

THE STUDY ON
 THE ENVIRONMENTAL IMPROVEMENT PROGRAM OF THE UPPER AND MIDDLE
 STREAM OF THE TUY RIVER BASIN
 IN THE REPUBLIC OF VENEZUELA

Fig. 10.4-1 Location Map of the Proposed
 Guare Dam

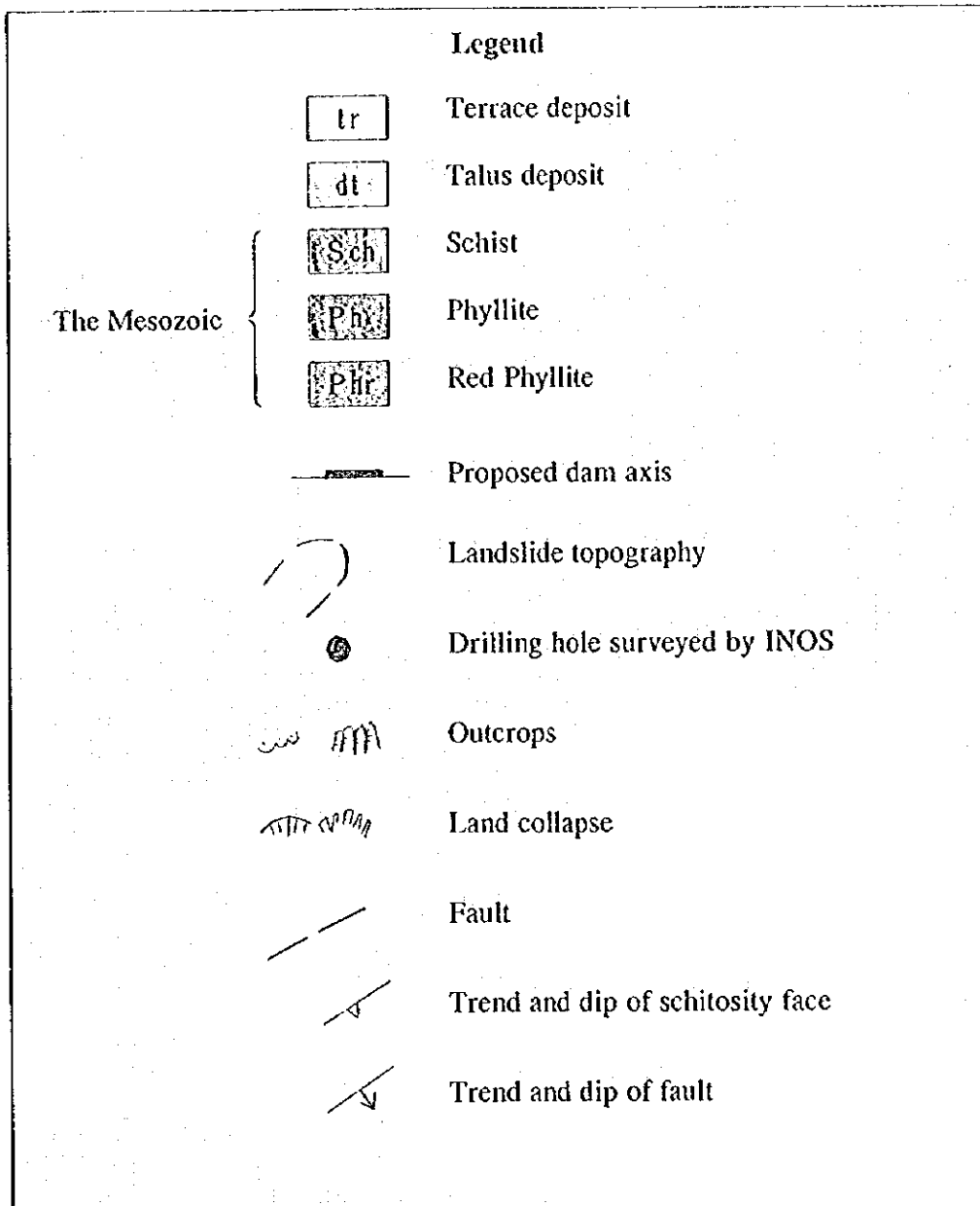
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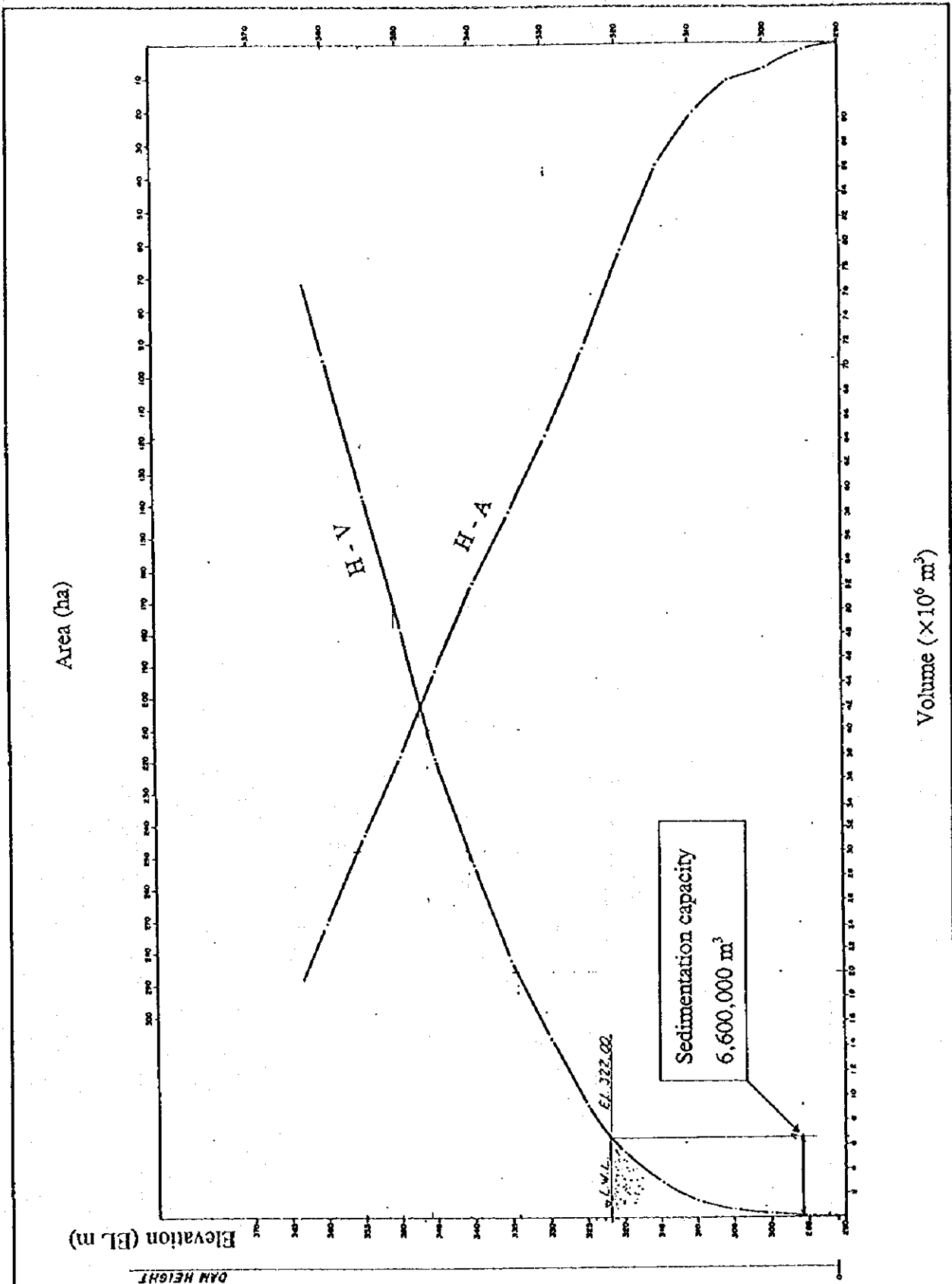
Fig. 10.4-2 Geological Map of the
 (1/2) Proposed Guare Damsite



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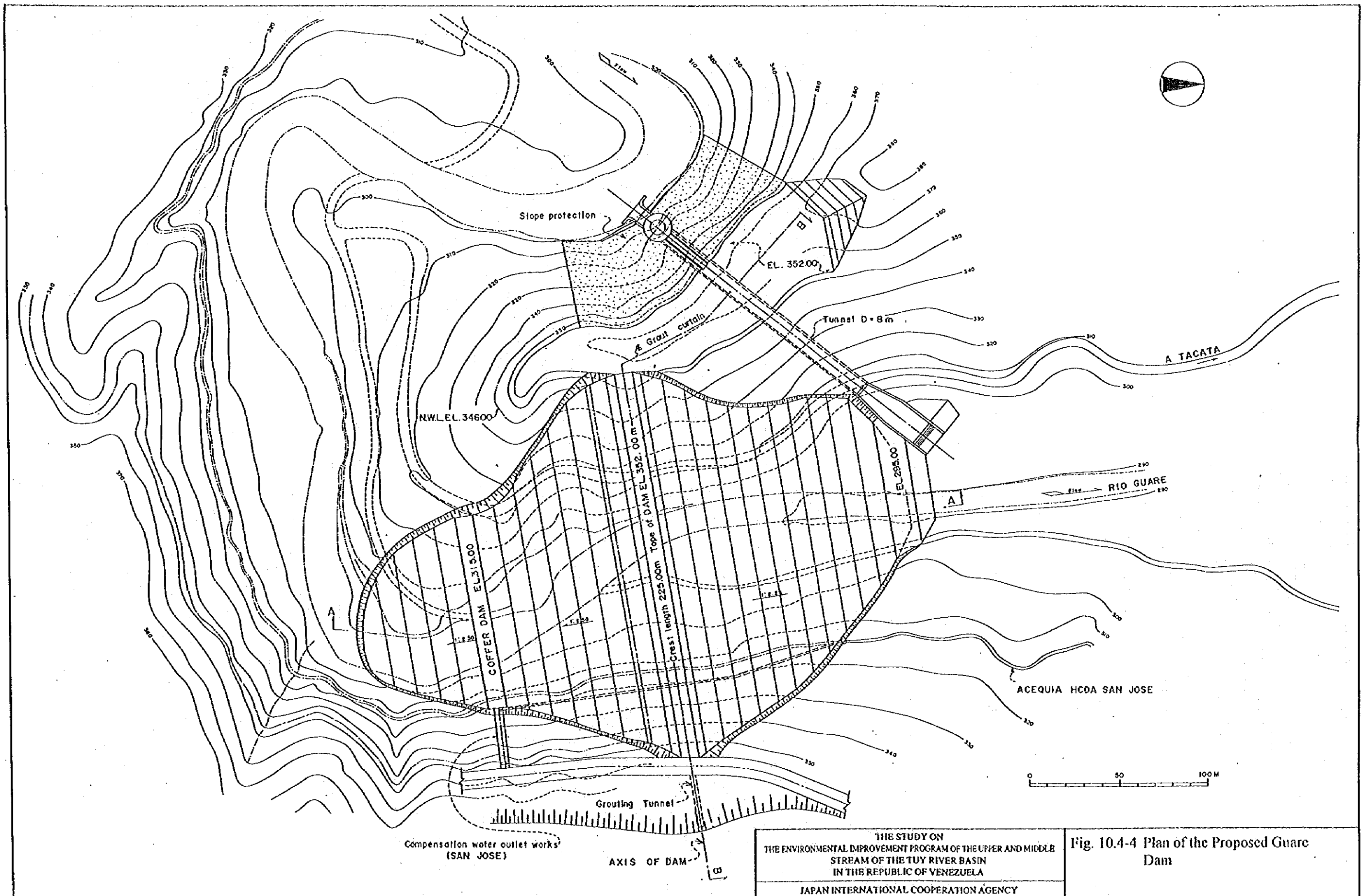
Fig. 10.4-2 Geological Map of the
 (2/2) Proposed Guare Damsite



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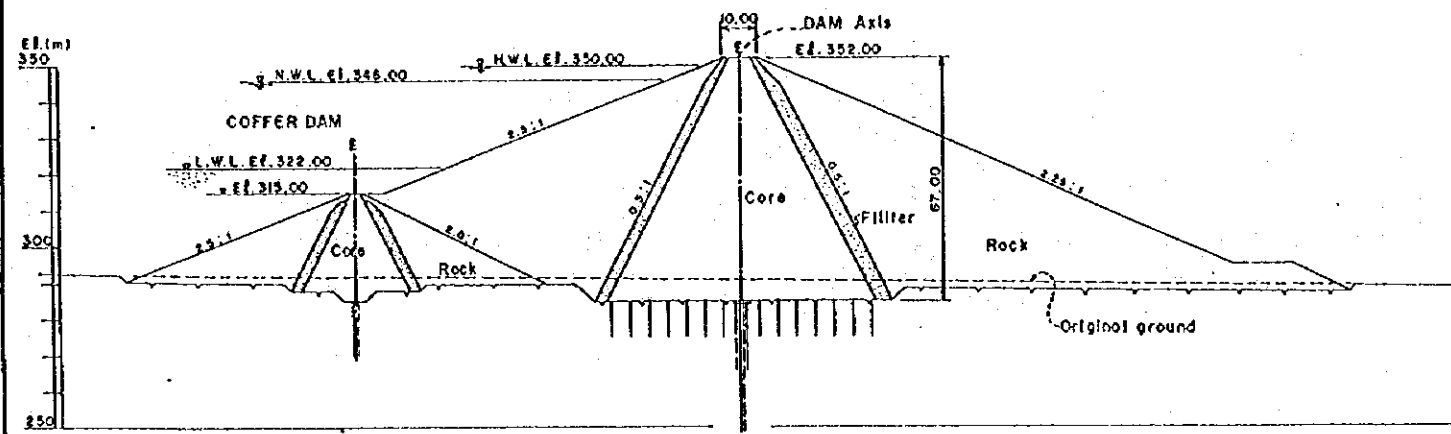
Fig. 10.4-3 H-A-V Curve of the Proposed Guare Dam



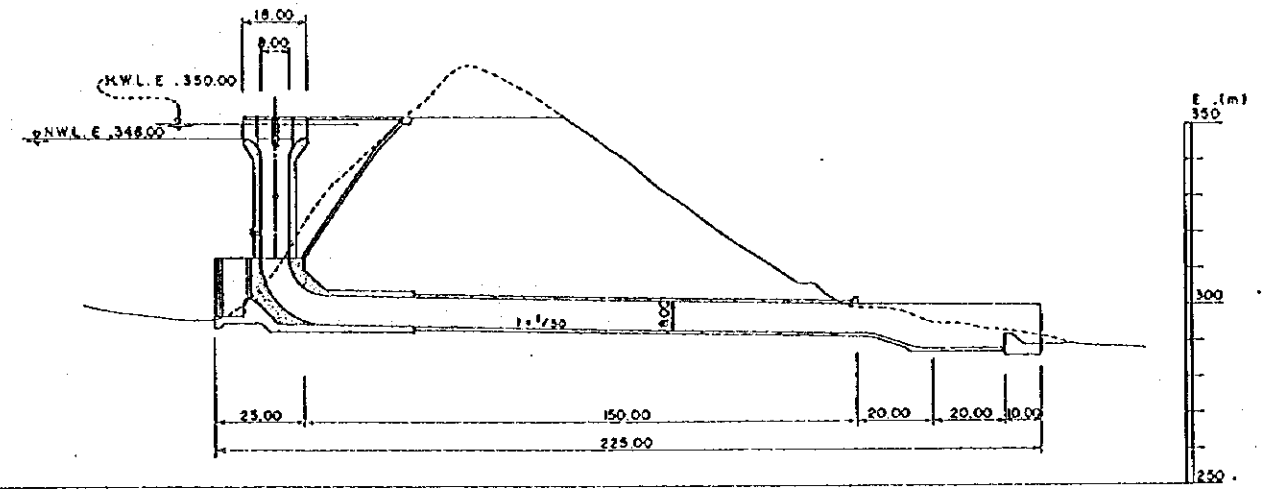
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Fig. 10.4-4 Plan of the Proposed Guare Dam

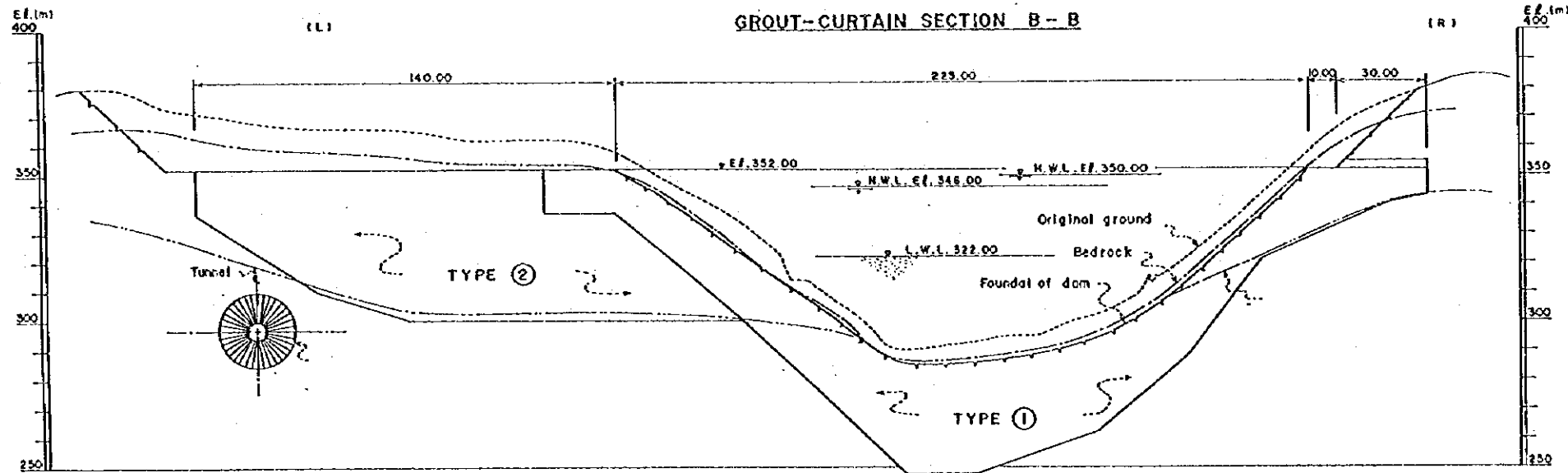
DAM MAXIMUM SECTION A-A



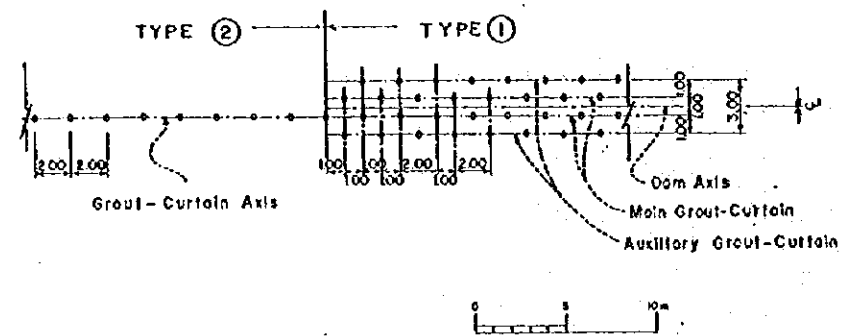
PROFILE OF SPILLWAY AND OUTLET AND RIVER-DIVERSION TUNNEL



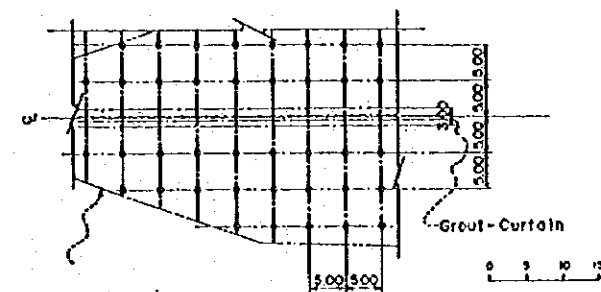
GROUT-CURTAIN SECTION B-B



GROUT-CURTAIN



CONSOLIDATION-GROUTING



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Fig. 10.4-5 Standard Section of the Proposed Guare Dam

ANNEX

*NECESSARY PROCEDURES
TOWARD IMPLEMENTATION*

ANNEX NECESSARY PROCEDURES TOWARD IMPLEMENTATION

1. Necessary Procedures toward Implementation

The Feasibility Study concludes that all of the six projects studied as the short term program are financially feasible. The necessary procedures toward implementation after this Study are presented below.

1.1 Structural Measures

The following three structural measures are assumed to be implemented: (1) sand settling pond at Toma de Agua, (2) sewage treatment system at Ocumare del Tuy and Las Tejerias, and (3) Reforestation. As to the treatment plant for factories and piggeries, it is assumed that installation will be realized through institutional measures as discussed in Section 1.2.

Sand Settling Pond

The construction of sand settling pond at Toma de Agua is presumed to be undertaken by Hidrocapital. The necessary procedures toward implementation are tabulated below and the schedule of work is shown in Fig. A.1-1.

Necessary Procedures	Necessary Period (Month)	Required Month (M/M)
Nomination of Agency for Project Execution	0.5	1
Arrangement of Personnel to handle the Project	0.5	1
Estimation of Cost for Necessary Procedure and Allocation of Budget	2	3
Preparation of Loan Application Documents (Implementation Program and TOR for D/D and S/V)	5	9
Approval of Documents by the Related Agency	1	1
Selection of Financing Agency	0.5	1
Loan Application	0.5	1
Negotiation of Loan Conditions and Loan Agreement	5	6
Procurement of Consultant	3	2
Detailed Design*	8	-
Preparatory Work for Land Acquisition	1	2
Land Acquisition	1	2

* Detailed design work for 8 months is to be undertaken by a Consultant (refer to Section 3.8).

Sewage Treatment System in Ocumare del Tuy and Las Tejerias

The implementation of sewage treatment systems in Ocumare del Tuy and Las Tejerias is assumed to be undertaken by the Tuy River Basin Agency. The necessary procedures toward implementation are tabulated below and the schedule of work is shown in Fig. A.1-1.

Necessary Procedures	Necessary Period (Month)	Required Man-month (M/M)
Creation of Project Execution Unit	2	3
Arrangement of Personnel to handle the Project	3	4
Work Agreement among Agencies concerned (ACRT, Hidrocapital and Local Government)	2	3
Estimation of Cost for Necessary Procedure and Allocation of Budget	2	3
Preparation of Loan Application Documents (Implementation Program and TOR for D/D and S/V)	5	10
Approval of Documents by the Related Agency	2	2
Selection of Financing Agency	0.5	1
Loan Application	0.5	1
Negotiation of Loan Conditions and Loan Agreement	5	6
Procurement of Consultant	3	4
Detailed Design*	18	-
Preparatory Work for Land Acquisition	2	3
Land Acquisition	5	10
Creation of Study Team on Sewage Charge to Polluters	2	2
Study on Sewage Charge	5	10
Establishment of Sewage Charge Collection System	5	5

* Refer to Sections 4.5 and 5.5.

Reforestation

The implementation of reforestation is assumed to be undertaken by SEFORVEN or CONARE under the technical guidance of the Tuy River Basin Agency. The necessary procedures toward implementation are tabulated below and the schedule of work is shown in Fig. A.1-1.

Necessary Procedures	Necessary Period (Month)	Required Man-month (M/M)
Nomination of Agency for Project Execution	1	1
Arrangement of Personnel to handle the Project	1	2
Estimation of Cost for Necessary Procedure and Allocation of Budget	2	3
Preparation of Loan Application Documents	3	5
Approval of Documents by the Related Agency	2	2
Selection of Financing Agency	0.5	1
Loan Application	0.5	1
Negotiation of Loan Conditions and Loan Agreement	5	7
Tendering and Execution of Planting until 2003*	60	-
Preparatory Work to Obtain Land Utilization Permit	2	3
Acquisition of Land Utilization Permit	5	8

* Refer to Section 4.2.4 in Sector E of Supporting Report (1).

1.2 Institutional Measures

Law and Regulations (Environmental Fund and Pollution Charge)

The creation of a new law and regulations is presumed to be undertaken through the initiative of the Tuy River Basin Agency. The necessary procedures toward implementation are tabulated below, though the necessary period for each item is subject to change. The schedule of work is shown in Fig. A.1-1.

Necessary Procedures	Necessary Period (Month)	Required Man-months (M/M)
Nomination of Agency responsible for the Establishment of Law and Regulations	1	1
Creation of Study Team on Law and Regulations and Allocation of Budget	2	4
Preparation of Draft of Law and Regulations	6	20
Approval of the Draft on the Ministry Level	2	3
Approval of the Draft by the Cabinet	3	6
Application to Congress	1	2
Resolution of Congress	5	9
Publication of the Law and Regulations	2	3
Enforcement of the Law and Regulations (until 2003 and beyond)	-	-
Total		48

Environmental Fund

The establishment of an environmental fund is presumed to be undertaken by a government financing agency such as FONCREI and CORPOINDUSTRIA as required under the law to be enacted. The necessary procedures toward the operation of the fund after the enactment of the law are tabulated below and the schedule of work is shown in Fig. A.1-1.

Necessary Procedures	Necessary Period (Month)	Required Man-month (M/M)
Creation of Section to handle the Environmental Fund	1	1
Allocation of Budget	2	3
Preparation of Loan Application Documents	5	17
Approval of Documents by the Related Agency	2	3
Selection of Financing Agency	0.5	1
Loan Application	0.5	1
Negotiation of Loan Conditions and Loan Agreement	5	11
Publication of the Environmental Fund	2	4
Operation of Environmental Fund (until 2003 and beyond)	-	-
Total		41

Pollution Charge

It is assumed that pollution charges are handled by the Tuy River Basin Agency. The necessary procedures toward the establishment of pollution charges after the enactment of the law are tabulated below and the schedule of work is shown in Fig. A.1-1.

Necessary Procedures	Necessary Period (Month)	Required Man-month (M/M)
Creation of Section to handle Pollution Charges and Allocation of Budget	2	3
Publication of Pollution Charges	5	8
Inventory Survey of Factories and Piggeries discharging Wastewater	5	8
Investigation of Wastewater Treatment Condition of Factories and Piggeries	8	20
Notification of Pollution Charge to Factories and Piggeries which do not Comply with the Standard	6	14
Collection of Pollution Charge (until 2003 and beyond)	-	-
Total		53

Organization

Strengthening of organization is related to the Tuy River Basin Agency. The necessary procedures toward the strengthening are tabulated below and the schedule of work is shown in Fig. A.1-1.

Necessary Procedures	Necessary Period (Month)	Required Man-month (M/M)
Creation of Study Team on the Strengthening of Organization	2	2
Nomination of Members of the Study Team	1	1
Formulation of Proposal for the Strengthening of Organization	2	2
Allocation of Budget	2	2
Procurement of Necessary Equipment and Arrangement of Office Space	3	5
Recruitment of Necessary Personnel	3	5
Total		17

Monitoring System

The establishment of a monitoring system is presumed to be undertaken by the Tuy River Basin Agency. The necessary procedures toward the establishment are tabulated below and the schedule of work is shown in Fig. A.1-1.

Necessary Procedures	Necessary Period (Month)	Required Man-month (M/M)
Nomination of a Responsible Person and Members for the Establishment of a Monitoring System	2	2
Allocation of Budget	3	5
Preparation of Loan Application Documents	5	8
Approval of Documents by the Related Agency	2	1
Selection of Financing Agency	0.5	1
Loan Application	0.5	6
Negotiation of Loan Conditions and Loan Agreement	4	5
Recruitment of Necessary Personnel	3	5
Procurement of Necessary Equipment and Arrangement of Office Space	3	3
Execution of Monitoring (until 2003 and beyond)	-	-
Total		35

Educational Program

The establishment of an educational program is presumed to be undertaken by the Tuy River Basin Agency. The necessary procedures toward the establishment of the program are tabulated below and the schedule of work is shown in Fig. A.1-1.

Necessary Procedures	Necessary Period (Month)	Necessary Personnel (Person)
Nomination of a Responsible Person and Members for the Establishment of an Educational Program	1	2
Allocation of Budget	2	3
Preparation of Loan Application Documents	3	3
Approval of Documents by the Related Agency	1	2
Selection of Financing Agency	0.5	2
Loan Application	0.5	2
Negotiation of Loan Conditions and Loan Agreement	5	3
Recruitment of Necessary Personnel	3	3
Procurement of Necessary Equipment and Arrangement of Office Space	3	3
Preparation of Educational Materials	3	3
Execution of Educational Program (until 2003 and beyond)	-	5

1.3 Required Man-Months and Cost of Necessary Procedures toward Implementation

Required Man Months

The man-months required for the necessary procedures toward project implementation are shown in Fig. A.1-1 and summarized below.

Project Component	Required Man-Month (M/M)
Sand Settling Pond at Toma de Agua	29
Sewage Treatment System (Ocumare del Tuy and Las Tejerias)	67
Reforestation	33
Establishment of Law and Regulations	48
Establishment of Environmental Fund	41
Establishment of Pollution Charge	53
Strengthening of Organization	17
Establishment of Monitoring System	35
Establishment of Educational Program	38
Total	361

Required Cost

The required cost is calculated by multiplying the required man-month with the unit cost of labor. Here, US\$1,000 per month is adopted as the unit cost of labor considering the current wage of about US\$500 for government staff and 100% of overhead.

The required cost is US\$361,000 in total as shown in the table below.

Project Component	Required Man-Month* (M/M)	Required Cost (US\$)
Sand Settling Pond at Toma de Agua	29	29,000
Sewage Treatment System (Ocumare del Tuy and Las Tejerias)	67	67,000
Reforestation	33	33,000
Establishment of Law and Regulations	48	48,000
Establishment of Environmental Fund	41	41,000
Establishment of Pollution Charge	53	53,000
Strengthening of Organization	17	17,000
Establishment of Monitoring System	35	35,000
Establishment of Educational Program	38	38,000
Total	361	361,000

2. Due Dates of Implementation

In the previous chapters, the implementation schedule for structural measures has been examined. In this section, discussion is made on the due dates of implementation to assure the accomplishment of each project component.

2.1 Structural Measures

Due dates for the implementation of structural measures are given below (refer to Fig. A.2-1).

Project Component	Item of Work	Due Date
Sand Settling Pond	Nomination of Agency for Project Execution	Sep. 1997
	Preparation of Loan Application Documents	Apr. 1998
	Loan Application	May 1998
	Procurement of Consultant for D/D	Dec. 1998
	Detailed Design	Sep. 2000
	Civil Works	Jun. 2001
	Pipeline Installation	Jun. 2002
	Testing and Start of Operations	Dec. 2002
Sewage Treatment at Ocumare del Tuy and Las Tejerias	Creation of Project Execution Unit	Oct. 1997
	Preparation of Loan Application Documents	May 1998
	Loan Application	Jul. 1998
	Procurement of Consultant for D/D	Mar. 1999
	Detailed Design	Sep. 2000
	Land Acquisition	Sep. 2000
	Civil Works	Sep. 2002
	Sewer Network	Sep. 2002
	Start of Operations of Treatment Plant	Mar. 2003
Reforestation	Nomination of Agency for Project Execution	Sep. 1997
	Preparation of Loan Application Documents	May 1998
	Loan Application	Aug. 1998
	Tendering and Start of Execution of Planting	Feb. 1999
	Acquisition of Land Utilization Permit	Feb. 1999

2.2 Institutional Measures

Due dates for the implementation of institutional measures are given below (refer to Fig. A.2-1).

Project Component	Item of Work	Due Date
Law and Regulations	Creation of Study Team on Law and Regulations	Nov. 1997
	Preparation of Draft of Law and Regulations	Jun. 1998
	Resolution of Congress	Feb. 1999
	Publication of the Law and Regulations	Mar. 1999
	Enforcement of the Law and Regulations	Sep. 2000
Environmental Fund	Creation of Section to handle the Environmental Fund	Apr. 1999
	Preparation of Loan Application Documents	Dec. 1999
	Loan Application	Feb. 2000
	Publication of the Environmental Fund	Sep. 2000
	Start of Operations of the Environmental Fund	Oct. 2000

Project Component	Item of Work	Due Date
Pollution Charge	Creation of Section to handle Pollution Charges	Jun. 1999
	Publication of Pollution Charges	Oct. 1999
	Investigation of Wastewater Treatment Condition of Factories and Piggeries	Jul. 2000
	Notification of Pollution Charge to Factories and Piggeries which do not Comply with the Standard	Sep. 2000
	Start of Collection of Pollution Charge	Oct. 2000
Organization	Creation of Study Team on the Strengthening of Organization	Sep. 1997
	Formulation of Proposal for the Strengthening of Organization	Oct. 1997
	Procurement of Necessary Equipment and Arrangement of Office Space	Dec. 1997
	Recruitment of Necessary Personnel	Feb. 1998
	Start of Operation of the Organization	Dec. 1997
Monitoring System	Nomination of a Responsible Person and Members for the Establishment of Monitoring System	Oct. 1997
	Preparation of Loan Application Documents	Jun. 1998
	Loan Application	Aug. 1998
	Recruitment of Necessary Personnel	Feb. 1999
	Procurement of Necessary Equipment and Arrangement of Office Space	Mar. 1999
	Start of Execution of Monitoring	Apr. 1999
Educational Program	Nomination of a Responsible Person and Members for the Establishment of Educational Program	Sep. 1997
	Preparation of Loan Application Documents	Mar. 1998
	Loan Application	Apr. 1998
	Recruitment of Necessary Personnel	Dec. 1998
	Procurement of Necessary Equipment and Arrangement of Office Space	Jan. 1999
	Preparation of Educational Materials	Mar. 1999
Start of Execution of Educational Program	Apr. 1999	

Fig. A.1-1(1/9) Necessary Procedures Toward Implementation (Sand Settling Pond)

Necessary Procedures	Necessary Period (Month)	Required Man-month (M/M)	1997												1998																			
			9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12				
			[Detailed monthly activity grid]																															
Nomination of Agency for Project Execution	0.5	1				---																												
Arrangement of Personnel to handle the Project	0.5	1				---																												
Estimation of Cost for Necessary Procedure and Allocation of Budget	2	3																																
Preparation of Loan Application Documents (Implementation Program and TOR for D/D and S/V)	5	9																																
Approval of Documents by the Related Agency	1	1																																
Selection of Financing Agency	0.5	1																																
Loan Application	0.5	1																																
Negotiation of Loan Conditions and Loan Agreement	5	6																																
Procurement of Consultant	3	2																																
Detailed Design*	8	-																																
Preparatory Work for Land Acquisition	1	2																																
Land Acquisition	1	2																																
Required Man-Month		29 M/M in total																																

* Detailed design is carried out for 8 months after procurement of Consultant.

Fig. A.1-1 (2/9) Necessary Procedures Toward Implementation (Sewage Treatment Plant at Ocumare del Tuy and Las Tejerías)

Necessary Procedures	Necessary Period (Month)	Required month (M/M)	1997												1998												1999							
			9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
			-----												-----												-----							
Creation of Project Execution Unit	4	3	-----												-----												-----							
Arrangement of Personnel to handle the Project	3	4	-----												-----												-----							
Work Agreement among Agencies concerned (ACRT, Hidrocapital and Local Government)	2	3	-----												-----												-----							
Estimation of Cost for Necessary Procedure and Allocation of Budget	2	3	-----												-----												-----							
Preparation of Loan Application Documents (Implementation Program and TOR for D/D and S/V)	5	10	-----												-----												-----							
Approval of Documents by the Related Agency	2	2	-----												-----												-----							
Selection of Financing Agency	0.5	1	-----												-----												-----							
Loan Application	0.5	1	-----												-----												-----							
Negotiation of Loan Conditions and Loan Agreement	5	6	-----												-----												-----							
Procurement of Consultant	3	4	-----												-----												-----							
Detailed Design*	18	-	-----												-----												-----							
Preparatory Work for Land Acquisition	2	3	-----												-----												-----							
Land Acquisition	5	10	-----												-----												-----							
Creation of Study Team on Sewage Charge to Polluters	2	2	-----												-----												-----							
Study on Sewage Charge	5	10	-----												-----												-----							
Establishment of Sewage Charge Collection System	5	5	-----												-----												-----							
Required Man-Month	67 M/M in Total		-----												-----												-----							

* Detailed design is carried out for 18 months after procurement of Consultant.

Fig. A.1-1(3/9) Necessary Procedures Toward Implementation (Reforestation)

Necessary Procedures	Necessary Period (Month)	Required month (M/M)	1997												1998																								
			9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12																					
Nomination of Agency for Project Execution	1	1	---																																				
Arrangement of Personnel to handle the Project	1	2	---																																				
Estimation of Cost for Necessary Procedure and Allocation of Budget	2	3				-----																																	
Preparation of Loan Application Documents	3	5					-----																																
Approval of Documents by the Related Agency	2	2											-----																										
Selection of Financing Agency	0.5	1																																					
Loan Application	0.5	1																																					
Negotiation of Loan Conditions and Loan Agreement	5	7																																					
Tendering and Execution of Planting until 2003*	60	-																																					
Preparatory Work to Obtain Land Utilization Permit	2	3																																					
Acquisition of Land Utilization Permit	5	8																																					
Required Man-Month		33 M/M in Total																																					

* Reforestation is continued until 2003.

Fig.A.1-1 (4/9) Necessary Procedures Toward Implementation (Establishment of Law and Regulations)

Necessary Procedures	Necessary Period (Month)	Required month (M/M)	1997												1998												1999										
			9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	1	2	3													
			-----												-----												-----										
Nomination of Agency responsible for the Establishment of Law and Regulations	1	1																																			
Creation of Study Team on Law and Regulations and Allocation of Budget	2	4																																			
Preparation of Draft of Law and Regulations	6	20																																			
Approval of the Draft on the Ministry Level	2	3																																			
Approval of the Draft by the Cabinet	3	6																																			
Application to Congress	1	2																																			
Resolution of Congress	5	8																																			
Publication of the Law and Regulations	2	3																																			
Enforcement of the Law and Regulations (until 2003 and beyond)	-	-																																			
Required Man-Month		47 M/M in Total																																			

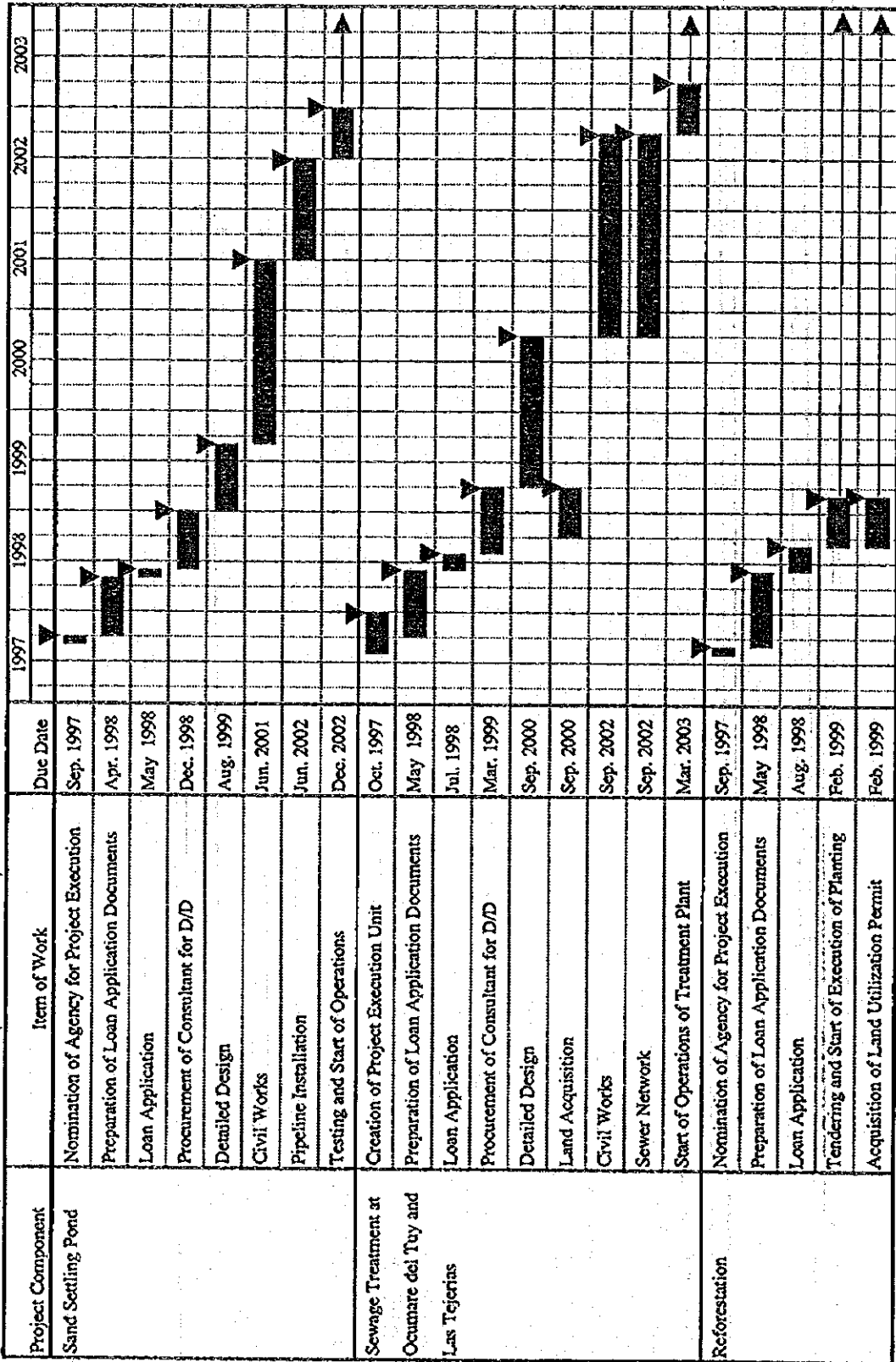
Fig.A.1-1 (5/9) Necessary Procedures Toward Implementation (Environmental Fund)

Necessary Procedures	Necessary Period (Month)	Required month (M/M)	1999												2000					
			4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Creation of Section to handle the Environmental Fund	1	1																		
Allocation of Budget	2	3																		
Preparation of Loan Application Documents	5	17																		
Approval of Documents by the Related Agency	2	3																		
Selection of Financing Agency	0.5	1																		
Loan Application	0.5	1																		
Negotiation of Loan Conditions and Loan Agreement	5	11																		
Publication of the Environmental Fund	2	4																		
Operation of Environmental Fund (until 2003 and beyond)	-	-																		
Required Man-Month		41 M/M in Total																		

Fig.A.1-1 (6/9) Necessary Procedures Toward Implementation (Establishment of Pollution Charge)

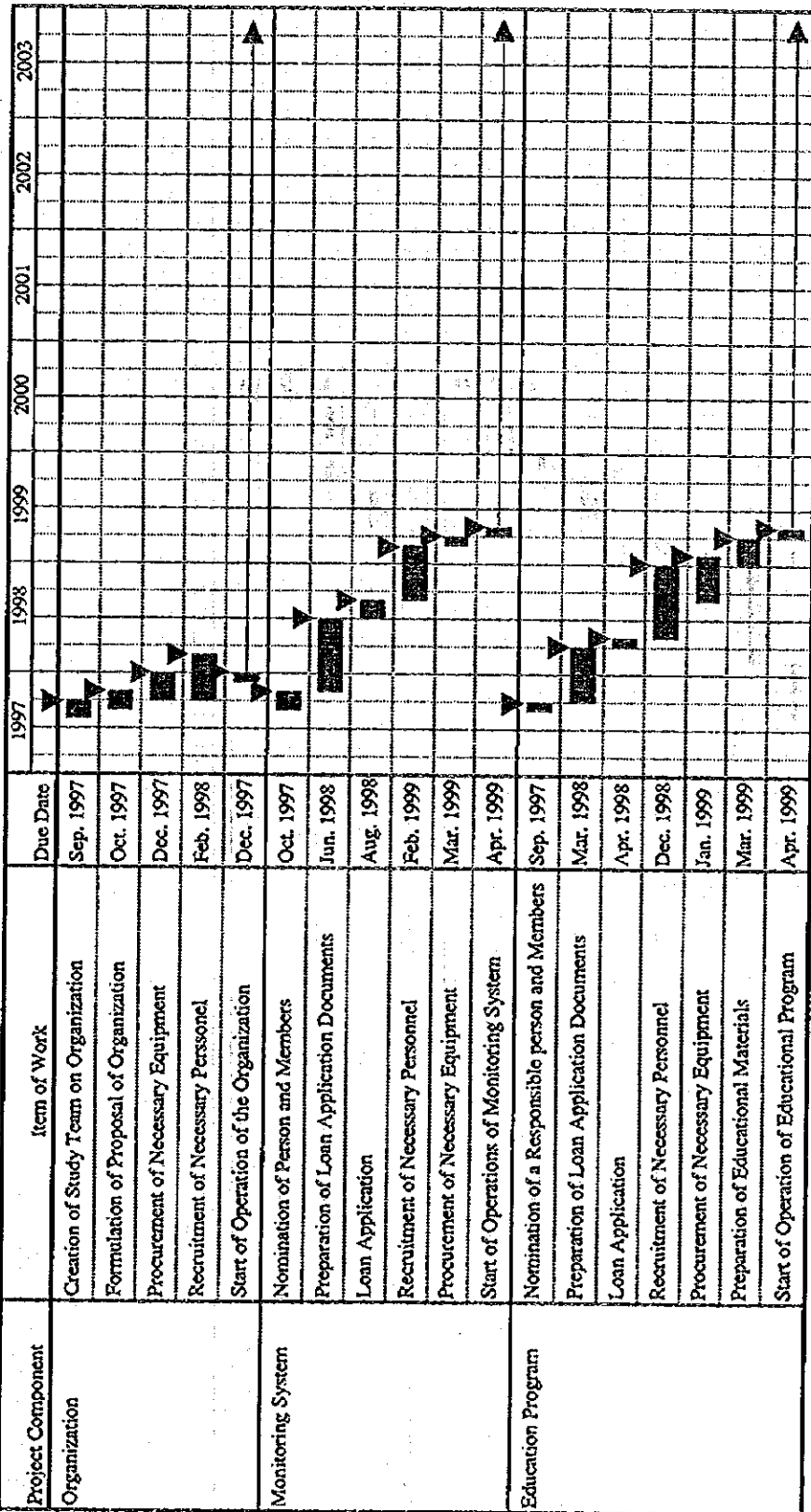
Necessary Procedures	Necessary Period (Month)	Required month (M/M)	1999												2000											
			4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9						
			-----												-----											
Creation of Section to handle Pollution Charges and Allocation of Budget	2	3																								
Publication of Pollution Charges	5	8																								
Inventory Survey of Factories and Piggeries discharging Wastewater	5	8																								
Investigation of Wastewater Treatment Condition of Factories and Piggeries	8	20																								
Notification of Pollution Charge to Factories and Piggeries which do not Comply with the Standard	6	14																								
Collection of Pollution Charge (until 2003 and beyond)	-	-																								
Required Man-Month	53 M/M in Total																									

Fig.A.2-1 (1/3) Implementation Schedule (Structural Measures)



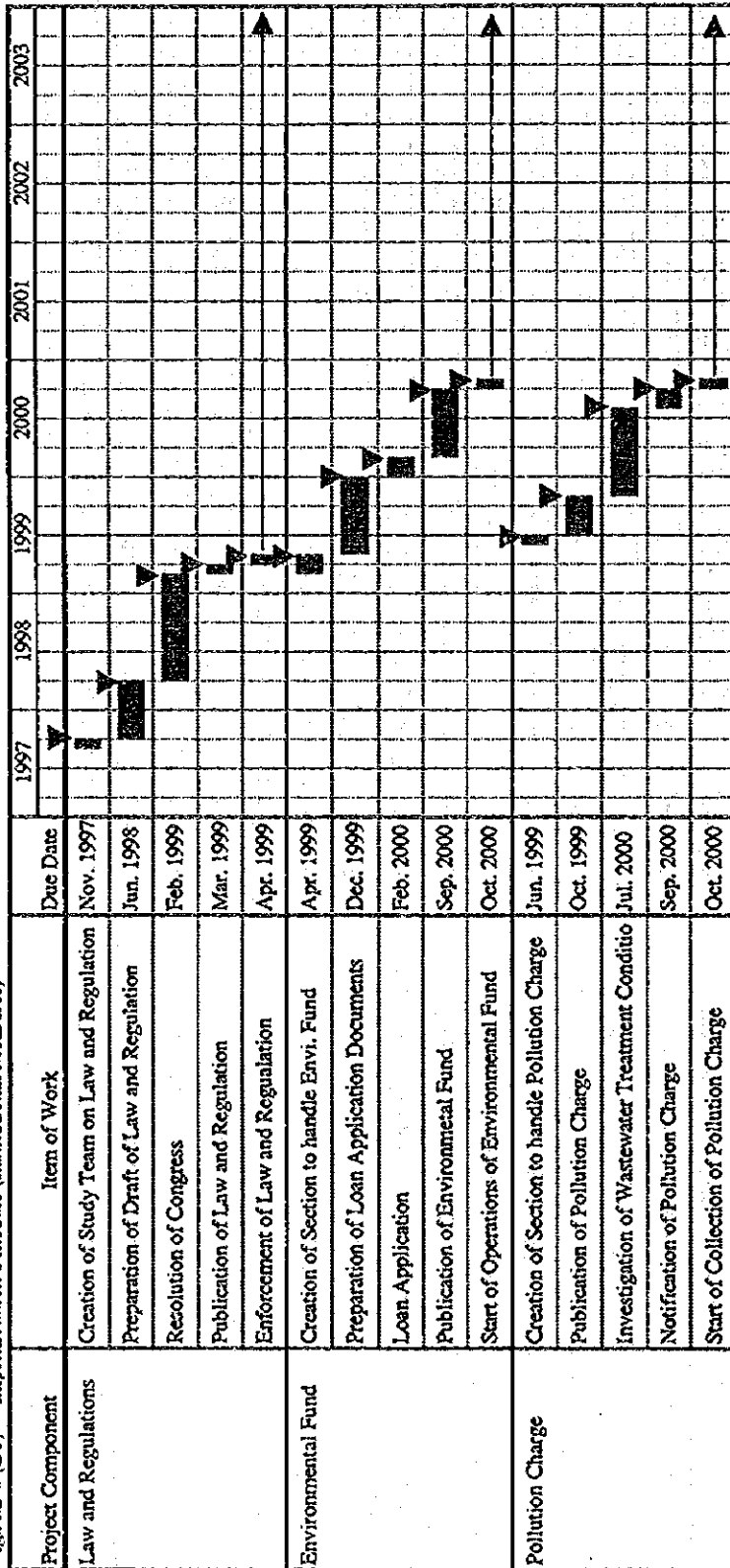
Note: : Operation Period (until 2003 and beyond) : Due Date

Fig.A.2-1 (3/3) Implementation Schedule (Institutional Measures)



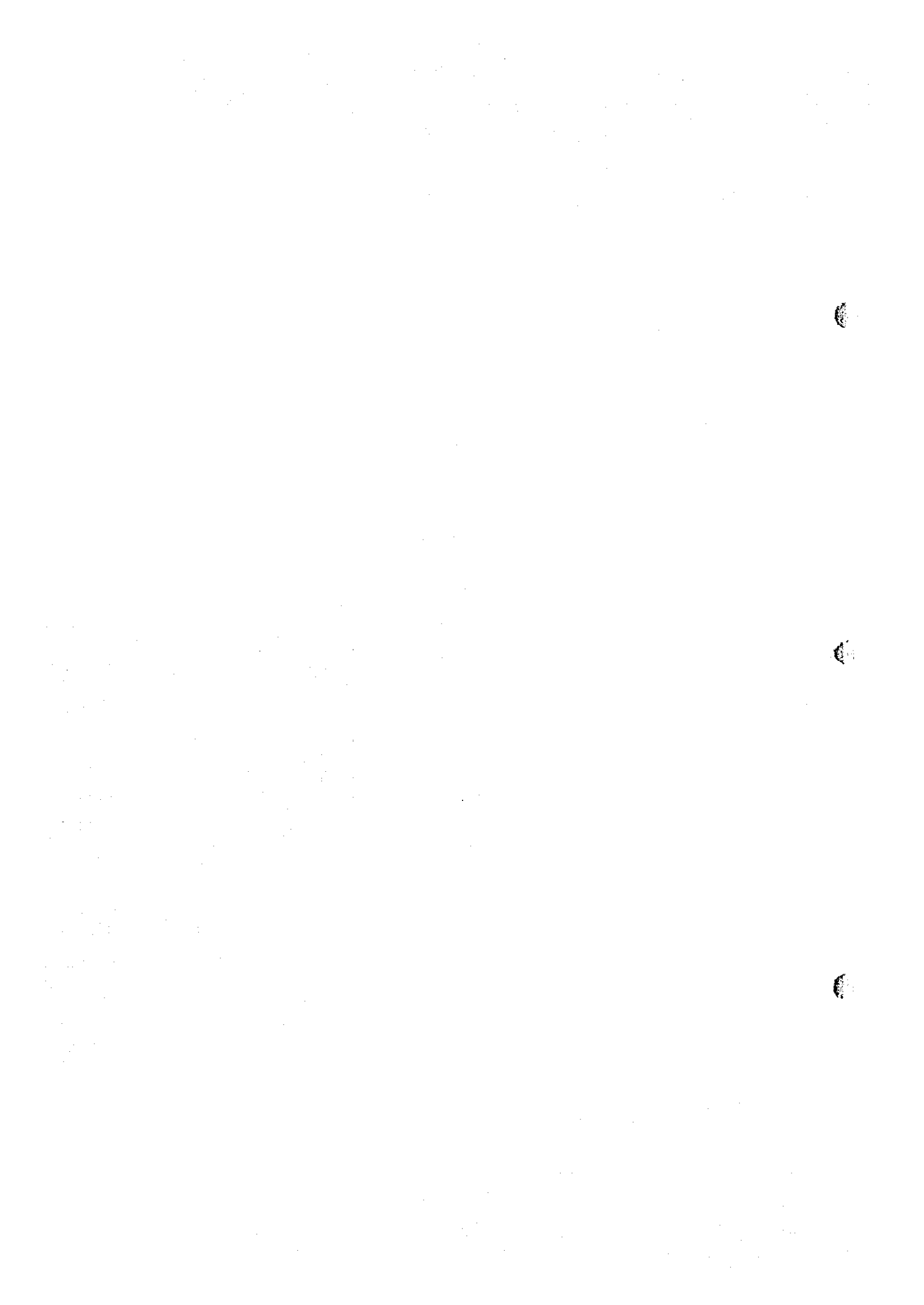
Note: ▲ : Operation Period (until 2003 and beyond)
 ▼ : Due Date

Fig.A-2-1 (2/3) Implementation Schedule (Institutional Measures)



Note : ▲ : Due Date
 : ■ : Operation Period (until 2003 and beyond)





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