APPENDIX 2.3.1

DECREE NUMBER 112 IN 2003 ON STANDARD QUALITY OF DEMESTIC WASTE BY MINISTRY OF LIVING ENVIRONMENT

THE DECREE OF MINISTRY OF LIVING ENVIRONMENT NO. 112 IN 2003 ON STANDARD QUALITY OF DOMESTIC WASTE

STATE MINISTER OF LIVING ENVIRONMENT

Considering : That to implement stipulation in paragraph 21 article (I) Government regulation

Number 82 of 2001 on water quality management and Water Pollution Control, it is necessary to stipulate a STATE MINISTER DECREE OF LIVING ENVIRONMENT ON STANDARD QUALITY OF DOMESTIC WASTE.

In view of :

1. Law number 23 of 1997 on Living Environment Management (State gazette of 1997 number 68, additional state gazette number 3699);
2. Law number 22 of 1999 on Local Government (State gazette of 1999 number 60, Additional state gazette 1999 number 3699);
3. Government Regulation Number 27 of 1999 on analysis on Living Environment Impact (State gazette of 1999 number 59, Additional State gazette number 3838).
4. Government Regulation number 25 of 2000 on Government authority and Local Government Authority as an Autonomy (State Gazette Year 2000 number 54, Additional State Gazette number 3952).
5. Government Regulation number 82 of 2001 on Water quality Management and Water Pollution Control (State Gazette of 2001 number 153, Additional State Gazette number 4161).
6. President Decree number 2 of 2002 on convert of stipulation of President Number 101 of 2001 on Position, Duty, Function, Authority, Organization Structure, and State Minister working system.

A DECREE:

To decide: A DECREEE OF LIVING ENVIROMENT MINISTER ON DOMESTIC WASTEWATER QUALITY STANDARD

Article 1

In this stipulation which is meant by:

(1) Domestic waste disposal is that wastewater from small business and or inhabitant of settlement of activities (real-estate), restaurants, offices, enterprises, apartment, and dormitory.

(2) Domestic wastewater quality standard is that parameter limit or substance contaminant degree and or number of contaminant substance which is restrained its existence in domestic wastewater disposal which is going to be discharged or released to the surface water.

(3) Integrated domestic wastewater treatment is a wastewater treatment system which is done collectively before it is discharge to water surface.

(4) The Minister is a minister in charge of managing living Environment and impact control to Environment.

Article 2

(1) Domestic wastewater Quality Standard is effective for small business, real-estate, restaurant, offices, business, apartment, and dormitory.

(2) Domestic wastewater Quality Standard as it is mentioned in Article (1) is valid for integrated of domestic wastewater treatment.

Article 3

Standard Quality of domestic liquid waste is as stipulated in the decree attachment:

Article 4

Standard Quality of domestic waste in this stipulation is effective for:

a. For all area of settlement (real estate), office, business and apartment
b. Restaurant which building is more than 1000m^2; and
c. Dormitory inhabited by more than 100 (one hundred) persons or more.

Article 5

Standard quality of domestic wastewater for housing which is managed individually will be stipulated later.

Article 6

(1) Local standard quality for domestic wastewater is stipulated by Provincial Government Regulations with the same stipulation or stricter than the stipulation as mentioned in the stipulation of the attachment.

(2) If local standard quality for domestic wastewater as mentioned in paragraph (1) has not been stipulated yet, the existing standard quality for domestic wastewater is effective as mentioned in the stipulation of the attachment.

Article 7

If result of study analysis on living environment impact or study result on an environment management effort and environment monitoring effort from business or activities as mentioned in the article (2) required that standard of wastewater quality is more strict, so standard quality for domestic wastewater is effective as required by analysis on living environment impact or environment management effort and environment monitoring effort.

Article 8

Every responsibility of business and or settlement activities (real-estate), restaurant, office, apartment and dormitory has to:

a. Treat domestic wastewater so that standard quality of wastewater disposed is not over than the standard quality.
b. Make covered and waterproofed channel of domestic wastewater so that it prevent wastewater from see-paging to environment.
a. Make tools for taking out sample from outlet of wastewater treatment plant.

Article 9

(1) Domestic wastewater treatment which is meant in the article 8 can be done collectively through integrated domestic wastewater process.
(2) Integrated domestic wastewater treatment has to fulfill the effective standard quality of the effective domestic wastewater.

Article 10

(1) Integrated domestic wastewater treatment as mentioned in article 8 is the responsibility of Management.
(2) If domestic wastewater treatment as mentioned in article (1) is not pointing-out certain management, so the treatment responsibility is on each person who is responsible for the activities.

Article 11

Regent /Mayor out to mention requirements as mentioned in article 6 in permission of domestic wastewater disposal for or activities of housing, (real estate), restaurant, offices, businesses, and dormitory.

Article 12

Minister observes quality standard of domestic wastewater as mentioned in the article 3 once in a while, at least once in 5 (five) years.

Article 13

If quality local quality standard of domestic wastewater has been decided before this stipulation:

a. More strict or the same as quality standard of domestic wastewater as meant in the attachment of stipulation, standard quality for domestic wastewater is still effective.

Is permissive than quality standard as mentioned in the stipulation attached, therefore quality standard for domestic wastewater ought to be adjusted to this stipulation at least 1 (one) year after the stipulation has been made.

Article 14

When this stipulation is effective all regulations and laws related to the quality standard for domestic wastewater for business, housing activities (real estate), restaurant, offices, apartment, and the existing dormitory, are regarded effective as long as not contradictory to the stipulation.

.

Article 15

This stipulation is effective on the date being decided

Decided: in Jakarta
Date: 10th July 2003

State Minister Living Environment

Nabiel Makarim, MPA, MSM

Attachment:
Stipulation of State Minister of Living Environment,
Number : 112 of year 2003
Dated : 10th July 2003

DOMESTIC WASTEWATER QUALITY STANDARD

PARAMETER	UNIT	MAXIMUM CONTENT
pH	-	6 - 9
BOD	mg/l	100
TSS	mg/l	100
Oil and Grease	mg/l	10

The State of
Minister of Living Environment

Nabiel Makarim, MPA, MSM.

APPENDIX 3.5.1

SAMPLE QUESTIONNAIR FOR CUSTOMER SATISFACTION

HOUSE HOLD QUESTIONAIRE ON COSTUMER SATISFACTION PDPAL JAYA

To improve the sewerage service quality PD PAL JAYA, it is required that the costumer be filling up the right answer to the following question. Chose one answer which is nearest to right in the four possible answers. Fill-up by giving checking mark X.

Costumer's data :

Sex : man woman
Age : < 25 years old 25 - 35 years old
Work : private employee civil employee running business others
How long have you been a customer : < 1 year 1 - 5 years 6 - 10 years > 10 years

1. How do you claim if there is disturbance in your sewerage pipe network, it is by way of
   A. Telephone B. E-mail C. Facsimile D. Goes to PD PAL JAYA

2. If you contact by way of telephone, which number are you dialing?.
   A. 021-8354252 B. 021-8354253 C. 021-8354254 D. 021-8354255

3. What is your impression towards complain facility which was you were using to express your complain?
   A. very easy B. easy C. difficult D. very difficult

4. How our employee responds to your complain?
   A. very friendly B. friendly C. less friendly D. not friendly

5. What do you think of time span between your complain and our employee come?
   A. very quickly B. quickly C. slowly D. very slowly

6. What do you think of solution time by our employee in responding to disturbance in your sewerage network?
   A. very quickly B. quickly C. slowly D. very slowly

7. What is your impression on our employee's capability in finding the solution to disturbance in your sewerage pipe network?
   A. very satisfactory B. satisfactory C. less satisfactory D. is not satisfactory.

8. When the last time do you see our employee maintaining your sewer piping?
   A. < 3 moths ago B. > 3 moths ago C. never D. I don't know.

9. What do you think if there is not any agreement on your bill, how to process this administration mistake by our employee of your complain that has been express?
   A. very satisfactory B. Satisfactory C. Less satisfactory D. Not satisfactory.

10. Based on your experience, the monthly bill of sewerage process service is submitted to you on?
    A. Less than the 7th B. right at the 7th C. between the 7th and 10th
    D. between the 7th and the 13th.

11. What is your impression on our employee's attitude when distributing the bill to your building or to your office?
    A. very friendly B. friendly C. less friendly D. not friendly.

12. What do you think if the limit payment of the sewerage service bill is on the 20th every month?
    A. very accurate B. accurate C. less accurate D. Not accurate.

13. What do you think of method of payment if the sewerage service bill is paid directly to ticket window PD PAL JAYA?
    A. very accurate B. accurate C. less accurate B not accurate

14. What do you think of our employee's service in helping you process the payment through ticket Window of PD PAL JAYA?
    A. very satisfactory B. satisfactory C. less satisfactory D. not satisfactory

15. Have you ever been late to pay the sewerage service bill?
    A. I have B. Never

16. If you have, what makes you late to pay for the sewerage service bill?

17. Do you know about the fine and sanction of your being to pay the sewerage service?
    A. I know B. No, I don't know.

18. If your answer "you know" where do you get the information from?
    A. from the bill paper
    B. information from employee on duty
    C. from circulated letter.

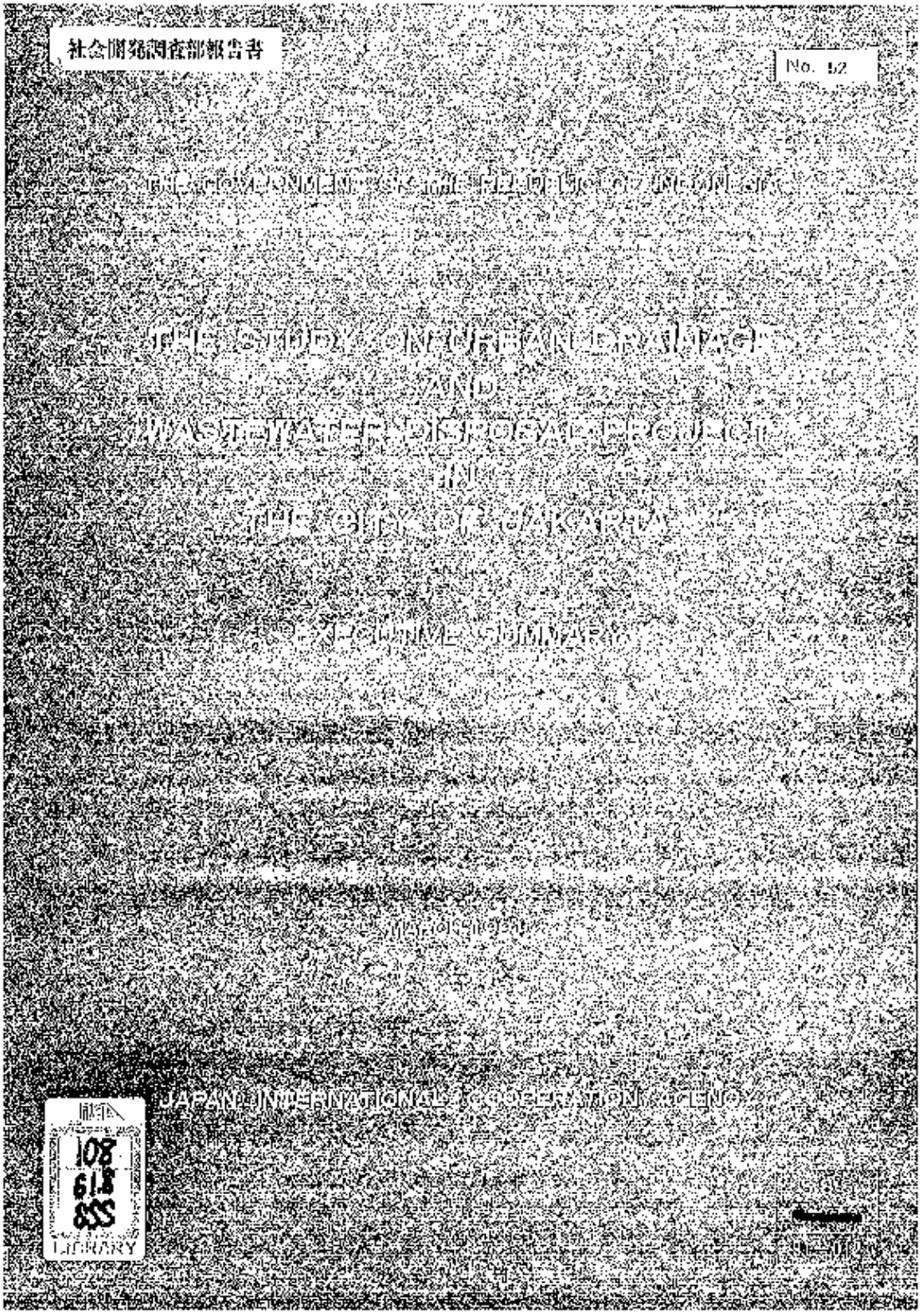
19. Who distributes your bill?
    A. PD PAL JAYA does
    B. through pointed local area officer (PT PAL JAYA business partner).

20. Payment of the sewerage service bill which you usually do is:
    A. directly to PD PAL JAYA's ticket window
    B. through the employee on duty
    C. through the pointed area officer.

This column can be filled up for your additional information you need

APPENDIX 3.9.1

EXECTIVE SUMMARY OF "THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL PROJECT IN THE CITY OF JAKARTA" (1991)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THE GOVERNMENT OF THE REPUBLIC OF INDONESIA

THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

EXECUTIVE SUMMARY

MARCH 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to a request from the Government of the Republic of Indonesia, the Japanese Government decided to conduct a Study on Urban Drainage and Wastewater Disposal Project in the City of Jakarta and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a study team headed by Mr. Ryuji Yanai, and composed of members from Pacific Consultants International and Nippon Koei Co., Ltd, three times between September 1989 and December 1990.

The team held discussions with the officials concerned of the Government of Indonesia and conducted field surveys. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

March, 1991

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

THE STUDY ON URBAN DRAINAGE
AND
WASTEWATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

Mr. Kensuke YANAGIYA
President
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

Dear Sir,

We are pleased to submit to you the final report entitled "THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL PROJECT IN THE CITY OF JAKARTA". This report has been prepared by the Study Team in accordance with the contract signed on 25 August 1989 and 17 May 1990 between the Japan International Cooperation Agency and the Joint Venture of Pacific Consultants International and Nippon Koei.

The report examines the existing conditions of urban drainage and wastewater disposal in the city of Jakarta, presents a master plan of drainage, sanitation and sewerage development and the results of a feasibility study on drainage and sewerage development for the priority areas selected by the master plan.

The report consists of the Executive Summary, Main Report, and Supporting Study Report. The Summary summarizes the results of all studies. The Main Report contains background conditions, overall drainage, sanitation and sewerage development plan, urgent drainage and sewerage development project, conclusions and recommendations. The Supporting Study Report includes data and technical details. In addition, a Data Book has been prepared and is submitted herewith.

All members of the Study Team wish to express grateful acknowledgement to the personnel of your Agency, Advisory Committee, Ministry of Foreign Affairs, Ministry of Construction, and Embassy of Japan in Indonesia, and also to officials and individuals of the Government of Indonesia for their assistance extended to the Study Team. The Study Team sincerely hopes that the results of the study will contribute to the socio-economic development and the improvement of health and hygiene in Jakarta.

Yours faithfully,

Ryuji YANAI
Team Leader

CONTENTS OF EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

1. Introduction

Jakarta, the capital of Indonesia, is undergoing rapid urbanization in recent years, resulting in an intense population growth that has almost doubled from 4.6 million in 1975 to 8.8 million in 1988, which is further expected to reach 12.8 million in 2010.

As the consequence, new flood prone areas are being created due to change in landuse even in the relatively undeveloped fringes of Jakarta. Furthermore, the city virtually lacks an environmentally and sanitarily acceptable means of wastewater disposal in commensuration with its urbanization and high growth of population.

Hence, the formulation of both the urban drainage, and sanitation and sewerage development plans has become necessary.

The Study Area, shown in Fig. 1.1, encompassed the entire administrative region of DKI, Jakarta with an area of about 650 sq.km.

This Study on urban drainage and wastewater disposal in Jakarta was carried out by the Study Team of the Japan International Cooperation Agency (JICA) in collaboration with the Directorate General of Human Settlements (Cipta Karya), Ministry of Public Works and Jakarta Metropolitan Government (DKI, Jakarta) of the Government of Indonesia from September 1989 to January 1991.

The objectives of the Study are as follows:

- Formulation of a master plan of drainage, sanitation and sewerage development encompassing the whole Study Area for the target year of 2010.
- Conduct a feasibility study for drainage and sewerage development for the priority areas selected by the master plan.

Based on the master plan study, conducted during September 1989 ~ August 1990, the respective priority areas for drainage and sewerage developments are identified along western fringe and central regions of the Study Area as shown in Fig. 1.2.

The feasibility study area of both drainage and sewerage, termed as Project Areas, that were selected based on detailed consideration of the respective priority areas are also shows in Fig. 1.2.

The Project Area for urban drainage development covers an area of 5,000 ha located in the north western fringe of Jakarta City. The urban drainage project consists of four (4) sub projects, Cengkareng West Drainage, Sepuk River Improvement, Bujong Drainage Improvement and Maruya Hir Drainage Improvement.

The Project Area for sewerage development covers an area of 4,300 ha located in central Jakarta and excludes an area of about 2,000 ha of the master plan priority area lying south of the existing Banjir Canal, which consist of Kec. Setia Budi and Tebet Manggarai, where a pilot sewerage development project is ongoing by JNSP.

The whole study, including the executive summary, consists of the following reports:

(1) MASTER PLAN STUDY (MAIN REPORT)
(2) MASTER PLAN STUDY (SUPPORTING REPORT, VOLUME I)
(3) MASTER PLAN STUDY (SUPPORTING REPORT, VOLUME II)
(4) FEASIBILITY STUDY (MAIN REPORT)
(5) FEASIBILITY STUDY (SUPPORTING REPORT)
(6) DATABOOK
(7) DRAWING
(8) EXECUTIVE SUMMARY

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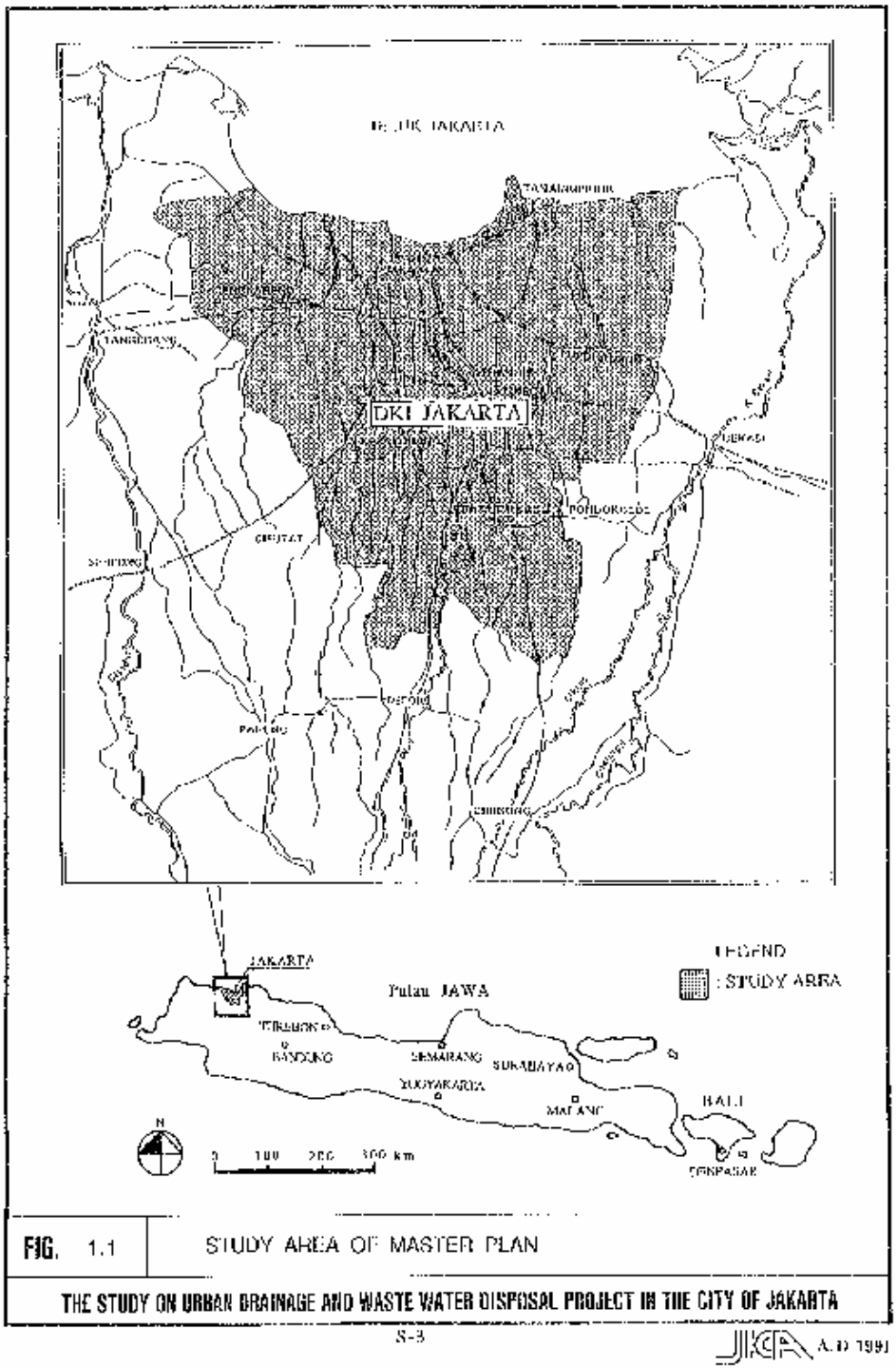

FIG. 1.1 STUDY AREA OF MASTER PLAN

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

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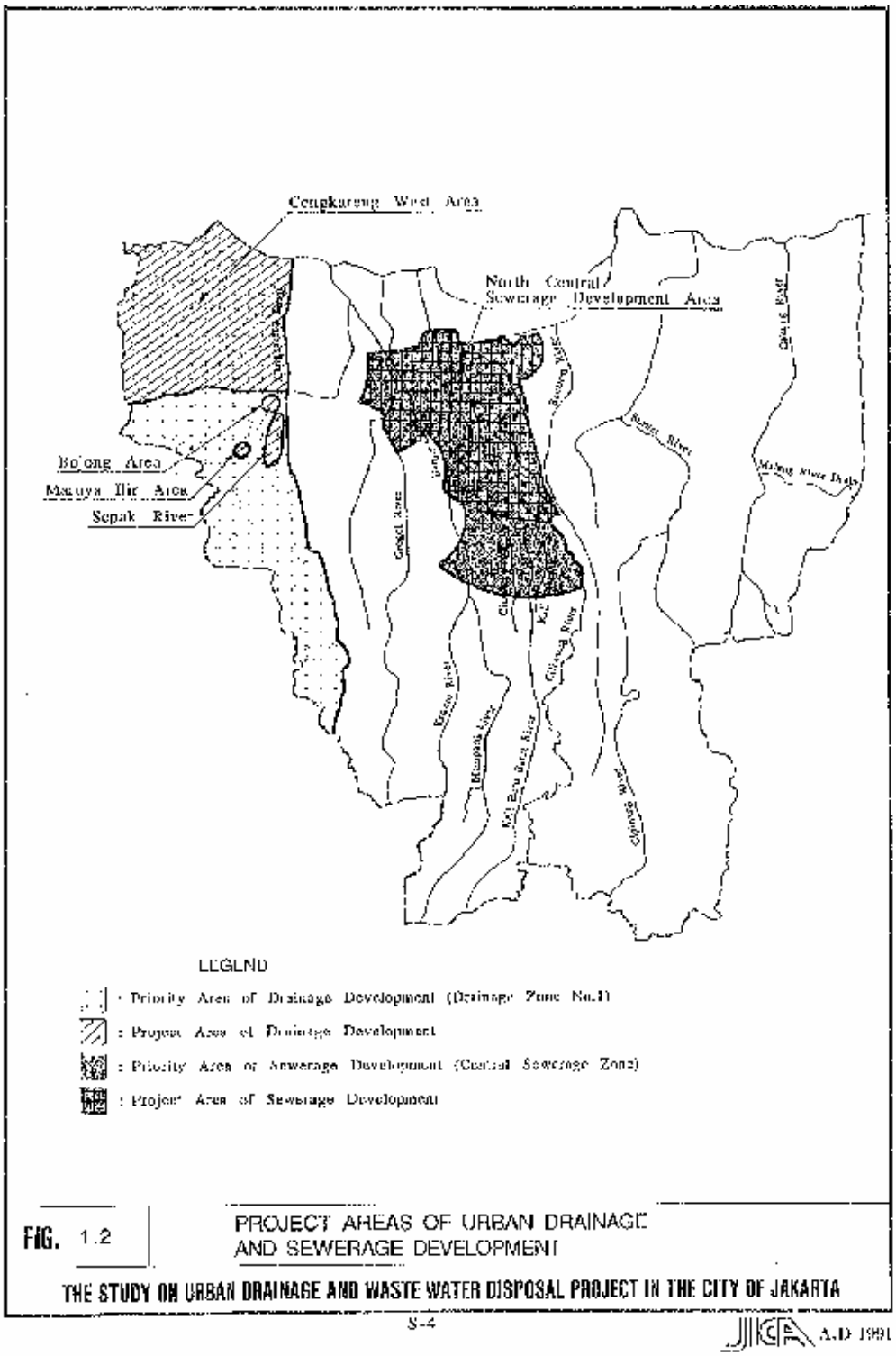

FIG. 1.2 PROJECT AREAS OF URBAN DRAINAGE AND SEWERAGE DEVELOPMENT

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

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JICA A.D 1991

2. Drainage Development Master Plan

2.1 Objective Urban Drainage Channel

The Study covers the whole major urban drainage channels only, excluding both the minor drainage channels and the flood control rivers. According to Indonesian governmental regulation, a flood control river is defined as a river that originates outside the objective urban area, while an urban drainage channel drains local rainfall within the objective urban area.

Among the water courses in the Study Area, the following 11 rivers are the flood control river.

- Mookervart, Angke, Pesanggrahan, Grogol, Krukut, Ciliwung, Cipinang, Sunter, Buaran, Jati Kramat and Cakung

Among the above rivers, six (6) rivers are diverted by the existing Cengkareng Floodway and Banjir Canal into the Bay of Jakarta. The remaining five (5) rivers will also be cut off by the on-going East Banjir Canal in the near future. Hence, the downstream reaches of the above rivers are all dealt as urban drainage channel.

The objective urban drainage channel networks consist of the main channels, tributaries and distributaries of 158 in total. Among them, 50 channels are on-going, under detailed design or under construction.

Location of the flood control rivers and objective urban drainage channels are shown in Fig. 2.1.

2.2 Floods and Flood Damages

The floods of the major urban drainage channels are caused by local rainfall and/or high tide of the Bay of Jakarta. The potential flood areas are located at 96 places out of which 79 locations are habitually inundated. The potential and habitual inundation areas sum up to 11,099 ha or 17.0% of the Study Area and 3,835 ha or 5.9%.

8-5

The expected major flood damages in the Study Area are:

(i) Direct damages to house, shop, factory and other properties
(ii) Income losses due to closure of shop, factory and other enterprises
(iii) Damage to traffic
(iv) Damage to infrastructure

The expected average annual flood damages without project in 1988 and 2010 are Rp. 47.1 billion and Rp. 161.0 billion at 1990 price respectively. The share of damage to house property is the highest of about 70%.

2.3 On-going Project

To cope with the above flood hazards, 25 urban drainage development projects are on-going, under detailed design or under construction for the 50 major drainage channels mostly by the Jakarta Flood Control Project. The projects include channel improvement of about 120 km, construction of eight (8) pump stations with a total capacity of 98 m^3/s, and construction of other facilities such as regulation pond, polder, gate, etc.

Location of the on-going projects are shown in Fig. 2.2.

2.4 Proposed Plan

The proposed drainage development plan is formulated for the drainage channels other than the 50 on-going channels, by dividing the whole Study Area into six (6) drainage zones. The division of the drainage-zones was made based on natural boundary of drainage (ref. Fig. 2.3).

The proposed major projects are improvement of existing channel, construction of new channel and installation of pump station. The project works for each drainage zones are summarized below.

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total
Existing Channel Impr.							
Number of Channel	10	3	3	-	1	15	32
Total Length (km)	30.6	8.1	8.9	-	1.2	27.3	76.1
New Channel Const.							
Number of Channel	-	-	-	-		3	3
Total Length (km)	-	-	-	-		11.4	11.4
P.S. Installation							
Number of P.S.	-	1	1	-		-	2
Total Capacity (m^3/s)	-	2.5	6.2	-		-	8.7

Location of the proposed projects are also shown in Fig. 2.3.

2.5 Project Evaluation

(i) Project Cost

The total project costs are estimated to be Rp. 676.7 billion with a break-down of Rp. 543.0 billion for the on-going project and Rp. 133.7 billion for the proposed project at 1990 price. Its break-down by drainage zone is shown below.

(Unit: billion Rp.)

Zone No.	On-going	Proposed	Total
1	1.8	59.6	61.4
2	84.6	9.7	94.3
3	5.2	14.6	19.8
4	165.9	-	165.9
5	-	0.8	0.8
6	285.5	49.0	334.5
Total	543.0	133.7	676.7

(ii) Economic Evaluation

The economic efficiency of the total project including on-going and proposed ones is evaluated as follows.

- Net Present Value (NPV) : Rp. 435 billion
- Benefit Cost Ratio (B/C) : 2.15
- Economic Internal Rate of Return (EIRR) : 20.2%

2.6 Priority Area

Priority sequence of the six (6) drainage zones for the proposed project was assigned from the integral view points of needs/benefits, regional equality, environmental quality improvement and poverty alleviation. Accordingly, Drainage Zone No. 1 was selected as the priority area for feasibility study (ref. Fig. 1.2).

2.7 Recommendation

(1) Progressing of land subsidence in coastal areas of Jakarta has been recognized in recent years. Artificial infiltration of storm water is an effective means for a concurrent realization of both flood run-off and land subsidence controls. Hence, it is recommended to investigate on-site flood control by means of artificial infiltration of storm water.

(2) The existing hydrological observation networks shall be improved to attain an effective management of the urban drainage system.

(3) The existing operation and maintenance activities of urban drainage shall be strengthened to maintain expected functions of the drainage system. The present organization of the urban drainage in DKI, Jakarta shall be strengthened to meet the increasing operation and maintenance requirements.

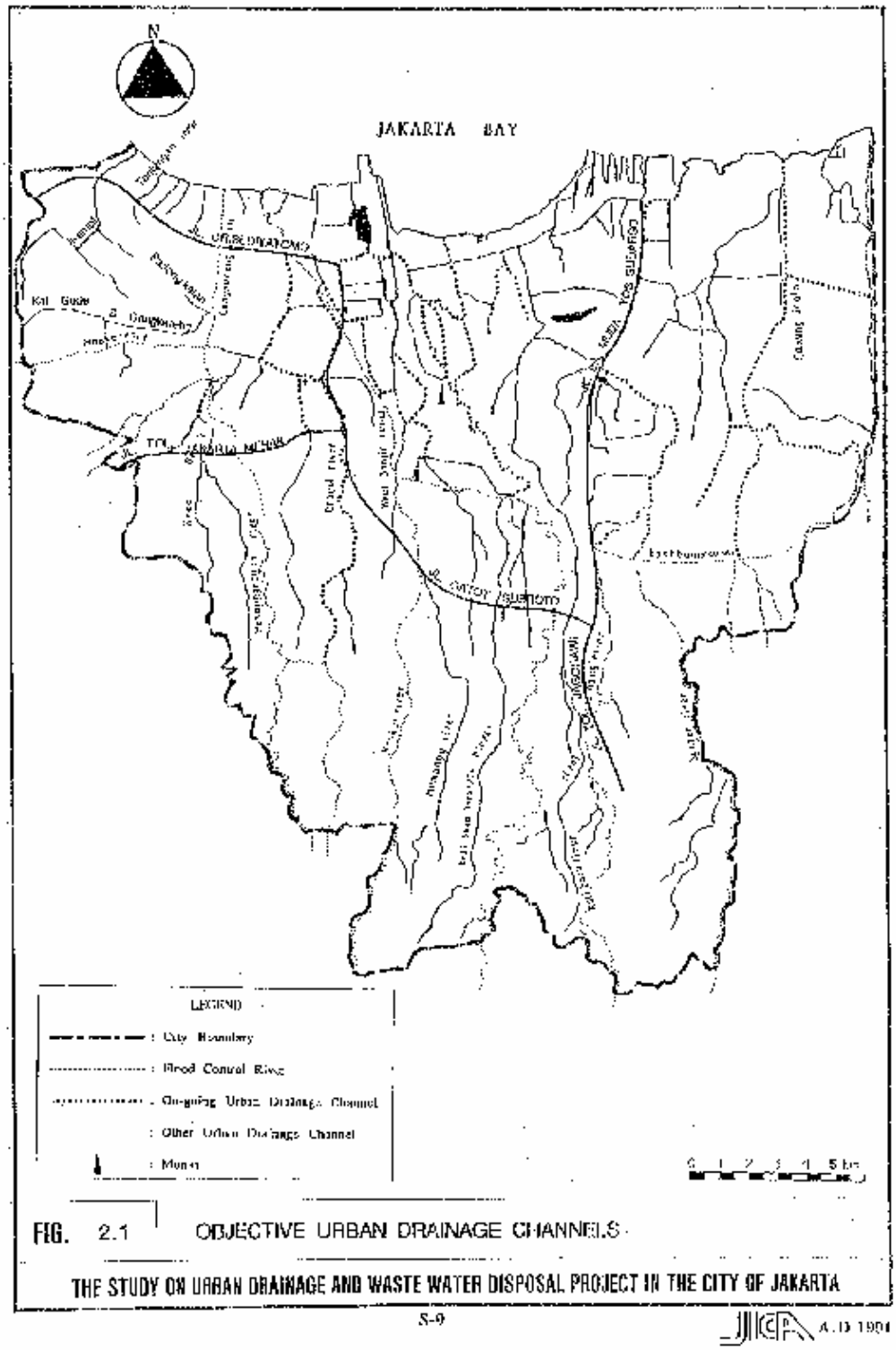

FIG. 2.1 OBJECTIVE URBAN DRAINAGE CHANNELS

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

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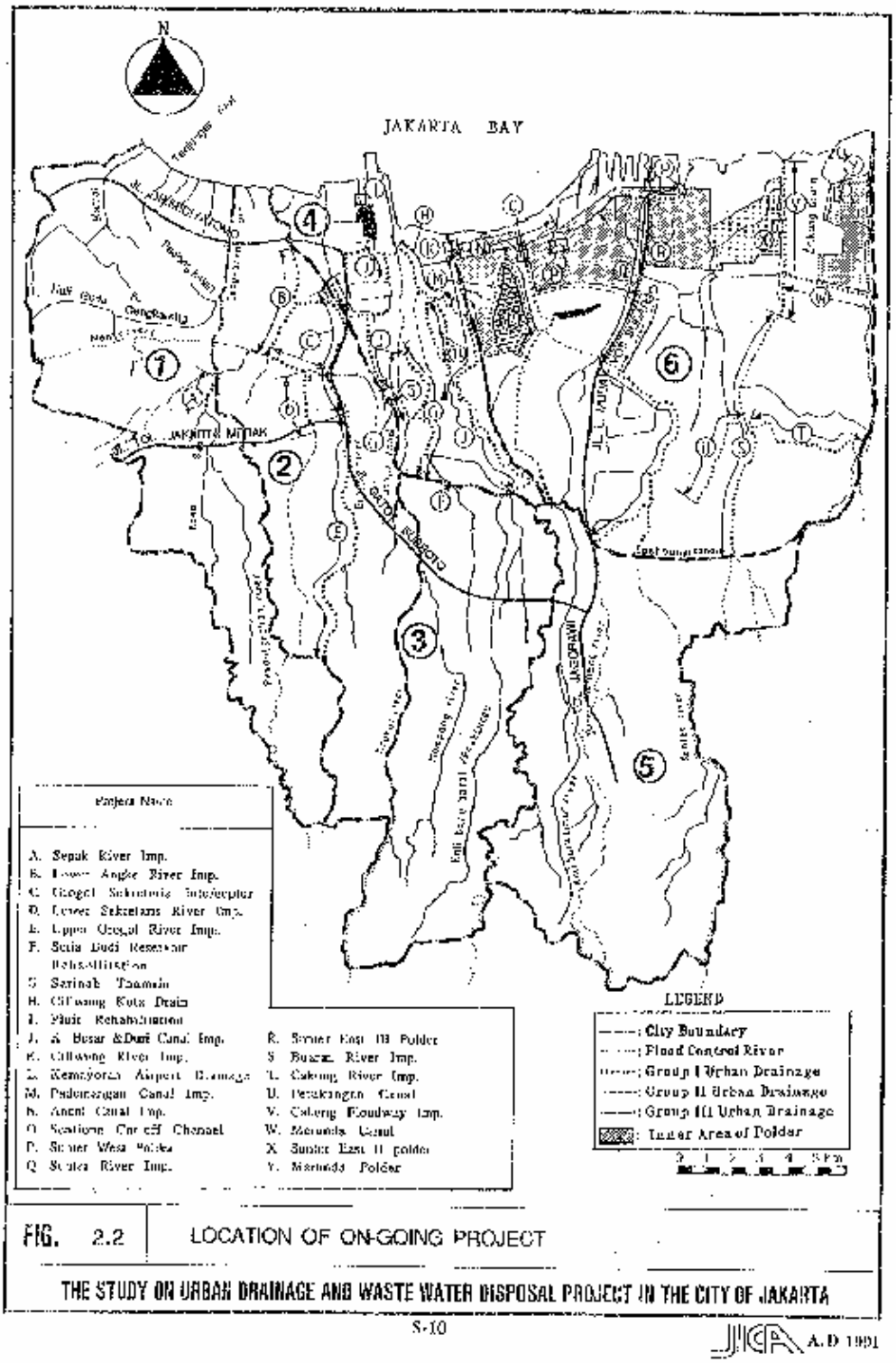

FIG. 2.2 LOCATION OF ON-GOING PROJECT

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

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JICA A.D 1991

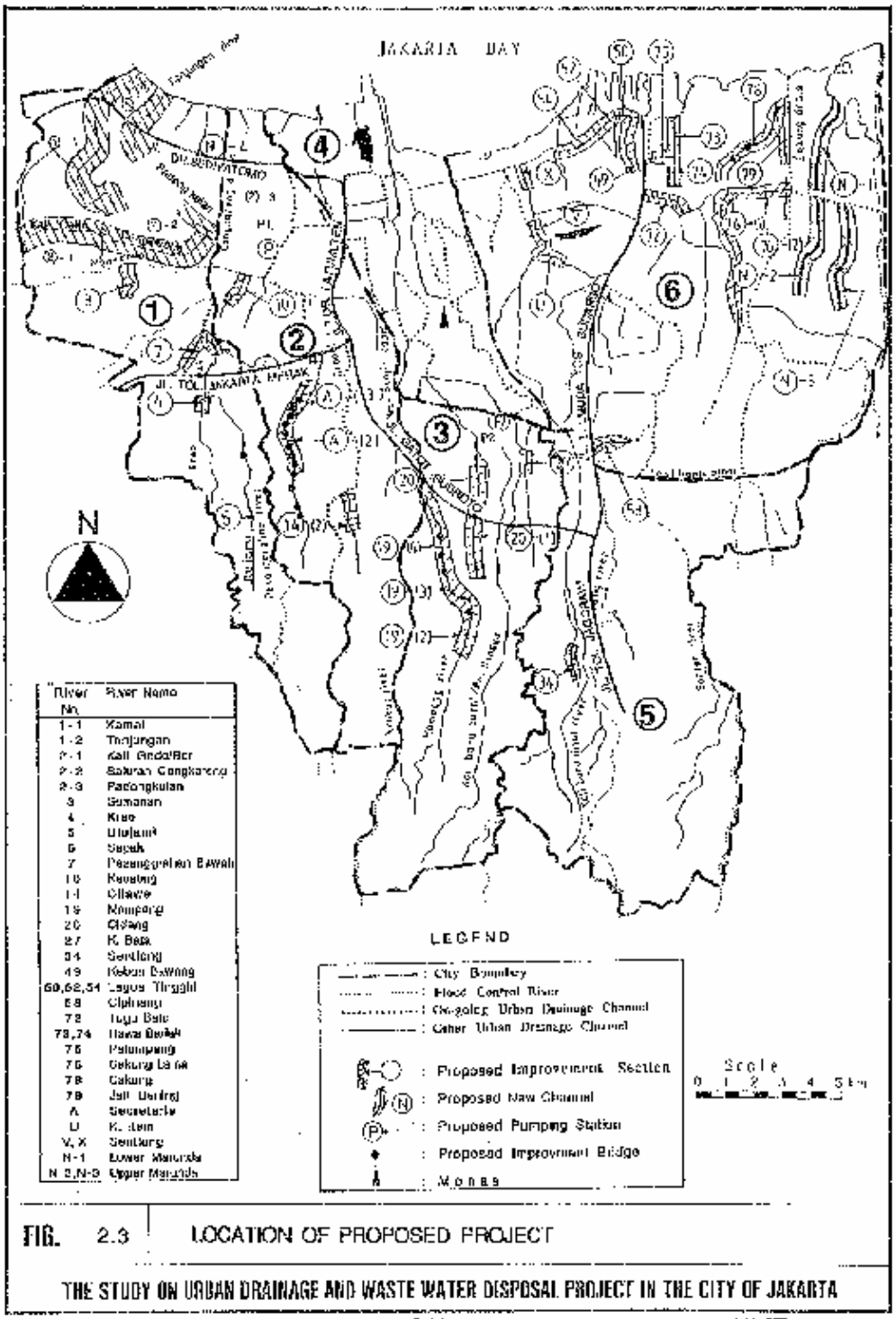

FIG. 2.3 LOCATION OF PROPOSED PROJECT

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

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JICA A.D 1991

3. Feasibility Study of Drainage Development

3.1 Project Area

The Project Area covers the north west low-lying area of Jakarta City with an area of 5,400 ha (ref. Fig. 1.2) and comprised of four (4) sub-project areas of Cengkareng West, Bojong, Sepak River and Maruya Hir. However, the major project facilities are confined to Cengkareng West area, and hence it is only briefed in this Chapter.

The Cengkareng West Project Area of 4,700 ha is encompassed by the administrative boundary of DKI to the west, Mookervart River to the south and Cengkareng Floodway to the east. Total population of the Area was 0.263 million in 1988. It is expected to increase to 0.456 million in 2010.

The Area is undergoing a rapid land development to accommodate the increasing population. Urban land area including residential, commercial & institutional and industrial ones of the Project Area will increase from 2,350 ha or 50% in 1990 to 3,525 ha or 75% in 2005.

The objective drainage basin for facility planning with a total area of 3,823 ha is selected from the Project Area as shown in Fig. 3.1. It excludes the southern fringe area of 470 ha, located along the Mookervart River and Mandar Permai Resort Development Area of 430 ha located in the north east coastal area. The objective drainage basin consists of the following five (5) sub-drainage basins (ref. Fig. 3.1).

(1) Drainage basin A covers a catchment area of 777 ha. Storm water is drained directly into the Jakarta Bay through the Tanjungan River with a total length of 3.2 km. The river width is in the range of 2 m and 5 m. The river gradient is approximately 1/3,000.

(2) Drainage basin B drains a catchment area of 1,637 ha of the Kamal River and its tributaries also into the Jakarta Bay. The total river length is 11.8 km. The river width ranges from 3 m to 18 m. The river gradient is 1/2,000 - 1/3,000.

(3) Drainage basin C consists of the channels of Kali Grale and Kali Bor. Storm water of the basin of 563 ha is drained into the Mookervart River. The total river length is 4.8 km. The river width and slope are 2 - 4 m and 1/2,000 respectively.

(4) Drainage basin D covers a catchment area of 331 ha of the Saluran Cengkareng channel. Storm water is drained into the Cengkareng Floodway through the Padongkelan channel of the drainage basin E. Total length of the Saluran Cengkareng channel is 4.5 km. Its river width and slope is 2 - 6 m and 1/2,000 respectively.

(5) Drainage basin E drains a catchment area of 515 ha of the Padongkelan channel into the Cengkareng Floodway. Most part of the basin is undergoing housing development. A sluice gate is provided at the confluence to the Cengkareng Floodway to control backwater of the Cengkareng Floodway. Total length of the Padongkelan channel is 1.1 km. Its river width and gradient is 2 - 5 m and 1/2,000 respectively.

3.2 Floods and Flood Damages

There are ten (10) potential inundation areas in the Project Area, out of which six (6) areas are habitually inundated. The total hectarage of the potential areas reaches 474 ha, while that of the habitual inundation areas 273 ha.

The major flood damages in the Study Area are as follows.

- Damages to properties including house, shop and factory
  Income losses due to closure of shop and factory
- Damages to traffic
  Damages to infrastructure and others

These were estimated in monetary terms. The total average flood damage in 1988 is estimated to be Rp. 1,262 million. It is expected to increase to Rp. 7,085 million in 2010. The damage to properties is predominant, accounting for approximately 80% in both cases.

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3.3 Proposed Drainage Improvement Plan

(1) Drainage System

The proposed drainage system of the Cengkareng West Area consists of the following five (5) sub-systems of the basin A, B, C, D and E.

(i) Basin A : Tanjungan River drainage system
(ii) Basin B : Kamal River drainage system
(iii) Basin C : Kali Gede and Kali Bur channel drainage system
(iv) Basin D : Saluran Cengkareng channel drainage system
(v) Basin E : Padongkelan channel drainage system

All the above basins are drained by gravity. No pump drainage is proposed. The existing main river and channel sections in all the above drainage systems will be widened/deepened to increase carrying capacity. The existing river/channel reaches will be extended to drain the upstream areas in the drainage systems of the Basin A, B and E. For extension, excavation of new drainage channel is proposed. Moreover, the existing sluice gate at the confluence of the Padongkelan channel to the Cengkareng Floodway will be improved.

All the drainage channels and facilities are designed to meet 10-year floods.

The proposed design flood discharge, length of channel improvement, channel gradient, channel width and channel depth for the five (5) drainage systems are summarized below.

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Design System	Catchment Area (ha)	Design Discharge (m^3/s)	Channel Improvement			
			Length (km)	Gradient	Width (m)	Depth (m)
(A) Tanjungan	777	13-24	7.2	1/3,000	7.0-16.0	2.5
(B) Kamal	1,657	22-47	8.1	1/1,600-1/3,000	8.9-25.2	2.4
(C) Kali Gede/Kali Dor	563	23-27	4.8	1/2,000	8.2-8.5	2.5-3.0
(D) Salurang Cengkareng	331	13-18	4.5	1/2,000	6.5-7.5	2.5
(E) Padongkelan	515	12-30	2.8	1/2,000	5.9-10.7	2.5
Total	3,893		27.4			

Location of the channel improvement is shown in Fig. 3.2. The design flood distribution for the respective channels are also given in Fig. 3.2.

(2) Construction Works and Land Acquisition

The proposed major construction works, and required land acquisition and compensation are summarized as follows.

(i) Construction Works

- Channel excavation : 469,000 m^3
- Embankment : 100,000 m^3
- Revetment works : 46 km, 195,000 m^2
- Bridge improvement : 15 places, 700 m^2
- Highway crossing : 2 places, 360 m^2
- Inspection road : 35 km, 138,000 m^2
- Sluice gate improvement : 1 place

(ii) Land Acquisition and Compensation

- Land Acquisition : 42 ha
- Resettlement Compensation : 230 houses

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3.4 Project Evaluation

(1) Project Cost

The total project cost is estimated to be Rp. 51,200 million at July, 1990 prices. Its break-down by cost item is given below.

(Unit: million Rp.)

Item	Cost
Direct Construction	19,880
Land Acquisition/Compensation	26,646
Engineering Service	1,988
Administration	698
Physical Contingency	1,988
Total	51,200

(2) Economic Evaluation

The economic efficiency of the proposed project is evaluated as follows.

- Net Present Value (NPV) : Rp. 20,822 million
- Benefit Cost Ratio (B/C) : 2.15
- Economic Internal Rate of Return (EIRR): 20.4%

(3) Environmental Assessment

No significant adverse effects on the environments are anticipated in consideration to the similar projects completed recently.

3.5 Recommendation

An immediate implementation of the project is recommended in consideration to the progressing and future land development activities and the resultant increase in rainfall runoff. Hence, it is recommended to commence the necessary financial procurement at the earliest.

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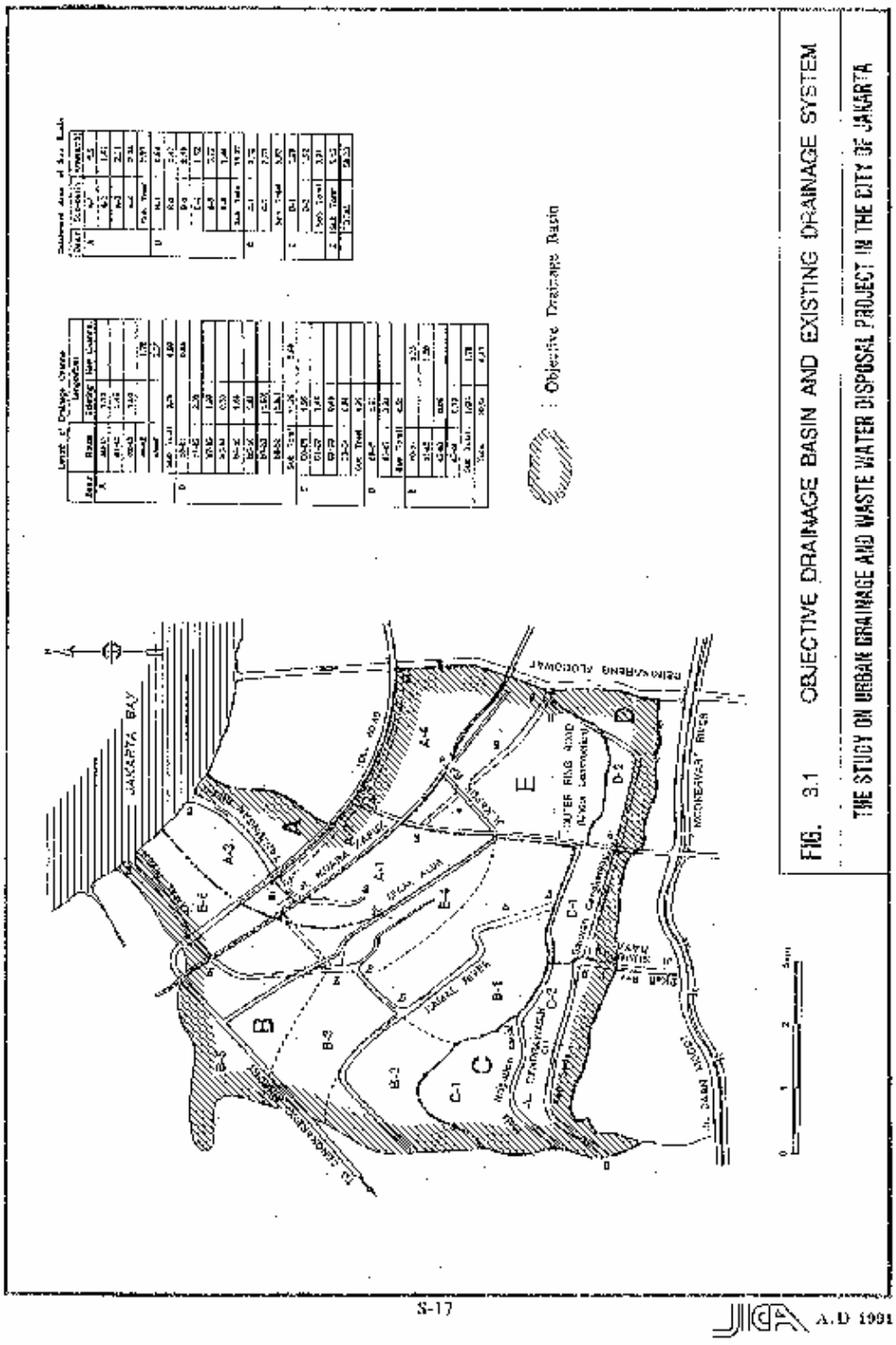
FIG. 3.1 OBJECTIVE DRAINAGE BASIN AND EXISTING DRAINAGE SYSTEM
THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA
: Objective Drainage Basin
JAKARTA BAY
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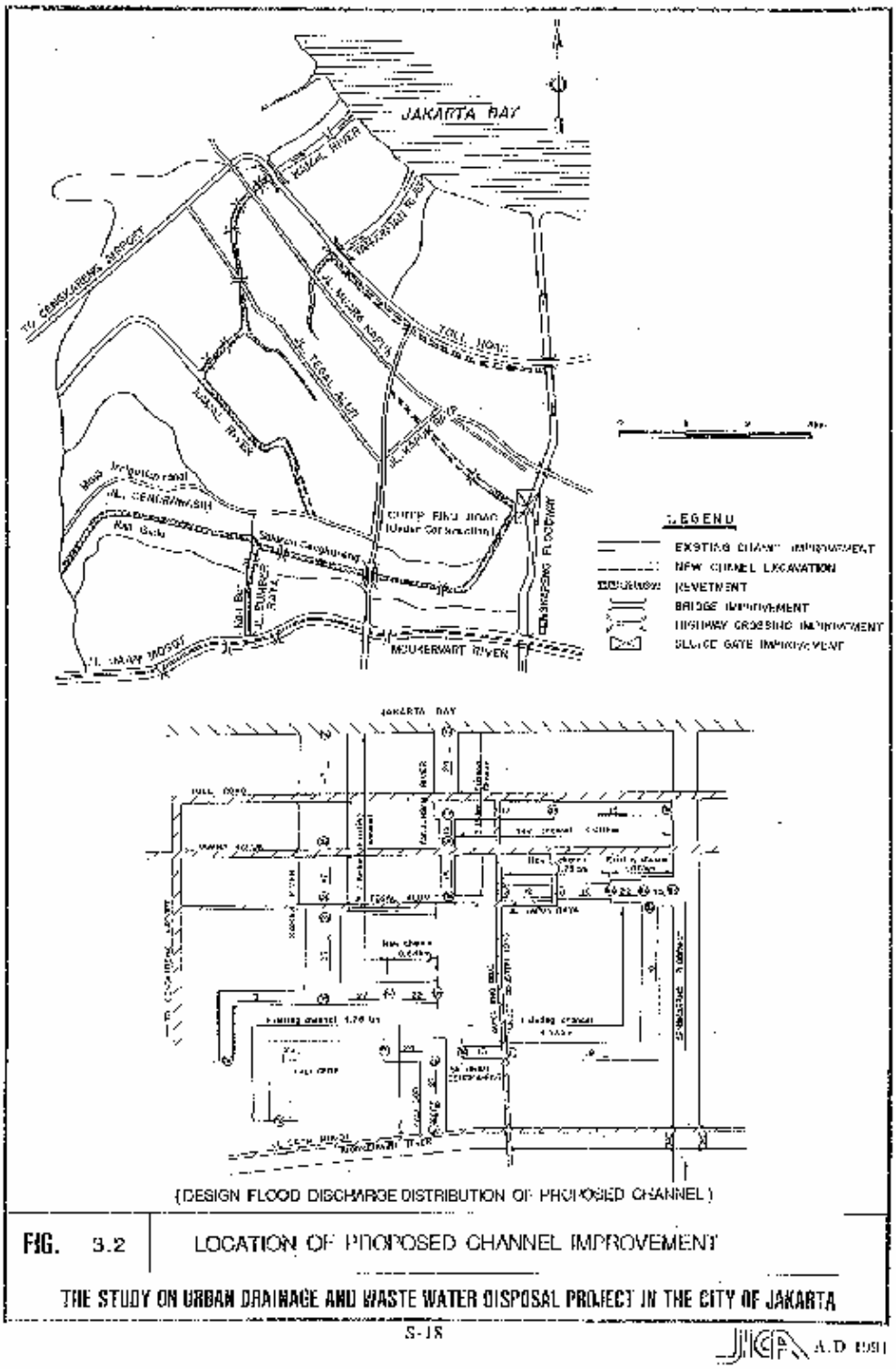
A.D 1991


JAKARTA BAY
LEGEND
EXISTING CHANNEL IMPROVEMENT
NEW CHANNEL EXCAVATION
REVETMENT
BRIDGE IMPROVEMENT
HIGHWAY CROSSING IMPROVEMENT
SLUICE GATE IMPROVEMENT
MOOKERWART RIVER
(DESIGN FLOOD DISCHARGE DISTRIBUTION OF PROPOSED CHANNEL)
FIG. 3.2
LOCATION OF PROPOSED CHANNEL IMPROVEMENT
THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA
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4. Sanitation and Sewerage Development Master Plan

4.1 Delineation of Sanitation and Sewerage Development Areas

The plan of sanitation and sewerage development in the Study Area is aimed both at the improvement of sanitary condition of the communities and abatement of water pollution of public waterways.

Based on existing data on population density and river water quality, it is established that increase in water pollution as BOD is linearly correlated to that of increase in population density. A similar pattern may be reasonably assumed for sanitary condition of communities.

Accordingly, in the Study Area, river water quality remained less than 30 mg/l as BOD in those areas with population density less than 100 person/ha, 30 mg/l ~ 80 mg/l for population density in the range of 100 ~ 300 person/ha, and higher than 80 mg/l as BOD for population density greater than 300 person/ha.

The target river water quality of sanitation and sewerage master plan is set at 30 mg/l as stream BOD in 2010, conforming the least permissible standards, stipulated to maintain aquatic biota, by the Governor's Decree No. 1608, 1988.

Conforming the criteria dealt above, the Study Area is divided into three (3) areas, Area A, Area B and Area C, based on Kelurahan-wise future population density in 2010 as shown in Fig. 4.1.

(i) Area A: Simple On-site Treatment System Development Area

The population density in this area is less than 100 person/ha. Sanitary disposal of toilet waste is only considered, in principle, and gray water be discharged with no treatment, which is adequate to maintain river water quality not to exceed 30 mg/l as stream BOD. This area having a total population of 1,482,000 in 2010 covers 37 Kelurahans with an area of 21,159 ha.

(ii) Area B: High Level On-site Treatment System Development Area

The population density is in the range of 100 – 300 person/ha. On-site system to treat both the toilet waste and gray water, typically septic tank with upflow filter, is proposed as it is found to be more economical than sewerage. This is to produce a moderate effluent quality of 60 mg/l as BOD in order to conform the target river water quality of 30 mg/l as stream BOD. The area covers 89 Kelurahans with a total area and future population of, respectively, 27,386 ha and 4,967,000.

(iii) Area C: Sewerage Development Area

This area covers the central region of the Study Area with high future population density of more than 300 person/ha. Sewerage development is proposed for this area, to conform the target river water quality, as it is found to be more economical than on-site system to produce an effluent quality of 30 mg/l as BOD. The number of Kelurahans covered, total area and future population in 2010 are respectively, 140, 16,604 ha and 6,351,000.

4.2 Proposed Sewerage Development Plan

Based on alternative study, carried out by dividing the sewerage area (Area C) into nine (9) independent small scale sewerage zones to one (1) single large zone, the optimum zoning was selected as the one that comprised of six (6) independent sewerage zones as shown in Fig. 4.2.

A sewage collection system consisting of conventional separate system and interceptor system is applied, along with aerated lagoon as the treatment system, in principle, wherever sufficient land/pond area is available. The main features of project facilities in each sewerage zone is summarized in Table 4.1.

The total project cost of sewerage development is estimated at Rp. 1,814.5 billion (Rp. 1,930.5 billion including the cost of house connection) and the

annual O&M cost is Rp. 18.1 billion, both at 1990 price. The cost breakdown is shown in Table 4.2.

4.3 Proposed Sanitation Development Plan

The sanitation development plan encompasses the whole Study Area, and specifically the on site system areas of Area A and Area B and the interceptor sewerage zones of Area C.

(1) Proposed On-site Facilities

The on-site sanitation systems planned are individual toilets and treatment units, and public toilets. However, the provision of public toilets is restricted to those existing population, living in relatively high population density areas, with no access to sanitation facilities. Hence, Area A with low population density is excluded.

Accordingly, for simple on-site treatment system development area of Area A (ref. Section 4.1) leaching pit/septic tank and septic tank with mound are proposed for respectively the deep and shallow groundwater zones, to treat toilet waste only, in principle.

Similarly, for Area B of high level on-site treatment system to treat both the toilet waste and gray water, conventional septic tanks and septic tank with upflow filter are proposed respectively for deep and shallow groundwater zones. For interceptor zones of the sewerage development area (Area C), septic tank is proposed to treat toilet waste only.

(2) Sludge Treatment

The Study Area is divided into ten (10) number service areas of desludging, transport and treatment of sludge desludged from the on-site facilities, as shown in Fig. 4.3. For sludge treatment, in addition to the planned six (6) wastewater treatment plants (Service Area 1 ~ 6) and the two existing and planned sludge treatment plants of Pulo Gebang and Duri Kosambi (Service Area 10 and Service Area

7), two (2) new sludge treatment plants are planned in Kec. Pasar Minggu and Pasar Rebu. The main features concerning desludging, transport and treatment of each service area is summarized in Table 4.3.

(3) Project Cost

The total project cost is estimated to be Rp. 1,411 billion with a break-down of Rp. 89 billion for public sector and Rp. 1,322 billion for private sector at 1990 price. The annual O&M cost is estimated at Rp. 4.6 billion.

4.4 Alleviation of Water Pollution

The future pollution load discharge of the Study Area in 2010 with no project is estimated at 545,245 kg/d with a break-down of 101,494 kg/d in Area A, 213,940 kg/d in Area B and 229,811 kg/d in Area C.

The total pollution load reduction by sanitation and sewerage development is estimated to be 297,570 kg-BOD/d with a break-down of 105,391 kg-BOD/d by sanitation development in Area B and 192,251 kg-BOD/d by sewerage development in Area C.

Existing average river water quality in the central part of the Study Area is 67 mg/l as stream BOD and it would further aggravate to more than 88 mg/l in 2010, under the condition of no project. The proposed sewerage and sanitation development along with industrial pollution control would enhance the river water quality to the target level of 30 mg/l as stream BOD, conforming the water quality standards by Governor's Decree No. 1608, 1988.

4.5 Financial Aspects

The required initial cost of sewerage and sanitation development by public sector is estimated at Rp. 1,904 billion at 1990 price. The O&M cost under full operational condition of all facilities is estimated at Rp. 22,662 million/annum.

The initial cost is high, hence it is not reasonable to burden the beneficiaries with the entire cost. However, the beneficiaries shall bear the entire O&M cost, a criteria already adopted by the Government of Indonesia concerning sewerage development. Based on the questionnaire survey of people's willingness to pay for the sewerage/on site sanitation service, sum total of the willingness to pay for all properties over the whole Study Area works out at Rp. 39,167 million per annum in 1988 and it will reach Rp. 97,562 million in the year 2010 at 1990 prices. These amounts are enough to burden the annual O&M costs of the proposed sewerage/on-site sanitation development systems.

Based on the past ratio of 4.8% of urban development funds of DKI Jakarta to its gross domestic product (GDP), urban development funds of DKI Jakarta over the 18 years of the project construction period from 1993 to 2010 is estimated at Rp. 12,280,910 million at 1990 price. This amount is adequate to carry out the proposed sewerage and sanitation development with the initial cost of Rp. 1,904 billion.

4.6 Priority Area of Sewerage Development

Priority sequence of the six (6) proposed sewerage development zones (ref. Fig. 4.2) was assigned based on integral viewpoints of demand/benefit, adverse effect and constraint by the project. Accordingly, Central Sewerage Zone was selected as the priority area for feasibility study (ref. Fig. 1.2).

4.7 Recommendation

Enhancement of public awareness on environmental pollution issues is extremely necessary not only to improve the environmental condition of Jakarta but also to gain public support for sewerage development. It is recommended to conduct public campaign by DKI Jakarta or other related organization to enhance the awareness of general populace on the importance of environmental quality improvement and its relation to alteration of behavioral pattern.

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Table 4.1 Main Features of Sewerage Zones

Zone	Central	North West	South West	North East	South East	Tanjung Priok	Total
Served Area (ha)	6,307	2,015	2,170	2,536	1,259	1,533	15,864
Conventional Area (ha)	5,422	530	938	1,610	907	700	7,507
Interception Area (ha)	2,505	1,322	1,232	1,845	956	303	8,283
No Sewerage Area (ha)	50	154	0	70	0	0	214
Population Served in 2010	2,466,000	642,000	624,000	1,382,000	532,000	463,000	6,351,000
Conventional Area	1,149,000	185,000	244,000	527,000	137,000	347,000	2,579,000
Interception Area	1,317,000	457,000	430,000	856,000	396,000	116,000	3,772,000
Population Density (person/ha)	410	345	311	366	431	411	382
Conventional Area	336	348	360	332	416	433	344
Interception Area	503	343	349	424	412	406	429
Lift Pump Station	1	3	3	11	0	1	19
Treatment Plant							
Plant Area (ha)	58.0	18.0	16.0	36.0	13.0	30.0	186.0
System	A.L & E.P	A.L	A.L	A.S	A.L	A.L & E.P	
Capacity (m3/d)	525,000	124,000	107,000	261,000	101,000	228,000	1,252,000
Discharge to	Jakarta B.	Cengkareng Drain	Pesanggrahan River	Sunter River	Sunter River	Cakung River	

Note : A.L means aerated lagoon
: A.L & E.P means aerated lagoon & facultative pond
: A.S means conventional activated sludge

Table 4.2 Project Cost and Annual O&M Cost of Sewerage Zones

(Project Cost)

(Unit: Rp. million)

Sewerage Zone / Cost Item	Central	North West	South West	North East	South East	Tanjung Priok	Total
A. Direct Construction Cost	523,862	158,154	193,538	398,559	97,110	141,850	1,224,066
(1) Collection Sewer Line	479,861	137,645	169,816	371,805	65,399	115,092	1,224,335
(2) Lift Pump Station	-	10,375	15,787	-	5,251	6,166	37,459
(3) Treatment Plant	44,082	91,196	27,934	126,753	23,466	28,780	364,092
B. Land Acquisition Cost	358	1,514	2,721	761	1,012	1,401	8,156
C. Administration Cost	7,667	2,566	2,943	5,989	1,472	2,149	22,986
D. Engineering Cost	36,622	11,841	13,516	20,889	6,198	9,930	106,585
E. Physical Contingency	53,380	16,915	19,351	30,856	9,711	14,185	152,499
Total	621,378	202,421	242,071	475,019	116,105	169,514	1,611,548
F. House Connection Cost	51,696	8,316	10,980	20,720	6,156	13,156	116,028
Grand Total	695,074	210,737	243,051	196,737	124,259	184,670	1,930,528

(Annual O&M Cost)

Sewerage Zone	Central	North West	South West	North East	South East	Tanjung Priok	Total
A.Collection System	193	49	62	104	50	45	483
B.Lift Pump Station	-	488	581	-	89	127	1,285
C.Treatment Plant	6,695	1,285	1,382	4,113	1,208	1,615	16,301
Total	6,889	1,822	2,025	4,217	1,327	1,787	18,067

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Table 4.3 Service Area, Desludging and Transport of Sludge

Service Area / Treatment Plant		Area (ha)	Average Quantity of Desludging (m3/d)		Vacuum Truck (Nos.)
			Whole Service Area	On-site Area (Area A + Area B)	
Wastewater Treatment Plant	1	10,523	411	121	48
	2	3,597	234	142	15
	3	5,931	389	298	30
	4	5,106	283	95	22
	5	1,243	78	0	5
	6	7,964	237	170	28
Sludge Treatment Plant	7(DK.)	6,950	300	300	23
	8	8,245	304	304	35
	9	9,441	299	299	35
	10(PG.)	6,149	310	310	24
Study Area (Total)		65,149	2,839	2,042	266

Note : DK. : Sludge treatment plant under construction in Duri Kosambi
PG. : Existing sludge treatment plant at Pulo Gebang
All others to be newly constructed

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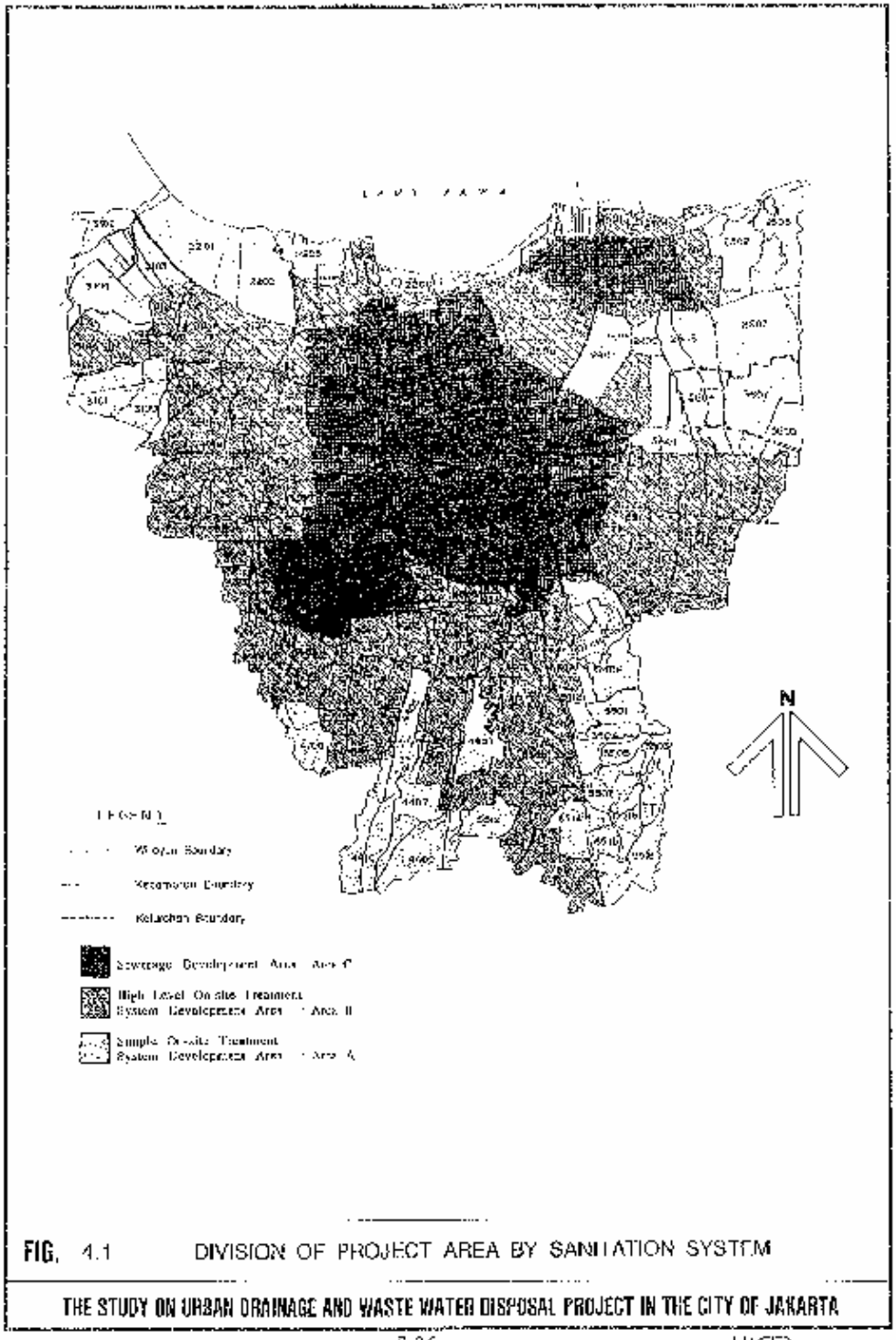

FIG. 4.1 DIVISION OF PROJECT AREA BY SANITATION SYSTEM

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

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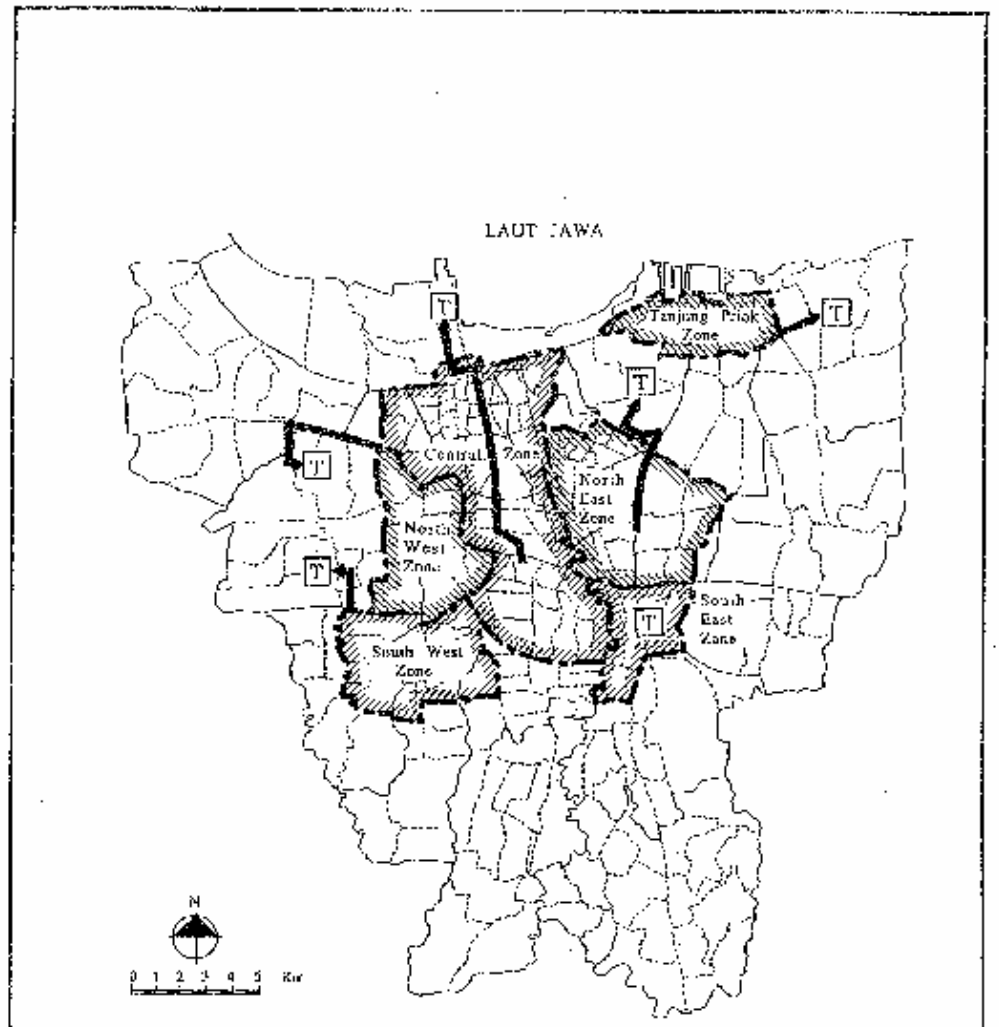

FIG. 4.2 | PROPOSED SEWERAGE DEVELOPMENT SYSTEM

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

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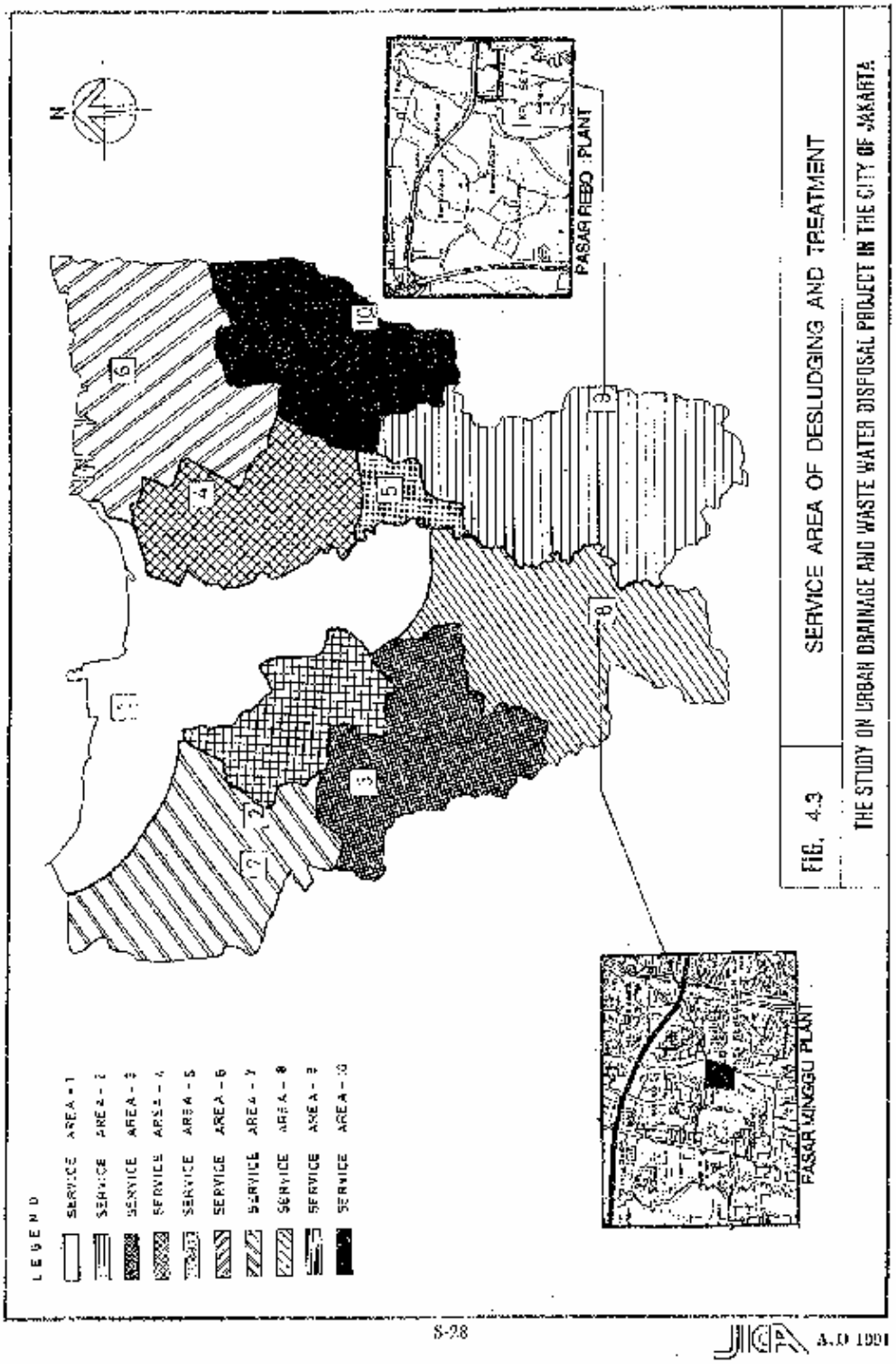
N
PASAR REBO PLANT
PASAR KINGGU PLANT
LEGEND
SERVICE AREA - 1
SERVICE AREA - 2
SERVICE AREA - 3
SERVICE AREA - 4
SERVICE AREA - 5
SERVICE AREA - 6
SERVICE AREA - 7
SERVICE AREA - 8
SERVICE AREA - 9
SERVICE AREA - 10
FIG. 4.3
SERVICE AREA OF DESLUDGING AND TREATMENT
THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA
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5. Feasibility Study of Sewerage Development

5.1 Project Area

The Project Area covers the northern portion of central sewerage zone with an area of 4,300 ha. defined as North Central Sewerage Development Area, excluding the ongoing pilot sewerage development area by JSSP (ref. Fig. 1.2). The Project Area encompasses 47 Kelurahans with a total existing and future population, in 1988 and 2030, of respectively 1,548,520 and 1,659,200.

The proposed sewerage development system, as shown in Fig. 5.1, covers the entire project area other than those of rivers, parks, ponds and reserved areas. Accordingly, the area covered by sewerage development system becomes 3,847 ha.

5.2 Sewerage Development Plan

(1) Collection System

Conventional separate collection system and interceptor collection system are applied for wastewater collection in the Project Area. Conventional sewage collection system collects both toilet waste and gray water through a complete sewer pipe networks. While the interceptor system collects gray water only through the existing road side drainage ditches. The toilet waste in this area will be treated by on-site septic tank systems.

Conventional sewage collection system covers the following areas:

(i) Commercial and institutional areas located along main roads.

(ii) Residential areas where redevelopment has been completed and besides, the existing road width is wider than 2 m, which is the minimum width required for laying sewer lines and other appurtenances.

Interceptor collection system is applied for the following areas in principle:

(i) High population density Kampung areas as there exist no road networks wide enough for sewer installation

(ii) Residential areas where land readjustment has not been completed even where the existing road width is more than 2 m in order to avoid future sewer reconstruction.

Service area and population served in the year 2000 by both the conventional and interceptor sewerage collection systems are respectively 2,285 ha and 1,562 ha, and 765,000 and 894,000.

Conveyance sewer of diameter 1,900 mm ~ 2,900 mm is proposed along the M.H. Thamrin Rd. and Gajah Mada Rd. Its total length, from Kel. Menteng located at southern boundary of the Project Area to the treatment plant at Pluit Pond, is 10.34 km.

(2) Treatment Plant

Aerated lagoon treatment system with facultative/anaerobic pond is proposed in the Pluit Pond used for storm water drainage at present.

Aerated lagoon system is selected because of its economics and ease of operation and maintenance, when sufficient land/pond area is available.

The treatment plant will serve not only the Project Area but also the JSSP Area. Wastewater of the JSSP Area will be transferred to the treatment plant by the above mentioned conveyance sewer.

Required capacity of the treatment plant in the year 2000 and 2010 are 441,000 m^3/d and 529,000 m^3/d. Those capacities include wastewater of the JSSP Area of 124,800 m^3/d in 2000 and 140,000 m^3/d in 2010 respectively (ref. Fig. 1.2).

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Treatment plant consists of inflow pump station of capacity 454 m^3/min, aerated lagoon of storage capacity 1,075,000 m^3 with 24 units of aerator, facultative/anaerobic pond with storage capacity 2,096,000 m^3 and drying bed for sludge treatment.

The design detention time of aerated lagoon and facultative/ anaerobic pond in 2000 is respectively 2.4 days and 4.8 days.

The wastewater treatment system in Pluit Pond is designed so that it does not interfere with the established function of storm water drainage and flood control of Pluit Pond.

5.3 Project Cost

Project cost of sewerage development is estimated to be Rp. 445.3 billion at 1990 price and break-down is shown below.

(Unit: Rp. billion)

1.	Construction Cost	375.3
	Collection Sewer	221.9
	Conveyance Sewer	117.0
	Treatment Plant	36.4
2.	Land Acquisition	0.6
3.	Administration Cost	5.6
4.	Engineering Services	26.3
5.	Physical Contingency	37.5
	Total	445.3

Annual operation and maintenance cost of the project in 2000 is estimated at Rp. 3.6 billion, consisting of sewer maintenance cost of Rp. 164 million, O&M cost of lift pump station of Rp. 114 million and that of treatment plant of Rp. 3,311 million at 1990 price.

Implementation of the Project is divided into two (2) phases because of the high amount of project cost. First phase is scheduled from 1992 to 1996 followed with the second one from 1996 to 2000.

5.4 Project Evaluation

(1) Pollution Load Reduction

The total pollution load reduction by sewerage development in the Project Area is estimated at 49,659 kg/d as BOD, which represents a reduction efficiency of 84% with respect to the total pollution load discharge of 59,145 kg/d in the year 2000.

The sewerage development is further expected to contribute to the pollution load reduction of 21,210 kg/d from 24,960 kg/d to 3,750 kg/d as BOD in the JSSP Area.

(2) Environmental Assessment

No significant long term adverse environmental effects by the project are identified other than foam pollution due to operation of wastewater treatment plant. As the major mitigatory measure, instituting of green belt around the pond is proposed along the already reserved green area.

5.5 Affordability and Willingness to Pay for Sewerage

(1) Willingness to Pay

The monthly average willingness to pay by a household for sewerage service is estimated to be Rp. 1,846. Accordingly, the total annual amount of household willingness to pay in the Project Area becomes Rp. 6,227 million in 1988 and Rp. 9,435 million in 2000. This accounts for respectively 86.7% and 77.1% of the total willingness to pay by all beneficiaries in the Project Area in 1988 and 2000.

(2) Affordability and Contribution of High Rise Building

Affordability of a high rise building, a building having more than four (4) stories, to sewerage development is considered to be

Rp. 10,000 per m^2 floor area of building. The corresponding total revenue from high rise buildings as capital work charge in the project area between 1993 and 2000 is estimated at Rp. 9.5 billion in present value which accounts for about 3.7% of the total construction cost by the year 2000.

(3) Sewerage Charge

The proposed sewerage charge consists of sewerage service charge and capital works charge. Sewerage service charge is levied on all the beneficiaries having direct connection to the sewers, based on floor area of building, as applied for the JSSP Project. The proposed charge is summarized below.

Resident	Rp. 28/m^2
Shop, Office, School and Others	Rp. 40/m^2
Restaurant	Rp. 60/m^2
Factory, Hotel and Hospital	Rp. 100/m^2
High rise building on average	Rp. 120/m^2

Capital works charge is imposed on high rise building only. The proposed charge is Rp. 10,000/m^2 on a lump sum basis.

5.6 Financial and Institutional Aspects

Of the total project cost of Rp. 445.3 billion at 1990 price, disbursed between the project implementation period of 1992 – 2000, it is proposed that the central government shall subsidize 60% of the cost and DKI, Jakarta a 30%. The remaining 10% of the capital cost and the whole O&M cost including depreciation shall be borne by the sewerage enterprise and hence the beneficiaries.

PDAL Jakarta, the permanent sewerage enterprise to be created in 1991 from the existing interim organization of BPAL of JSSP Project, is recommended to take charge of this project as well. It shall also formulate the necessary sewerage tariff to meet the above financial requirement

based on the affordability and willingness to pay briefed in foregone section, in addition to be in charge of the project implementation.

5.7 Recommendation

(1) An immediate implementation of the project is necessary for both the river water quality and overall sanitary improvements of the Project Area. Hence it is recommended to commence the necessary financial procurement, at the earliest.

(2) PDAL Jakarta is recommended to be the executing agency of the Project along with that of JSSP Project by IBRD. Hence, it is necessary to strengthen the institutional and financial management of the organization so that it can take over this project implementation smoothly and to eventually become capable to conduct the feasibility studies for subsequent sewerage developments as proposed in the Master Plan.

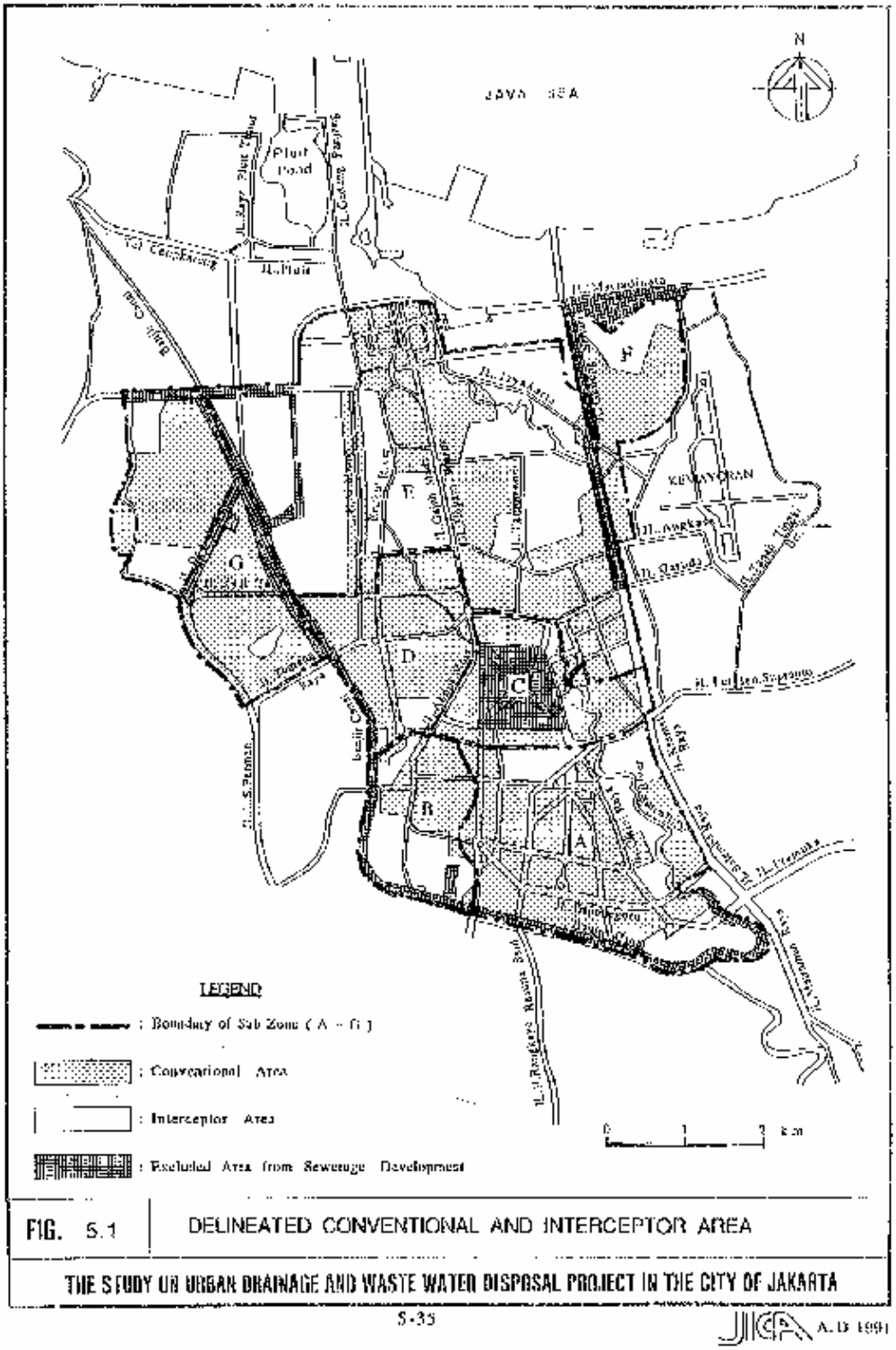

FIG. 5.1 DELINEATED CONVENTIONAL AND INTERCEPTOR AREA

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

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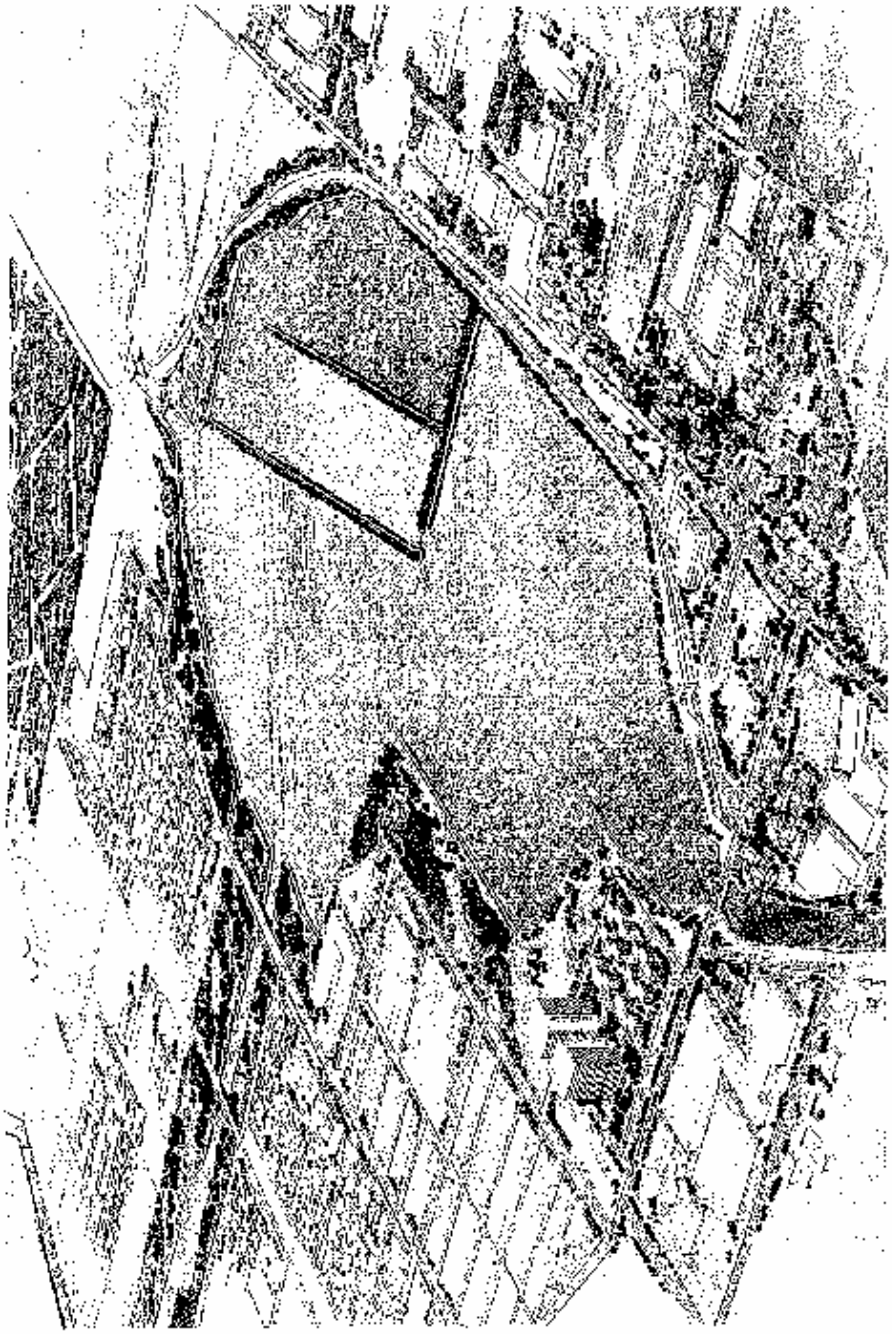
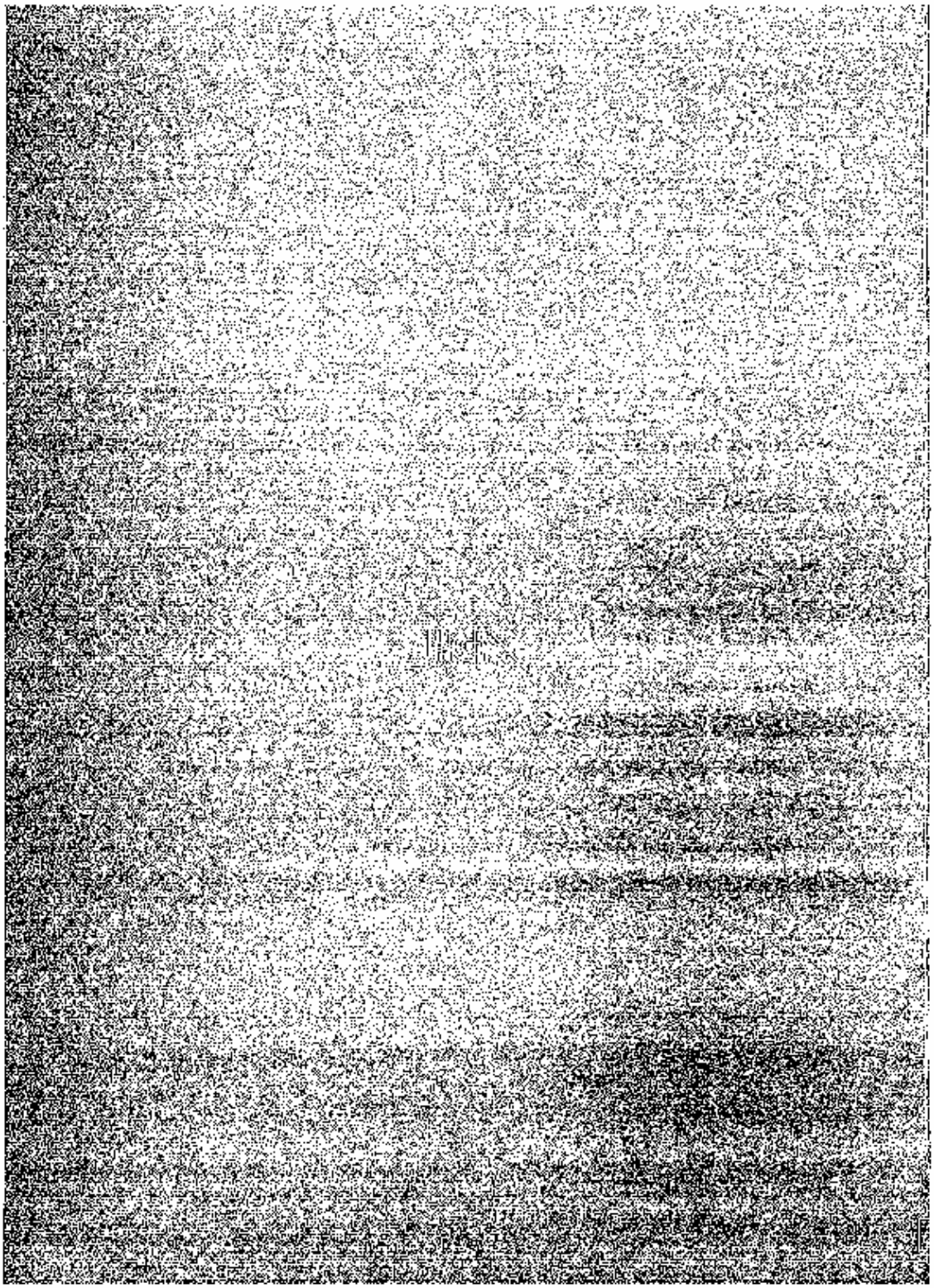

PLUIT TREATMENT PLANT



APPENDIX 4.9.1

SAMMARY OF EAST ASIA CLIMATE PARTNERSHIP PROGRAMME BY GOVERNMENT OF KOREA

"Building a Partnership between the Republic of Indonesia and the Republic of Korea."

1. Project Title

Preparation of Master Development Plan for Metropolitan Bandung (sewerage Sector) & Capacity Upgrade for Bojongsoang wastewater treatment plant

2. Overview

The project has been initiated for the development cooperation between the Republic of Indonesia and the Republic of Korea based on mutual benefits and building a strong partnership between each nation for Climate Change and Environments.

2.1 Project Summary

The main objective for the Preparation of Master Plan for Metropolitan Bandung and Capacity Upgrade for Bojongsoang wastewater treatment plant is to provide West Java Province and Indonesia with effective and economical means to conserve, preserve the environment and water resources which is the most vital water resources for the Indonesia.

The phase development program has been formulated for the long term development and for the social benefits for the residents of Metropolitan Bandung by improving on the water quality, effective management of wastewater (Domestic/Industrial wastewater) and also providing provision for recycle/reuse of water for the conservation of water resources for Agriculture and Industrial Sector Development.

Phase	Project Sector/Name	Financial Support
1	Environment -sewerage Sector / Preparation of Master Plan for Metropolitan Bandung and Capacity Upgrade for Bojongsoang wastewater Plant	Climate Partnership Program
2	Environment -Solid Waste Management Sector / Landfill and Incinerator Plant Development	WB / CDM Project Funding (Under Discussion)
3	Environment -Water Resources / Water Quality Management and Water Resources of the Upper Citarum River Basin	ADB
4	Environment -Water Supply Sector / Saguling Dam Bulk Water Supply Development	Public Private Partnership Development Program
5	Energy -Power Generation / Steam Supply Power Generation & Landfill Gas Extraction and Power Generaltion	

3. With hopeful implementation of the Phase 1 from the support of the Republic of Korea Government and its successful implementation, the subsequence phase development projects shall be implemented by phase with the support from World Bank, Asian Development Bank and also by forming a partnership with private sector in the mode of PPP to develop Kota Bandung as one of the model city for Indonesia in terms of environment and climate changes.

Project Beneficiary

The direct beneficiary for the development project shall be for the residents of Metropolitan Bandung, where immediate impact shall be caused from the development project, but by improving the water quality and sustainable water resources for the catchment area, inclusive of Citarum river water quality management will be beneficiary to the low land communities including Jakarta in long term.

The development project to provide environmentally sustainable water resources for the regions including the Bandung Water Catchment Area and Citarum river cascade area (Saguling, Cirata and Jatiluhur Dam), which serves up to 70% of raw water for Jakarta. This comprehensive phase development of Metropolitan Bandung and its water treatment capacity will further enhance the Government's Millennium Development Goal in improving the social welfare and social infrastructure by providing effective wastewater treatment and management along with solid waste management.

This development carried out in phase, will also improve and prevent any health issues which may be caused by the ill use and management of water resources.

Also the project implemented will be in line with National Development Strategy 2005~2025 for the Realization of Beautiful Scenery and Everlasting Indonesia and midterm development plan for 2004 ~ 2009, Acceleration of Infrastructure Development program for Water resources.

- Development, Management and Conservation of Rivers, Lakes, and Water Resources.
- Integrated and Sustainable provision and Management of Raw Water Program
- Conservation of Upstream Watershed Areas
- Rehabilitation of Water Quality and Environs on the Priority Water Areas
- Water Quality Management and Water Resources of the Upper Citarum River Basin.

4. Project Description

A. Phase 1 to be implemented using Climate Partnership Program

Preparation of Master Development Plan for Metropolitan Bandung (sewerage Sector) & Capacity Upgrade for Bojongsoang wastewater treatment plant

- Capacity Upgrade for WWTP: 200,000 m3/D

- Sewer Pipe Line Extension: 40 km
- Recycle & Reuse of Treated wastewater (Agricultural / Industrial Water Usage)

B. Project Activities for Phase 1

I. Engineering Design Consulting Services for the Preparation of Development Plan.

The project activities shall include the design and consulting services which needs to be implemented as soon as possible to prepare for the capacity upgrade on Bojongsoang Treatment plant.

II. Construction of Bojongsoang Treatment Plant

Based on the preliminary activities of Engineering Design Consulting Services, detail implementation schedule and requirements for the construction shall be prepared for the construction of the new treatment plant and capacity upgrade on existing Bojongsoang Treatment Plant shall be implemented.

III. Technical Knowledge Transfer on O&M, Management of Treatment Plant

The technical knowledge transfer on operation and maintenance, management of treatment plant, which will also be accompanied by visit to treatment plant in Korea for engineers from Indonesia so that they will gain firsthand knowledge of treatment plant operated in Korea.

C. Phase 2 to be implemented using other funding sources

Preparation of Solid Waste Management Project (Landfill and Incinerator Plant Development)

D. Phase 3 to be implemented using PPP Mode

Preparation of Development of Water Treatment Plant and Conveyance System using Saguling Dam Water Resource for Kota Bandung with estimated capacity of 1,100 l/s treatment plant with pumping station and closed conduit pipe water conveyance system.

E. Expected Impact

- Strategic and Phase Development Plan for Metropolitan Bandung Area in line with Government Development Plan to meet the Millennium Development Goal
- Improve on the basic living condition for Metropolitan Bandung Area
- Improve on the public awareness for wastewater and solid waste management
- Improve on the public services for Health and Sanitation

With implementation of Millennium Development Goal by Government of Indonesia to meet the standard for Health and Social benefits for the general populous, the Preparation and Implementation of Master Development Plan for Metropolitan Bandung (sewerage Sector) & Capacity Upgrade for Bojongsoang wastewater treatment plant will cause major benefits to the populous in provision of effective sanitation and management, improvement of water quality to conserve and preserve the water resources, and with effective management of the sewer with domestic and industrial wastewater within the region shall also improve on the health of general populous, freeing them of hazardous environment which may cause skin diseases, diarrhea, etc.

Furthermore, by providing effective management of sewer and it's treatment facilities, additional benefits can be gained by providing farmers with alternative water resources for irrigation use. Current use of contaminated sewer for irrigation may cause problem to general populous in a long run. With many of small factories operating within the region consisting of Batik factories using chemicals and untreated discharge of this contaminated water to the natural water system is a major environmental and health concerns which needs to be addressed.

Also can be considered is the by-products from the sewer treatment, the sediments can be collected and used for manure for the irrigation which will improve on the productivities of agricultural products.

With these benefits, additional benefits will be the improvement of Citarum river quality along with the major improvement on Saguling Dam water resources, which can be used in provision of portable water to the regions.

APPENDIX 4.10.1

MIDDLE-TERM PLAN FOR INTEGRATED SEWERAGE MANAGEMENT DEVELOPMENT PROGRAMME IN 2010 - 2014 OF PDAM BANDUNG

AGREEMENT

BETWEEN

DEPARTMENT OF PUBLIC WORKS

AND

WEST JAVA PROVINCIAL GOVERNMENT

AND

GOVERNMENT OF BANDUNG CITY

AND

PUBLIC WATER SUPPLY ENTERPRISE

ON

INTEGRATED SEWERAGE MANAGEMENT DEVELOPMENT PROGRAMME

BANDUNG CITY YEAR 2010 UP TO 2014

Based on the components of wastewater instrument development activities the responsibility of which is on the Central Government, Provincial, City where authority division has been stipulated in the Government regulation number 38 of 2007 on authority division between Central Government, Provincial Government, Government of County/City. Today is Friday, dated 19 (nineteen) in the month of June of the year of 2009 (two thousand nine). In this agreement these names of this group is called as 1st group namely:

5. Name : Ir. Susmono, The Director of PLP Development, Directorate General of Human Settlements Department of Public Works, addressed at Jl. Patimura No. 20 Jakarta and henceforth is called the 1st (first) party
6. Name : Prof Dr. Denny Juanda P, The Head of Bappeda of West Java Province., addressed at Jl. Ir.H. Juanda No. 85 and henceforth is called the 2nd (second) party
7. Name : Ir. Drs. Ahmad Taufiq, The head of Bappeda Bandung city, addressed at Jl. Tamansari 76, henceforth is called the 3rd (third) party.
8. Name : Jaya Sutarja, Managing Director of Bandung City Water Supply Enterprise, henceforth called as the 4th group, henceforth called as the 4th (fourth) party.

Henceforth who together is called parties agree to make joined agreement in "Implementing the Activities of centralized sewerage instrument." With the stipulation and conditions as follows:

Article 1
The goal of the Cooperation

1.1. To implement the development of centralized sewerage instrument and make use of the capacity of centralized sewerage process from idle 39,600m^3/day (49.8%) to 24,000m^3/day (30%).
1.2. To repair the condition of sewerage instrument to improve the environment quality and to improve Bandung communities' heath.
1.3. To enlarge the centralized service area of Bandung city from 97,952 housing connection (SR) to 107,950 SR.

Article II
The scope of the Cooperation

2.1. To reach the cooperation goal mentioned in the above agreement, the activities scope of developing centralized sewerage management includes:
   A. Planning, budgeting, and implementation of the infrastructure development in the field of the Bandung sewerage management in the time of 5 (five) years (2010 -2014) to be able to cover waste service area.
   B. To improve the professionalism of Bandung sewerage management organization.
   C. The issuance of local government regulations on sewerage management.
   D. To improve the capability of human resources of sewerage management in Bandung.

E. Monitoring and evaluating the implementation of the developing of activities of the sewerage management in Bandung.

Article III
The Implementation of Cooperation

3.1. All Parties joint cooperative plan for the complete centralized sewerage management for a time span of 5 (five) years from 2010 up to 2014 which will be regarded as input to the RPIJM document city which will be completed by working division according to the PP No. 38 in 2007 (Table plan program is in the attachment)

3.2. The step above is continued, all parties each year have to prepare a fund based on the stipulation of the agreement which have been made and have applied the development.

3.3. The following stipulation on activities, personnel, working division, rights, and, and obligation, activity schedule and so forth will be arranged in details and agreed by all parties.

Article IV
Time span for implementation

This cooperation will last for 5 (five) years, effective since 2010 up to 2014.

Article V

5.1. Funding means fund which is prepared by each party to finance operational activities, training, and be functioning personnel, physical developing activities according to the RPIJM Bandung sanitation (2010 -2014) and program which have been agreed.

Article VI
Cost

Cost of tax and others related to the fund clearance process and operational will be the responsibility of each party.

Article VII
Special stipulations

7.1. Things which have not been arranged in this joint stipulation will be stipulated later in the work program with the agreement of all party.
7.2. If there are things that can make them differ in opinion in this joint stipulation, this different Opinion, the way out is by way of discussion in order to meet agreement.
7.3. If the solution as mentioned in the ayat (2) is not reached, the further solution is by way of the effective law.

Article VIII
Closing

This way the agreement is made and signed on the date as mentioned above, in four carbon copies which has the same law force.

1st PARTY (Kesatu) Director of Developing PPLP Directorate General Cipta Karya Department of Public Works Ir. Susmono NIP. 110021935	2ndPARTY (Kedua) The Head of Bappeda West Java Province Prof. Dr. Denny Juanda DEA NIP……
3rd PARTY (Ketiga) The Head of Bappeda Bandung city. ……. NIP……	4th PARTY (keempat) Managing Director PDAM Bandung City Jaya Sutarya.

APPENDIX 5.3.1

REGULATION NUMBER 8 IN 2007 REGARDING QUALITY STANDARD OF ENVIRONMENT AND CRITERIA STANDARD OF ENVIRONMENTAL DAMAGE BY GOVERNOR OF BALI

GOVERNOR OF BALI

REGULATION OF GOVERNOR OF BALI

NUMBER 8 YEAR 2007

REGARDING

QUALITY STANDARD OF ENVIRONMENT AND CRITERIA STANDARD OF ENVIRONMENTAL DAMAGE

BY THE GRACE OF THE ALMIGHTY GOD

GOVERNOR OF BALI

Considering : a. that to apply the provision of Section 10 paragraph (4) of The Regional Regulation of Bali Number 4 Year 2005 regarding the Control on Pollution and Damaging of Environment, need to maintain Quality Standard of Environment and Criteria Standard of Environmental Damage;

b. that Recommendation Letter from House of Representatives of Bali dated of 15 January 2007 Number 640 /131/DPRD subject: Recommendation;

c. that according to consideration as mentioned in point a and point b it needs to issue Regulation of Governor regarding the Control on Pollution and Damaging of Environment, need to maintain Quality Standard of Environment and Criteria Standard of Environmental Damage;

Referring : 1. Acts Number 64 Year 1958 regarding the Form of First Level Regional's of Bali, Nusa Tenggara Barat and Nusa Tenggara Timur (State Gazette of Republic of Indonesia Year 1958 Number 115, addition to the State Gazette of Republic of Indonesia Number 1649);

2. Acts Number 2 Year 1966 regarding Hygiene (State Gazette of Republic of Indonesia Year 1966 Number 22, addition to the State Gazette of Republic of Indonesia Number 1649);

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e. Quality Standard of Domestic Waste Water

No.	PARAMETER	UNIT	QUALITY STANDARD
	PHYSICAL		
1	Temperature	°C	35
2	Soluble Solid Substance	Mg/L	2000
3	Suspended Solid substance	Mg/L	50
	CHEMICAL		
1	pH	Mg/L	6 - 9
2	Soluble iron (Fe)	Mg/L	5
3	Soluble manganese (Mn)	Mg/L	2
4	Barium (Ba)	Mg/L	2
5	Copper (Cu)	Mg/L	2
6	Zinc (Zn)	Mg/L	5
7	Chrom Hexavalen (Cr)	Mg/L	0.1
8	Total Chrom (Cr)	Mg/L	0.5
9	Cadmium (Cd)	Mg/L	0.05
10	Quicksilver (Hg)	Mg/L	0.002
11	Lead (Pb)	Mg/L	0.1
12	Stanum (Sn)	Mg/L	2
13	Arsenic (As)	Mg/L	0.1
14	Selenium (Se)	Mg/L	0.05
15	Nickel (Ni)	Mg/L	0.2
16	Cobalt (Co)	Mg/L	0.4
17	Cyanide (CN)	Mg/L	0.05
18	Sulfide (H2S)	Mg/L	0.05
19	Fluoride (F)	Mg/L	2
20	Free chlorine (C12)	Mg/L	1
21	Free Ammoniac (NH3N)	Mg/L	1
22	Nitrate (NO3-N)	Mg/L	20
23	Nitrite (NO2-N)	Mg/L	1
24	BOD	Mg/L	75
25	COD	Mg/L	100
26	Active compound of meliten blue	Mg/L	5
27	Total phenol	Mg/L	0,5
28	Plant oil	Mg/L	10
29	Mineral oil	Mg/L	10

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3. Acts Number 5 year 1984 regarding Industry (State Gazette of Republic of Indonesia Year 1984 Number 22, addition to the State Gazette of Republic of Indonesia Number 3274);

4. Acts Number 23 Year 1997 regarding Management of Environment (State Gazette of Republic of Indonesia Year 1997 Number 68, addition to the State Gazette of Republic of Indonesia Number 3699);

5. Acts Number 7 Year 2004 regarding the Water Source (State Gazette of Republic of Indonesia Year 2004 Number 32, addition to the State Gazette of Republic of Indonesia Number 4377);

6. Acts Number 10 Year 2004 regarding the Form of Regulations (State Gazette of Republic of Indonesia Year 2004 Number 53, addition to the State Gazette of Republic of Indonesia Number 4389);

7. Acts Number 32 Year 2004 regarding Local Government (State Gazette of Republic of Indonesia Year 2004 Number 125, addition to the State Gazette of Republic of Indonesia Number 4437) as amended with Acts Number 8 Year 2005 regarding the Decision of Governmental Regulation To Replace Acts Number 3 Year 2005 regarding the Amendment of Acts Number 32 Year 2004 regarding Local Government to be Acts (State Gazette of Republic of Indonesia Year 2005 Number 108, addition to the State Gazette of Republic of Indonesia Number 4548);

8. Governmental Regulation Number 27 Year 1999 regarding Analysis of Environmental Impact (State Gazette of Republic of Indonesia Year 1999 Number 59, addition to the State Gazette of Republic of Indonesia Number 3838);

9. Governmental Regulation Number 41 Year 1999 regarding the Control of Air Pollution (State Gazette of Republic of Indonesia Year 1999 Number 86, addition to the State Gazette of Republic of Indonesia Number 3853);

10. Governmental Regulation Number 150 Year 2000 regarding the Control of Land Damage for Biomass Production (State Gazette of Republic of Indonesia Year 2000 Number 267, addition to the State Gazette of Republic of Indonesia Number 4068);

11. Governmental Regulation Number 82 Year 2001 regarding The Management of Water Quality and the Control of Water Pollution (State Gazette of Republic of Indonesia Year 2001Number 153, addition to the State Gazette of Republic of Indonesia Number 4161);

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12. Regional Regulation of Bali Number 3 Year 2005 regarding the Plan of Layout of Bali (State Gazette of Republic of Indonesia Year 2005 Number 7, addition to the State Gazette of Republic of Indonesia Number 5);

13. Regional Regulation of Bali Number 4 Year 2005 regarding The Control on Pollution and Environmental Damage (State Gazette of Republic of Indonesia Year 2005 Number 4, addition to the State Gazette of Republic of Indonesia Number 3);

DECIDING:

Drawing up : REGULATION OF GOVERNOR REGARDINGQUALITY STANDARD OF ENVIRONMENT AND CRITERIA STANDARD OF ENVIRONMENTAL DAMAGE

Section 1

In this Regulation of Governor what means by:

1. Environment is the unity of space with all things, power, condition and living things, including human beings and their behavior which impact to the continuance of the living and welfare of mankind and other living things.

2. Pollution is the meddle in or the meddled of living things, energy substance, and /other components into the environment by human's activity so that its quality is degraded until certain level which cause the environment cannot function as its use.

3. Environmental Quality Standard is the limit or level of living things, substance, energy or existing components or must exist and /or pollutant elements which are tolerated its existence in one certain resource as the element of environment.

4. Quality Status of environment is the information of environmental quality condition which refers the condition of polluted or clean in on environment within certain time if compared with the environmental quality standard maintained.

5. Water is all water found out up and down the ground surface except sea and fossil water.

6. Water quality is the condition of water quality which is measured and tested based on certain parameters and methods according to the effective regulations.

7. Water quality standard is the limit or level of living things, substance, energy or existing components or must exist and /or pollutant elements which are tolerated its existence in water.

8. Water quality Status is the level of water quality condition which performs condition of polluted or clean within certain time compared with water quality maintained.
9. Sea Water quality standard is the limit or level of living things, substance, energy or existing components or must exist and /or pollutant elements which are tolerated its existence in sea water.
10. Ambient Air Quality Standard is the limit or level of living things, substance, energy or existing components or must exist and /or pollutant elements which are tolerated its existence in ambient air.
11. Ambient Air quality Status is the condition of air quality in one place by the time of inventory
12. Emission is substance, energy and/or other components produced in one activity which meddle in or the meddled into ambient air which has and /or has no potency as pollutant element.
13. Emission Quality Standard is the maximum level limit and /or emission maximum charge which allowed to exist or existed into the ambient air.
14. Quality Standard of Odor Level is the maximum limit of odor in the air which is allowed that not disturb human's health and environmental freshness.
15. Quality Standard of Noise Level is the maximum limit of noise which is allowed to dispose to the environment from business or activity that not disturb human's health and environmental freshness.
16. Environmental damaging is an action which causes direct or indirect change to physical characteristic and /or its vital that makes environment unable to function in supporting continuous development.
17. Standard Criteria of environmental damaging is the limit measure of physical characteristic change and/or biological environment which can be tolerated.
18. Environmental damaging of mining is the change of mining environmental characteristic so it is unable to function as its use.
19. Standard Criteria of Mining environmental damaging is the change of mining environmental characteristic which performs indicators of environmental damaging.
20. Status of environmental damaging for mining activity of excavating material C of ground condition in certain place and time which is valued based on the quality standard of environmental damaging for the activity of excavating material C.

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21. Standard Criteria of ridge of rock damaging is the limit measure of physical characteristic change and/or biological environment which can be tolerated

22. Condition Status of ridge of rock is Condition of ridge of rock in a location within certain time which is valued based on certain criteria of ridge of rock damaging by using percentage of live ridge of rock cover.

23. Waste water is the rest of a business and /or activity result in form of liquid.

24. Quality Standard of waste water is the maximum limit of noise which can be allowed its existence in waste water to dispose or release into water source from a business and/or activity

25. Responsible person for business and/or activity, furthermore is called responsible person for business is the person who makes activity which produces waste that potentially to pollute and/or damage environment.

Section 2

(1) Quality Standard of Environment and Criteria Standard of Environmental Damaging cover:

a. Quality Standard of Water According to Class I up to IV;

b. Quality Standard of Sea Water for Marine Tourism;

c. Quality Standard of Sea Water for Port waters;

d. Quality Standard of Sea Water for Sea biotic;

e. Quality Standard of Domestic Waste Water;

f. Quality Standard of Liquid Waste for Textile Industry activity'

g. Quality Standard of Liquid Waste for Industry activity 'of Metal Coating

h. Quality Standard of Liquid Waste for Industry activity' of Soft drink;

i. Quality Standard of Liquid Waste for hospital activity;

j. Quality Standard Liquid Waste for Hotel activity;

k. Quality Standard of Ambient Air XI;

l. Quality Standard of Emission for Other Activities except Industries of Cement, Pulp – Paper and Iron – Steel;

m. Quality Standard of Odor Level;

n. Quality Standard of Noise Level;

o. Quality Standard of Disposed Gas Emission Limit of New type Vehicles and Current Production Vehicles;

p. Criteria of Environmental Damaging for Business or Activity of Mining of Excavating Material C of Free Type in Land;

q. Criteria Standard of Environmental Damaging of Ridge of Rock.

(2) Quality Standard of Environment and Criteria Standard of Environmental Damaging as mentioned in paragraph (2) noted in the enclosure which cannot separated from this Regulation of Governor.

Section 3

(1) Quality Standard of Environment and Criteria Standard of Environmental Damaging as mentioned in section 2 paragraph (1) are prohibited to be trespassed anytime.

(2) In case of Quality Standard of Environment and Criteria Standard of Environmental Damaging as mentioned in paragraph (1) is trespassed because of certain condition or certain weather condition, the responsible person for business and/or activity reporting and delivering the activity to overcome environmental pollution or damaging to Regent/Major with copy to Governor.

Section 4

(1) Quality Standard of Environment as the standard to determine the status of Quality of Environment.

(2) Status of Quality of Environment is determined to declare the condition of polluted and / or damage and good.

(3) The condition of polluted and/or damage and good as mentioned in paragraph (2) must be compared with Quality Standard of Environment and Criteria Standard of Environmental Damaging as mentioned in section 2 paragraph (1)

Section 5

(1) Every one or responsible person for business that dispose waste to environment must subject to Quality Standard of Environment as mentioned in section 2 and section 3.

(2) Every one or responsible person for business that his activity makes environmental damage must subject to Quality Standard of Environment as mentioned in section 2 paragraph (1).

(3) Responsible person for business as mentioned in paragraph (1), and paragraph (2) has obligations:

a. To manage waste before it is disposed to environment so that it does not trespass Quality Standard of Environment as mentioned in section 2 paragraph (1);

b. To prevent pollution and/or environmental damaging;

c. To deliver report of observation result at the latest 6 (six) months at once to Governor and Technical Institution which responsible for the related field

Section 6

Quality Standard of Environment and Criteria Standard of Environmental Damaging as mentioned in section 2 paragraph (1) are evaluated periodically at the shortest within 5 (five years).

Section 7

Regent/Major can determine Quality Standard of Environment and Criteria Standard of Environmental Damaging in which is more strict than the provision as noted in the enclosure which cannot separated from this Regulation of Governor.

Section 8

By the time this Regulation of Governor begins to effective, the Decree of Governor of Bali Number 515 Year 2000 regarding Quality Standard of Environment is cancelled and declared not effective anymore.

Section 9

This Regulation of Governor begins to effective on the date of enacted.

In order to that every one acknowledge it, it is ordered the enactment of this Regulation of Governor with its placement in the Regional Gazette of Bali Province.

Decided in Denpasar
On the date of 1 February 2007

Governor of Bali

signed

DEWA BERATHA

SWORN TRANSLATOR
FATCHUROZAK
PENERJEMAH BERSUMPAH

Enacted in Denpasar
On the date of 1 February 2007

PROVINCIAL SECRETARY OF BALI,

signed

I NYOMAN YASA

REGIONAL GAZETTE OF BALI PROVINCE YEAR 2007 NUMBER 8

ENCLOSURE

REGULATION OF GOVERNOR BALI

DATE OF 1 FEBRUARY 2007 NUMBER 8 YEAR 2007

REGARDING QUALITY STANDARD OF ENVIRONMENT AND CRITERIA STANDARD OF ENVIRONMENTAL DAMAGING

a. Quality Standard Of Water According to Class I up to IV

PARAMETER	UNIT	CLASS				NOTICE
		I	II	III	IV	
PHYSICAL						
Temperature	C	Deviation 3	Deviation 3	Deviation 3	Deviation 5	Deviation of temperature from its natural condition
Soluble Residue	mg/L	1000	1000	1000	2000	
Suspended Residue	mg/L	50	50	400	400	For the processing of drink water conventionally, suspended residue < 5000 mg/l
INORGANIC CHEMICAL						
Ph	mg/L	6-9	6-9	6-9	5-9	If naturally is out of the range, then it is determined based on the natural condition
BOD	mg/L	2	3	6	12	
COD	mg/L	10	25	50	100	
DO	mg/L	6	4	3	1	
Total Phosphate as P	mg/L	0.2	0.2	1	5	Number of Minimum Limit
Nitrite (NO3 as N)	mg/L	10	10	20	20	
Nitrate (NH3-N)	mg/L	0.5	(-)	(-)	(-)	For fishery, the content of free ammoniac for sensitive fish < 0.02 mg/l as NH3
Arsenic (As)	mg/L	0.05	1	1	1	
Cobalt (Co)	mg/L	0.2	0.2	0.2	0.2	
Barium (Ba)	mg/L	1	(-)	(-)	(-)	
Boron (Bo)	mg/L	1	1	1	1	

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Barium (Ba)	mg/L	1	(-)	(-)	(-)		
Boron (Bo)	mg/L	1	1	1	1		
Selenium (Se)	mg/L	0.01	0.05	0.05	0.05		
Cadmium (Cd)	mg/L	0.01	0.01	0.01	0.01		
Chrom (VI) (Cr)	mg/L	0.05	0.05	0.05	1		
Copper (Cu)	mg/L	0.02	0.02	0.02	0.02	For the processing of drink water conventionally, Cu < 1 mg/l	
Iron (Fe)	mg/L	0.3	(-)	(-)	(-)	For the processing of drink water conventionally, Fe < 5 mg/l	
Lead (Pb)	mg/L	0.03	0.03	0.03	1	For the processing of drink water conventionally, Pb < 0.1 mg/l	
PHYSICAL							
Manganese (Mn)	mg/L	0.1	(-)	(-)	(-)		
Quicksilver (Hg)	mg/L	0.001	0.002	0.002	0.005		
Zinc (Zn)	mg/L	0.05	0.05	0.05	2	For the processing of drink water conventionally, Zn < 5 mg/l	
Chloride (Cl2)	mg/L	600	(-)	(-)	(-)		
Cyanide (ion Cn)	mg/L	0.02	0.02	0.02	(-)		
Fluoride (ion F)	mg/L	0.5	1.5	1.5	(-)		
Nitrite as N	mg/L	0.06	0.06	0.06	(-)	For the processing of drink water conventionally, NJ2 N < 1 mg/l	
Sulfate (SO4)	mg/L	400	(-)	(-)	(-)		
Free Chloride	mg/L	0.03	0.03	0.03	(-)	For ABAM is not required	
Sulfur as H2S	mg/L	0.002	0.002	0.002	(-)	For the processing of drink water conventionally, S as H2 S< 0.1 mg/l	
MICROBIOLOGY							
-Fecal Coli form	Jml/100 ml	50	1000	2000	2000	For the processing of drink water conventionally, fecal coli form < 10.000 number/100 ml	
- Total Coli form	Jml/100 ml	500	5000	10000	10000		
RADIO ACTIVITY							
-Gross -A	Bq/L	0.1	0.1	0.1	0.1		
-Gross-B	Bq/L	1	1	1	1		
ORGANIC CHEMICAL							
Oil and Fat	ug/L	500	1000	1000	(-)		
Detergant as MBAS	ug/L	100	200	200	(-)		
Compound of Phenol	ug/L	0.5	1	1	(-)		
Aldrin / Dieldrin	ug/L	(-)	(-)	(-)	(-)		

Chlordane	ug/L	(-)	(-)	(-)	(-)	
DDT	ug/L	(-)	2	2	2	

Notes:

- mg = milligram
- ug = microgram
- ml = milliliter
- l = liter
- Bq = Bequerel
- MBAS = Methyne Blue Active Substance
- ABAM = Quality Standard Water for Drink Water

(-) = the change is not required

- Class One : Water which is its use can be used for standard water for water, and or other uses require the same water quality with the use.
- Class Two : Water which is its use can be used for cultivating of pure water fish, cattle, water for irrigation, and or other uses require the same water quality with the use.
- Class Three : Water which is its use can be used for cultivating of pure water fish, cattle, water for irrigation, and or other uses require the same water quality with the use.
- Class Four : Water which is its use can be used for irrigation and or other uses require the same water quality with the use

b. Quality Standard Of Sea Water for Marine Tourism

No.	PARAMETER	UNIT	QUALITY STANDARD
PHYSICAL			
1	Color	Pt. Co	30
2	Odor		Not tasty
3	Brightness	M	>6
4	Muddiness	ntu	5
5	Total Suspended Solidity	Mg/l	20
6	Temperature	C	Natural[2&5]
7	Trash	-	Nil[1;4]
8	Oil layer	-	Nil[1;3]
CHEMICAL			
1	pH		Natural [5]
2	Salinity	‰	Natural [3(c)]
3	Soluble oxygen (DO)	Mg/l	>5
4	BOD	Mg/l	10
5	Free Ammoniac (NH3 –N)	Mg/l	Nil[1]
6	Phosphate (PO4-P)	Mg/l	0.015
7	Nitrate (NO3-N)	Mg/l	0.008
8	Sulfide (H2S)	Mg/l	Nil[1]
9	Compound of Phenol	Mg/l	Nil[1]
10	PAH (Poly aromatic Hydrocarbon)	Mg/l	0.003
11	PCB (Polychlore Biphenile)	Ug/L	Nil[1]
12	Surfactant (detergent)	Mg/l (MBAS)	0.001
13	Oil and Fat	Mg/l	1
14	Pesticide	Ug/L	Nil[1]
SOLUBLE METAL			
1	Quicksilver (Hg)	Mg/l	0.002
2	Chromium Heksavalen (Cr(VI)	Mg/l	0.002
3	Arsenic (As)	Mg/l	0.025
4	Cadmium (Cd)	Mg/l	0.002
5	Copper (Cu)	Mg/l	0.050
6	Lead (Pb)	Mg/l	0.002
7	Zinc (Zn)	Mg/l	0.095
8	Nickel	Mg/l	0.075
BIOLOGICAL			
1	E.Coli (fecal)	MPN/100mL	200
2	Coli form (total)	MPN/100mL	1000
RADIO NUCLEAD			
1	Unknown Composition	Bq/L	4

Notes:

1. Score is undetected with the detection limit of tool used (according to method used)
2. Method of analysis referring to method of analysis for existing sea water, whether international or national.
3. Natural is normal condition of an environment, vary for each time (day, night and season).
4. Human's observation (visual).
5. Human's observation (visual). Oil layer referred is thin layer with the thickness is 0.01 mm.

a. Allowed to get change up to < 10 % of the euophotic depth
b. Allowed to get change up to< 10 % of concentration of seasonal average
c. Allowed to get change up to < 2 C of natural temperature
d. Allowed to get change up to <0.2 of pH unit
e. Allowed to get change up to < 5% of salinity of seasonal average
f. Variety of kinds of Pesticide such as: DDT, endrin, endosulfan, and heptachlor.
g. Allowed to get change up to < 10% of concentration of seasonal average

c. Quality Standard of Sea Water for Port Waters

No.	PARAMETER	UNIT	QUALITY STANDARD
PHYSICAL			
1	Brightness	m	>3
2	Odor	-	Scentless
3	Total Suspended Solidity	Mg/l	80
4	Trash	-	Nill [1)4)]
5	Temperature	C	Natural [3)5)]
6	Oil Layer	-	Nill [1)6)]
CHEMICAL			
1	pH		6.5 - 8.5 [1)6)]
2	Salinity	%o	Natural [3)4)]
3	Total Ammoniac (NH3 –N)	Mg/l	0.3
4	Sulfide (H2S)	Mg/l	0.03
5	Total Hydrocarbon	Mg/l	1
6	Compound of Total Phenol	Mg/l	0.002
7	PCB (Polychlore Biphenile)	Ug/L	0.01
8	Surfactant (detergent)	Mg/l (MBAS)	1
9	Oil and Fat	Mg/l	3
10	TBT (Tri Butyl Tin)	Ug/L	0.01
SOLUBLE METAL			
1	Quicksilver (Hg)	Mg/l	0.003
2	Cadmium (Cd)	Mg/l	0.005
3	Copper (Cu)	Mg/l	0.05
4	Lead (Pb)	Mg/l	0.01
5	Zinc (Zn)	Mg/l	0.1
BIOLOGICAL			
1	Coli form (total)	MPN/100mL	1000

Notes:
1. Score is undetected with the detection limit of tool used (according to method used)
2. Method of analysis referring to method of analysis for existing sea water, whether international or national.
3. Natural is normal condition of an environment, vary for each time (day, night and season).
4. Human's observation (visual).
5. Human's observation (visual). Oil layer referred is thin layer with the thickness is 0.01 mm.
6. TBT is the antifouling substance which is usually found in the ship paint.

a. Allowed to get change up to < 10 % of the euophotic depth
b. Allowed to get change up to< 10 % of concentration of seasonal average
c. Allowed to get change up to < 2 C of natural temperature
d. Allowed to get change up to <0.2 of pH unit
e. Allowed to get change up to < 5% of salinity of seasonal average
f. Allowed to get change up to < 10% of concentration of seasonal average

d. Quality Standard Of Sea Water for Sea Biotic

No.	PARAMETER	UNIT	QUALITY STANDARD
PHYSICAL			
1	Odor	m	Coral >6 Mangrove Waves>3
2	Brightness		Natural [3c]
3	Muddiness	NTU	
4	Total Suspended Solidity	Mg/l	Coral >20 Mangrove >80 Waves>20
5	Trash	-	Nil [1,2]
6	Temperature	°C	Natural [3c] Coral : 28-30 Mangrove :28-30 Waves: 28-30
7	Oil layer	-	Nil [1,5]
CHEMICAL			
1	pH		7 – 8.5 [c]
2	Salinity	‰	Natural [3,c] Coral : 28-30 Mangrove :28-30 Waves: 28-30
3	Soluble oxygen (DO)	Mg/l	>5
4	BOD	Mg/l	20
5	Free Ammoniac (NH3 –N)	Mg/l	0.3
6	Phosphate (PO4-P)	Mg/l	0.015
7	Nitrate (NO3-N)	Mg/l	0.008
8	Cyanide (CN)	Mg/l	0.3
9	Sulfide (H2S)	Mg/l	0.01
10	Compound of Phenol	Mg/l	0.002
11	PAH (Poly aromatic Hydrocarbon)	Mg/l	0.003
12	PCB (Polychlore Biphenile)	Ug/l	0.01
13	Surfactant (detergent)	Mg/l (MBAS)	1
14	Oil and Fat	Mg/l	1
15	Pesticide	Ug/l	0.01
16	TBT (Tri Butyl Tin)	Ug/l	0.01
SOLUBLE METAL			
1	Quicksilver (Hg)	Mg/l	0.001
2	Chromium Heksavalen (Cr(VI)	Mg/l	0.005
3	Arsenic (As)	Mg/l	0.012
4	Cadmium (Cd)	Mg/l	0.001
5	Copper (Cu)	Mg/l	0.005
6	Lead (Pb)	Mg/l	0.005
7	Zinc (Zn)	Mg/l	0.05
8	Nickel	Mg/l	0.05

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BIOLOGICAL			
1	Coli form (total)	MPN/100ml	1000 [3]
2	Pathogen	Cell/100ml	Nil [1]
3	Plankton	Cell/100ml	Not bloom[5]
RADIO NUCLEAD			
1	Unknown Composition	Bq/l	4

Notes:

1. Score is undetected with the detection limit of tool used (according to method used)
2. Method of analysis referring to method of analysis for existing sea water, whether international or national.
3. Natural is normal condition of an environment, vary for each time (day, night and season).
4. Human's observation (visual).
5. Human's observation (visual). Oil layer referred is thin layer with the thickness is 0.01 mm.
6. Not Bloom is there is no over growth that can cause euthrofication
7. The over growth plankton is influenced by nutrient, light, temperature, stream speed and the stability of plankton itself.
8. TBT is the antifouling substance which is usually found in the ship paint

a. Allowed to get change up to < 10 % of the euophotic depth
b. Allowed to get change up to< 10 % of concentration of seasonal average
c. Allowed to get change up to < 2 C of natural temperature
d. Allowed to get change up to <0.2 of pH unit
e. Allowed to get change up to < 5% of salinity of seasonal average
f. Variety of kinds of Pesticide such as: DDT, endrin, endosulfan, and heptachlor.
g. Allowed to get change up to < 10% of concentration of seasonal average

SUMPAH TRANSLATOR
SK GUBERNUR DKI JAKARTA
FATCHUROZAK
NO. 3086/2003
PENERJEMAH BERSUMPAH

f. Quality Standard of Liquid Waste for Textile Industry Activity

No.	PARAMETER	UNIT	MAXIMUM CONTENT	MAXIMUM WEIGHT OF MAXIMUM (kg/ton)
1	2	3	4	5
	PHYSICAL			
1	Temperature	°C	35	
2	Soluble Solid Substance	Mg/L	2000	300
*3	Suspended Solid substance	Mg/L	60	9.0
	CHEMICAL			
1	pH		6-9	
2	Soluble iron (Fe)	Mg/L	5	0.75
3	Soluble manganese (Mn)	Mg/L	2	0.30
4	Barium (Ba)	Mg/L	2	0.30
5	Copper (Cu)	Mg/L	2	0.30
6	Zinc (Zn)	Mg/L	5	0.75
*7	Chrom Hexavalen (Cr)	Mg/L	0.1	0.015
*8	Total Chrom (Cr)	Mg/L	1.0	0.15
9	Cadmium (Cd)	Mg/L	0.05	0.0075
10	Quicksilver (Hg)	Mg/L	0.002	0.0030
11	Lead (Pb)	Mg/L	0.1	0.015
12	Arsenic (As)	Mg/L	0.1	0.015
13	Selenium (Se)	Mg/L	0.05	0.0075
14	Nickel (Ni)	Mg/L	0.05	0.0075
15	Cyanide (CN)	Mg/L	0.05	0.0075
*16	Sulfide (H2S)	Mg/L	0.1	0.015
17	Fluoride (F)	Mg/L	2	0.30
18	Free chlorine (C12)	Mg/L	1	0.15
*19	Free Ammoniac (NH3N)	Mg/L	5	0.75
20	Nitrate (NO3-N)	Mg/L	20	3
21	Nitrite (NO2-N)	Mg/L	1	0.15
*22	BOD	Mg/L	60	90
*23	COD	Mg/L	150	22.50
24	Active compound of meliten blue	Mg/L	5	0.75
*25	Total phenol	Mg/L	0.5	0.075
26	Plant oil	Mg/L	5.0	0.75
*27	Mineral oil	Mg/L	3.0	1.50
*	Maximum Debit of Waste	150 m3 ton of textile product		

Notes:
Mark * = compulsory to test
1. Maximum content for each parameter said in Mg parameter per liter of waste water
2. Maximum weight pollutant for each parameter said in kg parameter per ton of textile product

g. Quality Standard of Liquid Waste for Metal Coating Industry Activity

No.	PARAMETER	UNIT	Copper Coating		Nickel Coating	
			MAXIMUM CONTENT	MAXIMUM WEIGHT OF MAXIMUM (kg/ton)	MAXIMUM CONTENT	MAXIMUM WEIGHT OF MAXIMUM (kg/ton)
1	2	3	4	5	4	5
PHYSICAL						
1	Temperature	°C	38	3.8	38	3.8
*2	Soluble Solid Substance	Mg/L	1500	150	1500	150
*3	Suspended Solid substance	Mg/L	60	6	60	6
CHEMICAL						
*1	pH			6 - 9		
2	Soluble iron (Fe)	Mg/L	5	0.5	5	0.5
3	Soluble manganese (Mn)	Mg/L	3	0.3	3	0.3
4	Barium (Ba)	Mg/L		0.2	2	0.2
*5	Copper (Cu)	Mg/L	2	0.2	-	-
6	Zinc (Zn)	Mg/L	5	0.5	5	0.5
7	Chrom Hexavalen (Cr)	Mg/L	0.5	0.05	0.5	0.05
8	Total Chrom (Cr)	Mg/L	1	0.1	1	0.1
*9	Cadmium (Cd)	Mg/L	0.05	0.005	0.05	0.005
10	Quicksilver (Hg)	Mg/L	0.005	0.0005	0.005	0.0005
11	Lead (Pb)	Mg/L	0.5	0.05	0.5	0.05
12	Arsenic (As)	Mg/L	0.5	0.05	0.5	0.05
13	Selenium (Se)	Mg/L	0.5	0.05	0.5	0.05
*14	Nickel (Ni)	Mg/L	-	-	3	0.3
*15	Cyanide (CN)	Mg/L	0.1	0.01	0.1	0.01
16	Sulfide (H2S)	Mg/L	0.1	0.01	0.1	0.01
17	Fluoride (F)	Mg/L	3	0.3	3	0.3
18	Free chlorine (C12)	Mg/L	2	0.2	2	0.2
19	Free Ammoniac (NH3N)	Mg/L	3	0.3	3	0.3
20	Nitrate (NO3-N)	Mg/L	20	2	20	2
21	Nitrite (NO2-N)	Mg/L	2	0.2	2	0.2
22	BOD	Mg/L	60	6	60	6
23	COD	Mg/L	100	10	100	10
24	Active compound of meliten blue	Mg/L	5	0.5	5	0.5
25	Total phenol	Mg/L	0.5	0.05	0.5	0.05
26	Plant oil	Mg/L	5	0.5	5	0.5
27	Mineral oil	Mg/L	10	0.5	10	1
*28	Total Metal	Mg/L	6	0.6	6	0.6
*29	Maximum Debit of Waste		100 L per m^2 of metal coating product		100 L per m^2 of metal coating product	

Notes:
Mark* = compulsory to test

h. Quality Standard of Liquid Waste for Metal Coating Industry Activity

No.	PARAMETER	UNIT	MAXIMUM CONTENT	MAXIMUM WEIGHT OF MAXIMUM (GRAM/M3)			
				With the bottle wash & syrup making	With the bottle wash & without syrup making	With the bottle wash & syrup making	With the bottle wash & without syrup making
1	2	3	4				
	PHYSICAL						
1	Temperature	°C	38				
2	Soluble Solid Substance	Mg/L	1500				
*3	Suspended Solid substance	Mg/L	30	105	84	51	36
	CHEMICAL						
*1	pH	Mg/L	6-9	6.0-9.0	6.0-9.0	6.0-9.0	6.0-9.0
2	Soluble iron (Fe)	Mg/L	5				
3	Soluble manganese (Mn)	Mg/L	3				
4	Barium (Ba)	Mg/L	2				
5	Copper (Cu)	Mg/L	2				
6	Zinc (Zn)	Mg/L	5				
7	Chrom Hexavalen (Cr)	Mg/L	0.3				
8	Total Chrom (Cr)	Mg/L	0.5				
9	Cadmium (Cd)	Mg/L	0.1				
10	Quicksilver (Hg)	Mg/L	0.005				
11	Lead (Pb)	Mg/L	0.5				
12	Arsenic (As)	Mg/L	0.1				
13	Selenium (Se)	Mg/L	0.1				
14	Nickel (Ni)	Mg/L	0.1				
15	Cyanide (CN)	Mg/L	0.1				
16	Sulfide (H2S)	Mg/L	0.1				
17	Fluoride (F)	Mg/L	3				
18	Free chlorine (C12)	Mg/L	1				
19	Free Ammoniac (NH3N)	Mg/L	3				
20	Nitrate (NO3-N)	Mg/L	20				
21	Nitrite (NO2-N)	Mg/L	3				
*22	BOD	Mg/L	50	175	140	85	60
23	COD	Mg/L	90				
24	Active compound of meliten blue	Mg/L	10				
25	Total phenol	Mg/L	1				
26	Plant oil	Mg/L	12				
27	Mineral oil	Mg/L	10				
*28	Oil and fat	Mg/L	5	17.5	14	8.5	6.0
*29	Maximum Debit of Waste	6 L per L of beverage product		3.5 L	2.8 L	1.7 L	1.2 L

Notes:
Mark * = compulsory to test

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i. Quality Standard of Liquid Waste for Hospital Activity

No.	PARAMETER	UNIT	MAXIMUM CONTENT	NOTES
1	2	3	4	5
PHYSICAL				
1	Temperature	°C	30	
CHEMICAL				
1	pH		6 - 9	
2	BOD5	Mg/L	30	
3	COD	Mg/L	80	
4	TSS	Mg/L	30	
5	NH3	Mg/L	0.1	
6	PO4	Mg/L	2	
MICROBIOLOGICAL				
1	Total coliform	Number/100ml	10.000	
RADIO ACTIVITY				
1	^{32}P	Bq/L	7×10^2	
2	^{35}S	Bq/L	2×10^3	
3	^{45}Ca	Bq/L	3×10^2	
4	^{51}Cr	Bq/L	7×10^4	
5	^{67}Ga	Bq/L	1×10^3	
6	^{85}Sr	Bq/L	4×10^3	
7	^{99}Mo	Bq/L	7×10^3	
8	^{113}Sn	Bq/L	3×10^3	
9	^{125}I	Bq/L	1×10^4	
10	^{131}I	Bq/L	7×10^4	
11	^{192}Ir	Bq/L	1×10^4	
12	^{201}Tl	Bq/L	1×10^6	

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j. Quality Standard of Liquid Waste for Hotel Activity

No.	PARAMETER	UNIT	MAXIMUM CONTENT	NOTES
1	2	3	4	5
	PHYSICAL			
1	Temperature	°C	35	
2	Soluble Solid Substance	Mg/L	1500	
*3	Suspended Solid substance	Mg/L	50	
	CHEMICAL			
*1	pH		6 - 9	
2	Soluble iron (Fe)	Mg/L	1	
3	Soluble manganese (Mn)	Mg/L	0.5	
4	Barium (Ba)	Mg/L	1	
5	Copper (Cu)	Mg/L	1	
6	Zinc (Zn)	Mg/L	2	
7	Chrom Hexavalen (Cr)	Mg/L	0.05	
8	Total Chrom (Cr)	Mg/L	0.1	
9	Cadmium (Cd)	Mg/L	0.01	
10	Quicksilver (Hg)	Mg/L	0.001	
11	Lead (Pb)	Mg/L	0.03	
12	Arsenic (As)	Mg/L	0.05	
13	Selenium (Se)	Mg/L	0.01	
14	Nickel (Ni)	Mg/L	0.1	
15	Cyanide (CN)	Mg/L	0.02	
*16	Sulfide (H2S)	Mg/L	0.01	
17	Fluoride (F)	Mg/L	1.5	
18	Free chlorine (C12)	Mg/L	0.5	
*19	Free Ammoniac (NH3N)	Mg/L	0.02	
*20	Nitrate (NO3-N)	Mg/L	10	
*21	Nitrite (NO2-N)	Mg/L	0.06	
*22	BOD	Mg/L	30	
*23	COD	Mg/L	50	
24	Active compound of meliten blue	Mg/L	0.5	
25	Total phenol	Mg/L	0.01	
26	Plant oil	Mg/L	1	
27	Mineral oil	Mg/L	1	

Notes
* = compulsory to test

SWORN TRANSLATOR
FATCHUROZAK
NO. 3056/2003
PENERJEMAH BERSUMPAH

k. Quality Standard of Ambient Air

No.	PARAMETER	MEASURING TIME	MAXIMUM CONTENT	NOTES
1	2	3	4	5
1	SO2 (Sulfur Dioxide)	1 hour 24 hours 1 year	900 µg/Nm^3 365 µg/Nm^3 60 µg/Nm^3	
2	CO (Carbon Dioxide)	1 hour 24 hours 1 year	30.000 µg/Nm^3 10.000 µg/Nm^3	
3	NO2 (Nitrogen Dioxide)	1 hour 24 hours 1 year	400 µg/Nm^3 150 µg/Nm^3 100 µg/Nm^3	
4	O3 (Oxidant)	1 hour 1 year	235 µg/Nm^3 50 µg/Nm^3	
5	HC (Hydro Carbon)	3 hours	160 µg/Nm^3	
6	PM10 (Particle < 10) PM2.5 (Particle < 2.5)	24 hours 24 hours 1 hour	150 µg/Nm^3 65 µg/Nm^3 15 µg/Nm^3	
7	TSP (Total Dust)	24 hours 1 hour	230 µg/Nm^3 90 µg/Nm^3	
8	Pb (Black lead)	24 hours 1 hour	2 µg/Nm^3 1 µg/Nm^3	
9	Dust fall	30 days	10 ton/km^2/month (Residence) 20 ton/km^2/month (Industry)	

SWORN TRANSLATOR
FATCHUROZAK
NO. 5068/2001
PENERJEMAH RESMI

I. Quality Standard of Emission for other Activities except Industries of cement, pulp-paper, and iron-steel.

No.	PARAMETER	MEASURING TIME	MAXIMUM CONTENT	NOTES
1	2	3	4	5
NON METAL				
1	Ammoniac (NH_3)	$\mu g/m^3$	0.5	
2	Chlorin Gas (Cl_2)	$\mu g/m^3$	10	
3	Hydrogen Chloride (HCl)	$\mu g/m^3$	5	
4	Hydrogen Fluoride (HF)	$\mu g/m^3$	10	
5	Nitrogen dioxide (NO_2)	$\mu g/m^3$	1000	
6	Opacity	$\mu g/m^3$	30%	
7	Particle	$\mu g/m^3$	350	
8	Sulfur Dioxide (SO_2)	$\mu g/m^3$	800	
9	Total Reduced Sulfur (H_2S)	$\mu g/m^3$	35	
METAL				
10	Quicksilver (Hg)	$\mu g/m^3$	5	
11	Arsenic (As)	$\mu g/m^3$	8	
12	Antimon (Sb)	$\mu g/m^3$	8	
13	Cadmium (Cd)	$\mu g/m^3$	8	
14	Zinc (Zn)	$\mu g/m^3$	50	
15	Black Lead (Pb)	$\mu g/m^3$	12	

Notes:
- Gas volume in standard condition (25°C and the pressure of 1 Atmophere)

SWORN TRANSLATOR
SK GUB. DKI JAKARTA
FATCHUROZAK
NO. 3085/2003
PENERJEMAH BERSUMPAH

m. Quality Standard of Odor Level

1. Single Odor

No.	PARAMETER	MEASURING TIME	MAXIMUM CONTENT
1	2	3	4
1	Ammoniac (NH_3)	ppm	2.0
2	Metil Mercaptan (CH_3 SH)	ppm	0.002
3	Hydrogen Sulfide (H_2S)	ppm	0.02
4	Metil Sulfide $(CH_3)_2$-S	ppm	0.014
5	Styrene ($C_5H_5CHCH_2$)	ppm	0.1

2. Mixed Odor

Odor level produced by mixed odor is said as odor limit which can be detected with sensor by more than 50% tester member of minimum 8 (eight) persons.

SWORN TRANSLATOR
FATCHURROZAK
NO. 306/2003
PENERJEMAH BERSUMPAH

n. Quality Standard of Noise Level

ALLOTMENT FOR THE AREA / NEIGHBORHOOD ACTIVITY		NOISE LEVEL dB (A)
A	Allotment For The Area	
1	Housing and Residence	55
2	Trade and Service	70
3	Office and Trade	65
4	Green Open Space	55
5	Industry	70
6	Government and Public Facility	60
7	Recreation	70
8	Special:	
	- Sea port	70
	- Culture reservation	60
	- Air port*	70 – 75 WECPNL
B	Neighborhood Activity	
1.	Hospital or its kind	55
2	School or its kind	55
3	Worship place and its kind	55

Notas:
*) = Adjusted to provision of Minister of transportation
Db(A) = Decibel
WECPNL = Weighted equivalent continuous Perceived Noise Level

SWORN TRANSLATOR
FATCHUROZAK
NO. 3066/2003
PENERJEMAH SEBUMPAH

0. Quality Standard of Disposed Gas Emission Limit of New type Vehicles and Current Production Vehicles

1. The Limit of Disposed Gas Emission Limit of New type Vehicles and Current Production Vehicles category L.

No	CATEGORY	PARAMETER	LIMIT VALUE (GRAM/KM)	TEST METHOD
1	a. L1	CO HC + NO_X	1.0 1.2	ECE R 47
	b. L2	CO HC + NO_X	3.5 1.2	ECE R 47
	c. L3<150 cm2	CO HC NO_X	5.5 1.2 0.3	ECE R 40
	d. L3>150 cm3	CO HC NO_X	5.5 3.0 0.3	ECE R 40
	e. L4 and L5 motor with fire burner ignition	CO HC NO_X	7.0 1.5 0.4	ECE R 40
	f. L4 and L5 motor with compressor burner ignition	CO HC NO_X	2.0 1.0 0.65	ECE R 40

Notes:

- L1 = two wheels motor vehicle with cylinder capacity of machine not more than 50 cm3 and with the maximum speed design not more than 50 km/hour whatever its kind of power source
- L2 = three wheels motor vehicle with pattern of random wheels and with the maximum speed design not more than 50 km/hour whatever its kind of power source
- L3 = two wheels motor vehicle with cylinder capacity of machine more than 50 cm3 and with the maximum speed design more than 50 km/hour whatever its kind of power source
- L4 = three wheels motor vehicle with pattern of asymmetric wheels and with cylinder capacity of machine more than 50 cm3 or the maximum speed design more than 50 km/hour whatever its kind of power source (motorcycle with carriage)
- L5 = three wheels motor vehicle with pattern of asymmetric wheels and with cylinder capacity of machine more than 50 cm3 or the maximum speed design more than 50 km/hour whatever its kind of power source

SWORN TRANSLATOR
FAYCHUROZAK
NO. 3066/2003
PENERJEMAH BERSUMPAH

2. The Limit of Disposing Gas Emission of New type Vehicles and Current Production Vehicles by fire burner ignition with gasoline category M and N.

No	CATEGORY (1)	PARAMETER	LIMIT VALUE	TEST METHOD
1	M1, GVW[2] ≤ 2.5 ton, seats ≤ 5 excluding driver's seat	CO HC + NO_x	2.0 0.5	ECE R 83-04
2	M1,with seats 6-8 excluding driver's seat GVW >2.5 ton or N1, GVW ≤ 3.5 ton			
	A. CLASS I, RM[3] ≤ 1250 kg	CO HC + NO_x	2.2 0.5	ECE R 83-04
	B. CLASS II 1250 kg<RM≤1700kg	CO HC + NO_x	4.0 0.6	ECE R 83-04
	C. CLASS III RM>1700 kg.	CO HC + NO_x	5.0 0.7	ECE R 83-04

Notes:
- (1) = In case of passengers number and GVW unmatched with the table categorical above then the limit value refers to GVW categorical
- (2) = GVW is for Gross Vehicle Weight is the total weight permitted.
- (3) = RM is for Reference Mass is the empty weight of vehicle added by mass of 100 kg.
- M1 = Motor vehicle used to carry people and has not more than 8 seats excluding the driver's seat.
- N1 = Motor vehicle used to carry goods and has total weight permitted (GVW) until 3.5 ton

For category vehicles of O,O1 and O2, the test method and limit value following category N1;
- O = Carriage motor vehicle
- O1 = Carriage motor vehicle with combination total weight permitted (GVW) not more than 0.75 ton.
- O2 = Carriage motor vehicle with combination total weight permitted (GVW) more than 0.75 ton but not more than 3.5 ton

SWORN TRANSLATOR FATCHURROZAK NO. 3086/2001 PENERJEMAH BERSUMPAH

3. The Limit of Disposing Gas Emission of New type Vehicles and Current Production Vehicles with Diesel. Category of Diesel Fuel.

No	CATEGORY (1)	PARAMETER	LIMIT VALUE (GRAM/MKM)	TEST METHOD
1	M1, GVW[2] ≤ 2.5 ton, seats ≤ 5 excluding driver's seat	CO HC + NO_X PM	1.0 0.7 (0.9) [4] 0.08 (0.1) [4]	ECE R 83-04
2	M1,with seats 6-8 excluding driver's seat GVW >2.5 ton or N1, GVW ≤ 3.5 ton			
	A. CLASS I, RM[3] ≤ 1250 kg	CO HC + NO_X PM	1.0 0.7 (0.9) [4] 0.08 (0.1) [4]	ECE R 83-04
	B. CLASS II 1250 kg < RM ≤ 1700kg	CO HC + NO_X PM	1.25 1.0 (1.3) [4] 0.12 (0.14) [4]	ECE R 83-04
	C. CLASS III RM>1700 kg.	CO HC + NO_X PM	1.5 1.2 (1.6) [4] 0.17 (0.2) [4]	ECE R 83-04
3	M2, M3, N2, N3, O3 and O4, GVW[2] > 3.5 TON	CO HC NO_X PM	4.0 1.1 7.0 0.15	ECE R 49-02

Notes:
- [1] = In case of passengers number and GVW unmatched with the table categorical above then the limit value refers to GVW categorical
- [2] = GVW is for Gross Vehicle Weight is the total weight permitted.
- [3] = RM is for Reference Mass is the empty weight of vehicle added by mass of 100 kg.
- [4] = Limit value (for direct injection) and after 3 years of its Limit value
- M2 = Motor vehicle used to carry people and has not more than 8 seats excluding the driver's seat and has total weight permitted (GVW) until 5 ton.
- M3 = Motor vehicle used to carry people and has total weight permitted (GVW) more than 5 ton
- N2 = Motor vehicle used to carry goods and has total weight permitted (GVW) until 3.5 ton but not more than 5 ton.
- N3 = Motor vehicle used to carry goods and has total weight permitted (GVW) more than 12 ton.
- O3 = Carriage motor vehicle with combination total weight permitted (GVW) more than 3.5 ton but not more than 10 ton
- O4 = Carriage motor vehicle with combination total weight permitted (GVW) more than 10 ton

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PENERJEMAH SEBELUMNYA

P. Criteria of Environmental Damaging for Business or Mining Activity of Excavating Material of Class C Free Type in Land

No.	ASPECT / PHYSICAL FEATURE AND BIOLOGICAL ENVIRONMENT	ALLOTMENT			
		RESIDENCE AND INDUSTRY AREA	ANNUAL PLANTS	FOOD PLANTS OF WET LAND	FOOD PLANTS OF DRY LAND AND CATTLE
1	2	3	4	5	6
1.	TOPOGRAPHY				
1.1	Excavated Hole				
	a. Depth	Deeper 1 meter above the surface of ground water in rainy season	More than the surface of ground water in rainy season	More than 10 cm below the surface of ground water in rainy season	More than the surface of ground water in rainy season
	b. Distance	< 5 meter of SIPD Limit	< 5 meter	< 5 meter	< 5 meter
1.2	Excavating Ground				
	a. Relief Difference of Excavating Ground	> 1 meter	>1 meter	>1 meter	> 1 meter
	b. Declivity of Excavating Ground				
1.3	Excavating Wall				
	a. Terrace Slope	Height >3m	Height >3m	Height >3m	Height >3m
	b. Terrace Ground	Width <6m	Width <6m	Width <6m	Width <6m
	2. Soil Soil which is backed as the cover soil				
	3. Vegetation				
3.1	Covered by cultivating plants	<20% of plants grow in all mining area			
3.2	Annual coverage plants		<50% of plants grow in all mining area		
3.3	Wet land coverage plants			<50% of plants grow in all mining area	
3.4	Dry land coverage plants / grass				<50% of plants grow in all mining area

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g. Criteria of Ridge of Rock Damaging

PARAMETER	STANDARD CRITERIA OF RIDGE OF ROCK (in %)		
Width percentage of ridge of rock coverage which is still alive	Damaged	Poor	0 - 24.9
		Fair	25 - 49.9
	Good	Good	50 - 74.9
		Very Good	75 - 100

Notes:

Width percentage of ridge of rock coverage which is still alive that can be tolerated is: 50-100 %.

GOVERNOR OF BALI,

Signed

DEWA BERATHA

SWORN TRANSLATOR
DKI JAKARTA
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NO. 308/2003
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