																						
2019	0	0	0.6264	0																						

2.19 Cost Estimate of Alternative 3, Local Portion

Alternative 3

	Equivalent	Present Cost	Factor	Total	Treatment Plant					Distribution Center							Transmission Pipeline				Raw Water Transmission					
	Yen				Buaran III	West I	West II	West III	Cisadane II	R1 II	R2	R4 II	R4 III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
	22.50		8.2775		5,000	5,000	5,000	10,000	5,000	1,500	4,000	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	Y	Rp.		Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.
	22,087	496,963		1,106,132	105,451	105,451	105,451	180,747	105,451	20,577	54,872	41,154	34,295	21,949	27,436	32,923	19,240	36,542	25,837	47,662	22,863	22,863	45,727	20,391	13,175	16,074
1996	0	0	1.0000	0																						
1997	0	0	0.9236	0																						
1998	0	0	0.8530	0																						
1999	2,130	47,935	0.7878	60,851	42,180										10,974		7,696									
2000	2,088	46,971	0.7275	64,562	36,908					11,317					9,603		6,734									
2001	1,412	31,776	0.6719	47,291	26,363					9,260					6,859		4,810									
2002	0	0	0.6206	0																						
2003	2,307	51,902	0.5731	90,561		42,180						16,462						14,617			9,145			8,156		
2004	1,864	41,942	0.5293	79,241		36,908						14,404						12,790			8,002			7,137		
2005	1,230	27,669	0.4888	56,601		26,363						10,289						9,136			5,716			5,098		
2006	1,618	36,411	0.4515	80,648			42,180						13,718						10,335			9,145			5,270	
2007	1,531	34,457	0.4170	82,639			36,908						12,003	12,072					9,043			8,002			4,611	
2008	2,204	49,601	0.3851	128,805			26,363	54,224					8,574	9,877					6,459	14,298		5,716			3,294	
2009	1,848	41,590	0.3556	116,941				45,187			21,949					13,169				11,915			18,291			6,429
2010	1,598	35,954	0.3285	109,461				45,187			19,205					11,523				11,915			16,004			5,626
2011	1,120	25,203	0.3034	83,081				36,149			13,718					8,231				9,532			11,432			4,018
2012	0	0	0.2802	0																						
2013	485	10,914	0.2587	42,180					42,180																	
2014	392	8,820	0.2390	36,908					36,908																	
2015	259	5,818	0.2207	26,363					26,363																	
2016	0	0	0.2038	0																						
2017	0	0	0.1882	0																						
2018	0	0	0.1739	0																						
2019	0	0	0.1606	0																						

2.20 Cost Estimate of Alternative 4, Foreign Portion

Alternative 4

	Equivalent Yen	Present Cost	Factor	Total	Treatment Plant						Distribution Center						Transmission Pipeline				Raw Water Transmission					
					Buaran III	East	West I	West II	Cisadane II	Cisadane III	R1 II	R4 II	R4 III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
			2.055%		5,000	4,000	5,000	5,000	5,000	6,000	1,500	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	52,150	52,150		64,754	4,687	3,940	4,687	4,687	4,687	5,400	292	585	487	312	390	468	3,952	9,761	5,305	6,749	0	974	974	0	3,209	3,209
1996	0	0	1.0000	0																						
1997	0	0	0.9799	0																						
1998	0	0	0.9601	0																						
1999	2,548	2,548	0.9408	2,709	1,406										117		1,186									
2000	3,464	3,464	0.9219	3,758	1,875						146				156		1,581									
2001	2,579	2,579	0.9033	2,855	1,406						146				117		1,186									
2002	0	0	0.8851	0																						
2003	3,911	3,911	0.8673	4,510					1,406			175						2,928								
2004	5,110	5,110	0.8498	6,013					1,875			234						3,904								
2005	3,755	3,755	0.8327	4,510					1,406			175						2,928								
2006	3,589	3,589	0.8160	4,399			1,406						146						1,592			292			963	
2007	4,814	4,814	0.7995	6,021			1,875						195	156					2,122			390			1,283	
2008	3,568	3,568	0.7834	4,555			1,406						146	156					1,592			292			963	
2009	4,612	4,612	0.7677	6,008		1,182		1,406								140				2,025			292			963
2010	6,026	6,026	0.7522	8,011		1,576		1,875								187				2,700			390			1,283
2011	4,428	4,428	0.7371	6,008		1,182		1,406								140				2,025			292			963
2012	0	0	0.7222	0																						
2013	1,147	1,147	0.7077	1,620						1,620																
2014	1,498	1,498	0.6934	2,160						2,160																
2015	1,101	1,101	0.6795	1,620						1,620																
2016	0	0	0.6658	0																						
2017	0	0	0.6524	0																						
2018	0	0	0.6393	0																						
2019	0	0	0.6264	0																						

2.21 Cost Estimate of Alternative 4, Local Portion

Alternative 4

	Equivalent	Present	Factor	Total	Treatment Plant						Distribution Center						Transmission Pipeline				Raw Water Transmission					
	Yen	Cost			Buaran III	East	West I	West II	Cisadane II	Cisadane III	R1 II	R4 II	R4 III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
	22.50		8.277%		5,000	4,000	5,000	5,000	5,000	6,000	1,500	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	Y	Rp.		Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.
	19,949	448,842		1,000,165	105,451	88,657	105,451	105,451	105,451	121,508	20,577	41,154	34,295	21,949	27,436	32,923	19,240	39,851	25,837	32,856	0	22,863	22,863	0	13,175	13,175
1996	0	0	1.0000	0																						
1997	0	0	0.9236	0																						
1998	0	0	0.8530	0																						
1999	2,130	47,935	0.7878	60,851	42,180										10,974		7,696									
2000	2,088	46,971	0.7275	64,562	36,908						11,317				9,603		6,734									
2001	1,412	31,776	0.6719	47,291	26,363						9,260				6,859		4,810									
2002	0	0	0.6206	0																						
2003	1,900	42,744	0.5731	74,582					42,180			16,462						15,940								
2004	1,535	34,542	0.5293	65,260					36,908			14,404						13,948								
2005	1,013	22,787	0.4888	46,614					26,363			10,289						9,963								
2006	1,618	36,411	0.4515	80,648			42,180						13,718						10,335			9,145			5,270	
2007	1,531	34,457	0.4170	82,639			36,908						12,003	12,072					9,043			8,002			4,611	
2008	1,032	23,214	0.3851	60,282			26,363						8,574	9,877					6,459			5,716			3,294	
2009	1,871	42,098	0.3556	118,370		35,463		42,180								13,169				13,142			9,145			5,270
2010	1,512	34,020	0.3285	103,574		31,030		36,908								11,523				11,500			8,002			4,611
2011	997	22,442	0.3034	73,981		22,164		26,363								8,231				8,214			5,716			3,294
2012	0	0	0.2802	0																						
2013	559	12,576	0.2587	48,603						48,603																
2014	452	10,163	0.2390	42,528						42,528																
2015	298	6,704	0.2207	30,377						30,377																
2016	0	0	0.2038	0																						
2017	0	0	0.1882	0																						
2018	0	0	0.1739	0																						
2019	0	0	0.1606	0																						

2.22 Cost Estimate of Alternative 5, Foreign Portion

Alternative 5

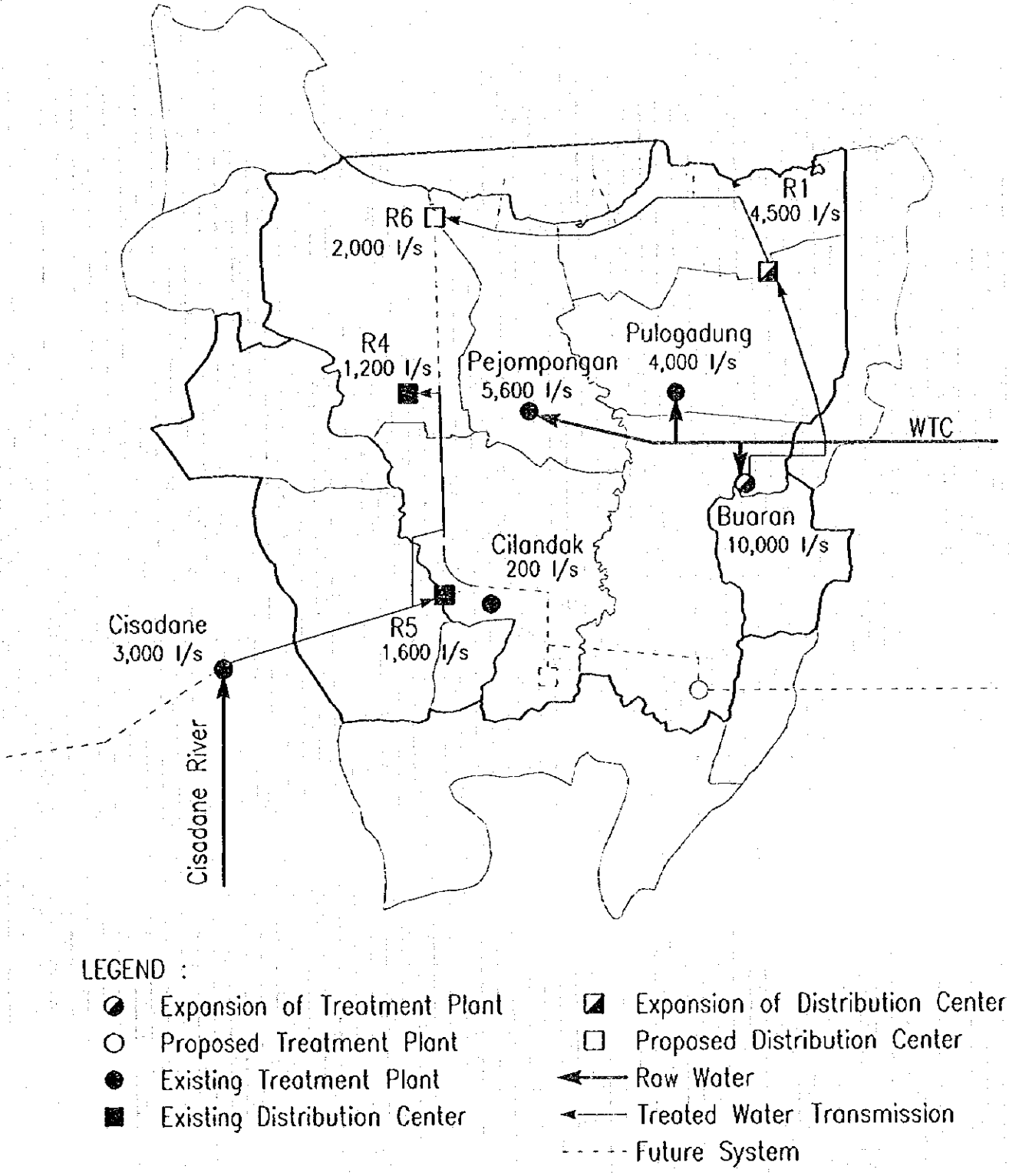
	Equivalent Yen	Present Cost	Factor	Total	Treatment Plant					Distribution Center							Transmission Pipeline				Raw Water Transmission					
					Buaran III	West I	West II	Cisadane II	Cisadane III	R1 II	R2	R4 II	R4 III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
			2.055%		5,000	5,000	10,000	5,000	5,000	1,500	4,000	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	54,137	54,137		67,206	4,687	4,687	8,033	4,687	4,687	292	780	585	487	312	390	468	3,952	9,761	4,301	8,008	0	974	1,949	0	3,209	4,960
1996	0	0	1.0000	0																						
1997	0	0	0.9799	0																						
1998	0	0	0.9601	0																						
1999	2,548	2,548	0.9408	2,709	1,406										117		1,186									
2000	3,464	3,464	0.9219	3,758	1,875					146					156		1,581									
2001	2,579	2,579	0.9033	2,855	1,406					146					117		1,186									
2002	0	0	0.8851	0																						
2003	3,911	3,911	0.8673	4,510				1,406				175						2,928								
2004	5,110	5,110	0.8498	6,013				1,875				234						3,904								
2005	3,755	3,755	0.8327	4,510				1,406				175						2,928								
2006	3,534	3,534	0.8160	4,331		1,406					234		146						1,290			292			963	
2007	4,617	4,617	0.7995	5,775		1,875					312		195						1,720			390			1,283	
2008	6,535	6,535	0.7834	8,341		1,406	2,008				234		146						1,290	2,002		292			963	
2009	4,777	4,777	0.7677	6,223			2,008									140				2,002			585			1,488
2010	5,353	5,353	0.7522	7,117			2,008							156		187				2,002			780			1,984
2011	4,702	4,702	0.7371	6,379			2,008							156		140				2,002			585			1,488
2012	0	0	0.7222	0																						
2013	995	995	0.7077	1,406					1,406																	
2014	1,300	1,300	0.6934	1,875					1,875																	
2015	955	955	0.6795	1,406					1,406																	
2016	0	0	0.6658	0																						
2017	0	0	0.6524	0																						
2018	0	0	0.6393	0																						
2019	0	0	0.6264	0																						

2.23 Cost Estimate of Alternative 5, Local Portion

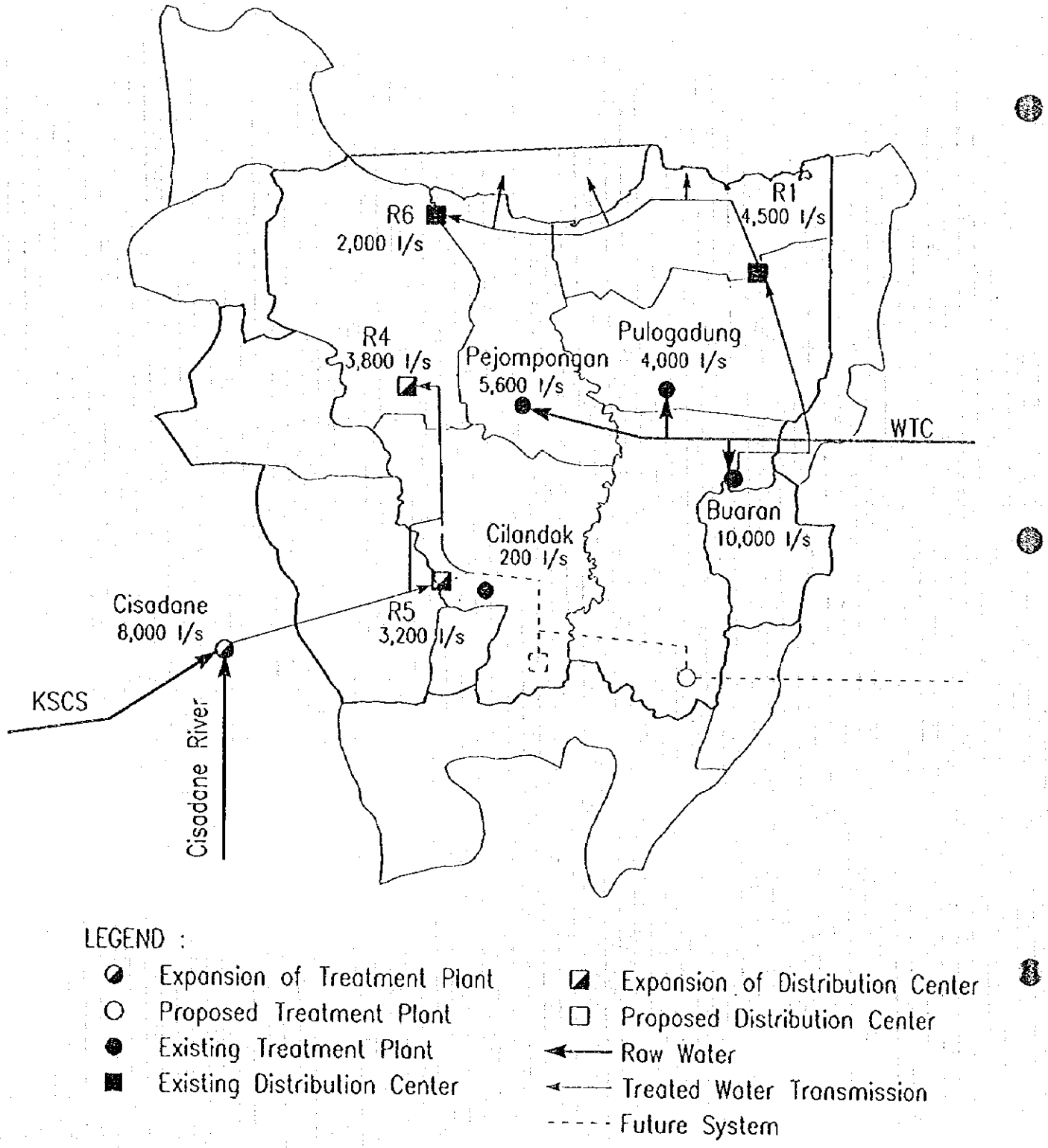
Alternative 5

	Equivalent Yen	Present Cost	Factor	Total	Treatment Plant					Distribution Center							Transmission Pipeline				Raw Water Transmission					
					Buaran III	East I	East II	Cisadane II	Cisadane III	R1 II	R2	R4 II	R4-III	R5 II	R6 I	R6 II	I	II	III	IV	Pump Station			Pipeline		
	22.50		8.277%		5,000	5,000	10,000	5,000	5,000	1,500	4,000	3,000	2,500	1,600	2,000	2,400					I	II	III	I	II	III
	Y	Rp.		Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.	Rp.
	21,069	474,045		1,053,785	105,451	105,451	180,747	105,451	105,451	20,577	54,872	41,154	34,295	21,949	27,436	32,923	19,240	39,851	22,915	38,182	0	22,863	45,727	0	13,175	16,074
1996	0	0	1.0000	0																						
1997	0	0	0.9236	0																						
1998	0	0	0.8530	0																						
1999	2,130	47,935	0.7878	60,851	42,180										10,974		7,696									
2000	2,088	46,971	0.7275	64,562	36,908					11,317					9,603		6,734									
2001	1,412	31,776	0.6719	47,291	26,363					9,260					6,859		4,810									
2002	0	0	0.6206	0																						
2003	1,900	42,744	0.5731	74,582				42,180				16,462						15,940								
2004	1,535	34,542	0.5293	65,260				36,908				14,404						13,948								
2005	1,013	22,787	0.4888	46,614				26,363				10,289						9,963								
2006	2,035	45,792	0.4515	101,429		42,180					21,949		13,718						9,166			9,145			5,270	
2007	1,645	37,005	0.4170	88,750		36,908					19,205		12,003						8,020			8,002			4,611	
2008	2,209	49,704	0.3851	129,072		26,363	54,224				13,718		8,574						5,729	11,454		5,716			3,294	
2009	1,464	32,941	0.3556	92,622			45,187									13,169				9,545			18,291			6,429
2010	1,459	32,832	0.3285	99,957			45,187							12,072		11,523				9,545			16,004			5,626
2011	1,043	23,462	0.3034	77,344			36,149							9,877		8,231				7,636			11,432			4,018
2012	0	0	0.2802	0																						
2013	485	10,914	0.2587	42,180					42,180																	
2014	392	8,820	0.2390	36,908					36,908																	
2015	259	5,818	0.2207	26,363					26,363																	
2016	0	0	0.2038	0																						
2017	0	0	0.1882	0																						
2018	0	0	0.1739	0																						
2019	0	0	0.1606	0																						

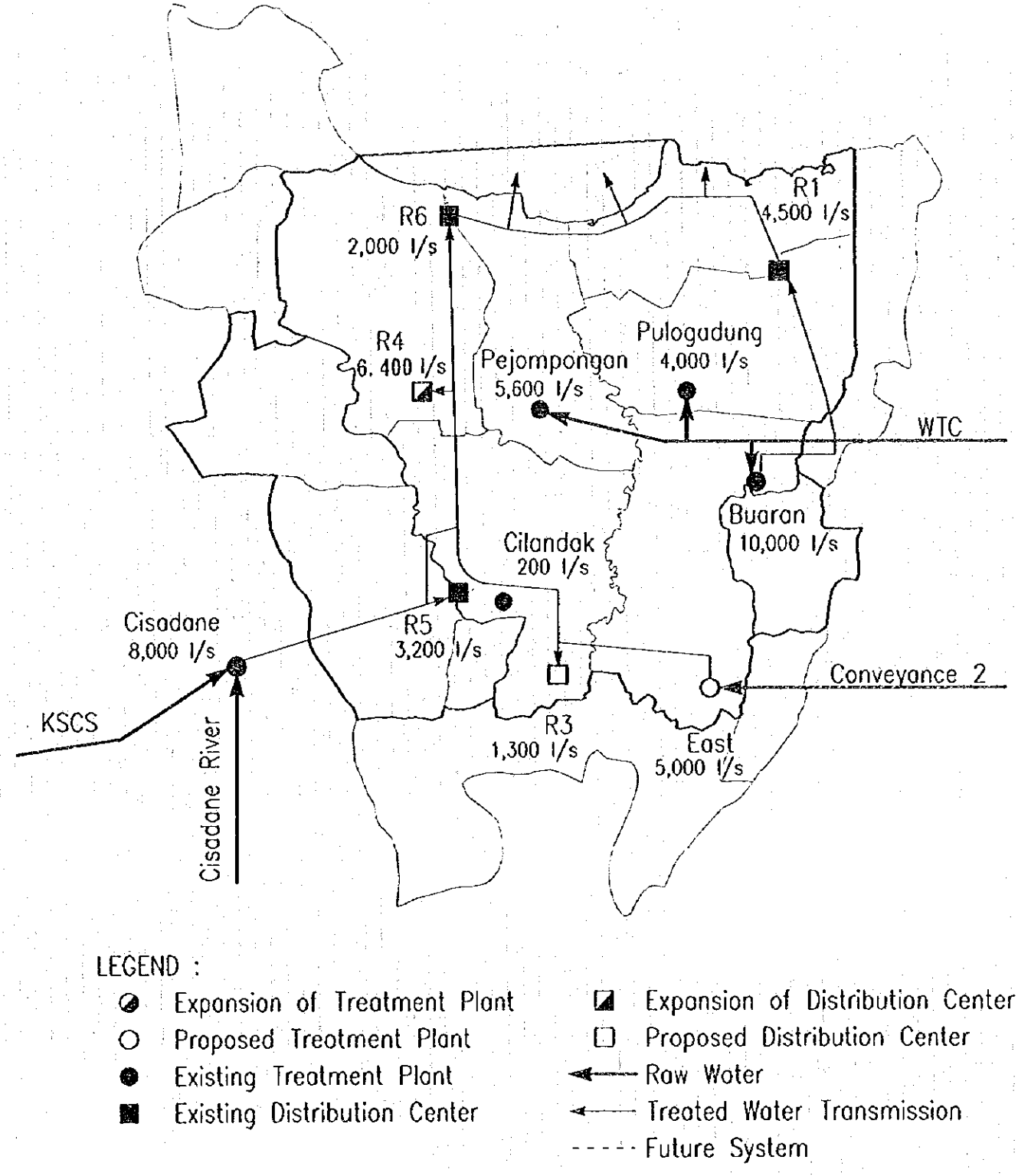
2.24 Proposed Water Supply System as of the Year 2002 in Original Alternative Study



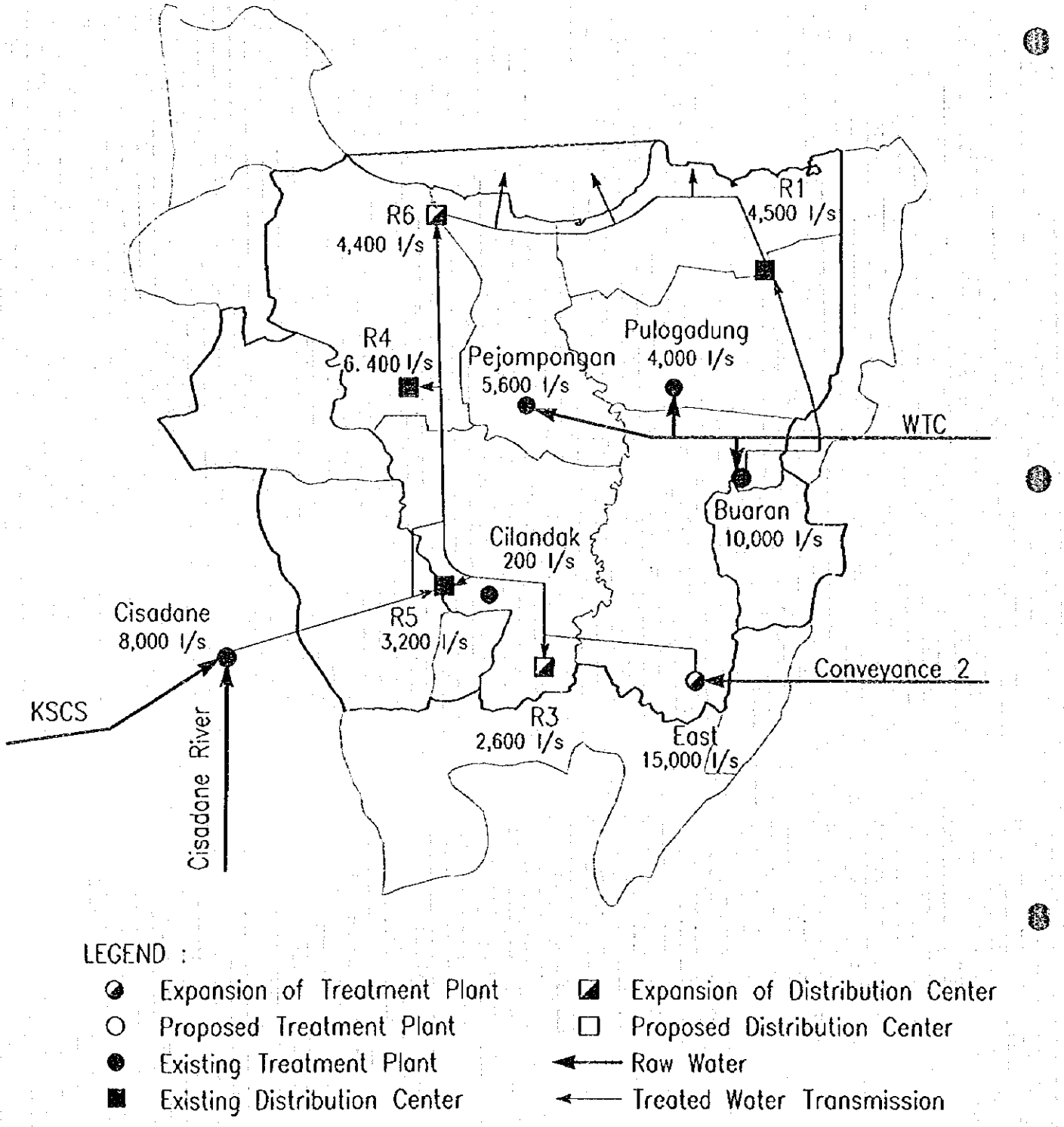
2.25 Proposed Water Supply System as of the Year 2006 in Original Alternative Study



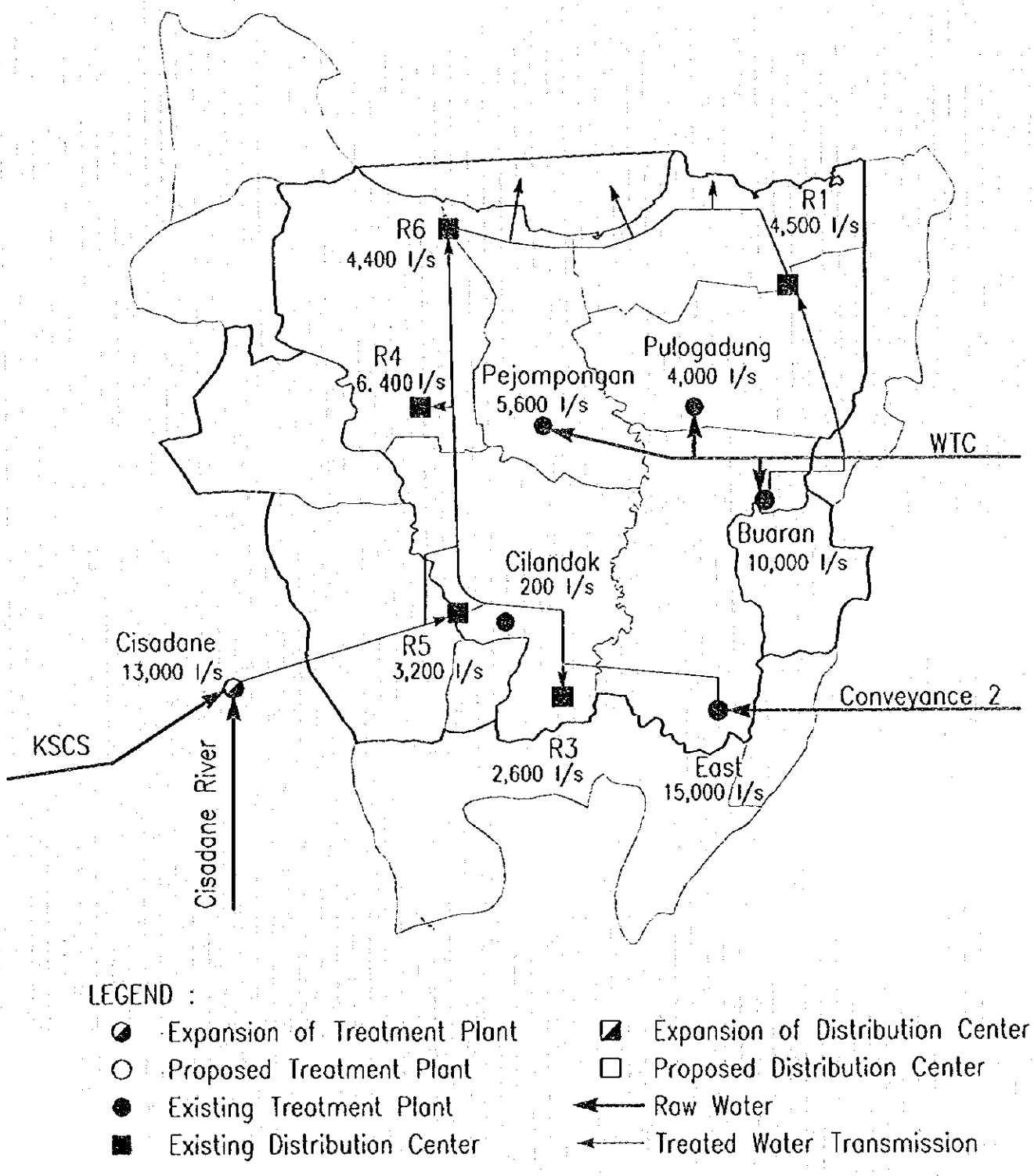
2.26 Proposed Water Supply System as of the Year 2009 in Original Alternative Study



2.27 Proposed Water Supply System as of the Year 2012 in Original Alternative Study



2.28 Proposed Water Supply System as of the Year 2016 in Original Alternative Study



2.29 Hydraulic Calculation for Transmission Pipeline for the Proposed system

		Cisadane	R5+1	R4+2	R4+1	R6	R5+1	R5	R4+1	R4
Length	km	14.0	7.0	7.5	10.0		2.0		1.0	
Flow Rate	m3/sec	3.5	1.9	4.6	2.0		1.6		2.6	
Diameter	mm	1,650	1,200	1,800	1,200		900		1,350	
C value		120	120	120	120		120		120	
dh	m	18.84	14.34	10.95	22.53		12.11		2.06	
v	m/sec	1.64	1.68	1.81	1.77		2.52		1.82	
W. level	m	74.7	55.8	41.5	30.5	8.0	55.8	43.7	30.5	28.5
Elevation	m	38.0				3.0		29.0		10.0

		East I	R3+1	R4+2	R3+1	R3
Length	km	13.5	17.5		2.0	
Flow Rate	m3/sec	4.8	2.7		2.1	
Diameter	mm	1,800	1,350		1,000	
C value		120	120		120	
dh	m	21.33	38.71		11.99	
v	m/sec	1.89	1.89		2.67	
W. level	m	101.5	80.2	41.5	80.2	68.2
Elevation	m	58.0				58.0

		East II	R3+1'	R5+2	R4+1'	R6
Length	km	13.5	12.0	13.0	10.0	
Flow Rate	m3/sec	5.5	5.0	5.0	2.4	
Diameter	mm	1,800	1,800	1,800	1,350	
C value		120	120	120	120	
dh	m	27.44	20.45	22.15	17.79	
v	m/sec	2.16	1.96	1.96	1.68	
W. level	m	95.8	68.4	47.9	25.8	8.0
Elevation	m	58.0				3.0

		R3+1'	R3	R5+2	R5	R4+1'	R4
Length	km	2.0		1.5		1.0	
Flow Rate	m3/sec	0.5		0.0		2.6	
Diameter	mm	600		700		1,100	
C value		120		120		120	
dh	m	10.14		0.00		5.59	
v	m/sec	1.77		0.00		2.74	
W. level	m	68.4	58.2	47.9	47.9	25.8	20.2
Elevation	m		58.0		29.0		10

		R1	R6
Length	km	26.0	
Flow Rate	m3/sec	2.0	
Diameter	mm	1,350	
C value		120	
dh	m	33.01	
v	m/sec	1.40	
W. level	m	41.0	8.0
Elevation	m	3.0	3.0