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# REPUBLIC OF INDONESIA DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT MINISTRY OF PUBLIC WORKS

# THE FEASIBILITY STUDY ON CIDANAU-CIBANTEN WATER RESOURCES DEVELOPMENT PROJECT

# FINAL REPORT

**VOLUME IV** 

SUPPORTING REPORT (2)

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June, 1992 JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO, JAPAN

# This Report consists of

Volume I Summary Report

Volume II Main Report

Volume III Supporting Report (1)

Volume IV Supporting Report (2)

Volume V Data Book



Appendix - F Plan Formulation

Appendix - G Preliminary Design

Appendix - H Environmental Assessment

# APPENDIX - F PLAN FORMULATION

# <u>APPENDIX - F</u> <u>PLAN FORMULATION</u>

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#### 1. General

Plans for the schemes were formulated in four (4) steps,incorporating information available at each Field and Home Work throughout First stage and Second stage. Various alternative plans were examined during the course of the Study. Fig. F-5 illustrates the logic and flow of plan formulation studies.

Data and information used at each study step may be summarized as below;

Stage of Study	Pha	ase I	Phase II		
Step of plan formulation	1st Step	2nd Step	3rd Step	4th Step	
Report output	Progress Report No.1 (March 1991)	Progress Report No.2 (Aug.1991)	Interim Report (Nov.1991)	Progress Report No.3(Jan.1992) and Draft Final Report (May 1992)	
Topographic information	1:50,000(Anyer& Krenceng, Rawa Danau) 1:5,000 (Cibanten) 1:2,000 (Cidanau)	1:50,000 (Beroeng) 1:5,000 (Cidanau & Rawa Danau)	1:2,000 (Krenceng) 1:400 (Cross section of Krenceng)	Revised 1:2000 (Krenceng) 1:400 (Profile of Beroeng diversion site)	
Geological information	Reconnaissance & core drilling	Reconnaissance & core drilling	Core drilling Seismic Exploration	Core drilling	
Construction material	Reconnaissance & test results	Reconnaissance	Test results	Test results	
Hydrological information	Records at Kubang Baros & Serut stations		Modified rating curve of both Serut station	Anyer&Krenceng: estimated by Serut station	
·	Anyer&Krenceng: estimated by Kubang Baros station	Anyer&Krenceng: estimated by Kubang Baros station			
Discharge Measurement	Kubang Baros & Scrut	Kubang Baros&Scrut		Kubang Baros, Serut & Beroeng	
Downstream information considered	Cibanten irrigable area		Added Anyer irrigable area	Revised Anyer irrigable area and added Beroeng irrigable area and river maintenance flow during dry season	
Alternative schemes considered	5	4	15	3	

#### 2 Identification of Dam Sites

#### 2.1 Selection of Proposed Dam Sites

## 1) First selection of proposed dam sites

Various possible damsites are identified in the study area through the site reconnaissance by the JICA Study Team. The following nine (9) damsites and two (2) intake weir sites are identified.

Scheme	Identified dam site & intake site	Name of river	Basin area (km²)	Location (upstream of estuary)
A-1	Cibanten	Cibanten	73.15	22 km
A-4 & A-5	Up-Cidanau	Cidanau	199.5	7.5 km
A-2	Mid-Cidanau	Cidanau	204.1	4.7 km
A-3	Down-Cidanau	Cidanau	208.25	3.5 km
A-6	Upstream of	Cidanau	214.95	1.2 km
	Krakatau intake			•
A-4-4	Up-Anyer	Anyer	31.2	3.5 km
A-4-3	Mid-Anyer	Anyer	38.6	3.0 km
A-4-1&A-4-2	Down-Anyer	Anyer	41.3	2.0 km
K-1, K-2 & K-3	Heightening of Krenceng dam	Krenceng	13.3	4.0 km
	Beroeng intake *	Beroeng	12.1	15.0 km
	Anyer intake *	Anyer	17.5	12.5 km

Note: \* means proposed intake weir site.

#### 2) Final selection of proposed dam sites

Among nine (9) damsites identified, five (5) damsites were discarded based on the following reasons;

# Anyer dam site (A-4-1, A-4-2, A-4-3 and A-4-4)

There is a lot of irrigated areas and houses in the downstream anyer river basin. Thus the Anyer storaged dam plan will bring the social problem due to the resettlement of inhabitants in the inundation area. Thus the Anyer dam site is not taken up.

#### Middle Cidanau damsite (A-2)

Both abutments above El.50.00 m is covered by thick residual soil of more 10 m depth and the underlying unconsolidated pumice tuff is highly weathered to more than 15 m in thickness. Besides, unconsolidated pumice tuff also develops below the river bed up to more 15 m depth. Serious geotechnical difficulties are envisaged for the stability of dam foundation.

The possible storage volume is very small comparing to the downstream Cidanau dam site even though the sediment is removed by maintenance dredging. Therefore the development cost would be quite high. Thus this damsite is not taken up.

#### Upstream Cidanau damsite (A-4 and A-5)

Based on a rough study, technically, a very large water storage of around 100 million m<sup>3</sup> could be developed by provision of a small dam, 10 m height at the outlet of Rawa Danau and by raising the lake water level up to about El.91.0 m, and the available water supply would be about 8 m<sup>3</sup>/sec. Thus the Rawa Danau storaged dam plan will be the most beneficial with very low water cost comparing to other damsites. However, this scheme is not taken up as it is beyond the Scope of Work in this Study. It is a prerequisite in the TOR that, the full supply water level of the Cidanau damsite should be settled so as not to submerge the Rawa Danau which is a nature reserve area.

In view of the potential of development of Rawa Danau storage scheme as mentioned above, it is suggested by DGWRD that the development of Rawa Danau should be reconsidered after the environmental problem would be settled.

Also, the free intake located in the upstream of the river which will not submerge Rawa Danau is planned to convey directly through the pipeline and store the water of Cidanau river in the Anyer river or the Krenceng reservoir. From the results of simultaneous discharge measurement carried out in first and second field works, it was not emerged the possibility of decrease in discharge toward the downstream due to infiltration of the flow into the tuffaceous bed rock. Therefore, the free intake is not practical because the downstream Krakatau intake is rather suitable due to that the pipeline will be shorter.

#### 2.2 Proposed Dam Sites

#### 1) Cibanten dam site

The Cibanten dam site is selected at 150 m downstream of confluence point between Cibanten river about 21.75 km upstream of the river mouth, at 10 km south of Serang. The site is accessible from Serang by the all-weather motorable road.

The dam and reservoir area are characterized by wide open valley and flat topography. The hills with ridges at the dam axis is formed around El.120 m. On the dam axis, the river, about 10 m wide shows a large meander with the riverbed at El.75.0 m. The slopes on both banks rise at around 1/2.0 of gradient almost immediately from the river brinks.

Both abutments are covered by residual soil of only 1 m in thickness. The weathered welded tuff under thin residual soil is about 20 m in depth. The difficulties in foundation treatment are not envisaged.

Annual inflow from the catchment area of 73.15 km<sup>2</sup> is estimated to be 63 x 10<sup>6</sup> m<sup>3</sup>. An area-storage curve of the reservoir is as shown in Fig. F-1.

#### Downstream Cidanau dam site

The dam site is selected at about 3.5 km upstream of the Cidanau river mouth, at 15 km south of Anyer. The site is accessible from Anyer by a jeep.

The dam and reservoir area are characterized by narrow valley and steep topography. The hills with ridges at the dam axis is formed around El.80 m. On the dam axis, the river, about 10 m wide shows a small meander with the riverbed at El.20.0 m. The slopes on both banks rise at around 1/1.5 of gradient almost immediately from the river brinks.

Both abutments around El.50 m to El.60 m are covered by residual soil of 5-10 m in thickness. The weakly welded pumice tuff under residual soil is about 10-15 m in depth and the top of CL class is located around El.50.0 m. The welded tuff under weakly welded pumice tuff widely develops around 30-45 m depth. The mudstone develops 2-3 m depth with the dipping downstream, 1/20 around El.0 m. The artesian ground water is observed beneath mudstone.

Permeability is generally high. Treatment including the artesian ground water will be made by ordinal procedure of grouting.

Annual inflow from the catchment area of  $208.25 \text{ km}^2$  is estimated to be 429 x  $10^6 \text{ m}^3$ . An area-storage curve of the reservoir is as shown in Fig. F-2.

#### 3) Cidanau gated weir site

The Cidanau gated weir site is selected at 200 m upstream of existing Cidanau intake weir about 1.2 km upstream of the river mouth, at 13 km south of Anyer. The site is accessible from Anyer by a jeep.

The dam and reservoir area are characterized by wide open valley and flat topography with scattered low hills. The hills with ridges at the dam axis are formed around El.35.0 m. On the dam axis, the river, about 60 m wide flows northeast at the riverbed of El.0 m. The slopes on both banks rise at around 1/3.5 of gradient almost immediately from the river brinks.

Both abutments are covered by residual soil of only 1-2 m in thickness. The unconsolidated pumice tuff under thin residual soil is about 5-7 m in depth. The welded pumice tuff under unconsolidated pumice tuff widely develops and the permeability is low. However, the riverbed is covered by deposited silt, sand and gravel of 15 m in maximum depth. The thick deposited material will be removed and backfilled by the leveling concrete for dam foundation.

Annual inflow from the catchment area of  $214.95 \text{ km}^2$  is estimated to be 452 x  $10^6 \text{ m}^3$ . An area-storage curve of the reservoir is as shown in Fig. F-3.

#### 4) Heightening of Krenceng dam

The Krenceng dam will be heightened at the downstream slope of the existing Krenceng dam. The dam is located about 4 km upstream of the river mouth, at 2.5 km west of Cilegon. The site is accessible from Cilegon by the all-weather motorable road.

The dam and reservoir area are characterized by wide open valley and flat topography with scattered low hills. The hills with ridges at the dam axis are formed around El.30 m.

The downstream foundation along the existing Krenceng dam is covered by residual soil of only 0.5 m in thickness. The weathered pumice tuff under thin residual soil is about 4 m in depth. The weakly welded pumice tuff under weathered pumice tuff is about 4 m in depth. The permeability is low.

Annual inflow from the catchment area of  $13.3 \text{ km}^2$  is estimated to be 13.5 x  $10^6 \text{ m}^3$ . An area-storage curve of the reservoir is as shown in Fig. F-4.

#### (5) Beroeng intake weir and diverted tunnel

The Beroeng intake weir is selected at 15 km upstream of mouth, 6 km upstream of the existing Krenceng dam. The site is accessible from Cilegon by a jeep along around on the ridge between Beroeng and Krenceng rivers.

The intake area is characterized by wide open valley and flat topography with scattered low hills. The inlet portal of diverted tunnel is located just upstream of intake weir. The tunnel passes through the gentle hill, the ground covering of which is 20-30 m. The residual deposit is thin around the weir and tunnel site. The weathered pumice tuff is exposed.

Annual inflow from the catchment area of  $12.1 \text{ km}^2$  is estimated to be 12.3 x  $10^6 \text{ m}^3$ .

#### (6) Anyer intake weir and diversion tunnel

The Anyer intake weir is selected at 12.5 km upstream of the river mouth, 10 km upstream of the existing Krenceng dam. The site is accessible from Cilegon by the all-weather motorable road along the ridge between Anyer and Krenceng basins.

The intake area is characterized by wide open valley and flat topography with scattered low hills. The inlet portal of diverted tunnel is located just upstream of intake weir. The tunnel passes through the gentle hill, the ground covering of which is 10-15 m. The residual deposit is thin around the weir and tunnel site. The weathered pumice tuff is exposed.

Annual inflow from the catchment area of  $17.5 \text{ km}^2$  is estimated to be 18.6 x  $10^6 \text{ m}^3$ .

#### 3. Comparative Study for Alternative Development Schemes

#### 3.1 Comparative Study of Alternative Single Development Schemes

#### 3.1.1 Formulation of Alternative Single Development Schemes

The following alternative schemes were selected through the site reconnaissance as shown in Fig. F-6. The six alternative development schemes are summarized as below;

#### 1) A-1: Cibanten dam development scheme

Construction of a storaged type dam in the Cibanten river, together with a 28 km pipe line to convey water from the dam site to the existing Krenceng receiving reservoir at Cilegon, and an additional water treatment plant.

#### 2) A-3: Downstream Cidanau dam development scheme

Construction of a storaged type dam in the Cidanau river, together with an additional water treatment plant. Water is conveyed from the existing Krakatau intake weir to the existing Krenceng receiving reservoir at Cilegon through the existing 27.2 km pipe line.

#### 3) A-6: Cidanau gated weir development scheme

Construction of a weir with high gates located at just upstream of existing Krakatau intake weir, together with an additional water treatment plant. Water is conveyed from the existing Krakatau intake weir to the existing Krenceng reservoir at Cilegon through the existing 27.2 km pipeline.

#### 4) K-1: Krenceng dam heightening scheme without diversion tunnel

Heightening of Krenceng dam, replacement of the pumping station and construction of an additional water treatment plant. Water is conveyed from the existing Krakatau intake weir to the heightened Krenceng reservoir through the existing 27.2 km pipe line.

#### 5) K-2: Krenceng dam heightening scheme with one diversion tunnel

Heightening of Krenceng dam and construction of a diversion tunnel from Beroeng river to the Krenceng basin, replacement of the pumping station at Krakatau intake and construction of an additional water treatment plant near Krenceng. Water is conveyed from the existing Krakatau intake weir to the heightened Krenceng reservoir

6) K-3: Krenceng dam heightening scheme with two diversion tunnels

Heightening of Krenceng dam along its downstream slope of and construction of two diversion tunnels from Beroeng river to Krenceng basin and Anyer river to Krenceng basin, replacement of the pumping station near Krakatau intake and construction of additional water treatment plant. Water is conveyed from the existing Krakatau intake weir to the heightened Krenceng reservoir through the existing 27.2 km pipe line.

#### 3.1.2 Design Criteria

1) Design criteria of dam and appurtenant facilities

The following design criteria is adopted and applied to the Formulation study.

#### (1) Design flood discharge

- a) The spillway is designed by 120% peak discharge of 200-year flood without reservoir retardation effect.
- b) The energy dissipator is designed by the peak discharge of 100-year flood adopted as the design flood discharge without reservoir retardation effect.
- c) The diameter of diversion tunnel is designed in order to discharge the 25-year inflow flood hydrograph without overtopping the cofferdam under construction.

The same design flood discharge is applied to both concrete and fill types at this stage.

#### Probable Flood Peak

(unit:  $m^3/s$ )

Return period (year)	Cibanten dam site	Downstream Cidanau dam site	Cidanau gated weir site	Heightening Krenceng dam site
25	814	3461)	3461)	128
100	1033	4441)	4441)	171
1.2 x 200	1324	535 <sup>1)</sup>	5351)	225

Note: 1) means regulated peak outflow at the outlet of Rawa Danau.

#### (2) Normal high water level and low water level

In the spillway with a non-gated overflow weir being adopted, the normal high water level (NHWL.El.) corresponds to the crest elevation of a spillway overflow weir.

The low water level (LWL.El.) corresponds to the horizontal sedimentation in 100 years

#### (3) Freeboard and dam crest elevation

The freeboard which provides the highest crest elevation of non-overflow section of a main dam is adopted from the following alternative combination of freeboard and the maximum design water surface.

Maximum design water surface	Freeboard requirement
Normal high water level	Hf (1) = hw +he+ha+hi or 3 m for fill type and 2 m for concrete type
Design flood discharge water	Hf(2)=hw+ha+hi or 2 m for fill type and 1m for concrete type

where, hw: Wave height due to wind

he: Wave height due to earthquake

ha: Rise of water level due to unexpected accident in operating

spillway gates (0.5 m for a gated type and 0 for a non-gated

type)

hi : Addition of allowance for safety according to type and importance of dams (1 m for fill dams and 0 m for concrete dams)

The crest elevation of the non-overflow section of a main dam which corresponds to the crest elevation of the impervious core of a fill dam, is the sum of the maximum design water level and the freeboard.

#### (4) Dam foundation

The depth of the cutoff trench for fill dam is excavated down to the top of CM class. The rock and random zones for fill dam is excavated down to the top of CL class.

The foundation of concrete dam is laid on the top of CM class.

#### (5) River diversion

The river diversion during the construction is divided into two types, tunnel type and multi-stage diversion type.

#### (6) Dam

The dam type is divided into three types, rockfill type, earthfill type and concrete gravity type.

Both upstream and downstream slopes for the rockfill dam and earthfill dam are conservatively designed with 1: 3.0, respectively.

In the concrete gravity dam, the upstream is vertical and downstream is 1:0.6.

# (7) Spillway

The spillway is divided into two types, gated type and non-gated type.

## 2) Design criteria of water supply facilities

#### (1) Outlet works

#### Intake

The intake tower which is of reinforced concrete is provided in the reservoir and its foundation is laid on the top of CM class.

#### Shaft and tunnel

The bottom of intake tower is connected to the diversion tunnel through the vertical shaft and horizontal tunnel. The diversion tunnel between the upstream plug portion and downstream plug portion beneath the dam axis is utilized as the permanent waterway after the operation of reservoir.

#### Steel conduit and outlet facility

The steel conduit is installed in the tunnel between the downstream plug portion and outlet portal. The outlet facility which consist of guard gate valve and hollow jet valve is provided at the downstream of tunnel portal.

In the proposed Cibanten dam, the irrigation water requirement to the downstream is regulated by the hollow jet valve and the water supply pipe line to the existing Krenceng reservoir is branched between the guard gate valve and hollow jet valve.

In the proposed Cidanau dam, the storaged water in the reservoir is released to the downstream Cidanau river by the hollow jet valve.

In the proposed Cidanau gated weir, the storaged water in the reservoir is directly transmitted to the existing sand trap basin by the steel conduit, about 200 m length between the upstream surface of non-overflow section at the gated weir and the entrance of existing sand trap basin. The regulation is made by hollow jet valve to be installed at the entrance.

#### (2) Water supply pipe line and pump station

#### Water transmission system from cibanten river

The water transmission system from the Cibanten dam to the existing Krenceng reservoir is of an embedded pipe line type because it is difficult to construct the open channel in view of topographic condition. The open channel will cause serious transportation loss and water pollution.

If the foundation condition is normal, pipes are placed on a sand bed of 30 cm in thickness in the excavated trench with a bottom width of 1.70 m. Side slopes of the trench will vary 1:0.3 to 1:0.5 depending on the soil condition. Soil cover of the pipe should be about 1.2 m.

#### Water conveyance and treatment facility from Cidanau river

- (1) In principle the incremental development due to the Project above the design capacity of existing Krakatau water conveyance and treatment facilities is additionally provided for the intake sand trap basin and Cidanau pump station and the water treatment plant.
- (2) The existing water conveyance facility which consists of Cidanau pump station and 27.2 km long pipe line having the conveyance capacity of 2 m<sup>3</sup>/sec at the maximum pumping head of 67.1 m is operated so as to exceed the design capacity of the existing.
- (3) The additional pumps to be provided at Cidanau pump station should be designed at the total head of 67.1 m.
- (4) In case that the development yield exceeds the existing, full water can not conveyed upto the Krenceng reservoir by using the design head of Cidanau pumps.

Therefore, the booster pump station should be provided at the intermediate point, about 14.25 km from the Cidanau pump station so as to convey the water up to the Krenceng reservoir after receiving of water conveyed from the Cidanau pump station.

Land of the state of the weather

- (5) According to the booster pump station, the surge tank is additionally provided at the place between the booster pump station and Krenceng receiving well.
- (6) The existing Krenceng pump station is replaced by the proposed heightening of Krenceng dam.
- (7) Distribution line

The distribution line is not included at this stage.

- 3.1.3 Water Balance Study
- (1) General condition

where,

The basic equation for the water balance study is;

$$ds/dt = O - I$$

ds: differential of reservoir capacity between time interval dt,

O: Safe yield
I: inflow

The general condition for water balance study is summarized as below;

 The inflow at each gauging station is calculated based on five (5)-day mean inflow based on the revised discharge rating curve. The simulation of water balance is carried out for 10 years as below.

Data of five(5)-day mean inflow at Serut : 1980 to 1989

Data of five(5)-day mean inflow at Kubang Baros : 1980 to 1989

2) The inflow into the proposed dam site and intake site for diverted tunnel is calculated as below.

$$Q_{\text{site}} = Q_{\text{key}} \cdot (R_{\text{site}}/R_{\text{key}}) \cdot (A_{\text{site}}/A_{\text{kcy}})$$

where;

Q<sub>site</sub>, R<sub>site</sub>, A<sub>site</sub>: daily mean discharge, annual rainfall and catchment

area at the project site, respectively.

 $Q_{key}$ ,  $R_{key}$ ,  $A_{key}$ : daily mean discharge, annual rainfall and catchment area at the key gauge site, respectively.

Annual rainfall and catchment area of the key gauges and project sites are as follows:

Proposed sites			Key gauge		
Name of site	Catchment area (km²)	Annual rainfall (mm)	Name of gauge	Catchment area (km <sup>2</sup> )	Annual rainfall (mm)
Cibanten dam	73.15	2000	Serut	73.15	2000
Cidanau downstream dam	208.25	3000	Kubang Baros	199.5	3000
Krakatau intake	214.95	3000	Kubang Baros	199.5	3000
Beroeng intake	12.10	2250	Serut	73.15	2000
Anyer intake	17.50	2500	Serut	73.15	2000
Krenceng dam	13.30	2250	Serut	73.15	2000
Cidanau gated weir	214.95	3000	Kubang Baros	199.5	3000

- 3) The basin area of alternative plan is obtained by the topographic map of 1/50,000.
- 4) The evaporation loss on the reservoir and transportation loss of water transmission facilities to the water treatment plant are neglected at this stage.
- 5) The sedimentation volume of reservoir is estimated based on the analysis results of sediment sampling conducted during first field work at the Cidanau and Cibanten rivers.

Cibanten river basin : 900 m³/year/km² Cidanau river basin : 500 m³/year/km² Krenceng river basin : 900 m³/year/km²

6) The river maintenance flow to the downstream reach is considered only the period of dry season for proposed Beroeng and Anyer intake sites because the wet season is satisfied by the return flow due to the irrigation water to be released from the proposed intake weir.

The river maintenance flow is converted by the annual rainfall, catchment area and 2-yrs probable drought at Serut gauging station.

#### River maintenance flow during dry season

Downstream Anyer

0.12 m<sup>3</sup>/sec

Downstream Beroeng :

0.07 m<sup>3</sup>/sec

The area and storage capacity curves of proposed dam sites were obtained by 7) the following topographic maps;

Cibanten dam site: existing 1/5,000

Cidanau dam site : 1/5,000 by topographic mapping during first field

work

Krenceng dam site: 1/2,000 by topographic and hydrographic survey

during second field work

- 8) The required effective storage volume for corresponding safe yield was obtained by maximum drought during the period of 10 years.
- (2) Specific condition

The specific condition of water balance study for each alternative is summarized as below.

1) Downstream conditions of proposed intake

> The downstream water requirement at the proposed intake site for the diversion tunnel is obtained as below.

$$Qr = \frac{IDR}{1000} \times Ha \times 1000$$

where,

: downstream water requirement (m<sup>3</sup>/day)

IDR: irrigation diversion requirement (mm/ha/day)

Ha: Total irrigable area in the Anyer basin (ha)

Downstream

Anyer: 320 ha during wet season

Beroeng: 120 ha during wet season

There is no data of irrigation water requirement for the paddy area in wet season. IDR is tentatively obtained by using the basic design report for rehabilitation of Ciujung irrigation canal system (June 1990) and the effective rainfall is obtained by the data of daily rainfall at Serang gauging station.

#### 2) Operation of diversion tunnel

The basic conditions for the water balance study against the downstream is as follows:

During wet season  $Qb \ge IDR$  : Q = Qb - IDR

Qmax = Qt

Qb < IDR : Q = 0

During dry season  $Qb \ge DRM$  : Q = Qb - DRM

 $\tilde{Q}$ max = Qt

Qb < DRM : Q = 0

Where, Qb: inflow at diversion site

IDR : irrigation diversion requirement

Qt : Maximum discharge capacity of tunnel (4.0 m<sup>3</sup>/sec)

DRM: downstream river maintenance flow

#### 3) Downstream condition of Cibanten dam site

The present downstream paddy area of Cibanten dam site through the intake weir is estimated by 1961 ha in wet season and 566 ha in dry season. The IDR is also obtained by the report of Ciujung irrigation canal system mentioned above and the effective rainfall is obtained by the data of daily rainfall at Serang gauging station.

#### (3) Flow chart of computation procedure

The flow chart of computation procedure is shown in Figs. F-7 to F-9 and its schematic diagram is shown in Figs. F-10 to F-15.

#### 3.1.4 Safe Yield for Existing Krakatau Water Supply System

The principal features of the existing Krakatau water supply system which consist of intake weir at the Cidanau river, pump station, 27.2 km long pipe line, Krenceng

reservoir, suction pump and water treatment plant are presented but there are no design data for safe yield of the existing Krakatau water supply system.

#### 1) Basic conditions

- Water conveyance capacity of a 27.2 km long pipe line

2.0 m<sup>3</sup>/sec

- Capacity of suction pump and water treatment plant

2.0 m<sup>3</sup>/sec

- Inflow at the Krenceng dam site from Krenceng own catchment area
- Inflow at the Krakatau intake weir site

#### 2) Revised storage volume

Based on the hydrographic survey results in the Krenceng reservoir carried out during the 2nd Field Work and 4th Field Work, the reservoir storage should be revised as below.

(unit:  $10^6 \text{m}^3$ )

Storage	Original (Krakatau's data)	Revision (Measurement)	Balance
Effective <sup>1)</sup>	1.45	3.155	+1.705
Gross <sup>2)</sup>	2.50	4.90	+2.400

Notes;

- 1) between LWL.18.50 and NHWL.22.50
- 2) between LWL.18.50 and Max.WL.24.00

# 3) Simulation study results of safe yield

According to the water balance study by Scheme K-1, the simulation study for the existing Krakatau water supply system is carried out by two cases so as to justify the safe yield.

- Case -1: with pump station and 27.2 km long pipe line

  (Krenceng own catchment and natural flow at Krakatau intake weir site)
- Case -2: without pump station and 27.2 km long pipe line (Only Krenceng own catchment)

# 3) Safe yield

Case -1: 1.97 m<sup>3</sup>/sec

Case  $-2: 0.235 \text{ m}^3/\text{sec}$ 

Considering the above simulation results, it is justified that the facility capacity of existing Krakatau water supply system, 2.0 m<sup>3</sup>/sec is well coincided with the safe yield, 1.97 m<sup>3</sup>/sec.

The safe yield of existing Krakatau water supply system is evaluated by 1.97 m<sup>3</sup>/sec.

3.1.5 Safe Yield vs. Required Effective Storage and Safe Yield vs. NHWL for Alternative Scheme

The safe yield vs. required effective storage and safe yield vs.normal high water level (NHWL) for alternative development schemes are summarized in Figs. F-16 to F-21.

#### 3.1.6 Maximum Exploitable Dam Scale and Development Yield

#### 1) Cibanten dam

From the topographical constraint where the ridge of both abutments is located at El.120.00 m, upper limit (NHWL) of the Cibanten dam site is set at El.115.00 m considering the freeboard of 5 m including the overflow depth. Besides, the geological condition is favourable and with thin top soil. Thus, the maximum exploitable dam scale is limited at NHWL.El.115.00 m. The development yield is 0.45 m<sup>3</sup>/sec under the condition that the design sedimentation has 6.58x10<sup>6</sup> m<sup>3</sup> and the downstream irrigation water requirement be satisfied with an 80% probability of exceedance the drought.

#### 2) Downstream Cidanau dam

From the topographical constraint where the ridge of left abutment is located at El.75.0 m, upper limit (NHWL) of the Cidanau dam site is set at El.70.0 m considering the freeboard of 5 m including the overflow depth. However, the residual soil and unconsolidated pumice tuff (D class) are covered up to El.50.0 m and the underlying weakly welded pumice tuff, CL class develops. The foundation of fill dam should be laid on the top of CL class.

Thus, the maximum exploitable dam scale is limited at NHWL.El.50.00 m and the gross storage is  $7.11 \times 10^6$  m<sup>3</sup> above the river bed of El.20.0 m.

Adding the design sedimentation, no effective storage is remained. In order to secure possible effective storage, the sediment basin is provided just upstream of outlet of Rawa danau.

Sediment basin: 1 nos x300 wide x300 m length (Wet season)

Excavation depth 2.5 m

Total water depth 2.0 m

Effective water depth 1.0 m

1 nos x100 wide x50 m length(dry season)

Excavation depth 2.0 m

Total water depth 1.5 m

Effective water depth 0.5 m

Smallest particles to be settled 0.035 mm

Critical velocity  $10 \text{ cm/sec=Vc=a(d)}^{(1/2)} = 51(0.035)^{(1/2)}$ 

Design velocity 0.1 m/sec=Q/A=30/(1x300)

Settled particles 60% (above 0.035 mm based on the

sediment sample in 1st field work)

Considering the above, the practical sedimentation become  $4.165 \times 10^6 \text{ m}^3$  and the effective storage become  $2.945 \times 10^6 \text{ m}^3$ . The development yield is  $1.825 \text{ m}^3/\text{sec}$ .

## 3) Cidanau gated weir

From the topographical constraint where the ridge of both abutments is located at El.35.00 m, upper limit (NHWL) of the Cidanau gated dam site is set at El.32.00 m considering the freeboard of 3 m with flood regulation by the gate. Besides, the geological condition is favourable but the removal of deposited material below the river bed is needed.

However, the maximum exploitable gate height is limited to around 20 m. Considering the above, the normal high water level is set at El.20.0 m and the development yield is 1.97 m<sup>3</sup>/sec.

## 4) Heightening of Krenceng dam

From the topographical constraint where the ridge of both abutments is located at El.32.00 m, upper limit (NHWL) of the heightened Krenceng dam is set at 29.00 m considering the freeboard of 3 m with flood regulation by the gate. Besides, the geological condition is favourable for foundation of fill dam.

Thus, the maximum exploitable dam scale is limited at NHWL.El.29.00 m. The gross storage is  $12.60 \times 10^6 \text{ m}^3$  above the lowest elevation of El.13.00 m. The effective storage is  $11.40 \times 10^6 \text{ m}^3$  considering the design sedimentation of  $1.20 \times 10^6 \text{ m}^3$ .

Scheme	Development yield (m <sup>3</sup> /sec)
K-1	3.10
K-2	3.15
К-3	3.20

#### 3.1.7 Incremental Yield for Alternatives

From the above results, the incremental yield for the alternatives is summarized as below.

Scheme	Maximum exploitable dam height (m)	Effective storage volume (10 <sup>6</sup> m <sup>3</sup> )	Develop- ment yield (cms)	Existing yield (cms)	Increment- al yield (cms)	Total system yield (cms)	Water demand of forecast in 2005 (cms)	Surplus /deficit (cms)
A-1	45 1)	14.9	0.45	1.97	0.45	2.42	3.67	-1.25
A-3	35 2)	2.95	1.825	1.97	0.09	2.06	3.67	-1.61
A-6	24.2 3)	3.44	1.970	1.97	0.235	2.205	3,67	-1.465
K-1	24 1)	12.87	3.10	1.97	1.03	3.00	3.67	-0.57
K-2	24 1)	12.87	3.15	1.97	1.15	3.12	3.67	-0.52
K-3	24 1)	12.87	3.20	1.97	1.28	3.25	3.67	-0.47

Notes:

- 1) due to topographic constraint
- 2) due to geological constraint
- 3) due to hydro-mechanical constraint

## 3.1.8 Preliminary Design and Principal Features for Alternative Single Development Schemes

The general plan of proposed dam and its reservoir are shown in Figs. F-22 to F-25. The plan, the maximum section and the upstream view of the main structures for the proposed dam are shown in Figs. F-26 to F-29. The plan and profile of conveyance from the proposed Cibanten dam to Krenceng receiving reservoir is shown in Fig. F-30. The principal features for alternative single development scheme are summarized in Table F-2.

## 3.2 Comparative Study on Alternative Combined Development Schemes

#### 3.2.1 Necessity of Comparative Study on Combined Development

As seen in the results of Chapter 3.1.7, any single development scheme cannot satisfy the urgent water demand in the year 2005. Therefore, the comparative study on alternative combined development scheme is required so as to increase the total system yield in the Study Area.

#### 3.2.2 Formulation of Alternative Combined Development Schemes

The following three alternative combined development schemes are divided into three groups in terms of the type of development for the heightening of Krenceng dam and formulated by nine (9) alternatives as below.

Scheme	Single scheme to be combined
B-1	K-1 plus A-1
B-2	K-1 plus A-3
B-3	K-1 plus A-6
C-1	K-2 plus A-1
C-2	K-2 plus A-3
C-3	K-2 plus A-6
D-1	K-3 plus A-1
D-2	K-3 plus A-3
D-3	K-3 plus A-6

#### 3.2.3 Design Criteria

#### Dam and appurtenant facilities

The design conditions concerned are same as the alternative single development one.

## 2) Water transmission facilities

## (1) Krakatau pump station

The Krakatau pump station should be added by the incremental yield except Scheme B-1, C-1 and D-1.

## (2) Booster pump station

The booster pump station should be added by the development yield except Scheme B-1, C-1 and D-1.

## (3) Krenceng pump station

The Krenceng pump station should be replaced by the development yield.

#### (4) Water treatment plant

The water treatment plant should be added by the incremental yield.

## 3.2.4 Water Balance Study and Incremental Yield

### 1) Water balance study

The water balance study for the combined development scheme is carried out by the same procedures described in Chapter 3.1.3.

The flow chart of computation procedure and the schematic diagram is shown in Figs. F-31 (1) to F-34.

#### 2) Safe yield

The safe yield, required effective storage volume and normal high water level for each scheme are summarized in Figs. F-35 to F-40.

#### 3) Incremental yield

From the above results, the incremental yield for the alternatives is summarized as below.

Scheme	Development yield	Existing yield	Incremental yield	Total system yield	Water demand forecast in 2005	Surplus or deficit
B-1	3.55	1.97	1.58	3.55	3.67	-0.12
B-2	3.40	1.97	1.43	3.4	3.67	-0.27
B-3	3.435	1.97	1.465	3.435	3.67	-0.235
C-1	3.60	1.97	1.63	3.60	3.67	-0.07
C-2	3.445	1.97	1,475	3.445	3.67	-0.225
C-3	3,49	1.97	1.52	3.49	3.67	-0.18
D-1	3.65	1.97	1.68	3.65	3.67	-0.02
D-2	3.49	1.97	1.52	3.49	3.67	-0.18
D-3	3.54	1.97	1.57	3.54	3.67	-0.13

## 3.2.5 Principal Features of Alternative Combined Development Schemes

The principal features of alternative combined development schemes are summarized in Table F-2.

#### 3.3 Selection of the Scheme

#### 3.3.1 General

Based on the Single and combined Comparative Studies mentioned in Chapter 3.1 and 3.2, the schemes to be selected as the feasibility study are determined by the economic and socio-environmental view-points.

#### 3.3.2 Cost Estimate

The construction cost is estimated based on the drawings for basic design and its principal features for the alternatives. The construction period including the tender design is 7 years. The breakdown of construction costs is summarized in Table F-3 to F-26.

#### 3.3.3 Economic Cost

### **Disbursement**

The construction cost is uniformly disbursed owing to the construction period.

#### O&M costs

The annual O&M costs for the dam and appurtenant structures are 0.5% of the direct cost. Annual O&M costs for water transmission and treatment facilities are taken at 1% of direct cost.

## Pumping costs

The pumping costs due to difference between "with Project" and "without Project" are estimated by the principal features.

#### Replacement cost

The water conveyance facilities is assumed to be incurred for replacement after the life of 25 years.

#### Conversion factor

The conversion factor is 0.9

#### Economic cost

The cost above is converted by the conversion factor.

#### 3.3.4 Economic Benefit

#### Combined water tariff

The combined water tariff which consists of domestic and industrial water is estimated by 1625 Rp/m<sup>3</sup>.

#### Economic benefit

The economic benefit is obtained by multiplying the combined water tariff and incremental yield as shown in Figs. F-41 to F-55.

#### 3.3.5 Economic Evaluation

### Results

The results of economic evaluation are summarized in Table F-27 and F-28.

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## Selection of the Schemes as Feasibility Study

The comparative study on the above fifteen (15) alternative schemes was made through comprehensive evaluation from the economic, technical and social aspects. Among alternative above, K-3 is the highest EIRR. Second highest is with the Scheme K-2 third is with the Scheme K-1 and fourth is the Scheme C-3. However, K-3 is discarded because there is more 330 ha of paddy field in the downstream of Anyer main only except the tributary and the diversion to Krenceng reservoir might cause various social effect to the downstream.

Finally, the following three (3) schemes are selected as the feasibility study.

- (i) Scheme K-1: Heightening of Krenceng dam without diversion tunnel
- (ii) Scheme K-2: Heightening of Krenceng dam with Beroeng diversion tunnel
- (iii) Scheme C-3: Heightening of Krenceng dam with Beroeng diversion tunnel and Cidanau gated weir

They were agreed in the Minute of Meeting on the Interim Report between the JICA Study Team, the Advisory Committee and the DGWRD on November 8, 1991.

#### 4. Plan Optimization

The scales of heightening of Krenceng dam, Beroeng diversion tunnel and Cidanau gated weir have been decided by the maximum exploitable scale due to the topographic constraint and hydro-mechanical constraint.

Herein, the optimal development scale of each project components above was studied by comparing the capitalized net benefit of various alternative scales based on the net benefit maximization criteria.

## 4.1 Optimal Heightening Scale of Krenceng Dam

A comparative study of heightening scale of Krenceng dam was worked out on the 3 alternatives (Fig. F-56).

	Description		Alternative	
		H-1	H-2	H-3
1)	Dam crest elevation	El.32.00	El.29.00	E1.26.00
2)	Normal high water level	NHWL.29.00	NHWL,26.00	NHWL.23.00
3)	Low water level level	LWL.18.50	LWL.18.50	LWL.18.50
4)	Effective storage (10 <sup>6</sup> m <sup>3</sup> )	12.81	7.90	4.05
5)	Design sediment (10 <sup>6</sup> m <sup>3</sup> )	1.20	1.20	1.20
6)	Gross storage (10 <sup>6</sup> m <sup>3</sup> )	14.01	9.1	5.25
7)	Safe yield (m <sup>3</sup> /sec)	3.10	2.65	2.105
8)	Incremental yield (m <sup>3</sup> /sec)	1.13	0.68	0.135
8)	Annual average conveyance from Krakatau intake (10 <sup>6</sup> m <sup>3</sup> /yr)	83.72	70.34	53.53
8)	Added pump capacity at Cidanau intake (m3/sec)	1.10	0.65	0.105
9)	Replaced pump capacity at Krenceng reservoir (m3/sec)	3.10	2.65	2.105
10)	Added water treatment plant(m3/hr)	3960	2340	378

The design for heightened dam and its spillway is carried out by fixing the following conditions;

- i) The dam axis for the heightening of Krenceng dam is located at the downstream toe of the existing dam so as to keep the slope stability of existing one and secure the operation of ordinary grouting work after cut-off excavation. The heightened dam is planned by the homogeneous earthfill type with the slope of 1:3.0 in both upstream and downstream sides.
- ii) Spillway is located at 60 m leftwards from the centre of existing spillway. The spillway is designed as a gated overflow type having a 15.5 m of net width. Spillway gate consists of two roller gates having an overall dimension of 7.75 m wide and 4.30 m high.

The stilling basin is designed as the hydraulic jump type.

The work quantities for alternatives are summarized as below.

	•		Alternative			
	Item	H-1	H-2	H-3		
1)	Dam					
	Excavation (m <sup>3</sup> )	25590	215032	173998		
	Embankment (m3)	1356001	886564	550458		
	Grouting (m)	39953	31812	28074		
2)	Spillway					
	Excavation (m <sup>3</sup> )	49769	49398	48225		
	Concrete (m <sup>3</sup> )	17866	12268	7383		
3)	Gate					
	Nos.	2	2	2		
	Dimension (BxH)	7.75 x 4.3	7.75 x 4.3	7.75 x 4.3		

The results of the economic comparison are summarized as below.

(unit: 10<sup>6</sup>Rp)

			Alternative	
	Description	H-1	H-2	H-3
1)	Economic cost 1]	112532	78034	40195
2)	Capitalized cost (C) 2]	91575	63293	32410
3)	Capitalized benefit (B) 3]	243637	146614	29107
4)	Net benefit (B-C)	152062	83320	-3303
5)	Benefit cost ratio (B/C)	2.66	2.32	0.90

Note:

1] Conversion factor: 0.9

2] Included O&M cost and pumping cost
Capitalized by the discount rate of 12%

3] Water tariff after treatment: 1625 Rp/m<sup>3</sup>

As shown in the table above, the alternative H-1, the maximum heightening scale yields the highest net benefit among the 3 alternatives.

## 4.2 Optimal Scale of Beroeng Diversion Tunnel

## (1) Basic approach

The economic diameter was obtained with the least cost criteria, taking into consideration the construction cost of alternative diversion tunnel and the

differential pumping cost of Krakatau intake due to the water conveyance from the Krakatau intake.

## (2) Design condition

The diversion tunnel is designed under the hydraulic condition of pressure flow. The downstream water depth at the outlet portal is assumed to set the crown of tunnel because the discharge capacity of downstream hydraulic cross section in the Krenceng river is bigger than that due to prospective tunnel diameter. The upstream water level at the inlet portal is designed to set the water depth of one (1) diameter of the tunnel above the tunnel crown at the inlet portal so as to keep the pressure flow condition. No slope of tunnel is provided.

$$H = \left(\frac{124.5 \text{ n}^2 \text{L}}{\text{D}^{4/3}} + \text{fe} + \text{fo}\right) \frac{\text{v}^2}{2\text{g}} = D$$

where, H: loss head between inlet and outlet (m)

g: acceleration of gravity (= 9.8 m/s<sup>2</sup>)

n: roughness coefficient for concrete (= 0.014)

L: tunnel length (= 280 m)

fe : coefficient of entrance loss

fo : coefficient of exit loss (= 1.0)

v : flow velocity

D: tunnel diameter

#### (3) Alternatives

Four (4) alternatives are selected as below.

			Alter	native	
	Description	J-1	J-2	J-3	J-4
1)	Tunnel diameter(m)	1.50	2.00	2.50	3.00
2)	Maximum discharge(cms)	4	11	20.5	35

The water balance study was carried out by fixing the following conditions;

i) The water conveyance capacity of Krakatau pump station has 3.15 m<sup>3</sup>/sec which corresponds to the safe yield of heightening of Krenceng reservoir.

The basic conditions for the water balance study against the downstream ii) Beroeng is as follow.

During wet season

Qb ≥ IDR

Q = Qb - IDR

 $\widehat{Q}$ max = Qt

Qb < IDR

Q = 0

During dry season

Qb≥DRM

Q = Qb - DRM

 $\widehat{Q}$ max = Qt

Qb < DRM

Q = 0

where,

Qb

: inflow at Beroeng diversion site

IDR :

irrigation diversion requirement

Qt

Maximum discharge capacity of tunnel

DRM: downstream river maintenance flow

#### (4)Results of water balance study

			Altem	ative	
	Description	J-1	J-2	J-3	J-4
1)	Development yield(cms)	3.15	3.15	3.15	3.15
2)	Required effective storage $(10^6 \text{m}^3)$	12.83	12.83	12.83	12.83
. 3)	Design sediment(10 <sup>6</sup> m <sup>3</sup> )	1.20	1.20	1.20	1.20
4)	Gross storage(10 <sup>6</sup> m <sup>3</sup> )	14.03	14.03	14.03	14.03
5)	Normal high water level (El-m)	29.00	29.00	29.00	29.00
6)	Water conveyance from Krakatau intake(10 <sup>6</sup> m <sup>3</sup> /yr)	77.238	77.057	77.057	77.057
7)	Water conveyance thru Beroeng diversion tunnel (10 <sup>6</sup> m <sup>3</sup> /yr)	10.062	10.243	10.243	10.243
8)	Total water conveyance to Krenceng reservoir (10 <sup>6</sup> m <sup>3</sup> /yr)	87.300	87.300	87.300	87.300

The annual equivalent of tunnel construction cost and differential pumping cost are summarized as below.

(unit: 106Rp)

	Demonstrations	Alternative				
	Description	J-1	J-2	J-3	J-4	
1)	Tunnel diameter(m)	1.5	2.0	2.5	3.0	
2)	Direct cost for tunnel	422.73	599.91	803.65	1033.94	
3)	Annual equivalent cost 1]	50.90	72.24	96.77	124.50	
4)	Annual pumping cost	2980.9	2974.5	2974.5	2974.5	
5)	Total annual cost	3031.8	3046.7	3071.3	3099.0	

Note: 1] Capital recovery factor, CRF:0.120416 Discount rate: 12%

As shown in the table above, the alternative J-1, the minimum tunnel diameter in the practical construction yields the lowest cost among the 4 alternatives.

## 4.3 Optimal Scale of Cidanau Gated Weir

A comparative study of gate height of Cidanau gated weir was worked out on the 2 alternatives (Fig. F-56).

		Aite	rnative
	Description	M-1	M-2
1)	Dam crest elevation	El.24.20	El.21.20
2)	Normal high water level	NHWL.21.20	NHWL.18.20
3)	Low water level	LWL.1.50	LWL.1.50
4)	Effective storage (10 <sup>6</sup> m <sup>3</sup> )	3.44	2.37
5)	Design sediment (10 <sup>6</sup> m <sup>3</sup> )	- '	-
6)	Gross storage (10 <sup>6</sup> m <sup>3</sup> )	3.44	2.37
7)	Safe yield (cms)	1.97	1.75
8)	Total yield (cms)	2.205	1.985
9)	Incremental yield (cms)	0.235	0.015
10)	Spillway gate	3 nos. x 17 m wide x 20 m high	3 nos. x 17 m wide x 17 m high
11)	Added pump capacity at Cidanau intake (m <sup>3</sup> /scc)	· •	
12)	Added water treatment plant (m <sup>3</sup> /hr)	738	54

The design for gated weir and its spillway is carried out by fixing the following conditions;

- i) The dam type for both abutments is of concrete gravity one. The upstream is vertical and downstream is 1:0.6.
- ii) The crest elevation and net width for gated weir are set at El.1.50 m and 51 m, respectively.

The work quantities for alternatives are summarized as below.

ltem		
	M-1	M-2
Dam		
Excavation(m <sup>3</sup> )	21324	20067
Concrete(m <sup>3</sup> )	23519	18984
Grouting(m)	3806	3140
Spillway		•
Excavation(m <sup>3</sup> )	24059	24059
Concrete(m <sup>3</sup> )	22011	19884
Gate		
Nos.	2	. 2
Dimension(BxH)	17 x 20	17 x 17

The results of the economic comparison are summarized as below.

(unit: 10<sup>6</sup>Rp)

		Alten	native
	Description —	M-1	M-2
1)	Economic cost 1]	67484	57927
2)	Capitalized cost (C) 23	46012	39182
3)	Capitalized benefit (B) 3]	50668	3234
4)	Net benefit value (B-C)	4656	-35948
5)	Benefit cost ratio (B/C)	1.10	0.08

Note:

- 11 Conversion factor: 0.9
- 2] Included O&M cost and pumping cost Capitalized by the discount rate of 12%
- 3] Water tariff after treatment: 1625 Rp/m<sup>3</sup>

As shown in the table above, the alternative M-1, the maximum gate height is more economical than M-2.

## 4.4 Final Reservoir Operation and Net Safe Yield

The final reservoir operation was carried out by fixing the development scale of each component determined in the preceding chapter so as to obtain the net safe yield for each scheme which means the supply yield after the evaporation loss from the reservoir.

#### 1) Basic conditions

#### (i) Reservoir operation study

The reservoir operation study was carried out by the following four (4) cases;

Case 1: Existing Krenceng dam

Case 2: Scheme K-1 (Heightening of Krenceng dam without Beroeng diversion tunnel)

Case 3: Scheme K-2 (Heightening of Krenceng dam with Beroeng diversion tunnel)

Case 4: Scheme C-3 (Heightening of Krenceng dam with Beroeng diversion tunnel and Cidanau gated weir)

	Description	Case 1	Case 2	Case 3	Cas	se 4
1)	Reservoir	Krenceng	Krenceng	Krenceng	Krenceng	Cidanau
2)	NHWL	22.50	29.00	29.00	29.00	21.20
3)	LWL	18.50	18.00	18.00	18.00	1.50
4)	Capacity of diversion tunnel (m <sup>3</sup> )		-	4.0	4.0	-

## (ii) Evaporation loss

The evaporation loss from the reservoir surface is estimated to be 70% of the mean pan-evaporation observed at Padarincang.

											(ui	110:11111/	day)
	Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1)	Observed pan record	4.5	3.7	3.3	3.4	3.4	3.1	3.4	4.4	4.0	4.1	4.5	4.1
2)	Evaporation loss	3.15	2.59	2.31	2.38	2.38	2.17	2.38	3.08	2.80	2.87	3.15	2.87

## 2) Results of reservoir operation study

## (i) Net supply yield

The net supply yield for each case is summarized as below.

	Case	Net supply yield (m <sup>3</sup> /sec)	Net incremental supply yield (m <sup>3</sup> /sec)
i)	Existing Krenceng dam	1.94	-
ii)	Heightening of Krenceng dam without diversion	3.05	1.11
iii)	Heightening of Krenceng dam with Beroeng diversion tunnel	3.11	1.17
iv)	Heightening of Krenceng dam with Beroeng diversion tunnel and Cidanau gated weir	3.435	1.495

## (ii) Reservoir operation study

The results of reservoir operation study were shown in Figs. F-58 to F-65 and Table F-34 (1) to F-37 (12).

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# TABLES

Table F-1 Principal Features for Alternative Single Development Schemes

		A-1	Λ-3	A-6	K-1	K-2	K-3
		Cibanten Dam	stream Cidanau	Cidanau Gated Weir	Heightening of Krenceng Dam without Diversion	Heightening of Krenceng Dam with One	Heightening o Krenceng Dam with Two Diversions
			Dam		DIVERSION	Diversion	Diversions
Reservoir		~··					
Name of river Catchment area	km²	Cibanten	Cidanau	Cidanau	Krenceng	Krenceng	Krenceng
Reservoir surface area	km² km²	73.15	208.25	214.95	13.3	13.3	13.3
Gross capacity	10 <sup>6</sup> m <sup>3</sup>	2.1 21.5	0.6	0.41	1.8	1.8	1.8
Effective capacity	10 <sup>6</sup> m <sup>3</sup>	14.9	7.11	3.44	14.1	14.1	14.1
Development yield	m <sup>3</sup> /s	0.45	2.95 1.825	3.44	12.9	12.9	12.9
High water level	EL-m	115.0	50.0	1.97	3.10	3.15	3.20
Low water level	EL-m	104.5	44.0	21.2	29.0	29.0	29.0
Annual rainfall	mm/yr	2,250	3,000	0 3,000	18.0	18.0	18.0
Mean runoff	m <sup>3</sup> /sec	2.0	13.63	14.36	2,250 0.43	2,250	2,250
Design peak flood	m <sup>3</sup> /sec	2.0	13.03	14.50	0.43	0.43	0.43
25 yrs		814	346	346	128	128	140
100 yrs		1,033	444	44	171	171	128
1.2 x 200 yrs		1,324	535	535	225	225	171 225
Dam and Rated Facility		-,		000	LLJ	223	243
Diversion Work							
River diversion		Tunnel	Tunnel	Multi-stage	Multi-stage	Multi-stage	Marie
		scheme	scheme	diversion	diversion	diversion	Multi-stage
Diversion tunnel, L	m	410	400		-	0140191011	diversion
D	m	5	5	_	-	-	•
Diversion gate	Nos.	1	1	_		_	-
Dam		Main Saddle	-			-	
There		<u>dam</u> <u>dam</u>					
Туре		Rock- Rando	Rockfill	Gravity	Impervious	Impervious	Impervious
Crast elevation	177	fill m-fill			random-fill	random-fill	random-fill
Crest elevation	EL-m	120 120	55	24.2	32	32	32
Height (from river bed) Crest length	m	45 34	35	24.2	16	16	16
	m - 1033	340 275	255	299	2,800	2,800	2,800
Embankment/Conc.yolum Spillway	e io-m-	947 168	474	43	1,281	1,281	1,281
Турс		Side overflow	eido oundam.	D 11			
Crest elevation of weir	EL-m		Side overflow	Roller gate	Roller gate	Roller gate	Roller gate
Width of weir		115	50	1.5	24	24	24
Gate	m	150	120	61	20	20	20
(wide x height x Nos.)		-	-	17x20x3	8.75x5,5x2	8.75x5.5x2	8.75x5.5x2
Outlet Works							
Intake type		Vertical	Vertical	TY!			
Steel conduit, L	m	230	Vertical 285	Horizontal	-	-	
Guard valve	Nos.	230	1	200	-	-	-
Hollow jet valve	Nos.	1	1	1· 1	-	•	-
Diversion Tunnel	1105.	•	1	1	-	-	-
Name of river							n .
Catchment area at weir	km²	-	-		* .	Beroeng	Beroeng Anyer
Mean runoff	m <sup>3</sup> /sec	- -		₹.	=	12.1	12.1 17.5
Maximum discharge	m <sup>3</sup> /sec	-	-	-	7	0.39	0.39 0.59
macini discitate	111 /300	-	-	-	-	4.0	4.0 4.0
canacity							
capacity Diverted tunnel I						200	
Diverted tunnel, L	m	<u>-</u> -	-	-	<del>-</del> ,	300	300 700
Diverted tunnel, L D	m m	- -	-	- -		300 1.5	300 700 1.5 1.5
Diverted tunnel, L D Water Transmission Facility	m m		-	-		1.5	1.5 1.5
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L	m m <u>v</u> km	28.0	Existing	Existing	Existing	1.5 Existing	1.5 1.5 Existing
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D	m m	- - 28.0 0.7	Existing Existing	Existing Existing	Existing Existing	1.5	1.5 1.5
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/	m m ½ km m		Existing	Existing	Existing	1.5 Existing Existing	1.5 1.5 Existing
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge	m m km m m		Existing  Existing	Existing Existing	Existing 1.1	1.5 Existing Existing 1.19	1.5 1.5 Existing Existing 1.2
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head	m m km m m <sup>3</sup> /s		Existing  Existing  Existing	Existing  Existing  Existing	Existing 1.1 67.1	1.5 Existing Existing 1.19 67.1	Existing Existing  1.2 67.1
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump	m m km m m		Existing  Existing	Existing Existing	Existing 1.1	1.5 Existing Existing 1.19	1.5 1.5 Existing Existing 1.2
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump Booster pump station <sup>3/</sup>	m m km m m <sup>3</sup> /s m kW		Existing  Existing  Existing	Existing  Existing  Existing	Existing 1.1 67.1 1150	1.5 Existing Existing 1.19 67.1 1200	1.5 1.5 Existing Existing 1.2 67.1 1250
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump Booster pump station <sup>3</sup> / Pump discharge	m m km m m <sup>3</sup> /s kW m <sup>3</sup> /s		Existing  Existing  Existing	Existing  Existing  Existing	Existing 1.1 67.1 1150 3.1	1.5 Existing Existing 1.19 67.1	Existing Existing  1.2 67.1
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump Booster pump station <sup>3</sup> / Pump discharge Pump head	m m km m m <sup>3</sup> /s m kW m <sup>3</sup> /s m		Existing  Existing  Existing	Existing  Existing  Existing	1.1 67.1 1150 3.1 75	1.5 Existing Existing 1.19 67.1 1200	1.5 1.5 Existing Existing 1.2 67.1 1250
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump Booster pump station <sup>3/</sup> Pump discharge Pump head Pump capacity	m m km m m <sup>3</sup> /s kW m <sup>3</sup> /s		Existing  Existing  Existing	Existing  Existing  Existing	Existing 1.1 67.1 1150 3.1	1.5 Existing Existing 1.19 67.1 1200 3.15	1.5 1.5 Existing Existing 1.2 67.1 1250 3.20
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump Booster pump station <sup>3</sup> / Pump discharge Pump head Pump capacity Krenceng pump station 3/	m m km m m <sup>3</sup> /s m kW m <sup>3</sup> /s m	0.7	Existing Existing Existing Existing Existing	Existing Existing Existing Existing	1.1 67.1 1150 3.1 75	1.5 Existing Existing 1.19 67.1 1200 3.15 76	1.5 1.5  Existing Existing  1.2 67.1 1250  3.20 77
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump Booster pump station <sup>3/</sup> Pump discharge Pump head Pump capacity Krenceng pump station 3/ Pump discharge	m m km m m <sup>3</sup> /s m kW m <sup>3</sup> /s m	0.7 - - - -	Existing Existing Existing Existing Existing	Existing  Existing  Existing	1.1 67.1 1150 3.1 75	1.5 Existing Existing 1.19 67.1 1200 3.15 76	1.5 1.5  Existing Existing  1.2 67.1 1250  3.20 77
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump Booster pump station <sup>3/</sup> Pump discharge Pump head Pump capacity Krenceng pump station 3/ Pump discharge Pump head Pump capacity Krenceng pump station 3/ Pump discharge Pump head	m m km m m <sup>3</sup> /s m kW m <sup>3</sup> /s m kW	0.7	Existing Existing Existing Existing Existing	Existing Existing Existing Existing	1.1 67.1 1150 3.1 75 3550	1.5 Existing Existing 1.19 67.1 1200 3.15 76 3650 3.15	1.5 1.5  Existing Existing  1.2 67.1 1250  3.20 77 3750  3.20
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump Booster pump station <sup>3</sup> / Pump discharge Pump head Pump capacity Krenceng pump station <sup>3</sup> / Pump discharge Pump head Pump capacity Krenceng pump station <sup>3</sup> / Pump discharge Pump head Pump capacity	m m km m <sup>3</sup> /s m kW m <sup>3</sup> /s m kW	0.7 - - - - - 0.45 <sup>3</sup> /	Existing Existing Existing Existing Existing	Existing Existing Existing Existing	1.1 67.1 1150 3.1 75 3550	1.5 Existing Existing 1.19 67.1 1200 3.15 76 3650	1.5 1.5  Existing Existing  1.2 67.1 1250  3.20 77 3750
Diverted tunnel, L D Water Transmission Facility Transmission pipeline, L D Krakatau pump station 2/ Pump discharge Pump head Additional pump Booster pump station <sup>3/</sup> Pump discharge Pump head Pump capacity Krenceng pump station 3/ Pump discharge Pump head Pump capacity Krenceng pump station 3/ Pump discharge Pump head	m m km m m <sup>3</sup> /s m kW m <sup>3</sup> /s m kW	0.7 - - - - - 0.45 <sup>3</sup> /	Existing Existing Existing Existing Existing	Existing Existing Existing Existing	1.1 67.1 1150 3.1 75 3550	1.5 Existing Existing 1.19 67.1 1200 3.15 76 3650 3.15	1.5 1.5  Existing Existing  1.2 67.1 1250  3.20 77 3750  3.20

Notes: 1/ means regulated peak outflow at the outlet of Rawa Danau,
2/ Facility replaced due to development scheme
3/ Facility added due to development scheme

Table F-2 Principal Features for Alternative Combined Development Schemes

Item	Unit	B-1	B-2	B-3	C-1	C-2	C-3	D-1	D-2	D-3
Scheme combined		K-1 & A-1	K-1 & A-3	K-1 & A-6	K-2 & A-1	K-2 & A-3	K-2 & A-6	K-3 & A-1	K-3 & A-3	K-3 & A-6
Development yield	m³/sec	3.55	3.40	3,435	3,60	3.445	3.49	3.65	3.49	3.54
Reservoir and Dam Facility				Same as	correspond	ing single	developme	ent scheme		
Transmission Facility										
Transmission pipeline, L	km	28.0			28.0			28.0		
D	m	0.7 & Existing	Existing	Existing	0.7	Existing	Existing	0.7 & Existing	Existing	Existing
Krakatau pump station										
pump discharge	m <sup>3</sup> /sec	1.55	1.40	1.435	1.60	1.445	1.49	1.65	1.49	1.54
pump head	m	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1
Additional pumps	kW	1,130	1,430	1,480	1,180	1,480	1,530	1,230	1,530	1,580
Booster pump station 1/										
Pump discharge	m <sup>3</sup> /sec	3.55	3.40	3.435	3.60	3.445	3.49	3.65	3.49	3.54
Pump head	m	65	82	84	66	83.5	85	67.5	85	86
Pump capacity	kW	3,510	4,240	4,380	3,630	4,380	4,520	3,750	4,520	4,650
Krenceng pump station 2/			-							
pump discharge	m <sup>3</sup> /sec	3.55	3.40	3.435	3.60	3.445	3.49	3.65	3.49	3.54
pump head	m	20	20	20	20	20	20	20	20	20
Connection pipeline, L	m	160	160	160	160	160	160	160	160	160
Water treatment plant	m³/hr	5,580	5,040	5,170	5,760	5,200	5,370	5,950	5,370	5,500

Notes: 1/ Facility added due to development scheme 2/ Facility replaced due to heightening of Krenceng dam

Table F-3 Cost Estimate for Cibanten Dam: Scheme A-1

DESCRIPTION		Unit	Qly	Pc Ysp)	1.c (Rp)	Fc (Yen)	Le (Rg)
. PREPARATORY WORK			·····			463,304,644	2,942,315,90
(20% of 2+3+4+5+6) DIVERSION WORK						463,304,644	2,912,313,3
2.1 Inlet & ordet						202.644	1 211 4
Excavation	Common Wearook	m3 m3	1,053 2,106	276 339	1,651 1,398	290,628 713,934	1,738,5 2,944,1
_	Rock	m3	7,371 2,640	962 13,442	3,475 132,187	7,090,902 35,486,880	25,614,2 348,973,6
Corente Rein bar		m3 t	100	5,292	1,460,955	529,200	146,095,5 525,366,0
(Sub-total)						44,111,544	3,23,300,0
2.2 Tanack(1=410m,D=5m) Excavation		m3	10,462	8,744	105,122	91,479,728	1,099,786,3
Lining cooc.		m3 m3	2,401 686	13,488 13,488	155,546 155,546	32,425,152 9,252,768	373,932,5 106,704,5
Plug cooc. Growing		ï	246 123	6,500 5,292	90,000 1,460,955	1,599,000 650,916	22,140,0 179,697,4
Rein bar		•	123	3,232	1,00,000	135,407,564	1,782,260,9
(Sub-total)							
SUB-TOTAL OF 2.						179,519,108	2,307,627,0
DAM							
3.1 Coffeedam Excavation		m3	2,500	276	1,651	690,000	4,127,
Emberkment		mJ	200,000	1,514	5,964	302,800,000	1,192,800,0
(Sub-total)						303,450,000	1,196,927,
3.2 Main dum						# nde 9.00	10 371
Excavation	Common Wratrock	m3 m3	11,075 22,150	276 339	1,651 1,398	3,056,700 7,506,850	18,284,0 30,965,7
Embackment	Rock Care	т3 m3	77,520 101,416	962 605	3,475 2,359	74,574,240 61,356,660	269,382, 239,240,
	Filter Random	m3 m3	62,614 174,900	2,215 441	5,756 1,144	143,141,540 77,130,900	360,578,5 200,085,6
0	Rock	tn3	408,105 474	1,514 6,500	5,964 90,000	617,870,970 3,081,000	2,433,938, 42,660,
Grouting	Blanket Censoli.		114	6,500	90,000	741,000 8,365,500	10,260, 115,830,
	Curtain	t	1,287	5,500	90,000	8,363,500 996,827,380	
(Sub-total)						230,821,383	3,721,225,
3.3 Saddle datu Excavation	Сопиноп	m3	3,595	276	2,176	992,220	7,822,
	Wearrek Rock	63 63	7,190 25,160	339 962	2,585 4,433	2,437,410 24,203,920	18,586, 111,534,
Embankment	NO.	m3	167,975 597	244 6,500	1,717 90,000	40,985,900 3,880,500	288,413, 53,730,
Growing		,	231	0,200	70,000	72,499,950	480,056,
(Sub-total)							
SUB-TOTAL OF 3.						1,372,817,330	5,398,239,
, SPILLWAY							
4.1 Side chansel	Ceuxpon	m3	8,100	276	1,651	2,235,600	13,373
Excavation	Wes.rock	m3	16,200	339 962	1,395 3,475	5,491,800 54,515,400	22,617, 197,032
Concrete	Rock	ങ് ത3	56,700 21,176	13,442	132,187	284,567,140	2,798,398
Rein bar		t	400	5,292	1,460,955	2,116,800	584,382,
(Sub-total)						343,956,740	3,615,833
42 Character	Common	m3	14,245	716	1,651	3,931,620	23,518
Excevation	Wearock	m3	28,490 99,715	339 952	1,398 3,475	9,658,110 95,925,830	39,829 346,509
Concrete	Rock	m3 m3	11,395	13,442 5,292	132,187 1,450,955	153,171,590 1,164,240	1,506,270 319,210
Reio bar		t	220	3,292	1,430,333	263,851,390	2,235,338
(Sub-total)						203,831,370	2,23,330
4.3 Plunge pool Excavation	Commo	103	4,032	276	1,651	1,112,832	6,656
Eura Pared	Wta.rock Rock	m3 m3	8,061 28,224	339 962	1,398 3,475	2,733,695 27,151,488	11,273 98,078
	KOL		20,22.	<del>,-</del>		30,593,016	116,006
(Sub-rotal)						613,806,146	5,967,180
SUB-TOTAL OF 4.						011/000/110	2,731,100
OUTLET WORKS							-
5.1 Inteke tower Excession	Соглано	m3	515	216	1,651	142,140	850
2772-91-84-92	Weatock Rock	m3 m3	1,030 3,606	339 962	1,398 3,475	349,170 3,468,972	1,439 12,530
Concrete	NA.	m3	760 29	13,442 5,292	132,187 1,460,955	10,215,920 153,468	100,462 42,367
Rein bar			Z			14,329,670	157,650
(Sub-total)						14,347,010	131,030
5.2 Intake sheft Excavation		m3	332	8,744	102,122	2,903,008	33,90
Concrete		m3	191 6	13,488 5,292	155,546 1,460,955	2,576,208 31,752	29,705 8,765
Rein bar		-	-			5,510,968	72,379
(Sub-total)					•	19,840,638	230,030
SUB-TOTAL OF 5.						-252024	
S, METAL WORK						94 410 408	
6.1 Diversion gate 6.2 Seed conduit		يا نيا	1 1	33,040,000	808,500,000	33,040,600	808,50
6.3 Hollow jet valve		La La	1	45,000,000 22,500,000		45,000,000 22,500,000	
6.4 Guard valve		1.4	•	22,000,000		100,540,000	808,50
SUB-TOTAL OF 6.						100,710,000	الدرجية
J. WATER SUPPLY PIPE LI	NE						_
7.1 Excavation		m3 m3	134,400 123,200	276 244	1,651 1,717	37,094,400 30,660,800	221,89 211,53
7.2 Backfill 7.3 Add. pump station		ю) 1	1	57,000,000	385,000,000	57,000,000	385,00 3,805,00
7.4 Add, purification plant 7.5 Add, pipe line		L L	1	569,000,000	3,805,009,000 40,010,000,000	569,000,000	3,805,00 40,040,00
7.6 Add. intake & surge to	nk	Ī.					
						693,155,200	44,663,47
SUB-TOTAL OF 7.							

Table F-4 Cost Estimate for Downstream Cidanau Dam: Scheme A-3

DESCRIPTION		Unit	Qty	Fe (Yeo)	i.c (Rp)	Fc (Ypo)	I.c. (Rp)
). PREPARATORY WORK (20% of 2+3+4+5+6)						375,176,927	2,810,769,9
2. DIVERSION WORK						-	
2.1 Inlet & cuilet Exception	Control	മീ	997	276	1,651	275,172	1,646,0
	Wearock Rock	ബ് ഗ്രീ	11,970 6,982	339 962	1,398 3,475	4,057,830 6,716,684	16,734,0 24,262,4
Concrete Rein bur		1 123	2,640 100	13,442 5,292	132,187 1,460,955	35,486,880 529,200	345,973,6 146,095,5
(Sub total)						47,065,766	537,711,7
2.2 Tunoci(2=400co,D=5co)							
Excevation Links conc.		#3 #3	10,710 2,464	8,741 13,488	105,122 155,546	93,648,240 33,234,432	1,125,856,6 383,265,3 106,704,5
Plugeone. Grouting		293 1	686 501	13,488 6,500	155,546 90,000 1,460,955	9,257,768 3,276,000 666,792	45,360,0 184,080,3
Reinbar		t	126	5,292	1,400,933	140,078,232	1,845,266,8
(Sub-total)						187,143,998	2,382,978,5
SUB-TOTAL OF 2.						241,142,770	<b>5</b>           -
I. DAM							
1.1 Coffeedato Excevacion		m³ m³	2,500 200,000	276 1,514	1,651 5,964	690,600 302,800,000	4,127,5 1,192,800,0
Embankment		<b>m</b> >	200,000	1,514	3,301	303,490,000	1,196,927,5
(Sub-total)							
3.2 Main days Excavation	Common Wta.rock	en! m3	24,986 \$1,136	276 339	1,651 1,398	6,896,136 18,352,104	41,251,8 75,682,1
Embankmant	Rock	es) Ess	4,164 49,100	962 605	3,475 2,359	4,005,768 29,705,500	14,469,9 115,126,9
Company (Cont.)	Filter Random	- m3 m3	31,308 72,975	2,285 441	5,756 1,144	71,538,780 32,181,975	180,208,0 83,483,4
Greating	Rock Blanker	m3 L	170,275 56	1,514 6,500	5,964 90,000	257,798,350 364,000	1,015,520,1 5,040,0
Distance .	Consoli.	i	182 2,556	6,500 6,500	90,000 90,000	1,183,000 16,614,000	16,380,0 230,040,0
(Sub-total)	<b>V</b>					438,637,613	1,777,903,1
3.3 Sand trap basin							
Excavation	Common Wearock	വ! ബീ	306,750	276 339	2,176 2,585	84,663,000	667,488,0
Maintenance row(Zem)	Rock	m3 m3	55,000	962 244	4,433 1,717	13,420,000	94,435,0
Concrete		ബ്	1,200	13,442	132,187	16,130,409	158,624,4
(Sub-total)						114,213,400	920,547,4
SUB-TOTAL OF 3.			•			856,341,013	3,495,378,0
I. SPILLWAY							
4.1 Side channel Excevation	Comeson	mJ	103,740	276	1,651 1,398	28,632,240 39,563,673	171,274,7 163,156,3
	Wourock Rock	m3 m3	116,707 38,902	339 962	3,475 132,187	37,423,724 372,666,004	135,184 3,664,752,3
Cornercia Rein bar		m3 t	27,724 520	13,442 5,292	1,460,955	2,751,840	759,696,6
(Sub-total)						481,037,485	4,894,064,5
4.2 Chaeway	0	2	53,093	276	1,651	14,653,668	\$7,656,5
Excevation	Common Wearnek	es3 es3	127,425	339 \$62	1.398 3,475	43,197,07 <i>5</i> 30,615,472	178,140,1 110,699,0
Concrete	Reck.	ന്ദ് ന3	31,856 8,775 175	13,442 5,292	132,187 1,450,955	117,953,550 926,100	1,159,940,9 253,917,1
Rein bar		ı	175	V,-2*	1,111,211	207.375.865	1,790,354,3
(Sub-total) 4 3 Plunge pool							
Escavation	Common Wearook	ബ് ബ	2,030 14,210	276 339	1,651 1,398	560,780 4,817,190	3,351,1 19,865,1
	Rock	m3	24,360	962	3,475	23,434,320	84,651,0
(Sub total)						28,811,790	107.868.1
SUB-TOTAL OF 4.			•			917,225,140	6,792,287,0
S. OUTLET WORK							
5.1 Jutako tewer Encavarion	Соложов	m3	3,753	276	1,651	1,037,208	6.204
•	Wearock Rock	m3 m3	4,176 418	339 962	1,398 3,475	1,415,664 402,116	5,838,0 1,452,5
Core into Rein bar		m3 t	500 20	13,442 5,292	132,187 1,460,955	6,721,000 105,840	66,093, 29,219,
(Sub-total)					-	9,681,828	108,807,6
5.2 Incake shaft							
Excavation Concrete		m3 m3	299 171	8,744 13,488	102,122 155,546	2,614,456 2,306,448	30,531, 26,598,
Rein bar		t	6	5,292	1,460,955	31,752	8,765,
(Sub-total)						4,952,656	65,898,
SUB-TOTAL OF 5.						14,634,484	174,706
. METAL WORK						44.540.000	
6.1 Diversion gate 6.2 Such crooking		L. L.	1	33,040,600	808,500,000	33,040,000	808,500
6.3 Hollow jet valve 6.4 Guard valve		1.a 1.a	1	45,000,000 22,500,000		45,000,000 22,500,000	
SUB-TOTAL OF 6.						100,540,600	508,500
WATER SUPPLY PIPE LINE							
7.I Excavation		m3		216	1,651		
7.2 Backfill 7.3 Add pump station		m3 La	í	244 15,000,000	101,000,000	15,000,000	101,000,
7.4 Add. purification plant 7.5 Add. pipe line		Li Li	i 1	79,000,000	530,000,000 504,000,000	79,000,000	530,000, 504,000,1
7.6 Add. itstake & range tank		L	i	11,000,000	411,000,000	11,000,000	411,000,0
_						94,000,000	1,135,000,0

Table F-5 Cost Estimate for Cidanau Gated Weir: Scheme A-6

DESCRIPTION		Unit	Q'ıy	Fo	PRICE Lo	Fc	MOUNT
			Q1y	(Yen)	(Rp)	Yen)	Lc (Rp)
1. PREPARATORY WORK							
(20% of 2+3+4+5)						414,455,432	1,755,702,09
2. DIVERSION WORK							
2.1 Coffering work Sheet pile & bracing		ı	159	131,583	26.016	20 001 407	
SUB-TOTAL OF 2.		•	139	131,161	36,915	20,921,697	5,869,48
3. DAM						20,921,697	5,869,41
•							
3.1 Main dam Excavation	Common	m3	10.663	474			
Executation	Wes.rock	m3	10,662 8,462	276 339	1,651 1,398	2,942,712 2,868,618	17,602,90
	Rock	m3	2,200	962	3,475	2,116,400	11,829,87 7,645,00
Concrete		m3	21,325	5,052	118,708	107,733,900	2,531,448,10
Grouting	Consoli.	t	219	6,500	90,000	1,423,500	19,710,00
	Curtain	t	352	6,500	90,000	2,288,000	31,680,00
SUB-TOTAL OF 3.						119,373,130	2,619,915,9
4. SPILLWAY							
4.1 Dental work	0	•					
Excavation	Common Wea.rock	m3 m3	22,389	276	1,651	6,179,364	36,964,23
	Rock	m3		339 962	1,398 3,475		
Concrete		m3	8,379	5,052	118,708	42,330,708	994,654,33
(Sub-total)						48,510,072	1,031,618,57
4.2 Weir & pier							
Excavation	Common	m3		276	1,651		
	Wea.rock	m3	1,170	339	1,398	396,630	1,635,66
0	Rock	m3	500	962	3,475	481,000	1,737,50
Concrete Rein bar		m3	10,761	13,442	132,187	144,649,362	1,422,464,30
Grouting	Consoli.	l l	1,290 126	5,292 6,500	1,460,955	6,826,680	1,884,631,95
E CONTRACTOR DE	Curtain	i	180	6,500	90,000 90,000	819,000 1,170,000	11,340,00 16,200,00
(Sub-total)				1,222	70,000		
4.3 Hoist & bridge						154,342,672	3,338,009,41
Concrete		m3	2,871	13,442	132,187	38,591,982	379,508,87
Rein bar		t	574	5,292	1,460,955	3,037,608	838,588,17
(Sub-total)						41,629,590	1,218,097,04
SUB-TOTAL OF 4.						244,482,334	5,587,725,03
5. METAL WORK							
5.1 Roller gate		Ls	1	1,620,000,000		1,620,000,000	
5.2 Steel conduit		Ls	1		565,000,000	-,,,	565,000,00
5.3 Hollow jet valve 5.4 Guard valve		Ls Ls	1 1	45,000,000 22,500,000		45,000,000 22,500,000	
SUB-TOTAL OF 5.						1,687,500,000	565,000,00
. WATER SUPPLY PIPE LINI	E						
6.1 Excavation		m3		276	1,651		
6.2 Backfill		m3		244	1,717		
6.3 Add. pump station 6.4 Add. purification plant		Ls Le	1	30,000,000	207,000,000	30,000,000	207,000,00
6.5 Add. pipe line		l.s l.s	1 1	261,000,000	1,747,000,000 504,000,000	261,000,000	1,747,000,00
6.6 Add. intake & surge tank		Ĺs	1	14,000,000	537,000,000	14,000,000	504,000,00 537,000,00
SUB-TOTAL OF 6.						305,000,000	2,995,000,000
	RUCTION CO.					<u></u>	

Table F-6 Cost Estimate for Heightening of Krenceng Dam without Diversion Tunnel: Scheme K-1

DESCRIPTION		Unit	Q'iy -	Fc (Yen)	LC (Rp)	Fe (Yen)	MOUNT Lc (Rp)
1. PREPARATORY WORK				(1en)	(KD)	(101)	1001
(20% of 2+3)						257,537,340	1,466,768,68
2. DIVERTED TUNNEL							
2.1 Coffering work Coffering	Ехся,	m3		276	1,651		
-	Embank	m3		441	1,144		
(Sub-total)							
2.2 Weir Excavation	Common	m3		276	1,651		
201641 - 1141	Wea.rock Rock	m3		339 962	1,398 3,475		
Concrete	NOCK	m3 m3		5,052	118,708		
Rein bar Gate		t ls		5,292 2,000,000	1,460,955		
(Sub-total)				2,-10,11-			
•							
2.3 Inlet & outlet Excavation	Common	m3		276	1,651		
	<ul> <li>Wearock</li> <li>Rock</li> </ul>	m3 m3		339 962	1,398 3,475		
Concrete	ROCK	m3		13,442	132,187		
Rein bar Trash rack		ı احا		5,292 1,000,000	1,460,955		
		La		1,000,000			
(Sub-total)							
2.4 Diverted turmel Excavation		m3		8,744	105,122		
Lining cone.		m3		13,488	155,546		
Plug conc. Grouting		m3 1		13,488 6,500	155,546 90,000		
Rein bar		i i		5,292	1,460,955		
(Sub-total)							
SUB-TOTAL OF 2.							
	mua n i i i						
3. HEIGHTENING OF KRENC	ENG DAM						
3.1 Main dain Excavation	Common	ш3	146,652	276	1,651	40,475,952	242,122,453
2,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Wea.rock	m3	97,768	339	1,398	33,143,352	136,679,664
Embankment	Reck Core	m3 m3	1,281,085	962 605	3,475 2,359	775,056,425	3,022,079,513
	Filter	m3		2,285	5,756		
	Random Rock	m3 m3		441 1,514	1,144 5,964		
Grouting	Blanket	t	1,868	6,500	90,000	12,142,000	168,120,000
	Curtain	t	3,676	6,500	90,000	23,894,000	330,840,000
(Sub-total)						884,711,729	3,899,841,631
3.2 Spillway						•	
(1) Approach wall & weir Excavation	Common	m3	3,097	276	1,651	854,772	5,113,147
	Wea.rock Rock	m3 m3	4,645	339 962	1,398 3,475	1,574,655	6,493,710
Concrete	NO.X	m3	6,628	13,442	132,187	89,093,576	876,135,436
Rein bar (2) Chuteway & basin		t	135	5,292	1,460,955	714,420	197,228,92
Excavation	Common	m3	11,879	276	1,651	3,278,604	19,612,229
	Wea.rock Rock	m3 m3	17,818	339 962	1,398 3,475	6,040,302	24,909,564
Concrete	11004	m3	14,260	13,442	132,187	191,682,920	1,884,986,620
Rein bar Grouting	Consoli.	t t	285 35	5,292 6,500	1,460,955 90,000	1,508,220 227,500	416,372,173 3,150,000
(3) Metal work	Conson.				Jogado		3,100,000
Spillway gate		Ls	. 1	108,000,000		108,000,000	
(Sub-total)						402,974,969	3,434,001,800
SUB-TOTAL OF 3.						1,287,686,698	7,333,843,43
	E						
. WATER SUPPLY PIPE LIN		m3		276 244	1,651		
WATER SUPPLY PIPE LINE 4.1 Excavation				1,022,000,000	1,717 6,833,000,000	1,022,000,000	6,833,000,00
WATER SUPPLY PIPE LIN 4.1 Excavation 4.2 Backfill		m3 Ls	ı	1.022.000.000			
. WATER SUPPLY PIPE LIN. 4.1 Excavation 4.2 Backfill 4.3 Add. pump station 4.4 Add. perification plant		اد اد	1	1,385,000,000	9,263,000,000	1,385,000,000	9,263,000,00
4.1 Excavation 4.2 Backfill 4.3 Add. pump station 4.4 Add. purification plant 4.5 Add. pipe line		اء اخ اخ	1	1,385,000,000	1,428,000,000		
4.1 Excavation 4.2 Backfill 4.3 Add. pump station 4.4 Add. purification plant	:	اد اد				1,385,000,000 63,000,000 6,000,000	9,263,000,000 2,305,000,000 218,400,000
4.1 Excavation 4.2 Backfill 4.3 Add. pump station 4.4 Add. purification plant 4.5 Add. pipe line 4.6 Add. intake & surge tank	s.	હ ડ ડ ડ	1	1,385,000,000	1,428,000,000 2,305,000,000	63,000,000	2,305,000,000

Table F-7 Cost Estimate for Heightening of Krenceng Dam with One Diversion Tunnel: Scheme K-2

Description   Care	DESCRIPTION		Unit	Q'ty ~~	Fc UNIT I	<u>RICE</u> Lc	Fo A	MOUNT Lo
2. DIVERTED TUNNEL   2. DIVERTED TUNNEL   2. DIVERTED TUNNEL   2. Coffering work								
2.1 Coffering work							264,175,476	1,556,022,42
Coffering   Exca.	2. DIVERTED TUNNEL							
Embank m3 590 441 1,144 220,500 57   (Sub-total)			•	<b>700</b>	074	1.681	100.000	205 50
2.2 Weir Reavelon Common m3 400 276 1,651 110,460 66   Reavelon Wearoek m3 400 379 1,298 133,600 55   Reavelon Reavek m3 400 379 1,298 133,600 55   Reavelon Reavek m3 100 3962 3,475 132,400 601   Reavelon I	Coffering							825,50 572,00
2.2 Weir Reavalion Common m3 400 276 1,651 110,460 66   Reavalion Waterook m3 400 379 1,298 133,600 55   Reavalion Reavalion	(Sub-total)				•		358,500	1,397,50
Excavation							•	
Reck   m3   190   962   3475   192,400   17,800   Rein bar   1   1   15   5,552   118708   737,800   17,800   Rein bar   1   1   15   5,552   1,460,935   79,380   21,991   20,000,000   22,000,000   23,900,000								660,40
Concrete   m3   150   5.052   113788   773,800   173,800   Reln bar   Ls   1   2,000,000								559,20 695,00
Gale   Ls   1 2,000,000   2,000,000   3,275,500   41,63   275,500								17,806,20
2.3 Inlet & outlet Exercation    Common   m3						1,400,933		21,714,32
Excavation	(Sub-total)						3,275,580	41,635,12
Excavation								
Rock   m3   100   13,442   132,187   1344,200   13,241   136,600   13,442   132,187   1344,200   13,241   13,600,000   13,442   132,187   1344,200   13,241   13,600,000   13,442   132,187   13,442,200   13,442   132,187   13,442,200   13,442   132,187   13,442,200   13,442   132,187   13,442,200   103,440   13,441   13,460,000   14,4273,784   50,400   22,341   13,460,000   14,4273,784   50,400   14,4273,784								2,747,26
Rein bar tack								2,326,27 2,891,20
Trish neck   Lis   1 1,000,000   1,000,0								13,218,70
2.4 Diverted turned						1,400,555		23,213,10
Becavation	(Sub-total)						4,273,784	50,402,53
Bescavation	2.4 Diverted tunnel							
Plug Conc.   m3								168,195,20 101,104,90
Rein bar   C   35   5,292   1,469,955   185,220   51,13	Plug conc.		m3		13,488	155,546		
SUB-TOTAL OF 2.  HEIGHTENING OF KRENCENG DAM  3.1 Main dam  Excavation Common m3 146,652 276 1,651 40,475,952 242,12  Weatock m3 97,168 339 1,398 33,143,352 136,67  Rock m3 962 3,475  Embankment Core m3 1,281,085 605 2,359 775,056,425 3,022,07  Filter m3 2,285 5,756  Random m3 441 1,144  Rock m3 1,514 5,964  Grouting Blanker t 1,868 6,500 90,000 12,142,000 168,12  (Sub-total)  3.2 Spillway  (1) Approach wall & weir Excavation Weatock m3 4,645 339 1,398 1,374,655 6,49  Rock m3 4,645 339 1,398 1,574,655 6,49  Rock m3 6,623 13,442 132,181 89,093,576 816,131  Rein bar Common m3 11,879 276 1,651 824,772 174,420 197,22  (2) Chuteway & basin Excavation Common m3 11,879 276 1,651 3,228,604 19,61  Excavation Common m3 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,280,000 1,								51,133,4
SUB-TOTAL OF 2.  HEIGHTENING OF KRENCENG DAM  3.1 Main dam  Excavation Common m3 146,652 276 1,651 40,475,952 242,122  Real Wearock m3 97,168 339 1,398 33,143,352 136,67  Rock m3 962 3,475  Embankment Core m3 1,281,085 605 2,359 775,056,425 3,022,07  Filter m3 2,285 5,756  Random m3 441 1,144  Rock m3 1,514 5,964  Grouting Blanket t 1,868 6,500 90,000 12,142,000 168,122  (Sub-total) 3.2 Spillway  (Sub-total) Common m3 3,097 276 1,651 854,772 3,899,284  (Sub-total) Real weir Excavation Wearock m3 4,645 339 1,398 1,574,655 6,49  Rock m3 6,623 13,442 132,183 89,993,576 876,98  Rock m3 6,623 13,442 132,183 89,993,576 876,98  Rein bar t 135 5,292 1,460,955 714,420 197,22  (2) Chuteway & basin Excavation Common m3 11,879 276 1,651 3,278,604 19,61  Rock m3 1,7818 339 1,398 6,404,302 197,22  (2) Chuteway & basin Excavation Common m3 11,879 276 1,651 3,278,604 19,61  Rock m3 1,7818 339 1,398 6,404,302 24,900  Rock m3 17,818 339 1,398 6,404,302 24,900  Rock m3 11,879 276 1,651 3,278,604 19,61  Rock m3 14,600 13,442 132,187 191,682,920 1,884,930  Concrete m3 14,600 13,442 132,187 191,682,920 1,884,930  Grouting Consoli t 35 6,500 90,000 227,500 3,151  Grouting Consoli t 35 6,500 90,000 227,500 3,151  Grouting Consoli t 3 10,400,000 108,000,000  (Sub-total) Sub-total) 12 1 108,000,000 108,000,000 402,974,969 3,434,00  Sub-TOTAL OF 3.  WATER SUPPLY PIPB LINE  4,1 Excavation 14 1 1,43,000,000 1,448,000,000 9,683,000,000	(Sub-total)						25,282,820	352,833,5
### HEIGHTENING OF KRENCENG DAM  3.1 Main dam    Excavation							33.190.684	446,268,6
3.1 Main dana   Excavation   Common   m3   146,652   276   1,651   40,475,952   242,12   126,67   1,651   40,475,952   242,12   126,67   1,651   40,475,952   242,12   126,67   1,651   1,65		ENV: DAM						,,-
Exeavation		ENO DAM						
Embankment Core m3 1,281,085 605 2,359 715,056,425 3,022,07 Filter m3 2,285 5,756 8,400 m3 441 1,144 1,144 8,000,000 Filter m3 4,41 1,144 1,144 8,000,000 12,142,000 168,12 1,145 1,		Common	m3	146,652	276	1,651	40,475,952	242,122,4
Embankment Core m3 1,281,085 605 2,359 775,056,425 3,022,07 Filter m3 2,285 5,756 Random m3 441 1,144 1,144 1,144 1,144 Rock m3 1,514 5,964 Random m3 1,868 6,500 90,000 12,142,000 168,122 (Sub-total) 1 3,676 6,500 90,000 23,894,000 330,844 (Sub-total) 2 25 5,114 20 23,894,000 330,844 (Sub-total) 2 2 2 5,111 2 2 2 2 2 5,111 2 2 2 2 2 5,111 2 2 2 2 2 5,111 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				97,768			33,143,352	136,679,6
Random   Rack   Mark   Rock   Rock   Mark   Rock   Mark   Rock   Rock   Mark   Rock   Mark   Rock   Rock   Mark   Rock   Rock   Mark   Rock   Rock   Mark   Rock   Rock   Rock   Mark   Rock   Rock   Rock   Mark   Rock	Embankment	Corc	m3	1,281,085	605	2,359	775,056,425	3,022,079,5
Rock   m3								
Curtain   1   3,676   6,500   90,000   23,894,000   330,844		Rock	m3		1,514	5,964		
3.2 Spillway (1) Approach wall & weir Excavation Common m3 3,097 276 1,651 854,772 5,117  Wea.rock m3 4,645 339 1,398 1,574,655 6,49  Rock m3 962 3,475 Concrete m3 6,628 13,442 132,187 89,093,576 876,13 Rein bar t 135 5,292 1,460,955 714,420 197,22 (2) Chuteway & basin Excavation Common m3 11,879 276 1,651 3,278,604 19,611 Excavation Wea.rock m3 17,818 339 1,598 6,040,302 24,900  Rock m3 962 3,475 Concrete m3 14,260 13,442 132,187 191,682,920 1,884,98 Rein bar t 285 5,292 1,460,955 1,508,220 416,375 Grouting Consoli. t 35 6,500 90,000 227,500 3,157  (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000  (Sub-total)  SUB-TOTAL OF 3. 1,287,686,698 7,333,84  WATER SUPPLY PIPE LINE  4.1 Excavation m3 244 1,717  4.3 Add. pump station Ls 1 1,448,000,000 6,977,000,000 1,448,000,000 9,683,00 4.5 Add. pipe line Ls 1 1,448,000,000 2,394,000,000 4,786,000,000 2,394,000,000 4,786,000,000 2,394	Grouting							168,120,0 330,840,0
3.2 Spillway	(Sub-total)						884,711,729	3,899,841,6
(1) Approach wall & weir Excavation	-							
Wea.rock   m3	(1) Approach wall & weir	C	-2	2.007	226	1.651	964 777	61121
Concrete	Bxcavation							6,493,7
Rein bar t 135 5,292 1,460,955 714,420 197,22 (2) Chuteway & basin	Concrete	Rock		6 628			80 003 576	876 135 A
Excavation	Rein bar							197,228,9
Rock   m3		Common	m3	11,879	276	1,651	3,278,604	19,612,2
Concrete m3 14,260 13,442 132,187 191,682,920 1,884,98 Rein bar 1 285 5,792 1,460,955 1,508,220 416,37 Grouting Consoli. 1 35 6,500 90,000 227,500 3,150 (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000 (Sub-total) 402,974,969 3,434,00 (Sub-total) 1,287,686,698 7,333,84 WATER SUPPLY PIPE LINE 4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,043,000,000 6,977,000,000 1,043,000,000 6,977,00 4.4 Add. purification plant Ls 1 1,448,000,000 9,683,000,000 1,448,000,000 9,683,000,000 4.5 Add. pipe line Ls 1,428,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400,000 218				17,818			6,040,302	24,909,5
Grouting Consoli. t 35 6,500 90,000 227,500 3,150 (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000  (Sub-total)  SUB-TOTAL OF 3. 1,287,686,698 7,333,844  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 1,717 4.2 Backfill m3 744 1,717 4.3 Add. pump station Ls 1 1,043,000,000 6,977,000,000 1,043,000,000 6,977,000 4.4 Add. purification plant Ls 1 1,448,000,000 9,683,000,000 1,448,000,000 9,683,000,000 4.5 Add. pipe line Ls 1,428,000,000 4,630,000 000 2,394,000,000 4,7 Receiving well Ls 1 6,000,000 2,394,000,000 6,000,000 218,400,000 2,394,000,000		NOO.	m3		13,442	132,187		1,884,986,6
Spiliway gate		Consoli.						3,150,0
(Sub-total) 402,974,969 3,434,00  SUB-TOTAL OF 3. 1,287,686,698 7,333,84  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,043,000,000 6,977,000,000 1,043,000,000 6,977,00 4.4 Add. pump station plant Ls 1 1,448,000,000 9,683,000,000 1,448,000,000 9,683,000 4.5 Add. pipe line Ls 1,428,000,000 4,448,000,000 4,674,000,000 4,7448,000,000 4,748,000,000			Ls	1	108.000.000		108,000,000	
SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,043,000,000 6,977,000,000 1,043,000,000 6,977,000 4.4 Add. purification plant 1.5 1 1,448,000,000 9,683,000,000 1,448,000,000 9,683,000 4.5 Add. pipe line Ls 1,428,000,000 4,548,000,000 4,548,000,000 4,6 Add. pine line Ls 1,428,000,000 4,7 Receiving well Ls 1 6,000,000 2,394,000,000 6,000,000 2,394,00				-			, ,	3,434,001,8
WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,043,000,000 6,977,000,000 1,043,000,000 6,977,000 4.4 Add. purification plant Ls 1 1,448,000,000 9,683,000,000 1,448,000,000 9,683,000 4.5 Add. pipe line Ls 1,428,000,000 4.6 Add. intake & surge tank Ls 1 65,000,000 2,394,000,000 65,000,000 2,394,00 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,40	•							7,333,843,4
4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,043,000,000 6,977,000,000 1,043,000,000 6,977,00 4.4 Add. purification plant Ls 1 1,448,000,000 9,683,000,000 1,448,000,000 9,683,00 4.5 Add. pipe line Ls 1,428,000,000 4.6 Add. intake & surge tank Ls 1 65,000,000 2,394,000,000 65,000,000 2,394,00 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,40		œ.					2,-01,000,000	<del>پارادیا بار</del> در در و .
4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,043,000,000 6,977,000,000 1,043,000,000 6,977,00 4.5 Add. purification plant Ls 1 1,448,000,000 9,683,000,000 1,448,000,000 9,683,00 4.5 Add. pipe line Ls 1,428,000,000 1,448,000,000 2,394,00 4.6 Add. intake & surge tank Ls 1 65,000,000 2,394,000,000 65,000,000 2,394,00 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,40			O		ate	1 751		
4.3 Add. pump station       Ls       1 1,043,000,000 6,977,000,000 1,043,000,000 6,977,00       1,043,000,000 1,043,000,000 9,683,000,000 1,448,000,000 9,683,00       6,977,000,000 1,448,000,000 9,683,000,000 1,448,000,000 9,683,00       9,683,000,000 1,448,000,000 9,683,000,000 1,448,000,000 9,683,000,000 1,448,000,000 9,683,000,000 1,448,000,			$\epsilon_m$		244	1,717		
4.5 Add. pipe line     Ls     1,428,000,000       4.6 Add. intake & surge tank     Ls     1 65,000,000     2,394,000,000     65,000,000     2,394,00       4.7 Receiving well     Ls     1 6,000,000     218,400,000     6,000,000     218,40								6,977,000,0
4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,40	4.5 Add. pipe line		Ls			1,428,000,000		
								2,394,000,0 218,400,0
			٠.,					19,272,400,0
							<del></del>	<del></del>

Table F-8 Cost Estimate for Heightening of Krenceng Dam with Two Diversion Tunnels: Scheme K-3

PRIDAYALTORY WORK   CREW of 2x3)	DESCRIPTION		Unit	Q'ty _	UNIT )	PRICE Lc	Fc A	MOUNT Le
2006 of 2-b   277,992,300   1,734,709;   1	DISCRIPTION							
2.1   Colfering work   Colfering work   Colfering   Embans   m3   1,000   441   1,144   441,000   1,651, 1,144   (341,000   1,651, 1,144   1,144   441,000   1,144   (341,000   1,144   1,144   441,000   1,144   (341,000   1,144   1,144   441,000   1,144   (341,000   1,144   1,144   1,144   441,000   1,144   (341,000   1,144   1,145   1,144							277,982,360	1,734,709,34
Coffering Exca. m3 1,000 276 1,451 276,000 1,651 (Sub-total)  (Sub-tot	DIVERTED TUNNEL							
Embank   m3   1,000   441   1,144   441,000   1,144		P	3	1 000	226	1.651	ስስስ እኖር	1 651 W
22   Weir   Common   m3   1,300   276   1,651   333,200   1,018.	Correring							1,144,00
Recavarion	(Sub-total)						717,000	2,795,00
Concrete   Rock   m3   1,200   339   1,398   406,800   1,677,700   2,0855   Concrete   Rock   m3   400   5,052   118,108   2,071,320   48,500   Concrete   Rock   m3   410   5,052   118,108   2,071,320   48,500   Concrete   Rock   m3   4,376   3,225   118,108   2,071,320   48,500   Concrete   Rock   m3   4,376   276   1,651   1,262,976   7,503,492   114,313   T,500   T,5	,	C		1 200	136	1 651	231 700	1 081 20
Conserted Relinbar	Excavation			1,200	339	1,398	406,800	1,677,60
Rein bar	Concrete	Rock						2,085,00 48,670,28
Country   Coun	Rein bar		t	41	5,292		216,972	59,899,1
2.3 Ialek & evalet			i.s	2	2,000,000			
Becavation	(Sub-total)						7,603,492	114,313,2
Rock m3   2,288   962   3,475   2,261,056   7,950,000   13,442   132,187   2,685,400   26,437, Rein bar (a)   1		Common	m3	4,576	276			7,554,9
Concrete   m3   200   13,442   132,187   2,688,460   5,8431, Trash rack								6,397,2
Triash rack   Lis   2   1,000,000   2,000,000	Concrete	KULK		200	13,442	132,187	2,688,400	26,437,4
2.4 Diverted bunnel Excavation						1,460,955		58,438,2
2.4 Diverted tunnel     Excavation	(Sub-total)						9,915,376	106,778,6
Excavation m3 5,320 8,744 105,122 46,518,085 559,249 11,101	·							
Ping cont.   m3	Excavation							559,249,0 337,534,8
Rein bar   1	Plug conc.		m3	-	13,488	155,546	- '	
SUB-TOTAL OF 2.  1. HEIGHTENING OF KRENCENG DAM  3.1 Main dam  Excavation Common m3 146,652 276 1,651 40,475,952 242,122,  We nock m3 97,763 339 1,398 33,143,352 136,679,  Rock m3 962 3,475  Embankanen Core m3 1,281,085 605 2,359 775,056,425 3,022,079,  Filter m3 2,285 5,756  Random m3 4,411 1,144  Rock m3 1,5114 5,964  Grouting Blanket t 1,868 6,500 90,000 12,142,000 168,120,  (Sub-total)  3.2 Spillway  (1) Approach wall & weir Excavation Common m3 4,645 339 1,398 1,374,655 6,493,  Rein bar Rock m3 4,645 339 1,398 1,374,655 6,493,  Concrete m3 6,628 13,442 132,187 89,093,576 876,135,  Concrete m3 6,628 13,442 132,187 89,093,576 876,135,  Excavation Common m3 11,879 276 1,651 854,772 5,113,  Reck m3 6,628 13,442 132,187 89,093,576 876,135,  Excavation Common m3 11,879 276 1,651 3278,664 196,102 197,228,  (2) Clasteway & basin Excavation Common m3 11,879 276 1,651 3278,664 196,102 197,228,  (2) Clasteway & basin Excavation Common m3 11,879 276 1,651 3278,664 196,102 197,228,  Concrete m3 14,260 13,442 132,187 89,093,576 876,135,  Excavation Common m3 11,879 276 1,651 3278,664 196,612 Grouting Common m3 11,879 276 1,651 3278,664 196,602 24,909,  Wearock m3 17,818 339 1,398 6,040,302 24,909,  Concrete m3 14,260 13,442 132,187 191,682,900 148,603,002 24,909,  Good Concrete m3 14,260 13,442 132,187 191,682,900 148,603,002 24,909,  Good Concrete m3 14,260 13,442 132,187 191,682,900 148,603,000 227,500 3,150,000 140,000 1								111,032,5
HEIGHTENING OF KRENCENG DAM   Servation	(Sub-total)						83,989,232	1,115,816,4
Second   S	SUB-TOTAL OF 2.						102,225,100	1,339,703,2
Sample	. HEIGHTENING OF KREN	CENG DAM						
Excavation								
Rock m3								242,122,4
Embankment Core m3 1,281,085 605 2.395 775,056,425 3,022,079, Filter m3 2,285 5,756 Random m3 441 1,144 Rock m3 1,514 5,964 Grouting Blanket t 1,868 6,500 90,000 12,142,000 168,120,130,130,130,130,130,130,130,130,130,13				97,768			33,143,352	136,679,6
Random   m3   441   1.144	Embanionent	Core	m3	1,281,085	605	2,359	775,056,425	3,022,079,5
Grouting   Harket   1   1,868   6,500   90,000   12,142,000   168,120,								
Curtain   T   3,676   6,500   90,000   23,894,000   330,840,000		Rock	m3	. 0.0	1,514		10 140 000	169 100 0
3.2 Spillway (1) Approach wall & weir Excavation	Growting							330,840,0
(1) Approach wall & weir Excevation	(Sub-total)						884,711,729	3,899,841,6
Excavation Common m3 3,997 276 1,651 834,772 3,113,   Wea.rock m3 4,645 339 1,398 1,574,655 6,493,   Rock m3 6,628 13,442 132,187 89,093,576 876,135,   Rein bar 1 135 5,292 1,460,955 714,420 197,228,   (2) Chuteway & basin   Excavation Common m3 11,879 276 1,651 3,278,604 19,612,   Wea.rock m3 17,818 339 1,398 6,040,302 24,909,   Rock m3 962 3,475     Concrete m3 14,260 13,442 132,187 191,682,920 1,884,986,   Rein bar t 285 5,292 1,460,955 1,508,220 416,372,   Grouting Consoli. t 35 6,500 90,000 227,500 3,150,   (3) Metal work   Spillway gate Ls 1 108,000,000 108,000,000     (Sub-total)	3.2 Spillway							
Wea.rock   m3   4,645   339   1,398   1,574,655   6,493;	(1) Approach wall & weir Excavation	Common	m3	3,097	276	1,651	854,772	5,113,1
Concrete Rein bar t 135 5,292 1,460,955 714,420 197,228, Rein bar t 135 5,292 1,460,955 714,420 197,228, Rein bar t 135 5,292 1,460,955 714,420 197,228, Rein bar Common m3 11,879 276 1,651 3,278,604 19,612, Wea.rock m3 17,818 339 1,398 6,040,302 24,909, Rock m3 962 3,475 Concrete m3 14,260 13,442 132,187 191,682,920 1,884,986, Rein bar t 285 5,292 1,460,955 1,508,220 416,372, Grouting Consoli. t 35 6,500 90,000 227,500 3,150, Grouting Consoli. t 35 6,500 90,000 227,500 3,150, Grouting Consoli. The second of the sec				4,645			1,574,655	6,493,7
(2) Chateway & basin  Excavation  Common m3 11,879 276 1,651 3,278,604 19,612,  Wea.rock m3 17,818 339 1,398 6,040,302 24,909,  Rock m3 962 3,475  Concrete m3 14,260 13,442 132,187 191,682,920 1,884,986,  Rein bar t 285 5,292 1,460,955 1,508,220 416,372,  Grouting Consoli. t 35 6,500 90,000 227,500 3,150,  (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000  (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 42,286,698 7,333,843,  WATER SUPPLY PIPE LINE  4.2 Excavation m3 244 1,717 4.3 Add. pump station 1s 1,511,000,000 7,120,000,000 1,065,000,000 7,120,000,000 4.5 Add. pipe line Ls 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000,000 4.5 Add. pipe line Ls 1,511,000,000 1,540,000,000 2,484,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 2,484,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400,000 4.000,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 6,000,000 218,400,000 6,000,000 6,000,000 6,000,000 6,000,000		ROOK	m3		13,442	132,187		876,135,4
Wea.rock   m3   17,818   339   1,398   6,040,302   24,909,	(2) Chuteway & basin							
Concrete m3 14,260 13,442 132,187 191,682,920 1,884,986, Rein bar t 285 5,292 1,460,955 1,508,220 416,372, Grouting Consoli. t 35 6,500 90,000 227,500 3,150, (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000 (Sub-total) 402,974,969 3,434,001, SUB-TOTAL OF 3. 1,287,686,698 7,333,843, WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,065,000,000 7,120,000,000 1,0133,000,000 1,511,000,000 10,103,000, 4.5 Add. pipe line Ls 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000,000 4.5 Add. pipe line Ls 1 68,000,000 2,484,000,000 68,000,000 2,484,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 6,000,000 6,000,000 6,000,000	Excavation	Wca.rock			339	1,398		19,612,5 24,909,5
Rein bar t 285 5,292 1,460,955 1,508,220 416,372, Grouting Consoli. t 35 6,500 90,000 227,500 3,150, (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000 (Sub-total) 402,974,969 3,434,001, SUB-TOTAL OF 3. 1,287,686,698 7,333,843, WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 1,287,686,698 7,333,843, 42 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,065,000,000 7,120,000,000 1,065,000,000 7,120,000,000 4.5 Add. pipe line Ls 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000,000 4.5 Add. pipe line Ls 1,511,000,000 1,540,000,000 4.6 Add. intake & surge tank Ls 1 68,000,000 2,484,000,000 68,000,000 2,484,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400,000 4.0 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 6,000,000 218,400,000 6,000,000 6,000,000 6,000,000 6,00	Concrete	Rock		14,260			191,682,920	1,884,986,6
(3) Metal work Spillway gate Ls 1 108,000,000  (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,065,000,000 1,0103,000,000 1,0103,000,000 1,511,000,000	Rein bar	O	t	285		1,460,955		416,372,1
(Sub-total) 402,974,969 3,434,001,  SUB-TOTAL OF 3. 1,287,686,698 7,333,843,  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1,065,000,000 7,120,000,000 1,055,000,000 7,120,000,  4.4 Add. purification plant Ls 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000,  4.5 Add. pipe line Ls 1,540,000,000 4,540,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 4,740,000,000 68,000,000 2,484,000,000 6,000,000 218,400,000 4,740,000,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 218,400,000 6,000,000 6,000,000 6,000,000 6,000,000		Consoil.				90,00	-	3,130,0
SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1,065,000,000 7,120,000,000 1,065,000,000 7,120,000, 4.4 Add. purification plant Ls 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000,000 4.5 Add. pipe line Ls 1,540,000,000 4,6 Add. intake & surge tank Ls 1 68,000,000 2,484,000,000 6,000,000 218,400,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400,000	Spillway gate		Ls	. 1	108,000,000		•	
### WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station 1.5 1 1,065,000,000 7,120,000,000 1,065,000,000 7,120,000, 4.4 Add. purification plant 1.5 1 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000, 4.5 Add. pipe line 1.5 1,540,000,000 2,484,000,000 4.6 Add. intake & surge tank 1.5 1 68,000,000 2,484,000,000 68,000,000 2,484,000, 4.7 Receiving well 1.5 1 6,000,000 218,400,000 6,000,000 218,400,000 10,000,000 10,000,000 10,000,000 10,000,00	(Sub-total)							
4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station i.s i 1,665,000,000 7,120,000,000 1,065,000,000 7,120,000, 4.4 Add. purification plant i.s i 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000, 4.5 Add. pipe line i.s i 1,540,000,000 4,600,000 2,484,000,000 4,6 Add. intake & surge tank i.s i 68,000,000 2,484,000,000 68,000,000 2,484,000, 4.7 Receiving well i.s i 6,000,000 218,400,000 6,000,000 218,400,000	SUB-TOTAL OF 3.						1,287,686,698	7,333,843,4
4.2 Backfill m3 244 1,717 4.3 Add. pump station I.s 1 1,065,000,000 7,120,000,000 1,065,000,000 7,120,000, 4.4 Add. purification plant I.s 1 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000, 4.5 Add. pipe line I.s 1,540,000,000 2,484,000,000 68,000,000 2,484,000, 4.6 Add. intake & surge tank I.s 1 68,000,000 2,484,000,000 68,000,000 218,400, 4.7 Receiving well I.s 1 6,000,000 218,400,000 60,000,000 218,400,000	WATER SUPPLY PIPE LIN	ΙE					5	
4.3 Add pump station								
4.5 Add. pipe line					1,065,000,000	7,120,000,000		7,120,000,0
4.6 Add intake & surge tank Ls 1 68,000,000 2,484,000,000 68,000,000 2,484,000, 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400,000	4.4 Add. purification plant			1	1,511,000,000			1.0
2.50	4.6 Add, intake & surge tank	k	Ls			2,484,000,000		2,484,000,0 218,400,0
	_		2,67	•	sissalana		•	19,925,400,0
	DOD-TOTALOL #			······				

Table F-9 Cost Estimate for Cibanten Dam: Scheme B-1

DESCRIPTION		Uris	Qψ	Fc (Ygs)	Is (Rp)	Fe (Ym)	OUNT Le (Rp)
PREPARATORY WORK							
(20% of 2+3+4+5+6) . DIVERSION WORK						464,133,519	2,947,352,6
2.1 felet & cuilet							
Excavation	Common Wearock	ա3 m3	1,053 2,106	276 339	1,651 1,398	290,628 713,934	1,738,5 2,944,1
Concrete	Rock	mJ m3	7,371 2,640	962 13,442	3,475 132,187	7,090,902 35,486,830	25,614,2 348,973,6
Rein bar		ı	100	5,292	1,460,955	529,200	146,095,5
(Sub-total)						44,111,544	525,366,0
2.2 Tunck(=410m,D⇒5m) Escavation		m3	10,462 2,404	8,744	105,122	91,479,728	1,099,786,3
Lining conc. Plug conc.		ოპ ოპ t	686 246	13,488 13,488 6,500	155,546 155,546	32,425,152 9,252,768	373,932,5 106,704,5
Greating Rein bar		i	123	5,292	90,000 1,460,955	1,599,000 650,916	22,140,0 179,697,
(Sub-total)						135,407,564	1,782,760
SUB-TOTAL OF 2.						179,519,108	2,307,627,
. DAM							
3.1 Cofferdates Excavation		m3	2,500	276	1,651	690,000	4,127
Emberkment		m3	200,000	1,514	5,961	302,800,900	1,192,800,
(Sub-total)						303,490,000	1,196,927,
3.2 Main dom Excavation	Common	m3	11,075	276	1,651	3,056,700	18,284,
P_1	Wearock Rock	m3 tn3	22,150 17,520	339 962	1,398 3,475	7,508,850 74,574,240	30,985) 269,382,
Embankeneut	Core Filter Resdom	m3 m3 m3	101,416 62,614 174,900	605 2,285 441	2,359 5,756	61,356,630 143,141,540	239,240, 360,574,
Genzina	Residen Rock Blanket	m3	174,900 408,105 474	1,514 6,500	1,144 5,964 90,000	77,130,900 617,870,970 3,081,000	200,085, 2,433,931, 42,660
Growing	Consoli. Contain		114 1,287	6,500 6,500 6,500	90,000 90,000	741,000 8,365,500	42,660, 10,260, 115,830,
(Sub-total)	J	•	- 1-0-1		20,000	996,827,380	3,721,225,
3.3 Saddedam	-					350042-1000	2,121,722
Excevation	Common Wearook	m3 m3	3,595 7,190	276 339	2,176 2,585	992,220 2,437,410	7,822, 18,586
Emberikosent	Rock	m3 m3	25,160 167,975	962 244	4,433 1,717	24,203,920 40,985,900	111,534 238,413
Growing		t	597	13,442	132,187	8,024,874	78,915
(Sub-total)						76,644,324	505,271
SUB-TOTAL OF 3.						1,376,961,704	5,423,424
SPILWAY				-			
4.1 Side channel Excavation	Common Wearock	m3 tn3	8,100 16,200	276 339	1,651 1,398	2,235,600 5,491,800	13,373, 22,647
Concrete	Rock	m3 m3	56,700 21,170	962 13,442	3,475 132,187	\$4,545,460 284,567,140	197,032 2,798,398
Reinbar		1	400	5,292	1,460,955	2,116,800	584,382
(Sub-total)						348,956,740	3,615,833,
4.2 Charavay Excerning	Common	ъ3	14,245	276	1,651	3,931,520	23,518,
	Wearock Rock	m3 m3	28,490 99,715	339 962	1,398 3,475	9,658,110 95,925,830	39,829, 346,509,
Concrete Rein bar		m3 ≀	11,395 220	13,442 5,292	132,187 1,450,955	153,171,590 1,164,240	1,906,270, 319,210
(Sub-total)						263,851.390	2,235,338,
4.3 Phiograpol							
Excavation	Common Wearock	დ3 <u>ლ3</u>	4,032 8,064	276 339	1,651 1,398	1,112,832 2,733,696	6,656, 11,273,
AS-A Lorent	Rock	ω3	28,224	962	3,475	27,151,458	98,078
(Sub-total) SUB-TOTAL OF 4.						30,998,016 643,806,146	116,008 5,967,180
OUTLET WORK						072,000,010	3,307,100
5.1 Intake tower							
Excavation	Coownou Westock	103 103	515 1,030	276 339	1,651 1,398	142,140 349,170	850, 1,439,
Concrete	Rock	ր-3 m3	3,606 760	962 13,442	3,47 <i>5</i> 132,187	3,468,972 10,215,920	12,530, 100,462,
Reinter		I.	29	5,292	1,460,955	153,468	42,367
(Sub-total)					4	14,329,670	157,650
5.2 Entake stiaft Excavation		m3	332	8,744	102,122	2,903,008	33,994,
Concrete Rein bur		t m3	191 6	13,485 5,292	155,546 1,460,955	2,576,208 31,752	29,709 8,765
(Sub-rotal)						5,510,968	72,379.
SUB TOTAL OF 5.						19,840,638	230,030
METAL WORK							
6.1 Diversion gate 6.2 Steel conduit		la La	1	33,040,000	808,500,000	33,040,000	806,500
6.3 Hollow jet valve 6.4 Guard valve		ម	į	45,000,000 22,500,000		45,000,000 22,500,000	***************************************
SUB-TOTAL OF 6.		-	•	-4-0-1		100,540,000	808,500
WATER SUFPLY PIPE LINE		•					
7,1 Excavation	•	m3	134,400	276	1,651	37,094,400	221,594
7.2 Backfill		m) Ls	123,200	241	1,717	30,060,800	211,534
73 Add		Ls Ls					
7.3 Add. pump station 7.4 Add. purification plant 7.5 Add. wite line			4		10 200 000 mm		\$0 300 AC-1
		i.			39,200,000,000		39,200,000

Table F-10 Cost Estimate for Heightening of Krenceng Dam without Diversion Tunnel: Scheme B-1

DESCRIPTION		Unit	Q'ıy -	Fc	PRICE Le	Fc Fc	MOUNT La
D, 20141 11/11			~ · ·	(Yen)	(Rp)	(Yen)	(Re)
1. PREPARATORY WORK (20% of 2+3)		i				257,537,340	1,466,768,687
2. DIVERTED TUNNEL							
2.1 Coffering work Coffering	Exca. Embank	m3 m3		276 441	1,651 1,144		
(Sub-total)							
2.2 Weir							
Excavation	Common Wea.rock Rock	m3 m3 m3		276 339 962	1,651 1,398 3,475		
Concrete Rein bar Gato		m3 t Ls		5,052 5,292 2,000,000	118,708 1,460,955		
(Sub-total)							
2.3 Inlet & outlet Excavation	Common Wez.rock Rock	m3 m3 m3		276 339 962	1,651 1,398 3,475		
Concrete Rein bar Trash rack	ROOK	m3 t Ls		13,442 5,292 1,000,000	132,187 1,460,955		
(Sub-total)			•				
2.4 Diverted tunnel Excavation Lining cone. Plug cone. Grouting		m3 m3 m3		8,744 13,488 13,488 6,500	105,122 155,546 155,546 90,000		
Rein bar		t		5,292	1,460,955		
(Sub-total)							
SUB-TOTAL OF 2.							
. HEIGHTENING OF KRENC	CENG DAM						
3.1 Main dam Excavation	Common Wearrock	m3 m3	146,652 97,768	276 339 962	1,651 1,398 3,475	40,475,952 33,143,352	242,122,452 136,679,664
Embankment	Rock Core Filter Random Rock	m3 m3 m3 m3 m3	1,281,085	605 2,785 441 1,514	2,359 5,756 1,144 5,964	775,056,425	3,022,079,515
Grouting	Blanket Custain	t t	1,868 3,676	6,500 6,500	90,000 90,000	12,142,000 23,894,000	168,120,000 330,840,000
(Sub-total)						884,711,729	3,899,841,631
3.2 Spillway							
(1) Approach wall & weir Excavation	Common Wearock Rock	m3 m3 m3	3,097 4,645	276 339 962	1,651 1,398 3,47 <i>5</i>	854,772 1,574,655	5,113,147 6,493,710
Concrete Rein bar		m3	6,628 135	13,442 5,292	132,187 1,460,955	89,093,576 714,420	876,135,436 197,228,925
(2) Chuteway & basin Excavation	Common Wes.rock	m3 m3	11,879 17,818	276 339	1,651 1,398	3,278,604 6,040,302	19,612,229 24,909,564
Concrete Rein bar Grouting	Rock Consoli,	m3 m3 t	14,260 285 35	962 13,442 5,292 6,500	3,475 132,187 1,460,955 90,000	191,682,920 1,508,220 227,500	1,884,986,620 416,372,175 3,150,000
(3) Metal work Spillway gate	Colour	Ls	1	108,000,000	2-,	108,000,000	
(Sub-total)				.,		402,974,969	3,434,001,306
SUB-TOTAL OF 3.						1,287,686,698	7,333,843,437
	t:						
. WATER SUPPLY PIPE LIN  4.1 Excavation		m3		276	1,651	•	
4.2 Backfill 4.3 Add. pomp station 4.4 Add. purification plant		m3 Ls Ls	1	244 1,145,000,000 1,385,000,000	1,717 7,657,000,000 9,263,000,000	1,145,000,000 1,385,000,000	7,657,000,000 9,263,000,000
<ul><li>4.5 Add. pipe line</li><li>4.6 Add. intake &amp; surge tank</li><li>4.7 Receiving well</li></ul>	c	ls Is Is	1	74,000,000 6,000,000	1,540,000,000 2,720,000,000 218,400,000	74,000,000 6,000,000	2,720,000,000 218,400,000
SUB-TOTAL OF 4.						2,610,000,000	19,858,400,000
TOTAL OF DIRECT CONST	TRUCTION CO	ST				4,155,224,038	28,659,012,124

Table F-11 Cost Estimate for Downstream Cidanau Dam: Scheme B-2

DESCRIPTION		Unit	Q\y	Fe UNIT PRIC	i.c	Pe	I.c.
				(Yee)	(Rg)	((re))	(QS)
PREPARATORY WORK (20% of 2+3+4+5+6)						375,176,927	2,810,769,9
, DIVERSION WORK							
7.1 Inlet & cuilet Excavation	Common	m3	997	276	1,651	275,172	1,646,0
	Wearock Rock	m3 m3	11,970 6,982	339 962	1,391 3,475	4,057,830 6,716,684	16,734,6 24,262,4
Concrete Rein bar		m3 l	2,640 100	13,442 5,292	132,187 1,460,955	35,486,880 539,200	348,973 146,095
		•	100	5,252	*********		
(Sub-total)						47,965,766	537,711
2.2 Turnsel(1=400m, D=5m) Excevation		m3	10,710	8,744	105,122	93,618,240	1,175,856
Liong conc. Plug conc.		to3	2,451 686	13,488 13,488	155,546 155,546	33,234,432 9,252,768	383,265, 106,704,
Grouting		t.	501	6,500	\$0,000	3,276,000	45,360
Rein ber		t	126	5,292	1,460,955	666,792	184,080,
(Sub-rocul)						140,678,232	1,845,266,
SUB-TOTAL OF 2.						187,143,998	2,382,978,
MAG							
3.1 Coffeedam							
Excavation Embankment		m3 m3	2,500 200,000	276 1,514	1,651 5,964	690,000 302,800,000	4,127 1,192,800,
(Sub total)						303,490,000	1,196,927,
						200,130,000	1,120,120,1
3.2 Main dan Excavation	Common	т3	24,986	276	1,651	6,896,136	41,251
	Wearock Rock	ഡ3 മാ3	54,136 4,164	339 962	1,398 3,47 <i>5</i>	18,352,104 4,005,768	75,682, 14,469,
Resharkment	Core Filiar	103 103	49,100 31,308	605 2,285	2,359 5,756	29,705,500 71,538,780	115,826, 180,208
	Randon	ш3	72,975	441	1,144	32,181,975	\$3,483,
Growing	Rock Blacker	m3 L	170,275 56	1,514 6,500	5,964 90,000	257,796,350 364,000	1,015,520 5,040
-	Consoli. Custain	i.	182 2,556	6,500 6,500	90,000 90,000	1,183,000 16,614,000	16,380 230,040
(Sub-total)		-				438,637,613	1777,903
						436,031,013	. 1,111,500,
3.3 Sand trap basin Excession	Common	m3	306,750	276	2,176	84,663,000	667,488,
	Wearock Rock	m3 m3		3 <del>33</del> 962	2,585 4,433		
Maintenance read(2km)		m3 m3	55,000 1,200	244 13,442	1,717 132,187	13,420,000 16,130,400	94,435 158,624
Concrete		. 1823	1,20	13,774	152,167		
(Sub-total)						114,213,400	930,547,
SUB-TOTAL OF 3.						855,341,013	3,895,378,
SPILLWAY			•				
4.1 Side channel							
Excavation	Common Weattock	233 2023	193,749 116,707	276 339	1,651 1,39 <b>1</b>	25,632,240 39,563,673	171,274 163,156
<b>.</b>	Rock	m3	38,902	962	3,475	37,423,724	135,181
Concrete Rein ber		m3 t	27,724 520	13,442 5,292	132,187 1,460,935	372,666,008 2,751,340	3,664,752 759,696
(Sub-total)						481,037,485	4,894,064
4.2 Chateway		•					
Excevation	Coroceon Westrock	m3	53,093 127,425	276 339	1,651 1,398	14,653,668 43,197,07 <i>5</i>	87,656 178,140
	Rock	m3	31,856	962	3,475	30,645,472	110,699,
Concerte Rein bar		103 L	8,775 175	13,442 5,292	132,187 1,450,955	117,953,550 926,100	1,159,940 253,917
(Sub-total)						207,375,865	1,790,354
4.3 Phings pool Excavation	Common	ш3	2,030	776	1,651	560,280	3,351
	Wearnek Rock	m3 m3	14,210 24,360	339 962	1,39 <b>t</b> 3,475	4,\$17,190 23,434,320	19,565 84,651
(Sub real)				,		28,811,790	107,868
(Sub-rotal)				100			
SUB-TOTAL OF 4.						717,225,140	6,792,287
OUTLET WORK							
5.1 Intake tower	Come	_,	3,758	276	1,651	1,037,208	6,204
Excavation	Common Wentrock	m3 tu3	4,176	339	1,398	1,415,664	5,838
Concrete	Rock	m3 m3	418 500	962 13,442	3,475 132,187	402,116 6,721,000	1,452 66,093
Rein bar		ľ	20	5,292	1,460,955	105,840	29,219
(Sub-total)						9,681,828	108,807
5.2 lixako shaft				_			_
Excavation Concrete		m3 w3	299 171	8,744 13,488	102,122 155,546	2,614,456 2,306,448	30,534 26,598
Rein bur		ī	6	5,292	1,460,955	31,752	8,765
(Sub-total)						4,952,656	88,83
SUB-TOTAL OF 5.						14,634,484	174,706
METAL WORK							
		•		32.020.000		33 040 000	
6.1 Diversion gate 6.2 Steel conduit		La La	1 1	33,040,000	608,500,000	33,040,000	808,500
6.3 Hollow jet valve 6.4 Guard valve		Ls La	1	45,000,000 22,500,000		45,000,000 22,500,000	
		,-				100,540,000	608,500
SUB-TOTAL OF 6.	,					ewystologo	4.0,300
WATER SUPPLY PIPELIN	<b>\$</b>						
7.1 Excavation 7.2 Backfull		m3 m3		276 244	1,651 1,717		
7.3 Add pump station		Ls		211	-4423		
		ع.ا ھ1	1		501,000,000		504,000
7.4 Add. parification plant 7.5 Add. pipe line							
7.4 Add. purdication plant 7.5 Add. pipe line 7.6 Add. intake & surge tank		ī,	•				

Table F-12 Cost Estimate for Heightening of Krenceng Dam without Diversion Tunnel: Scheme B-2

DESCRIPTION  1. PREPARATORY WORK (20% of 2+3)  2. DIVERTED TUNNEL.  2.1 Coffering work Coffering (Sub-total)  2.2 Weir Excavation  Concrete Rein bar Gate (Sub-total)  2.3 Inlet & outlet Excavation  Concrete Rein bar Trash rack (Sub-total)  2.4 Diverted tunnel Excavation Lining conc. Plug conc.	Exca. Embank  Common Wea.rock Rock  Common Wea.rock Rock	m3 m	Qʻiy	Fe {Yen}  276  441  276  339  962  5,052  5,292  2,000,000  276  339  962	Le (Rp)  1,651 1,144  1,651 1,398 3,475 118,708 1,460,955	Fc (Yen) 257,537,340	Lc (Re)
(20% of 2+3)  2. DIVERTED TUNNEL.  2.1 Coffering work Coffering  (Sub-total)  2.2 Weir Excavation  Concrete Rein bar Gate  (Sub-total)  2.3 Inlet & outlet Excavation  Concrete Rein bar Trash rack  (Sub-total)  2.4 Diverted tunnel Excavation  Lining conc.	Embank  Common Wes.rock Rock  Common Wes.rock	m3 m3 m3 m3 t Ls  m3 m3 m3 m3 m3 m3 m3		276 339 962 5,052 5,292 2,000,000	1,144 1,651 1,398 3,475 118,708 1,460,955	257,537,340	1,466,768,68
2.1 Coffering work Coffering  (Sub-total)  2.2 Weir Excavation  Concrete Rein bar Gate (Sub-total)  2.3 Inlet & outlet Excavation  Concrete Rein bar Trash rack (Sub-total)  2.4 Diverted tunnel Excavation Lining conc.	Embank  Common Wes.rock Rock  Common Wes.rock	m3 m3 m3 m3 t Ls  m3 m3 m3 m3 m3 m3 m3		276 339 962 5,052 5,292 2,000,000	1,144 1,651 1,398 3,475 118,708 1,460,955		
Coffering  (Sub-total)  2.2 Weir Excavation  Concrete Rein bar Gate  (Sub-total)  2.3 Inlet & outlet Excavation  Concrete Rein bar Trash rack  (Sub-total)  2.4 Diverted tornel Excavation  Lining conc.	Embank  Common Wes.rock Rock  Common Wes.rock	m3 m3 m3 m3 t Ls  m3 m3 m3 m3 m3 m3 m3		276 339 962 5,052 5,292 2,000,000	1,144 1,651 1,398 3,475 118,708 1,460,955		
2.2 Weir Excavation  Concrete Rein bar Gate (Sub-total)  2.3 Inlet & outlet Excavation  Concrete Rein bar Trash rack (Sub-total)  2.4 Diverted tunnel Excavation Lining conc.	Wea.rock Rock Common Wea.rock	m3 m3 t Ls m3 m3 m3 m3		339 962 5,052 5,292 2,000,000 276 339 962	1,398 3,475 118,708 1,460,955		
Excavation  Concrete Rein bar Gate  (Sub-total)  2.3 Inlet & outlet Excavation  Concrete Rein bar Trash rack  (Sub-total)  2.4 Diverted tornel Excavation Lining conc.	Wea.rock Rock Common Wea.rock	m3 m3 t Ls m3 m3 m3 m3		339 962 5,052 5,292 2,000,000 276 339 962	1,398 3,475 118,708 1,460,955		
Concrete Rein bar Gate (Sub-total)  2.3 Inlet & outlet Excavation  Concrete Rein bar Trash rack (Sub-total)  2.4 Diverted tunnel Excavation Lining conc.	Wea.rock Rock Common Wea.rock	m3 m3 t Ls m3 m3 m3 m3		339 962 5,052 5,292 2,000,000 276 339 962	1,398 3,475 118,708 1,460,955		
Rein bar Gate (Sub-total)  2.3 Inlet & outlet Excavation  Concrete Rein bar Trash rack (Sub-total)  2.4 Diverted tunnel Excavation Lining conc.	Wea.rock	m3 m3 m3 m3 m3		5,292 2,000,000 276 339 962	1,460,955 1,651		
2.3 Inlet & outlet Excavation  Concrete Rein bar Trash rack (Sub-total)  2.4 Diverted tunnel Excavation Lining conc.	Wea.rock	m3 m3 m3		339 962			
Excavation  Concrete Rein bar Trash rack (Sub-total)  2.4 Diverted tonnel Excavation Lining conc.	Wea.rock	m3 m3 m3		339 962			
Rein bar Trash rack (Sub-total)  2.4 Diverted tonnel Excavation Lining conc.	Kock	m3 t			3,475		
2.4 Diverted tunnel Excavation Lining conc.				13,442 5,292 1,000,000	132,187 1,460,955		
Excavation Lining conc.							
Grouting		m3 m3 m3 t		8,744 13,488 13,488 6,500 5,292	105,122 155,546 155,546 90,000 1,460,955		
Rein bar		•		3,272	1,100,500		
(Sub-total)							
SUB-TOTAL OF 2.							•
3. HEPHEIGHTENING OF KR	ENCENG DA	M					
3.1 Main dam Excavation	Common Wea.rock Rock	m3 m3 m3	146,652 97,768	276 339 962	1,651 1,398 3,475	40,475,952 33,143,352	242,122,452 136,679,664
Embankment	Core Filter Random	m3 m3 m3	1,281,085	605 2,285 441	2,359 5,756 1,144	775,056,425	3,022,079,515
Grouting	Rock Blanket Curtain	m3 t	1,868 3,676	1,514 6,500 6,500	5,964 90,000 90,000	12,142,000 23,894,000	168,120,000 330,840,000
(Sub-total)						884,711,729	3,899,841,631
3.2 Spillway							
(1) Approach wall & weir Excavation	Common Wea.rock Rock	т3 т3 т3	3,097 4,645	276 339 962	1,651 1,398 3,475	854,772 1,574,655	5,113,147 6,493,710
Concrete Rein bar	NOCK	m3	6,628 135	13,442 5,292	132,187 1,460,955	89,093,576 714,420	876,135,436 197,228,925
(2) Chuteway & basin Excavation	Common Wearock	m3 m3	11,879 17,818	276 339	1,651 1,398	3,278,604 6,040,302	19,612,229 24,909,564
Concrete Rein bar	Rock	m3 m3 t	14,260 285	962 13,442 5,292	3,475 132,187 1,460,955	191,682,920 1,508,220	1,884,986,620 416,372,175
Grouting (3) Metal work	Consoli.	t	3\$	6,500	90,000	227,500	3,150,000
Spillway gate		Ls	1	108,000,000		108,000,000	2 424 601 904
(Sub-total)						402,974,969	3,434,001,800
SUB-TOTAL OF 3.						1,287,686,698	7,333,843,437
4. WATER SUPPLY PIPE LINU	E						•
4.1 Excavation 4.2 Backfill 4.3 Add. pump station 4.4 Add. purification plant		m3 m3 Ls Ls	1	276 244 1,146,000,000 1,749,000,000	1,651 1,717 7,665,000,000 11,699,000,000	1,146,000,000 1,749,000,000	7,665,000,000 11,699,000,000
4.5 Add. pipe line 4.6 Add. intake & surge tank 4.7 Receiving well	i	Ls Ls Ls	<u>!</u> 1	77,000,000 6,000,000	1,540,000,000 2,824,000,000 218,400,000	77,000,000 6,000,000	2,824,000,000 218,400,000
SUB-TOTAL OF 4.			<i>y</i>		. •	2,978,000,000	22,406,400,000
TOTAL OF DIRECT CONST			<b>/</b>			4,523,224,038	

Table F-13 Cost Estimate for Cidanau Gated Weir: Scheme B-3

DESCRIPTION		Unit	Q'ty -	Fc UNIT P	l.c	Fc	MOUNT Lc
			~~	(Yen)	(Re)	(Yen)	(Rp)
1. PREPARATORY WORK							
(20% of 2+3+4+5)	-					414,455,432	1,755,702,09
2. DIVERSION WORK							
2.1 Coffering work Sheet pile & bracing		1	159	131,583	36,915	20,921,697	5,869,48
SUB-TOTAL OF 2.						20,921,697	5,869,48
3. DAM							, .
3.1 Main dam							
Excavation	Common	m3	10,662	276	1,651	2,942,712	17,602,96
	Wearock	m3	8,462	339	1,398	2,868,618	11,829,8
	Rock	m3	2,200	962	3,475	2,116,400	7,645,0
Concrete		m3	21,325	5,052	118,708	107,733,900	2,531,448,1
Grouting	Consoli.	t ·	219	6,500	90,000	1,423,500	19,710,00
	Curtain	ŧ	352	6,500	90,000	2,288,000	31,680,0
SUB-TOTAL OF 3.						119,373,130	2,619,915,9
4. SPILLWAY							
4.1 Dental work			22.444				
Excavation	Common	m3	22,389	276	1,651	6,179,364	35,964,23
	Wea.rock	m3		339	1,398		
Concrete	Rock	m3 m3	8,379	962 5,052	3,475 118,708	42,330,708	994,654,3
(Sub-total)				·	•	48,510,072	1,031,618,5
(DOC-FORM)						40,310,012	1,031,010,3
4.2 Weir & pier	_	_					
Excavation	Common	m3		276	1,651		
	Wea.rock	m3	1,170	339	1,398	396,630	1,635,6
Concrete	Rock	m3 лл3	500 10,761	962 13,442	3,475 132,187	481,000 144,649,362	1,737,5
Rein bar		t	1,290	5,292	1,460,955	6,826,680	1,422,464,3 1,884,631,9
Grouting	Consoli.	ì	126	6,500	90,000	819,000	11,340,0
Glotting	Curtain	t	180	6,500	90,000	1,170,000	16,200,0
(Sub-total)						154,342,672	3,338,009,4
4.3 Hoist & bridge							÷
Concrete		m3	2,871	13,442	132,187	38,591,982	379,508,8
Rein bar		E.	574	5,292	1,460,955	3,037,608	838,588,1
(Sub-total)						41,629,590	1,218,097,0
SUB-TOTAL OF 4.						244,482,334	5,587,725,0
5. METAL WORK							
5.1 Roller gate		Ls	1	1,620,000,000		1,620,000,000	
5.2 Steel conduit		Ls	1		565,000,000	,	565,000,0
5.3 Hollow jet valve 5.4 Guard valve		Ls Ls	! 1	45,000,000 22,500,000		45,000,000 22,500,000	
SUB-TOTAL OF 5.						1,687,500,000	565,000,0
6. WATER SUPPLY PIPE LI	NE					•	
6.1 Excavation		m3		276	1,651		
6.2 Backfill		m3		244	1,717		
6.3 Add. pump station		Ls			.,		
6.4 Add, purification plant	t	1,5					
6.5 Add. pipe line		Ls					
6.6 Add. intake & surge ta	ınk	Ls					

Table F-14 Cost Estimate for Heightening of Krenceng Dam without Diversion Tunnel: Scheme B-3

	DESCRIPTION		Unit	Q'ty ~~	Fc UNIT	lc	Fc	MOUNT Le
					(Yen)	(Rp)	(Yen)	(Rp)
	EPARATORY WORK						067 F07 745	1 466 769 60
(20)	% of 2+3)						257,537,340	1,466,768,68
. DIV	PERTED TUNNEL							
2.1	Coffering work							
	Coffering	Exca. Embank	m3 m3		276 441	1,651 1,144		
		EMIONICA	111.3		441	1,177		
	(Sub-total)							
2.2	Weir							
	Excavation	Common Wearrock	m3 m3		276 339	1,651 1,398		
		Rock	m3		962	3,475		
	Concrete Rein bar		m3 t		5,052 5,292	118,708 1,460,955		
	Gate		Ls		2,000,000			
	(Sub-total)							
22	Inlet & outlet							
2.5	Excavation	Common	m3		276	1,651		
		Wea.rock Rock	m3 m3		339 962	1,398 3,475		
	Concrete	(COL	m3		13,442	132,187		
	Rein bar Trash rack		t Ls		5,292	1,460,955		
	(Sub-total)							
2.4	Diverted tunnel		m3		8,744	105,122		
	Excavation Lining cone.		ms m3		13,488	155,546		
	Plug conc.		m3		13,488	155,546 90,000		
	Growting Rein bar		t. 1		6,500 5,292	1,460,955		
	(Cut and)							
	(Sub-total)				*			
SUB	I-TOTAL OF 2.							
HEI	GHTENING OF KREN	CENG DAM						
3.1	Main dam							
	Main dam Excavation	Common	m3	146,652 97,768	276 339	1,651 1,398	40,475,952 33.143.352	
	Excavation	Wes.rock Rock	m3 m3	97,768	339 962	1,398 3,475	33,143,352	136,679,6
		Wes.rock Rock Core	m3 m3 m3		339 962 605	1,398 3,475 2,359		136,679,6
	Excavation	Wes.rock Rock Core Filter Random	m3 m3 m3 m3	97,768	339 962 605 2,285 441	1,398 3,475 2,359 5,756 1,144	33,143,352	136,679,6
	Excavation Embankment	Wes.rock Rock Core Filter Random Rock	m3 m3 m3 m3 m3 m3	97,768 1,281,085	339 962 605 2,285 441 1,514	1,398 3,475 2,359 5,756 1,144 5,964	33,143,352 775,056,425	136,679,6 3,022,079,5
	Excavation	Wes.rock Rock Core Filter Random	m3 m3 m3 m3	97,768	339 962 605 2,285 441	1,398 3,475 2,359 5,756 1,144	33,143,352	136,679,66 3,022,079,5 168,120,0
	Excavation Embankment Grouting	Wes.rock Rock Core Filter Random Rock Blanket	m3 m3 m3 m3 m3 m3	97,768 1,281,085 1,868	339 962 605 2,285 441 1,514 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000	33,143,352 775,056,425 12,142,000 23,894,000	136,679,64 3,022,079,5 168,120,04 330,840,04
	Excavation  Embankment  Grouting  (Sub-total)	Wes.rock Rock Core Filter Random Rock Blanket	m3 m3 m3 m3 m3 m3	97,768 1,281,085 1,868	339 962 605 2,285 441 1,514 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000	33,143,352 775,056,425 12,142,000	136,679,6 3,022,079,5 168,120,0 330,840,0
3.2	Excavation  Embankment  Grouting  (Sub-total)  Spillway	Wes.rock Rock Core Filter Random Rock Blanket	m3 m3 m3 m3 m3 m3	97,768 1,281,085 1,868	339 962 605 2,285 441 1,514 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000	33,143,352 775,056,425 12,142,000 23,894,000	136,679,6 3,022,079,5 168,120,0 330,840,0
3.2	Excavation  Embankment  Grouting  (Sub-total)	Wes.rock Rock Core Filter Random Rock Blanket Curtsin	m3 m3 m3 m3 m3 m3 t	97,768 1,281,085 1,868 3,676	339 962 605 2,285 441 1,514 6,500 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6
3.2	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir	Wes.rock Rock Core Filter Random Rock Blanket Curtsin	m3 m3 m3 m3 m3 t t	97,768 1,281,085 1,868 3,676 3,097 4,645	339 962 605 2,285 441 1,514 6,500 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1 6,493,7
3.2	Excavation  Embankment  Grouting  (Sub-total)  Spillway  Approach wall & weir Excavation  Concrete	Wea.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wea.rock	m3 m3 m3 m3 m3 t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628	339 962 605 2,285 441 1,514 6,500 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1 6,493,7 876,135,4
3.2	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock	m3 m3 m3 m3 m3 t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135	339 962 605 2,285 441 1,514 6,500 6,500 276 339 962 13,442 5,292	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000 1,651 1,398 3,475 132,187 1,460,955	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1 6,493,7 876,135,4 197,228,9
3.2	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock Common	m3 m3 m3 m3 m3 t t t m3 m3 m3 m3 m3 m3 m3 m3 m3	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879	339 962 605 2,285 441 1,514 6,500 6,500 276 339 962 13,442 5,292	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420 3,278,604	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1 6,493,7 876,135,4 197,228,9
3.2 (1)	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock	m3 m3 m3 m3 m3 t t t m3	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818	339 962 605 2,285 441 1,514 6,500 6,500 276 339 962 13,442 5,292 276 339 962	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955 1,651 1,398 3,475	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1- 6,493,7 876,135,4 197,228,9 19,612,2 24,909,5
3.2 (1)	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock	m3 m3 m3 m3 m3 t t t m3	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260	339 962 605 2,285 441 1,514 6,500 6,500  276 339 962 13,442 5,292 276 339 962 13,442 13,442	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955  1,651 1,398 3,475 132,187	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302 191,682,920	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1- 6,493,7 876,135,4 197,228,9 19,612,2 24,909,5 1,884,986,6
3.2 (1)	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock	m3 m3 m3 m3 m3 t t t m3	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818	339 962 605 2,285 441 1,514 6,500 6,500 276 339 962 13,442 5,292 276 339 962	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955 1,651 1,398 3,475	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1 6,493,7 876,135,4 197,228,9 19,612,2 24,909,5 1,884,986,6 416,372,1
3.2 (1)	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock	m3 m3 m3 m3 m3 t t t m3 m3 m3 m3 t t m3 m3 t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35	339 962 605 2,285 441 1,514 6,500 6,500 276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 1,460,955  1,651 1,398 3,475 1,460,955	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302 191,682,920 1,508,220 227,500	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1 6,493,7 876,135,4 197,228,9 19,612,2 24,909,5 1,884,986,6 416,372,1
3.2 (1)	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock	m3 m3 m3 m3 m3 t t t m3 m3 m3 m3 m3 m3 t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285	339 962 605 2,285 441 1,514 6,500 6,500 276 339 962 13,442 5,292 276 339 962 13,442 5,292	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 1,460,955  1,651 1,398 3,475 1,460,955	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302 191,682,920 1,508,220 227,500 108,000,000	136,679,64 3,022,079,5' 168,120,04 330,840,04 3,899,841,6: 5,113,14 6,493,7 876,135,4' 197,228,9: 19,612,2: 24,909,5: 1,884,986,6: 416,372,1' 3,150,04
3.2 (1)	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock	m3 m3 m3 m3 m3 t t t m3 m3 m3 m3 t t m3 m3 t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35	339 962 605 2,285 441 1,514 6,500 6,500 276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 1,460,955  1,651 1,398 3,475 1,460,955	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302 191,682,920 1,508,220 227,500	136,679,64 3,022,079,5' 168,120,04 330,840,04 3,899,841,6: 5,113,14 6,493,7 876,135,4' 197,228,9: 19,612,2: 24,909,5: 1,884,986,6: 416,372,1' 3,150,04
3.2 (1)	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock	m3 m3 m3 m3 m3 t t t m3 m3 m3 m3 t t m3 m3 t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35	339 962 605 2,285 441 1,514 6,500 6,500 276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 1,460,955  1,651 1,398 3,475 1,460,955	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302 191,682,920 1,508,220 227,500 108,000,000	136,679,64 3,022,079,5' 168,120,04 330,840,04 3,899,841,6: 5,113,1-6,493,7 876,135,4' 197,228,9: 19,612,2: 24,909,5! 1,884,986,6: 416,372,1' 3,150,04
3.2 (1) (2) (3)	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach walt & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate  (Sub-total)	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock  Common C	m3 m3 m3 m3 m3 t t t m3 m3 m3 m3 t t m3 m3 t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35	339 962 605 2,285 441 1,514 6,500 6,500 276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 1,460,955  1,651 1,398 3,475 1,460,955	33,143,352 775,056,425  12,142,000 23,894,000  884,711,729  854,772 1,574,655  89,093,576 714,420  3,278,604 6,040,302  191,682,920 1,508,220 227,500  108,000,000  402,974,969	136,679,64 3,022,079,5' 168,120,04 330,840,04 3,899,841,6: 5,113,1-6,493,7 876,135,4' 197,228,9: 19,612,2: 24,909,5! 1,884,986,6: 416,372,1' 3,150,04
3.2 (1) (2) (3) SUB	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate (Sub-total)  -TOTAL OF 3.	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock  Common C	m3 m	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35	339 962 605 2,285 441 1,514 6,500 6,500  276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500  108,000,000	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955 1,651 1,398 3,475 132,187 1,460,955 90,000	33,143,352 775,056,425  12,142,000 23,894,000  884,711,729  854,772 1,574,655  89,093,576 714,420  3,278,604 6,040,302  191,682,920 1,508,220 227,500  108,000,000  402,974,969	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1 6,493,7 876,135,4 197,228,9 19,612,2 24,909,5 1,884,986,6 416,372,1 3,150,0
3.2 (1) (2) (3) SUB WAT 4.1 4.2	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate (Sub-total)  -TOTAL OF 3.  FER SUPPLY PIPE LIN Excavation  Backfill	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock  Common C	m3 t t t Ls	97,768 1,281,085 1,368 3,676 3,097 4,645 6,628 135 11,879 17,318 14,260 285 35	339 962 605 2,285 441 1,514 6,500 6,500  276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500 108,000,000	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955 1,651 1,398 3,475 132,187 1,460,955 90,000	33,143,352 775,056,425  12,142,000 23,894,000 884,711,729  854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302  191,682,920 1,508,220 227,500 108,000,000 402,974,969 1,287,686,698	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1 6,493,7 876,135,4 197,228,9 19,612,2 24,909,5 1,884,986,6 416,372,1 3,150,0 3,434,001,8 7,333,843,4
3.2 (1) (2) (3) SUB WAT 4.2 4.3	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate (Sub-total)  -TOTAL OF 3.  FER SUPPLY PIPE LIN Excavation  Excavation  Excavation  Excavation  Add. pump station	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock  Common C	m3 m3 m3 m3 m3 t t t  m3 m3 m3 t t t  m3 m3 t t t  m3 m3 t t t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35	339 962 605 2,285 441 1,514 6,500 6,500  276 339 962 13,442 5,292 6,500 108,000,000	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955 1,651 1,398 3,475 132,187 1,460,955 90,000	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729 854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302 191,682,920 1,508,220 227,500 108,000,000 402,974,969 1,287,686,698	136,679,6 3,022,079,5 168,120,0 330,840,0 3,899,841,6 5,113,1 6,493,7 876,135,4 197,228,9 19,612,2 24,909,5 1,884,986,6 416,372,1 3,150,0 3,434,001,8 7,333,843,4
3.2 (1) (2) (3) SUB WAT 4.1 4.2 4.3 4.4 4.5	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate (Sub-total)  -TOTAL OF 3.  FER SUPPLY PIPE LIN Excavation  Backfill Add. pump station Add. purification plant Add. pipe line	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock  Common Wes.rock Rock	m3 t t t Ls Ls	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35 1	339 962 605 2,285 441 1,514 6,500 6,500  276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500 108,000,000	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955 1,651 1,398 3,475 132,187 1,460,955 90,000	33,143,352 775,056,425  12,142,000 23,894,000  884,711,729  854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302  191,682,920 1,508,220 227,500 108,000,000 402,974,969 1,287,686,698	136,679,66 3,022,079,51 168,120,06 330,840,06 3,899,841,63 5,113,14 6,493,71 876,135,42 197,228,92 24,909,56 416,372,17 3,150,06 3,434,001,86 7,333,843,43
3.2 (1) (2) (3) SUB WAT 4.1 4.2 4.3 4.4 4.5 4.6	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate (Sub-total)  -TOTAL OF 3.  FER SUPPLY PIPE LIN Excavation  Backfill Add. purification plant Add. pipe line Add. jungte & surge tan Add. dintake & surge tan	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock  Common Wes.rock Rock	m3 t t t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35 1	339 962 605 2,285 441 1,514 6,500 6,500  276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500 108,000,000 108,000,000 80,000,000	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955  1,651 1,398 3,475 132,187 1,460,955 90,000	33,143,352 775,056,425  12,142,000 23,894,000  884,711,729  854,772 1,574,655  89,093,576 714,420  3,278,604 6,040,302  191,682,920 1,508,220 227,500  108,000,000 402,974,969 1,287,686,698  1,167,000,000 1,812,000,000 80,000,000	242,122,4; 136,679,66 3,022,079,51 168,120,00 330,840,06 3,899,841,62 5,113,14 6,493,71 876,135,43 197,228,92 19,612,22 24,909,56 416,372,17 3,150,00 3,434,001,80 7,333,843,43
3.2 (1) (2) (3) SUB WAT 4.1 4.2 4.3 4.4 4.5 4.6 4.7	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate (Sub-total)  TOTAL OF 3.  TER SUPPLY PIPE LIN Excavation  Backfill Add. pump station Add. pirification plant Add. pirification well	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock  Common Wes.rock Rock	m3 t t t Ls Ls	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35 1	339 962 605 2,285 441 1,514 6,500 6,500  276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500 108,000,000	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955 1,651 1,398 3,475 132,187 1,460,955 90,000	33,143,352 775,056,425 12,142,000 23,894,000 884,711,729  854,772 1,574,655 89,093,576 714,420 3,278,604 6,040,302 191,682,920 1,508,220 227,500 108,000,000 402,974,969 1,287,686,698  1,167,000,000 1,812,000,000 80,000,000 6,000,000	136,679,66 3,022,079,51 168,120,04 330,840,04 3,899,841,63 5,113,14 6,493,71 876,135,42 197,228,92 24,909,56 11,884,986,62 416,372,17 3,150,04 3,434,001,81 7,333,843,43
3.2 (1) (2) (3) SUB WAT 4.1 4.2 4.3 4.4 4.5 4.6 4.7	Excavation  Embankment  Grouting  (Sub-total)  Spillway Approach wall & weir Excavation  Concrete Rein bar Chuteway & basin Excavation  Concrete Rein bar Grouting Metal work Spillway gate (Sub-total)  -TOTAL OF 3.  FER SUPPLY PIPE LIN Excavation  Backfill Add. purification plant Add. pipe line Add. jungte & surge tan Add. dintake & surge tan	Wes.rock Rock Core Filter Random Rock Blanket Curtsin  Common Wes.rock Rock  Common Wes.rock Rock  Common Wes.rock Rock	m3 t t t t	97,768 1,281,085 1,868 3,676 3,097 4,645 6,628 135 11,879 17,818 14,260 285 35 1	339 962 605 2,285 441 1,514 6,500 6,500  276 339 962 13,442 5,292 276 339 962 13,442 5,292 6,500 108,000,000 108,000,000 80,000,000	1,398 3,475 2,359 5,756 1,144 5,964 90,000 90,000  1,651 1,398 3,475 132,187 1,460,955  1,651 1,398 3,475 132,187 1,460,955 90,000	33,143,352 775,056,425  12,142,000 23,894,000  884,711,729  854,772 1,574,655  89,093,576 714,420  3,278,604 6,040,302  191,682,920 1,508,220 227,500  108,000,000 402,974,969 1,287,686,698  1,167,000,000 1,812,000,000 80,000,000	136,679,66 3,022,079,51 168,120,00 330,840,00 3,899,841,63 5,113,14 6,493,71 876,135,43 197,228,92 24,909,50 1,884,986,62 416,372,17 3,150,00 3,434,001,80 7,333,843,43

Table F-15 Cost Estimate for Cidanau Dam: Scheme C-1

DESCRIPTION		Unit	Qly	Fc (Yes)	Lc (Rb)	Fe (Ym)	Ic (RD)
PREPARATORY WORK			.,,	11*21			
(20% of 2+3+4+5+6)			•			464,133,519	2,947,352,
DIVERSION WORK							
2.1 Inlet & coulet Harsvarion	Сопинов	m3	1,053	. 276	1,651	290,628	1,738,
	Wearock Rock	m3 m3	2,106 7,371	339 962	1,39 <b>L</b> 3,475	713,934 7,090,902	2,944 25,614
Commto Rein bar		to3	2,610 100	13,442 5,292	132,187 1,460,955	35,486,880 529,200	348,973 146,095
		•	100	3,272	1,400,300		
(2019-101st)						44,111,544	\$25,366
2.2 Tuenet(t=410m,D=5m) Excavation		m3	10,462	8,744	105,122	91,479,728	1,099,786
Lining core. Plug core.		ო3 ო3	2,404 686	13,488 13,488	155,546 155,546	32,425,152 9,252,768	373,932 106,704
Greating Rain bar		i i	246 123	6,500 5,292	90,000 1,460,955	1,599,000 650,916	22,140 179,697
		•	16	2,232	1,100,155	135,407,564	
(தம்-எவ்)							1,782,260
SUB-TOTAL OF 2.						179,519,108	2,307,627
DAM							
3.1 Cofferdam Excavation		ro3	2,500	276	1,651	690,000	4,127
Embankmen		mJ	200,000	1,514	5,964	302,800,000	1,192,800
(Sub-total)						303,490,000	1,196,927
3.2 Main days							
Excavation	Common Weartock	m3 m3	11,075 22,150	276 339	1,651 1,398	3,056,700 7,508,850	18,284, 30,965
<b>0_6</b>	Rock	tn3	77,520	962	3,475	74,574,240	269,332
Embanktomt	Core Filter	m3 m3	101,416 62,644	605 2,285	2,359 5,756	61,356,680 143,141,540	239,240 360,578
	Rundem Rock	m3 m3	174,900 408,105	441 1,514	1,144 5,964	77,130,900 617,870,970	200,085 2,433,938
Growing	Blacket Contoli.	:	474 114	6,500 6,500	90,000 90,000	3,081,000 741,000	42,660 10,760
	Carain	ì	1,287	6,500	90,000	8,365,500	115,630
(Sub-total)						596,827,380	3,721,225
3.1 Saddie dam							
Excavation	Common Wextock	മ3 മ3	3,595 7,190	276 339	2,176 2,585	992,220 2,437,410	7,822 18,525
Embrok ment	Rock	m3	25,160	962 244	4,433 1,717	24,203,920 40,985,900	111,534 218,413
Growing		ı,	1 <i>67,975</i> 597	13,442	132,187	8,024,874	71,915.
(Sub-total)						76,644,324	505,271
SUB-TOTAL OF 3.						1,376,961,704	5,423,424,
SPILLWAY							-,
						•	
4.1 Side channel Excavation	Солилон	en3	8,100	776	1,651	2,235,600	13,313
	Wearock Rock	<u>മു</u> പ്ര	16,200 56,700	339 962	1,39 <b>8</b> 3,47 <b>5</b>	5,491,800 54,545,400	22,647 197,032
Constitute Rein bar		±23 L	21,170 400	13,442 5,292	132,187 1,460,955	284,567,140 2,116,800	2,798,398 584,382
		•		-,-,-	2,000,033	348,956,740	3,615,833
(Sub-total)						210,730,79U	2,013,833
4.2 Charway Excavation	Common	Ecz	14,245	276	1,651	3,931,620	23,518
	Weareck Rock	63 63	28,490 99,715	339 962	1,398 3,475	9,658,110 95,925,830	39,829 346,509
Concrete Prin her		ъ3	11,395	13,442	132,187	153,171,590 1,164,240	1,506,270
Reig bar		ı	220	5,292	1,450,935		319,210
(Sub-tast)						263,851,390	2,235,338
4.3 Plange pool Excertation	Соппосо	m3	4,032	276	1,651	1,112,832	6,656
	Wearock	m <sup>1</sup>	8,061	339 962	1,398 3,475	2,733,696	11, <i>273</i> 98,078
	Rock	Eng	28,224	<del>30</del> 2	2413	27,151,488	
(Sub-rots)						30,998,016	116,008
SUB-TOTAL OF 4.						643,805,146	5,967,180
OUTLET WORK				•			
5.1 Intake tower							
Excavation	Common Weznock	m3 m3	515 1,030	276 339	1,651 1,398	142,140 349,170	850 1,439
Concrete	Rock	ლ3 ლ3	3,606 760	962 13,412	3,475 132,187	3,468,972 10,215,920	12,530 100,462
Rein bur		(	29	5,292	1,460,955	153,468	42,367
(Sub total)						14,329,670	157,650
5.2 Intake shaft							
Excevation		m3	332 191	8,744 13,488	102,122 155,546	2,903,008 2,576,208	33,904 29,709
Concrete Rein ber		m3 I	9	5,292	1,460,955	31,752	8,765
(Sub-total)						5,510,968	72,379
SUB-TOTAL OF 5.						19,840,638	230,030
						-214 -41204	230,030
METAL WORK							
6.1 Diversion gate 6.2 Steel conduit		Le Le	:	33,040,000	\$03,500,000	33,040,000	806,500
6.3 Hollow jet valve 6.4 Guard valve		نا نا	· i	45,000,000 22,500,000		45,000,000 22,500,000	•
			·	**********			**- **
SUB-TOTAL OF 6.						100,540,600	808,500
WATER SUPPLY PIPE LINI	E						
7.1 Excavation		mJ	134,400	276 244	1,651 1,717	37,094,400	221,894 711,534
7.2 Backfill 7.3 Add pare station		nd Le	123,200	294	1,717	30,060,800	711,534
7.4 Add, purification plant 7.5 Add, pipe line		La . La	. 1		39,200,000,000		39,200,000
7.6 Add, intake de narge rank		ű.	•		,,		
						67,155,200	39,633,42
TOTAL OF 7.							

Table F-16 Cost Estimate for Heightening of Krenceng Dam with One Diversion Tunnel: Scheme C-1

DESCRIPTION		Unit	Q'ty	Fe	PRICE Le	Fc	AMOUNT Lc
, pprototopy work				(Yen)	(Rp)	(Yen)	(Rp)
1. PREPARATORY WORK (20% of 2+3)						264,175,476	1,556,022,4
2. DIVERTED TUNNEL.							
2.1 Coffering work Coffering	Exca. Embank	m3 m3	500 500	276 441	1,651 1,144	138,000 220,500	825,50 572,00
(Sub-total)					•	358,500	1,397,50
2.2 Weir							,
Excavation  Concrete	Common Wea.rock Rock	m3 m3 m3 m3	400 400 200 150	276 339 962 5,052	1,651 1,398 3,475 118,708	110,400 135,600 192,400	660,41 559,20 695,00
Rein bar Gate		l.s	15	5,292 2,000,000	1,460,955	757,800 79,380 2,000,000	17,806,20 21,914,32
(Sub-total)						3,275,580	41,635,12
2.3 Inlet & outlet Excavation  Concrete Rein bar	Common Wea.rock Rock	m3 m3 m3 m3	1,664 1,664 832 100 20	276 339 962 13,442 5,292	1,651 1,398 3,475 132,187 1,460,955	459,264 564,096 800,384 1,344,200 105,840	2,747,26 2,326,27 2,891,20 13,218,70 29,219,10
Trash rack		ه.ا	1	1,000,000		1,000,000	,,
(Sub-total)						4,273,784	50,402,53
2.4 Diverted tunnel Excavation Lining cone. Plug cone.		m3 m3	1,600 650	8,744 13,488	105,122 155,546	13,990,400 8,767,200	168,195,20 101,104,90
Grouting Rein bar		m3 t	360	13,488 6,500	155,546 90,000	2,340,000	32,400,00
(Sub-total)	•	ŧ .	35	5,292	1,460,955	185,220	51,133,42
						25,282,820	352,833,52
SUB-TOTAL OF 2.						33,190,684	446,268,68
3. HEIGHTENING OF KREN	CENG DAM		•				
3.1 Main dam Excavation	Common Wea.rock Rock	m3 m3 m3	146,652 97,768	276 339 962	1,651 1,398	40,475,952 33,143,352	242,122,45 136,679,66
Embankment	Core Filter Random Rock	m3 m3 m3 m3	1,281,085	605 2,285 441 1,514	3,475 2,359 5,756 1,144 5,964	775,056,425	3,022,079,51
Grouting	Blanket Curtain	t t	1,868 3,676	6,500 6,500	90,000 90,000	12,142,000 23,894,000	168,120,000 330,840,000
(Sub-total)						884,711,729	3,899,841,63
3.2 Spillway							
(1) Approach wall & weir Excavation	Common Wea.rock Rock	m3 m3 m3	3,097 4,645	276 339 962	1,651 1,398 3,475	854,772 1,574,655	5,113,147 6,493,710
Concrete Rein bar (2) Chuteway & basin		m3 (	6,628 135	13,442 5,292	132,187 1,460,955	89,093,576 714,420	876,135,436 197,228,925
Excavation	Common Wearrock Rock	m3 m3 m3	11,879 17,818	276 339 962	1,651 1,398 3,475	3,278,604 6,040,302	19,612,229 24,909,56
Concrete Rein bar Grouting	Consoli.	лι3 1 t	14,260 285 35	13,442 5,292 6,500	132,187 1,460,955 90,000	191,682,920 1,508,220 227,500	1,884,986,620 416,372,175 3,150,000
(3) Metal work Spillway gate		Ĺs	1	103,000,000		108,000,000	
(Sub-total)						402,974,969	3,434,001,806
SUB-TOTAL OF 3.						1,287,686,698	7,333,843,437
. WATER SUPPLY PIPE LIN	Е					•	
4.1 Excavation 4.2 Backfill 4.3 Add, pump station		m3 in3 Ls	ı	276 244 1,166,000,000	1,651 1,717 7,800,000,000	1,166,000,000	7,800,000,000
4.4 Add. purification plant 4.5 Add, pipe line		کیا کیا کیا	ì	1,448,000,000	9,683,000,000 1,540,000,000	1,448,000,000	9,683,000,000
4.6 Add. intake & surge tank 4.7 Receiving well		al al	1	77,000,000 6,000,000	2,810,000,000 218,400,000	77,000,000 6,000,000	2,810,000,000 218,400,000
SUB-TOTAL OF 4.						2,697,000,000	20,511,400,000
TOTAL OF DIRECT CONST	PLICTION COS	т				4,282,052,858	29,847,534,548

Table F-17 Cost Estimate for Downstream Cidanau Dam: Scheme C-2

DESCRIPTION		Unit	Q\y	Fc (Yes)	Le (Rp)	Fe (Yes)	le (Rp)
1. PREPARATORY WORK						11607	180
(20% of 2+3+4+5+6)  2. DIVERSION WORKS						375,176,927	2,810,769,9
2.1 Telet & coulet	C						
Excavation	Common Wra.rock	tn3 tn3	997 11,970	276 339	1,651 1,398	275,172 4,057,830	1,616,0 16,734,0
Concrete Rein bar	Rock	m3 m3	6,982 2,640	962 13.442	3,475 132,187	6,716,684 35,486,880	24,262,4 348,973,6
(Sub-total)		t	100	5,292	1,460,935	529,200	146,095,5
2.7 Tunock(1=400m,D=5m	)					47,065,766	537,711,7
Escavation Lining cone,		m3 to3	10,710 2,464	\$,744 13,485	105,122	93,618,240	1,125,856,6
Plug cooc. Grossing		m3 t	686 501	13,438 6,500	155,546 155,546 90,000	33,234,432 9,252,768 3,276,000	383,265,3 106,764,5
Rein bar		t	126	5,292	1,460,955	666,792	45,360,0 184,080,3
(Sub-totel)						140,078,232	1,845,266,8
SUB-TOTAL OF 2.						187,143,998	2,382,978,5
3. DAM							
3.1 Cofferdam Excavation		mJ	2,500	276	1,651	690,000	4,127,5
Emberkment		m3	200,000	1,514	5,964	302,800,000	1,192,800,0
(Sub-total)						303,490,000	1,196,927,5
3.2 Main dan Excavation	Common	m³	24,986	276	1,651	6,896,136	41,251,8
Emback mees	Wea-rock Rock Core	m3 m3	54,136 4,161	339 962	1,39 <b>8</b> 3,475	18,352,104 4,005,768	75,682,1 14,469,9
Louis/ME LINES	Filter Random	m3 m3 m3	49,100 31,308	605 2,285	2,359 5,756	29,705,500 71,538,780	113,826,9 180,208,8
Growing	Rock Blacket	m3 L	72,975 170,275	441 1,514	1,144 5,964	32,181,975 257,796,350	\$3,483,4 1,015,520,1
	Consoli.	1	56 182 7 556	6,500 6,500 6,500	90,000 90,000	364,000 1,183,000	5,040,0 16,380,0
(Sub-total)		•	2,556	6,500	90,000	16,614,000	230,040,0
3.3 Sand trap basin						438,637,613	1,777,903,1
Excavation	Common Wratrock	1123 1113	306,750	276 339	2,176	84,663,000	667,488,0
Maintenance road(Zkm)	Rock	m3 m3	55,000	962	2,585 4,433		
Concrete		m3	1,200	244 13,442	1,717 132,187	13,420,000 16,139,400	94,435,0 158,624,4
(Sub-total)						114,213,400	920,547.40
SUB-TOTAL OF 3,						856,341,013	3,895,378,00
. SPILWAY							
4.1 Side channel Excavation	Common	m3	103,740	276	1.551		
	Wearock Rock	203 1113	116,707 38,902	339 962	1,651 1,398 3,475	28,632,240 39,553,673	171,774,74 163,156,38
Conceste Reio bar		m3 l	27,724 520	13,44 <b>2</b> 5,292	132,187 1,460,955	37,423,724 372,666,008	135 184 45 3,664 752 38
(Sub-total)				2/27-	1,100,133	2,751,840	759,696,60
4.2 Charvey						481,037,485	4,894,064,56
Excevation	Constion Westock	m3 m3	53,093 127,425	276 339	1,651 1,398	14,653,668 43,197,075	\$7,656,54
Concrete	Rock	m3 m3	31,856 8,775	962 13,442	3,475 132,187	30,645,472 117,953,550	178,140,15 110,699,60
Rein bar		ı	175	5,292	1,450,955	926,100	1,159,940,92 253,917,12
(Sub-total)						207,375,865	1,790,354,34
4.3 Plange pool Excavation	Состонов	<b>m</b> 3	2,030	276	1,651	\$60.750	2.251.5
	Weateck Rock	ra3 m3	14,210 24,360	339 962	1,398 3,475	4,417,190 23,434,320	3,351,53 19,865,58
(Sub-total)					4,,,,,	28,811,790	84,651,00
SUB TOTAL OF 4.		-				717,225,140	6 797 287 01
OUTLET WORK						* 4*,64J,19U	6,792,287,01
5.1 Intake tower							
Excavation	Common Wearnek	m3 m3	3,758 4,176	276 339	1,651 1,398	1,037,208 1,415,661	6,204,45 5,838,04
Constite	Rock	m3 m3	418 500	962 13,442	3,475 137,187	402,116 6,721,000	5,838,04 1,452,55 66,003,50
Rein ber		t	20	5,292	1,460,955	105,840	66,093,50 29,219,10
(Sub-total)						9,681,828	108,807,65
5.2 locake shaft Excavation		ш3	299	8,744	102,122	2,614,456	30,534,478
Concrete Rein bar		m3 t	17j 6	13,488 5,292	155,546 1,460,955	2,305,448 31,752	30,334,471 26,598,366 8,765,730
(Sub-total)				1,472	1,400,733		
SUB-TOTAL OF 5.						4,952,656 14,634,484	65,898,574 174,706,230
METAL WORK							174,700,230
6.1 Diversion gate		L	1	33,040,000		33,040,000	
6.2 Steel conduit 6.3 Hollow jet valve		la La	1	45,000,000	808,500,000	45,000,000	808,500,000
6.4 Guard valve		La	1	22,500,000		22,500,600	
UB TOTAL OF 6.						100,540,000	806,500,000
YATER SUPPLY PIPE LINE							
7.1 Excavation 7.2 Backfill		គរ3 ពល		276 244	1,651		
7.3 Add. pump station 7.4 Add. pump station plant		Ls Ls	•	194	1,717		•
7.5 Add. pipe line		Le	1		501,000,000		504,000,000
7.6 Add. intake & surge tank		1.4					
7.6 Add. incake & surge tank UB-TOTAL OF 7.		La					504,000,000

Table F-18 Cost Estimate for Heightening of Krenceng Dam with One Diversion Tunnel: Scheme C-2

The REPENAL TICKY WORK	DESCRIPTION		Unit	Q'ty	Fc	T PRICE Lc	Fc	AMOUNT La
Control   Cont			·-··					
2. DIVERTED TUNNE!.  2.1 Coffring work Coffr								
Coffering work   Distance   Dis							264,175,476	1,556,022,42
Confering								
Embank m3		lives	3	ron.				
(Sub-batal)  2.2 Weir Exerwision Common m3 400 276 1,651 110,400 660,40	containing					.,,,,,,		825,500 572,00
2.2   Weir	(Sub-total)							
Real Process							338,300	1,397,300
Wed-rock   m3   400   339   1398   135,600   559,200   136,000					276	1,651	110,400	660,400
Concrete								559,200
Give Ls 1 2,000,000 2,000,000 3,000,000 3,000,000 2,000,000 1,000,000 1,000,000 1,000,000 1,000,000			m3	150	5,052	118,708	757,800	17,806,20
Sub-total)								21,914,32
23 Intel & outlet Exercised on Common m3	(Sub-total)							A1 626 104
Eccaration	-						3,273,380	41,033,123
Wearock   m3			m3	1,664	276	1,651	459.264	2.747 264
Concrete   m3   100   13.442   132,187   1344.260   13.218.76   Rein bar   1   20   5.292   1,460,955   105,940   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   29.219.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   12.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10   1.000,000   13.19.10						-,	564,096	2,326,277
Rein Sar Trosh reck		******	m3	100	13,442	132,187		2,891,200 13,218,700
(Sub-total)  2-4. Diverted turnel Exercision								29,219,100
2.4 Diverted turned Exex sign in a series of the series of	(Sub-total)			_	.,,			<b></b>
Eccavation	-						4,273,784	50,402,536
Lining conc.   m3   650   13,48\$   155,546   8,767,200   101,104,900   Plug conc.   m3   13,48\$   155,546   8,767,200   101,104,900   Plug conc.   m3   13,48\$   155,546   8,767,200   101,104,900   Plug conc.   m3   13,48\$   155,546   8,767,200   32,400,000   32,4			<b>m</b> 3	1,600	8.744	105.122	13 000 400	169 105 200
Grouing Rein bar 1 360 6,500 90,000 2,340,000 31,133,42 (Sub-total) 25,282,820 31,133,143,322 (Sub-total) 25,282,820 31,133,143,322 (Sub-total) 25,282,820 31,133,143,322 (Sub-total) 25,282,820 31,133,143,132 (Sub-total) 25,282,820 31,133,143,132 (Sub-total) 25,282,820 31,133,143,132 (Sub-total) 25,282,820 31,133,143,132 (Sub-total) 25,282,820 31,134,134 (Sub-total) 25,282,820 (Sub-total					13,488	155,546		101,104,900
Sub-total   Sub-	Grouting			360			2.340.000	32,400,000
SUB-TOTAL OF 2.  HEIGHTENING OF KRENCENG DAM  3.1 Main dam  Excavation  Neerock  Meerock  Mock	Rein bar		t	35				51,133,425
### HEIGHTENING OF KRENCEING DAM  3.1 Main dam	(Sub-total)						25,282,820	352,833,525
HEIGHTENING OF KRENCENG DAM	SUB-TOTAL OF 2.						33,190,684	446 268 686
3.1 Main dam	HEIGHTENING OF KREN	CENG DAM						110,200,000
Excavation	k							
Wearock m3		Common	m3	146,652	276	1,651	40.475.952	242 122 452
Embankment Core m3 1,281,085 605 2,359 775,056,425 3,022,079,515   Filter m3 Random m3 441 1,144				97,768		1,398		136,679,664
Filter   m3   2,285   5,756   Random   m3   441   1,144   1,	Embankment	Core	m3	1,281,085			775,056,425	3,022,079,515
Rock   m3								
Curtain t 3,676 6,500 90,000 23,894,000 330,840,000 (Sub-total) 884,711,729 3,899,841,631 (3.2 Spillway (1) Approach wall & weir Excavation		Rock	m3					
(Sub-total)  3.2 Spillway (1) Approach wall & weir Excavation  Common m3 3,097 276 1,651 854,772 5,113,147 Wea.rock m3 4,645 339 1,398 1,574,655 6,493,710 Rock m3 962 3,475 80,935,576 876,135,436 (2) Chateway & basin Excavation  Concrete m3 6,628 13,442 132,187 89,093,576 876,135,436 (2) Chateway & basin Excavation  Common m3 11,879 276 1,651 3,278,604 19,612,229 Wea.rock m3 17,818 339 1,398 6,040,302 24,909,564 Rock m3 17,818 339 1,398 6,040,302 24,909,564 Rock m3 17,818 339 1,398 6,040,302 24,909,564 Rock m3 14,260 13,442 132,187 191,682,920 1,884,986,620 Rein bar 1 285 5,292 1,460,955 1,508,220 416,372,175 Grouting Consoli. t 35 6,500 90,000 227,500 3,150,000 (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000 (Sub-total)  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4,271,775 4,	Circuting							168,120,000
3.2 Spillway (1) Approach wall & weir Excavation Common Rock M3 4,645 339 1,398 1,574,655 6,493,710 806,28 13,442 132,187 80,093,576 876,135,436 Rein bar (2) Chuteway & basin Excavation Common M3 11,879 276 1,651 3,278,604 19,612,229 Wearock M3 17,818 339 1,398 6,040,302 24,909,564 Rock Rock M3 17,818 339 1,398 6,040,302 24,909,564 Rock Rock M3 14,260 13,442 132,187 191,682,920 1,884,986,620 Rein bar Rein bar 1 285 5,292 1,460,955 1,508,220 416,372,175 (3) Metal work Spillway gate Ls 1 108,000,000  (Sub-total)  WATER SUPPLY PIPE LINE  4.1 Excavation M3 276 1,287,686,698 7,333,843,437  WATER SUPPLY PIPE LINE  4.1 Excavation M3 244 1,717 4.2 Backfill M3 244 1,717 4.3 Add, pump station Ls 1 1,167,000,000 7,808,000,000 1,2118,000,000 1,2118,000,000 1,2118,000,000 1,2118,000,000 2,914,000,000 4.7 Roceiving well Ls 1 1,800,000 2,914,0	(Sub-total)				2,000	30,000		
(1) Approach wall & weir  Excavation	• •						884,711,729	3,899,841,631
Excavation Common m3								
Rock m3	Excavation							
Concrete m3 6,628 13,442 132,187 89,093,576 876,135,436 Rein bar t 135 5,292 1,460,955 714,420 197,228,925 (2) Chuteway & basin Excavation Common m3 11,879 276 1,651 3,278,604 19,612,229 Wea-rock m3 17,818 339 1,398 6,040,302 24,909,564 Rock m3 17,818 339 1,398 6,040,302 24,909,564 Rock m3 14,260 13,442 132,187 191,682,920 1,884,986,620 Rein bar 1 285 5,292 1,460,955 1,508,220 416,372,175 Grouting Consoli. t 35 6,500 90,000 227,500 3,150,000 (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000 (Sub-total) 402,974,969 3,434,001,806 SUB-TOTAL OF 3. 1,287,686,698 7,333,843,437 WATER SUPPLY PIPE LINE 4.1 Excavation m3 276 1,651 1,717 4.3 Add, purification plant Ls 1 1,167,000,000 7,808,000,000 1,167,000,000 12,118,000,000 4.5 Add, pipi line Ls 1 1,812,000,000 12,118,000,000 12,118,000,000 4.5 Add, pipi line Ls 1 80,000,000 2,914,000,000 1,167,000,000 218,400,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 23,058,400,000 SUB-TOTAL OF 4.				4,643			1,574,655	6,493,710
(2) Chuteway & basin Excavation  Common m3 11,879 276 1,651 3,278,604 19,612,229 Wea.rock m3 17,818 339 1,398 6,040,302 24,909,564 Rock m3 17,818 339 1,398 6,040,302 24,909,564 Rock m3 14,260 13,442 132,187 191,682,920 1,884,986,620 Rein bar 1 285 5,292 1,460,955 1,508,220 416,372,175 Grouting Consoli. 1 35 6,500 90,000 227,500 3,150,000 (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000  (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 244 1,717 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 4.4 Add. pump station Ls 1,1812,000,000 1,118,000,000 1,812,000,000 1,2118,000,000 4.5 Add. pipe line Ls 1,540,000,000 2,914,000,000 4,5 Add. pipe line Ls 1,540,000,000 2,914,000,000 2,914,000,000 2,914,000,000 1,812,000,000 2,914,000,000 1,812,000,000 2,914,000,000 1,806,000,000 1,806,000,000 1						132,187		
Wearock   m3   17,818   339   1,398   6,040,302   24,909,564		Common						
Rock   m3   14,260   13,442   132,187   191,682,920   1,884,986,620   Rein bar   1   285   5,292   1,460,955   1,508,220   416,372,175   Grouting   Consoli.   1   35   6,500   90,000   227,500   3,150,000   (3) Metal work   5pillway gate   Ls   1   108,000,000   108,000,000   (Sub-total)   402,974,969   3,434,001,806   SUB-TOTAL OF 3.   1,287,686,698   7,333,843,437   WATER SUPPLY PIPE LINE   4.1 Excavation   m3   276   1,651   4.2 Backfill   m3   244   1,717   4.3 Add, pump station   Ls   1   1,167,000,000   7,808,000,000   1,167,000,000   7,808,000,000   4.4 Add, purification plant   Ls   1   1,167,000,000   7,808,000,000   1,167,000,000   7,808,000,000   4.6 Add, pire line   Ls   1   1,812,000,000   1,912,000,000   1,812,000,000   2,914,000,000   4.7 Receiving well   Ls   1   80,000,000   2,914,000	EXCAVALION	Wea.rock	m3					
Rein bar	Concrete	Rock		14.260				
Crossin Consoli. I 35 6,500 90,000 227,500 3,150,000 (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000 (Sub-total) 402,974,969 3,434,001,806 (Sub-total) 402,974,969 3,434,001,806 (Sub-TOTAL OF 3. 1,287,686,698 7,333,843,437 (WATER SUPPLY PIPE LINE 4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 4.4 Add. purification plant Ls 1 1,812,000,000 12,118,000,000 1,812,000,000 12,118,000,000 4.5 Add. pipe line Ls 1,540,000,000 4.7 Receiving well Ls 1 80,000,000 2,914,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 23,058,400,000 (SUB-TOTAL OF 4. 3,065,000,000 23,058,400,000 (SUB-TOTAL OF DIRECT CONSTRUCTION COST.	Rein bar		Ι.,	285	5,292	1,460,955		
(Sub-total) 402,974,969 3,434,001,806  SUB-TOTAL OF 3. 1,287,686,698 7,333,843,437  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 4.4 Add, purification plant Ls 1,812,000,000 12,118,000,000 1,812,000,000 12,118,000,000 4.5 Add, pipe line Ls 1,840,000,000 2,914,000,000 4,6 Add, intake & surge tank Ls 1 80,000,000 2,914,000,000 80,000,000 2,914,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 23,058,400,000		Consoli.	t	35	6,500	90,000	227,500	
SUB-TOTAL OF 3.  **A2,574,909**  1,287,686,698**  7,333,843,437**  **WATER SUPPLY PIPE LINE**  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1,167,000,000 7,808,000,000 4.4 Add, purification plant Ls 1,1812,000,000 12,118,000,000 13,112,000,000 12,118,000,000 4.5 Add, pipe line Ls 1,540,000,000 4.6 Add, intake & surge tank Ls 1 80,000,000 2,914,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 23,058,400,000  SUB-TOTAL OF 4.  **TOTAL OF DIRECT CONSTRUCTION COST**	Spillway gate		Ls	1	108,000,000		108,000,000	
SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 4.4 Add, purification plant Ls 1 1,812,000,000 12,118,000,000 1,812,000,000 12,118,000,000 4.5 Add, pipe line Ls 1,540,000,000 4,6 Add, pintake & surge tank Ls 1 80,000,000 2,914,000,000 80,000,000 2,914,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 23,058,400,000  SUB-TOTAL OF 4.  3,065,000,000 23,058,400,000	(Sub-total)						402,974,969	3,434,001,806
## WATER SUPPLY PIPE LINE  4.1 Excavation ## ## ## ## ## ## ## ## ## ## ## ## ##	SUB-TOTAL OF 3.							•
4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 4.4 Add. purification plant Ls 1 1,812,000,000 12,118,000,000 1,812,000,000 12,118,000,000 4.5 Add. pipe line Ls 1,540,000,000 4,914,000,000 4,7 Receiving well Ls 1 80,000,000 2,914,000,000 80,000,000 2,914,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 23,058,400,000	WATER CHIRDLY DIDE I INC	;					1,207,000,030	1,333,643,431
4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 4.4 Add, purp fication plant Ls 1 1,812,000,000 12,118,000,000 12,118,000,000 4.5 Add, pipe line Ls 1 80,000,000 2,914,000,000 80,000,000 2,914,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 218,400,000  SUB-TOTAL OF 4. 3,065,000,000 23,058,400,000		•						
4.3 Add. pump station Ls 1 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 4.4 Add. porification plant Ls 1 1,812,000,000 12,118,000,000 1,812,000,000 12,118,000,000 4.5 Add. pipe line Ls 1,540,000,000 2,914,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400,000  SUB-TOTAL OF 4. 3,065,000,000 23,058,400,000								*
4.4 Add. portheation plant Ls 1 1,812,000,000 12,118,000,000 12,11	4.3 Add, pump station		Ls		1,167,000,000	7,808,000,000	1,167,000,000	7,808,000,000
4.6 Add. Intake & surge tank				1	1,812,000,000			
SUB-TOTAL OF 4. 3,065,000,000 23,058,400,000	4.6 Add. intake & surge tank		Ls			2,914,000,000		
TOTAL OF DIRECT CONSTRUCTION COST	-		LS	1	6,000,000	218,400,000	6,000,000	218,400,000
TOTAL OF DIRECT CONSTRUCTION COST	SUB-TOTAL OF 4.						3,065,000,000	23,058,400,000
OTAL OF DIRECT CONSTRUCTION COST 4,650,052,858 32,394,534,548	POTAL OF DIVIDED TO							
	OTAL OF DIRECT CONSTI	KUCTION COS	T'				4,650,052,858	32,394,534,548

Table F-19 Cost Estimate for Cidanau Gated Weir: Scheme C-3

DESCRIPTION		Unit	Q'ty	Fc	Lc	Fc	AMOUNT Lc
·····				(Yen)	(Rp)	(Yen)	(Rp)
. PREPARATORY WORK							
(20% of 2+3+4+5)						414,455,432	1,755,702,0
2. DIVERSION WORK							
2.1 Coffering work Sheet pile & bracing		ŧ	159	131,583	36,915	20,921,697	5,869,4
SUB-TOTAL OF 2.				,	33,710		
. DAM						20,921,697	5,869,4
3.1 Main dam Excavation	Common	m3	10,662	276	1 651	2042712	10.000
	Wea.rock	m3	8,462	339	1,651 1,398	2,942,712 2,868,618	17,602,9 11,829,8
	Rock	m3	2,200	962	3,475	2,116,400	7,645,0
Concrete Grouting	Consoli.	m3	21,325	5,052	118,708	107,733,900	2,531,448,1
Orontang	Curtain	t t	219 352	6,500 6,500	90,000 90,000	1,423,500 2,288,000	19,710,0
SUB-TOTAL OF 3.		-	-	4,550	70,000		31,680,0
. SPILLWAY						119,373,130	2,619,915,9
4.1 Dental work Excavation	Common	m3	22,389	276	1 661	6 170 064	
. Dam ubba	Wea.rock	m3	22,309	339	1,651 1,398	6,179,364	36,964,2
Concrete	Rock	m3	0.220	962	3,475		
		m3	8,379	5,052	118,708	42,330,708	994,654,3
(Sub-total)						48,510,072	1,031,618,5
4.2 Weir & pier Excavation	C	•					•
EXCAVATION	Common Wearock	m3 m3	1,170	276 339	1,651	207.700	
	Rock	m3	500	962	1,398 3,475	396,630 481,000	1,635,6 1,737,5
Concrete		m3	10,761	13,442	132,187	144,649,362	1,422,464,3
Rein bar	<i>a</i>	t	1,290	5,292	1,460,955	6,826,680	1,884,631,9
Grouting	Consoli. Curtain	l t	125 180	6,500	90,000	819,000	11,340,0
ta r v	Curani		180	6,500	90,000	1,170,000	16,200,0
(Sub-total)						154,342,672	3,338,009,4
4.3 Hoist & bridge Concrete		m3	0.021	12.440			
Rein bar		i i	2,871 574	13,442 5,292	132,187 1,460,955	38,591,982 3,037,608	379,508,8° 838,588,1°
(Sub-total)						41,629,590	1,218,097,0
SUB-TOTAL OF 4.						244,482,334	5,587,725,0
METAL WORK						271,102,021	0,301,125,0
5.1 Roller gate		Ls	1	1,620,000,000		1 600 000 000	
5.2 Steel conduit		Ls	i	1,020,000,000	565,000,000	1,620,000,000	565,000,0
5.3 Hollow jet valve 5.4 Guard valve		Ls Ls	1	45,000,000 22,500,000	303,200,000	45,000,000 22,500,000	505,000,0
SUB-TOTAL OF 5.			-	,- **,***		1,687,500,000	565 non o
WATER SUPPLY PIPE LIN	E					4,001,300,000	565,000,0
6.1 Excavation		•					
6.2 Backfill		m3 m3		276 244	1,651 1,717		
6.3 Add, pump station		Ls		217	1,11		
6.4 Add purification plant		l.s			•		
6.5 Add, pipe line	,	Ls					
6.6 Add. intake & surge tank		Ls					
SUB-TOTAL OF 6.							

Table F-20 Cost Estimate for Heightening of Krenceng Dam with One Diversion Tunnel: Scheme C-3

DESCRIPTION		Unit	Q'ty -	Fc	l.c	Fc	MOUNT Lo
			·	(Yen)	(Rp)	(Yen)	(Rp)
PREPARATORY WORK (20% of 2+3)						264,175,476	1,556,022,4
. DIVERTED TUNNEL							
2.1 Coffering work							
Coffering	Excs. Embank	m3 m3	500 500	276 441	1,651 1,144	138,000 220,500	825,5 572,0
(Sub-total)						358,500	1,397,5
2.2 Weir							
Excavation	Common	m3	400	276	1,651	110,400	660,4
	Wea,rock Rock	m3 m3	400 200	339 962	1,398 3,475	135,600 192,400	559,; 695,0
Concrete Rein bar		m3 t	150 15	5,052 5,292	118,708 1,460,955	757,800 79,380	17,806,3 21,914,3
Gate		Ls	1	2,000,000	1,100,730	2,000,000	21,711,
(Sub-total)						3,275,580	41,635,1
2.3 Inlet & outlet		_					
Excavation	Common Wea.rock	m3 m3	1,664 1,664	276 339	1,651 1,398	459,264 564,096	2,747,; 2,326,;
	Rock	m3	832	962	3,475	800,384	2,891,1
Concrete Rein bar		m3 L	100 20	13,442 5,292	132,187 1,460,955	1,344,200 105,840	13,218, 29,219,
Trash rack		Ls	1	1,000,000		1,000,000	
(Sub-total)						4,273,784	50,402,
2.4 Diverted tunnel Excavation		an3	1,600	8,744	105,122	13,990,400	168,195,2
Lining conc.		m3	650	13,488	155,546	8,767,200	101,104,9
Plug conc. Grouting		m3 t	360	13,488 6,500	155,546 90,000	2,340,000	32,400,0
Rein bar		ι	35	5,292	1,460,955	185,220	51,133,4
(Sub-total)						25,282,820	352,833,
SUB-TOTAL OF 2.						33,190,684	446,268,
HEIGHTENING OF KREN	CENG DAM						
3.1 Main dam				207.5	2.665	40 475 050	242 122
Excavation	Common Wea.rock	m3 m3	146,652 97,768	276 339	1,651 1,398	40,475,952 33,143,352	242,122, 136,679,
Embankment	Rock Core	m3 m3	1,281,085	962 605	3,475 2,359	775,056,425	3,022,079,
Philosophical	Filter	m3	1,201,003	2,285	5,756	710,030,123	3,022,0.3,
	Random Rock	m3 m3		441 1,514	1,144 5,964		
Grouting	Blanket	t	1,868	6,500	90,000	12,142,000	168,120,
	Curtain	t	3,676	6,500	90,000	23,894,000	330,840,0
(Sub-total)						884,711,729	3,899,841,
3.2 SPILLWAY							
(1) Approach wall & weir Excavation	Соттоп	m3	3,097	276	1,651	854,772	5,113,
	Wea.rock Rock	m3 m3	4,645	339 962	1,398 3,475	1,574,655	6,493,
Concrete Rein bar		m3 L	-6,628 135	13,442 5,292	132,187 1,460,955	89,093,576 714,420	876,135,4 197,228,5
(2) Choteway & basin	_						
	Common Wea.rock	m3 m3	11,879 17,818	276 339	1,651 1,398	3,278,604 6,040,302	19,612, 24,909,
Excavation	Rock	т3 m3	14,260	962 13,442	3,475 132,187	191,682,920	1,884,986,6
Concrete		1	285	5,292 6,500	1,460,955 90,000	1,508,220 227,500	416,372,
Concrete Rein bar	Congri		26		50,000	221,300	3,150,0
Concrete Rein bar Grouting (3) Metal work	Consoli.	t	35				
Concrete Rein bar Grouting (3) Metal work Spillway gate	Consoli.		35	0,000,000		108,000,000	
Concrete Rein ber Grouting (3) Metal work Spillway gate (Sub-total)	Consoli.	t				402,974,969	
Concrete Rein bar Grouting (3) Metal work Spillway gate (Sub-total) SUB-TOTAL OF 3.		t					
Concrete Rein bar Grouting (3) Metal work Spillway gate (Sub-total) SUB-TOTAL OF 3. WATER SUPPLY PIPE LIN		t Ls		100,000,801		402,974,969	
Concrete Rein bar Grouting (3) Metal work Spillway gate (Sub-total) SUB-TOTAL OF 3.		t			1,651 1,717	402,974,969	
Concrete Rein bar Grouting (3) Metal work Spillway gate (Sub-total) SUB-TOTAL OF 3. WATER SUPPLY PIPE LIN 4.1 Excavation 4.2 Backfill 4.3 Add, pump station		t Ls m3 m3 Ls	1	108,000,000 276 244 1,189,000,000	1,717 7,951,000,000	402,974,969 1,287,686,698 1,189,000,000	7,333,843,4 7,951,000,6
Concrete Rein bar Grouting (3) Metal work Spillway gate (Sub-total) SUB-TOTAL OF 3. WATER SUPPLY PIPE LIN 4.1 Excavation 4.2 Backfill 4.3 Add, pump station 4.4 Add, purification plant 4.5 Add, pipe line	ΙE	m3 m3 Ls Ls	1 1 1	276 244 1,189,000,000 1,875,000,000	1,717 7,951,000,000 12,538,000,000 1,540,000,000	402,974,969 1,287,686,698 1,189,000,000 1,875,000,000	3,434,001,8 7,333,843,4 7,951,000,6 12,538,000,6
Concrete Rein bar Grouting (3) Metal work Spillway gate (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LIN 4.1 Excavation 4.2 Backfill 4.3 Add, purification plant 4.5 Add, pipe line 4.6 Add, intake & surge tan	ΙE	t Ls m3 m3 Ls Ls	1	276 244 1,189,000,000 1,875,000,000 82,000,000	1,717 7,951,000,000 12,538,000,000	402,974,969 1,287,686,698 1,189,000,000	7,333,843,4 7,951,000,6 12,538,000,6 3,003,000,6
Concrete Rein bar Grouting (3) Metal work Spillway gate (Sub-total) SUB-TOTAL OF 3. WATER SUPPLY PIPE LIN 4.1 Excavation 4.2 Backfill 4.3 Add, pump station 4.4 Add, purification plant 4.5 Add, pipe line	ΙE	m3 m3 Ls Ls Ls	1 1 1	276 244 1,189,000,000 1,875,000,000	1,717 7,951,000,000 12,538,000,000 1,540,000,000 3,003,000,000	402,974,969 1,287,686,698 1,189,000,000 1,875,000,000 82,000,000	7,333,843,4 7,951,000,6
Concrete Rein bar Grouting (3) Metal work Spillway gate (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LIN 4.1 Excavation 4.2 Backfill 4.3 Add, pump station 4.4 Add, purification plant 4.5 Add, intake & surge tan	ΙE	m3 m3 Ls Ls Ls	1 1 1	276 244 1,189,000,000 1,875,000,000 82,000,000	1,717 7,951,000,000 12,538,000,000 1,540,000,000 3,003,000,000	402,974,969 1,287,686,698 1,189,000,000 1,875,000,000 82,000,000 6,000,000	7,333,843,4 7,951,000,1 12,538,000,4 3,003,000,4 218,400,6

Table F-21 Cost Estimate for Cibanten Dam: Scheme D-1

DESCRIPTION		Unit	Q\y	UNIT PRI Fo (Yeo)	(e (Rg)	Fc (Ysu)	OUNT Le (Rg)
I, PREPARATORY WORK	····			1190	TOPI		
(20% of 2+3+4+5+6) 2. DIVERSION WORK						464,133,519	2,947,352,6
2.1 विकास कार्यस							
Excavation	Common Weatfook	m3 m3	1,053 2,106	276 339	1,651	290,628 713,934	1,738.3 2,944,1
Concrete	Rock	m)	7,371 2,640	962 13,442	3,425 132,187	7,090,902 35,486,880	25,614,7 313,973,6
Rein but		:	100	5,292	1,460,955	529,200	146,095,5
(Sub-rocal)						44,111,544	525,356,0
2.2 Tuenel(=410m,0=5m) Excession		m3	10,462 2,404	8,744	105,122	91,479,728	1,099,786.3
Lining conc. Plagrene.		m3	2,904 686 246	13,488 13,488	155,546 155,546	32,425,152 9,252,768	373,932,5 106,704,5
Growing Rein bar		i.	123	6,500 1,292	90,000 1,460,955	1,599,000 650,916	22,140,0 179,697,4
(Sub-total)						135,407,564	1,782,260,9
SUB-TOTAL OF 1.						179,519,108	2,307,627,0
3. DAM							
3.1 Coffeedwn Excavation		m3	2,500	276	1,651	690,000	4,127,5
Etrobenik tracnit		m	200,000	1,514	5,964	302,800,000	1,192,500.0
(Sub-total)						303,490,000	1,195,927,
3.2 Main dem Excavation	Сопосно	ш3	11,075	276	1,651	3,056,700	18,254,8
	Wearock Rock	m3 m3	72,150 77,520	339 962	1,398 3,475	7,508,850 74,574,240	30,965, 269,382,0
Embackment	Core Filter	m3 m3	101,416 62,614	605 2,285	2,359 5,756	61,356,650 143,141,540	239,240, 360,578,
	Raceloro Rock	m3 m3	174,900 408,105	441 1,514	1,144 5,964	77,130,900 617,870,970	200,065, 2,433,938,
Growing	Blanket Consoli.	i.	474 114	6,500 6,500	90,000 90,000	3,081,000 741,000	42,660, 10,260,
	Contain	τ	1,287	6,500	90,000	8,365,500	115,830
(Sub-total)			4			996,827,380	3,721,225,
3.3 Saddle dan Excevation	Соходного	m3	3,595	276	2,176	992,220	7 322
	Wearock Rock	m3 m3	7,190 25,160	339 962	2,585 4,433	2,437,410 24,203,920	18,586, 111,534,
Emb <u>urk</u> prost Growing		m3 t	167,975 597	244 13,442	1,717 132,187	40,985,900 8,024,874	288,413, 78,913,
(Sub-rotal)						76,614,324	505,271
SUB-TOTAL OF 3.						1,376,961,704	5,423,424
SPILLWAY							
4.1 Side charact	0		4100	<b>277</b>	1.75		
Excevation	Common Wearock	63 63	8,100 16,200	276 339	1,651 1,398	2,235,600 5,491,300	13,313. 22,647.
Conemic	Rock	m3 m3	56,700 21,170 400	962 13,442 5,292	3,475 132,187	34,345,400 284,367,140	197,002, 2,798,391,
Rein bas		τ .	140	3,292	1,460,955	2,116,800 348,956,740	584,382,
(Sub-total) 4.2 Chaleway						3101777140	3,615,833,
Excavation	Correson Weartock	т3 т3	14,245 28,490	276 339	1,651 1,398	3,931,620 9,658,110	23,518,
Concrete	Rock	m) m3	\$9,715 11,395	962 13,442	3,475 132,187	95,925,330 153,171,590	39,829, 346,509, 1,506,270,
Rein bar		i	220	5,292	1,450,955	1,161,240	319,210
(Sub-total)						263,851,390	2,235,336
4.3 Phinge pool Excavation	Сопинов	m3	4,032	276	1,651	1,112,832	6,655
Directalido	Wearock Rock	113 103	8,051 28,224	339 962	1,398 3,475	2,733,696 27,151,433	11,273 91,071
(Sub-total)			20,442		•	30,998,016	116,008,
SUB-TOTAL OF 4.						643,806,146	5,967,180,
OUNLET WORK						014,04,110	2,5-1,5-4
5.1 Intake towar							
Excavation	Common Westock	ւր3 Մա	515 1,030	276 339	1,651 1,398	142,140 349,170	150, 1,439,
Conemie	Rock	თ3 თპ	3,606 750	962 13,442	3,475 132,187	3,468,972 10,215,920	12,530, 100,462
Rein ber		t.	29	5,292	1,460,955	153,468	42,367
(Sub-roral)						14,329,670	157,650
5.2 Intake shaft Exercision		ъ3	332	8,344	101,122	2,903,028	33,904
Concrete Rein bar	•	æ3 t	191 6	13,488 5,292	155,546 1,460,955	2,576,208 31,752	29,709 3,765
(Sub-total)						5,510,968	12,379
SUB-TOTAL OF S.						19,840,638	230,030
METAL WORK						•	
6.1 Diversion gate		Ls	1	33,040,000		33,040,000	
6.2 Steel condisk 6.3 Hollow jet valve		L .	1	45,000,000	\$08,500,000	45,000,000	808,500,
6.4 Guard valve		L	1	22,500,000		22,500,000	
SUB TOTAL OF 6.		100				100,540,008	808,500
WATER SUPPLY PIPE LINE							
7.1 Exceptation 7.2 Backfill		m3 m3	134,400 123,200	216 244	1,651 1,717	37,094,400 30,960,800	221, <b>194</b> 211,534
7.3 Add. pump mation 7.4 Add. purification plant		Tai La		=		••	
7.5 Add. orpe line 7.6 Add. make & surge tank	:	lii Va	1		39,200,000,000		39,200,000
SIB-TOTAL OF 7.						67,155,200	39,633,428

Table F-22 Cost Estimate for Heightening of Krenceng Dam with Two Diversion Tunnels: Scheme D-1

PERPERATION   WORK   CR06 of 343    277,982,360   1,734;   277,982,374;   277,982,374;   277,982,374;   277,982,374;   277,982,374;   277,982,374;   277,982,374;   277,982,374;   27	DESCRIPTION		Unit	Q'ty	Fc	PRICE Lc	Fc	AMOUNT Le
Coffering work	····	**************************************						(Rp)
Coffering work							277,982,360	1,734,709,3
Confering	2. DIVERTED TUNNEL							
Bishank m3 1,000 441 1,144 441,000 1,17 (Sub total)   717,000 2,2	2.1 Coffering work							
Concrete   Common	Coffering							1,651,0
22 Weir Exervation   Common   m3   1,200   276   1,651   331,200   15	27 4 1	Luitenik	111.5	1,000	441	1,144		1,144,0
Beavarian	(Sub-total)						717,000	2,795,0
Wearack   m3   1,200   339   1,398   46,800   1,400		Common	m3	1 200	27.6	1.651	221 222	
Concrete   m3	LAGRICUIT	Wea.rock	m3	1,200	339	1,398	406,800	1,981,20 1,677,60
Rein bar   1   44   5,202   1,460,955   216,572   598,606   Gate   Ls   2   2,000,000   7,603,492   114,3  2.3 Intel & coulet   Excavation   Common   m3   4,576   339   1,198   1,515,1264   6,576   7,683,492   114,3  Concrete   Rek   m3   4,576   339   1,198   1,515,1264   6,576   7,683,492   1,460,955   7,983,492   1,460,955	Concrete	Rock						2,085,00 48,670,28
(Sub-total)  2.3 Iniex & contex					5,292	1,460,955	216,972	59,899,13
2.3 Inlet & outlet	*		LS	2	2,000,000		4,000,000	
Becavision	(Sub-total)						7,603,492	114,313,23
Westrock   m3   4,576   339   1,598   1,551,264   6,76   7,76		Common	m2	4 574	176	1 (4)	1.000.000	
Concrete	LACATAGON	Wea.rock	m3	4,576	339	1,398		7,554,97 6,397,24
Rein bar tack	Concrete	Rock						7,950,80 26,437,40
(Sub-total)  2.4 Diverted tumel Escavation			ţ	40	5,292		211,680	58,438,20
2.4 Diverted tumel Excavation			LS	2	1,000,000		2,000,000	
Becavation	(Sub-total)						9,915,376	106,778,62
Lining conc.   m3   2,170   13,488   155,546   29,268,950   337,5   134,888   155,546   29,268,950   337,5   134,888   155,546   29,268,950   337,5   134,888   155,546   29,268,950   337,5   134,888   155,546   29,268,950   337,5   134,69,555   402,192   111,00   (Sub-total)			m-3	6 200	0744	105 100	je svane-	
Plug conc.   m3	Lining conc.		m3					559,249,04 337,534,82
Rein bar I 76 5,292 1,466,955 402,192 111,6 (Sub-total) 83,989,232 1,115,8 SUB-TOTAL OF 2 102,225,100 1,339,76				1 200				
SUB-TOTAL OF Z.  HEIGHTENING OF KRENCENG DAM  3.1 Main dam  Excavation								111,032,58
SUB-TOTAL OF 2  HEIGHTENING OF KRENCENG DAM  3.1 Main dam  Excavation	(Sub-total)					•	83,989,232	1,115,816,44
### HEIGHTENING OF KRENCENG DAM  3.1 Main dam	SUB-TOTAL OF 2.						102 225 100	
3.1 Main dam		2010 12 13 1	i				102,225,100	1,339,703,29
Excavation		ENG DAM						
Wearock m3		Common		146 652	276	1.651	AD A75 D52	040 100 46
Embankment Core m3 1,281,085 605 2,359 775,056,425 3,022,07 Filter m3 2,285 5,736 Random m3 441 1,144 5,964 M3 1,514 5,964 Curtain t 3,676 6,500 90,000 12,142,000 168,12 Curtain t 3,676 6,500 90,000 23,894,000 330,84 (Sub-total) 884,711,729 3,899,84 (Sub-total) 88		Wea.rock	m3		339	1,398		136,679,66
Filter   m3   Random   m3   441   1,144   Rock   m3   1,514   5,964   Stock   St	Embankment	Core		1,281,085			775,056,425	3,022,079,51
Rock   m3							• • • •	-,,,
Curtain   1   3,676   6,500   90,000   23,894,000   330,84		Rock	m3		1,514	5,964		
(Sub-total)  3.2 SPILLWAY (1) Approach wall & weir Excavation	Grouting							168,120,000 330,840,000
3.2 SPILLWAY (1) Approach wall & weir Excavation Common m3 3,097 276 1,651 854,772 5,11 Wea.rock m3 4,645 339 1,398 1,574,655 6,49 Rock m3 962 3,475 Cencrete m3 6,628 13,442 132,187 89,093,576 876,13 Excavation Common m3 11,879 276 1,651 3,278,604 19,61 Excavation Common m3 11,879 276 1,651 3,278,604 19,722 (2) Chatteway & basin Excavation Common m3 17,818 339 1,398 6,040,302 24,90 Rock m3 17,818 339 1,398 6,040,302 24,90 Rock m3 14,260 13,442 132,187 191,682,920 1,884,98 Rein bar t 285 5,292 1,460,955 1,508,220 416,37 Grouting Consoli. t 35 6,500 90,000 227,500 3,15  (3) Metal work Spillway gate I.s 1 108,000,000 108,000,000  (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 244 1,717 4.3 Add, purp station latt I.s 1 1,188,000,000 7,943,000,000 1,188,000,000 1,013,000,000 4.5 Add, pipe lime I.s 1,511,000,000 10,103,000,000 1,511,060,000 10,103,000 4.5 Add, pipe lime I.s 1,540,000,000 7,900,000 2,899,000,	(Sub-total)				·			
(1) Approach wall & weir Excavation Common m3 3,097 276 1,651 854,772 5,11 Wea.rock m3 4,645 339 1,398 1,574,655 6,49 Rock m3 962 3,475 89,093,576 876,13	• •						884,711,729	3,899,841,631
Wea.rock   m3   4,645   339   1,398   1,574,655   6,49								
Rock   m3   962   3,475   89,093,576   876,13   Rein bar   1   135   5,292   1,460,955   714,420   197,22	Excavation							5,113,147
Rein bar (2) Chuteway & basin			m3		962		1,374,633	6,493,710
(2) Chuteway & basin  Excavation    Common   m3   11,879   276   1,651   3,278,604   19,61     Weatrock   m3   17,818   339   1,398   6,040,302   24,90     Rock   m3   962   3,475     Concrete   m3   14,260   13,442   132,187   191,682,920   1,884,98     Rein bar   t   285   5,292   1,460,955   1,508,220   416,37     Grouting   Consoli   t   35   6,500   90,000   227,500   3,15     (3) Metal work   Spillway gate   Ls   1   108,000,000   108,000,000     (Sub-total)   402,974,969   3,434,00     SUB-TOTAL OF 3.   1,287,686,698   7,333,84     WATER SUPPLY PIPE LINE     4.1 Excavation   m3   276   1,651     4.2 Backfill   m3   244   1,717     4.3 Add, pump station   Ls   1   1,188,000,000   7,943,000,000   1,188,000,000   7,943,000     4.4 Add, purification plant   Ls   1   1,511,000,000   10,103,000,000   1,511,000,000   10,103,000     4.5 Add, intake & surge tank   Ls   1   79,000,000   2,899,000,000   79,000,000   2,899,000     4.7 Receiving well   Ls   1   6,000,000   218,400,000   79,000,000   2,899,000     Common   Rock   m3   1,380,000,000   1,511,000,000   2,899,000     Common   Rock   m3   1,380,000,000   1,511,0								876,135,436 197,228,925
Wearock m3		Common	m3	11 970				
Concrete m3 14,260 13,442 132,187 191,682,920 1,884,98 Rein bar t 285 5,292 1,460,955 1,508,220 416,37 Grouting Consoli. 1 35 6,500 90,000 227,500 3,15 (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000 (Sub-total) 402,974,969 3,434,00 (Sub-total) 402,974,969 3,434,00	EACATHOO!	Wea.rock	m3		339	1,398		19,612,225 24,909,564
Rein bar t 285 5,292 1,460,955 1,508,220 416,37 Grouting Consoli. t 35 6,500 90,000 227,500 3,15 (3) Metal work Spillway gate Ls I 108,000,000 108,000,000 (Sub-total) 402,974,969 3,434,00 SUB-TOTAL OF 3. 1,287,686,698 7,333,84 WATER SUPPLY PIPE LENE 4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls I 1,188,000,000 7,943,000,000 1,188,000,000 7,943,000 4.4 Add. purification plant Ls I 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000 4.5 Add, intake & surge tank Ls I 79,000,000 2,899,000,000 4,7 Receiving well Ls I 6,000,000 218,400,000 79,000,000 218,400	Concrete	Rock		14.260			191 682 920	1,884,986,620
(3) Metal work Spillway gate Ls 1 108,000,000  (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,188,000,000 1,188,000,000 1,188,000,000 1,180,000,000 1,180,000,000 1,180,000,000 1,180,000,000 1,180,000,000 1,180,000,000 1,180,000,000 1,180,000,000 1,511,00		Consoli	t	285	5,292	1,460,955	1,508,220	416,372,175
(Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 1,717 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1,188,000,000 7,943,000 000 1,188,000,000 7,943,000 4.4 Add, purification plant Ls 1 1,510,000,000 10,103,000,000 1,511,000,000 10,103,000 4.5 Add, pipe line Ls 1,540,000,000 4,600,000 79,000,000 4,7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400	(3) Metal work	Conson.		.33	6,300	90,000	227,500	3,150,000
SUB-TOTAL OF 3.  **PARTICLE SUPPLY PIPE LINE**  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,188,000,000 7,943,000,000 1,188,000,000 7,943,000 4.4 Add. purification plant Ls 1 1,511,000,000 10,103,060,000 1,511,000,000 10,103,000 4.5 Add. pipe line Ls 1,540,000,000 4,6 Add. intake & surge tank Ls 1 79,000,000 2,899,000,000 79,000,000 2,899,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400	Spillway gate		Ĺs	. 1	108,000,000		108,000,000	
## WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1,188,000,000 7,943,000,000 1,188,000,000 7,943,000 4.4 Add. purification plant Ls 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000 4.5 Add. pipe line Ls 1,540,000,000 79,000,000 2,899,000 4.6 Add. intake & surge tank Ls 1 79,000,000 2,899,000,000 79,000,000 2,899,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400	(Sub-total)						402,974,969	3,434,001,806
4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,188,000,000 7,943,000,000 1,188,000,000 7,943,000 4.4 Add. purification plant Ls 1 1,511,000,000 10,103,050,000 1,511,000,000 10,103,000,000 4.5 Add. pipe line Ls 1,540,000,000 4,6 Add. intake & surge tank Ls 1 79,000,000 2,899,000,000 79,000,000 2,899,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400	SUB-TOTAL OF 3.						1,287,686,698	7,333,843,437
4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,188,000,000 7,943,000,000 1,188,000,000 7,943,000 4.4 Add. purification plant Ls 1 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000 4.5 Add. pipe line Ls 1,540,000,000 7,000,000 2,899,000,000 4.6 Add. intake & surge tank Ls 1 79,000,000 2,899,000,000 79,000,000 2,899,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400	WATER SUPPLY PIPE LINE	3						
4.2 Backfill m3 244 1,717 4.3 Add. pump station Ls 1 1,188,000,000 7,943,000,000 1,188,000,000 7,943,000 4.4 Add. purification plant Ls 1 1,511,000,000 10,103,000,000 1,511,000,000 10,103,000 4.5 Add. pipe line Ls 1,540,000,000 79,000,000 2,899,000 4.6 Add. intake & surge tank Ls 1 79,000,000 2,899,000,000 79,000,000 2,899,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400			m²			1 451		
4.3 Add. pump station	4.2 Backfill		m3		244	1,717		
4.5 Add. pipe line     Ls     1,540,000,000       4.6 Add. intake & surge tank     Ls     1       4.7 Receiving well     Ls     1       6,000,000     218,400,000       218,400,000     218,400,000       218,400,000     218,400,000						7,943,000,000		7,943,000,000
4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400	4.5 Add. pipe line		l.s			1,540,000,000		
		•						2,899,000,000 218,400,000
2,764,000,000 21,163,40	-				, ,	,, - <del></del>		
	JOD-TOTAL OF 3.						Z,784,000,000	, 21,163,400,000

Table F-23 Cost Estimate for Downstream Cidanau Dam: Scheme D-2

DESCRIPTION		Unit	Qty	Fc (Yeo)	(Rp)	Pc (Y∞n)	MOXINI Le (Rp)
1. PREPARATORY WORK (20% of 2+3+4+5+6)							
2. DIVERSION WORK						375,176,927	2,810,769,97
2.1 Inlet & coulet	_						
Excavation	Common Wearook	<del>തി</del> മൂ	997 11,970	276 339	t,651 1,398	275,172 4,057,830	1,616,04 16,734,06
Concrete	Rock	m3 m3	6,982 2,640	962 13,412	3,475 132,187	6,716,684 35,486,880	24,762,45 348,973,68
Rein bur		t	100	5,292	1,460,955	529,200	146,095,500
(Sub-rotal)						47,065,766	537,711,73
2.2 Tunnel(1=400m, D=5s Excavation	1)	m3	10,710	8,744	105,122	93,618,240	1,125,856,626
Lining conc. Plug conc.		103 103	2,464 636	13,488 13,488	155,546 155,546	33, 234, 432 9, 252, 764	383,265,344 106,704,556
Growing Rein bar		t t	504 126	6,500 5,292	90,000 1,460,955	3,276,000 666,792	45,360,000 184,080,330
(Sub-total)						140,078,232	1,845,766,850
SUB-TOTAL OF 2.						187,143,998	2,382,978,587
3. DAM							,
2.1 Cofferdam Excavation		m3	2.500				
Erobenkrocos		m3	2,500 200,000	276 1,514	1,651 5,964	690,000 302,800,000	4,127,500 1,192,800,000
(Sub-total)						303,490,000	1,196,927,500
2.2 Main dam Excavation	Common		****				
126244000	Wea.rock	m3 m3	24,986 54,136	276 339	1,651 1,398	6,896,136 18,352,104	41,251,886 75,682,128
Embeckment	Rock Core	mi mi	4,164 49,100	962 605	3,475 2,359	4,005,768 29,705,500	14,469,900 115,826,900
	Filter Randon	m3 m3	31,308 72,975	2,285 441	5,756 3,144	71,538,789 32,181,975	180,208,848
Grazing	Rock Blacket	to3 t	170,275 56	1,514 8,500	5,964 90,000	257,796,350 364,000	\$3,483,400 1,015,520,100
	Consoli. Cunsin	1	182 2,556	6,500 6,500	90,000 90,000	1,183,000 16,614,000	5,040,000 16,380,000 230,040,000
(Sub-total)			•	-,	70,000	438,637,613	
3.3 Sand trap barin						430,007,013	1,777,903,162
Excevações	Common Westrock	മാ! m3	306,750	276 339	2,176 2,585	84,663,000	667,411,000
Maintenance road(Ziro	Rock )	m3 m3	\$5,000	962 244	4,433 1,717	13,420,000	04.436.000
Concrete		m3	1,200	13,442	132,187	16,130,400	94,435,000 158,624,400
(Sub-total)						114,213,400	929,547,490
SUB-TOTAL OF 3.						856,341,013	3,895,378,062
I. SPILLWAY							
4.1 Side channel Excavation	Common	m3	103,740	276			
	Wearock Rock	m3 m3	116,707 38,902	3.39 962	1,651 1,398	28,632,240 39,563,673	171,274,740 163,156,386
Concrete Rein bar		Ear Ear	27,724	13,442	3,475 132,187	37,423,724 372,666,008	135,184,450 3,664,752,388
(Sub-total)		t	520	5,292	1,460,955	2,751,340	759,696,600
42 Chiteway						481,037,485	4,894,064,564
Excevation	Common Wearock	m3	53,093	276	1,651	14,653,668	87,656,543
Concrete	Rock	m3 m3	127,425 31,656	339 962	1,398 3,475	43,197,075 30,645,472	178,140,150 110,699,600
Rein baz		m3 L	<b>8,775</b> 175	13,442 5,792	132,187 1,450,955	117,953,550 926,100	1,159,940,925 253,917,125
(Sub-total)						207, 375, 865	1,790,354,313
4.3 Phone pool							11.74.00.10.10
Excavation	Common Wearook	m) m3	2,030 14,210	276 339	1,651 1,398	560,280 4,817,190	3,351,530 19,865,580
	Rock	т3	24,360	962	3,475	23,434,320	84 651 000
(Sub-total)						28,811,790	107,868,110
SUB-TOTAL OF 4.						717,225,140	6.792.287.017
OUTLET WORK							
5.1 Intake tower Excavation	Соскозец	ι <b>α3</b>	3,758	276	1,651	1.027.000	****
	West rock Rock	m3 m3	4,176 418	339	1,398	1,037,208 1,415,664	6,201,458 5,838,018
Concrete Rein bar		m3 t	500 20	962 13,442 \$303	3,475 132,187	492,116 6,721,000	1,457,550 66,093,500
(Sub-total)		•	ىن	5 292	1,460,935	105,840	29,219,100
5.2 Islate shift						9,681,828	108,807,656
Excavation		ш3	299	8,744	102,122	2,614,456	30,534,478
Concrete Rein bur		m3 ւ	17  6	13,488 5,292	155,546 1,460,955	2,306,448 31,752	26,598,366 1,765,730
(Sub-total)						4,952,656	65,898,574
SUB-TOTAL OF 5.							
METAL WORK						14,634,484	174,706,230
6.1 Diversion gate		l.	1	33,040,000		22.010.000	
6.2 Sizel conduit 6.3 Hollow jet valve		ii La	i		808,500,000	33,040,000	808,500,000
6.4 Guard valve		I.	i	45,000,000 22,500,000		45,000,000 22,500,000	
SUB-TOTAL OF 6.						100,540,000	\$08,500,000
WATER SUPPLY PIPE LINE							
7.1 Escavation 7.2 Backfull		m3		276	1,651		
7.3 Add. purso station		m3 Ls		244	1,717		
7.4 Add. partification plant 7.5 Add. pipe line		دا دا	ı		501,000,000		\$01,000,000
7.6 Add. intake & surge tank		L <sub>F</sub>	-		~		501,000,000
THO TOTAL ORT							*****
SUB-TOTAL OF 7							504,000,000

Table F-24 Cost Estimate for Heightening of Krenceng Dam with Two Diversion Tunnels: Scheme D-2

PREDEADATORY WORK   CORE (23)   CYen)   CReb   Core (24)   Core	DESCRIPTION		Unit	Q'iy -	Fe UNIT I	Lo	Fc	MOUNTLc
Control   Cont	***************************************	····						(Rp)
2.1 Coffering week Coffering Extra m3 1,000 226 1,551 276,000 1,551, Coffering Extra m3 1,000 441 1,144 41,000 1,144, (Sub-total)	PREPARATORY WORK (20% of 2+3)						277,982,360	1,734,709,3
Coffering Broam m3 1,000 276 1.651 276,000 1.051, (Sub-total)  (Sub-to	DIVERTED TUNNEL							
Sub-total)								
2.2 Weir Examples  Examples  Mocked: ## A	Coffering							1,651,0 1,144,0
22   Weir	(Sub-total)						717,000	2,795,0
Excavation	•							
Rock		Common	m3	1,200	276	1,651		1,981,2
Contracte   m3								
Content	Concrete	ROCK					2,071,320	48,670,7
Common						1,460,955		59,899,
2.3 Infect & coulet			1.5	L	2,000,000		·	*****
Excavation							7,603,492	114,313,
Wearock   m3   2,288   962   3475   2,201,050   7950   7		Common	m3	4,576	276	1,651	1,262,976	7,554,
Concrete Rein bar	***************************************			4,576				6,397,
Rein bar   Trath rack	Concrete	Rock						26,437,
(Sub-total)  2.4 Diverted tunnel Exervation Exervation Infigence m3 2,170 13,488 155,546 29,268,590 337,534, Plug cone. m3 1,200 6,548 155,546 29,268,590 168,000, Rein bar 1 176 3,292 1,466,555 402,192 111,032, (Sub-total)  SUB-TOTAL OF 2.  HEIGHTERING OF KRENCENG DAM  3.1 Main dam Excavation Common M3 146,652 276 1,651 40,475,952 242,122, Mexarcock M3 97,708 339 1,398 31,43,352 136,679, Mexarcock M3 97,708 339 1,398 31,43,352 136,679, Mexarcock M3 1,281,085 962 3,475 775,056,425 3,022,079, Mexarcock M3 1,281,085 962 3,475 775,056,425 3,022,079, Mexarcock M3 1,414 5,564 (5,500 90,600 12,142,000 168,170,600)  (Sub-total)  3.2 Spillway (1) Approach wall & were Excavation Common M3 3,077 276 1,551 834,771,729 3,899,841,  (Sub-total)  3.2 Spillway (1) Approach wall & were Excavation Common M3 3,077 276 1,551 834,771,772 3,899,841,  (Sub-total)  3.2 Spillway (1) Approach wall & were Excavation Common M3 3,077 276 1,551 834,771,772 3,899,841,  (2) Choiceway & basin Excavation Common M3 3,077 276 1,551 854,772 5,113,  Wearock M3 4,645 339 1,398 6,040,000 330,840,  (Sub-total)  3.2 Spillway (1) Approach wall & were Excavation Common M3 4,645 339 1,398 6,040,000 130,840,000  Common M3 4,645 339 1,398 6,040,000 130,840,000  Common M3 4,645 339 1,398 6,040,000 227,940,000  Common M3 1,818 339 1,398 6,040,000 227,000 3,150,000,000  Common M4 1,788 339 1,398 6,040,000 1,827,000,000  Common M5 1,187 6,000,000 1,187,000,000 1,187,000,000 1,187,000,000  Common M6 1,187 6,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000  Common M6 1,187 6,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,000,000 1,187,0	Rein bar		ι	40	5,292		211,680	58,438,
2.4 Diverted tumel Excavation			LS	2	1,000,000		·	
Excavation	(Sub-total)						9,915,376	106,778,
Lining cone. m3 2,170 13,488 155,546 29,268,960 337,534, Plug cone. m3 1,200 6,500 90,000 7,800,000 10,800,000 Rein bar 1 76 5,292 1,460,955 403,192 111,032, (Sub-total) 1,76 5,292 1,460,955 403,192 111,032, (Sub-total) 1,300,000 10,800,000 1			m3	5,320	8.744	105,122	46,518,080	559,249,
Grouting Rein bar 1 76 5.292 1.460,955 7.400,000 108,000 Rein bar 1 76 5.292 1.460,955 7.400,192 111,1932, (Sub-total) 83,989,232 1,115,816, SUB-TOTAL OF 2. 102,225,100 1,339,703, HEIGHTENINO OF KRENCENG DAM  3.1 Main dam Excavation Common m3 1.46,652 276 1,651 40,475,952 242,122, Rock m3 97,768 339 1,398 33,143,352 136,679, Rock m3 1,281,985 605 2,3475 Filter m2 2,285 5,756 Rendom m3 4,41 1,144 Rock m3 4,41 1,144 Rock m3 4,41 1,144 Rock m3 Curtain 1 3,676 6,500 90,000 12,142,000 168,100 (Sub-total) 834,711,729 3,899,841, 32.285 1,344 1,345 1,346	Lining conc.		т3		13 488	155,546		337,534,
Nein bar   1 76 5.292 1.460,955				1.200			7.800.000	108,000,
SUB-TOTAL OF 2.  HEIGHTENING OF KRENCENG DAM  3.1 Main dam  Excavation								111,032,
### HEIGHTENING OF KRENCENG DAM  3.1 Main dam   Bixavation	(Sub-total)				•		83,989,232	1,115,816,
### HEIGHTENING OF KRENCENG DAM  3.1 Main dam    Excavation	SUR-TOTAL OF 2.						102,225,100	1,339,703,
3.1 Main dam		ENG DAM						
Excavation								
Mearock m3		Common	m3	146,652	276	1,651	40,475,952	242,122,
Embankment		Wea.rock	m3	97,768			33,143,352	136,679,
Filter   m3   2,285   5,756   Random   m3   441   1,144   1,	Embankment			1,281,085			775,056,425	3,022,079,
Rock m3	<u></u>	Filter						
Grouting Blanket t 1,868 6,500 90,000 12,142,000 168,120,   Curtain t 3,676 6,500 90,000 23,894,000 330,840,   (Sub-total) 884,711,729 3,899,841,   3.2 Spillway (1) Approach wall & weir Excavation								
(Sub-total)  3.2 Spillway (1) Approach wall & weir Excavation Common m3 3,097 276 1.651 854,772 5.113, Recard m3 4,645 339 1.398 1.574,655 6,493, Rock m3 962 3,475 Concrete m3 6,628 13,442 132,187 89,093,576 876,135, Rein bar t 135 5,292 1,460,955 714,420 197,228, (2) Choteway & basin Excavation Common m3 11,879 276 1.651 3,278,604 19,612, Reck m3 17,818 339 1.398 6,040,302 24,999, Rock m3 14,260 13,442 132,187 191,682,920 1,884,986, Rein bar t 285 5,292 1,460,955 1,508,220 416,372, Grouting Consoli 1 35 6,500 90,000 227,500 3,150, (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000  (Sub-total)  SUB-TOTAL OF 3. 1,287,686,698 7,333,843, WATER SUPPLY PIPE LINE  4.1 Excavation m3 244 1,717 4.2 Backfill m3 244 1,717 4.3 Add, purification plant Ls 1 1,167,000,000 7,808,000,000 1,812,000,000 12,118,000, 4.5 Add, purification plant Ls 1 1,167,000,000 7,808,000,000 1,812,000,000 12,118	Grouting	Blanket	ŧ		6,500	90,000		168,120,
3.2 Spilway (1) Approach wall & weir Excavation	•	Curtain	I	3,676	6,500	90,000		
(1) Approach wall & weir Excavation	(Sub-total)						884,711,729	3,899,841,
Excavation Common m3 3,097 276 1,651 854,772 3,113,   Wearock m3 4,645 339 1,398 1,574,655 6,493,   Rock m3 6,628 13,442 132,187 89,093,576 876,135,   Rein bar 1 135 5,292 1,460,955 714,420 197,228,   (2) Chuteway & basin   Excavation Common m3 11,879 276 1,651 3,278,604 19,612,   Wearock m3 17,818 339 1,398 6,040,302 24,999,   Rock m3 962 3,475    Concrete	3.2 Spillway					•		
Rock   m3   962   3,475   Rock   m3   6,628   13,442   132,187   89,093,576   876,135,	Excavation							5,113,
Concrete Rein bar 1 135 5,292 1,460,955 714,420 197,228, (2) Choteway & basin Excavation Common m3 11,879 276 1,651 3,278,604 19,612, Wea.rock m3 17,818 339 1,398 6,040,302 24,999, Rock m3 17,818 339 1,398 6,040,302 24,999, Rock m3 14,260 13,442 132,187 191,682,920 1,884,986, Rein bar 1 285 5,292 1,460,955 1,508,220 416,372, Grauting Consoli. 1 35 6,500 90,000 227,500 3,150, (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000 (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4,717 4.3 Add, pump station Ls 1 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 4.4 Add, purification plant Ls 1 1,167,000,000 12,118,000,000 12,118,000,000 4.5 Add, pipe line Ls 1 1,812,000,000 1,540,000,000 2,914,000,000 4.7 Receiving well Ls 1 80,000,000 2,914,000,000 2,914,000,000 2,914,000,000 4,7 Receiving well Ls 1 6,000,000 218,400,000 2,914,000,0				4,645			1,574,655	6,493,
(2) Choteway & basin Excavation  Common  M3  11,879  276  1,651  3,278,604  19,612  Wea.rock  m3  17,818  339  1,398  6,040,302  24,909,  Rock  m3  14,260  13,442  132,187  191,682,920  1,884,986, Rein bar  1 285  5,292  1,460,955  1,508,220  416,372  Grouting  Consoli.  1 35  6,500  90,000  227,500  3,150, (3) Metal work  Spillway gate  Ls  1 108,000,000  (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation  m3  276  1,651  1,287,686,698  7,333,843, WATER SUPPLY PIPE LINE  4.2 Backfill  m3  244  1,717  4.3 Add, pump station  Ls  1 1,167,000,000  7,808,000,000  1,167,000,000  1,118,000,000  1,2118,000,000  1,2118,000,000  1,2118,000,000  1,2118,000,000  2,914,000,000  4.7 Receiving well  Ls  1 6,000,000  218,400,000  20,914,000,000  218,400,000  20,914,000,000  218,400,000  20,914,000,000  218,400,000  20,914,000,000  218,400,000  20,914,000,000  20,914,000,000  218,400,000  20,914,000,000  218,400,000  20,914,000,000  218,400,000  20,914,000,000  20,914,000,000  218,400,000  20,914,000,000  20,914,000,000  218,400,000  20,914,000,000  218,400,000  20,914,000,000  218,400,000  20,914,0			m3		13,442	132,187		876,135,
Excavation Common m3 11,879 276 1.651 3,278,604 19,612 Wea.rock m3 17,818 339 1,398 6,040,302 24,909, Rock m3 962 3,475  Concrete m3 14,260 13,442 132,187 191,682,920 1,884,986 Rein bar t 285 5,292 1,460,955 1,508,220 416,372 Grouting Consoli. 1 35 6,500 90,000 227,500 3,150, (3) Metal work Spillway gate Ls 1 108,000,000 108,000,000 (Sub-total)  SUB-TOTAL OF 3. 1,287,686,698 7,333,843, WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4,2 Backfill m3 244 1,717 4.3 Add, purp station Ls 1 1,167,000,000 1,118,000,000 1,167,000,000 7,808,000,000 4.5 Add, pipe line Ls 1,812,000,000 12,118,000,000 1,812,000,000 12,118,000,000 4.6 Add, intake & surge tank Ls 1 80,000,000 2,914,000,000 80,000,000 2,914,000, 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400,000 1,812,000,000 218,400,000 1,812,000,000 218,400,000 6,000,000 218,400,000 1,812,000,000 218,400,0			1	135	5,292	1,460,955	114,420	197,228,
Rock   m3								19,612,
Concrete				17,818			6,040,302	24,909,
Grouting   Consoli.   1   35   6,500   90,000   227,500   3,150,			m3		13,442	132,187		1,884,986,
(3) Metal work Spillway gate Ls 1 108,000,000  (Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1,167,000,000 1,167,000,		Consoli						416,372, 3,150,0
(Sub-total)  SUB-TOTAL OF 3.  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls i 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 1,2118,000,000 12,118,000	(3) Metal work	- Comment				20,000		-,1
SUB-TOTAL OF 3. 1,287,686,698 7,333,843,  WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add, pomp station Ls 1 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000, 4.4 Add, purification plant Ls 1 1,812,000,000 12,118,000,000 18,12,000,000 12,118,000, 4.5 Add, pipe line Ls 1,540,000,000 40,000 12,118,000,000 40,6 Add, intake & surge tank Ls 1 80,000,000 2,914,000,000 80,000,000 2,914,000,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400	Spillway gate		Ls		108,000,000			
WATER SUPPLY PIPE LINE  4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,000 1,4 Add, purification plant Ls 1,812,000,000 12,118,000,000 18,12,000,000 12,118,000,000 4.5 Add, pipe line Ls 1,540,000,000 1,540,000,000 4.6 Add, intake & surge tank Ls 1 80,000,000 2,914,000,000 80,000,000 2,914,000,4.7 Receiving well Ls 1,600,000 218,400,000 6,000,000 6,000,000 218,400,000 6,000,000 6,000,000 6,000,000 6,000,000	(Sub-total)						402,974,969	3,434,001,
4.1 Excavation m3 276 1,651 4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000, 4.4 Add, purification plant Ls 1 1,812,000,000 12,118,000,000 1,812,000,000 12,118,000, 4.5 Add, pipe line Ls 1,540,000,000 1,540,000,000 12,118,000,000 4.6 Add, intake & surge tank Ls 1 80,000,000 2,914,000,000 80,000,000 218,400, 4.7 Receiving well Ls 1,600,000 218,400,000 6,000,000 218,400,000	SUB-TOTAL OF 3.						1,287,686,698	7,333,843,
4.2 Backfill m3 244 1,717 4.3 Add, pump station Ls 1 1,167,000,000 7,808,000,000 1,167,000,000 7,808,000,4 Add, purification plant Ls 1 1,812,000,000 12,118,000,000 12,118,000,000 4.5 Add, pipe line Ls 1,540,000,000 2,914,000,000 4.6 Add, intake & surge tank Ls 1 80,000,000 2,914,000,000 80,000,000 2,914,000,4 Add, intake & surge tank Ls 1 6,000,000 218,400,000 6,000,000 6,000,000 6,000,000 6,000,000	WATER SUPPLY PIPE LIN	Е					•	
4.3 Add. pump station								$x \in \mathcal{X}, x \in \mathbb{R}$
4.4 Add. purification plant Ls 1 1,812,000,000 12,118,000,000 1,812,000,000 12,118,000, 000 4.5 Add. pipe line Ls 1,540,000,000 2,914,000,000 4.6 Add. intake & surge tank Ls 1 80,000,000 2,914,000,000 6,000,000 218,400,000 4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400							1,167,000,000	7,808,000,
4.6 Add, intake & surge tank Ls 1 80,000,000 2,914,000,000 80,000,000 2,914,000, 4.7 Receiving well Ls 1 80,000,000 218,400,000 6,000,000 218,400,000	4.4 Add. purification plant		Ls			12,118,000,000		12,118,000,
4.7 Receiving well Ls 1 6,000,000 218,400,000 6,000,000 218,400				1	80.000.000		80,000,000	2,914,000,
SUB-TOTAL OF 4. 3,065,000,000 23,058,400,								218,400,
	SUB-TOTAL OF 4.						3,065,000,000	23,058,400,

Table F-25 Cost Estimate for Cidanau Gated Weir: Scheme D-3

DESCRIPTION		Unit	Q'ty	UNIT P	I.c.	Fc	MOUNT Lc
			<u> </u>	(Yen)	(Rp)	(Yen)	(Rp)
I. PREPARATORY WORK							
(20% of 2+3+4+5)						414,455,432	1,755,702,0
2. DIVERSION WORK							
2.1 Coffering work Sheet pile & bracing		t	159	131,583	36,915	20,921,697	5,869,4
SUB-TOTAL OF 2.						20,921,697	5,869,4
3. DAM							
3.1 Main dam							
Excavation	Common	m3	10,662	276	1,651	2,942,712	17,602,9
	Wea.rock	m3	8,462	339	1,398	2,868,618	11,829,8
Concrete	Rock	m3 m3	2,200 21,325	962	3,475	2,116,400	7,645,0
Grouting	Consoli.	1 .	21,323	5,052 6,500	118,708 90,000	107,733,900 1,423,500	2,531,448,1
2144.6	Curtain	i	352	6,500	90,000	2,288,000	19,710,0 31,680,0
SUB-TOTAL OF 3.						119,373,130	2,619,915,9
, SPILLWAY							
4.1 Dental work							
Excavation	Common	m3	22,389	276	1,651	6,179,364	36,964,2
	Wea.rock Rock	m3 m3		339 962	1,398		
Concrete	ROCK	m3	8,379	5,052	3,475 118,708	42,330,708	994,654,33
(Sub-total)						48,510,072	1,031,618,5
4.2 Weir & pier							
Excavation	Common	m3		276	1,651		
	Wea.rock	m3	1,170	339	1,398	396,630	1,635,6
_	Rock	m3	500	962	3,475	481,000	1,737,5
Concrete		m3	10,761	13,442	132,187	144,649,362	1,422,464,3
Rein bar Grouting	Consoli,	t L	1,290 126	5,292	1,460,955	6,826,680	1,884,631,9
Citating	Curtain	i	180	6,500 6,500	90,000 90,000	819,000 1,170,000	11,340,0 16,200,0
(Sub-total)						154,342,672	3,338,009,4
4.3 Hoist & bridge							
Concrete		m3	2,871	13,442	132,187	38,591,982	379,508,8
Rein bar		t	574	5,292	1,460,955	3,037,608	838,588,1
(Sub-total)						41,629,590	1,218,097,0
SUB-TOTAL OF 4.						244,482,334	5,587,725,0
. METAL WORK							
5.1 Roller gate		Ls	1	1,620,000,000		1,620,000,000	
5.2 Steel conduit		Ls	1		565,000,000		565,000,0
5.3 Hollow jet valve 5.4 Guard valve		Ls Ls	1 1	45,000,000 22,500,000		45,000,000 22,500,000	
SUB-TOTAL OF 5.						1,687,500,000	565,000,0
. WATER SUPPLY PIPE LINI	E .						*
6.1 Excavation		m3		276	1,651		
6.2 Backfill		m3		244	1,717		
6.3 Add. pump station		Ls			,		
6.4 Add. purification plant		Ls					
6.5 Add, pipe line 6.6 Add, intake & surge tank		Ls Ls					
SUB-TOTAL OF 6.							•
	<del></del>						

FT-25

Table F-26 Cost Estimate for Heightening of Krenceng Dam with Two Diversion Tunnels: Scheme D-3

DESCRIPTION		Unit	Q'ty '	UNIT Fc	PRICE Lc	Fc	MOUNT Lc
DISCRITION			Q.y	(Yen)	(Rp)	(Yen)	(Rp)
I. PREPARATORY WORK (20% of 2+3)						277,982,360	1,734,709,34
2 DIVERTED TUNNEL							
2.1 Coffering work							
Coffering	Exca. Embank	m3 m3	1,000 1,000	276 441	1,651 1,144	276,000 441,000	1,651,00 1,144,00
(Sub-total)			·		•	717,000	2,795,00
2.2 Weir							
Excavation	Common Wea.rock	m3 m3	1,200 1,200	276 339	1,651 1,398	331,200 406,800	1,981,20 1,677,60
Concrete	Rock	m3 m3	600 410	962 5,052	3,475	577,200	2,085,00
Rein bar		ŧ	41	5,292	118,708 1,460,955	2,071,320 216,972	48,670,28 59,899,13
Gate		Ls	2	2,000,000		4,000,000	
(Sub-total)						7,603,492	114,313,23
2.3 Inlet & outlet Excavation	Common	m3	4,576	276	1,651	1,262,976	7,554,97
	Wea.rock Rock	m3 m3	4,576 2,288	339 962	1,398 3,475	1,551,264 2,201,056	6,397,2/ 7,950,80
Concrete	NO.	m3	200	13,442	132,187	2,688,400	26,437,4
Rein bar Trash rack		t Ls	40 2	5,292 1,000,000	1,460,955	211,680 2,000,000	58,438,2
(Sub-total)						9,915,376	106,778,63
2.4 Diverted tunnel							
Excavation Lining conc.		m3 m3 m3	5,320 2,170	8,744 13,488 13,488	105,122 155,546	46,518,080 29,268,960	559,249,04 337,534,82
Plug conc. Grouting		t	1,200	6,500	155,546 90,000	7,800,000	108,000,00
Rein bar		ì	76	5,292	1,460,955	402,192	111,032,58
(Sub-total)			٠			83,989,232	1,115,816,44
SUB-TOTAL OF 2.						102,225,100	1,339,703,29
HEIGHTENING OF KRENC	ENG DAM						
3.1 Main dam Excavation	Common	т3	146,652	276	1,651	40,475,952	242,122,45
	Wea.rock Rock	m3 m3	97,768	339 962	1,398	33,143,352	136,679,66
Embankment	Core	m3	1,281,085	605	3,475 2,359	775,056,425	3,022,079,51
	Filter Random	m3 m3		2,285 441	5,756 1,144		
	Rock	m3		1,514	5,964		
Grouting	Blanket Curtain	ŧ ŧ	1,868 3,676	6,500 6,500	90,000 90,000	12,142,000 23,894,000	168,120,00 330,840,00
(Sub-total)						884,711,729	3,899,841,63
3.2 Spillway							
(1) Approach wall & weir Excavation	Common	m3	3,097	276	1,651	854,772	5,113,14
	Wea.rock Rock	m3 m3	4,645	339 962	1,398 3,475	1,574,655	6,493,71
Concrete	ROCK	m3	6,628	13,442	132,187	89,093,576	876,135,43
Rein bar (2) Chuteway & basin	•	t	135	5,292	1,460,955	714,420	197,228,92
Excavation	Common Wea.rock	m3 m3	11,879 17,818	276 339	1,651 1,398	3,278,604 6,040,302	19,612,22 24,909,56
Concrete	Rock	m3 m3	14,260	962 13,442	3,475 132,187	191,682,920	1,884,986,62
Rein bar	Carroll	ι	285	5,292	1,460,955	1,508,220	416,372,17
Grouting (3) Metal work	Consoli.	t	35	6,500	90,000	227,500	3,150,00
Spillway gate		Ls	1	108,000,000		108,000,000	
(Sub-total)						402,974,969	3,434,001,80
SUB-TOTAL OF 3.						1,287,686,698	7,333,843,43
WATER SUPPLY PIPE LINE	3						
4.1 Excavation 4.2 Backfill		m3 m3		276 244	1,651 1,717		
4.3 Add. pump station		Ls	1	1,208,000,000	8,080,000,000	1,208,000,000	8,080,000,00
4.4 Add. purification plant 4.5 Add. pipe line		Ls ls	1	1,931,000,000	12,916,000,000 1,540,000,000	1,931,000,000	12,916,000,00
4.6 Add. intake & surge tank 4.7 Receiving well		Ls Ls	1	84,000,000 6,000,000	3,084,000,000 218,400,000	84,000,000 6,000,000	3,084,000,00 218,400,00
SUB-TOTAL OF 4.						3,229,000,000	24,298,400,00

Table F-27 Economic Cost and Economic Evaluation for Alternative Single Development Schemes

						Cheme	e Ha	•	,			(Unit: Million)
Description		A-1		A-3		A-6	K-1		K-2			K-3
	F/C *5	1/0 *6	F/C	T/C	F/C	277	F/C	27	F/C	2/2	F/C	IVC
1) Direct Const. cost	3,473	62,317	2,345	18,000	2,792	13,529	4,021	27,420	4,147	28,609	4,318	30,334
Dam and related facility Water transmission facility	2,780 693	17,654	2,251 94	16,865	2,487	10,534	1,545 2,476	8,301 18,619	1,585 2,562	9,336 19,272	1,668 2,650	10,408 19,925
2) Land acquisition cost	0	210	0	12	0	28	0	3,722	0	3,722	0	3,722
3) Administration *1	0	6,253	0	1,801	0	1,356	0	3,114	0	3,233	0	3,406
4) Engineering Services *2	521	3,116	352	96	419	919	603	1,371	622	1,430	648	1,517
5) Physical contingency *3	599	10,753	405	3,105	482	2,334	694	4,786	715	4,991	745	5,288
6) Grand Total	4,593	82,649	3,101	23,818	3,692	17,924	5,318	40,413	5,484	41,985	5,710	44,266
(Rp) *4	15	154,300		72,199		75,520	123,375	75	127,542	<b>4</b> 3	<b>****</b>	133,348
7) Economic cost *7	13	138,681	v	64,968		67,943	107,688	88	111,439	39	_*	116,664
8) Capitalized cost *8	10	106,165	*	48,612		51,116	96,189	68	98,398	88	p4	101,167
9) Capitalized benefit *8	5	97,024	-	19,405		20,668	243,637	37	254,418	18	61	265,198
10) Net benefit		-9,141	17	-29,208		-448	147,449	64	156,019	6		164,031
11) Benefit cost ratio		0.91		0.40		0.99	7	2.53	.2.	2.59		2.62
12) Economic internal rate of return (EIRR)	(EIRR)	11.16		5.22		11.92	24	24.02	24.22	23		24.26
			·									

F/C 0%, LC 10% of 1) + 2)
F/C 15%, L/C 5% of 1)
F/C 15%, L/C 15% of 1) + 3) + 4)
Y1 = Rp.15.6
F/C: Japanese Yen
L/C: Rupiah 

Conversion factor: 0.9 / Excluded land acquisition cost Capitalized by discount rate of 12% Excluded Land acquistion cost

Table F-28 Economic Cost and Economic Evaluation for Alternative Combined Development Schemes

									Scheme	9								
Description	6	P.1	æ	B-2	B-3			ច	C:5		င်ဒ		I	D-1	D-2		23	
	P/C *5	1.0.6	F/C	LVC	F/C	3	P/C	S	3,5	3	P/C	Ŋ	F/C	rvc	7.5	27	F/C	27
1) Direct Const. cost	7,00,7	776,28	6,774	48,576	7,097	42,393	7,134	87,165	6,901	49,763	455,7	43,581	7,304	683,889	486,9	50,855	7,384	45,241
Dam and related facility		26,485	3,796	25,665	4,032	19,335	4,370	27,020	3,836	26,201	4,072	19,870	4,453	23,092	3,919	27,273	4,155	20.942
water transmission is anny 2) Land acquisition cost	, 65 C	5 772	2,978	22,910	3,000 000 000 000 000 000 000 000 000 00	86,052	7,4 28 C	5 362	3,063	23,562	3,152 0	23,710	2,851	757,752	3,065 C	25.562	3,228	24,298
3) Administration *1	. 0	9,135		5,375	6	4,758		9,253	0	5,494	. 0	4.877	• •	9,426		5,601		5,043
4) Engineering Services *2	1,051	4,299	1,016	2,429	590,1	2,128	1,070	4,358	1,035	2,488	1,084	2,179	1,096	4,444	1,048	2,542	1,108	2,262
5) Physical contingency *3	1,209	14,912	1,169	8,457	1,224	7,391	1,231	15,116	1,190	8,662	1,246	7,596	1,260	15,414	1,205	8,847	1,274	7,882
6) Grand Total	7,82,6	119,693	8,959	70,010	9'386	61,852	9,435	121,254	9,127	71,581	9,553	63,422	659'6	123,545	952'6	72,998	9,765	65,618
(Rp) *4	**	264,259	Ŕ	209,770	208,269	36	••	268,436	213,957	53	212,456	<b>5</b> 0	ä	274,231	217,084		217,949	Ş
7) Economic cost *7	ង់	232,998	. 8	184,137	182,771	1,	-•	236,767	187,905	Š	186,540	0	**	241,974	02.C.06.1	_	191,484	<b>3</b> 5
8) Capitalized cost *8	19.	192,065	150	156,747	153,174	74	- "	194,290	156,491	. 16	155,149	ο,	13	197,046	150,721		157,279	73
9) Capitalized benefit *8	E	330,235	Ř	305,286	313,873	573		336,925	313,873	773	321,535	zo.	¥	343,026	321,535	15	328,184	2
10) Net benefit	133	138,170	37	148,539	160,699	&		142,635	157,382	182	166,386	ور	41	145,980	164,484	••	170,905	502
11) Benefit cost ratio		1.72		1.95	. 61	2.05		1.73	4	2.01	2.07	<u>t</u>		1.74	205	50		503
12) Economic internal rate of return (EIRR)		18.00	4	19.91		20.60		18.04	8	20.22	20.64	.st		18.00	20.36	vo.	8	20.58

Note: \*1 F/C 06, LC 10% of 1) + 2)

\*2 P/C 15%, LC 15% of 1)

\*3 P/C 15%, LC 15% of 1) + 3) + 4)

\*4 Y1 = Rp.15.6

\*5 F/C: Japanese Yen

\*6 L/C: Ruplah

\*7 Conversion factor: 0.5 / Exchuded land acquisition cost

\*8 Capitalized by discours rate of 12%

Water Conveyance and Treatment Facilities for Alternative Development Scale of Heightening of Krenceng Dam Table F-29

		Alternative	
	H-1	H-2	H-3
Required Additional Pump Capacity*	1.10 m <sup>3</sup> /s	0.65 m <sup>3</sup> /s	0.105 m <sup>3</sup> /s
Intake Facilities (Cidanau)			
Intake*	L = 40  m B = 2.0  m $H = 2.2  m$	L = 40  m B = 1.0  m $H = 2.2  m$	-
Sand trap basin*	L = 80  m B = 6.5  m $H = 3.0  m$	L - 80 m B = 4 m $H = 3.0 \text{ m}$	-
Water Conveyance Facilities			
Cidanau Pump station*	$0.55 \text{ m}^3/\text{s} \times 2 \text{ units}$	$0.33 \text{ m}^3/\text{s} \times 2 \text{ units}$	0.105 m <sup>3</sup> /s x 1 unit
Booster pump station*	$1.03 \text{ m}^3/\text{s} \times 4^{1]}$	$0.88 \text{ x m}^3/\text{s x 4}^{1}$	$0.70 \text{ m}^3/\text{s} \times 4^{1}$
Surge tank	2 units	2 units	1 unit
Purification Facilities			
Pump station**	1.03 m <sup>3</sup> /s x 4 <sup>1</sup>	$0.88 \text{ m}^3/\text{s} \times 4^{1}$	0.105 m <sup>3</sup> /s x 1
Receiving well**	Replaced	Replaced	Replaced
Water purification plant**	1.10 m <sup>3</sup> /s	0.65 m <sup>3</sup> /s	0.105 m <sup>3</sup> /s

Note:

included one standby, additional facilities replaced facilities

1] \*

Table F-30 Water Conveyance and Treatment Facilities for Alternative Development Scale of Cidanau Gated Weir

	Alter	mative
	M-1	M-2
Required Additional Pump Capacity*	0.205 m <sup>3</sup> /s	0
Intake Facilities (Cidanau)		
Intake*	_	
Sand trap basin*	•	-
Pump station*	-	-
Conveyance Facilities		
Booster pump station*	•	. <b>-</b>
Surge tank	-	-
Purification Facilities		
Pump station*	$0.205 \text{ m}^3\text{/s} \times 1 \text{ unit}$	$0.015 \mathrm{m}^3/\mathrm{s} \times 1 \mathrm{unit}$
Receiving well		- -
Water purification plant	0.205 m <sup>3</sup> /s	$0.015 \text{ m}^3\text{/s}$

Note: \* additional facilities

Table F-31 Five (5)-day Mean Inflow Discharge at Existing Cidanau Weir Site

Year   Period (clay)   Jun.   Pib.   Mar.   Apr.   May   Jun.   Jun.   Jun.   Aug.   Sep.   Oct.   Nev.   Dec.   Mar.   Oct.														(Unit:	m3/sec)_
	Year	Period (day)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.		
11th   15th   9.38   11.6   32.45   15.05   2.04   4.36   6.51   15.84   66.5   5.88   31.05   75.87   23.59   21th   25th   9.00   25th   9.00   21th   9				7.63	10.49			8.89	3,78			1.98	21.75	64.63	12.20
16th   20th		6th - 10th	9.22	11.72	7.95	4.09	0.42	10.17	6.52	10.38	62.58	1.47	25.6	73.43	18.63
21in   25in   9,002   11,78   5,29   7,57   12,4   8,74   6,11   12,25   5,73   15,0   42.38   68,39   17,13		11th - 15th	9.38	11.6	32,45	15.05	2.04	4.36	6.51	15.84	66.5	5.88	31.05	75.87	23.04
1981   1st - 5sh		16th - 20th	9.07	11.72			4.42	7.34							
1981		21st - 25th	9.02	11.78	5.29	7.57	12.4	8.74							
Gib.   10th   167/61   49.8   4.05   28.48   10.24   8.54   2.94   7.15   15.99   33.15   9.34   2.99   30.27   11th   15th   66.59   23.67   5.24   2.98   6.84   11.8   6.44   5.13   16.4   11.46   56.21   1.97   22.14   16th   2.0th   70.21   24.47   8.51   23.48   10.07   22   12.86   3.65   3.8   8.17   157.94   7.06   29.43   21th   2.5th   32.2   4.35   5.41   2.0th   2.12   7.49   9.99   17.02   8.72   2.28   20.99   21.64   72.94   24.95   20th   1.15   1.5 th   2.5th   2.5th   3.22   4.02   4.01   2.15   2.5th   5.22   2.8th   2.95   2.95   1.33   1.29   12.26   0.98   13.88   11th   15th   10.12   4   29.24   4.07   4.15   12.5th   5.95   5.92   2.8th   3.95   2.92   1.13   3.15   13.15		26th - 31st	6.86	14.65	3.35	4.61	9.63	5.49	5.29	4.09	3.78	19.05	49.61	91.21	18.14
Gib.   10th   167/61   49.8   4.05   28.48   10.24   8.54   2.94   7.15   15.99   33.15   9.34   2.99   30.27   11th   15th   66.59   23.67   5.24   2.98   6.84   11.8   6.44   5.13   16.4   11.46   56.21   1.97   22.14   16th   2.0th   70.21   24.47   8.51   23.48   10.07   22   12.86   3.65   3.8   8.17   157.94   7.06   29.43   21th   2.5th   32.2   4.35   5.41   2.0th   2.12   7.49   9.99   17.02   8.72   2.28   20.99   21.64   72.94   24.95   20th   1.15   1.5 th   2.5th   2.5th   3.22   4.02   4.01   2.15   2.5th   5.22   2.8th   2.95   2.95   1.33   1.29   12.26   0.98   13.88   11th   15th   10.12   4   29.24   4.07   4.15   12.5th   5.95   5.92   2.8th   3.95   2.92   1.13   3.15   13.15	1004		140.70	10.00	00.00	on tto	1400		0.07	10.0	e 0.4	06.00	10.70	40.50	06.01
Tith   15th   66.59   32.67   524   26.98   6.84   11.8   6.44   5.13   16.4   11.46   56.21   597   22.14   21.1   25th   32.2   4.33   5.41   20.12   7.49   9.99   17.02   8.72   2.63   4.25   60.02   13.4   13.60   24.04   22.14   8.03   2.12   9.78   22.06   10.29   22.8   20.99   21.64   72.94   24.95	1981														
16th   20th   70.21   24.47   8.51   23.48   10.07   22   12.86   3.65   3.8   81.7   157.94   79.6   29.43   24.51   22.64   31.81   33.02   43.04   42.74   18.03   21.2   9.78   22.06   12.29   22.8   20.99   21.64   72.94   24.95   24.81   31.01   26.97   26.5   73.74   24.95   24.81   25.81   24.82   24.82   25.81   25.81   24.82   24															
21st 25th   32.2   433   541   20.12   7.49   9.99   71.02   8.72   2.65   4.25   60.02   13.4   13.46     26th -10th   26.97   2.63   73.45   24.62   8.29   8.78   2.55   2.25   1.35   1.29   12.36   0.98   13.88     11th 15th   10.12   4   22.24   16.71   7.78   5.92   2.88   1.89   1.25   1.35   1.29   12.36   0.98   13.88     11th 15th   10.12   4   22.24   16.71   7.78   5.92   2.88   1.89   1.25   0.88   1.55   7.88     16th -20th   41.99   3.63   39.29   8.12   4.47   8.92   18.8   4.14   1.61   1.02   22.21   1.6   6.45   12.71     25th -25th   36.65   7.71   50.8   12.25   3.48   4.47   1.61   1.02   22.21   1.6   6.45   12.71     26th -31st   7.07   10.93   15.69   17.23   4.46   3.921   1.03   2.48   1.22   5.88   1.65   5.79     1983   1s5th   15.68   18.28   12.35   3.88   1.14   1.47   7.94   11.4   1.57   1.76   0.67   13.21   2.381   9.55     11th 15th   14.29   6   5.37   8.8   14.13   6.23   5.87   2.78   1.14   0.87   3.21   2.381   9.55     11th 15th   14.25   6.53   4.6   10.47   71.12   9.70   7.77   3.44   1.63   0.85   90.38   1.48   8.64   10.00     26th -31st   26.34   9.6   6.81   10.93   6.119   6.5   2.04   1.25   12.64   50.62   13.11   3.15     1984   1st -5th   13.13   17.21   13.6   27.51   13.54   14.43   5.23   5.79   3.86   4.13   1.35   1.45   4.78     1985   1st -5th   13.13   7.21   13.6   6.22   4.73   8.04   11.33   4.46   11.35   1.45   4.78   4.63   0.85   9.38   1.49   8.46   10.00     26th -31st   26.34   9.6   6.81   10.93   6.119   6.5   2.04   1.25   12.64   50.62   13.61   13.19     1984   1st -5th   13.13   7.21   13.6   27.51   13.54   7.72   7.60   3.35   7.70   7.73   4.62   4.75   7															
26th - 31st   33.02   43.04   22.74   18.03   2.12   9.78   22.06   10.29   22.88   20.99   21.64   72.94   24.95     1982   1st - 5th   49.48   6.42   21.14   24.15   12.58   5.62   3.25   3.88   1.95   2.92   1.13   3.15   11.31     11th - 15th   10.12   4   22.24   16.17   7.78   5.52   2.88   1.89   1.23   1.26   0.98   13.88     11th - 15th   10.12   4   22.24   16.17   7.78   5.52   2.85   1.89   1.23   0.64   5.98   5.15   7.48     12tt - 25th   36.68   7.93   36.88   12.54   3.94   4.77   5.11   1.22   2.27   6.3   6.47   1.21     12tt - 25th   36.68   18.28   12.55   11.24   4.78   9.21   1.03   2.48   1.22   5.88   16.55   7.90     1983   1st - 5th   15.68   18.28   12.55   11.44   4.78   9.22   18.42   3.31   1.14   0.87   16.39   4.47   3.16     11th - 15th   14.29   6   5.37   8.8   14.13   6.23   5.87   2.78   1.96   0.75   17.05   10.13   7.78     16th - 20th   25.58   6.53   4.6   10.47   7.12   9.07   7.77   3.44   1.63   0.85   0.93   10.25   4.84     21st - 25th   46.39   7.22   4.57   8.87   9.33   11.23   5.69   9.1   1.63   5.81   1.49   8.64   10.00     20th - 31st   25.04   9.6   6.81   10.93   6.62   6.119   6.5   2.04   1.25   12.55   2.06   2.35   1.65     10th - 15th   14.45   13.05   2.99   8.87   3.67   7.25   7.02   3.46   4.04   9.46   3.85   1.49   8.64   10.00     10th - 15th   14.45   13.05   2.99   8.87   3.67   7.25   7.62   3.43   14.49   4.69   11.28   13.57     10th - 15th   14.45   13.05   2.99   8.87   3.67   7.25   7.62   3.43   14.49   4.69   11.28   13.73   14.14   1.55   1.65   5.204   1.15   5.204   1.15   5.204   1.15   5.35   8.25   7.7   1.13   1.14   1.55   1.2															
1982   1st - 5th															
Chi   10th   26.97   26.3   73.45   24.62   8.29   8.78   2.95   2.95   1.33   1.29   12.36   0.98   13.88   11th   15th   10th   20th   41.99   3.63   39.29   40.02   44.88   5.88   4.14   1.61   1.05   2.22   1.8   6.45   12.71   2.14   2.26h   3.16   7.71   5.05   3.94   4.37   5.11   1.31   2.22   2.18   6.45   12.71   2.26h   3.18   7.07   10.93   15.59   17.23   4.46   3   9.21   1.03   2.48   1.22   5.88   16.55   7.90   1983   1st   5th   15.68   18.28   12.53   11.42   4.78   9.32   18.42   3.31   1.14   0.87   16.39   44.79   13.08   6th   10th   16.16   21.76   6.29   10.11   4.7   7.94   11.4   15.77   1.76   0.67   13.21   23.81   9.95   11th   15th   14.29   6.53   6.53   4.6   10.47   7.74   11.4   15.77   1.77   10th   20th   25.58   6.53   4.6   10.47   7.74   11.2   9.07   7.77   3.44   1.63   0.85   90.38   10.25   14.81   21.4   25.51   12.2   25.41   46.39   7.22   45.77   8.87   9.33   11.23   5.69   9.1   1.03   3.81   1.49   8.64   10.00   20th   25.18   25.84   3.96   6.11   3.13   7.21   3.6   27.51   13.54   14.43   5.3   5.79   3.86   24.07   3.73   46.23   15.70   10th   20th   25.58   6.53   4.6   24.73   8.04		2041 - 3181	33,02	4,3.04	22.14	10.03	2.12	7.76	22.00	10.29	22.0	20,77	21.04	14.74	64.73
Chi   10th   26.97   26.3   73.45   24.62   8.29   8.78   2.95   2.95   1.33   1.29   12.36   0.98   13.88   11th   15th   10th   20th   41.99   3.63   39.29   40.02   44.88   5.88   4.14   1.61   1.05   2.22   1.8   6.45   12.71   2.14   2.26h   3.16   7.71   5.05   3.94   4.37   5.11   1.31   2.22   2.18   6.45   12.71   2.26h   3.18   7.07   10.93   15.59   17.23   4.46   3   9.21   1.03   2.48   1.22   5.88   16.55   7.90   1983   1st   5th   15.68   18.28   12.53   11.42   4.78   9.32   18.42   3.31   1.14   0.87   16.39   44.79   13.08   6th   10th   16.16   21.76   6.29   10.11   4.7   7.94   11.4   15.77   1.76   0.67   13.21   23.81   9.95   11th   15th   14.29   6.53   6.53   4.6   10.47   7.74   11.4   15.77   1.77   10th   20th   25.58   6.53   4.6   10.47   7.74   11.2   9.07   7.77   3.44   1.63   0.85   90.38   10.25   14.81   21.4   25.51   12.2   25.41   46.39   7.22   45.77   8.87   9.33   11.23   5.69   9.1   1.03   3.81   1.49   8.64   10.00   20th   25.18   25.84   3.96   6.11   3.13   7.21   3.6   27.51   13.54   14.43   5.3   5.79   3.86   24.07   3.73   46.23   15.70   10th   20th   25.58   6.53   4.6   24.73   8.04	1982	1st - 5th	49.48	6.42	21.14	24.15	12.58	5.62	3.25	3.88	1.95	2.92	1.13	3.15	11.31
11th   15th   10,12	-,														
16th - 20th   41.99   363   39.29   40.02   4.48   5.88   4.14   1.61   1.05   2.22   1.8   6.45   12.71     26th - 31st   7.07   10.93   15.69   17.23   4.46   3   9.21   1.03   2.48   1.22   5.88   16.55   7.90     1983   1st - 5th   15.68   18.28   12.53   11.42   4.78   9.32   18.42   3.31   1.14   0.87   16.39   44.79   13.08     6th - 10th   16.16   21.76   6.29   10.11   4.7   7.94   11.4   1.57   1.76   0.67   13.21   23.81   9.95     11th - 15th   14.29   6   5.37   8.8   14.13   6.23   5.87   2.78   1.96   0.75   17.05   10.13   7.78     16th - 20th   25.58   6.53   4.6   10.47   7.12   9.07   7.77   3.44   1.63   0.85   9.93   10.25   4.81     21st - 25th   46.39   7.22   4.57   8.87   9.33   11.23   5.69   9.1   1.63   5.81   1.49   8.64   10.00     20th - 31st   26.34   9.6   6.81   10.93   6   11.91   6.5   2.04   1.25   12.64   50.62   13.61   13.19     1984   1st - 5th   13.13   17.21   13.6   27.51   13.54   14.43   5.3   5.79   3.86   24.07   3.33   4.62   13.11     16th - 10th   3.19   28.98   24.73   6.62   24.73   8.04   11.33   4.46   11.65   10.2   6.39   44.47   15.39     16th - 10th   3.19   28.98   24.73   6.62   24.73   8.04   11.33   4.46   11.65   10.2   6.39   44.47   15.39     16th - 20th   14.85   17.45   50.95   15.02   24.37   3.22   7.21   4.19   8.05   6.53   8.69   33.45   16.51     1985   1st - 5th   21.96   11.95   31.08   4.25   13.79   3.86   4.77   3.22   4.75   4.79   4.70   4.88   3.77   3.86   3.77   12.33     1985   1st - 5th   21.96   11.95   31.08   4.25   3.77   3.87   3.22   7.21   4.19   8.05   6.53   8.69   33.45   16.51     1985   1st - 5th   14.85   1.75   1.75   1.16   6.73   1.17   5.68   11.79   4.76   4.82   12.67   2.78   6.16   8.98   28.56   13.23   11.15   1.55   3.23   4.75   12.42   2.74   4.04   9.46   33.72   11.55     1985   1st - 5th   15.11   24.64   2.17   5.48   11.79   4.76   4.82   12.79   5.73   10.12   3.03   9.88   8.65   3.23   3.15   1.17   5.66   1.18   5.11   7.76   6.73   5.15   5.75   5.33   7.77   12.35   6.60   5.34   5.15   5								5.92	2.88	1.89	1.23	0.84	3.98	5.15	7.48
21st - 25th   36.65   7.71   56.8   12.24   3.94   4.37   5.11   1.31   2.22   2.17   6.13   6.78   12.14				3.63	39.29	40.02	4.48	5.88	4.14	1.61	1.05	2.22	1.8	6.45	12.71
1983					56.8	12.54	3.94	4.37	5.11		2.22	2.17	6.13	6.78	12.14
Soh   10th   16,16   21,76   6.29   10,11   4.7   7.94   11,4   1.57   1.76   0.67   13,21   23,81   9.95     11th   15th   14,29   6   5.37   8.8   4,13   6.23   5.87   2.78   1.96   0.75   17,05   10,13   7.78     16th   20th   25,58   6.53   4.6   10,47   7,12   9.07   7.77   3,44   1.63   0.85   90,38   10,25   14,81     26th   31st   26.34   9.6   6.81   10,93   6   11,91   6.5   2.04   1.25   12,64   50,62   13,61   13,19     1984   1st   5th   13,13   17,21   13.6   27,51   13,54   14,43   5.3   5.79   3,86   24,07   3.73   46,23   15,70     10th   10th   13,19   28,98   24,73   6.62   24,73   8.04   11,33   4,46   11,56   10.2   6.39   44,47   15,91     10th   10th   10th   13,05   29,99   8.87   36,17   7.25   7.62   3,43   14,49   4.69   11,28   18,37   14,14     16th   20th   16th   608   9.61   24,88   7.79   13,42   6.04   4.98   3.5   11,67   5.54   11,43   1623   10,93     21st   25th   16,33   6.64   44.2   10,14   9,18   7.22   6.4   3,24   10,14   5.35   8.25   7.7   11,23     26th   31st   18,98   17,45   50,95   15,02   24,37   3,22   72,1   4,19   8.05   6.53   8.69   33,45   16,51     1985   1st   5th   21,96   11,95   13,08   42,5   15,15   5,23   4,75   12,42   2.74   4.04   9,46   33,72   11,56     6th   10th   19,4   11,84   42,17   5,48   11,79   47,6   48,2   12,07   2.78   6.16   8,98   28,56   13,23     11th   15th   37,45   14,6   32,83   10,37   9,33   5.76   5.32   7.34   10,2   10,30   9,98   8,88   13,3     16th   20th   12,81   7.56   11,11   21,81   7.82   7.11   5,69   6.28   7.87   16,73   6.94   4.11   9,68     21st   25th   8.72   13,14   6.09   15,98   8,38   7.34   13,79   3,35   15,15   10,44   15,24   4.25   9,80     1986   1st   5th   15,11   28,46   11,96   24,45   12,69   5.92   2.81   6.07   1.89   7.88   21,24   11,94   12,54     10th   10th   10th   14,13   13,13   13,14   14,16   5.11   17,61   6.73   6.73   6.73   6.73   5.15		26th - 31st	7.07	10.93	15.69	17.23	4.46	. 3	9.21	1.03	2.48	1.22	5.88	16.55	7.90
Soh   10th   16,16   21,76   6.29   10,11   4.7   7.94   11,4   1.57   1.76   0.67   13,21   23,81   9.95     11th   15th   14,29   6   5.37   8.8   4,13   6.23   5.87   2.78   1.96   0.75   17,05   10,13   7.78     16th   20th   25,58   6.53   4.6   10,47   7,12   9.07   7.77   3,44   1.63   0.85   90,38   10,25   14,81     26th   31st   26.34   9.6   6.81   10,93   6   11,91   6.5   2.04   1.25   12,64   50,62   13,61   13,19     1984   1st   5th   13,13   17,21   13.6   27,51   13,54   14,43   5.3   5.79   3,86   24,07   3.73   46,23   15,70     10th   10th   13,19   28,98   24,73   6.62   24,73   8.04   11,33   4,46   11,56   10.2   6.39   44,47   15,91     10th   10th   10th   13,05   29,99   8.87   36,17   7.25   7.62   3,43   14,49   4.69   11,28   18,37   14,14     16th   20th   16th   608   9.61   24,88   7.79   13,42   6.04   4.98   3.5   11,67   5.54   11,43   1623   10,93     21st   25th   16,33   6.64   44.2   10,14   9,18   7.22   6.4   3,24   10,14   5.35   8.25   7.7   11,23     26th   31st   18,98   17,45   50,95   15,02   24,37   3,22   72,1   4,19   8.05   6.53   8.69   33,45   16,51     1985   1st   5th   21,96   11,95   13,08   42,5   15,15   5,23   4,75   12,42   2.74   4.04   9,46   33,72   11,56     6th   10th   19,4   11,84   42,17   5,48   11,79   47,6   48,2   12,07   2.78   6.16   8,98   28,56   13,23     11th   15th   37,45   14,6   32,83   10,37   9,33   5.76   5.32   7.34   10,2   10,30   9,98   8,88   13,3     16th   20th   12,81   7.56   11,11   21,81   7.82   7.11   5,69   6.28   7.87   16,73   6.94   4.11   9,68     21st   25th   8.72   13,14   6.09   15,98   8,38   7.34   13,79   3,35   15,15   10,44   15,24   4.25   9,80     1986   1st   5th   15,11   28,46   11,96   24,45   12,69   5.92   2.81   6.07   1.89   7.88   21,24   11,94   12,54     10th   10th   10th   14,13   13,13   13,14   14,16   5.11   17,61   6.73   6.73   6.73   6.73   5.15								0.00				0.00	1.5.00	44.70	10.00
11th - 15th   14.29   6   5.37   8.8   14.13   6.23   5.87   2.78   1.96   0.75   17.05   10.13   7.78   16th - 20th   25.58   6.53   46.   10.47   7.12   9.07   7.77   3.44   1.63   0.55   90.38   10.25   14.81   12ts - 25th   46.39   7.22   4.57   8.87   9.33   11.23   5.69   9.1   1.63   5.81   1.49   8.64   10.00   126th - 31st   26.34   9.6   6.81   10.93   6   11.91   6.5   2.04   1.25   12.64   50.62   13.61   13.19   1984   1sr - 5th   13.13   17.21   13.6   27.51   13.54   14.43   5.3   5.79   3.86   24.07   3.73   46.23   15.70   16th - 10th   3.19   28.98   24.73   6.62   24.73   8.04   11.33   4.46   11.55   10.2   6.39   44.47   15.39   11th - 15th   14.65   13.05   29.99   8.87   36.17   7.25   7.62   3.43   14.49   4.69   11.28   18.37   14.41   16th - 20th   16.08   9.61   24.88   7.79   13.42   6.04   4.98   3.5   11.67   5.54   11.43   16.22   10.93   12ts - 25th   16.33   6.64   44.2   10.14   9.18   7.22   6.4   3.24   10.14   3.35   8.25   7.7   11.23   12ts - 25th   16.33   6.64   44.2   10.14   9.18   7.22   7.21   4.19   8.05   6.33   8.69   33.45   16.51   1985   1st - 5th   21.96   11.95   13.08   4.25   15.15   5.23   4.75   12.42   2.74   4.04   9.46   33.72   11.56   6th - 10th   19.4   11.84   42.17   5.48   11.79   4.76   4.82   12.07   2.78   6.16   8.98   28.56   13.23   11th - 15th   3.745   14.6   32.83   10.57   9.33   5.76   5.32   2.75   10.43   13.03   9.98   9.68   13.84   16th - 20th   12.81   7.56   11.11   21.81   7.82   7.11   5.69   6.28   7.87   16.73   6.94   4.41   9.84   17ts - 25th   8.77   13.14   6.93   15.98   8.38   7.34   13.79   3.51   5.15   10.44   15.24   4.23   9.80   17ts - 25th   3.51   13.47   14.16   5.31   10.6   24.45   12.65   5.92   2.81   6.07   1.89   5.27   22.92   4.67   4.41   18th - 15th   51.29   24.43   8.07   18.98   9.8   5.06   6.28   7.87   16.73   2.18   6.44   1.98   18t - 5th   15.11   28.46   11.96   24.45   12.65   5.92   2.81   6.07   1.89   5.27   2.29   4.67   4.41   18th - 15th   51.29   24.33   6.37   11.65   22.55   6.9	1983														
16th - 20th   25.58   6.53   4.6   10.47   7.12   9.07   7.77   3.44   1.63   0.85   90.38   10.25   14.81															
21st - 25sh   46.39   7.22   4.57   8.87   9.33   11.23   5.69   9.1   1.63   5.81   1.49   8.64   10.00															
1984   1st - 5th   13,13   17,21   13,6   27,51   13,54   14,43   5,3   5,79   3,86   24,07   3,73   46,23   15,70   11th - 15th   14,45   13,05   29,99   8,87   36,17   7,25   7,62   3,43   14,49   4,69   11,28   18,37   14,14   16th - 20th   16,08   9,61   24,88   7,79   13,42   6,04   4,98   3,5   11,67   5,54   11,43   16,23   10,93   21st - 25th   16,33   6,64   44,2   10,14   9,18   7,22   6,4   3,24   10,14   5,35   8,25   7,7   11,23   26th - 31st   18,98   17,45   50,95   15,02   24,37   3,22   7,21   4,19   8,05   6,33   8,69   33,45   16,51   16,61   10,61   19,4   11,84   42,17   5,48   11,79   4,76   48,2   12,07   2,78   6,16   8,98   28,36   13,23   11th - 15th   5,74   11,84   42,17   5,48   11,79   4,76   48,2   12,07   2,78   6,16   8,98   28,56   13,23   11th - 15th   5,24   13,14   6,93   15,98   8,38   7,34   13,79   4,77   5,53   21,81   8,6   4,08   9,92   26th - 31st   13,47   14,16   6,11   17,61   6,73   6,71   15,19   3,51   5,51   10,44   15,24   4,25   9,80   18,48   10,04   24,03   9,79   5,53   3,19   7,26   3,09   2,78   2,															
1984															
6th - 10th		2001 - 3131	20.54	7.0	0.01	10.75	· ·	11.21	0.5	2.01	1.25	, 2.0	50.02	15.01	13.17
Gub - 10th   3.19   28.98   24.73   6.62   24.73   8.04   11.33   4.46   11.55   10.2   6.39   44.47   15.39     11th - 15th   14.45   13.05   29.99   8.87   36.17   7.25   7.62   3.43   14.49   4.69   11.28   18.37   14.14     16th - 20th   16.08   9.61   24.88   7.79   13.42   6.04   4.98   3.5   11.67   5.54   11.43   16.23   10.93     21st - 25th   16.33   6.64   44.2   10.14   9.18   7.22   6.4   3.24   10.14   5.35   8.25   7.7   11.23     26th - 31st   18.98   17.45   50.95   15.02   24.37   3.22   7.21   4.19   8.05   6.33   8.69   33.45   16.51     1985   1st - 5th   21.96   11.95   13.08   4.25   15.15   5.23   4.75   12.42   2.74   4.04   9.46   33.72   11.56     6th - 10th   19.4   11.84   42.17   5.48   11.79   4.76   4.82   12.07   2.78   6.16   8.98   28.55   13.23     11th - 15th   3.745   14.6   63.283   10.57   9.33   5.76   5.32   7.34   10.2   13.03   9.98   9.88   13.84     16th - 20th   12.81   7.56   11.11   21.81   7.82   7.11   5.69   6.28   7.87   16.73   6.94   4.41   9.68     21st - 25th   27.18   13.47   14.16   5.11   17.61   6.73   6.71   15.19   3.51   5.15   10.44   15.24   4.25   9.80      1986   1st - 5th   51.11   28.46   11.96   24.45   12.69   5.92   2.81   6.07   1.89   5.78   21.24   11.94   12.54     6th - 10th   48.59   18.48   10.04   24.03   9.79   5.53   3.19   7.26   6.65   5.96   23.06   22.26   13.07     21st - 25th   25.19   20.85   6.83   17.98   9.8   5.06   4.65   8.59   5.97   8.81   53.45   14.23   17.78     16th - 20th   26.19   20.85   6.83   17.98   9.4   5.17   3.21   5.66   6.65   9.6   23.06   22.26   13.07     21st - 25th   11.51   17.83   36.57   15.28   3.66   4.65   8.59   5.97   8.81   53.45   14.23   17.78     16th - 10th   44.13   28.18   36.32   15.59   17.38   7.01   4.13   2.14   1.13   1.13   2.66   3.34   13.55     16th - 10th   41.13   21.13   3.76   8.67   5.28   3.66   4.65   2.99   1.22   1.16   1.54   1.95     1987   1st - 5th   11.51   17.83   36.52   15.69   17.38   7.59   2.45   2.89   2.81   5.79   7.32   14.39     16th - 10th	1984	1st - 5th	13.13	17.21	13.6	27.51	13.54	14.43	5.3	5.79	3.86	24.07	3.73	46.23	15.70
11th - 15th								8.04	11.33	4.46	11.56	10.2	6.39	44.47	15.39
16th - 20th   16.08   9.61   24.88   7.79   13.42   6.04   4.98   3.5   11.67   5.54   11.43   16.23   10.93     21st - 25th   61.33   6.64   44.2   10.14   9.18   7.22   24.37   3.22   7.21   4.19   8.05   6.53   8.69   33.45   16.51     1985   1st - 5th   21.96   11.95   13.08   4.25   15.15   5.23   4.75   12.42   2.74   4.04   9.46   33.72   11.56     6th - 10th   19.4   11.84   42.17   5.48   11.79   4.76   4.82   12.07   2.78   6.16   6.98   28.55   13.23     11th - 15th   37.45   14.6   32.83   10.57   9.33   5.76   5.32   7.34   10.2   13.03   9.98   9.68   13.43     16th - 20th   12.81   7.56   11.11   21.81   7.82   7.11   5.69   6.28   7.87   16.73   6.94   4.41   9.68     21st - 25th   8.72   13.14   6.93   15.98   8.38   7.34   13.79   4.77   5.53   21.81   8.6   4.08   9.92     26th - 31st   13.47   14.16   5.11   17.61   6.73   6.71   15.19   3.51   5.15   10.44   15.24   4.25   9.80     1986   1st - 5th   15.11   28.46   11.96   24.45   12.69   5.92   2.81   6.07   1.89   7.88   21.24   11.94   12.54     6th - 10th   48.59   18.48   10.04   24.03   9.79   5.53   3.19   7.26   3.09   5.27   32.92   4.67   14.41     11th - 15th   5.12   24.43   8.07   18.98   9.8   5.06   4.65   8.59   5.97   8.81   53.45   14.23   17.78     16th - 20th   26.19   20.85   6.83   17.98   9.4   5.17   3.21   5.66   6.65   9.6   23.06   22.26   13.07     21st - 25th   31   31.37   33.637   11.65   22.55   6.91   5.4   2.92   1.22   1.16   1.54   1.95   10.08     6th - 10th   44.13   28.18   36.32   15.09   17.38   7.01   4.13   2.14   1.13   1.13   2.66   3.34   13.55     10th - 10th   44.13   28.18   36.32   15.09   17.38   7.63   3.32   2.46   1.32   2.13   2.25   2.25   2.25   2.25   6.91   5.4   2.92   1.22   1.16   1.54   1.95   10.08     6th - 10th   1.94   48.07   4		11th - 15th				8.87	36.17	7.25	7.62	3.43	14.49	4.69	11.28	18.37	14,14
26th - 31st   18.98   17.45   50.95   15.02   24.37   3.22   7.21   4.19   8.05   6.53   8.69   33.45   16.51     185		16th - 20th	16.08	9.61	24.88	7.79	13.42	6.04	4.98	3.5	11.67	5.54	11.43	16.23	10.93
1885		21st - 25th	16.33	6.64	44.2	10.14	9.18	7.22	6.4	3.24	10.14	5.35	8.25	7.7	11.23
6th - 10th         19.4         11.84         42.17         5.48         11.79         4.76         4.82         12.07         2.78         6.16         8.98         28.56         13.23           11th - 15th         37.45         14.6         32.83         10.57         9.33         5.76         5.32         7.34         10.2         13.03         9.98         9.68         13.84           15th - 20th         12.81         7.56         11.11         21.81         7.82         7.11         5.69         6.28         7.87         16.73         6.94         4.41         9.68           26th - 31st         13.47         14.16         5.11         17.61         6.73         6.71         15.19         3.51         5.15         10.44         12.24         4.25         9.80         6.71         15.19         3.51         5.15         10.44         4.25         9.80         6.71         15.19         3.51         5.15         10.44         4.25         9.80         6.71         15.19         3.51         10.44         4.25         9.80         6.71         13.19         7.55         3.09         7.22         3.22         4.67         14.41         11.11         11.11         11.11		26th - 31st	18.98	17.45	50.95	15.02	24,37	3.22	7.21	4.19	8.05	6.53	8.69	33.45	16.51
6th - 10th         19.4         11.84         42.17         5.48         11.79         4.76         4.82         12.07         2.78         6.16         8.98         28.56         13.23           11th - 15th         37.45         14.6         32.83         10.57         9.33         5.76         5.32         7.34         10.2         13.03         9.98         9.68         13.84           15th - 20th         12.81         7.56         11.11         21.81         7.82         7.11         5.69         6.28         7.87         16.73         6.94         4.41         9.68           26th - 31st         13.47         14.16         5.11         17.61         6.73         6.71         15.19         3.51         5.15         10.44         12.24         4.25         9.80         6.71         15.19         3.51         5.15         10.44         4.25         9.80         6.71         15.19         3.51         5.15         10.44         4.25         9.80         6.71         15.19         3.51         10.44         4.25         9.80         6.71         13.19         7.55         3.09         7.22         3.22         4.67         14.41         11.11         11.11         11.11	1007	1 . 54.	21.04	11.06	13.00	4.05	15.15	5 22	A 75	10.40	224	4.04	0.46	22.72	11 86
11th - 15th   37,45   14.6   32,83   10.57   9.33   5.76   5.52   7.34   10.2   13.03   9.98   9.68   13.84   16th - 20th   12.81   7.56   11.11   21.81   7.82   7.11   5.69   6.28   7.87   16.73   6.94   4.41   9.68   21st - 25th   8.72   13.14   6.93   15.98   8.38   7.34   13.79   4.77   5.53   21.81   8.6   4.08   9.92   26th - 31st   13.47   14.16   5.11   17.61   6.73   6.71   15.19   3.51   5.15   10.44   15.24   4.25   9.80    1986   1st - 5th   15.11   28.46   11.96   24.45   12.69   5.92   2.81   6.07   1.89   7.88   21.24   11.94   12.54   6th - 10th   48.59   18.48   10.04   24.03   9.79   5.53   3.19   7.26   3.09   5.27   32.92   4.67   14.41   11th - 15th   51.29   24.43   8.07   18.98   9.8   5.06   4.65   8.59   5.97   8.81   53.45   14.23   17.78   16th - 20th   26.19   20.85   6.83   17.98   9.4   5.17   3.21   5.66   6.65   9.6   23.06   22.26   13.07   21st - 25th   53.9   17.23   29.23   11.07   5.97   5.94   2.49   2.89   6.82   6.08   9.45   11.96   13.59   26th - 31st   51.05   13.74   53.76   8.67   5.28   3.66   4.93   2.31   9.29   15.9   12.24   7.32   15.68    1987   1st - 5th   11.51   17.83   36.37   11.65   22.55   6.91   5.4   2.92   1.22   1.16   1.54   1.95   10.08   6th - 10th   44.13   28.18   36.32   15.09   17.38   7.01   4.13   2.14   1.13   1.13   2.66   3.34   13.55   11th - 15th   61.24   25.46   19.54   15.66   19.87   7.63   3.32   2.36   1.13   2.15   5.31   9.12   26th - 31st   20.56   44.32   10.85   11.22   7.99   6.11   3.17   1.28   1.13   1.15   5.31   9.12   104th - 20th   3.42   20.36   8.49   15.64   6.83   7.59   2.46   1.82   1.13   1.15   2.53   3.29   13.2   10.11   26th - 31st   20.56   44.32   10.85   11.22   7.99   6.11   3.17   1.28   1.13   1.55   2   7.33   9.79    1988   1st - 5th   3.34   38.29   15.24   47.82   17.99   7.23   4.65   2.39   2.01   3.32   3.36   15.35   11th - 15th   1.96   34.22   15.25   16.91   15.6   14.51   2.11   3.48   3.47   2.61   13.72   31.22   12.92   16th - 20th   4.87   50.13   14.61   16.79   21.4   12.64   2.49	1980														
16th - 20th   12.81   7.56   11.11   21.81   7.82   7.11   5.69   6.28   7.87   16.73   6.94   4.41   9.68   21st - 25th   8.72   13.14   6.93   15.98   8.38   7.34   13.79   4.77   5.53   21.81   8.6   4.08   9.92   26th - 31st   13.47   14.16   5.11   17.61   6.73   6.71   15.19   3.51   5.15   10.44   15.24   4.25   9.80   18.48   10.04   24.03   9.79   5.53   3.19   7.26   3.09   5.27   32.92   4.67   14.41   11th - 15th   51.29   24.43   8.07   18.98   9.8   5.06   4.65   8.59   5.97   8.81   53.45   14.23   17.78   16th - 20th   26.19   20.85   6.83   17.98   9.4   5.17   32.1   5.66   6.65   9.6   6.55   9.6   23.06   22.26   13.07   21st - 25th   53.9   17.23   29.23   11.07   5.97   5.94   2.49   2.89   6.82   6.08   9.45   11.96   13.59   26th - 31st   51.05   13.74   53.76   8.67   5.28   3.66   4.93   2.31   9.29   15.9   12.24   7.32   15.68   11th - 15th   61.24   25.46   19.54   16.16   19.87   7.63   3.32   2.36   1.13   2.15   5.35   1.13   2.66   3.34   13.55   13.14   2.14   1.15   17.83   36.32   15.09   17.38   7.01   4.13   2.14   1.13   2.15   5.31   9.12   1.14   1.15   2.14   2.14   2.14   2.14   2.15   2.															
21st - 25th   8.72   13.14   6.93   15.98   8.38   7.34   13.79   4.77   5.53   21.81   8.6   4.08   9.92															
1986															
1986															
6th - 10th															
11th - 15th   51.29   24.43   8.07   18.98   9.8   5.06   4.65   8.59   5.97   8.81   53.45   14.23   17.78     16th - 20th   26.19   20.85   6.83   17.98   9.4   5.17   3.21   5.66   6.65   9.6   23.06   22.26   13.07     21st - 25th   53.9   17.23   29.23   11.07   5.97   5.94   2.49   2.89   6.82   6.08   9.45   11.96   13.59     26th - 31st   51.05   13.74   53.76   8.67   5.28   3.66   4.93   2.31   9.29   15.9   12.24   7.32   15.68    1987   1st - 5th   11.51   17.83   36.37   11.65   22.55   6.91   5.4   2.92   1.22   1.16   1.54   1.95   10.08     6th - 10th   44.13   28.18   36.32   15.09   17.38   7.01   4.13   2.14   1.13   1.13   2.66   3.34   13.55     11th - 15th   61.24   25.46   19.54   16.16   19.87   7.63   3.32   2.36   1.13   2.81   5.79   7.32   14.39     16th - 20th   34.2   20.36   8.49   15.64   16.83   7.59   2.46   1.82   1.13   2.15   5.31   9.12     26th - 31st   20.56   44.32   10.85   11.22   7.99   6.1   3.17   1.28   1.13   1.55   2   7.33   9.79    1988   1st - 5th   3.34   38.29   15.24   47.82   17.99   7.23   4.65   2.39   2.01   3.32   8.32   33.61   15.35     6th - 10th   1.79   48.05   24.94   23.5   19.95   13.23   3.18   4.39   2.65   2.67   10.41   21.84   14.72     11th - 15th   1.96   34.22   15.25   16.91   15.6   14.51   2.11   3.48   3.47   2.61   13.72   31.22   12.92     16th - 20th   4.87   50.13   14.61   16.79   21.4   12.64   2.49   3.21   3.06   4.65   12.61   58.7   17.10     21st - 25th   7.52   25.29   16.7   19.45   17.94   10.34   2.14   3.43   3   5.25   18.37   28.63   13.17     26th - 31st   15.99   7.87   22.49   14.13   8.59   7.25   2.22   2.23   2.89   4.98   31.08   14.3   11.17    1989   1st - 5th   10.35   9.84   57.46   7.82   7.82   7.82   9.29   6.28   1.79   2.39   2.67   3.33   6.51   11.02     11th - 15th   6.52   24.09   21.83   7.82   7.82   9.29   6.28   1.79   2.39   2.67   3.33   6.51   11.02     11th - 15th   6.52   24.09   21.83   7.82   7.82   9.29   6.28   1.79   2.39   2.67   3.33   6.51   11.02     11th - 15th   6.52   24.0	1986	1st - 5th	15.11	28.46	11.96										
16th - 20th   26.19   20.85   6.83   17.98   9.4   5.17   3.21   5.66   6.65   9.6   23.06   22.26   13.07     21st - 25th   53.9   17.23   29.23   11.07   5.97   5.94   2.49   2.89   6.82   6.08   9.45   11.96   13.59     26th - 31st   51.05   13.74   53.76   8.67   5.28   3.66   4.93   2.31   9.29   15.9   12.24   7.32   15.68     1987   1st - 5th   11.51   17.83   36.37   11.65   22.55   6.91   5.4   2.92   1.22   1.16   1.54   1.95   10.08     6th - 10th   44.13   28.18   36.32   15.09   17.38   7.01   4.13   2.14   1.13   1.13   2.66   3.34   13.55     11th - 15th   61.24   25.46   19.54   16.16   19.87   7.63   3.32   2.36   1.13   2.81   57.9   7.32   14.39     16th - 20th   34.2   20.36   8.49   15.64   16.83   7.59   2.46   1.82   1.13   2.15   5.31   9.12   10.43     21st - 25th   21.03   42.99   10.47   6.91   8.75   6.91   2.56   1.53   1.13   2.53   3.29   13.2   10.11     26th - 31st   20.56   44.32   10.85   11.22   7.99   6.1   3.17   1.28   1.13   1.55   2   7.33   9.79     1988   1st - 5th   3.34   38.29   15.24   47.82   17.99   7.23   4.65   2.39   2.01   3.32   8.32   33.61   15.35     6th - 10th   1.79   48.05   24.94   23.5   19.95   13.23   3.18   4.39   2.65   2.67   10.41   21.84   14.72     11th - 15th   1.96   34.22   15.25   16.91   15.6   14.51   2.11   3.48   3.47   2.61   13.72   31.22   12.92     16th - 20th   4.87   50.13   14.61   16.79   21.4   12.64   2.49   3.21   3.06   4.65   12.61   58.7   17.10     21st - 25th   7.52   25.29   16.7   19.45   17.94   10.34   2.14   3.43   3   5.25   18.37   28.63   13.17     26th - 31st   15.99   7.87   22.49   14.13   8.59   7.25   2.22   2.23   2.89   4.98   31.08   14.3   11.17     1989   1st - 5th   10.35   9.84   57.46   7.82   7.82   9.29   6.28   1.79   2.39   2.67   3.33   6.51   11.02     11th - 15th   6.52   24.09   21.83   7.82   7.82   9.29   6.28   1.79   2.39   2.67   3.33   6.51   11.02     11th - 15th   6.52   24.09   21.83   7.82   7.82   9.29   6.28   1.79   2.39   2.67   3.33   6.51   11.02     11th - 15th   6.52   2		6th - 10th	48.59	18.48	10.04	24.03	9.79		3.19						
21st - 25th		11th - 15th	51.29	24.43	8.07		9,8								
1987   1st - 5th   11.51   17.83   36.37   11.65   22.55   6.91   5.4   2.92   1.22   1.16   1.54   1.95   10.08															
1987 1st - 5th 11.51 17.83 36.37 11.65 22.55 6.91 5.4 2.92 1.22 1.16 1.54 1.95 10.08 6th - 10th 44.13 28.18 36.32 15.09 17.38 7.01 4.13 2.14 1.13 1.13 2.66 3.34 13.55 11th - 15th 61.24 25.46 19.54 16.16 19.87 7.63 3.32 2.36 1.13 2.81 5.79 7.32 14.39 16th - 20th 34.2 20.36 8.49 15.64 16.83 7.59 2.46 1.82 1.13 2.15 5.31 9.12 10.43 21st - 25th 21.03 42.99 10.47 6.91 8.75 6.91 2.56 1.53 1.13 2.53 3.29 13.2 10.11 26th - 31st 20.56 44.32 10.85 11.22 7.99 6.1 3.17 1.28 1.13 1.55 2 7.33 9.79 1988 1st - 5th 3.34 38.29 15.24 47.82 17.99 7.23 4.65 2.39 2.01 3.32 8.32 33.61 15.35 6th - 10th 1.79 48.05 24.94 23.5 19.95 13.23 3.18 4.39 2.65 2.67 10.41 21.84 14.72 11th - 15th 1.96 34.22 15.25 16.91 15.6 14.51 2.11 3.48 3.47 2.61 13.72 31.22 12.92 16th - 20th 4.87 50.13 14.61 16.79 21.4 12.64 2.49 3.21 3.06 4.65 12.61 58.7 17.10 21st - 25th 7.52 25.29 16.7 19.45 17.94 10.34 2.14 3.43 3 5.25 18.37 28.63 13.17 26th - 31st 15.99 7.87 22.49 14.13 8.59 7.25 2.22 2.23 2.89 4.98 31.08 14.3 11.17 1989 1st - 5th 10.35 9.84 57.46 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.3 10.52 2.26 4.34 2.19 5.15 9.45 9.27 16th - 20th 8.52 74.81 18.76 7.82 7.82 9.3 10.52 2.26 4.34 2.19 5.15 9.45 9.27 16th - 20th 8.52 74.81 18.76 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01															
6th - 10th		26th - 31st	51.05	13.74	53.76	8.67	5.28	3.66	4.93	2.31	9.29	15.9	12.24	7.32	15.68
6th - 10th	1097	1 or 5sh	1151	17 02	26.17	11.65	22.55	6.01	5 4	2 02	1 22	1 16	1.54	1 05	10.08
11th - 15th 61.24 25.46 19.54 16.16 19.87 7.63 3.32 2.36 1.13 2.81 5.79 7.32 14.39 16th - 20th 34.2 20.36 8.49 15.64 16.83 7.59 2.46 1.82 1.13 2.15 5.31 9.12 10.43 21st - 25th 21.03 42.99 10.47 6.91 8.75 6.91 2.56 1.53 1.13 2.53 3.29 13.2 10.11 26th - 31st 20.56 44.32 10.85 11.22 7.99 6.1 3.17 1.28 1.13 1.55 2 7.33 9.79 1988    1st - 5th 3.34 38.29 15.24 47.82 17.99 7.23 4.65 2.39 2.01 3.32 8.32 33.61 15.35 6th - 10th 1.79 48.05 24.94 23.5 19.95 13.23 3.18 4.39 2.65 2.67 10.41 21.84 14.72 11th - 15th 1.96 34.22 15.25 16.91 15.6 14.51 2.11 3.48 3.47 2.61 13.72 31.22 12.92 16th - 20th 4.87 50.13 14.61 16.79 21.4 12.64 2.49 3.21 3.06 4.65 12.61 58.7 17.10 21st - 25th 7.52 25.29 16.7 19.45 17.94 10.34 2.14 3.43 3 5.25 18.37 28.63 13.17 26th - 31st 15.99 7.87 22.49 14.13 8.59 7.25 2.22 2.23 2.89 4.98 31.08 14.3 11.17 1989 1st - 5th 10.35 9.84 57.46 7.82 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 6.35 12.33 1.44 5.45 1.89 4.85 10.6 13.39 21st - 25th 9.03 30.83 10.8 7.82 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01	1707	6th 10th													
16th - 20th															
21st - 25th 21.03 42.99 10.47 6.91 8.75 6.91 2.56 1.53 1.13 2.53 3.29 13.2 10.11 26th - 31st 20.56 44.32 10.85 11.22 7.99 6.1 3.17 1.28 1.13 1.55 2 7.33 9.79 1988    1st - 5th 3.34 38.29 15.24 47.82 17.99 7.23 4.65 2.39 2.01 3.32 8.32 33.61 15.35 6th - 10th 1.79 48.05 24.94 23.5 19.95 13.23 3.18 4.39 2.65 2.67 10.41 21.84 14.72 11th - 15th 1.96 34.22 15.25 16.91 15.6 14.51 2.11 3.48 3.47 2.61 13.72 31.22 12.92 16th - 20th 4.87 50.13 14.61 16.79 21.4 12.64 2.49 3.21 3.06 4.65 12.61 58.7 17.10 21st - 25th 7.52 25.29 16.7 19.45 17.94 10.34 2.14 3.43 3 5.25 18.37 28.63 13.17 26th - 31st 15.99 7.87 22.49 14.13 8.59 7.25 2.22 2.23 2.89 4.98 31.08 14.3 11.17 1989 1st - 5th 10.35 9.84 57.46 7.82 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 20th 8.52 74.81 18.76 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 20th 8.52 74.81 18.76 7.82 7.82 9.3 10.52 2.26 4.34 2.19 5.15 9.45 9.27 16th - 20th 8.52 74.81 18.76 7.82 7.82 6.35 12.33 1.44 5.45 1.89 4.85 10.6 13.39 21st - 25th 9.03 30.83 10.8 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01															
26th - 31st 20.56 44.32 10.85 11.22 7.99 6.1 3.17 1.28 1.13 1.55 2 7.33 9.79  1988															
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6th - 10th															
11th - 15th	1988														
16th - 20th															
21st - 25th 7.52 25.29 16.7 19.45 17.94 10.34 2.14 3.43 3 5.25 18.37 28.63 13.17 26th - 31st 15.99 7.87 22.49 14.13 8.59 7.25 2.22 2.23 2.89 4.98 31.08 14.3 11.17 1989 1st - 5th 10.35 9.84 57.46 7.82 7.82 7.63 3.17 2.67 3.89 3.17 3.88 5.28 10.25 6th - 10th 7.94 36.72 39.68 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.3 10.52 2.26 4.34 2.19 5.15 9.45 9.27 16th - 20th 8.52 74.81 18.76 7.82 7.82 6.35 12.33 1.44 5.45 1.89 4.85 10.6 13.39 21st - 25th 9.03 30.83 10.8 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01															
26th - 31st 15.99 7.87 22.49 14.13 8.59 7.25 2.22 2.23 2.89 4.98 31.08 14.3 11.17  1989 1st - 5th 10.35 9.84 57.46 7.82 7.82 7.63 3.17 2.67 3.89 3.17 3.88 5.28 10.25 6th - 10th 7.94 36.72 39.68 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.3 10.52 2.26 4.34 2.19 51.5 9.45 9.27 16th - 20th 8.52 74.81 18.76 7.82 7.82 6.35 12.33 1.44 5.45 1.89 4.85 10.6 13.39 21st - 25th 9.03 30.83 10.8 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01															
1989															
6th - 10th 7.94 36.72 39.68 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.3 10.52 2.26 4.34 2.19 5.15 9.45 9.27 16th - 20th 8.52 74.81 18.76 7.82 7.82 6.35 12.33 1.44 5.45 1.89 4.85 10.6 13.39 21st - 25th 9.03 30.83 10.8 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01		20th - 31st	15.99	7.87	42.49	14.13	8.59	7.25	2.22	2.25	2.89	4.98	31.08	14.5	11.17
6th - 10th 7.94 36.72 39.68 7.82 7.82 9.29 6.28 1.79 2.39 2.67 3.33 6.51 11.02 11th - 15th 6.52 24.09 21.83 7.82 7.82 9.3 10.52 2.26 4.34 2.19 5.15 9.45 9.27 16th - 20th 8.52 74.81 18.76 7.82 7.82 6.35 12.33 1.44 5.45 1.89 4.85 10.6 13.39 21st - 25th 9.03 30.83 10.8 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01	1080	1st - 5th	10.35	9.84	57 46	7.82.	7 82	7.63	3.17	2.67	3.89	3.17	3.88	5.28	10.25
11th - 15th 6.52 24.09 21.83 7.82 7.82 9.3 10.52 2.26 4.34 2.19 5.15 9.45 9.27 16th - 20th 8.52 74.81 18.76 7.82 7.82 6.35 12.33 1.44 5.45 1.89 4.85 10.6 13.39 21st - 25th 9.03 30.83 10.8 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01	1707														
16th - 20th     8.52     74.81     18.76     7.82     7.82     6.35     12.33     1.44     5.45     1.89     4.85     10.6     13.39       21st - 25th     9.03     30.83     10.8     7.82     7.82     3.75     8.72     1.63     3.54     2.01     5.35     9.9     8.43       26th - 31st     7.36     82.69     7.54     7.82     7.82     3.24     4.44     2.46     1.93     4.69     4.05     10.03     12.01															
21st - 25th 9.03 30.83 10.8 7.82 7.82 3.75 8.72 1.63 3.54 2.01 5.35 9.9 8.43 26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01															
26th - 31st 7.36 82.69 7.54 7.82 7.82 3.24 4.44 2.46 1.93 4.69 4.05 10.03 12.01	-														
	Mean												19.09	23.30	14.36

Table F-32 Five (5)-day Mean Inflow Discharge at Krenceng Dam Site

V	ar Period (day)	Ton	Pah	Man	A	Man	T							m3/sec)
1980		Jan. 0.27	Feb. 0.43	<u>Mar,</u> 0.34	<u> Apr.</u>	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Main
1980	6th - 10th	0.27			0.14	0.25	0.26	0.09	0.27	0.53	0.25	0.41	0.11	0.28
				0.53	0.15	0.22	0.13	0.09	0.43	0.46	0.28	0.23	0.15	0.35
	11th - 15th	0.68		0.36	0.66	0.25	0.17	0.1	0.66	0.74	0.28	0.29	0.12	0.45
	16th - 20th	0.67		0.38	0.23	0.24	0.11	0.12	0.87	0.26	0.19	0.73	0.41	0.50
	21st - 25th	0.67		0.16	0.39	0.17	0.14	0.11	0.12	0.18	0.28	0.17	1.23	0.39
	26th - 31st	0.76	0.54	0.21	0.25	0.12	0.12	0.12	0.1	0.33	0.22	0.15	1.23	0.35
1981	1st - 5th	3.96	0.92	1.52	0.32	0.49	0.15	0.14	0.38	0.42	0.77	0.32	. 0.71	0.84
	6th - 10th	2.72	0.81	0.77	0.37	0.38	0.13	0.13	0.4	0.39	0.77	0.64	0.46	0.66
	11ւհ - 15ւհ	1.65	1.19	1.18	0.22	0.48	0.28	0.49	0.24	1.09	0.59	0.97	0.39	0.73
	16th - 20th	0.96	1.19	0.74	0.31	0.67	0.47	0.74	0.34	0.26	0.25	2.28	0.39	
	21st - 25th	0.68	1.07	0.39	0.32	0.25	0.21	0.82	0.34	0.23	0.28	0.4	0.78	0.72
	26th - 31st	0.95	2.88	0.6	0.24	0.19	0.27	1.29	0.23	0.36	0.42	1.07	1.49	0.48 0.83
1982	1st - 5th	0.9	1.1	0.68	0.64	0.55	0.57	0.19	0.25	0.11	0.15	0.00	٥.	
	6th - 10th	2.07	0.52	0.86	0.52	0.49	0.43	0.15	0.23	0.11	0.15	0.09	0.1	0.44
	11th - 15th	3.25	0.67	1.4	0.49	0.38	0.31	0.15	0.19		0.1	0.15	0.09	0.47
	16th - 20th	2.09	0.51	1.36	0.8	0.26	0.26	0.13	0.07	0.1	0.1	0.14	0.1	0.60
	21st - 25th	1.49	0.41	1.02	0.53	0.26	0.17			0.1	0.23	0.14	0.1	0.53
	26th - 31st	1.06	0.5	0.8	0.76	0.20	0.17	0.4 0.39	0.05 0.04	0.09 0.12	0.11 0.1	0.14 0.13	0.11 0.24	0.40 0.39
1002	1 51	0.40	0.5								0,1	0.15	0.24	0.39
1983	1st - 5th 6th - 10th	0.43 0.25	0.5	1 0.45	0.43	0.58	0.34	0.36	0.05	0.01	0.01	0.09	0.86	0.39
	11th - 15th		0.51	0.45	0.68	1.07	2.24	0.05	0.04	0.02	0	0.18	0.83	0.53
		0.18	0.13	0.36	0.14	0.66	0.84	0.04	0.03	0.02	0	0.02	0.27	0.22
•	16th - 20th	0.28	0.32	0.15	0.31	0.65	0.5	0.11	0.03	0.03	0.01	1.08	0.18	0.30
	21st - 25th	0.75	0.19	0.16	1.37	0.41	0.28	0.1	0.06	0.02	0.09	3.17	0.13	0.56
	26th - 31st	0.11	1.02	0.6	1.04	0.53	0.62	0.12	0.02	0.01	0.09	9.05	0.15	1.11
1984	1st - 5th	0.28	1.06	0.87	0.41	1.16	0.46	0.56	0.2	0.26	1.1	0.34	0.24	0.58
	6th - 10th	0.54	0.79	2.34	0.56	0.98	0.38	0.39	0.16	0.9	0.31	0.19	0.2	0.65
	11th - 15th	0.19	0.92	3.27	0.37	0.52	0.5	0.21	0.36	0.93	0.52	0.19	0.34	0.69
	16th - 20th	0.3	1.84	2.14	0.56	0.35	0.48	0.19	0.22	0.63	0.42	0.43	0.27	0.65
	21st - 25th	2.07	1.67	4.11	0.42	0.55	0.32	0.38	0.2	0.42	0.5	0.33	0.23	0.03
	26th - 31st	3.25	1.33	3.9	1.06	0.43	0.23	0.34	0.36	0.97	0.26	0.18	0.75	1.09
1985	Ist - 5th	0.26	0.23	0.39	0.25	0.24	0.14	0.16	0.58	0.09	0.07	0.10	0.5	0.40
	6th - 10th	0.94	0.2	0.88	0.35	0.18	0.19	0.10			0.27	0.19	0.7	0.29
	11th - 15th	0.27	0.17	0.33	0.57	0.2	0.12		0.22	0.19	0.24	0.34	0.28	0.36
	16th - 20th	0.2	0.11	0.35	1.33	0.14		0.39	0.14	0.13	0.16	0.14	0.11	0.23
	21st - 25th	0.28	0.42	0.18	0.41		0.13	0.4	0.14	0.11	0.78	0.1	0.18	0.33
-	26th - 31st	0.45	0.42	0.18	0.41	0.12 0.18	0.49 0.13	0.62	0.11 0.13	0.1 0.22	0.16 0.15	0.14 0.24	0.28 0.22	0.28 0.23
1000									0.10	0.22	0.15	0.24	0.22	0.23
1986	1st - 5th	0.18	0.78	0.61	0.68	0.24	0.14	0.22	0.11	0.14	0.41	0.24	0.14	0.32
	6th - 10th	1.94	0.64	0.37	0.49	0.36	0.25	0.21	0.12	0.33	0.29	0.46	0.11	0.46
	11th - 15th	0.68	1.11	0.55	0.64	0.39	0.51	0.7	0.36	0.32	0.16	0.39	0.51	0.53
	16th - 20th	0.99	0.39	0.44	0.38	0.19	0.21	0.34	0.16	0.17	0.15	0.57	0.65	0.39
	21st - 25th	2.78	0.53	0.41	0.3	0.25	0.12	0.19	0.11	0.12	0.1	0.24	0.15	0.44
	26th - 31st	1.76	0.58	0.29	0.49	0.2	0.14	0.27	0.15	0.14	0.58	0.43	0.22	0.44
1987	1st - 5th	0.37	0.32	0.58	0.29	0.46	0.2	0.14	0.1	0.09	0.09	0.1	0.1	0.24
	6ւհ - 10ւհ	1.42	0.87	0.33	0.23	0.61	0.23	0.12	0.09	0.09	0.09	0.24	0.11	0.24
	11th - 15th	1.13	0.35	0.25	0.24	0.43	0.31	0.1	0.09	0.09	0.09	0.13	0.11	0.37
	16th - 20th	0.41	0.46	0.22	0.23	0.34	0.18	0.1	0.09	0.09	0.09			
	21st - 25th	0.53	0.3	0.29	0.21	0.17	0.18	0.1	0.09			0.09	0.66	0.25
	26th - 31st	0.57	1.78	0.31	0.72	0.17	0.15	0.1	0.09	0.09 0.09	0.09 0.09	0.09 0.09	0,14 0.09	0.19 0.35
1988	1st - 5th	0.09	2.02	0.10	0.27	0.10	0.10							
1700			2.92	0.19	0.37	0.13	0.18	0.19	0.11	0.09	0.09	0.64	0.12	0.43
	6th - 10th	0.17	2.02	0.16	0.22	0.11	0.12	0.13	0.12	0.09	0.09	0.21	0.12	0.30
	11th - 15th	0.17	0.37	0.15	0.17	0.13	0.11	0.08	0.14	0.09	0.51	0.16	0.88	0.25
	16th - 20th	0.27	0.18	0.15	0.16	0.16	0.09	0.1	0.12	0.09	0.32	0.11	0.21	0.16
	21st - 25th	0.19	0.16	0.19	0.19	0.13	0.09	0.08	0.11	0.09	0.15	0.12	0.09	0.13
	26th - 31st	0.77	0.16	0.17	0.14	0.1	0.09	0.09	0.1	0.09	0.36	0.11	0.09	0.19
1989	1st - 5th	0.09	0.5	0.8	0.08	0.05	0.04	0.13	0.14	0.12	0.09	0.09	0.09	0.19
	6th - 10th	0.1	0.5	0.69	0.0	0.03	0.16	0.13	0.14	0.12	0.09	0.09	0.09	0.19
	11th - 15th	0.13	0.21	0.51	0.1	0.02	0.21	0.14	0.14	0.10	0.09	0.09	1.14	0.24
	16th - 20th	0.14	0.62	0.24	0.04	0.03	0.18	0.13	0.14	0.12	0.09	0.09		
	21st - 25th	0.27	1.75	0.08	0.03	0.04	0.18	0.13	0.14	0.09	0.09		0.38	0.18
	26th - 31st	0.16	1.49	0.1	0.03	0.04	0.18	0.12	0.13	0.09	0.09	0.09	0.17	0.25
Mean	***************************************	0.86	0.81	0.72	0.41	0.33	0.18	0.25	0.19			0.09	0.47	0.27
			V.V.	· · · · · ·	V. 11	17.23		U.4.J	0.19	0.23	0.25	0.50	0.36	0.43

Table F-33 Five (5)-day Mean Inflow Discharge at Beroeng Intake Weir Site

							E						(Unit:	m3/sec)
Year	Period (day)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean
1980	1st - 5th	0.25	0.39	0.31	0.13	0.23	0.23	0.08	0.25	0.48	0.23	0.38	0.1	0.26
	6th - 10th	0.42	1.01	0.48	0.14	0.2	0.12	0.08	0.39	0.41	0.26	0.21	0.14	0.32
	11th - 15th	0.62	1.03	0.33	0.6	0.23	0.16	0.09	0.6	0.67	0.26	0.27	0.11	0.41
	16th - 20th	0.61	1.64	0.34	0.21	0.22	0.1	0.11	0.79	0.23	0.17	0.66	0.37	0.45
	21st - 25th	0.61	0.97	0.15	0.36	0.15	0.12	0.1	0.11	0.17	0.25	0.16	1.12	0.36
	26th - 31st	0.69	0.49	0.19	0.23	0.11	0.11	0.11	0.09	0.3	0.2	0.13	1.12	0.31
1981	1st - 5th	3.61	0.84	1.38	0.29	0.45	0.14	0.13	0.35	0.38	0.7	0.29	0.65	0.77
	6th - 10th	2.48	0.73	0.7	0.34	0.34	0.12	0.12	0.36	0.36	0.7	0.58	0.41	0.60
	11th - 15th	1.5	1.09	1.07	0.2	0.44	0.26	0.45	0.22	0.99	0.54	0.88	0.35	0.67
	16th - 20th	0.88	1.08	0.68	0.28	0.61	0.43	0.67	0.31	0.24	0.22	2.07	0.35	0.65
	21st - 25th	0.62	0.98	0.35	0.29	0.22	0.19	0.75	0.31	0.21	0.26	0.36	0.71	0.44
	26th - 31st	0.86	2.62	0.54	0.22	0.17	0.25	1.18	0.21	0.33	0.38	0.97	1.35	0.76
1982	1st - 5th	0.82	1	0.61	0.58	0.5	0.52	0.17	0.23	0.1	0.13	0.08	0.09	0.40
	6th - 10th	1.88	0.47	0.78	0.48	0.45	0.39	0.14	0.17	0.1	0.09	0.13	0.08	0.43
	11th - 15th	2.96	0.61	1.28	0.45	0.34	0.28	0.14	0.08	0.09	0.09	0.13	0.09	0.55
	16ւհ - 20ւհ	1.9	0.47	1.24	0.73	0.24	0.24	0.35	0.06	0.09	0.21	0.13	0.09	0.48
	21st - 25th	1.35	0.37	0.93	0.48	0.24	0.16	0.36	0.05	0.08	0.1	0.12	0.1	0.36
	26th - 31st	0.97	0.45	0.73	0.69	0.29	0.24	0.35	0.03	0.11	0.09	0.12	0.22	0.36
1983	1st - 5th	0.39	0.46	0.91	0.39	0.53	0.31	0.32	0.04	0.01	0.01	0.09	0.78	0.35
1705	6th - 10th	0.23	0.46	0.41	0.62	0.97	2.04	0.05	0.03	0.02	0.01	0.17	0.75	0.48
	11th - 15th	0.17	0.12	0.33	0.13	0.6	0.76	0.04	0.03	0.02	ő	0.02	0.25	0.21
	16th - 20th	0.25	0.29	0.13	0.29	0.59	0.45	0.1	0.03	0.02	0.01	0.98	0.17	0.28
	21st - 25th	0.68	0.17	0.14	1.24	0.37	0.26	0.09	0.06	0.02	0.08	2.89	0.12	0.51
	26th - 31st	0.1	0.93	0.55	0.94	0.48	0.56	0.11	0.02	0.01	0.08	8.23	0.13	1.01
1984	1st - 5th	0.26	0.96	0.79	0.37	1.06	0.42	0.51	0.18	0.24	1	0.31	0.22	0.53
1704	6th - 10th	0.49	0.72	2.13	0.51	0.89	0.35	0.35	0.15	0.82	0.28	0.17	0.18	0.59
	11th - 15th	0.43	0.84	2.98	0.34	0.47	0.45	0.19	0.13	0.85	0.47	0.17	0.10	0.63
	16th - 20th	0.13	1.68	1.94	0.51	0.32	0.43	0.18	0.32	0.57	0.38	0.16	0.31	0.60
	21st - 25th	1.89	1.52	3.74	0.39	0.5	0.29	0.18	0.18	0.39	0.45	0.3	0.21	0.85
	26th - 31st	2.96	1.21	3.55	0.96	0.39	0.21	0.31	0.33	0.88	0.24	0.16	0.68	0.99
1005	1 Kob	0.24	0.01	0.26	0.22	Δ22 -	0.12	0.15	0.53	0.00	0.24	0.17	0.62	0.37
1985	1st - 5th	0.24	0.21	0.36	0.23	0.22	0.13	0.15	0.53	0.09	0.24	0.17	0.63	0.27
	6ւհ - 10ւհ	0.86	0.18	0.8	0.32	0.16	0.17	0.29	0.2	0.18	0.22	0.31	0.26	0.33
	11th - 15th	0.24	0.16	0.3	0.52	0.18	0.11	0.36	0.13	0.12	0.15	0.13	0.1	0.21
	16th - 20th	0.18	0.1	0.32	1.21	0.13	0.12	0.36	0.13	0.1	0.71	0.09	0.16	0.30
	21st - 25th	0.26	0.38	0.17	0.37	0.11	0.44	0.56	0.1	0.09	0.15	0.13	0.25	0.25
	26th - 31st	0.41	0.1	0.26	0.38	0.16	0.12	0.19	0.11	0.2	0.14	0.21	0.2	0.21
1986	Isi - 5th	0.16	0.71	0.55	0.62	0.21	0.13	0.2	0.1	0.13	0.38	0.22	0.12	0.29
	6th - 10th	1.77	0.58	0.34	0.44	0.33	0.23	0.19	0.11	0.3	0.27	0.42	0.1	0.42
	11th - 15th	0.62	1.01	0.5	0.58	0.35	0.46	0.64	0.32	0.29	0.14	0.35	0.47	0.48
	16th - 20th	0.9	0.35	0.4	0.35	0.17	0.19	0.31	0.14	0.15	0.13	0.52	0.6	0.35
	21st - 25th	2.53	0.48	0.37	0.27	0.23	0.11	0.17	0.1	0.11	0.09	0.22	0.13	0.40
	26th - 31st	1.6	0.53	0.27	0.44	0.18	0.12	0.25	0.14	0.13	0.53	0.39	0.2	0.40
1987	1st - 5th	0.34	0.29	0.53	0.26	0.41	0.18	0.13	0.09	0.08	0.08	0.09	0.09	0.21
	6th - 10th	1.29	0.79	0.3	0.21	0.55	0.21	0.1	0.08	0.08	0.08	0.22	0.1	0.33
	11th - 15th	1.03	0.32	0.23	0.22	0.39	0.28	0.09	0.08	0.08	0.08	0.12	0.14	0.26
	16th - 20th	0.37	0.42	0.2	0.21	0.31	0.16	0.09	0.08	0.1	0.08	0.08	0.6	0.23
	21st - 25th	0.48	0.27	0.27	0.19	0.16	0.17	0.09	0.08	0.08	0.08	0.08	0.13	0.17
	26th - 31st	0.51	1.62	0.28	0.66	0.16	0.14	0.09	0.08	0.08	0.08	0.08	0.08	0.32
1988	1st - 5th	0.08	2.66	0.17	0.34	0.12	0.16	0.17	0.1	0.09	0.08	0.58	0.11	0.39
	6ւհ - 10ւհ	0.15	1.84	0.15	0.2	0.1	0.11	0.12	0.11	0.08	0.08	0.19	0.11	0.27
	11th - 15th	0.15	0.33	0.14	0.15	0.12	0.1	0.07	0.13	0.08	0.46	0.14	0.8	0.22
	16th - 20th	0.24	0.16	0.13	0.15	0.14	0.08	0.09	0.11	0.08	0.29	0.1	0.19	0.15
	21st - 25th	0.17	0.15	0.17	0.18	0.12	80.0	0.07	0.1	80.0	0.14	0.11	0.08	0.12
	26th - 31st	0.7	0.14	0.16	0.13	0.1	0.08	0.08	0.09	0.08	0.32	0.1	0.08	0.17
1989	1st - 5th	0.08	0.46	0.73	0.08	0.04	0.04	0,12	0.13	0.11	0.08	0.08	0.08	0.17
1202	6th - 10th	0.09	0.46	0.63	0.1	0.04	0.15	0.12	0.17	0.15	80.0	0.08	0.08	0.18
	11th - 15th	0.12	0.19	0.03	0.09	0.03	0.19	0.12	0.17	0.13	0.08	0.08	0.08	0.14
	16th - 20th	0.12	0.19	0.21	0.03	0.02	0.16	0.13	0.13	0.08	0.08	0.09	0.09	0.14
•	21st - 25th	0.15	1.59	0.08	0.03	0.04	0.17	0.12	0.11	0.08	0.08	0.03	0.08	0.23
	26th - 31st	0.14	1.35	0.00	0.03	0.04	0.16	0.11	0.26	0.08	0.08	0.08	0.08	0.21
Mean	WORL - 0 10t	0.78	0.73	0.65	0.37	0.30	0.26	0.23	0.17	0.21	0.22	0.45	0.30	0.39
TATCOM		V-13	- Cr. 1 ,3		V-31	0.00		<u> </u>	V13.3	~~~	V-2020	~	<u> </u>	- 3137

Table F-34 (1) Reservoir Operation Study for Existing Krenceng Dam (1/12) Net supply yield: 1.94m3/sec.

	Spillout	0	0	•	0 0	0	0	0	ဂ	00	0	0	0	<b>&gt;</b> <	0	<u>ن</u>	90	0	0	00	0	00	0	00	90	00	9 0	0	0	00	0	00	00	9 0	00	0	00		00		00	00	0
Reservoir	water (evel (El-ra)	22.5	22.5	27.5	35	22.5	22.5	22.5	22.5	22.5	2,55	22.5	22.5	25.5	22.5	22.5	22.5	12	22.5	22.5	22.5	21.87	22.14	22.23	22.45	22.5	22.5	22.5	22.5 22.5	22.5	22.5	22.5 22.5	22.5	22.5	22.5	22.5	25 25 25	22.5	22.5	122	22.33	22.5 22.5 2.5	300
Krenceng	Storage	4,66	4.66	8.4	3 75	**************************************	4.66	4.66	4.66	8 4	8.4 8.4	4.66	9.4	8,4 8,8	4.66	4.66	60.4	8,4	4.66	4. 4. 8. 8.	4.66	4.08	4.32	4.41	4.61	4,66	4.66	4.66	4.66	4.66	8 4. 8 8.	6 4 4 8 6 6	4. 4 8. 4	8.4	4 4 8 8	4.66	8.4 8.4 8.4	3,4	8.4.4 8.4.4	4.66	4.56 6.56	4. 4. 8. 8.	4 66
Water	conveyance from Cida	0.74	990	8 5	75.0	0.63	99.0	0.37	0.36	0.07	0.5	0.7	0.62	~;o	0.78	0.91	0.79	0.57	0.75	0.74	0.74	0.18	0.86	0.86	0.86	48.0	0.8	0.79	0.81	0.81	8.0	0.96	47.0	0.57	0.48	0.98	0.62 28.0	0.53	27.0	0.71	0.63 0.63	0.83	27.0
Gvapo			8.8	0.02	000	0.02	0.01	10'0	0.01	0.01	0.0	0.01	0.01	0.0	0.01	0.01	0.0	10.0	0.01	000	0.01	0.0	0.0	0.01	0.0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	20.0	0.02	0.01	0.01	0.01	10.0	0.0	0.01	100
Supply	Actual	0.84	\$ 5	\$ 3 5 C	28	1,01	28.0	28.0	0.87	9.0	790	28:0	Q. Q.	3 3	0.84	1.01	48.5	80	0.84	2 2	0.84	o. c	4	0.84	18.0 18.0	0.84	\$ 50°	9.0 28.0 28.0	\$ <b>3</b>	20.0	* ** *** ***	2.0.5	28.0	28.0	2 2 2 3	101	0.84	28.0	0.84 48.0	28.0	3 35 3 35 3 35 3 35 3 35 3 35 3 35 3 35	2.0 28.0 28.28	ro v
harge	Cidanau	3.9	3.98	3.5	\$ 00 00 00 00 00 00 00 00 00 00 00 00 00	3.56	3.3	5.06	5.01	5.06 5.06	5.06	4.53	2. ž	14.02	2.29	1.74	27.7	6.5																	•					•		2.54 6.13	
Inflow discharge	Krenceng	0.12	0.2	800	80	0.39	0.19	0.48	0.49	0.78	61.0	0.15	623	51.9	0.07	0.11	800	0.28	0.1	0.17	0.11	0.09	0.11	0.07	0.11	90.0	0.05	0.06	9.50	8.5	0.05	0.03	0.12	0.28	0.38	0.05	200 200 200	0.32	0.11	0.14	0.11 0.12	0.12	c, o
Script No.	or 5 day period	1	М с	า ช	r V	·φ	• •••	61		** v	n vo		<i>(</i> 2 <i>(</i>	v) ∢	· vn	φ.	ч <b>с</b>	4 m	41	n vo	, ,,,4	01 m	J 4	V) Y	o	<b>6</b> 1	u 4	VS V	٥~	9.6	0 4	vn vc	~ (	400	4 v	o	~ c	1 m	4 v	) <b>(</b> 0)	<b>⊣</b> (1	<b>መ</b> 4	
	Mond	1	٠,	٦.	- ۱	1 mai	. 64	2	2	r3 r	16	l 69	m r	<b>1</b> ) (1)	'n	សា	4 4	t <del>-4</del>	47 1	ব খ	· vn	VI V	רא ר	Y) V	n vô	<b>v</b>	0 0	vo v	0 1~	<i>L</i> t	- 1-		ac •	0 00	90 90	0 00	o. o	۰.	0.0	, a	음 음	22	; 5
2	it H	1980	1980	1880	1980	1980	1980	1980	1980	385	9861	1980	1980	086 086 086	28 28 28 28	1980	1080	0861	1980	1980	1980	1980	1980	1980	1980	1980	1980	0861	1980	1980	1980	0861	1980	1986	1980	1980	1980	1980	086	1980	0861 1980	1980	, 6

.00 m3/sec	5	nonide i	0	• •	0:	00	Ф	0	၁၀	, 0	0 V	0.32	00	0	00	. 0	00	0	42.0	>0	٥٥	00	00	00	00	00	00	001	00	0	0	00	0	00	0	• •	• • •	00	<b>Φ</b> ¢	000	000	•
Net supply yield: 1,942,8xec Water conveyance capacity: 2.00 m3/sec of 27,2 km pipe line 6 (Unit: 10 m3)	Reservoir	(El-m)	22.5	. 222	225	250	22.5	22.5	222 222 222	22.5	22.5	22.5	22.5 22.5	22.5	22.5 22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	12	22.5	22.5	22.5 22.5	22.5	22	22.5	22.5	22.5	22.5	22.5	22.5	22.22	22.5	22.5	325	3
Net supply yi Water convey of 27,2 km p	Krenceng	Storage	98.4	9,4	9,4	9.4.4 8.4.4	. 4. 8.	4.66	8.4 8.8	4.66	4. 4 8. 8	4.66	24. 26.	4.66	4. 4 8. 8	4.66	86.4	4.66	4.66	8.4.	4.66	4.66	4.66		4.66	8.4 8.8	8.4.4 8.4.4	4.66	4 4 8 8	4.66	8.4 9.4	4.66	86.4 86.4	4.66 4.66	3.4	4, 4 6, 66	4.6	4. 4. 8. 8.	4.66	99.4	8.4	**
Dam (2/12)	Water	from Cida	89.0	0.73	0.54	87.0	0.81	67.0	8.99	0.32	0.39	, 0	0.19 41.00	0.56	0.53	0.5	9.00 45.00	039	0 0	0.52	0.34	0,68	0.71	0.69	0.75	0.71	0.74	0.69	4 850	0.74	0.78	0.79	0.65	0.76	67.0	0.79 49.0	0.53	0.49	0.69	0.75	0.71	0.91
ing Krenceng	Еуаро																																								70.0	
Study for Exis	Supply																																								\$ \$.	
ir Operation S	charge	Cidanau intske																																							3.7.5	
Table F-34 (2) Reservoir Operation Study for Existing Krenceng Dam	Inflow discharge	Krenceng	0.18	61.0	0.31	80.0	0.05	70.0	0.00	0.53	20.0	1,18	0.71	0.29	0.49 0.4	0.35	0.52	0.46	6.75	0.33	0.51	0.17	0.31	0.16	0,1	0.13	0.11	91.0	12.0 12.0 13.0 14.0 15.0 16.0 16.0 16.0 16.0 16.0 16.0 16.0 16	0.11	90.0	9000	0.12	0.09	90.0	90.0	0.32	0.36	0.16	0.11	0.0 0.15	0.12
Table	Serial No.	period	110	4 m	41	n 40	> ⊷	4	ν <del>4</del>	י מא	<b>.</b>	. 73	€ 4	· va ·	φ-	. 71	ហុង	t va	9-	- r	en v	t &	φ.	- 7	en v	t v	φ-	. 4	ጠ 4	ימי	۰	c4 (	n 4	יט ע	<b>&gt;</b>	00 00	1 🕏	vs vo	, <b>(</b>	N EN	er vn v	٥
	1	TO TO THE TOTAL PROPERTY.	11:		<b>:</b> ::::	<b>#</b>	12	27	12.	12	12	-			6	1 (4	46	7 79	4	n en	en e	<b>1</b> (1)	en t	4 4	4 -	<b>:</b> 4	4 V	י מי ר	va v	י מיז פ	vn vo	•	φ φ	9 1	c [~	~ ~	- 1-	<i></i>	<b>90</b> 6	×0 ex	жо <b>ж</b> о 6	<b>×</b> 0
	<u> </u>	ļ	1980	385	1980	0861	1980	1980	1980	1980	1980	1981	1981 1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1861	1981	1981	1861	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981

Net supply yield: 1.94m3/sec Water conveyance capacity: 2.00 m3/sec of 27.2 km pipe line
(3/12)
Table F-34 (3) Reservoir Operation Study for Existing Krenceng Dam

m3)		Spillout	0	၁ဗ	0	00	•	0	0,1	0 0	0	0	00	0,13	0 (		0	0	00	0	0 0	0.55	0.05	90	0	00	0	00	00	0	00	00	0	0	<b>.</b> •	00	) <i>(</i> 2	0 (	00	00	000	00	00	0
nit: 10	Reservoir	Water level (El-m)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	225	22.5	22.5	22.5	22.5	22.5	22.5	ig S	22.5	22.5	22.5	22.5	22.5	22.5	22.5	38	22.5	22.2	22.5	22.5	22.5	122	22.5	22.5	22.5
or 27.2 km pipe line	Krenceng		4.66	8.4. 8.8.	4.66	4.66 4.66	4.66	4.66	4.66	4, 4 8, 8	4,66	4.66	4.66 6.44	4.66	4.66	8.4 8.6	4.66	99,4	60.4 90.4	4.66	99.4	4.66	4.66	4.66 6.66	4.66	4.66	4.66	4.66	4. 4. 8. 8.	4.66	4,4 9,4,4	4.66	4.86	4.66	4.66 9.4	4.66	4.66	4.66	4.00	4.66	99,	4,66	4.66 4.66	4.86
	Water	conveyance from Cida	29.0	0.38	27.0	27.0	0.52	0.52	0.6	0.70 0.71	0.80	0.72	0.58	0	0.68	6.59	99.0	0.69	0.52	25	0.47	0	0:00	0.47	0.37	0.63	0.63	0.67	0.58	0.48	920	0.41	0.58	0.62	0.51	0.62	0.52	20.0	0.74	0.74	9.0	0.72	0.74 0.78	0.74
	Evapo		0.01	7 7 7 8	0.01	0.01	0.01	0.03	0.01	0.01	0.02	0.02	0.02	0.00	20:0	70.0	0.01	0.0	0.01	0.02	0.02	0.02	0.02	0.02 0.03	0.01	0.01	10.0	0.0	0.0	0.01	10.0 0.0	0.01	0.0	0.01	10:0	0.01	000	10:0	9.01	0.01	0.01	0.01	0.01	0.01
	Supply	yeild	3.84	\$ \$ 3 0	0.84	# # 50 0	0.84	0.84	28.0	2 2	1.01	48.0	% 5 5 8 8	28.0	28.0	2 2	0.84	25.5	2 2 3 3 3	5	\$2.5 42.8		0.84	1.01	0.84	5.0°	8.0	8.0	. 89	48.0	క్ష	\$8.0	0.8 1.85	28.0	\$ 35 35 35 36 36 36 36 36 36 36 36 36 36 36 36 36	20.0	\$ <del>\$</del>	\$ 6 6 6	\$ 50 5 75 5 75	0.84 19.4	80	2 2	2 2 3 3	98.0
	20	Cidanau		7.08	25.	1.14 0.84	41.83	14.32	4.95	3.53	10.88	4.61	40.45 40.45	68.23	25.93	2,35	11.62	8.62	5.79 5.79	37.81	21.37	4.37	18.14	3.66	2.77	1.14	1.57	3.33	9.13	31.73	16.98	24.54	8.13 10.43	10.64	17.29	5.42	. v. 1 4	3.58	1.94	1.7	2.43	2.56	1.89	1.29
	Inflow discharge	Krenceng	81.0	0.17	11.0	0.1	0.33	0.33	0.25	0.11	0.22	0.14	87.0	7 <del>.</del> 70	0.17	9.0	0.2	0.17	4.0	0.77	0,39	1.4	6.0	20.0	0.48	0.22	0.22	0.18	0.13	0.37	0.59	44.0	0.27	870	0.34	0.2	6.20	0.21	0.16	0.11	0.25	0.13	0.07	0.11
	Serial No.	of 5 day period	<b>≠</b> → !	7 M	<b>寸</b> '	vo v	ο ⊷	7	en ·	4 v	o vo	-	ο, π	v 4	<b>30</b> (	۰ -	. 73	en •	4. AJ	ı vo	~ (	4 60	4,	n c		64 6	ን ቀ	VI V	۰	74	ພ 4	ا (تا	ø ==	14	w 4	νην	۰ -	7	u 4	wa w	o ·	C4 60	4 W	9
		Month	6	ን ዕ	on I	<b>o</b> s o	» 01	10	01	10	2 2	===	==	: :		1 5	121	27 :	7 2	12			.,	<b></b>	. 41	<b>1</b> 10	. 1	64.6	N M	, m	m m	. 67 (	w 4	4 ,	4 4	4	4 v	vs v	n v	Ś	י לאי ח	<b>0 0</b>	\$	9
		ž X	1981	1981	1981	1931	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982 1982	1982	1982	1982	1982 1982	1982	1982	1982	1982	1982	1982	1982 1982	1982	1982

2.00 m3/sec	6 п3)		Spillout	0	00	00	0	00	90	00	0	00	> 0	00	0	0 (		00	<b>5 6</b>	00	00	00	00	96	00	00	9 9	00	00	00	00	00	00	0	00		00	00	000	9 0	500	
Net supply yield: 1,24m3/sec Water conveyance capacity: 2.00 m3/sec of 21.2 km pipe line	(Unit : 10	ı	Water level (El-m)	22.5	22.5	22.5	22.5	22.5	22.5	22.35	21.55	21.59	17.5	20.65	20.78	20.86	19.98	20.15	19.75	19.29	19.52	19.5	19.71	19.79	19.32	19.41	19.71	20.18	20.31	20.5	20.95	21,46	21.54	21.81	22.5	22.5	22.5	22.5	22.5	122	444	
Net supply y Water conversion of 27.2 km p		Krenceng	Storage	4.66	36.4	36,4	, 4. 3.	24. 4 28. 4	4.65	4.52	3.79	3.83	3.32	2.96	3.08	3.16	2.47	2.58	231	2.5	2.15	2.13	2.28	2.34	2.01	2.07	2.28	2.48	72.5	3.17	3.24	3.71	3.78	4.02	4.5	4.66	5, 4, 8, 39,	4.68 86.48	99,4	3,8,3	8, 4, 4, 86, 89, 89, 89, 89, 89, 89, 89, 89, 89, 89	
am (4/12)		Water	conveyance from Cids	0.77	0.79	0.68	0.82	0.75	0.81	0.69	0.54	20.00 28.00	0.53	0.45	0.86	0.86	0.36	0.86	0.63	0.49	0.86	0.73	0.86	0,86	0.86	98.0 98.0	8 3	0.86 0.86	0.86	0.86	25.5	0.86	0.86	0.86	0.78	99.0	6.79	0.78	0.67	0.79	0.26 0.4 0.4	
g Krenceng D		Evapo	o	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	6,0	0.01	0.01	0.01	0.01	0.01	000	0.01	0.01	100	0.01	0.01	0.01	0.01	0.0	0.01	0.01	10.0	0.0	0.02	0.0	0.01	0.01	0.01	0'01	0.01	0.01	0.01	0.01	0.01	
dy for Existin		Supply	yend	0.84		ষ্ট্ৰ ভ	1.01	9 8 8 8	28.0	2 2 3 3	10.1	\$ \$ 0 0	28.0	3 3 3 3	25.0	25 S	28.0	\$ \$	1.01	0 2 2 3	28.5	3 3 3 3	28.0	3 X	30	3 3 0 0	101	\$ \$ 5 6	<b>3</b> 500	\$ \$ 6 6	1.01	35	# # 0 0	25.0 25.0	3	28.0	. Z	0.84 1.01	28.0	800	2,00 2,80 2,80 2,80 3,80 4,80 4,80 4,80 4,80 4,80 4,80 4,80 4	
peration Stu		2	Cidanau intake	1.41	2	2.23	4.78	88. 82	0.81	0.69	0.54	3 (S	0.53	0.45 0.96	1.07	5.26 5.26	0.36	9.0 9.8	0.63	0,49 5,34	1.72	2.65	3,5	0.42	2.22	2.79	8.58	6.98	6.17	20.04	13.66	9.4	2.82	3.12	5.41	2.72	18	3.53	4.93 7.54	8.6	3.83 4.72	
Table F-34 (4) Reservoir Operation Study for Existing Krenceng Dam		Inflow discharge	Krenceng	0.08	0.0	0.17	0.2	0.08	800	0.03 0.03	0.02	0.05	0.04	8 8 3 8	0.05	8 8	0.04	0.1	0.05	7 % 6 0	90.0	8 9 9 9	90.0	3 8 3 8	40.0	6.05 20.05	0.0	0.19 0.11	0.08	0.32	9.0	223	0.06 0.14	0.08	0,43	0.19	90.0	0.07	0.19	90.0	0.59 0.45	
Table F-34		Serial No.	period	- 6	ı mı	4 V)	φ.	- 6	(M ·	4 v	<b>.</b>	<b>⊣</b> 74	m·	4 v	φ.	<b>-</b> 2	ı m	4 N	1 40 -	- 2	lmt	t 1/0	9-	- 14	m	\$ V)	ν.	<b>-</b> 10	୧୯	cv 1	vo ~	. 17 (	<b>.</b> 9 ₹	y v	ò	r3 r7	14:	oν	- 6	l en 🕏	+ v1 v0	
		Month		r- r-	۱ - ۱		۲.	× ×	90 (	× ×	00 G	<i>y</i> 6,	σ, α	<i>y</i> 0,	ov č	2 01	91	22	2:	12	##	7.7	<b>∷</b> £	12	22	22	12			• •••	6	~	N 64	96	ł m	en e	י פיז	നന	4 4	4 4	****	
		, ,		1982 1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1982	1983	1983	1983	1983	1983	1983	1983	1983	1983	1983	1983	1983	1983	1983	

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Reservoir
Table F-34 (5)

в m3/sec		nomide	00	00	00	0	0.12	٥	<b>&gt;</b> 0	0	ලෙස		00	0	0	0	00	0	00	06	<b>.</b> 0	00	00	0	0	00	• • •	00		1.91 0	00	90	00	•	00	0	9. 9. 8. 8.	0	00	00	0
Net supply yield: 1.94m3/sec Water conveyance capacity: 2.00 m3/sec of 27.2 km pipe line (Unit: 10 m3)	Reservoir	(El-m)	22.5	22.5	22.5	22.5	22.5	12.5	225	22.5	22.5	22.5	22.5	22.5	22.23	22.35	22.38	4.5	21.98	21.97	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	21.33	20.11	19.35	18.68	18.81	19.06	19.1	21.24	222	22.5	222	25 25 25	22.5	22.5 22.5	22.5	222	22.5	22.5 22.5	22.5 22.5	22.5
Net supply yie Water conveys of 27.2 km pa	Krenceng	Storage	4.66	4.66	4. 4. 8. 8.	4.66	8 4	88.4	8.4.	4.66	4, 4 66 8	99,4	4 4	4.66	00.4 0 A	4 52	4.54	4.6	4.25	4.17	3.89	3.59	2.55	2.03	1.6.	1.68	1.83	1.86 2.45	3,5	8 4	4,66	4, 4, 8, %	4. 4. 88. 4.	8.4	4, 4, 8, 8,	4.66	4. 4. 8.8	95.4	8.4. 8.4.	4, 4, 4, 8,	4.66
Dam (5/12)	Water	from from Gids	9.0	0.57	0.57	0.75	/·0	0.49	0.03	0.58	0.83	0.83	0.81	860	0.83	0.86	0.86	26.	0.49	0.85	0.7	25.0	0.29	0.33	0.86	4.0 4.0	0.86	98.0 98.0	42.0	0.48 3	0.5	0.74	8.0	0.73	0.62	0.72	<b>0</b> 0	0.39	0.51	0.06	0.22
ng Krenceng I	Evapo	;		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.0	0.01	0.01	20.00	0.02	0.02	0.02	0.01	0.0	0.0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.00 0.02	10.0	0.01	10:0	0.01
udy for Existi	Supply		25.5 28.5 28.5 28.5	28.0	\$ \$	1.01	25.0	0.84	\$ % 5 0	48.0	9.00 4.80 4.80	20.0	2.0	1.01	2.0 4.84	0.84	\$ \$ 0 0	10.1	2.0 2.8 4.8	25.0	28.6	28.0	\$ \$.	48.0 28.0	6.9 8.0	10.1	28.0	0 3 3 3	68.0	2.0 4.8.0	28.0	# # 200	28.4	0.84	\$ \$	0.84	9.84 1.01	28.0	28.0 28.0 28.0	2.0 2.3 3.3	0.67
Operation St	тике	Cidanau		6.1	5.05 5.05 5.03	3.11	3,43	2.69	2.9.2 4.85	5.14	9. 4 9. 59	22.5	2.46	3.37	0.68	77	3.93	1.06	0.49	0.85	0.7	42.0	0.29	0.33											1.38	٠				4.15	
Table F.34 (5) Reservoir Operation Study for Existing Krenceng Dam	Inflow discharge	Krenceng	0.25	0.28	0.18	0.27	76.0	0.36	0.12	0.20	0.13	888	9.05	90.00	0.02	0.01	0.01	0.01	0.0	10.0	0.01	0.01	<b>&gt;</b> C	06	90.0	0.05	0.08	0.01	1.37	3.91	0.36	0.08	90.00	0.12	0.00 0.00	0.13	0.9 1.69	0.46	9.39 4.0	0.8 0.72	0.46
Table	Serial No.	period	-,	ł m ·	4 v)	9 -	- C	en •	4 w	φ.	<i>c</i>	110	<b>,</b> v	φ.	<b>→</b> 63	i en	4 vi	o vo	6	l (6) •	4 w	<b>v</b> o +	(4	t,	t VI	Φ~	. 00	w 4	י מל	•	100	<b>ນ</b> 4	S	> ⊷	64 W	ব ব	vn vo	٠ جنا (	C3 FD	4 N	9
	7	muosar	o v	, v3 (	nν	Y) Y	o 40	φ.	<b>\$</b> \$	<b>v</b> 1		~ r		7	× ×	s act	00 00	0 (0)	ው ው	.00.0	<b>አ</b> ው	و د	2 2	9.5	3 2	10	11	# E	:=:	11	121	22	25	3		-	e4 e4	74		20 10	7
	>	Ĭ	1983	1983	1983 1983	1983	1983	1983	1983	1983	1983	2862	1983	1983	1983	1983	1983	1983	1983	1983	5861 5861	1983	1983	1983	1983	1983	1983	1983	1983	1983	1983	2851 2861	1983	18 28	286 286 286	1984	1984 1984	1984	1984	1984	1984

Not supply yield: 1.94m3/sec. Weter conveyance capacity: 2.00 m3/sec of 27.2 km pipe line
(6/12)
4 (6) Reservoir Operation Study for Existing Krenceng Dam (
Table F-34 (6)

	Spillout		0.0	0.56	0.07	0.93	. 0	0	φ¢	•	<b>&gt;</b> c	• •	0	90		0	0	<b>&gt;</b> c	• <b>•</b>	Φ.	<b>o</b> c	0	0	00	0	0	00	• •	0	0 (	0	o:	<b>•</b> •	. 0	00	0	00	0	0	00	00	0	<b>-</b>	00	<b>-</b>	0	,
Reservoir	Water level (El-fi)		22.5						22.5							22.5					22.5			22.5		22.5			22.5		22.5						22.5							22.5			
Krenceng	Storage	volume	6 4,40 6 4,60	0 4.66	4.56	00.4	, 4																																					4.66			
Water	conveyance from	- 1		01	01	5 8			0.01						0.01						0.01										0.01											0.02		0.01			
Evapo											_																																	0.84			
Supply			10.68				. ~~			3.37	649			15.63					2.61		1.39				3.74		1,93				8,4														3.2		
Inflow discharge	eng Cidanau	n 20	1.01	4.	0.92	8/:	0.18	0.24	0.16	47.0	0.18	20	0.42	20.0	0.24	0.23	700	0.17	0.21	0.14	0.1	0.17	0.09	80.0	0.18	60.0	0.0	600	0.08	6:0	0.39	0.4	0.Z.0	0.42	0.48	22	0.18	0.13	0.15	80.0	0.19	0.14	80°0	0.0	0.15 0.13	0.1	
	Krenceng																																														
Serial No.	of 5 day period	-  -	7 7	m	4,	nv	> ~1	7	m •	d v	n vo	) r-4	7	m	, v.	9	(	7 6	4	S	φ-	. 77	3	4 ^	φο	~ .	r2 r	J 4	Ŋ	· 0	- 2	en ·	4 v	9	¢	4 10	4,	n vo			<b>1</b> 4	, co	•	. 73	en ed	v	•
	Month	,	<b>1) (</b> 1)	m	<b>en</b> (	n e	4	4	4 4	<b>.</b>	4 4	, v	80	<i>y</i> 0 <b>y</b>	1 1/1	ν,	Φ,		ف د	9	10			r- r		90		6 90	900	∞ •	n 0		0.0	. 6	22		01	90	11	<b>:</b>	117			12			
;	Year	100:	1987	1984	1984	1984	198	1984	\$ 5 5 5	4861	1984	1984	1984	1982	1984	1984	25. 25.	1984	1984	1984	2861	1984	1984	1984	1982	1984	1984	1984	1984	1981	198	1984	1984 1984	1984	1984	2 2 Z	198	1982	1984	1984 2967	1982	1984	25.5	1984	26. 26.	192	1984

Net supply
(21/12)
Table F-34 (7) Reservoir Operation Study for Existing Krenceng Dam

|                | lout  | 0   | 00  | 0   | 00  |   | 00  | • • •  | 00  | 0   | 00   | 0   | 00  
  | 0  | 00  | 0   | 00  | 0  | 00   | 0   
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  | 00   | 00   | 000  | 00  | 00  
   | 00           | 90   | 900  | 00   |
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| J i            | 1 .   | 22.5  | 22  | 22.5  | 22.5  | 22.5  | 22.5  | 22.5   | 22.5  | 22.5  | 22.5   | 22.5  | 222   
  | 22.5   | 22.5  | 22.5  | 22.5  | 22.5   | 22.5   | 22.5  
   | 22.5  
   
   
  | 22.5  | 222  | 22.5   | 22.5   | 22.5  
   
   
  | 225  | 22   | 22.5   | 22.5  
  | 22.5   | 225  | 22.5   | 22  | 22.5  
   | 22.5         | 22.5   | 22.5   | 22.5.  |
| Reservo        | Water lev<br>(El-m)                                     | 9   | 0 40  | <b>5</b> 0 V  | o vo  | vov   | a va  | · •  | a vo  | · • •   |  | <b>S</b>  | o vo  
  | \$   | v v   |   | o vo  | · vo ·   | o vo   | · · ·   
   | 2 12  
   
   
  | vo u  | c vo   | <b>\C</b> \(\daggeream\)   |  | ·0 ·0   
   
   
  |  | <b>.</b>   | vc v   | <b>10</b> 11  
  |  | ve ve  |  | A 15  | رد برد<br>د   
   | . vo v       |  | 0.00.0   | 210  |
| Krenceng       | Storage   | и.  | 4. 4.<br>9. 99.   | 4, 4  | 1, 4,<br>9, 3,  | 20.0  | ু ধ<br>হু ২ই  | 4, 4   | 4. 4.<br>9. 9.  | 4,4   | 1, 4,<br>9, 2  | 20.   | 4. 4.<br>9. 9.  
  | 4.6  | 4 4   | 4,  | 4, 4,<br>9, 99  | 4,   | 4, 4,<br>9, 9,   | 35.4  
   | 1 4<br>8 3  
   
   
  | 9.4   | t. 4.<br>9. 20.  | 2,4  | 4.   | 4. 4.<br>2. 8   
   
   
  | 4, 4   | 4. 4.<br>9. 9.   | 4. 4.<br>9. 9.   | 4.4   
  | 4.   | 4. 4.<br>2. 3.   | 4,   | 4. 4.<br>8. %   | 4, 4  
   | 4.4          | . 4.   | 4 4 4<br>9 9 9   | 4,   |
| Water          | conveyance<br>from<br>Cida                              | 0.74  | 0.74  | 77.0  | 0.79  | 0.75  | 0.78  | 0.8  | 0.48  | 0.68  | 0.71   | 0.7   | 0.87  
  | 0.74   | 0.0   | 0.28  | 0.67  | 0.75   | 0.76   | 0.79  
   | 0.93  
   
   
  | 0.79  | 0.8  | 0.79   | 0.79   | 0.78  
   
   
  | 89.0   | 0.58   | 0.91<br>0.6  | 0.76  
  | 0.79   | 9.0<br>0.96  | 0.81   | 0.8   | 0.81  
   | 0.76         | 0.75   | 0.51   | 0.94   |
|                |   |   | 0.02  | 0.02  | 0.02  | 0.01  | 0.01  | 10.0   | 0.0   | 0.0   | 0.01   | 0.01  | 0.01  
  | 0.01   | 0.01  | 0.0   | 0.01  | 0.0  | 0.0  | 0.01  
   | 0.01  
   
   
  | 0.01  | 0.01   | 0.01   | 0.01   | 0.0   
   
   
  | 0.01   | 000  | 0.01   | 0.02  
  | 0.02   | 0.02<br>0.02   | 0.01   | 0.01  | 0.01  
   | 0.01         | 0.0  | 100<br>000<br>000<br>000<br>000  | 0.02   |
| Supply         | yeiid   | 200   | . Z   | 20.0<br>28.0  | 1.01  | 0.84<br>48.0  |   | 26.0<br>26.0   |   | 0.0<br>28.0   | 2.0.   | 28.0  | 1.01  
  | 28.0   | <b>3</b>  | 9.00<br>2.00  |   | 9.0<br>48.0  |  | 0<br>2<br>2<br>3  
   | 101   
   
   
  | 2<br>2<br>2<br>3  | <b>3</b>   | \$ \$<br>\$ \$   | <b>3</b> 5   |   
   
   
  | 0.0<br>28.0<br>28.0  | 28.5   | 2.0.   | 3<br>3<br>3   
  | 28.0   | 1.01   | 28.0   | \$ 50<br>5 60   | \$ \$<br>0 0  
   | 26.25        | 3, 5   | 28.2   | 10.1   |
| 20             | Cidanau<br>intake                                       |   | 16.18   | 5.53<br>77 F  | 6.98  | 5.16  | 631   | 3.27<br>88.4   | 3.67  | 5.65  | 14.18  | 8. 6<br>8. 8  | 2.65  
  | 1.83   | \$ <del>\$</del>  | 9.42  | 7.61  | \$ 8<br>\$ 8   | 4.03   | 3.38  
   | 3.49  
   
   
  | 25.26   | 249  | 3.07   | 56   | 7.03<br>7.03  
   
   
  | 2.3  | 5.96   | 5.37   | 5.21  
  | 2,71   | 1.82   | 1.18   | 4.4]  | 3.4<br>2.39   
   | 2.22         | 2.66   | 7.23   | 5.41   |
| Inflow dischar | Krenceng  | 0.11  | 0.11  | 0.09<br>0.15  | 6.23  | 1.00  | 0.07  | 0.05   | 0.03  | 0.17  | 0.14   | 0.15  | 0.15  
  | 0.11   | 3   | 0.57<br>91.0  | 0.18  | 0.1  | 60.0<br>60.0   | 8,50  
   | 6:00  
   
   
  | 8 8   | 0.05   | 8.6  | 900  | 0.14  
   
   
  | 0.17   | , s  | 200  | 6 8<br>8  
  | 90.00  | 0.0<br>0.03  | 2.0  | 90.0  | 0.0<br>20.0<br>20.0   
   | 0.12         | 0.0  | * * E  | 0.08   |
| Serial No.     | of 5 day<br>period                                      | 1 2   | i en •  | 4 <b>v</b> u  | 100   | - 63  | l en ·  | 4 v  | 1 40  | 6   | l en ·   | er v  | <b>1 1 0</b> 1  
  | c  | <b>1</b> m  | 4 v   | , v¢  |  | ł m  | 4 v   
   | , .   
   
   
  | r 69  | ł en ·   | 4 VI   | 9 -  | - 63  
   
   
  | ረህ 4   | · 1/2 4  | <b>5</b>   | 3 2   
  | 4 v  | יסי, מ   | 1 0  | ł m   | 4 v   
   | 9 [          | : K) &   | ) 4 v  | • •  |
| ;              | ไฟอกใก  | e-4 p-4   |   |   | 1   | N 64  | 167   | C1 C1  | 10  | en en   |  | נוז נון   | . en ·  
  | ષ પ  | <b>* 47</b>   | ব্য ব্  | . 4   | vı v   | · vo ·   | va va   
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   | 6 01         | ឧទ   | 299  | 10   |
| 2              | ğ   | 1985  | 1985  | 1985  | 1985  | 1985  | 1985  | 1985<br>1985   | 1985  | 1985<br>1985  | 1985   | 1985  | 1985  
  | 1985<br>2885   | 1985  | 1985  | 1985  | 1985   | 1985   | 1985  
   | 1985  
   
   
  | 1985  | 1985   | 1985   | 1985   | 1985  
   
   
  | 1985<br>1985   | 1985   | 1985   | 1985<br>1985  
  | 1985   | 1985   | 1985   | 1985  | 1985<br>1985  
   | 1985<br>1985 | 1985   | 1985   | 1985   |
|                | Serial No. Inflow discharge Supply Evapo Water Keengeng | Scrial No. Inflow discharge Supply Evapo Water Krenseng Reservoir  Month of 5 day Vender Cidanau from Storage (El-m)  period Krendeng Cidanau from Storage (El-m) | Scrial No.   Inflow discharge   Supply   Evapo   Water   Krengeng   Reservoir | Serial No.   Inflow discharge   Supply   Evapo   Water   Krenceng   Reservoir | Serial No.   Inflow discharge   Supply   Evapo   Water   Krenceng   Reservoir | Month of 5 day         Inflow discharge         Supply beind conveyance         Water conveyance conveyance         Kresport         Reservoir (El-m)         Spillout (El-m)           1         1         0.11         9.49         0.84         0.02         0.74         4.66         22.5           1         2         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         3         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.53         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.53         0.84         0.02         0.74         4.66         22.5           1         5         0.12         0.77         4.66         22.5         22.5           1         6         0.23         0.73         4.66         22.5           1         6         0.23         0.73         4.66         22.5           1         6         0.23         0.73         4.66         22.5           1         6         0.23         0.73         4.66         < | North of 5 day   Inflow discharge   Supply   Evapo   Water   Krenceng   Reservoir   Supply   Evapo   Water   Krenceng   Reservoir   Supply   Evapo   Cidas   Water   Supply   Cidas   Water   Cidas   Water   Cidas   Water   Cidas   Water   Cidas   Water   Cidas   Water   Cidas   Cidas | Month of 5 day         Inflow discharge         Supply beind conveyance         Water conveyance         Kresport (El-m)         Reservoir (El-m)           1         1         0.11         9.49         0.84         0.02         0.74         4.66         22.5           1         2         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.39         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.39         0.84         0.02         0.77         4.66         22.5           1         5         0.12         16.18         0.84         0.02         0.77         4.66         22.5           1         6         0.23         6.98         1.01         0.02         0.77         4.66         22.5           2         0.23         6.98         1.01         0.02         0.73         4.66         22.5           2         0.23         6.98         1.01         0.02         0.73         4.66         22.5           2         0.09         5.12         0.84         0.01         0.77         4.66 | Serial No.         Inflow discharge         Supply         Evapo         Water conveyance         Krenceng         Cidanau intake         Supply         Evapo         Water conveyance         Reservoir (EI-m)         Spillout           1         0.11         9.49         0.84         0.02         0.74         4.66         22.5           1         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         0.41         16.18         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.53         0.84         0.02         0.77         4.66         22.5           1         6         0.22         6.98         1.01         0.02         0.73         4.66         22.5           2         0.22         6.98         1.01         0.02         0.73         4.66         22.5           2         2         0.07         0.77         4.66         22.5           2         2         0.09         5.12         0.84         0.01         0.77         4.66         22.5           2         2         0.07         0.77         4.66         22.5 | Month of 5 day         Serial No.         Inflow discharge         Supply being         Evapo         Water conveyance conveyance conveyance conveyance displays         Reservoir spillout conveyance conveyance conveyance displays         Reservoir spillout conveyance conveyance conveyance displays         Water level           1         0.11         9.49         0.84         0.02         0.74         4.66         22.5           1         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.37         0.84         0.02         0.77         4.66         22.5           1         6         0.12         5.77         0.84         0.02         0.77         4.66         22.5           2         0.12         5.77         0.84         0.01         0.77         4.66         22.5           2         2         0.09         5.16         0.02         0.77         4.66         22.5           2         2         0.09         5.12         0.84         0.01         0.77         4.66         22.5           2         2         0.09         5.12         0.84         0.01         0.77         4.66         22.5 | Month of 5 day         Serial No.         Inflow discharge         Supply being         Evapo         Water conveyance         Krenceng (E-m)           1         0.11         9.49         0.84         0.02         0.74         4.66         22.5           1         0.11         9.49         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.77         4.66         22.5           1         0.12         3.77         0.84         0.02         0.77         4.66         22.5           2         0.12         0.77         4.66         22.5         22.5         22.5           2         0.22         0.94         0.01         0.77         4.66         22.5           2         0.09         5.12         0.84         0.01         0.77         4.66         22.5           2         2         0.09         5.37         0.84 | Month of 5 day         Serial No.         Inflow discharge         Supply being         Evapo         Water conveyance conveyance conveyance conveyance (El-m)         Reservoir (El-m)           1         2         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         0.11         8.38         0.84         0.02         0.74         4.66         22.5           1         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.37         0.84         0.02         0.73         4.66         22.5           1         6         0.22         6.98         1.01         0.02         0.73         4.66         22.5           2         0.12         5.16         0.02         0.73         4.66         22.5           2         2         0.09         5.12         0.84         0.01         0.77         4.66         22.5           2         2         0.09         5.12         0.84         0.01         0.77         4.66         22.5           2         2         0.09         5.12         0.84         0.01         0.78 | Month of 5 day         Serial No.         Inflow discharge         Supply reind         Water conveyance conveyance         Varied removes the conveyance conveyance         Water level (E1-m)         Spillout           1         2         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.12         5.77         0.84         0.02         0.77         4.66         22.5           2         0.22         0.09         5.12         0.84         0.01         0.77         4.66         22.5           2         0.09         5.12         0.84         0.01         0.77         4.66         22.5           2         0.09         5.12         0.84         0.01         0.77         4.66< | Month of 5 day         Scrial No.         Inflow discharge         Supply being         Evapo         Water from from conveyance         Water fived conveyance         Reservoir (E1-m)         Spillout           1         2         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         2         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.53         0.84         0.02         0.74         4.66         22.5           1         6         0.12         3.77         0.84         0.02         0.77         4.66         22.5           2         0.12         3.77         0.84         0.02         0.77         4.66         22.5           2         0.12         3.77         0.84         0.01         0.75         4.66         22.5           2         2         0.09         5.16         0.84         0.01         0.77         4.66         22.5           2         2         0.09         5.16         0.84         0.01         0.77         4.66         22.5           2         2         0.09         5.2 | Month of 5 day         Of 5 day         Month of 5 day         Supply being         Evapo         Water from Conveyance (El-m)         Reservoir (El-m)         Spillout (El-m)           1         0.11         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.12         0.77         0.84         0.02         0.77         4.66         22.5           2         0.12         0.77         0.84         0.02         0.77         4.66         22.5           2         0.22         0.84         0.01         0.77         4.66         22.5           2         2         0.09         5.77         0.84         0.01         0.77         4.66         22.5           2         2         0.09         5.11         0.84         0.01         0.77         4.66         22.5 | Month         of 5 day         Krenorng         Cidarau         Supply         Evapo         Water         Krenorng         Reservoir<br>Valid         Spillout           1         of 5 day         Krenorng         Cidarau         veild         600         0.74         4.66         22.5           1         2         0.41         8.38         0.84         0.02         0.74         4.66         22.5           1         2         0.41         16.18         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.53         0.84         0.02         0.74         4.66         22.5           1         4         0.09         5.53         0.84         0.02         0.73         4.66         22.5           2         0.11         16.18         0.84         0.02         0.73         4.66         22.5           2         0.12         5.77         0.84         0.01         0.77         4.66         22.5           2         0.09         5.12         0.09         0.77         4.66         22.5           2         0.09         5.21         0.09         0.77         4.66 | Month of Says         Evapo         Water Name         Kenjoeng Supply bridge         Supply bridge         Evapo         Water Water Water Precipit         Reservoir Precipit         Position         Strange of Says         Cidan         Valid Says         Reservoir Precipit         Spillout Says         Strange Says         Cidan Says | Month of Script No.         Inflow discharge integration         Supply billion         The period integration of 5 day (Cidar)         Supply billion         The period integration integration         Supply integrated integration         Supply integrated integration         Period integration         Reservoir integration         Reservoir integration         Period integrated i | Month         of 5 day         Luffoot discharge         Supply         Parpo         Water         Keanceng         Cidenan         Supply         Parpo         Water         Keanceng         Reservoir         Pull         Spilout           1         0f 5 day         Kenneag         Cidenan         yelid         0.02         0.74         4.66         22.5           1         0.11         9.49         0.64         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.74         4.66         22.5           1         0.11         16.18         0.84         0.02         0.77         4.66         22.5           2         0.11         16.18         0.84         0.02         0.77         4.66         22.5           2         0.12         3.77         0.84         0.01         0.77         4.66         22.5           2         0.12         5.16         0.84         0.01         0.77         4.66         22.5           2         0.12         5.16         0.84         0.01         0.77         4.66         22.5           2         0.12         5.16 | Script No.         Inflow discharge         Supply both of Says         Evapor Water         Water level of Conveyance of Says         Water level of Conveyance of Says         Reservoir of Conveyance of Says         Water level of Conveyance of Conveyance of Says         Reservoir of Conveyance of | Month of Says         Serial No. Inflow discharge         Shipply conveyance         Water conveyance         Water conveyance         Conveyance conveyance         Reservoir conveyance         Spilout conveyance         Conveyance conveyance         Reservoir conveyance         Spilout conveyance         Conveyance conveyance         Water fived conveyance         Spilout conveyance         Conveyance conveyance conveyance         Conveyance conveyance conveyance <t< th=""><th>Mortity         Official No.         Inflicted discipance         Supply billion         Parton         Water record         Restrong         Claim water record         Storage water record         Restrong         Parton record         Water record         Storage water record         Storage water record         Storage water record         Spillout           1         0.11         1.041         1.038         0.044         4.06         22.5         0.077         4.06         22.5           1         0.11         1.044         0.09         5.75         0.02         0.74         4.06         22.5           2         0.11         1.044         0.09         0.02         0.74         4.06         22.5           2         0.11         1.044         0.09         0.07         0.74         4.06         22.5           2         0.12         0.13         0.04         0.02         0.77         4.06         22.5           2         0.12         0.13         0.04         0.01         0.77         4.06         22.5           2         0.12         0.13         0.04         0.01         0.77         4.06         22.5           2         0.09         0.03         0.04</th><th>Warth of S day         Of S day         Water of S day         Water of S day         Water of S day         Water field         Spilout           1         1         0.11         949         0.84         0.02         0.74         4.66         22.5           1         2         0.11         9.49         0.84         0.02         0.74         4.66         22.5           1         2         0.11         1.61.8         0.84         0.02         0.74         4.66         22.5           1         0.11         1.61.8         0.84         0.02         0.74         4.66         22.5           2         0.11         1.61.8         0.84         0.02         0.77         4.66         22.5           2         0.12         5.17         0.84         0.02         0.77         4.66         22.5           2         0.10         5.11         0.84         0.01         0.77         4.66         22.5           2         0.10         5.11         0.84         0.01         0.77         4.66         22.5           2         0.18         0.18         0.02         0.07         4.66         22.5           2         0.18</th><th>Month of Says         Telefon discharge from the control and t</th><th>Month         Script (s)         United by Conveyance         Water (s)         Kennest         Reservoir (s)         Spillout (s)         Print (s)         By Print (s)</th><th>Month         Scriid No.         Inflow discisaries         Supply print         Perspo         Water (consequence processes)         Consequence (Client)         Spriid (consequence processes)         Perspoin (Client)         Spriid (consequence processes)         Client (Client)         Spriid (consequence processes)         Water (Client)         Spriid (consequence processes)         Client (Client)         Spriid (consequence processes)         Spriid (consequence processes)         <th< th=""><th>Month         Scriid No.         Inflow discitation         Supply point         Period consequence         Water from consequence         Reservoir of Supply point         Period consequence         Reservoir of</th><th>Month         Scribt No.         Inflowed distributes         Supply         Despite         Water         Kentenne         Respectories         Water best of 5 app         Water best of 5 app</th><th>  Month   Oct   Serial No.   Inflowed discharge   Cidaran   Vertical C</th><th>  North   Script   No.   Infliced discherance   Specific   Construction   Constru</th><th>  North   Scried No.   Infline discriments   Supply   Perpo   Water   Recently   Secretaria   Se</th><th>  North   Serial No.   Inflored discharge   Supply   Perspo   Without   Kententia   State   Mark   Fined   Supply   Perspo   Without   State   State  </th><th>  Month   Serial No.   Indicate discipline   Yerid   Supply   Surgical No.   Indicate discipline   Yerid   Supply   Surgical No.   Indicate discipline   Yerid   Surgical No.   Yerid   Ye</th><th>  Notice   Section   Notice   March   March  </th><th>  Month   Colored   Milton distributed   Special No.   Milton   Milton</th><th>  North</th><th>  Market   M</th><th>  March   Marc</th><th>  Month   Colon   March   Colon   March   Colon   March   Colon   March   Colon   March   Colon   March   Colon   Colon   March   Colon   Colo</th></th<></th></t<> | Mortity         Official No.         Inflicted discipance         Supply billion         Parton         Water record         Restrong         Claim water record         Storage water record         Restrong         Parton record         Water record         Storage water record         Storage water record         Storage water record         Spillout           1         0.11         1.041         1.038         0.044         4.06         22.5         0.077         4.06         22.5           1         0.11         1.044         0.09         5.75         0.02         0.74         4.06         22.5           2         0.11         1.044         0.09         0.02         0.74         4.06         22.5           2         0.11         1.044         0.09         0.07         0.74         4.06         22.5           2         0.12         0.13         0.04         0.02         0.77         4.06         22.5           2         0.12         0.13         0.04         0.01         0.77         4.06         22.5           2         0.12         0.13         0.04         0.01         0.77         4.06         22.5           2         0.09         0.03         0.04 | Warth of S day         Of S day         Water of S day         Water of S day         Water of S day         Water field         Spilout           1         1         0.11         949         0.84         0.02         0.74         4.66         22.5           1         2         0.11         9.49         0.84         0.02         0.74         4.66         22.5           1         2         0.11         1.61.8         0.84         0.02         0.74         4.66         22.5           1         0.11         1.61.8         0.84         0.02         0.74         4.66         22.5           2         0.11         1.61.8         0.84         0.02         0.77         4.66         22.5           2         0.12         5.17         0.84         0.02         0.77         4.66         22.5           2         0.10         5.11         0.84         0.01         0.77         4.66         22.5           2         0.10         5.11         0.84         0.01         0.77         4.66         22.5           2         0.18         0.18         0.02         0.07         4.66         22.5           2         0.18 | Month of Says         Telefon discharge from the control and t | Month         Script (s)         United by Conveyance         Water (s)         Kennest         Reservoir (s)         Spillout (s)         Print (s)         By Print (s) | Month         Scriid No.         Inflow discisaries         Supply print         Perspo         Water (consequence processes)         Consequence (Client)         Spriid (consequence processes)         Perspoin (Client)         Spriid (consequence processes)         Client (Client)         Spriid (consequence processes)         Water (Client)         Spriid (consequence processes)         Client (Client)         Spriid (consequence processes)         Spriid (consequence processes) <th< th=""><th>Month         Scriid No.         Inflow discitation         Supply point         Period consequence         Water from consequence         Reservoir of Supply point         Period consequence         Reservoir of</th><th>Month         Scribt No.         Inflowed distributes         Supply         Despite         Water         Kentenne         Respectories         Water best of 5 app         Water best of 5 app</th><th>  Month   Oct   Serial No.   Inflowed discharge   Cidaran   Vertical C</th><th>  North   Script   No.   Infliced discherance   Specific   Construction   Constru</th><th>  North   Scried No.   Infline discriments   Supply   Perpo   Water   Recently   Secretaria   Se</th><th>  North   Serial No.   Inflored discharge   Supply   Perspo   Without   Kententia   State   Mark   Fined   Supply   Perspo   Without   State   State  </th><th>  Month   Serial No.   Indicate discipline   Yerid   Supply   Surgical No.   Indicate discipline   Yerid   Supply   Surgical No.   Indicate discipline   Yerid   Surgical No.   Yerid   Ye</th><th>  Notice   Section   Notice   March   March  </th><th>  Month   Colored   Milton distributed   Special No.   Milton   Milton</th><th>  North</th><th>  Market   M</th><th>  March   Marc</th><th>  Month   Colon   March   Colon   March   Colon   March   Colon   March   Colon   March   Colon   March   Colon   Colon   March   Colon   Colo</th></th<> | Month         Scriid No.         Inflow discitation         Supply point         Period consequence         Water from consequence         Reservoir of Supply point         Period consequence         Reservoir of | Month         Scribt No.         Inflowed distributes         Supply         Despite         Water         Kentenne         Respectories         Water best of 5 app         Water best of 5 app | Month   Oct   Serial No.   Inflowed discharge   Cidaran   Vertical C | North   Script   No.   Infliced discherance   Specific   Construction   Constru | North   Scried No.   Infline discriments   Supply   Perpo   Water   Recently   Secretaria   Se | North   Serial No.   Inflored discharge   Supply   Perspo   Without   Kententia   State   Mark   Fined   Supply   Perspo   Without   State   State | Month   Serial No.   Indicate discipline   Yerid   Supply   Surgical No.   Indicate discipline   Yerid   Supply   Surgical No.   Indicate discipline   Yerid   Surgical No.   Yerid   Ye | Notice   Section   Notice   March   March | Month   Colored   Milton distributed   Special No.   Milton   Milton | North        | Market   M | March   Marc | Month   Colon   March   Colon   March   Colon   March   Colon   March   Colon   March   Colon   March   Colon   Colon   March   Colon   Colo |

Table F-34 (8) Reservoir Operation Study for Existing Krenceng Dam (8/12)

.00 m3/sec	(c)	Spillout	00	0	00	O	00	0	00	0	00	00	C C	0	00	0	00	•	0 (	0	0	<b>3</b> 0	0	9 0	0	> 0	00	00	00	o o :	00	00	901	00	00	9 0 0	<b>0</b> 0	၁ဝ	000	
Net supply yield: 1.94m3/sec Water conveyance capacity: 2.06 m3/sec of 27.2 km pipe line Office 10 may	Reservoir	Water level (El-m)	22.5	22.5	22.5 22.5	22.5	2 23 2 25 2 25	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	222	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	222	22.5	22.5
	Krenceng	Storage	4,66	9,4	8 4 8 8	4.66	8.4	4.66	8. 4. 8. 86.	4.66	4 8 8	4.68	4 4 8 8	4.66	8 4 4	4.66	4. 4 86. 4	4 66	4.66	8,4 8,6	4.66	4,68	4.66	4. 4. 6. 6.	4.66	36.4 96.4	4, 4 8, 8	99.4	8,4 9,66	4,66	8.3	4,66	99,4	8 %	4, 66	4,66	8,4	8.4.	8 26 2	9.4
g Dam (8/12)	Water	conveyance from Cida																							0.68		0.75 7.0	0.68	0.77	0.92	0.74	0.63	0.8	0.76	0.76	0.7	0.88	0.8	0.79	0.94
sting Krenceng	Evapo		0.02																						0.01														0.02	-
Study for Exi	Supply	yeild																																					\$ 35 S	
oir Operation	scharge	Cidanau							1.76																		5.48					2.19			1.38		÷	3.14		1.2
Table F-34 (8) Reservoir Operation Study for Existing Krenceng Dam	Inflow discharge	Krenceng	0.08	8.6	90.0	0.0	0.12	0.03	0.12	0.11	8.8	0.29	0.45 1.2	0.91	200	0.48	0.17	0.15	0.26	0.24	0.19	0.15	0.3	0.28	0.17	0.21	0.1	0.17	0.08	0.1	0.11	200	0.05	0.0	90.0 0.3	0.15	0.14	0.05	0.00	0.08
Table	Serial No.	of 5 day period	- 7	ረባ ፕ	r vn	φ.	- 71	m 4	OV 1	<b>.</b>	- 14	en d	t va	<b>9</b> +	- 14	m·	4 M	νο.	- 0	ŧm	4 v	שינ	1 0	łm	4 v	19	- 0	ı m •	4 v	9-	- 72	თ 4	<b>S</b>	<b>,</b>	01 m	4 v	, o.	- 63 6	υ4ιν	υ¢
	;	Month	11		11	I 1	12:	2.5	121	12	<b>→</b>	~ -	• ==	<b>⊣</b> (	4 64	77	N 14	86	የት የጣ	) en	en er	nen	* *	. 4	4 4	· 4 i	vi vi	<b>4</b> 0 4	n va	vo v	φ.	<b>.</b>	<b>9 4</b>	o /-	r- r-	<i>L</i> - L-		0 90 0	o ec ec	> 00
	. :	ig i	1985 1985	1985	2865	586	1985	1985	1985	2861	9861	1986	1986	1986	1986	9861	1986	1986	986	1986	1986	1986	1986 1986	1986	1986	1986	1986	1986	8 1 2 8 8 1	1986	1986	1986 1986	1986	1986	1986 1986	1986	9861	1986	1986	1986

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2.00 m3/sec	101	Spillout		0
Net supply yield: 1.94m3/sec Water conveyance capacity: 2.00 m3/sec of 27.2 km pipe line O lini 10	J 1	Water level (El-m)	<u> </u>	22.5
Net supply yi Water convey of 27.2 km p	Krenceng		44444444444444444444444444444444444444	99.4
Dam (9/12)	Water	conveyance from Cida	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.78
ing Krenceng	Evapo			0.01
tudy for Exist	Supply	)cna	\$	ŧ .
r Operation S	्राम्बर्धाः	Cidanau intake	2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.	20.3
Table F-34 (9) Reservoir Operation Study for Existing Krenceng Dam	Inflow discharge	Krenceng	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	200
Table F	Scrial No.	period	๚๚๚๚๛๛๚๚๚๚๛๛๚๚๚๛๚๚๚๚๛๚๚๚๚๛๚๚๚๚๛๚๚๚๚๛๚๚๚๚	•
	Month		๛๛๛๛๛๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖๖	•
	Y.		1986 1986 1986 1986 1986 1986 1986 1987 1987 1987 1987 1987 1987 1987 1987	i

Net supply yield
(10/12)
Reservoir Operation Study for Existing Krenceng Dam
Table F-34 (10)

33	;	Spillout	0	0	0	0	<b>3</b> C		Ο.	00	90	0	90	00	<b>O</b> 1	00	0	01	<b>5</b> C	0	Φ,	00	00	0	0	0	0	0	9	٥ ٥	90	09	00	<b>0</b> (	0	a	90	. •	50	• •	06	0	G O	0	<del>.</del>	
(Unit: 10 m3)	Reservoir	Water (evel (El-m)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.47	21.95	21.64	21.29	85.85 85 85 85 85 85 85 85 85 85 85 85 85 8	20.16	19.69	18.74	18.84	\$ S	18.74	18.49	18.71	18.94	19.03	19.11	19.26	19.38	19.81	20.02	20.09	20.19	20.38	20.97	22.36	12 22 23	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	222	
	Krenceng	Storage	1	4.66	4. 8.	4.66	4.40 4.40	8.4	4.66	4.63	4.16	3.87	3.55	2.91	2.59	7.27		7.1	27.1	2.	1.5	1.63	1.75	1.81	1.86	 76.1	2.05	2,35	249	2.55	2.61	274	3.25 2.25	4.53	4.66 8.66	99,4	4,66	7,66	4. 4. 8. 8.	4.66	4. 4 8. 8	4.66	4.56 6.56	4.66	4.66 4.66	
	1	conveyance from Cida		8.0	0,81	0.81	/6.0 18.0	0.82	0.82	97.0	99:0	0.53	0.49	0.49	0.49	0.49 0.49	0.49	0.86	0.80	0.8	0.67	0.86	0.86	0.86	9.86	980	0.86	0.86	1.08	0.86	0.85	0.86	2.5	0.86	0.69	0.78	0.63	0.77	0.78	0.79	0.77	0.69	0.78	0.78	0.79	
	Evapo	8	0,01	0.01	0.0	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.0	0.01	0.01	0.01	0.01	0.01	0.0	0.0	0.01	0.01	0.01	0.01	0.01	0:01	0.0	0.01	0.01	0.01	0.01	0.01	5 6	0.01	0.0	0.01	0.0	0.01	0.01	
	Supply	yend	0.84	3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5	2	0.84	10.1		28.0	3 Z	101	28.0	\$ 5 25 5		0.8 4 :	\$ % \$	28.0	0.8 4.5	\$ \$ 5 0	1.01	\$ 00°	0 25 25 26 26 27 28	3.0	0.84	\$ 6	\$ <b>3</b>	25.0	\$ 0 C	1.01	28.0 28.0 28.0	<b>3</b> 8 5 6 6	2.0 2.0 2.0 2.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3	1:01	28.0	; ; ;	25.5	0.67	48.0	2 2	\$ 5	\$ 6 6	. S. O.	2 % 2 %	98.0	0.8 48.0	
		Cidanau		1.78	96	1:11	25.5	0.93	1.02	0.79	\$ <b>9</b>	0.53	0.49	0.49	0.49	0.49	0.49	1.21	666	0.8	0.67	1.15	229	1.42	0.87	2 4	3.16	; <u>x</u>	3.8	1. 4.	0.85	277	23 S	16.54	14.78	21.66	27.72	85.5	10.78	6.31	7.21	20.66	10.15	7.25	6.1 6.1	
	Inflow discharge.	Krenceng	90.0	0.05 20.05	\$ 5	0.05	0.00	9 9 8 8	0.0	\$ \$	0.05	90.0	\$ 6	0.05	0.0 40.0	<b>8</b> . 8	20.0	9.0 20.0	\$ 5 5 5	0.05	0.04	0.1	3.0	0.04	200 200 200 200 200 200 200 200 200 200	4 20	0.07	870	8.50	40.0	0.07	0.12	0.08 4.08	1.26	0.16	0.08	0.05	80.0	6.03	90.0	0.0°	0.16	0.1	0.07	0.08 0.06	
	Serial No.	of 5 day period	1	c) c	J 4	v,	<b>o</b> +	- 61	æ ·	4 v	۷ ر		<b>c</b> 4	0.4	νn·	φ-	. 7	m ·	4 v	οv		r3 r	ባቀ	S	9 -	c	ł eń	4 4	nφ	→ (	~ m	4,	n vo	(	N 67	4,	n vo	) e-a (	r4 ~	<b>1</b> 4	٠. ٠	o	01 m	14	νιν	
		Month	7	۲۰	۰, ۲	7	× «	) aç	∞ (	20 aa		0.1	σ. 0	n 01	61	۰ 5	2 2	0;	2 5	20	11	= :	1 2	11	Ξ:	7 2 2	12	21 2	22	٦,	٦, ٦	r4 ,	-4 2***	71	71 74	. 10	4 64	l to (	en er	n (n)	en e	n +t	4 4	4	प प	
	,	res.	1961	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988 1988	

Table F-34 (11) Reservoir Operation Study for Existing Krenceng Dam (11/12) Net supply yield: 1.94m3/sec of 27.2 km pipe line

(Unit: 10 m3)

Spillout		0	<b>0</b>	0	0	90	- <	<b>,</b>	0	0	• •	0	0	0	0	0	0	0 (	<b>&gt;</b> e	÷ C	0	· C	D	O	0	0	0	0	<b>&gt;</b> C	9 6	> C	0	0	0	0 (	<b>&gt;</b> c	• •	0	0 (	70	0	0	06	> 0	0	0 '	၁ဝ	0	00	0	00	
Reservoir Water level (El-m)		22.5	22.5	22.5	22.5	22.5	2 66	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	2,42	3 6	22.5	22.5	27.5	22.5	22.5	22.5	22.5	22.5	38	2 66	22.5	22.5	22.5	22.5	22.5	2.47	22.5	22.5	22.5	3,5	122	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	
	ŧ	4,66	8,4	4.66	4.66	8.4 8.4	3,4	5 4	4.66	4.66	4.66	4.66	4.66	4.66	8.6	4.66	4,66	39.4	00.4	, 4 8, 4	4.66	4,66	4,66	4.66	4.66	4,66	4.65	8.5	9,4	4 66	4.66	4.56	4.66	4.66	4.66	4.66	4.	4.66	4.66	4. 4. 6. 4.	8.4	4.66	4.66	4 4 8 8	4.66	8	6 4 6 6	4.66	4.66	4.86	4, 4, 8, 8, 8, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9,	
Water K		Ø. 0	62'0	0.78	0.79	), C. O		e «	0.81	0.81	0.81	0.77	0.79	0.82	0.81	0.82	0.98	0,81	0 0	S C	0.81	0.97	0.81	0,81	0.82	0.82	0,82	0.81	, c	0.63	0.71	62.0	28.0	0,58	6.7	6.79	8.0	0.81	8.0	8.0	0.76	0.81	0.98	18.0	0.8	0.79	6.75 4.75	0.63	25.5	0.58	0.13 0.13	
Evapo	- 1	0.01	0.0	0.01	0.01	1 0 0 0	100	500	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	70.0	70.0	0.02	0.02	0.01	0.03	10.0	0.01	0.03	0.01	100	600	0.01	0.01	0.02	0.02	200	7000	0.02	0.02	0.01	0.0	0.0	0.01	0.02	0.00 0.00	0.02	0.02	0.02	10.0	0.0	0.01	0.01	
Supply yeild		\$.0°	2,8	0.84	2.0 2.0	15 K	5 6	\$ <b>3</b>	380	35	35	28.0	<b>3</b>	0.84	<b>3</b> ,	<b>3</b> .0	1.01	200	\$ 60°	280	25	1.01	0.84	<b>*</b>	0.84	25.0	*	9.0	<b>t</b> 3	5 c	<b>3</b>	28.0	10.1	2. 2.	35.5 25.6	\$ 58 5 C	8.0	28:0	<b>3</b>	\$ 50 50 50 50 50 50 50 50 50 50 50 50 50 5	2.0	28.0	101	\$ \$ 5 5 6	9.84	<b>3</b>	2.0 2.5	0.84	0.84 2.84	9 O	48.0 2.0	
Ke Cidansu	intake	7.7.	6,74	9.24	7.75	4.43 5 + 5	5.7.5	22.5	5,46	4.47	3.13	2.01	1.37	0.91	1.08	6.93	1.15	E0:1	1.87	25.	148	1,16	0.87	1.15	1.5	1.32	1.29	23	. v.		2.01	2.27	2.58	3.59	4. 6. 6. 6. 6. 6. 6. 6. 6. 6. 6. 6. 6. 6.	28.5	19.	13.43	14.52	19.43	25.36	12.37	7.41	4.4. 7.4.5	2.82	3.68	3,9	37,	15.86	32.32	13.32 21.43	
Inflow discharge Krenceng Cie		0.05 20.05	0.96	0.07	90.0	S 8	50.0	20.0	8	40.0	8.0	0.08	90:0	60:03	40.0 40.0	70:0 70:0	9.0°	8.5	9 8	3.5	500	0.05	9:05	9.0 8.0	9.04	25.0	<b>7</b> 0.0	8 6 6	\$ 50	\$ 6	41.0	0.07	0.19	0.28	60.0	) (S	0.05	0.05	0.05	0.00	0.03	\$0.0	0.05	4 0 0	0.05	90.0	0.12	0.22	0.22	0.27	0.75	
Scrial No. of 5 day period	•	t	4 00	4	vn ·	۰ م	• •	4 6-	4	Ŋ	•		64	m	4	S	9	- 6	7 6	ণ ব		9	-	7	m	₹ '	vo :	φ.		7 ~	n 4	·va	•	~*	2 1	าซ	· VI	\$	(	71 6	1 4	w	φ.	<b>→</b> (	ı m	4,	v, v	<b>&gt;</b> ~-	<b>~</b> (	n 4	νν	
Month		V3 H	יט רי	s	۰ دی	n v	p <b>v</b>	o •c	v	· <b>v</b> o	• •	7	7	7	7	7	7	97 (	×ου	O 04	oo	) aç	6	6	σ	ÇN I	0	ъ.;	2 5	<u> </u>	2 0	200	10	11	Ξ:	7 -	:=	1	27	21 5	12	2	77	-t	• •-•			• 64	ભ	4 74	લલ	
Year		1988	1988	1988	1988	988	2001	1089	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	8861	1988	1988	1988	1988	1988	1988	1988	2061	1088	1088	1988	1988	1988	1988	1993	1989	1988	1988	1988	1988	1988	1988	1989	6861	1989	1989	1989	1989	1989	1989	

Net supply yield: 1.94m3/kec Water conveyance capacity: 2.00 m3/kec of 27.2 km page line	•
(12/12)	
Table F-34 (12) Reservoir Operation Study for Existing Krenceng Dam (12/12) Net supply yield: 1.94m3/sec operation Study for Existing Krenceng Dam (12/12) Net supply yield: 1.94m3/sec of 27.12km pape line	
Fable F-34 (12)	

wwwwwa4444AN	period	Krenceng				Contraction			
<b>ພ</b> ພພພພພພພ4 4 4 4 4 4 A A A A A A A A A A A	1		Cidanau intake			fog E G	Storage	(El-m)	
መመጠመታታታታታታ መመጠመታታታታታ		0,35	24.82	\$ 3 8 3	0.01	0.5	4,66	22.5	
<b>መመመ</b> ቀቀቀቀቀቀነ/ህ	l m	0.22	9.43	28.0	0.01	0.63	4,66	22.5	
ሳጠላፊላላላላላነሃን	• • • •	0.1	 	28.0	0.01	0.75	4,66	22.5	_
) 4 4 4 4 4 W W	n v	5 C	8.0	\$ E	0.0	0.81	8,4 8,4	222	
44444W <i>W</i>	>	20	38.5	28.0	0.01	18.0	8 4	22.5	
4444NN	. 73	0.05	3.38	0.84	0.01	0.81	4,66	22.5	
4 4 4 W M	6	20.0	3.38	0.84	0.01	0.81	4,66	22.5	
4 4 N N	4	0.02	3.38	28.0	0.01	0.83	4,66	22.5	
4 N N	v)	0.01	3.38	0.84	0.01	<b>3</b>	4.66	22.5	
n n	•	0.01	3.38	28.0	0.01	0.84	4.88	22.5	
n	<b>.</b> • •	0.02	338	28.0	0.01	0.83	4.66	22.5	
•	71	0.02	3,38	<b>3</b>	0.01	0.83	4,86	22.5	
'n	m ·	10.0	3.38	<b>3</b> 5.7	0.01	<b>3</b>	4.66	22.5	
ሳነ	47 1	0.01	3,38	80	0.01	\$ 50.0	4.66	22.5	
va v	· .	0.02	3.38	\$.0 \$8.0	10.0	0.83	4,66	22.5	
vo ·	φ	0.02	4.06	1.01	0.01	-	4.66	22.5	
9		0.02	33	28.	0.01	0.83	4.66	22.5	
۰	۲۷	0.07	4.01	<b>3</b> ,0	10:0	0.78	4.66	22.5	
	en ·	60.0	4.02	<b>3</b> 8.0	0.01	0.76	4.66	22.5	
ø	4	0.08	2.74	25.	0.01	0.77	4,66	22.5	
9	vı	0.08	1.62	\$ 5 5	0.01	0.77	4.66	22.5	
<b>9</b>	•	0.08	1.4	0.84	0.01	0.77	9,4	22.5	
7		90.0	1.37	0.84	0.01	8.0	4.66	22.5	
7	C)	90.0	2.71	\$	0.01	0.79	4.66	22.5	
7	w	90.0	4.54	28.	0.01	0.79	4.66	22.5	
r i	ব	8 6	5.32	28.0	0.0	0.79	4.66	22.5	
,	'n	0.05	3.77	0.82	0.01	8.0	** **	22.5	
7	9	0.08	2.3	10.1	10.0	80	4.56	22.5	
ø	<b>1</b>	90.0	1.15	<b>3</b> .0	0.02	0.79	4.66	22.5	
× ·	5	0.08	0.77	35.0	0.05	0.77	4.65	22.5	
×¢ «	· v	833	86.0	\$ 5	20.0	80.00	8.4	C.77	
» «	cy i	90.0	0.62	36 TO	0.02	0.62	4.49		
×0 6	<b>Λ</b> `	50.0	<u>ک</u> خ	\$, ĕ	70.0	7.0	4.39		
0 0	۰.	0.10	77.	70.0	70.0	3 8	1.5.4		
ħ G	٠, ر	35	867	20.0		8,9	16.4	20.5	
٠. ٥	4 (*	200	9 00	28	100		4.66	200	
۰.0	4 ر	25	236	78.0	200	0.81	997		
	y u	5 8	25.	b c	5 6	100	277		
<b>n</b> 0	n v	3 8	£0.1 20.1	5.0	700	79.0	8.4		
٧.		5 5	6,0	5.0	100	100	34.		
2 5	- 6	5 6	7.	5 6	10.0	3.00	37.		
2 5	4 (	33	51.13	5 5	10.0	70.0	8 3		
2 5	٠,	5 6	<b>X</b> 6	5.5	10.0	76.0	20.7		
2 :	<b>.</b>	\$ 6	18.0	\$ 60	70.0	0.01	50,4		
21	^	50.0	/8'0	\$ 3	10:0	0.82	00.4		
2	•	0.05	2.43	10.1	0.02	86.0	90.7		
Ξ	~•	<b>1</b> 50	3.68	0.85	0.02	0.82	8.3		
Ξ	7	9. 2	4.	36, 36,	0.02	0.82	8.8		
11	m	800	2.22	0.84	0.02	0.82	4.66		
=	4	Ş	2.09	20	0.02	0.81	4.66		
11	v	1 1800	2.31	\$8.0°	0.02	0.82	4.66		
13	. 9	200	1.75	8.0	0.02	0.81	4.66		
12	_	9. 8.	2.28	<b>3</b> 5.0	10.0	0.83	4.56		
12		90.0	2.81	28.	0.01	0.78	4.66		
77	មា	0.49	4.08	¥.;	0.01	0.36	8,		
21	चं ¹	0.16	\$0.4°	<b>5.</b> 3	0.0	60.0	8.4		
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Water conveyance capacity: 3.05 m3/soc of 27.2 km pipe line (Umit: 10 m3)		Water level Spillour (El-m)	818	ន	ያ የ	ই প্র	ধি	৪	818	ই ম	ধ	&	ጽ ጽ	3 83	20	8 8	38	8	21 23	83	28.74	28.08 27.86	27.91	27.95 79.77	28.03	28.05	28.3	28.13	28.15	28.17	28.19	28.22	28.25	28.4	28.78	28.8	28.93	ጽጾ	ঃ	ጽ ጽ	28.76	28.46	28.49 28.55	28.6
Water conveys of 27.2 km pro	Krenceng	Storage volume	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	13.66	12.25	12.34	12.39	12.52	12.55	12.64	12.68	12.71	12.75	12.77	12.83	12.86	13.12	13.72	13.75	13.96	14.07	14.07	14.07	13.7	13.2	13.26 13.36	3.4
,	Water	from from Cide	1.23	1.05	1:06	1.22	1.15	0.86	0.85	0 88 0 88 0	68.0	1.19	1.1	1.18	1.27	7 5	1.27	1.06	1.24	1.23	0.82	0.18	1.32	1.32	1.32	1.32	132	1.32	1.32	1.32	1.32	1.32	1.58	132	1.32	1.32	1.32	1.25	1.23	25.	0.86	1.32	132	1.58
	Evapo			0.03	0.03	500	0.02	0.02	9.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	20.0 0.03	0.03	0.03	0.03	0.03	0.03	0.03	6.03 0.03	0.03	0.03	9,03 2,03	0.03
,	Supply	propé	1.32	1.32	1.32	1.58	1.32	1.32	1.32	1.32	1.05	1.32	1,32	1.32	1.32	1.38	1.32	1.32	1.32	1.32	1.32	132	1.32	1.32	132	1.32	1.32	1.32	132	1.32	1.32	1.32	1.58	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.58
)	arge	Cidanau	3.98	4,05	3.92	3.56	e e	5.06	5.01	5.09 5.09	5.06	4.53	3.44 14.02	9.57	2.29	1.74	1.77	گ	4.84	1.99	0.82	88.0	1.91	5.36	38.5	4,39	3.17	3.77	2.37	28.2	2.81 4.75	73.7	27.7	4.48	2 5 2 2	5.29	1 7. 1 7.	27.03	12.39	248	0.86	2.54	6.13	9.88
	Inflow discharge	Krenceng	0.12	0.29	\$1.50 C	0.39	0.19	0.48	0.49 91.0	0.78	61.0	0.15	200 C	0.16	0.07	0.00	0.0	0,28	0.1 71.0	0.11	0.11	0.09	0.11	0.07	0.11	90.0	0.05 20.05	90.0	0.00	0.0	4.0 8.0 8.0	0.05	0.06	61.0	88.0 0	5).0 20.0	0.23	0.2	0.11	0.08	0.0	0.12	0.08	11'0
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Diversion Tunnel)	
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able F-35 (2)	

3.05 m3/soc		Spillout	• • • • • • • • • • • • • • • • • • •	
Net supply yield: 3.05m3/sec Water conveyance capacity: 3.05 m3/sec of 27.2 km pipe line (Thit: 10 m3)	Reservoir	Water level (El-m)	្តីក្នុងក្នុងក្នុងក្នុងក្នុងក្នុងក្នុងក្នុង	i
Net supply y Water convey of 27.2 km p	Krenceno	Storage	7.8.6.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4	?
el) (2/12)	Water	conveyance from Cids	1222 123 123 123 123 123 123 123 123 123	ļ
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Reservoir Operation Study for Heightening of Krenceng Dam (without Diversion Tunnel)	fathow discharge	Клепоец	90000000000000000000000000000000000000	****
eration Study F	Serial No.	of 5 day period	- a a 4 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	>
Reservoir Op		Month		•
Table F-35 (2)		Year	1980 1980 1980 1980 1980 1980 1980 1980	1021

Net	:
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oir Operation Study for Heightening of Krenceng Dam (without Diversion Tunnel) (3	
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Table F-35 (3)	

5.0.5 m2/855 16.0.5 m2/855 17.0.5 m2/855		Spillout	c	0	0 1	00	0	0	0	00	Φ	0	Φ.	0	0	0 6	00	, O	00	00	0	Ф С	90.0	0	⇒ c	0	00	00	00	00	<b>0</b> 0	0	00	00	90	0 (	90	00	0	<b>0</b>	00		)	٥
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of 27.2 km p	Krenceng	Storage	Volume 14.07	14.07	14.07	13.97	14.07	14.07	14.07	14.07	14.07	14.07	70,41	14,07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07
	Water	from	1.16	1.17	0.87	1.14	1.29	1.01	10.1	1.24	1.22	1.39	17.1	0.93	0.36	1.18	1.8	1,15	80 80	1.01	28.0	0.90	0	4.5	1.06	0.86	1.12	1.12	0.68	1.05	0.73	0.75	91.1	1.06	1.13		1.0.1	1.13	1.18	1.23	4. S.	1.15	1,22	1.22
	Evapo		0.03	0.03	0.03	0.03	0.03	0.03	0,03	0.03	0.03	0.03	900	0.03	0.03	0.03	0.03	0.03	20.0 20.0	0.03	0.03	0.03	0,03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02 0.02	0.02	0.05 0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02
	Supply	yeng	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.58	1.32	1.32	1.32	132	1.32	1.32	132	1.32	1.28	1.32	1.32	1.32	1.58	1.32	1.32	1.32	0.79	1.32	1.32	1.32	1.58	1.32	1.32	1.32	1.32	1.32	1,32	1.32	1.32	1.32	1.32	1.52
	harge	Cidanau		6.52	8.7 4.0	1.14	2.82	41.83	4,95	3.53	1.83	10.88	4 2 2	24.28	68.23	9.35	12.78	11.62	3.65	5.79	21.37	11.65	4,37	15.83	3,66	27.7	1.73	1.57	2.83	9.13	12.63	16.98 24.54	8,13	10.43	7.22	5.42	4. A	3.58	3.36	7.7	2.43	3.79	2.54	17.03
	Inflow discharge	Krenceng	0.18	0.17	0.11	0.1	0.16	0.33	30	0.11	0.12	77.0	0.28	0.42	0.98	9.0	0,31	020	0.17	\$ F	0.39	0.89	1.4	20.0 20.0	0.55	8.0°	180	20.0	0.13	86	0.61	8 3	0.42	673	0.21	រ <u>ព</u>	0.33	0.21	0.16 0.11	0.11	0.23	0.18	0.11	V.11
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3.05 m3/sec m3)	Spillout	000000000000000000000000000000000000000
Net supply yield: 3.05m3/sec Water conveyance capscity: 3.05 m3/sec of 27.2 km pipe line 6 (Unit: 10, m3)	Reservoir Water level (El-m)	88888888888888888888888888888888888888
Net supply yis Water convey of 27.2 km pi	Krenceng Storage volume	7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
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Krenceng Da	ge Cidanau intake	141111144111699999999999999999999999999
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eration Study	Serial No. of 5 day period	<b>゙゙</b> ゙゙゙゙゙゙゙゙゙゙゙゙゙゚゠゙゙゙゙゙゚゚ゟ゠゙゙゚゚ゟ゚゠゙゙゚ゟ゚ゟ゠゙゙゚ゟ゚ゟ゚゚ゟ゚゚゚゚゚ゟ゚゚゚゚゚゚゚゚
Reservoir Op	Month	ケレアととなるのののののでははははははははははははははは、これにはなるなるののののではは、は、まななないでは、は、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、
able F-35 (4)	Year	1982 1982 1982 1982 1982 1982 1982 1982
Table F-35 (4) Reservoir Operation Study for Heightening of Krenceng Dam (without Diversion Tunnel)		

Table F-35 (5) Reservoir Operation Study for Heightening of Krenceng Dam (without Diversion Tunnel) (5/12)

	:	Spillout	00	00	000	9 0	00	0	00	<b>3</b> 6	06	• •	00	000	00	00	00	00	00	00	00	0	00	00	000	00	00	00	00	00	00	00	.00	000		00	0
(Unit : 10 m3)		Water Tevel (El-m)	24.9 25.2	25 52 52 52 52 52	8.8	25.87	26.47 26.69	26.81	26.88	27.05	27.12	27.14	27.15	27.17	26.69	26.68 26.68	26.35	\$5.55	24.7	24.18	22.74	20.57	19.21 19.25	19.3	19.45	20.1	20.95 24.55	2 X 2 &	25.15	25.27	25.25 16.25 16.25	25.44 4.84 4.84	25.55	27.13	27.84	28.32 28.76	જ
	Krenceng R	Storage volume	7.55	8.28	69.8	£ 0.6	10.02	10.57	10.67	10.92	11.06	11.09	11.12	11.15	10.38	10.37	9.83	8,41	85	6.68 5.89	¥.5	2.89	¥ %	7 %	212	2.55	3.24 7.13	7.48	7.92	8.02	8.07	8.38 44.8	8.55	11.08	11.83	12.98	14,07
	Water	conveyance from Cida	1.32	1.32	1.32	1,32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.2	1.32	1.06	0.76	0.7	0.5 9.5	0.38	0.33	1.32	1.58	33	1.32	0.64	1.32	1.32	1.32	33 28	1.32	1.32	158	132	132	1.01
	Evapo		0.02	0.02	0.02	20.0	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02 0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.0 0.0	0.01	0.0	0.0	0.01	0.02	0.02	0.02	0.02	0.02	0,0	0.03	0.02	0.02	0.02
	Supply		1.32	132	1.32	1.32	132	1.32	132	133	1.32	1.32	1.52	132	គ្គ	132	1.58	132	132	1.32	1.32	1.32	1.32	1.58	1.32	132	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.58	1.32	1.32	1.05
		Cidanau intake	2.07 2.03	3.08	4.03	4.03	3.43 2.69	3.92	4.85 5.14	7.96	4.92 5.42	338	2.46 3.37	1.43	27.	3.93 3.93	1.06	0.76	6.0	0,52,0	0.38	0.33	25.5	6.55	5.71	39.95	21.87	19.35	4.38	3.73	5.67	1.38	8,5 8,5	9.84	12.52 5.64	4.15 2.87	6.03
	Inflow discharge	Krenoeng	0.25 0.46	0.28	0.18	0.15	76.0 95.0	0.21	0.12	0.15	0.02	0.05	S 8	0.02	0.01	0.01 0.03	0.01	0.01	0.00	0.00	00	0	9.6	0.05	0.08	0.47	3.91	0.36	0.12	90.0	0.12	0.23 0.03	0.13	1.69	2.0 2.0	0.8 0.72	0.46
	Serial No.	of 5 day period	C1 (	u 4	'nν	) 🛶	64 FE	4	Yn vo	<b>&gt;</b> (	r) m	041	vi vo		1 m ·	4 <i>i</i> v	\$	Ме	ો ઇજે પ	n vo	- 6	m •	4 vJ	φ	61 6	041	n vo	<b>ч</b> и	w 4	· 1/1 ·	φ	<b>6</b> 9 m	4 V	· •	ପ୍ର	4 A)	•
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Not supply yield: 3.05m3/sec Water conveyance capacity: 3.05 m3/sec of 27.2 km pipe line (Unit: 10 m3)	Reservoir	(El-m)																																								
	Krenceng	Storage							14.0	14.07		14.07	14.07	14.07		14.07	14.0	14.07	14.0		14.07		•																	3 14.07		
mel) (6/12)	Water	from from Cida	l		0.42		1.16			0.88		0.92	1.19	1.1		1.17	1,13	1.2	[.1		126				1.19									÷		1.26	•	_	1.28			
Diversion Tur	Evapo		0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0,02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03 0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	60.0 60.0	
am (without I	Supply	yeno	1.32	1.32	1.32	1.58	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.58	1.32	1.32	1.32	1.58	1.32	1.32	132	1,32	132	1.32	1.32	1.58	132	1.32	1.32	1.32	1.32	132	
f Krenceng D	arge	Cidanau	5.87	12.95	10.75	26.41	11.88	2, 5, 8, 58	3.37	4.38 64.98	5.85	10,68	5.8	73.57	6.23	3.47	2.61	3.12	2.29	4.9	3.29	2.76	3.74	1 <u>8.</u>	1.48	1.4	2.17	86.4	6.26 6.26	4.38	3.48	4.41	2.02	231	3.38	2.76	2 Z	5.57 3.76	19.91	8.0.	3.33	
Reservoir Operation Study for Heightening of Krenceng Dam (without Diversion Tunnel)	Inflow discharge	Krenceng	0.38	1.4.1	0.92	2.02	0.18	0.24	0.24	0.18	0.5	0.42	0.15	20.0	0.2	0.17	0.25	0.14	0.24	0.17	8 8	0.16	0.18	0.07	0.15	80:0	0.19	0.39	4.0	0.18	0,42	0.13	20°0	27.0	0.13	0.08	0.08	0.14	1.0	0.15	0.1	!
peration Stud	Scrial No.	of 5 day		4 m	÷ v	n vo		<b>64</b> 60	14.	v, ve	)	୯ କ	, 4	vo v	~	61 6	y 4	v) v	ø	. 64	wa	. ~	9,	- 7	en •	t vo	. 0	- 12	en •	t va	40 -	- 2	en d	t <b>v</b> a	φ-	- 64 6	w 4	vi «		1 W 4	vs vo	
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(Unit: 10	Reservoir Water level	(El-fi)	នុស្តិននុស្តិននុស្តិនស្តិនស្តិនស្តិនសត្តិនិស្តិនសត្តិនិស្តិនសត្តិនិស្តិនសត្តិនិស្តិនសត្តិនិស្តិនសត្តិនិស្តិនសត ក្រុម អ្នក សត្តិ អ្នក សត្តិ ស្តិនសត្តិ ស្តិនិស្តិនសត្តិ ស្តិនសត្តិ ស្តិនិស្តិនសត្តិ ស្តិនសត្តិ ស្តិនិស្តិនសត្តិ ស្តិនសត្តិ ស្តិនិស្តិនសត្តិ ស្តិនសត្តិ ស្តិនិស្តិនសត្តិ ស្តិនសត្តិ ស្តិនិស្តិនសត្តិ ស្តិនសត្តិ ស្តិ ស្តិនសត្តិ ស្តិនសត្តិ ស្តិនសត្តិ ស្តិនសត្តិ ស្តិនសត្តិ ស្តិនស្តិ ស្តិនស្តិនសត្តិ ស្តិនសត្តិ ស្តិនសត្តិ ស្តិនសត្តិ ស្តិនសត្តិ ស្តិនស្តិនស្តិនសត្តិ ស្តិនសត្តិ ស្តិនស្តិនស្តិនសត្តិ ស្តិនសត្តិ ស្តិនស្តិនសត្តិ ស្តិនស្តិនស្តិនស្តិនស្តិនស្តិនស្តិនស្តិន
or and produce the 6 (Unit: 10 m3)	Krenceng		4.07 4.07
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	Evapo	'	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	Supply		
	98	Cidanau intake	2.25 2.25 2.25 2.25 2.25 2.25 2.25 2.25
	Inflow discharge	Krenceng	901 911 911 911 911 911 911 911 911 911
	Serial No.	period	
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Table F-35 (

3.05 m3/sec m3)	;	Spillout	00	00	<b>ф</b> с	0	Φ.	00	0	00	0	00	0	0	ဘင	0	Φ (	9 0	0	00	00	00	00	9	0 (	0	0	<b>0</b>	0 (	00	0 0	00	00	0	00	90	φα	00	00	<b>,</b> ф (	90	00	
Net supply yield: 3.05m3/sec Water conveyance capacity: 3.05 m3/sec of 27.2 km pipe line 6 (Unit: 10 m3)	Reservoir	Water level (El-m)	20.25	१ ११	ጸዩ	ষ	ጵያ	B 23	ន	<b>83</b> 83	3 23	818	<b>3</b> 83	ង៖	ষ হ	181	ឧទ	<b>3</b> 82	ጽ ጽ	\$ <b>\$</b> \$	& ዩ	3 23	818	ই হ	នាន	হ হ	83	8 8	20 2	র হা	នុ	8 23	818	3 83	818	8. S.	818	28.89	28.96	8.8	য় গ্র	28.97	
Net supply y. Water conve of 27.2 km p	Krenceng	Storage	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14.07	14,07	14.07	13:89	14.01	14.05	14.07	14.02	
nel) (8/12)	Water	conveyance from Cida	1.26	1.29	1.3	17	<u> </u>	173	1.27	1.22	12.1	0.51	0.92	0.15	0./1	1.07	0.85	Ē	0.65	1.18	1.1	1.16	1.46	1.13	1.06	1.17	1.13	1.18	1.17	1.23	1.5	121	1,12	123	1.28	1.28	40.1.2	1.08	1.58	1.32	128	1.25	
iversion Tun	Буаро		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	000	0.03	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	
am (without D	Supply	yeild	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.52	1.32	1.32	1.32	1.32	1.32	1.32	1.32	132	0.79	1:32	1.32	1.32	1.58	1.32	1.32	1.32	1.32	1.32	1.32	132	1.58	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.58	132	1.32	1.32 1.58	
f Krenceng D	arge	Cidanau	4.09	4.31	371	6.58	14.57	4.18	1.9	2.2	6.53	20.99	11.32	23.29	12.29	7.98	10.55	4.	3,56	. 4 . 5	3.49	12.63	27.87	10.38	8.2	4.78	3.75	5,48 4,23	4.24	2.58	2.74	2.39	2.19	2.56	1.58	1.38	201	1.08	2.56	3.14	2. 2. 4. 1.	22. 1.2	
Reservoir Operation Study for Heightening of Krenceng Dam (without Diversion Tunnel)	Inflow discharge	Krenceng	0.08	90.0	4 50 0 50 0	0.1	0.3	50.0	0.08	0.12	0.08	28.0 28.0 28.0	0.43	717	26.0	0.27	0.48	0.33	0.15	0.16	92.0	0.18	0.15	0.21	0.28	0.13	0.21	0.15	0.17	0.11	10 0	0.11	2.0	0.05	90.0	60.0	6.0	80.0	41.0	0.05	0.07 0.07	0.05	
peration Study	Serial No.	of 5 day period	1 2	m	4 41	ø	<b>.</b> → (	400	44	n vo		64 %	24	V) V	o	. 77	m t	183	- ه	· 14	w 4	e v	φ-	• 64	w.	4 <i>N</i>	\$	ru	m	ŧ vo	9-	. 73	<b>છ</b> ⊲	'n	φ.	- 17	ማ ፕ	רא ז	9 →	- 61 6	J 4	so so	
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able F-35 (8)	, ,	ı	1985	1985	1985	1985	1985	1985	1985	1985	1986	1986 1 <b>9</b> 86	1986	1986 7991	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	9867	1986	1986	1986	1986	1986	1986	1986	1986	1986	986	1986	1986 1986	