

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF SETTLEMENT AND REGIONAL DEVELOPMENT
THE REPUBLIC OF INDONESIA

**THE DETAILED DESIGN
OF
FLOOD CONTROL, URBAN DRAINAGE AND
WATER RESOURCES DEVELOPMENT IN
SEMARANG IN THE REPUBLIC OF INDONESIA**

FINAL REPORT

GOVERNMENT OF THE

REPUBLIC OF INDONESIA

MINISTRY OF SETTLEMENT AND REGIONAL DEVELOPMENT

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AUGUST 2000

CTI ENGINEERING INTERNATIONAL CO., LTD.

IN ASSOCIATION WITH

PACIFIC CONSULTANTS INTERNATIONAL

AND

PASCO INTERNATIONAL INC.

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FINAL REPORT

**COMPONENT B:
JATIBARANG MULTIPURPOSE DAM CONSTRUCTION**

VOLUME VI COST ESTIMATE

AUGUST 2000

CTI ENGINEERING INTERNATIONAL CO., LTD.

IN ASSOCIATION WITH
PACIFIC CONSULTANTS INTERNATIONAL
AND
PASCO INTERNATIONAL INC.



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ESTIMATE OF PROJECT COST

Price Level	:	As of July 1999	
Currency Conversion Rate	:	US\$1.00	= Rp. 6,885
		1 Yen	= Rp. 60.39

CONSTITUTION OF THE REPORT

- 1. SUMMARY**
- 2. COMPONENT A : WEST FLOODWAY/GARANG RIVER IMPROVEMENT**

VOLUME I	MAIN REPORT
VOLUME II	DESIGN CRITERIA
VOLUME III	DESIGN NOTES
VOLUME IV	WORK QUANTITY CALCULATION
VOLUME V	CONSTRUCTION PLANNING
VOLUME VI	COST ESTIMATE
VOLUME VII	DATA BOOK

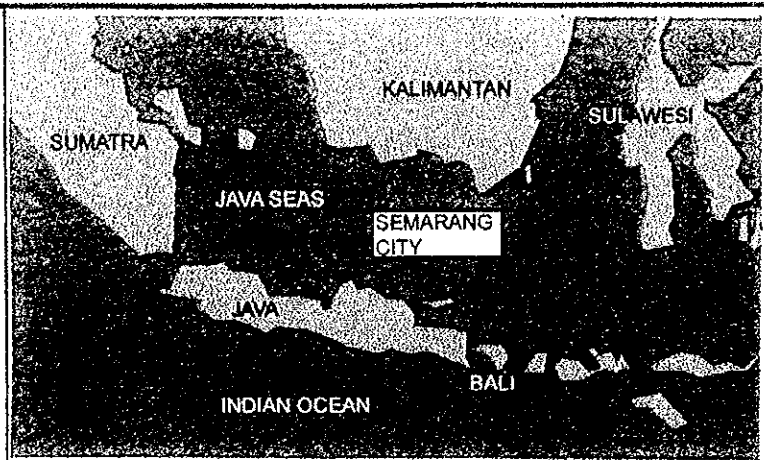
- 3. COMPONENT B : JATIBARANG MULTIPURPOSE DAM CONSTRUCTION**

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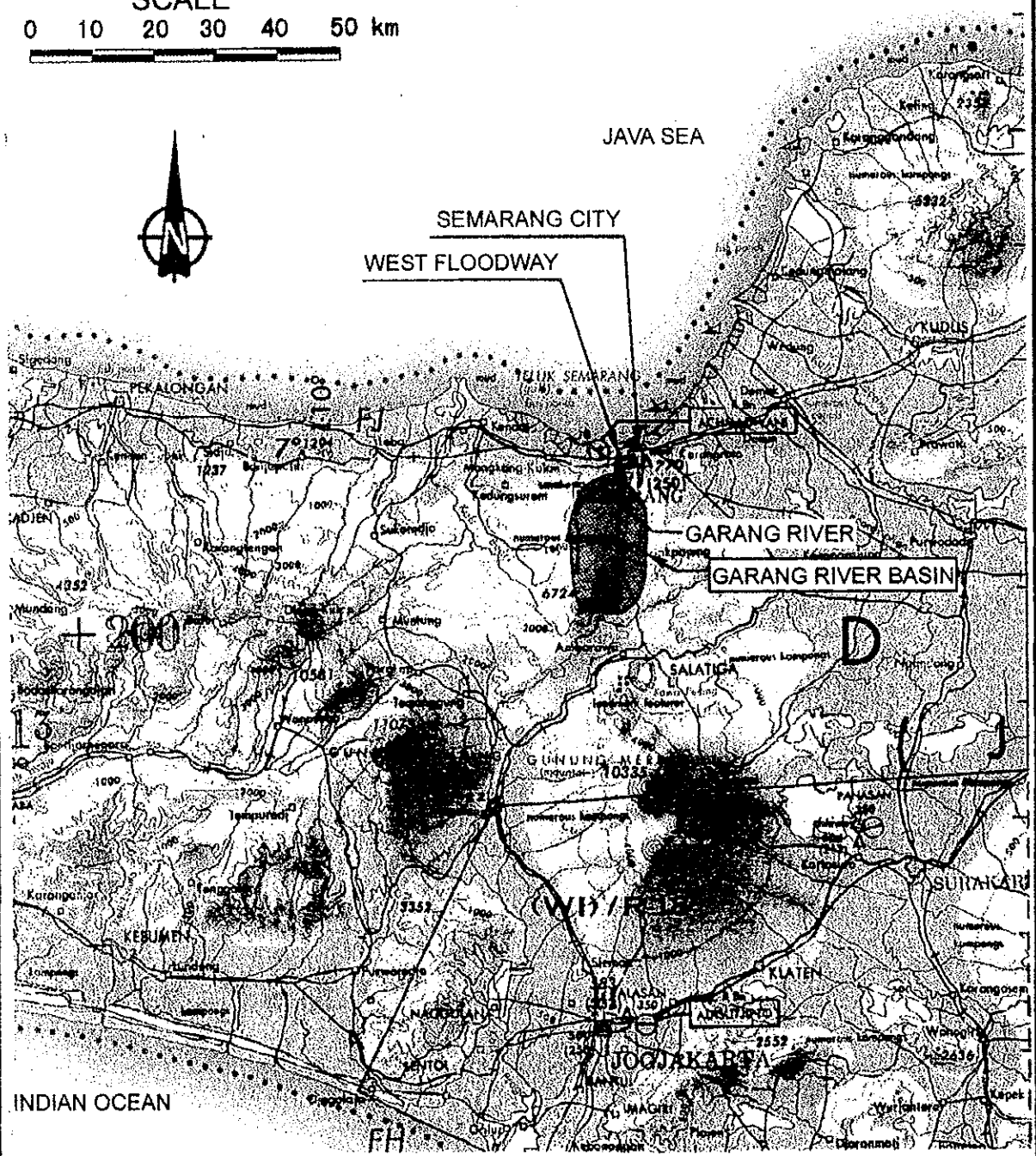
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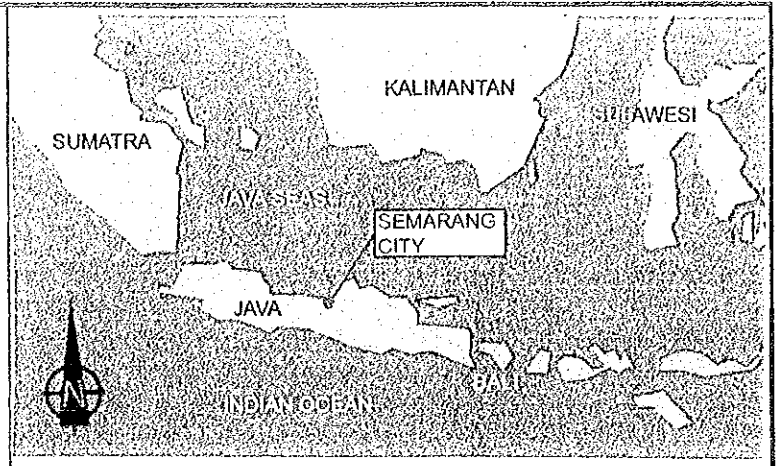
GENERAL MAP



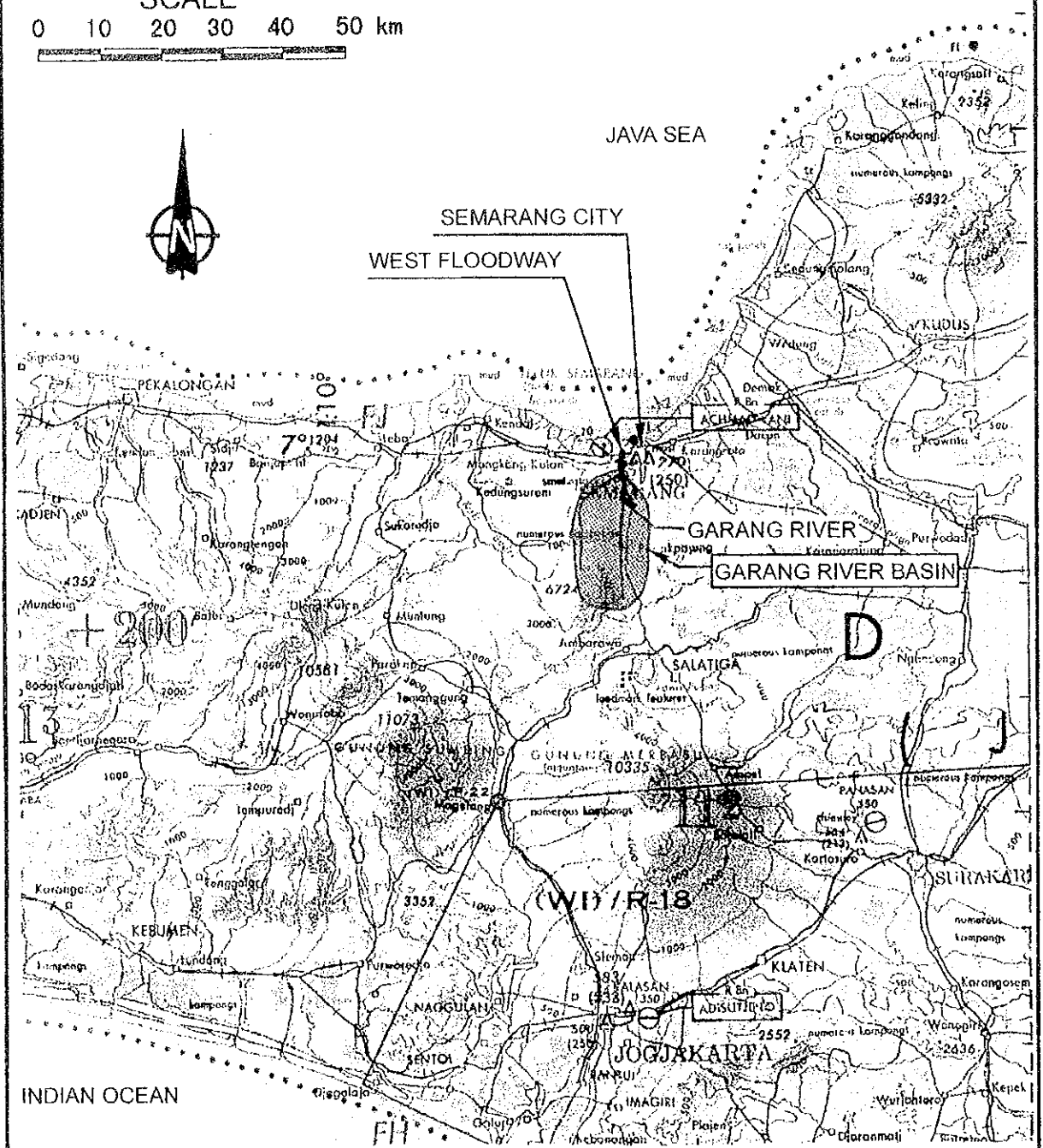
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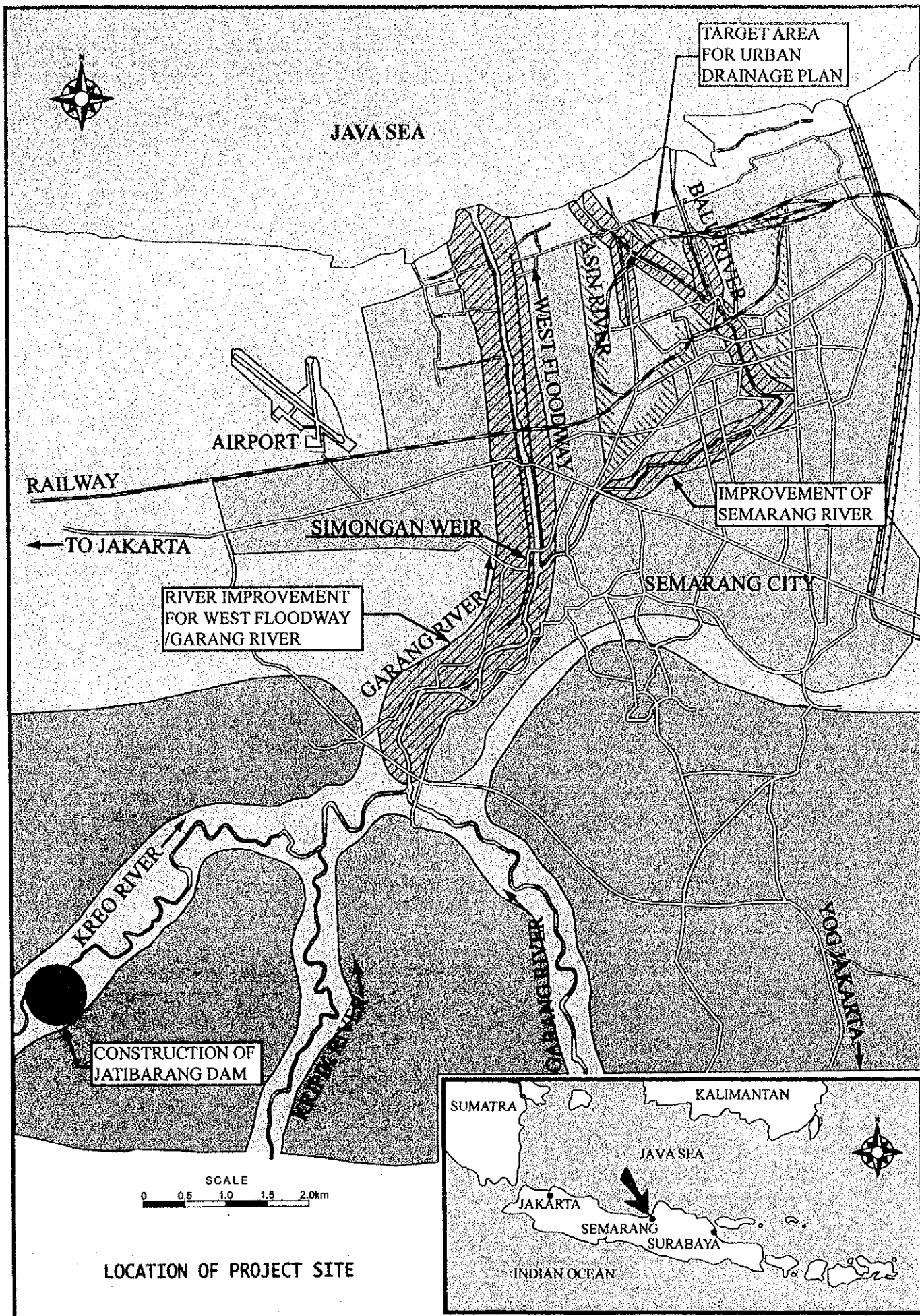


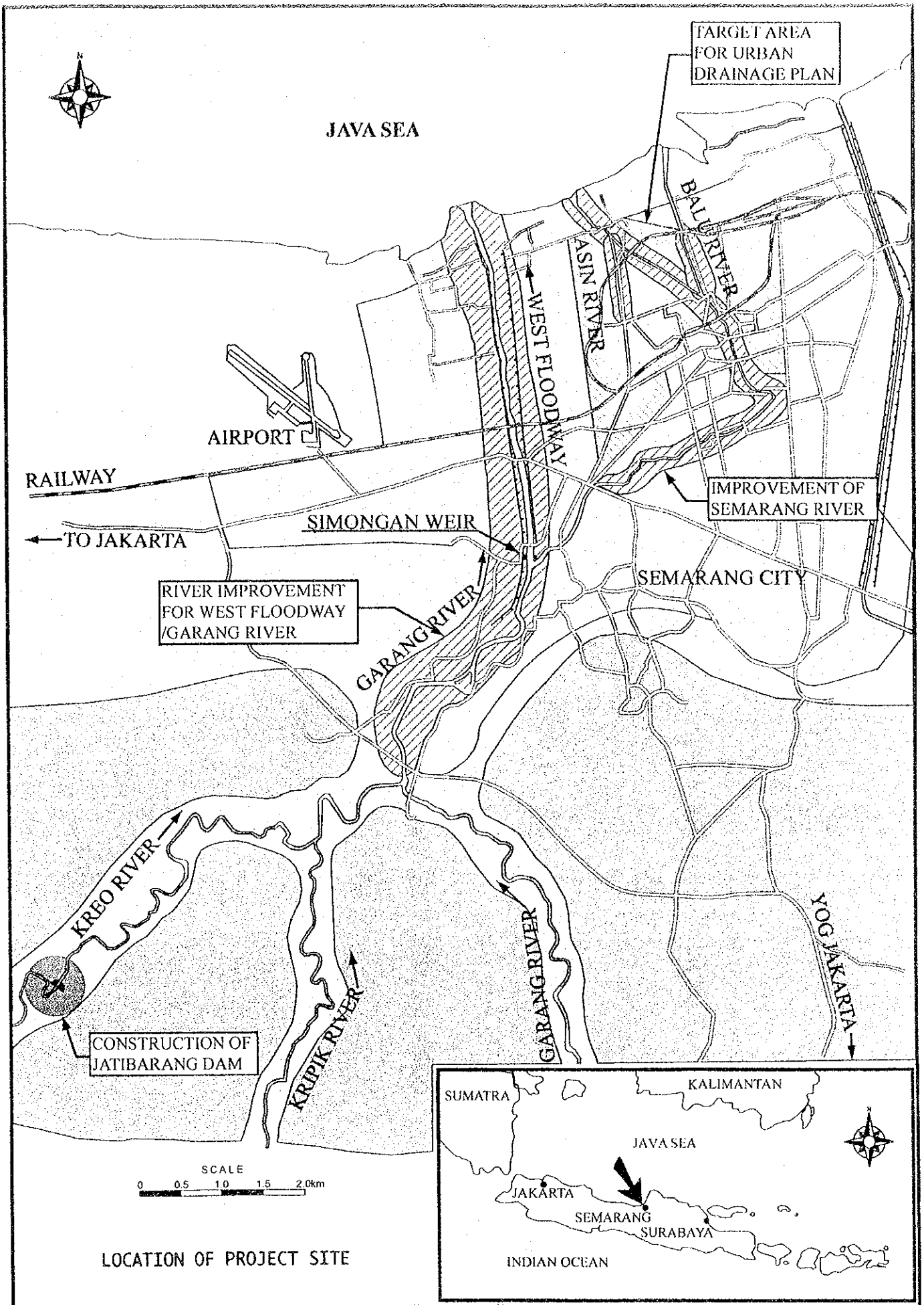
GENERAL MAP



SCALE
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TERMS AND ABBREVIATIONS

1. INDONESIAN GOVERNMENT AGENCIES AND ORGANIZATIONS

GOI	:	Government of Indonesia
BAPPENAS	:	Badan Perencanaan Pembangunan Nasional (National Development Planning Board)
BAPPEDA	:	Badan Perencanaan Pembangunan Daerah (Provincial Development Planning Board)
BINAMARGA	:	Directorate General of Road and Bridge, Ministry of Public Works
BAPEDAL	:	Badan Pengendalian Dampak Lingkungan (Environmental Impact Assessment Board)
BPN	:	Badan Pertanahan Nasional (National Land Agency)
BPP	:	Balai Penyuluhan Pertanian (Agricultural Extension Center)
DPU	:	Departemen Pekerjaan Umum (Ministry of Public Works)
DGWRD	:	Directorate General of Water Resources Development, Ministry of Public Works
DGCK	:	Directorate General of Cipta Karya (Housing, Building and Urban Development, Ministry of Public Works)
DGRD	:	Directorate General of Research and Development, Ministry of Public Works)
DOR	:	Directorate of Rivers
DPUP	:	Dinas Pekerjaan Umum Propinsi (Provincial Public Works Services)
IHE	:	Institute of Hydraulic Engineering (Bandung)
PJKA	:	Perusahaan Jawatan Kereta Api (Railway Company, Old Name)
PERUMKA	:	Perusahaan Umum Kereta Api (Indonesian Railway Public Corporation, New Name)
PDAM	:	Perusahaan Daerah Air Minum (Water Works Company)
PMG	:	Pusat Meteorologi dan Geofisika (Center of Meteorology and Geophysics)
PLN	:	Perusahaan Listrik Negara (State Electricity Corporation)
P3SA	:	Proyek Pengembangan dan Penyelidikan Sumber-Sumber Air (Water Resources Development and Investigation Project)

2. JAPANESE GOVERNMENT / INTERNATIONAL ORGANIZATIONS

GOJ	:	Government of Japan
JICA	:	Japan International Cooperation Agency
MOC	:	Ministry of Construction, Japan
JEM	:	Japan Electric Machine Industry
ADB	:	Asian Development Bank

IBRD	:	International Bank for Reconstruction and Development (World Bank)
UNDP	:	United Nations Development Program
WMO	:	World Meteorological Organization
ASTM	:	American Society for Testing and Materials
ASME	:	American Society of Mechanical Engineer
USASI	:	United States of America Standards
IEC	:	International Electrotechnical Committee
NEMA	:	National Electrical Manufacturers Association

3. MEASUREMENT UNITS

(Length)		(Weight)	
mm	: millimeter(s)	g, gr	: gram(s)
cm	: centimeter(s)	kg	: kilogram(s)
m	: meter(s)	t, ton	: tonnage (s)
km	: kilometer(s)		
(Area)		(Time)	
mm	: square millimeter(s)	sec., s	: second(s)
cm	: square centimeter(s)	min	: minute(s)
m	: square meter(s)	h (hrs)	: hour(s)
km	: square kilometer(s)	d (dys)	: day(s)
ha(has)	: hectare(s)	y, yr(yrs)	: year(s)
(Volume)		(Discharge)	
cm	: cubic centimeter(s)	l, ltr	: liter(s)
m	: cubic meter(s)	EL., El.	: Elevation

(Combined Units)

Speed/Velocity

cm/sec, cm/s	: centimeter per second
m/sec, m/s	: meter per second
km/hr, km/h	: kilometer per hour

Stress

kgf/cm	: kilogram per square centimeter
tf/m	: ton per square meter
N/mm ²	: newton per square millimeter
Mpa	: mega pascal

Discharge

(Note : Other combined units may be constructed similarly as above)

MW	:	megawatt	GW	:	gigawatt
MWh	:	megawatt hour	GWh	:	gigawatt hour
kV	:	kilovolt			

¥, Yen	:	Japanese Yen
US\$, USD	:	United States Dollar
Rp.	:	Indonesian Rupiah

JKT	: Jakarta
Jawa	: Java
Propinsi	: Province
Kabupaten, Kab.	: District (Regency)
Kotamadya, Kodya	: Municipality
Kecamatan, Kec.	: Sub-District
Desa	: Village (Rural Area)
Kampung, Kp.	: Village (Rural Area)
Kelurahan	: Village (Urban Area)
Kali, Sungai	: River
Gunung	: Mountain
Rawa	: Swamp
Danau	: Lake
Laut	: Sea
PT.	: Incorporated or Limited
PPT	: Panitia Pembebasan Tanah (Land Acquisition Committee)
KOMPUS	: Komisi Pusat (Central Committee for Environmental Impact Assessment)
KA-ANDAL	: Terms of Reference of Environmental Impact Statement
ANDAL	: Environmental Impact Statement
RKL	: Environmental Management Plan
RPL	: Environmental Monitoring Plan

AMDAL	: Environmental Impact Assessment
BPPM2	: Semarang Port Bench Mark
SPB	: Semarang Peil Baru (New Semarang Level)
TTG	: Tanda Tinggi Geodesi (National Bench Mark)

6. OTHERS

JRATUNSELUNA PROJECT : Water Resources Development Projects for Jragung, Tuntang, Serang, Lusi and Juwana Rivers

SSUDP	: Semarang and Surakarta Urban Development Program
IUIDP	: Integrated Urban Infrastructures Development Program
SWL	: Surcharge Water Level
DFWL	: Design Flood Water Level
PMP	: Probable Maximum Precipitation
PMF	: Probable Maximum Flood
EIRR	: Economic Internal Rate of Return
JIS	: Japanese Industrial Standard
USASI	: United States of America Standards
SWR	: Shadow Wage Rate
CIF	: Cost, Insurance and Freight
VAT	: Value Added Tax.

CHAPTER 1 INTRODUCTION

This sector report is prepared for the estimate of the project cost for the component of Construction of Jatibarang Multipurpose Dam on Kreo River, which consist of Jatibarang Multipurpose Dam including Appurtenant Structures (hereinafter referred to as the Package-1) and Operation and Maintenance Buildings and Goa Kreo Bridge (the Package-2).

CHAPTER 2 CONSTITUTION OF PROJECT COST AND CONDITIONS OF COST ESTIMATE

2.1 Constitution of Project Cost

Project cost is composed of such costs as construction base cost, engineering service cost, compensation cost, administration cost, physical contingency, price contingency and value added tax. In addition, construction base cost is divided into many cost items as illustrated in Fig. 2.1.1.

The explanation of each project cost item is described below. Administration cost, physical contingency, price contingency and tax are calculated by ratios which are expressed in percentage to other cost items (refer to Table 2.1.1):

Construction Base Cost : Construction base cost is composed of direct cost estimated based on the work quantities and indirect cost which is estimated in percentage (refer to Sub-Section 2.2 “Composition of Construction Base Cost”).

Engineering Service Cost : Engineering service cost is entirely expended for the construction supervision services of consultants. It is estimated based on the number of consultant engineers and other expenses, necessary for the supervision service. The engineering service cost is estimated based on the data collected from the previous and current similar projects.

Compensation Cost : Compensation cost consists of the land acquisition and house evacuation costs.

Administration Cost : This cost is Project Owner’s expenditures for the proper project management to execute the project implementation smoothly. **Seven (7) %** of the sum of the construction base cost and the compensation cost is adopted.

Physical Contingency : **Ten (10) %** of the sum of the construction base cost, the engineering service cost and the compensation cost is considered for contingent expenses for the incidental construction tasks.

- Price Contingency** : This contingency is the cost for the price escalation. From the economical point of view, it is assumed and adopted that **three (3) %** of all costs, in which construction base cost, engineering service cost, compensation service cost, administration service cost and physical contingency are included, in foreign currency portion and **eight (8) %** of all costs in local currency portion is the ratios of price escalation for one (1) year. (Refer to Tables 2.1.2 and 2.1.3)
- Value Added Tax** : **Ten (10) %** of the sum of the construction base cost, the engineering service cost and contingencies shall be considered.

2.2 Composition of Construction Base Cost

The construction base cost is calculated in the following manner.

Construction Base Cost = Σ (Unit Cost for a Payment Item x Work Quantity for a Payment Item).

The unit costs for payment items are estimated as the sum of the direct cost and the indirect cost.

2.2.1 Direct cost

The estimate for direct costs is performed based on the quantities of all construction tasks shown on drawings and described in the project requirements. The direct cost includes all of countable element due to the type, size, design, construction procedures and quality of the intended structure, which are taken into account when deriving the cost for each work item. Direct costs are broken down into the following costs and rates.

(1) Basic Cost

Basic costs are determined at first for the estimate of the project cost. Basic costs consist of labor wage, unit prices of materials and operation costs of equipment. Details of each basic cost are explained in Chapter 3.

(2) Unit Rate

Using the basic costs, unit rates are estimated for basic work items such as unit rate of excavation by backhoe, rate of concrete works per 1.0 m³, etc. Basic costs and unit

rates were used directly to compute unit costs of payment items, which correspond to items of Bill of Quantities. Lump sum for each facilities, system and maintenance is adopted referring to similar and recent projects or quotation by manufactures through formal inquiry letters. Unit rates are explained in Chapter 4.

2.2.2 Indirect Cost

The indirect cost on the project is an integral part for estimate. "Site expense", "Overhead and profit" and parts of "Preparatory and Temporary works" ("General" in items of Bill of Quantities and payment) are considered as the indirect cost.

"Site expense" includes the cost items such as staffing, site office expenses, consumables, small tools and insurance, safety and welfare for laborers at a site. Fifteen (15) % of direct costs of each payment item are adopted.

"Overhead and Profit" includes the cost items such as home office support, profit, communication and insurance at head office. Ten (10) % of the sum of the direct costs of each payment item and site expense is adopted.

"Site expense" and "Overhead and Profit" are added in unit costs of payment items.

Basically, "Preparatory and Temporary works" are direct costs. However, they include countable and uncountable items, direct cost and indirect cost, such as temporary buildings, electrical facilities, water supply system, construction and maintenance for access road, investigation and temporary utilities. The countable items in these costs are added up in their payment items as a direct cost. On the other hand, indirect uncountable costs, such as costs for safety, measuring of tunnel work and etc, are included in some other payment items.

2.3 Conditions of Project Cost Estimate

2.3.1 Price Level and Foreign Exchange Rate

The cost estimate is made on the price level as of the end of July 1999, since the cost data of materials, labor wages, equipment and other necessary items for the cost estimate are collected in this period. The foreign exchange rate applied to the cost estimate is US\$ 1.0 = Rp. 6,885 and ¥1.0 = Rp. 60.39 formally issued by the Bank of Indonesia at that time.

2.3.2 Currency Component

The project cost is divided into the foreign currency components representing pure foreign and indirect foreign currencies and local currency component. The local currency for cost estimate is expressed in Rupiah currency. Moreover, the pure foreign and the indirect foreign currencies and total cost are expressed in Rupiah after exchanging from Yen, US\$ or Other Currencies to Rupiah. The pure foreign currency, indirect foreign currency and local currency comprise the following items respectively:

Pure Foreign Currency (Rp.) : (1) Cost of wage for foreign engineer and foreman,
(2) Base cost of all components for construction plants and heavy equipment except local mechanic, maintenance, repairing, fuel and laborer costs,
(3) Cost of imported materials and
(4) Cost of materials that are produced in Indonesia by Foreign-Indonesian joint enterprise with the capital of the foreign firm which occupy more than 10% of the share.

Indirect Foreign Currency (Rp.): (1) Cost of foreign portion of local materials and
(2) Cost of foreign portion of equipment produced in Indonesia.

Local Currency (Rp.) : (1) Cost of per diem portion for foreign personnel,
(2) Cost of local laborers,
(3) Cost of local portion of local materials,
(4) Cost of local portion of equipment produced in Indonesia, and
(5) Inland transportation cost exclusive of foreign portions

Refer to Chapter 3 for further details.

CHAPTER 3 BASIC COST

The basic costs are estimated as unit rates for laborer wages, material and equipment costs.

3.1 Constitution of Currency Component

The basic costs are estimated in terms of pure and indirect foreign currencies and local currency. The constitution of currency component is explained below.

3.1.1 Laborer Wage

The local laborer wages is computed as local currency portion in the cost estimate. The foreign laborer wage is computed as pure foreign and local currencies taking into account the annual income, airfare and living allowance, etc.

3.1.2 Material Cost

Materials are counted as local currency portion and indirect or pure foreign currency portion taking account into their usage of imported raw or processed materials, costs of production facilities and amount imported as a pure or indirect foreign currency. The price ratios of some material groups divided into every portion are listed in Table 3.1.1.

3.1.3 Equipment Cost

The currency component of the operation cost of the equipment is taking account into the following currency portion.

Pure Foreign Currency (Rp.) : Hourly depreciation costs,
Spare parts and foreign mechanic costs for repairing, and
Parts of annual management costs.

Indirect Foreign Currency (Rp.): Foreign portion in local material such as tire, fuel, etc.

Pure Local Currency (Rp.) : Local mechanic cost for repairing,
Local laborer for repairing, and
Parts of annual management costs.

3.2 Basic Cost of Laborer

The List of Construction Material Unit Cost in Semarang by DPU, April-May 1999/2000 (hereinafter referred to as "DPU Cost Table") ("Daftar Harga Satuan Bahan Bangunan), as well as survey in Semarang City, are referred for the wages of laborer. The laborer wages are shown in Table 3.2.1 including the laborer's all fringe benefits, such as vacation and sick leave, charge of insurance, living allowance and others according to the Labor Law in Indonesia.

3.3 Basic Cost of Material

Prices of materials required for the construction works are canvassed from DPU Cost Table, some cost reports published periodically and domestic market price survey as well as Japanese market price (refer to Section 3.5 Reference Material).

Table 3.3.1 shows basic costs of materials divided into each currency portion.

3.4 Basic Cost of Equipment

The costs of equipment are reached by the calculation measure of Japanese Construction Equipment Society as well as the measure of Technical Guide of Cost Analysis & Unit Price of Work in Semarang, Bina Marga 1995. The equipment cost for the work consists of the hourly depreciation cost, repairing cost, annual management cost and operator wage for operating, which are calculated by using a rate of delivered cost, proper economical life and repairing rate in Indonesia.

Hourly driving equipment cost calculated is shown in Table 3.4.1. In addition, Table 3.4.2 shows calculation sheet of equipment depreciation cost. Costs in Table 3.4.1 contain laborer costs operating equipment and electrical charge in need.

3.5 Reference Book

The following reference books are referred for the estimate of the basic costs:

No.	Data in Indonesia		Data in Japan
	Indonesian Word	English Word	
1	Daftar Harga Satuan Bahan Bangunan, DPU	The list of Construction Material Unit Price, DPU	
2	Jurnal Bahan Bangunan, Konstruksi dan Interior	Journal of Building & Interior	
3	Petunjuk Teknik Analisa Biaya dan Harga Satuan Pekerjaan Kabupaten, Bina Marga 1995	Technical Guide of Cost Analysis & Unit Price of Work in Semarang, Bina Marga 1995	
4			Construction Equipment/Machine Catalogue in Japan
5			Depreciation Calculation Table by Japanese Construction Equipment Society
6			Journal of Cost Estimate, July 1999

CHAPTER 4 UNIT RATES FOR WORK ITEMS AND UNIT COSTS FOR PAYMENT ITEMS

Based on the basic costs mentioned in the preceding chapter, unit rates for work items and unit costs for payment items will be calculated in the manner mentioned hereinafter.

4.1 Unit Rate

It is important for estimate of unit rates, such as excavation by an excavator or concreting works per m³, etc. to decide production rates. Most of production rates are quoted from Japanese and Indonesian Standard. Japanese standard rates are utilized in case of construction works by using equipment for drilling, main concrete structures, earth works and so on. On the other hand, Indonesian Standard rates are utilized in case of construction by manpower mainly, such as building, masonry works and etc. The summary of unit rates is enumerated in Table 4.1.1.

4.1.1 Calculation Table for Unit Rate of Dam Works

Based on Japanese Standard mainly, unit rates of works, which are needed in dam construction, are calculated in Table 4.1.2 as Diversion Tunnel works, Table 4.1.3 as Intake Tunnel works, Table 4.1.4 as turbid water treatment works, Table 4.1.5 as drilling and grout works, Table 4.1.6 as excavation and hauling works for dam earth works, Table 4.1.7 as embankment works for dam construction, Table 4.1.8 as aggregate production works and concrete works for main dam structures. In addition, based on Indonesian Standard mainly, unit rates of building works are calculated in Table 4.1.9.

4.1.2 Calculation Table for Unit Rate of Building Works

Based on Indonesian Standard, unit rates for construction of buildings are also enumerated in Table 4.1.10.

4.2 Unit Cost for Payment Item

4.2.1 General

As described in Fig. 2.1.1, an unit cost for a payment item consists of basic costs, unit rates and their production rates.

The other conditions for the estimates of unit costs are as follows:

(1) Quotation

Quotations of electrical and mechanical products for hydropower facilities and Instrumentation for measuring are quoted by manufactures for certainty.

(2) Mobilization and Demobilization

Based on the construction schedule established in “Volume VI Construction Planning”, numbers of mobilization and demobilization of equipment for cost estimates are counted. Tables 4.2.1 and 4.2.2 show the number of mobilization and demobilization of equipment. The results, which are adopted to the unit costs for payment items, of the number of trailer, track and vessel for mobilization and demobilization are summarized in Tables 4.2.3 and 4.2.4.

4.2.2 Amount of Unit Costs for Payment Items

(1) Unit Costs for Payment Items

The unit costs for payment items, which are tabulated in the Volume V Work Quantity Calculation, in two (2) packages are broken down into basic costs and unit rates in Tables 4.2.5 and 4.2.6.

(2) Unit Costs for Buildings/Complexes

Appurtenant buildings such as the Dam Management Complex and Buildings for Hydropower are constructed in Package-1 and 2 respectively. As for these buildings, it is necessary for obtaining the costs to calculate each payment items through one more step. Calculation sheets, breaking down unit costs of buildings/complexes, are indicated in Tables 4.2.7 to 4.2.8.

4.3 Reference Book

In addition to the reference book enumerated in Section 3.5, the following books/materials are referred to for computation of unit rates and costs.

No.	Data in Indonesia		Data in Japan
	Indonesian Word	English Word	
1	Dasar Penyusunan Anggaran Biaya Bangunan	Standard of Building Cost Estimate	
2			Standards Outline of Production Rate for Construction (1998)
3			Manual for Cost Estimate Standard for Civil Work by Ministry of Construction (1999)
4			Construction Equipment/Machine Catalogue in Japan
5			Standard of Cost Estimate for Civil Work by Ministry of Construction (1999)

CHAPTER 5. PROJECT COST

5.1 Construction Schedule

To estimate the project cost, construction schedule is the most important factor in terms of price escalation, depreciation cost of equipment and/or temporary facilities, running cost of site office and so on. Therefore the construction schedules of two (2) packages, which were established in Volume VI Construction Planning, are confirmed hereafter. The schedule are prepared under the assumption that the project implementation starts at the beginning of 2001 with arrangement such as tendering, contract and etc. in 2000. The project is completed until the end of 2004. Tables 5.1.1 and 5.1.2 indicate annual progress rate of the construction works based on the Construction Schedule. The schedules of main items are assumed as follows (refer to Volume VI Construction Planning);

Package-1 (Jatibarang Multipurpose Dam including Appurtenant Structures)

- | | | |
|--|---|-----------------------|
| 1. Preparatory Works | : | Jan. 2001 – Jun. 2002 |
| 2. River Diversion Works | : | Apr. 2001 – Jun. 2002 |
| 3. Zoned Rockfill Dam | : | May 2002 – Jul. 2004 |
| 4. Gallery | : | Jun. 2002 – Nov. 2003 |
| 5. Spillway | : | Aug. 2001 – Sep. 2004 |
| 6. Outlet Facilities | : | May 2002 – Sep. 2004 |
| 7. Plug Work (grouting of outlet) | : | Sep. 2002 – Oct. 2002 |
| 8. Plug Work (impounding of diversion) | : | Oct. 2004 – Nov. 2004 |
| 9. Power House | : | Oct. 2002 – Dec. 2004 |
| 10. Quarry Development & Operation | : | Jun. 2001 – Jul. 2004 |

Package-2 (Operation and Maintenance Buildings and Goa Kreo Bridge)

- | | | |
|----------------------|---|-----------------------|
| 1. Preparatory Works | : | Apr. 2002 – Jun. 2002 |
| 2. Pedestrian Bridge | | |

2-1. Substructure	:	Jun. 2002 – May 2003
2-2. Superstructure	:	Feb. 2003 – Apr. 2003
2-3. Gate Instruction	:	May 2002 – May. 2003
3. Dam Management Complex	:	Jun. 2003 – Apr. 2004

5.2 Project Cost

5.2.1 Construction Base Cost

Based on the unit costs for each payment item, construction base costs of two (2) packages are computed respectively and summarized as follows:

(1) Package-1: Jatibarang Multipurpose Dam including Appurtenant Structures

The payment items, the work quantities, the unit costs and the construction base cost for Package-1 are indicated in Table 5.2.1. Excavation, embankment and concrete works account for main items in this package. Embankment and concrete works include production and hauling of aggregate from the quarry area to the dam construction site. This package accounts for more than 99% of the sum of the construction base costs of the two packages.

(2) Package-2: Operation and Maintenance Building and Goa Kreo Bridge

The payment items, the work quantities, the unit costs and the construction base cost for Package-2 are indicated in Table 5.2.2. The main structures in this package are only dam management complex and approach bridge to Goa Kreo. The works for construction of the approach bridge includes relocation work of an entrance gate to Goa Kreo.

(3) Total Construction Base Cost

The results of calculation of the construction base cost are summarized in the following table.

Name of Package	Currency	Construction Base Cost			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Package-1 (Jatibarang Multipurpose Dam including Appurtenant Structures)	Rp x 10 ⁶	190,367	11,592	126,630	328,588
Package-2 (Operation and Maintenance Buildings and Goa Kreo Bridge)	Rp x 10 ⁶	922	279	2,743	3,945
Total	Rp x 10 ⁶	191,289	11,872	129,372	332,533
	Yen x 10 ⁶	3,168	197	2,142	5,506
	US\$ x 10 ³	27,783	1,724	18,790	48,298

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

5.2.2 Engineering Service Cost

The total man-months of foreign engineers have been assumed at 120 man-months for 1 year of preliminary term and 4 years for construction works in which package-1 and 2 are undertaken. In addition, local engineer remuneration, international and local transportation fee and salary for office staff and etc. are summed up. Establishment costs, such as engineering office combined with site office, are included in the construction base cost. The summary of the engineering service cost are tabulated below (refer to Tables 5.2.3 and 5.2.4) :

Name of Package	Currency	Engineering Service Cost			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Two (2) packages in Total	Rp x 10 ⁶	27,709	0	5,663	33,372
	Yen x 10 ⁶	459	0	94	553
	US\$ x 10 ³	4,025	0	822	4,847

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

5.2.3 Compensation Cost

land areas for the reservoir and the dam site should be expropriated for construction. Unit compensation costs were decided as below under the results of consultation between the JRATUNSELUNA and the Study Team;

Land : 9,000 Rp/m²

Approximate 150 hectares of land acquisition are necessary to be compensated in the two (2) packages.

The total compensation cost is shown in the following table (refer to Table 5.2.5);

Name of Package	Currency	Compensation Service Cost (million rupiah/yen)			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Two (2) packages in Total	Rp x 10 ⁶	0	0	13,500	13,500
	Yen x 10 ⁶	0	0	224	224
	US\$ x 10 ³	0	0	1,961	1,961

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

5.2.4 Administration Cost

As described in “Section 2.1 Basic Composition of Project Cost”, the administration cost for owner’s expenditures is estimated as local portion at seven (7) % of the sum of the construction base cost and the compensation cost. The amount of the administration cost is as follows;

Name of Package	Currency	Administration Cost (million rupiah)			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Two (2) packages in Total	Rp x 10 ⁶	0	0	24,222	24,222
	Yen x 10 ⁶	0	0	401	401
	US\$ x 10 ³	0	0	3,518	3,518

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

5.2.5 Physical Contingency

Physical contingency is considered as local portion at ten (10) % of the sum of the construction base cost, engineering service cost and the compensation cost.

Name of Package	Currency	Physical Contingency (million rupiah)			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Two (2) packages in Total	Rp x 10 ⁶	21,900	1,187	14,853	37,940
	Yen x 10 ⁶	363	20	246	628
	US\$ x 10 ³	3,181	172	2,157	5,511

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

5.2.6 Price Contingency

Based on the construction period and construction schedule described in Section 5.1 Construction Schedule, price contingency are computed at three (3) % of the foreign currency portion and eight (8) % of the local portion respectively. Table 5.2.6 shows summary of price contingency for the period between years 2000 and 2004.

Name of Package	Currency	Price Contingency (million rupiah)			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Two (2) packages in Total	Rp x 10 ⁶	27,518	1,541	59,450	88,509
	Yen x 10 ⁶	456	26	984	1,466
	US\$ x 10 ³	3,997	224	8,635	12,855

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

5.2.7 Value Added Tax

Value added tax is considered as local portion at ten (10) % of the sum of the construction base cost and engineering service cost including physical and price contingencies. The amount of the value added tax is shown in the following table.

Name of Package	Currency	Value Added Tax (million rupiah)			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Two (2) packages in Total	Rp x 10 ⁶	0	0	48,218	48,218
	Yen x 10 ⁶	0	0	798	798
	US\$ x 10 ³	0	0	7,003	7,003

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

5.3 Total Project Cost

Total project cost, which is summed up aforementioned items, is as follows;

Project Cost of Package-1

Name of Package	Currency	Project Cost (million rupiah)			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Construction Base Cost	Rp x 10 ⁶	190,367	11,592	126,630	328,588
Engineering Service Cost	Rp x 10 ⁶	27,381	0	5,595	32,976
Compensation Cost	Rp x 10 ⁶	0	0	13,500	13,500
Administration Cost	Rp x 10 ⁶	0	0	23,946	23,946
Physical Contingency	Rp x 10 ⁶	21,775	1,159	14,572	37,506
Price Contingency	Rp x 10 ⁶	27,387	1,503	58,290	87,180
Value Added Tax	Rp x 10 ⁶	0	0	47,616	47,616
Total	Rp x 10 ⁶	266,909	14,255	290,149	571,313
	Yen x 10 ⁶	4,420	236	4,805	9,460
	US\$ x 10 ³	38,767	2,070	42,142	82,979

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

Project Cost of Package-2

Name of Package	Currency	Project Cost (million rupiah)			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Construction Base Cost	Rp x 10 ⁶	922	279	2,743	3,945
Engineering Service Cost	Rp x 10 ⁶	329	0	67	396
Compensation Cost	Rp x 10 ⁶	0	0	0	0
Administration Cost	Rp x 10 ⁶	0	0	276	276
Physical Contingency	Rp x 10 ⁶	125	28	281	434
Price Contingency	Rp x 10 ⁶	131	37	1,160	1,328
Value Added Tax	Rp x 10 ⁶	0	0	602	602
Total	Rp x 10 ⁶	1,507	345	5,129	6,982
	Yen x 10 ⁶	25	6	85	116
	US\$ x 10 ³	219	50	745	1,014

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

Total Project Cost of Two Packages

Name of Package	Currency	Project Cost (million rupiah)			
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total
Construction Base Cost	Rp x 10 ⁶	191,289	11,872	129,372	332,533
Engineering Service Cost	Rp x 10 ⁶	27,709	0	5,663	33,372
Compensation Cost	Rp x 10 ⁶	0	0	13,500	13,500
Administration Cost	Rp x 10 ⁶	0	0	24,222	24,222
Physical Contingency	Rp x 10 ⁶	21,900	1,187	14,853	37,940
Price Contingency	Rp x 10 ⁶	27,518	1,541	59,450	88,509
Value Added Tax	Rp x 10 ⁶	0	0	48,218	48,218
Total	Rp x 10 ⁶	268,417	14,599	295,278	578,294
	Yen x 10 ⁶	4,445	242	4,890	9,576
	US\$ x 10 ³	38,986	2,120	42,887	83,993

Note ; Conversion Rate : US\$ 1.0 = Rp. 6,885, ¥ 1.0 = Rp. 60.39

5.4 Disbursement Schedule

Table 5.4.1 shows summary of disbursement schedule.

