CHAPTER 7

CONSTRUCTION PLANNING

CHAPTER 7 CONSTRUCTION PLANNING

7.1 Outline of Construction Works

7.1.1 Summary of Construction Works

Improvement of West Floodway / Garang River including reconstruction of Simongang Weir are conducted for the stretch of 9.761 km from the river mouth to the confluence of Garang River and Kreo River. The main work items and work volumes are summarized as below.

Work Item	West Floodway Improvement	Garang River Improvement	Reconstruction of Simongan Weir	Total
Length of Objective Stretch	5,436 m	3,907 m	418 m	9,761 m
Coffering		160 m	120 m	280 m
Dredging and Excavation	857,400 m ³	395,100 m ³	61,200 m ³	1,313,700 m ³
Dike Embankment	57,200 m ³	10,400 m ³	14,200 m ³	81,800 m ³
Raising of Existing Floodwall	4,970 m	160 m	,	5,130 m
Revetment Works	4,000 m	2,500 m	490 m	6,990 m
Foundation Works				
PC Pile L=12.0 m			680 pcs	680 pcs
PC Sheet Pile L=5.0 m			3,880 m	3,880 m
Concrete Works	5,800 m ³	6,300 m ³	11,700 m ³	23,800 m ³
Water Gate				- 1,1 - 1
18.5 m x 3.7 m	·		3 gates	3 gates
5.5 m x 4.35 m			2 gates	2 gates
Simongan Weir Intake Structure			2 places	2 places
Control Office			11 nos.	11 nos.
Maintenance Bridge			1 L.S	1 L.S
Raising of Existing Railway Bridge	1 L.S			
Ground Sill		2 places		2 places

7.1.2 Possible Spoil Bank Areas

The total volume of the excavated and demolished material from the improvement works of West Floodway / Garang River including relocation of Simongang Weir is estimated at 1,313,700 m³.

The features of the proposed spoil bank areas are summarized as shown in the table below and the possible spoil bank is shown in Fig. 7.1.1.

Area No	Schedule of reclamation	Area (ha)	Volume of reclamation (m³)
1	1999 ~ 2003	150	6,800,000
2	1997 ~ 2000	200	3,000,000
3	2003 ~ 2008	-	2,800,000
4	2001 ~		1,000,000
5	1999 ~	-	4,000,000
6	~ 2008	-	-
7	~ 2003	<u>-</u>	-
8	~ 2003	_	-
Total			17,600,000

Area No.1 is considered suitable spoil bank in terms of hauling distance and available schedule.

7.2 Construction Method of West Floodway/Garang River Improvement

7.2.1 Temporary construction road and bridge

As described in "7.1.1 Summary of Construction Works" the length of the objective stretch becomes about 10 km and the total volume of main earth works (dredging and excavation, dike embankment works) becomes about 1.4 million m³. Considering this project conditions, temporary construction roads should be prepared with consideration of the balance of earth works in each construction area.

7.2.2 Channel Excavation and Dike Embankment Works

Some excavated material with required quality that meets the specification can be used for embankment material of earth dike and filling material of earth filling. Excavated material above water level will meet the specification and in principle, the qualified excavated material is transported directly to embankment and filling areas which are located at the same working place. Excavated material which cannot be used for dike embankment and filling will be hauled to spoil bank areas.

(1) Excavation above Water Level

Excavation and loading is done by backhoes and dump trucks are used for hauling excavated material to embankment area and a spoil bank. Giant breaker is applied to excavate of soft rock, which is predicted with low percentage at downstream side of the confluence with Kreo River.

(2) Excavation below Water Level and Dredging

(a) Excavation by backhoe

Even though an excavation area is below water level, if a backhoe could operate and move safely, excavation and loading are done by backhoe and dump trucks are used for hauling excavated material to a spoil bank. The capacity of the equipment are same as the excavation above water level.

(b) Excavation by dredger

In the stretch between the river mouth and North Ring Road, dredger is used for dredging river bed material and loading. Hauling of dredged material to a spoil bank is done by a combination of barge and tugboat.

Summary of the excavation, embankment and filling and material volume to be spoiled are shown in Table 7.2.1.

7.2.3 Earth Dike Embankment

Earth dike embankment works are executed for the areas at the river mouth and the confluence with Kreo River. If excavated material meet the specification for embankment material, the excavated material will be hauled to construction area directly. Spreading and compaction works are done by 21t-bulldozer. Bulldozer spreads transported material with the thickness of 30 cm and compacts with 4 times of pass keeping specified moisture content. After completion of embankment final slope shaping will be done by backhoe. Considering the work quantity, 15t-bulldozer is applied in the confluence with Kreo River.

7.2.4 Raising of Existing Floodwall

Raising works are done by connecting new reinforced concrete wall with the existing ones. Connecting surface of existing wall is chipped carefully, deformed bars are inserted in drilling holes with non-shrinkage mortar and concrete placing work will be carried out directly by agitator truck with chute and vibrator. The concrete should be vibrated to prevent honeycomb and to improve the appearance of the exposed surface.

Typical section of raising of existing floodwall is shown in Fig. 7.2.1.

7.2.5 Protection Works for Riverbank and Riverbed

(1) Coffering and Dewatering

Some types of coffering are employed for Revetment (refer to Fig. 4.2.22) and Groin (refer to Fig. 7.2.2).

A single steel sheet pile and earthfill type of coffering which has 100 m of unit length is applied. Standard section of coffering types are shown in Fig. 7.2.3.

(2) Bank Protection Works

After closing the construction area by coffering and completion of access road, excavation until bottom elevation of base concrete is carried out by backhoe and log pile driving is done by backhoe also.

Some types of revetment have concrete sheet piles, and these concrete sheet piles are driven by vibratary pile driver, base concrete, backfill gravel and wet stone masonry work is followed.

7.2.6 Ground Sill

(1) Construction of Ground Sill with Head (WF.124)

Ground Sill with Head is located about 1,050m upstream from Simongan Weir. After the access road to the site reached to the downstream side of the riverbed at the elevation about EL. 1.80 m, foundation excavation work will be commenced. After the foundation excavation and hauling excavated material to spoil bank areas, replacement work by selected material and concrete sheet pile driving work follows.

Base slab concrete of apron and sidewall concrete will be placed by concrete pump and backfill, backfill gravel and wet stone masonry works follows.

(2) Construction of Ground Sill without Head (WF.172+30)

Ground Sill without Head is located about 3,400 m upstream from Simongan Weir. After the access road to the site reached to the riverbed at the elevation of about EL. 5.30 m, foundation excavation work using by bulldozer, backhoe and if necessary giant breaker will be commenced.

Wet stone masonry works of the ground sill, backfill, gabion mattress, backfill gravel and wet stone masonry works of sidewall follows.

7.2.7 Raising of the Existing Railway Bridge

The railway bridge is located at the point of 3.6 km upstream from the river mouth and is to be raised about 70 cm to have a clearance of 1.0 m above the design high water level, because the present clearance of about 34 cm is too small.

Location of the new bridge shall be the same as the existing bridge but be shifted to the Cirebon side by 5.0 m in order to decrease the traffic jam at the Semarang side.

The raising of the existing railway bridge works consist of three main works, the raising and shifting of superstructures, reconstruction of the substructures and the raising of approach railway tracks.

Necessary time for raising up works of the existing superstructure of the truss bridge on the existing substructures which foundation condition is not grasped, should be shortened. Considering these matters, procedure of main works and construction time schedule is prepared and shown in Table 7.2.2 and Fig. 7.2.4.

(1) Abutment

Since the abutment of the Cirebon side is reconstructed within the existing public road, a retaining wall should be installed before the commencement of the excavation and structure construction works. On the other hand, the one of the Semarang side is reconstructed in the flood plain, so there is no need a retaining wall. Concrete placing works are continued until the same elevation of the existing one, and the remaining height (a part of wall concrete and parapet) is continued after completion of the raising work of the superstructure.

(2) Pier

After completion of the coffering, piling and retaining wall work, excavation and concrete work for pier will be carried out. But concrete placing works for beam portion are executed after completion of the raising of the existing superstructure in order not to avoid the existing rail elevation. Coffering is needed again at the time for the removal of the existing piers after the completion of bridge shifting works.

(3) Bridge and approach track

After completion of the concrete placing of piers and abutments until the same elevation of the existing substructures, raising works of the bridge and the approach tracks are carried out step by step. Considering the total raising height of 60 cm and the existing railway track conditions, 15 cm raising in one time is applied as the stepped raising height in this project.

Raising of tracks are carried out during the free time of train at first and after completion of the one step of the raising of tracks, raising works of superstructure is followed using the no operation time of day.

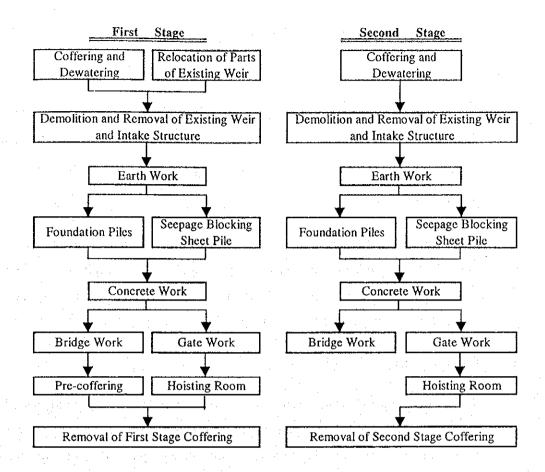
A shifting works of 3-spaned bridge are carried out at one time during no operation time after preparation of the temporary girders at both abutments. Demolition of existing piers and abutments, removal works of temporary girders and other supporting facilities are followed and arrangement of the rail alignment within the project area is carried out finally.

7.3 Construction Method of Reconstruction of Simongan Weir

7.3.1 Staged Construction

Whole construction time schedule of reconstruction of Simongan Weir takes several years, so diversion method of streamflow during rainy season becomes very important. River diversion method is not reasonable because a new bypass structure of full closing of the river has to have same capacity as the existing river.

Therefore, the staged construction method, which the half of the river is closed by coffering and after completion of construction of structures within the coffering area the coffering is removed in order to keep enough capacity for the rainy season's streamflow, is applied for the river diversion of Simongan Weir reconstruction works. Procedure of the two-stage construction is shown below.



7.3.2 Temporary Cofferdam

(1) First Stage Coffering and Dewatering

The first stage works are carried out at the left bank side, and first stage working area is closed by using a few types of coffering. After completion of the first stage works, the first stage coffering will be removed before rainy season remaining pre-constructed double steel sheet pile for a part of the second stage coffering. Procedure of the first stage coffering is shown in Fig. 7.3.1.

(2) Second Stage Coffering and Dewatering

The second stage works are carried out at the right bank side. The driving work of double steel sheet pile (upstream coffering) will be commenced from the preconstruction portion to the bank side. In order to execute this driving direction, earthfill coffering is necessary for working place of crawler crane, and after finishing sheet pile driving, this earthfill coffering is used as access road to the riverbed. Procedure of the second stage coffering is shown in Fig. 7.3.2.

7.3.3 Channel Diversion and Water Supply

(1) For Semarang River

Required discharge to Semarang River is $0.50 \text{ m}^3/\text{s}$ during the construction period. It is too big amount to supply by temporary pumps. Many numbers of pumps and big size of an intake structure is required (for example ϕ 180 mm submergible pump : 2.5 m³/min/unit x 16 units).

Since a new intake structure is to be constructed at almost same location as the existing one, it is difficult to install open channel type temporary water supply facilities in this area. Therefore, corrugated pipe with gravity flow type is applied to supply water of 0.50 m³/s to Semarang River. (refer to Fig. 7.3.3)

(2) For Left Irrigation Channel

Rquired discharge to Left Irrigation Channel is 0.15 m³/s during construction period. It is possible amount to supply by pumps, so submersible pumps set in a sump pit will be prepared at the upstream side of the coffering. Water is pumped up to a temporary water tank which is installed on the left bank crest and flows down to the existing Channel Water Gate through open ditch by gravity flow.

7.3.4 Demolition and Removal of Existing Weir and Intake Structures

After completion of coffering works and construction of temporary access road, demolition and removal works of the existing Weir are commenced and the construction works of the Intake Structures will be followed. Giant breaker and backhoe are used for these works and demolished material is hauled to a spoil bank through access road on both sides.

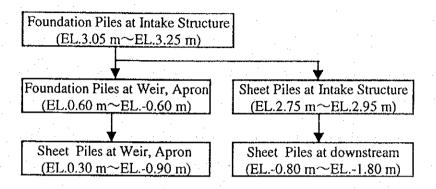
7.3.5 Earth Work

In principle, earth work area will be closed by coffering and dried up by pumps, so that excavation work can be carried out by backhoe and bulldozer under dry condition. Careful excavation work by backhoe and manpower shall be carried out near the existing structures under the protection of temporary retaining wall.

The excavated material and the demolished material of the existing structure are to be hauled to a spoil bank located 7.0 km away from the site by dump trucks through the public roads along the river and North Ring Road.

7.3.6 Foundation Piles and Seepage Blocking Sheet Piles

Top elevation of both the foundation piles and the sheet piles of Intake Structures is 2.50 m higher than the one of the Weir and the apron, pile driving work for Intake Structure should be done first before excavation of the Weir foundation. Procedure of these two works is shown below.



7.3.7 Concrete Work

(1) Foundation Slab Concrete

Maximum concrete volume among the blocks is about 460 m³ and block's height is 2.20 m at the upstream and 1.60 m at the downstream. Construction joint is to be made at the height of 1.60 m of slab and separated two lifts, then the maximum concrete volume of the block becomes about 390 m³.

Ready mixed concrete is transported from a concrete plant in Semarang City or the one established by a contractor to the sites and concrete will be placed by concrete pump, concrete bucket and chute.

(2) Pier Concrete

Since pier concrete volume is not so big as slab, 1.80 m lift height with maximum volume of 72 m³ is available for standard lift height for Simongan Weir.

25-ton truck crane is used for loading and unloading of form material and reinforcing bar at the work site and prefabricated independent scaffold or single-pole scaffold is used according to the working conditions.

7.3.8 Gate Installation Work

After completion of concrete work, gate guide frame and gate installation works will be commenced. These installation works will be done by truck/crawler crane setting on EL.1.500 m of apron slab and concrete block.

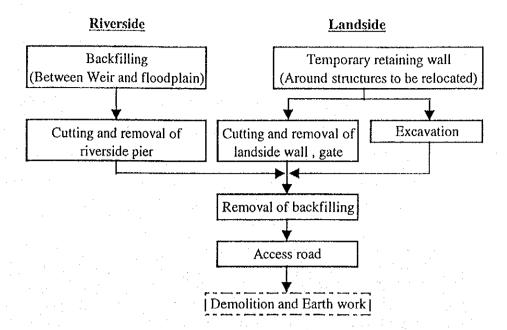
Flood discharge gates and sediment flush gates will be transported from a factory to the site by separated several pieces. These gate pieces are assembled on the support facilities setting on EL.1.500 m of slab at the exact location of the gates by 50-ton crawler crane with assistance by 25-ton truck crane and welding work follows. While intake gates will be transported from a factory to the site by one unit and installed by 20-ton truck crane.

Hoist apparatus for flood discharge and sediment flush gates, which are separated into 3 blocks, will be installed on the winch deck by 50-ton crawler crane. The plan of the gate installation works is shown in Fig. 7.3.4 and 7.3.5.

7.3.9 Relocation of Parts of Existing Weir

The existing Intake Structures on the left bank and a part of Simongan Weir is relocated to a area where a part of the existing structures are exhibited publicly as historical monument. Therefore, relocation works should be carried out before commencement of the demolition and removal of the existing Weir.

In order to keep schedule cutting works of the structure relocation works will be commenced from the both the riverside and landside in parallel. On the riverside, before start of coffering of upstream side, water area that exists between the Weir and floodplain will be backfilled and used for working area and access road. On the landside, single steel sheet pile for the temporary retaining wall will be driven around the relocation parts and excavation work will be carried out step by step until reasonable depth for cutting work. Working procedure is shown below.



The wire sawing and the wall sawing method are available for cutting work of structures. Considering the present conditions, it is better to use the wire sawing for structures with thickness of more than 1.0 m and the wall sawing for structures with thickness less than 1.0 m. According to the working efficiency, safety and capacity of transportation condition, the maximum cutting block's weight shall be less than 5.0 t.

7.4 Construction Time Schedule

7.4.1 Planning Condition

To establish construction plan, estimation of the workable days is most important factor for construction schedule.

(1) Workable Days

(a) Dry and Rainy Seasons

- Dry Season : April to November (8 months)
- Rainy Season : December to March (4 months)

(b) Construction Mode

Construction works, which are possible to be done even in rainy season by applying dewatering facilities, will be executed through a year. While construction works which are difficult to be done in rainy seasons will be

executed in dry seasons.

(c) Seasonal Workable Days

Since construction works along/within the river course are much influenced by rainfall and flooding, the construction period and workable days are estimated based on the rainfall data at the Semarang station for 10 years starting from 1987. In addition, national holidays and religious events are considered. The summary of the workable days by season is tabulated below.

Work Items	Dry Season (Apr. – Nov.)	Rainy Season (Dec. – Mar.)	Through a Year
Earth Works and	176 days/8 mths	49 days/4 mths	225 days/year
Foundation Works	= 22 days/mth	= 12 days/mth	= 18 days/mth
Concrete Works and	184 days/8 mths	68 days/4 mths	252 days/year
Installation of Gate	= 23 days/mth	= 17 days/mth	= 21 days/mth

(2) Daily Workable Hours

All construction works are planned to be carried out under the single shift working system of 9-hour labour per day including 2 hours of overtime work.

7.4.2 Construction Time Schedule

The balance of construction volumes including numbers of construction equipment and facilities is very important for economic construction. The principal conception of the Construction Time Schedule for each package is described below.

(1) West Floodway and Garang River Improvement

It is possible to start up at the same time both West Floodway and Garang River Improvement works, but it causes the concentration of equipment, facilities, manpower and materials from the beginning of the project. To avoid the concentration of works at the first year, commencement of Garang River Improvement works is brought to the second year.

Construction time schedule of West Floodway and Garang River Improvement is shown in Table 7.4.1.

(2) Reconstruction of Simongan Weir

The principal condition with regard to the upstream water level will affect to the construction time schedule. Especially at the first stage, all main works are on the critical path and the critical path continues from the relocation works of the existing structures to gate installation work.

Construction time schedule of Simongan Weir is shown in Table 7.4.2.



TABLES

CHAPTER 7

CONSTRUCTION PLANNING

이 보이지 않고 하는데 그 부탁을 하는데 보고 보인 전 하는데 되고 있는데 모든데 살아가고 있다.	
그 하시는 것이 있는 이 사람이 말이 살아 가는 사람들이 되는 것이 모든 것이 없는 것이다.	
그는 이 모르는 그는 사람이 많을 보고 있는 그들이 그렇게 되면 살이 되었다. 하나 있는 것이	
그들이 들어 있다면 사람들이 들어들어 보다는 눈에 생겼다. 그는	
그런 공연하는 이름 이 때문에는 회사를 받는데 되었다. 하는 아니라 전환 그리고 되었다. 등 호기	
그 '작업통 그는 이가 나에 지난화가 고장되었다. 얼마에 된 바이로 살이면 찾으라며?	
그 문문을 보고 살아 살아들이 다른 회에 가입하면 하고 아이들의 사람들을 하고 된다면 한다.	
그러면 얼굴한 하늘이 있는 요즘 그는 그 전문에는 어떻게 하고 하지 않는 것은 말을 하고 있다.	
그들 아무리 회사들은 사람들은 하는 사람들은 사람들은 사람들은 사람들은 사람들은 사람들은 사람들은 사람들은	
그 집에 맞았다. 이번 살아보고 있다면 되었다. 그런 그는 사람이 되었다는 것이 모든 모든 것이 없다.	
그는 그림을 내면 전에를 그리고 한 경험을 가지 않는 사람들이 살 때문에 걸려왔다는 것이다.	
그림 오늘이걸 네티를 보냈다고 하다. 하다 남은 그는 이 나는 그 동생 사람들이 있는 것이다.	
그리면 보호 마음 하십시간 그들은 조심을 하지만 하고 있는 것은 사람들이 되었다. 나를 내고 살고,	
그리즘, 님 한 호텔 이 생각들에 되면 하게 되었습니다. 하는 데 되었는데 얼굴하게 살았다니다.	
그는데 한 그는 다른 동안을 내려올 때 얼마와 아마라지만 흥미를 가면 하십시다. 스트리는 한 만입니다	
그리는 이 항상 그 이 말라고 하고 있다. 하는 네트 그는 그는 사람들이 하는 사람들이 되었다. 그렇게 되었는데,	
그리가 보면 그렇게 되었다. 그렇게 하고 보다가 된 경기가 하는 것 같은 점점 보다는 없는다.	
그 사일 마다 나는 기계의 공기 모양을 열심는 이번 이용을 만으면 다음을 만든 이렇게 되었습니다.	
그리고 이 항상 보는 아이를 하면 하는 사람들은 사람들을 하는 것들은 사람들이 되었다.	
그리는 본 사람이 있는 아니는 그림을 내려가는 물로 나는 장난 아이는 모든 살림은 나도 살을 받는 것은	
그는 그는 그 얼마나는 일시되면 되었다면 하는 그는 그는 그는 그들은 얼마는 중에 가지 않아 하는데 다	
그 맛있는데 물건이 하고 말만했다. 그의 물이라면 다른이라고 만입하고 말을 모고 없었다. 물질	
그는 이번 사람들이 들어서 그는 사람들이 그 그들이 얼룩 그는 사람들은 사람들이 되었다. 그 그들이 얼룩 그렇게 되었다. 그 그들이 얼룩 그렇게 되었다.	
그 물론 살고 있다면 한 번째 연극이 많은 사람들이 만입면 살고 그리는 걸게 하나를 쓸대한	
그런 그는 그는 그의 시민 그림의 말 한 번째는 그리는 얼굴하면 걸을 살았다면 되었다.	
그리면 기가 그리는 보는 사람들이 하면 내는 이 그들고 살아 있을 때 그들을 모른 하는데 되었다.	
그리다 이 민준이는 가격이 한 일을 받아 보다를 만했다. 저는 사람들은 사람들은 사람들은 사람들은 사람들은 사람들은 사람들이 되었다.	
그리고 방송 병원 회문을 통하는 하다 한 사람들의 사람들은 교육하다는 사용실도 있었다. 하고 학생하다는	
그리고 하다는 경험을 받는 것 같아요. 그렇게 되는 그는 그를 하고 있는 것은 것이다.	
그는 그는 이번 시간 사람들은 이번 보고 하게 하는데 보고를 하는데 하는데 하는 것은 것이 되는 것은 사람	
그는 이번 지역에 없었다. 남은 일이라고 한 경우 보다는 분류를 받았다. 이 및 관측을 걸어 있다. 살림은	
그러면 인물하다 한테는 그 마음이 있는 사람들이 있는 사람들이 얼마를 보는 것 같아요. 그렇게 되었다. 모양하다	
그 한다는 이번째 가게 되는 그 경기를 하는 것 같습니다. 그는 그들은 얼마를 하는 것이 되었다면 하는 사람이다.	
그는 사람들은 그렇다는 근학에서 고장한다고는 사람들은 사람들이 사용되었다. 등 전투 전혀 나타를 모르	
그리는 한 말이 모든 물에 되는 사이라는 물이 된 아니라 하고 있으면 말했다면 하는 것으로 발달했다면	
그는 물론이 이끌어지는 하는 사람들이 얼마를 만든 말을 하는 것은 사람들이 얼마를 하고 있다.	
그 아니라 그리를 한 경기에 하는데 그렇지 않고 있다. 그리고 나를 모양하는 그 사람들이다.	
그렇게 만든 살이면 하느님, 그는 이름에 받는 사이면 속과 존점하고 싶은 방송하게 되어 되었다.	
그들이 많이 들었다. 그는 사람들은 학교 경험이라고 있는 사람들이는 살 보였다. 하면 회사를 받는 것	
그 스마이 그리고 그리고 있는데 아이지 않는데 들어 보는 사람들이 하는데 그를 하는데 그를 가고 있다.	

Table 7.2.1 WORK VOLUME OF CHANNEL EXCAVATION AND DIKE EMBANKMENT (WEST FLOODWAY/GARANG RIVER IMPROVEMENT)

LOCATION WORK ITEM, EQUIPMENT	River Mouth - NRR Bridge (WF9 - WF.15)	NRR Bridge - Simongan Weir (WF.15 - WF.96)	Simongan Weir - Kreo Junction (WF.101 - WF.184)	TOTAL
RIGHT BANK	(m ³)	(m³)	(m³)	(m³)
Excavation above W.L.	27,671	147,015	176,616	351,303
Excavation below W.L.	120,462	247,399	71,153	439,013
Embankment	8,701	4,654	4,793	18,148
Earthfilling	11,130	14,598	4,779	30,507
LEFT BANK	(m³)	(m³)	(m ³)	(m³)
Excavation above W.L.	934	83,581	81,552	166,067
Excavation below W.L.	99,396	130,969	65,795	296,159
Embankment	510	7,028	995	8,533
Earthfilling	464	10,097	1,024	11,585
TOTAL (RIGHT B. + LEFT B.)	(m ³)	(m ³)	(m ³)	(m³)
Excavation	248,463	608,963	395,115	1,252,541
Embankment and Earthfilling	20,805	36,377	11,591	68,773
Material to be spoiled	227,658	572,587	383,524	1,183,769
NUMBER OF EQUIPMENT	unit	unit	unit	unit
Bulldozer 15 t	2	2	2	6
Backhoe 0.35 m ³	6	10	6	22
Backhoe 0.60 m ³			: 2	2
Giant Breaker 600/800kg			2	2
Dump Truck 10 t	18	50	. 46	114
Clamshell Grabbing 1.0 m ³	2			2
Pontoon 200 t	2			2
Barge 100 m ³	. 4			4
Tug Boat 15 t	2	:		2

--9 Removal (Both side) Semi and side Table 7.2.2 CONSTRUCTION TIME SCHEDULE OF RAISING OF THE EXISTING RAILWAY BRIDGE Both rider ઠ Crebon side 9 Semerang side Semarant side 2 12 1 merang ade 11 10 Cirebon side opa voqe Cirebon side Location/refocation of utilities Superstructure works emporary access works emperary support works DESCRIPTION Substructure works Remarks emperary cofferres Foundation concrete Anolliary works Excavation works Beam concrete Track works Post concrete Raining track Backfill works Raising works Abutment

T-7-2

Table 7,4,1 CONSTRUCTION TIME SCHEDULE OF WEST FLOODWAY/ GARANG RIVER IMPROVEMENT

	TAD	1.4.1	NI CONO	Table 7.4.1 CONSTRUCTION TIME SCIEDOLE OF TEST		
	Work Item	Unit	Quantity	1 st year 1 st 2 3 4 5 6 7 8 9 10 11	2 nd year 2 10 11 12 12 2 3 4 5 6 7 8 9 10 11 12 12 2 3 4 5 6 7	8 9 10 11 12
	1. West Floodway Improvemen					
	Clearing and Grubbing	m ₂	105,900			
	Dredging	m ₃	163,000			
	Excavation	m3	694,000			
	Filling on Floodplain	E.E.	36,300			
	Earth Dike Embankment	m ³	20,900			
	Raising of Existing Floodwall	m	4,970			
	Revelment	m	4,000			
•	Waterfront Facilities	L.S	1			
Γ-	Drainage Outlet	ST	1			
7 -	Protection Works for Bridge Pier	L.S	7			
3						
	2. Garang River Improvement					
	Clearing and Grubbing	E	17,100			
	Excavation	m ₃	395,000			
	Filling of Channel and Floodplain	E _{III}	5,800			
	Earth Dike Embankment	m ₃	5,800			
	Floodwall	E	160			
:	Revelment	æ	2,500			
	Ground Sill (WF 124)	L.S	Ţ			
	Ground Sill (WF 176)	L.S	Ţ			
	Waterfront Facilities	L.S	1			
	Sluiceway	L.S	1			
	Drainage Outlet	L.S	1			
	Protection Works for Bridge Pier	L.S	1			

Table 7.4.2 CONSTRUCTION TIME SCHEDULE OF RECONSTRUCTION OF SIMONGAN WEIR

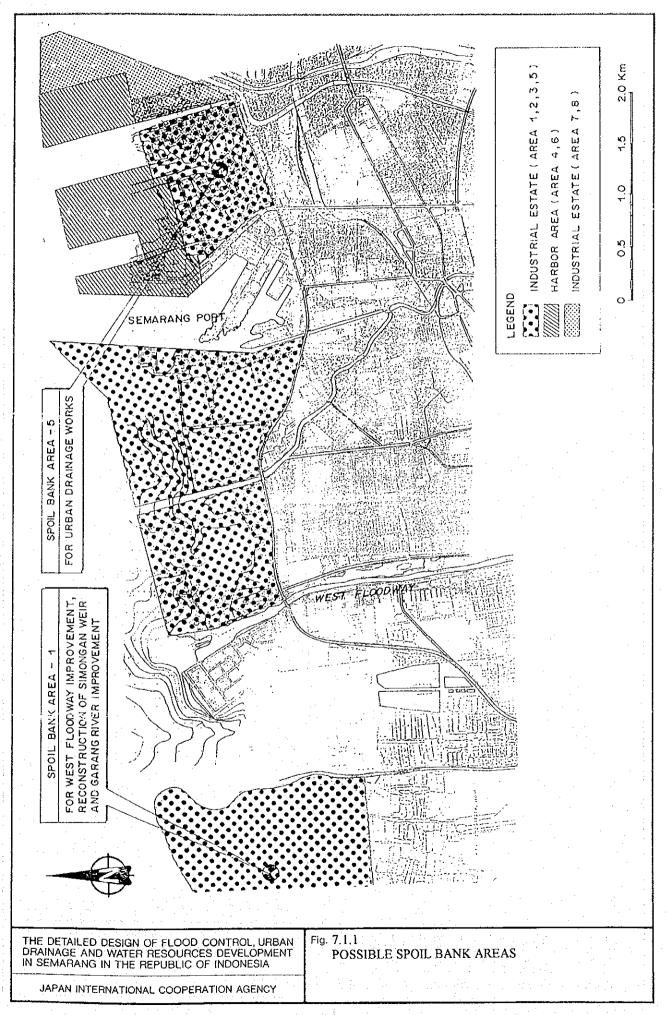
Work Item 1. Preparation Works	Ē	Chantity							Specific 1		
1. Preparation Works		y	1 2 3 4	5 6 7 8	9 10 11 12	2 [2 3 4	5 6 7 8 9	10 11 12 1	2+3 4 5	6 7 8 9	10 11 12
1. Preparation Works											
	L.S	-									
2. Simongang Weir											
Coffering and Dewatering	L.S	1									TI I
Relocation of Parts of Existing Weir	L.S	1				П					
Demolition and Excavation	, un	66,400									
Filling and Embankment	m	14,200									
Foundation P.C.Pile, L=12m	SS	089									
Stoct Shoot Pile and P.C. Shoot Pile	E	8,100		arconologicos.							
Concrete	E CE	11,700		00000000							
Gate Works	L.S	ĭ				11					П
Retaining Wall and Revetment	L.S	1									
Bridge	L.S	_				1					
Control House	L.S	_				•					
											2.00.

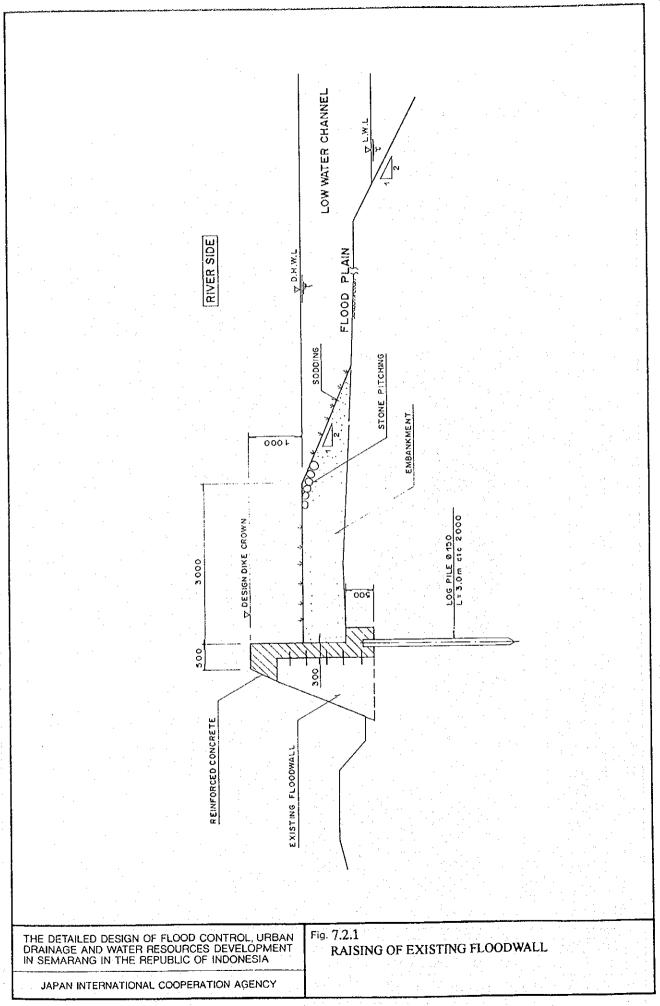
FIGURES

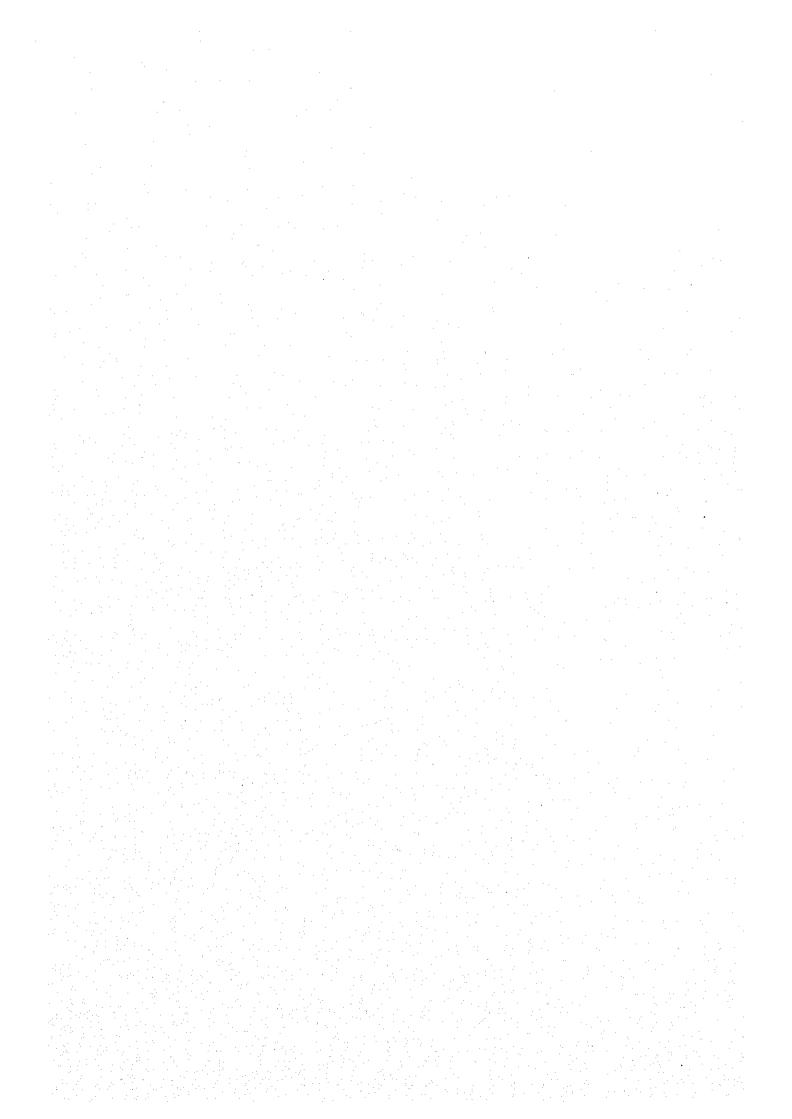
CHAPTER 7

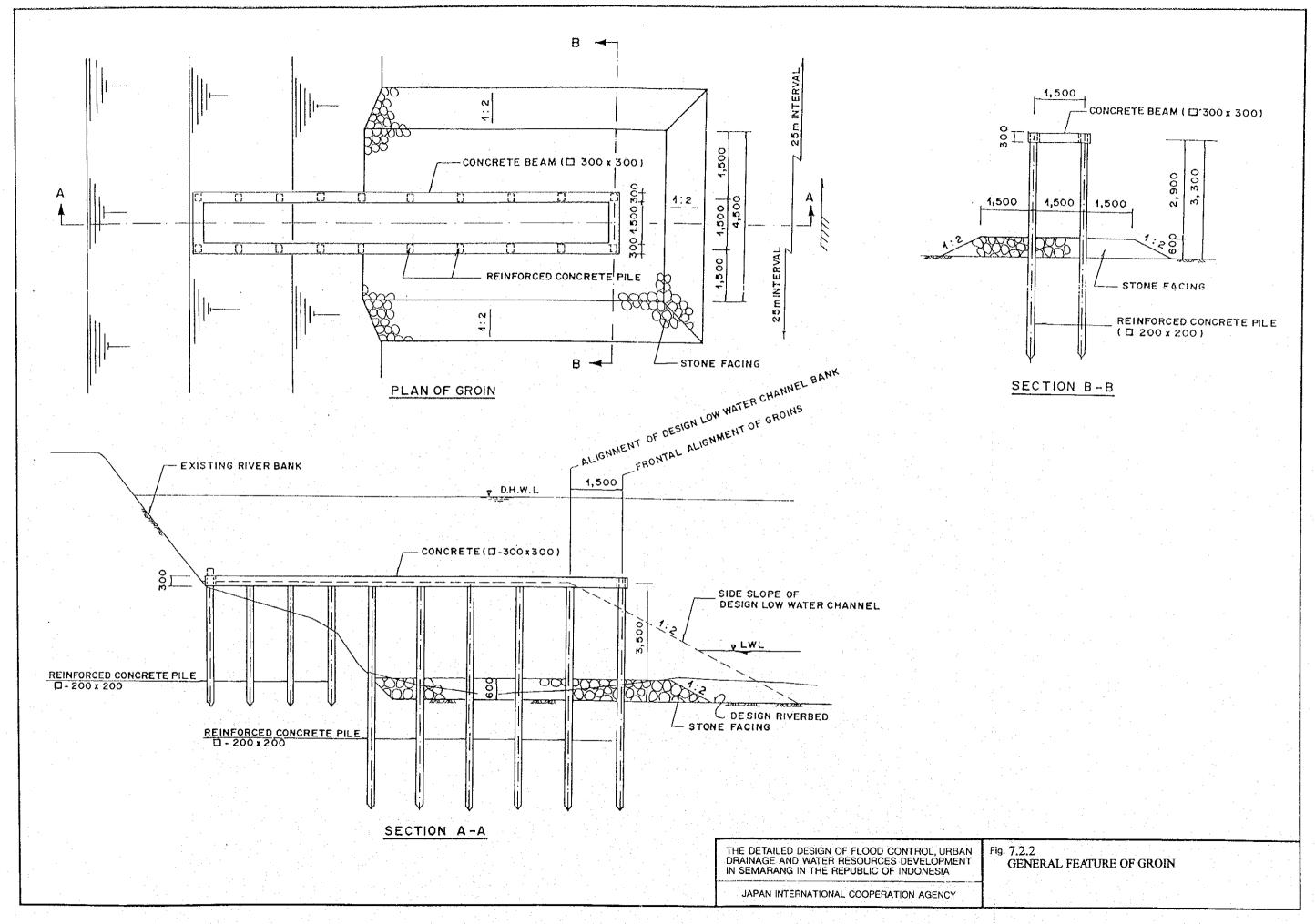
CONSTRUCTION PLANNING

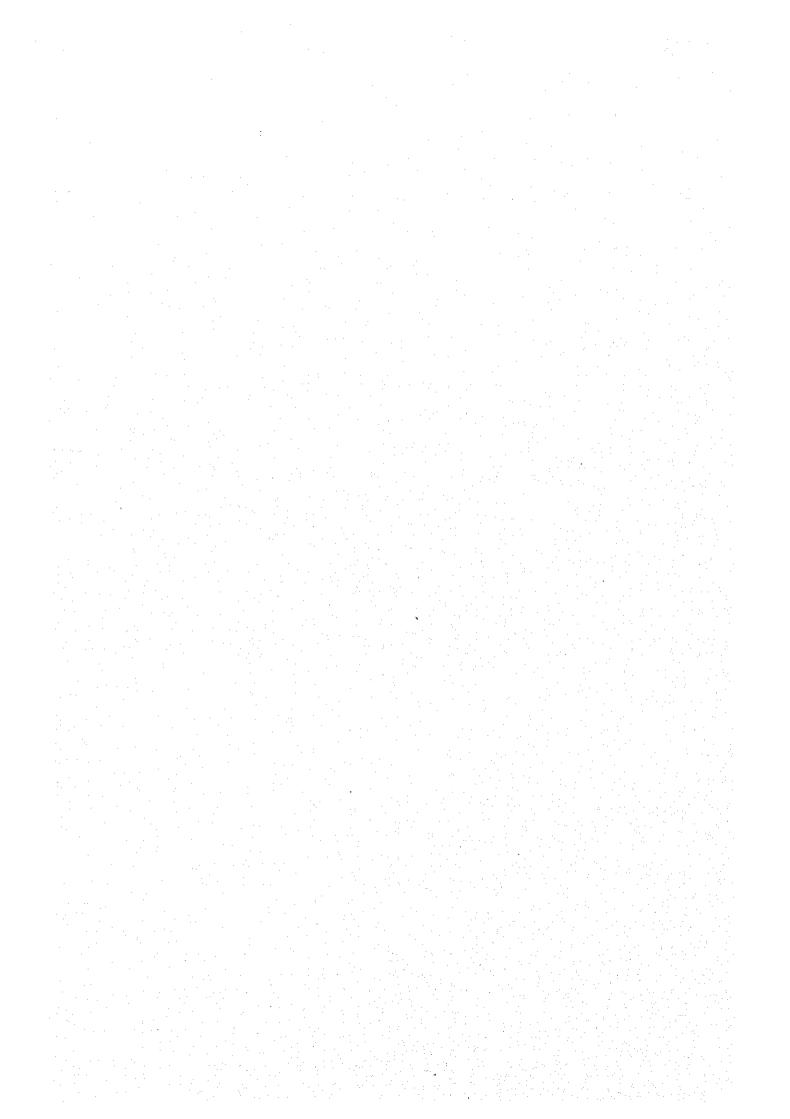
그가 그 맛있다는 그 사이 나는 아들은 이 아들은 살이 하고 아니는 것이 되었다. 네가 나는	
그는 어느!![[선생] 보고 아는 사회 그들은 사람들에 살아 있는 아니는 아니는 얼마를 모음하다고 있다.	
그 보이는 한다. 살이 있으로 이 일반으로 되어 보이는 사람들은 사람들이 보는 사람은	
그렇다는 시간에 발하를 살려고 하다 되었는데 그 아이들은 그리고 있다. 그는 점점 그 모든 사람이	
그 전 등을 가지할 때 생물을 먹는데 받는 모임이다. 그는 그는 등의 대로 모임되었다. 나는 안	
그 회사는 이 경찰 로젝트하게 한 사고하는 하는 사람들은 살림을 하고 있다. 그는 점점이 되었다.	
그는 사람이 어느 아이를 가장 아이들은 사람들이 나는 사람들이 살아 있다.	
그 100 원리 그 아들은 요한 나는 한 게 살아가는 아이지 않는 그 안 하는 사람이 되었다. 항상하는 것	
그는 그는 문화가 가는 가는 것 같아. 그런데 그는 그는 그는 그는 그런 그를 가는 가는 것이 살아보다.	
그림님도 그는 그들 아이들이 불어야 하면 하는 사이를 하는 이들이 되어 하는 이번 시간을 하다고 한다.	
그 가장 가장하는 그리는 이름을 하고만, 이름은 이름은 만하고 말한 다음이 하나 들어 먹다.	
그 이 눈이는 사람들은 이 눈이 그 그 때문에 가는 하는 때문에 보고 하는 것이 되었다. 이 것 같은 물론이 만든다.	
그는 있는데 그는 내가 하는데 하는 말이 살아 가는 그는 그는 그들은 그들은 사람들은 살아 다른 사람이 되었다.	
그리고 보험에 가입하다면서 속한 눈으로 되는 하나 눈에 그라면 하다면 나를 만든다는데	
그 아는 사람들의 아버지는 그 전쟁을 내려가 하는데 되는데 모두 모두 모두 모든 모든 모든	
그리지 그는 그림 아님 교육과 작은 사람이 들어 다음이 그리고 있는 사람들은 점을 가는 그리다.	
그리고 있는 이 속이 되는 말이 나는 사람은 사람들이 하는 사람들이 생각하지 않는 물로 사람들이	
그가도 그렇는 그림이 되었다. 하는데 되어 그렇는 그렇게 하는데 화면하고 있는데 되었다. 그렇다.	
그는 사물은 그의 일반 그의 회장에 가장하는 보고 하지 않는데 사람들이 되었다.	
그런 하는 그들은 경기 이번 이렇게 되었다. 그렇게 하고 말을 하는 것은 그런데 하는데 뭐 뭐 뭐 하는데 하는데 없다.	
그 성 어느 마늘되고 하다면 한번 학교에 되고 되고 말했다면 하는 바람이를 모른날까.	

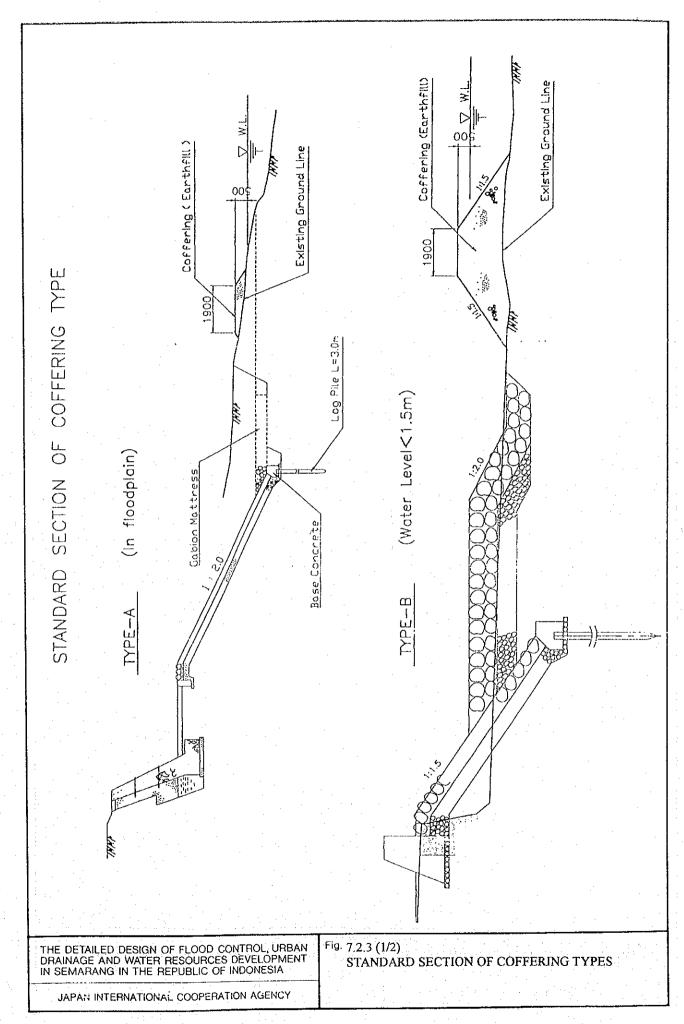


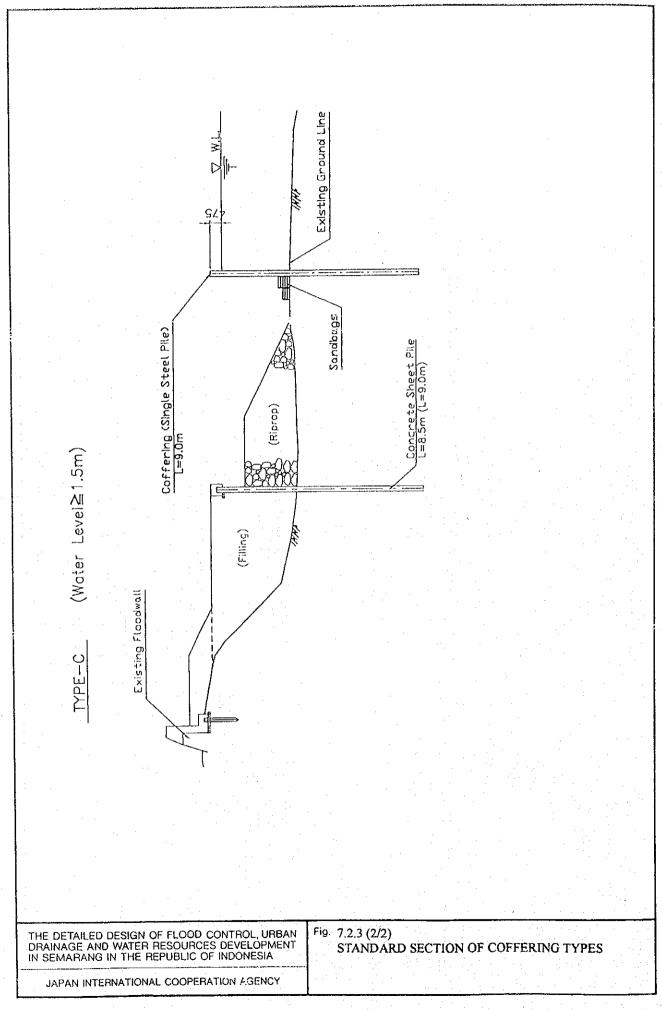


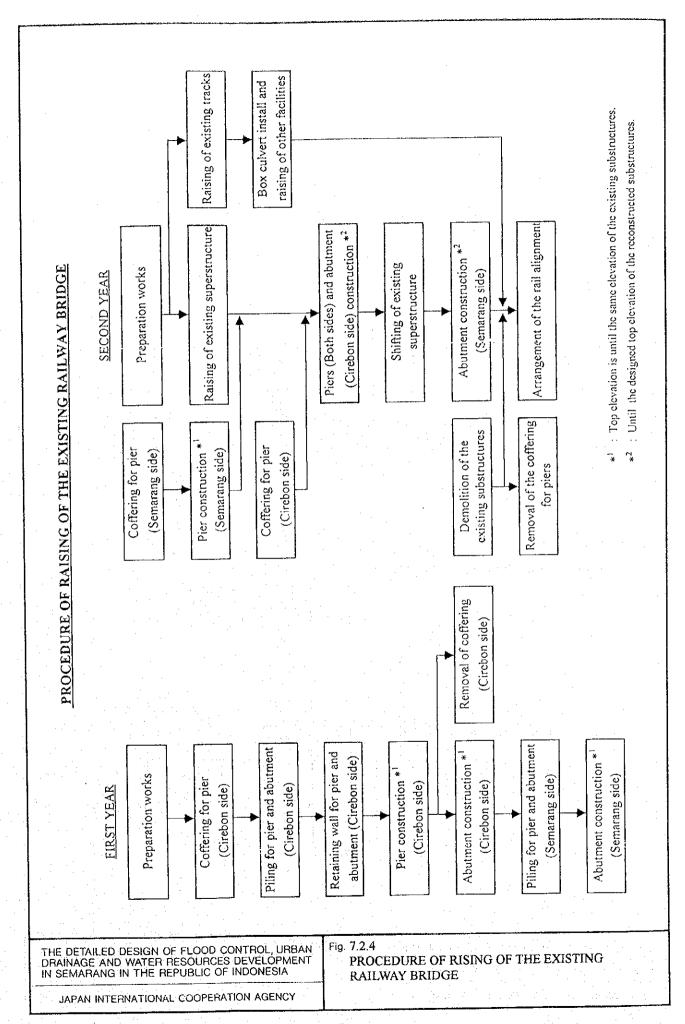






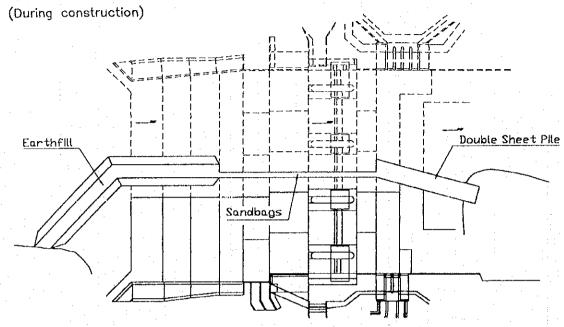




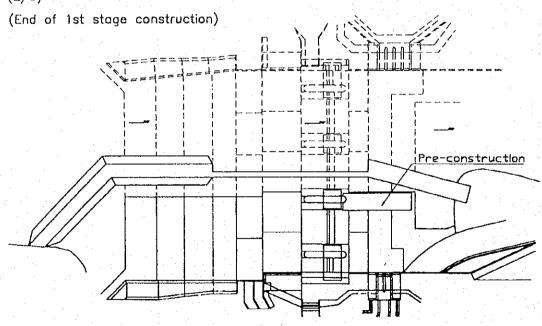


FIRST STAGE

(1/3)



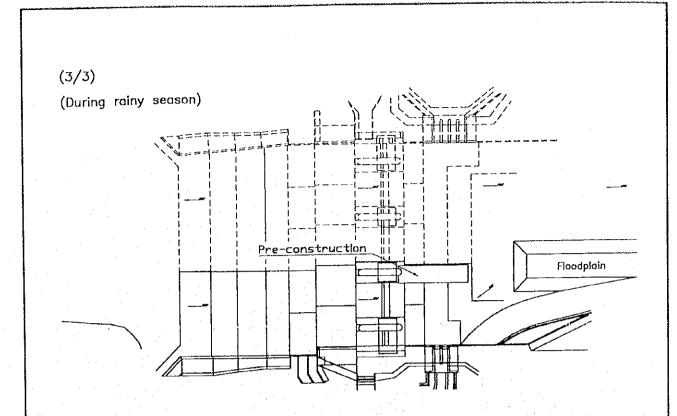
(2/3)



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

Fig. 7.3.1 (1/2) PROCEDURE OF THE FIRST STAGE COFFERING

JAPAN INTERNATIONAL COOPERATION AGENCY



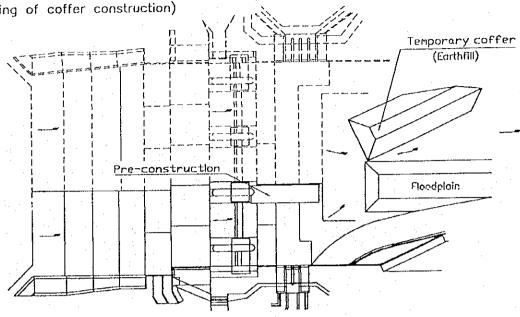
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

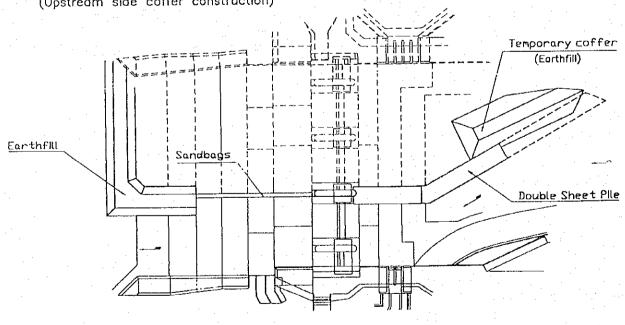
Fig. 7.3.1 (2/2) PROCEDURE OF THE FIRST STAGE COFFERING



(1/5)(Biginning of coffer construction)



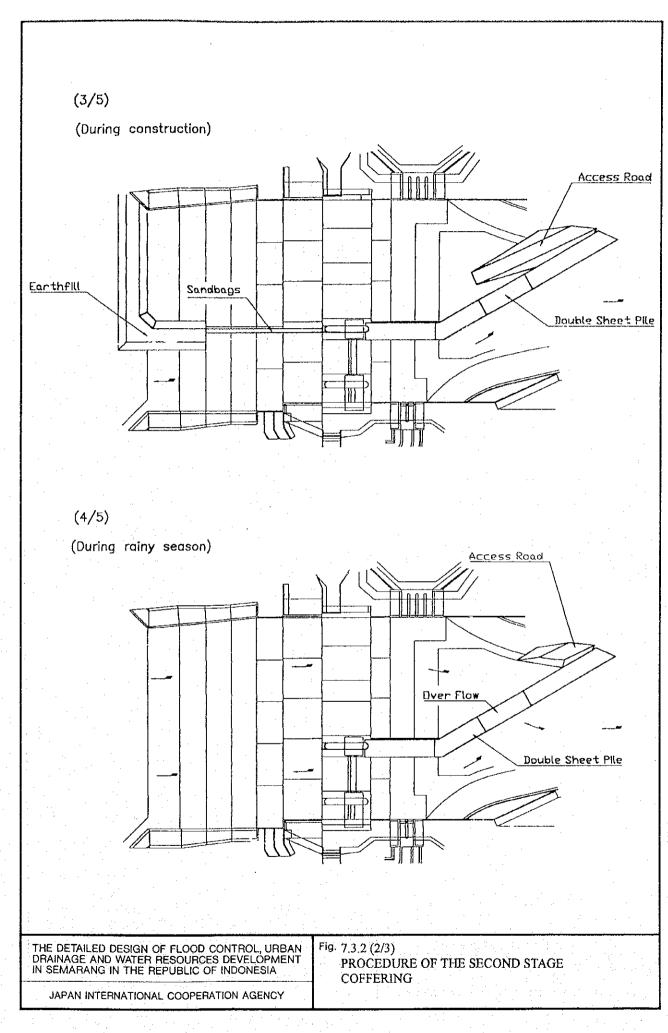
(2/5)(Upstream side coffer construction)

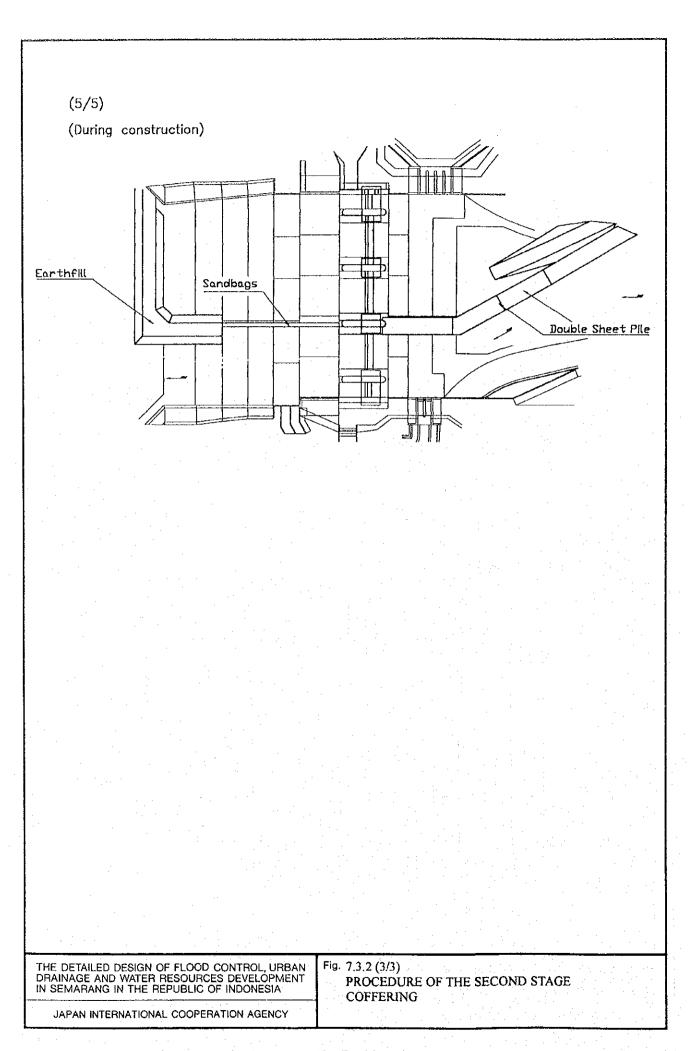


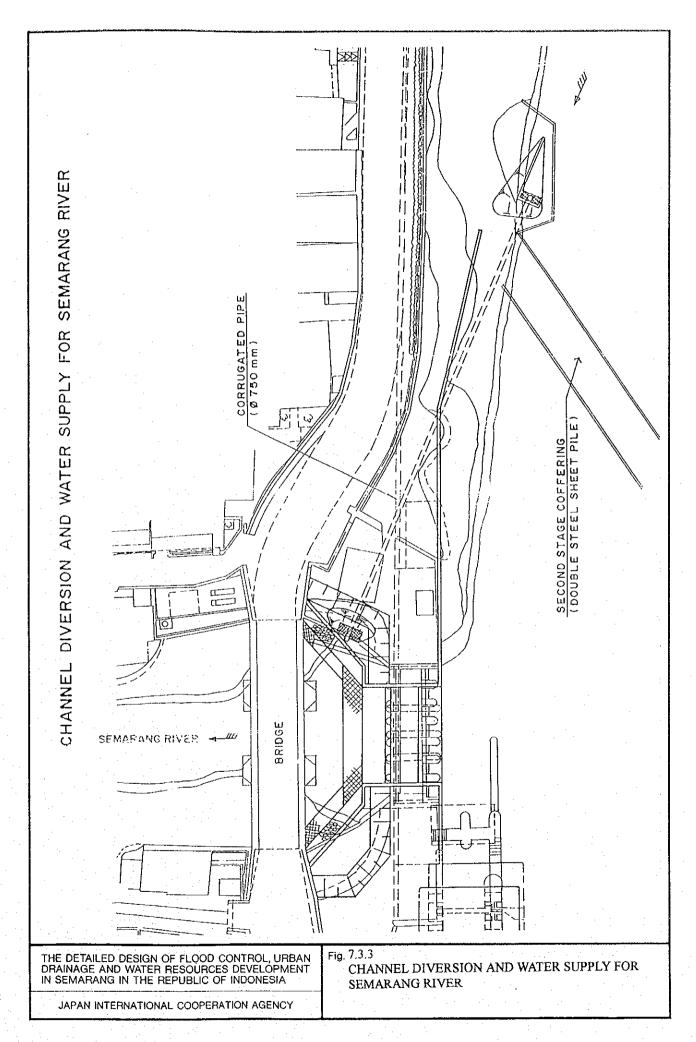
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

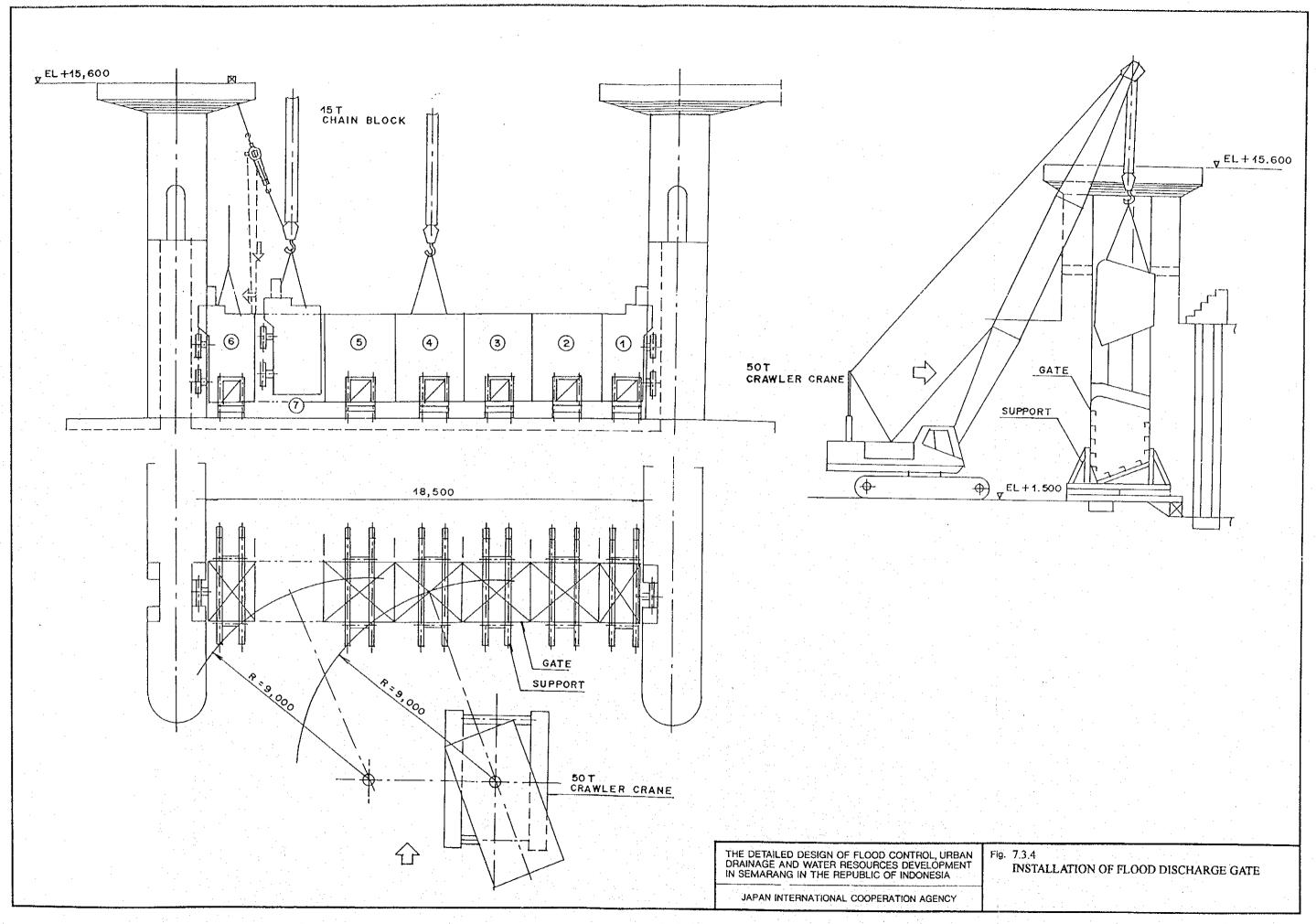
Fig. 7.3.2 (1/3) PROCEDURE OF THE SECOND STAGE **COFFERING**

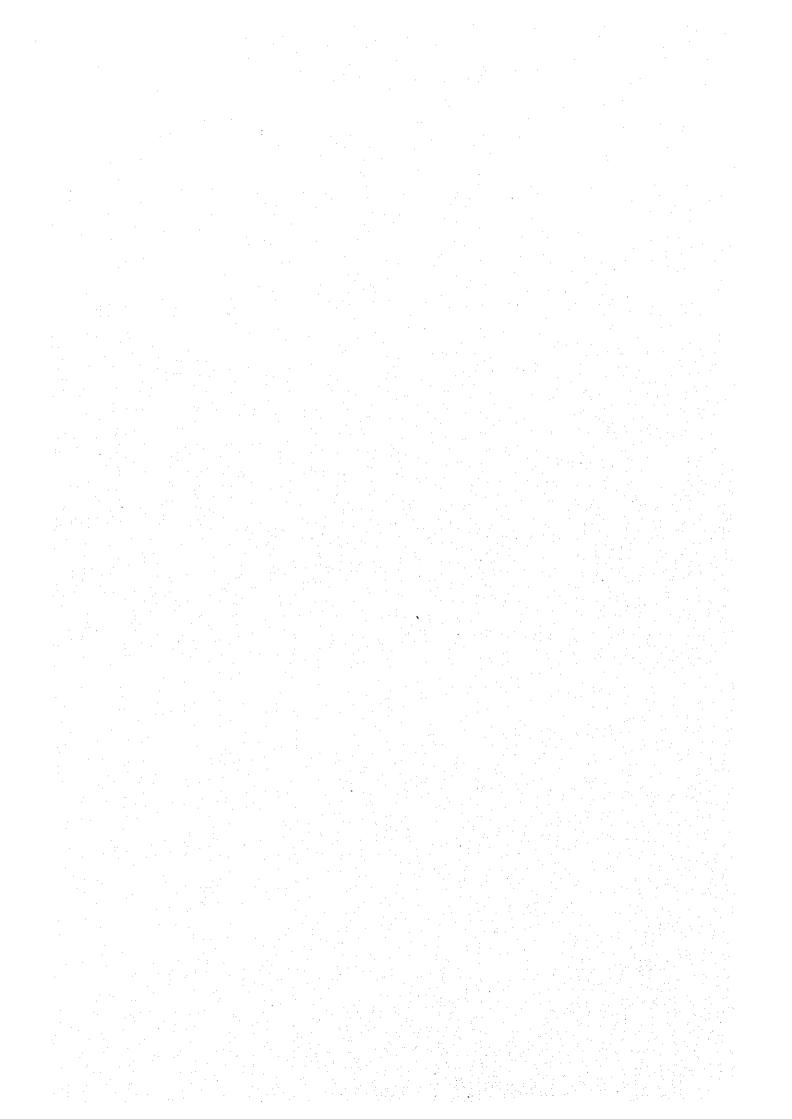
JAPAN INTERNATIONAL COOPERATION AGENCY

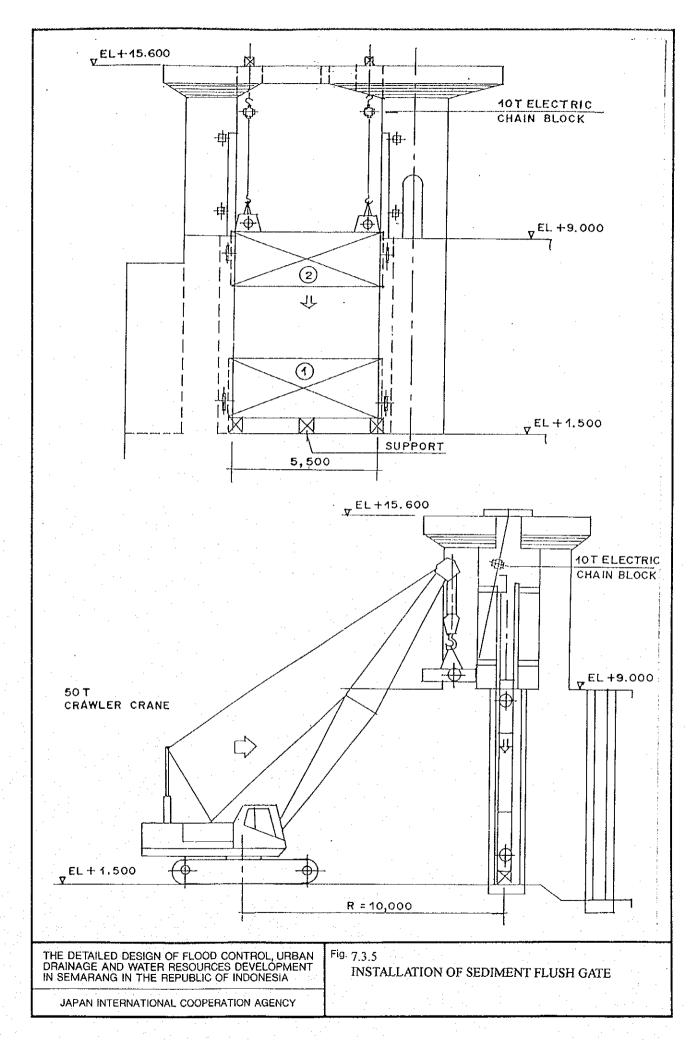












CHAPTER 8

COST ESTIMATE

그 회장 내용을 보고 하는 하는 사람들이 되는 일본 그는 하는 게 하는 것이다. 한다	
그 웃고 말하고 있다. 그 사이가 그림 그는 그 보다는 것 같아. 이 모양이는 사람이	
그 사람은 그리는 하는 사람들이 살아 있는데 그렇게 되었다. 그 사람들이 되었다.	
그런 하는 집에는 얼마를 살았다. 하는 것이 얼마 아니라 하는 것이 하고 있는 것이다.	
어린 시시 아이들의 경기를 가게 하는 것이 없는 것이 되었다. 나는 것은	
그 시간의 그리에도 시청한 등 경기는 시간을 모든 그래면 하는 것도 되어 있었다. 전기기	
그는 아들은 한 경기들도 물이 가을 하고는 일을 하겠다면 보는 보고 보는 사람들이 하셨다.	
어머니를 받아 한 살고 있다면 살아 하는 사람들이 어떻게 되어 살아 있는 것이 없는데 살고 있다.	
근처 이 동안 동일을 하고 하는 이 사람들은 살이 되어 있는 사람들이 하는 사람들이 없었다.	
그의 교통 주리는 살길 중인한 그리고 있는 그는 그 얼마는 것 같은 그리고 있는 것이 없다.	
그만 그래도 그 가는 민족은 옷을 ټ하다고 하는데 잘 말하고 있다고 모르는 것을 모임하는	
그렇다는 살이 많은 다른 하고 살이 보고 나를 했다. 그는 내 만들었는데 이 모든 만드라는 생각하네 다른	
그는 사용을 가장했다면 하다고 있다면 하는 사람들이 되었다. 그는 사람들이 모든 사람들이 모든 사람들이 없다.	
그러지만 그리트를 하게 되었다. 중대통령 회사 회사 사람은 대로 그리고 있다고 모든 그릇이 있다.	
그는 그렇게 보았다. 그리고 보고 있는 그리고 있는 그리고 말고 되는 것이 없었다. 그 그는	
그는 것은 경기를 받는 말을 하고 하고 있는 것은 것은 것은 것을 하는 것은 것을 하는 것을 가는 것을 하는 것이다.	
그렇게 하는 사람들은 하는 사람들에게 하는 사람들은 얼마나 되었다면 되었다. 이 중요한 점점	
그는 그는 그를 나가 살아 모른 사고 생계를 보고 있어 만나 말을 하셨다. 그렇게 하는 것은 이렇게	
그는 시간에 가장한 물리를 들어야 하고 있는데 이 사용했는데 하는데 살린 경우를 살린다는데 살린다.	
그는 경기 방송 시간 아이들은 한 사람들은 그는 사람들은 하는 사람들은 사람들은 사람들이 되었다.	
그 회사는 경우 보다 살아가는 병이 되고 하면 보고 있는 것 같아 그를 가는 것 같아. 안 들고 하	
그리고 이 그는 그 전 경험은 이 분석이들도 전혀들이 있습니다. 하는 그를 맞이 요즘하지만	
그들 전통 시간과 이 동안을 그렇게 되는 이번 회장도 없어야 하는 장인을 시작되었다.	
그들이 하는 사람이 많은 이 보이스로 모든 사는 사람들이는 말하는 그는 얼굴을 통했다. 독특성 하다	
이 어린 그리는 이번 물로 이 맛을 보는 것 같아 되는 것 같아 하면 하는 말을 모았다. 충행하는 다음	
그 그렇게 하는 사람들은 아이들이 하는 사람이 하는 것이 하는 것이 되었다.	
그 보는 병에 가는 이번, 외국 학교 전 경화 서울 내 나는 중에 가를 하고 말을 했다. 제공하는 그릇	
그는 그는 나는 아이들이 들어 있는 것들은 사람들이 하는 것이 없는 것이 없는 것이 없는 것이 없다.	
- 이 보고 있다면 1	
는 사람이 되는 경험이 가는 것을 되고 있는데, 이 가장이 많은 것이 되는 것이 들어 없는데 되었다. 그런데 보다 그렇게 되었다. 그는 사람들이 가장이 되었다. 그는 것이 되었다면 보고 있는데 그런데 보고 있는데 그런데 되었다. 그런데	
그는 그들은 전에 하는 한 없을까지. 시험에 있는 이렇게 하면 모든 그리고 하는 것은 바람이 되었다.	
- 이 보이 있다. 이 일본 10 이 보고 있는 사람들은 그리고 있는데 10 전에 보고 있는데 10 전에 10 	
그리 얼마 이 때문 [인도막일] 그 없일 마다고 되었다. 이 불 바꾸는 모모는 참 해 밝혔습니다.	
으로 보고 있다. 그 사람이 가는 그는 아이를 하는 것을 보고 있는 것이 하는 것이 하는 것이 가능한 것을 하는 것이다. 그는 사람이 있다고 있는 것이 있는 사람이 되는 것이 되는 것이 있다. 그는 것이 되는 것이 되었다.	
그리는 이 집안이 아내는 이렇는 아이들까? 또 이 얼룩하는 아이들의 얼굴은 얼마나를 하나를 했다. 하는	
그리고 하는 이 그를 보이라고 말했다고 있다. 그리고 얼마를 하다 하는 것이다.	
그 그 그 이 그리는 사람은 이렇게 하고 있다. 하는 사람들은 사람들은 사람들은 사람들이 되었다.	
그는 그는 말이 살이 있는 것이 되었다. 그들은 말이 가는 말이 되었다. 그는 말이 되었다. 그는 말이 되었다.	
그 사람이 있는데 하는데 얼마를 가면 하나 하나 가수 있었다. 한다고 있는데 말라는 얼마를 가는데 되었다. 나는 아니다	

CHAPTER 8 COST ESTIMATE

8.1 Introduction

This chapter is prepared for the estimate of the project cost for the West Floodway/Garang River Improvement, which consists of the West Floodway and Garang River Improvement (hereinafter referred to as the Package-1), Simongan Weir Reconstruction (the Package-2) and Raising Existing Railway Bridge (the Package-3).

8.2 Constitution of Project Cost and Conditions of Cost Estimate

8.2.1 **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 tax. In addition, construction base cost is divided into many cost items as illustrated in Fig. 8.2.1.

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 8.2.1):

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 8.2.2 Composition of Construction Base Cost).

Engineering Service Cost : Engineering service cost is mainly 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

:Six (6) % 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 8.2.2 and 8.2.3)

Value Added Tax

:Ten (10) % of the construction base cost, the engineering service cost and contingencies shall be considered.

8.2.2 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.

(1) Direct cost

The estimate for direct costs is performed based on the quantities of all construction tasks shown on drawing and described in 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.

(a) Basic Cost

Basic costs are determined at first for the estimate of the project cost. Basic costs consist of labor wage, prices of materials and operation costs of equipment. Details of each basic cost are explained in Section 8.3.

(b) 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. Unit rates are explained in Section 8.4.

(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 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 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.

"Preparatory and Temporary works" includes 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. These costs for each payment item are added up as countable cost or appropriated as percentage. Lump sum for each facilities, system and maintenance is adopted referring to similar and recent projects or quotation by private firms through formal inquiry letters.

8.2.3 Conditions of Project Cost Estimate

(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, laborers, 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 of the International Banking Rate at that time.

(2) Currency Component

The project cost is divided into the foreign currency components representing the 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.)

: Cost of wage for foreign engineer and foreman,

- Base cost of all components for construction plants and heavy equipment except local mechanic, maintenance, repairing, fuel and laborer costs,
- (2) Cost of imported materials and

 Cost of materials that are produced in

 Indonesia by Foreign-Indonesian joint
 enterprise with the capital of the foreign firm
 which occupy more then 10% of the share.

Indirect Foreign Currency (Rp.)

: Cost of foreign portion of local materials and Cost of foreign portion of equipment produced in Indonesia.

Local Currency (Rp.)

Cost of per diem portion for foreign personnel,
Cost of local laborers,
Cost of local portion of local materials,

Chapter 8 Cost Estimate

Cost of local portion of equipment produced in

Indonesia, and

Inland transportation cost exclusive of foreign

portions

Refer to Section 8.3 for further details.

8.3 Basic Cost

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

8.3.1 Condition 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.

(1) Laborer Cost

The laborer cost 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.

(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

8.3.1.

(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 of local material such as

8 - 5

tire, fuel, etc.

Pure Local Currency (Rp.)

Local mechanic cost for repairing,

Local laborer for repairing, and

Parts of annual management costs.

8.3.2 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 the Semarang City, are referred for the basic costs of laborer. The costs of laborer wages are shown in Table 8.3.2 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.

8.3.3 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 Chapter 6 Reference Material).

Table 8.3.3 shows basic costs of materials divided into each currency portion.

8.3.4 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 8.3.4.

8.3.5 Reference Book

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

No.	Data in I	ndonesia	Data in Japan
140.	Indonesian Word	English Word	Data in Japan
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 & Iterior	
3	Petunjuk Teknik Analisa Biaya dan Harga Stuan 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

8.4 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.

8.4.1 Unit Rate

It is important for estimate of unit rates, such as excavation by an excavator, or concreting works by 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 weir, bridge, dredging, 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 8.4.1.

8.4.2 Unit Cost for Payment Item

(1) General

As described in Fig. 8.2.1, 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:

(a) Quotation

Quotations of electrical and mechanical facilities for pumping facilities and gates are asked to private firms for certainty.

(b) 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. 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 8.4.2 and 8.4.3.

(2) Amount of Unit Costs for Payment Items

The unit costs for payment items, which are tabulated in the Volume IV, Work Quantity Calculation, in three (3) packages are broken dawn into basic costs and unit rates with construction base costs in Tables 8.5.1 to 8.5.3.

8.4.3 Reference Book

In addition to the reference book enumerated in Sub-section 8.3.5, the following books/materials are referred to for computation of unit rates and costs.

No.	Data in Ir	Data in Lauren		
NO.	Indonesian Word	English Word	Data in Japan	
ı	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)	

8.5 Project Cost

8.5.1 Construction Schedule

To estimate the project cost, construction schedule is 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 three (3) 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 2003. The schedules of main items are assumed as follows (refer to Volume VI Construction Planning);

Package-1 (the West Floodway/Garang River Improvement)

1. West Floodway : Feb. 2001 - Mar. 2001

2. Garang River : Apr. 2001 – Oct. 2003

Package-2 (Simongan Weir Reconstruction)

1. Preparation Works : Feb. 2001 – Mar. 2001

2. Construction : Apr. 2001 – Oct. 2003

3. Relocation of Existing Weir : Apr. 2001 – Nov. 2001

Package-3 (Raising Existing Railway Bridge)

1. Raising of Main Bridge : Apr. 2002 – Jun. 2002

2. Truck Work : Apr. 2002 – Oct. 2002

3. Other Facilities : Apr. 2001 – Sep. 2002

8.5.2 Project Cost

(1) Construction Base Cost

Based on the unit costs for each payment item, construction base costs of three (3) packages are computed respectively as follows:

(a) Package-1: Improvement of West Floodway and Garang River

Payment items and the work quantities for Package-1 are indicated in Table 8.5.1. Soil and masonry works account for main item in this package. Specially speaking, dredging works are implemented in payment item "Excavation below Water Level" (B.2.1).

(b) Package-2: Reconstruction of Simongan Weir

Payment items and the work quantities for Package-2 are indicated in Table 8.5.2. The main purpose of this package is reconstruction of the Simongan Weir. Therefore, the major items are concrete and gate works including furnishing and installation. In addition to concrete and gate, another main works are to dismantle existing weir for preservation of historical structure. Specially, when the existing structure is cut into some hundred blocks for transportation, new technology named "Wire Saw Method" is utilized for smooth cutting. It is necessary for implementation of the work to use special equipment and engineers.

(c) Package-3: Raising of Railway Bridge

Payment items and the quantities for Package-3 are indicated in Table 8.5.3. There are also particular works undertaken with maintaining regular operation of train. Therefore, the one of the most important work is the temporary work as well as Bridge Work from the cost's points of view.

(1) Total Construction Base Cost

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

		Construction Base Cost				
Name of Package	Currency	Pure Foreign Portion	Indirect Foreign Portion	Pure Local Portion	Total	
Package-1 (the West Floodway/Garang River Improvement)	Rp x 10 ⁶	52,579	3,343	47,600	103,521	
Package-2 (Simongan Weir Reconstruction)	Rp x 10 ⁶	61,201	3,632	24,128	88,960	
Package-3 (Raising Existing Railway Bridge)	Rp x 10 ⁶	5,804	838	9,871	16,514	
	Rp x 10 ⁶	119,583	7,813	81,599	208,995	
Total	Yen x 10 ⁶	1,980	129	1,351	3,461	
	US\$ x 10 ³	17,369	1,135	11,852	30,355	

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

(2) Engineering Service Cost

The total man-month of foreign engineer has been assumed at 79 man-months for 1 year of preliminary term and 3 years for construction works in which package-1, 2 and 3 are undertaken. In addition, local engineer remuneration, international and local transportation fee, salary for office staff and establishment and etc. are summed up. The summary of the engineering service cost are tabulated below (refer to Tables 8.5.4):

		Engineering Service Cost				
Name of Package	Currency	Pure Foreign Portion	Indirect Foreign Portion	Pure Local Portion	Total	
	Rp x 10 ⁶	11,950	0	6,220	18,170	
Three (3) packages in Total	Yen x 10 ⁶	198	0	103	301	
	US\$ x 10 ³	1,736	0	903	2,639	

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

(3) Compensation Cost

Some hectare of land areas and three (3) houses/buildings 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 : 25,000 Rp/m²

Building: 30,000,000 Rp/house

5.0 ha of land acquisition and 3 units of house evacuation are necessary to be compensated in the three (3) packages.

The total compensation cost is shown in the following table (refer to Table 8.5.5);

		Compensation Service Cost (million rupiah/yen)				
Name of Package	Currency	Pure Foreign Portion	Indirect Foreign Portion	Pure Local Portion	Total	
	Rp x 10 ⁶	0	0	710	710	
Three (3) packages in Total	Yen x 10 ⁶	0	0	12	12	
	US\$ x 10 ³	0	0	103	103	

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

(4) Administration Cost

As described in Sub-Section 8.2.1 Basic Composition of Project Cost, the

administration cost for owner's expenditures is estimated as local portion at seven (7) % of the sum of construction base cost and the compensation cost. The amount of administration cost is as follows;

		Administration Cost (million rupiah)				
Name of Package	Currency	Pure Foreign Portion	Indirect Foreign Portion	Pure Local Portion	Total	
	Rp x 10 ⁶	0	0	14,679	14,679	
Three (3) packages in Total	Yen x 10 ⁶	0	0	243	243	
	US\$ x 10 ³	0	0	2,132	2,132	

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

(5) Physical Contingency

Physical contingency is considered as local portion at six (6) % of the sum of the construction base cost, engineering service cost and the compensation cost.

				ontingency rupiah)	
Name of Package	Сигтепсу	Pure Foreign Portion	Indirect Foreign Portion	Pure Local Portion	Total
	Rp x 10 ⁶	7,892	469	5,312	13,673
Three (3) packages in Total	Yen x 10 ⁶	131	8	88	226
	US\$ x 10 ³	1,146	68	771	1,986

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

(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 currecy portion and eight (8) % of the local portion respectively. Table 8.5.6 shows summary of price contingency between years 2000 and 2003.

		Price Contingency (million rupiah)				
Name of Package	Currency	Pure Foreign Portion	Indirect Foreign Portion	Pure Local Portion	Total	
Three (3) packages in Total	Rp x 10 ⁶	11,867	735	24,886	37,489	
	Yen x 10 ⁶	197	12	412	621	
	US\$ x 10 ³	1,724	107	3,615	5,445	

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

(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 value added tax is shown in the following table.

		Value Added Tax (million rupiah)				
Name of Package	Currency	Pure Foreign Portion	Indirect Foreign Portion	Pure Local Portion	Total	
	Rp x 10 ⁶	0	0	27,554	27,554	
Three (3) packages in Total	Yen x 10 ⁶	0	0	456	456	
	US\$ x 10 ³	0	0	4,002	4,002	

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

8.5.3 Total Project Cost

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

Project Cost of Package-1

		Project Cost (million rupiah)				
Name of Package	Currency	Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total	
Construction Base Cost	Rp x 10 ⁶	52,579	3,343	47,600	103,521	
Engineering Service Cost	Rp x 10 ⁶	5,253	0	3,627	8,880	
Compensation Cost	Rp x 10 ⁶	0	0	710	710	
Administration Cost	Rp x 10 ⁶	0	0	7,373	7,373	
Physical Contingency	Rp x 10 ⁶	3,470	201	3,116	6,787	
Price Contingency	Rp x 10 ⁶	5,201	311	14,506	20,017	
Value Added Tax	Rp x 10 ⁶	0	0	13,756	13,756	
	Rp x 10 ⁶	66,502	3,854	90,688	161,044	
Total	Yen x 10 ⁶	1,101	64	1,502	2,667	
	US\$x10 ³	9,659	560	13,172	23,391	

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	61,201	3,632	24,128	88,960	
Engineering Service Cost	Rp x 10 ⁶	6,117	0	1,838	7,955	
Compensation Cost	Rp x 10 ⁶	0	0	0	0	
Administration Cost	Rp x 10 ⁶	0	0	6,116	6,116	
Physical Contingency	Rp x 10 ⁶	4,039	218	1,558	5,815	
Price Contingency	Rp x 10 ⁶	6,089	344	7,469	13,901	
Value Added Tax	Rp x 10 ⁶	0	0	11,566	11,566	
	Rp x 10 ⁶	77,445	4,193	52,675	134,313	
Total	Yen x 10 ⁶	1,282	69	872	2,224	
	US\$x10 ³	11,248	609	7,651	19,508	

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

Project Cost of Package-3

Name of Package	Currency	Project Cost (million rupiah)				
		Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total	
Construction Base Cost	Rp x 10 ⁶	5,804	838	9,871	16,514	
Engineering Service Cost	Rp x 10 ⁶	580	. 0	755	1,335	
Compensation Cost	Rp x 10 ⁶	.0	0	0	0	
Administration Cost	Rp x 10 ⁶	0	0	1,190	1,190	
Physical Contingency	Rp x 10 ⁶	383	50	638	1,071	
Price Contingency	Rp x 10 ⁶	578	81	2,912	3,570	
Value Added Tax	Rp x 10 ⁶	0	0	2,231	2,231	
	Rp x 10 ⁶	7,345	969	17,597	25,912	
Total	Yen x 10 ⁶	122	16	291	429	
	US\$x10 ³	1,067	141	2,556	3,764	

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

Total Project Cost of Three Packages

		Project Cost (million rupiah)				
Name of Package	Currency	Pure Foreign Portion	Indirect Foreign Portion	Local Portion	Total	
Construction Base Cost	Rp x 10 ⁶	119,583	7,813	81,599	208,995	
Engineering Service Cost	Rp x 10 ⁶	11,950	0	6,220	18,170	
Compensation Cost	Rp x 10 ⁶	0	0	710	710	
Administration Cost	Rp x 10 ⁶	0	0	14,679	14,679	
Physical Contingency	Rp x 10 ⁶	7,892	469	5,312	13,673	
Price Contingency	Rp x 10 ⁶	11,867	735	24,886	37,489	
Value Added Tax	Rp x 10 ⁶	0	0	27,554	27,554	
	Rp x 10 ⁶	151,292	9,017	160,961	321,270	
Total	Yen x 10 ⁶	2,505	149	2,665	5,320	
	US\$x10 ³	21,974	1,310	23,379	46,662	

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

8.5.4 Disbursement Schedule

Based on the Project Cost estimates, disbursement schedule of total project costs is indicated as Table 8.5.7.