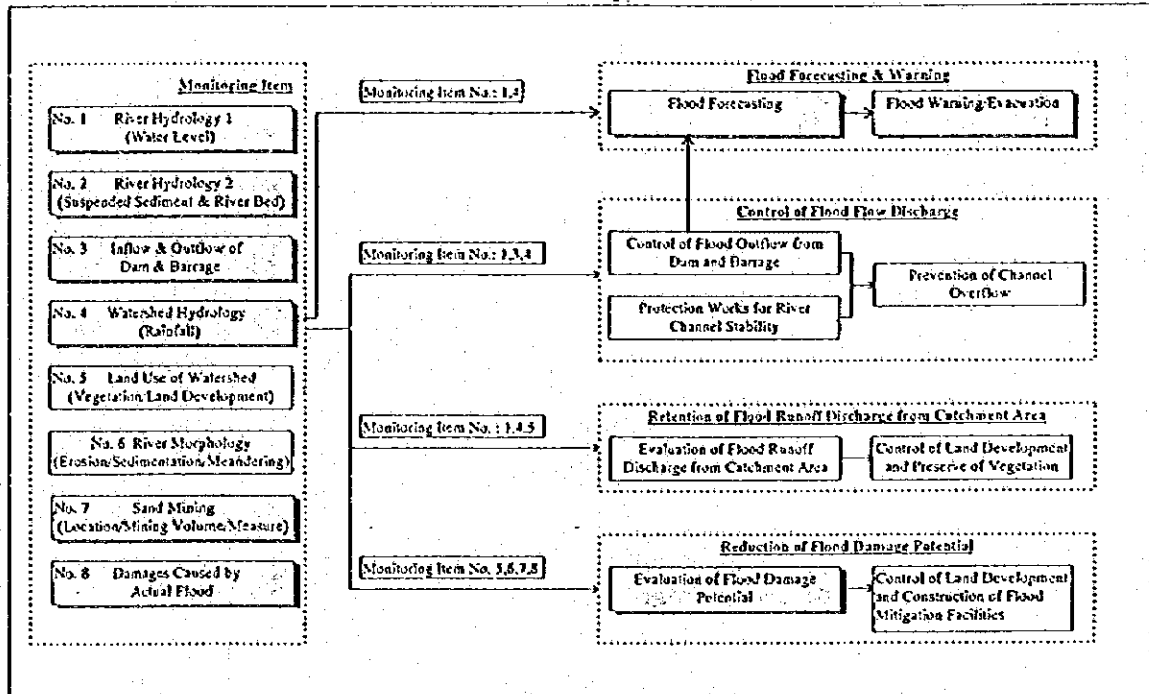
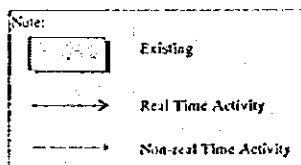
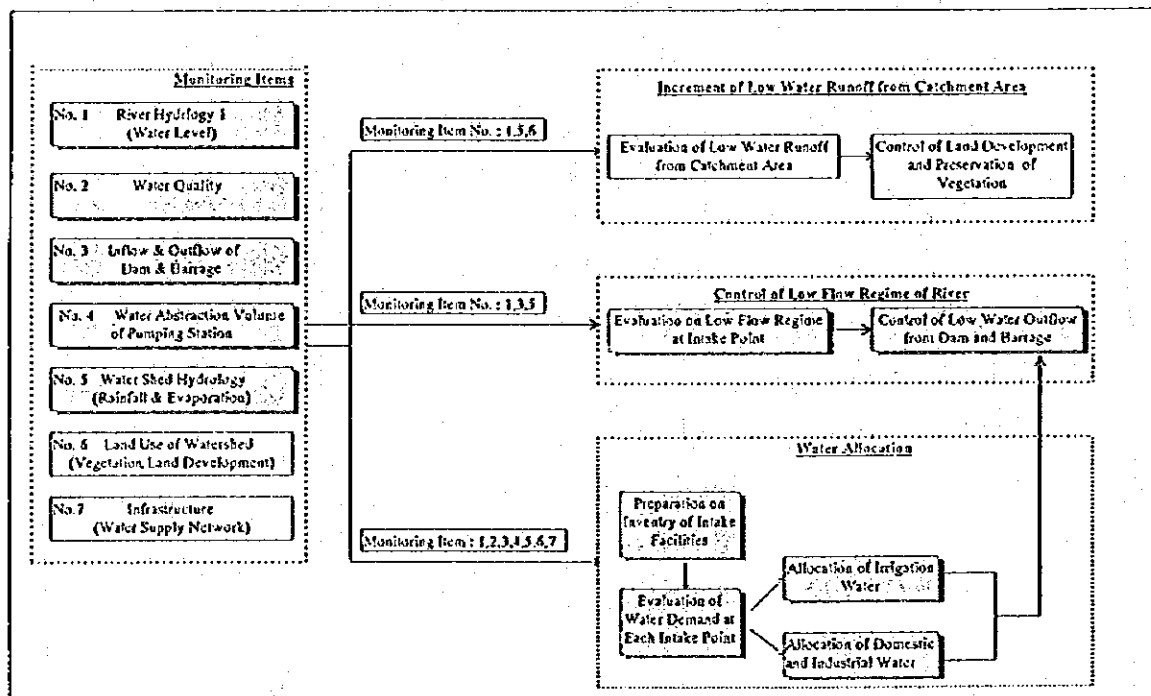


Flood Management



Water Resources Development Management

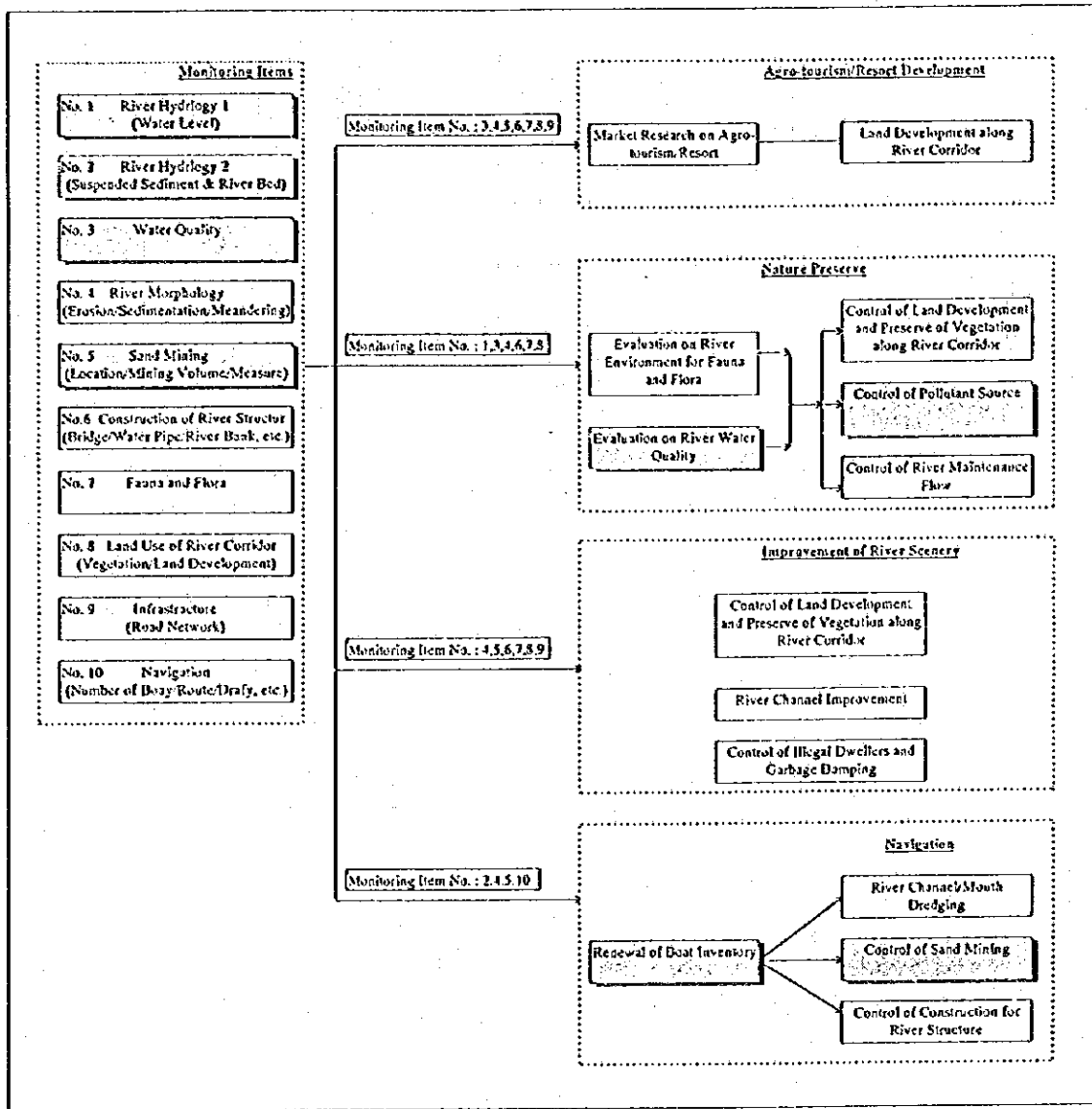


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

FIG. 9.3.1 (1/2)
DIAGRAM OF PROPOSED MONITORING SYSTEM

JAPAN INTERNATIONAL COOPERATION AGENCY

River Environmental Management

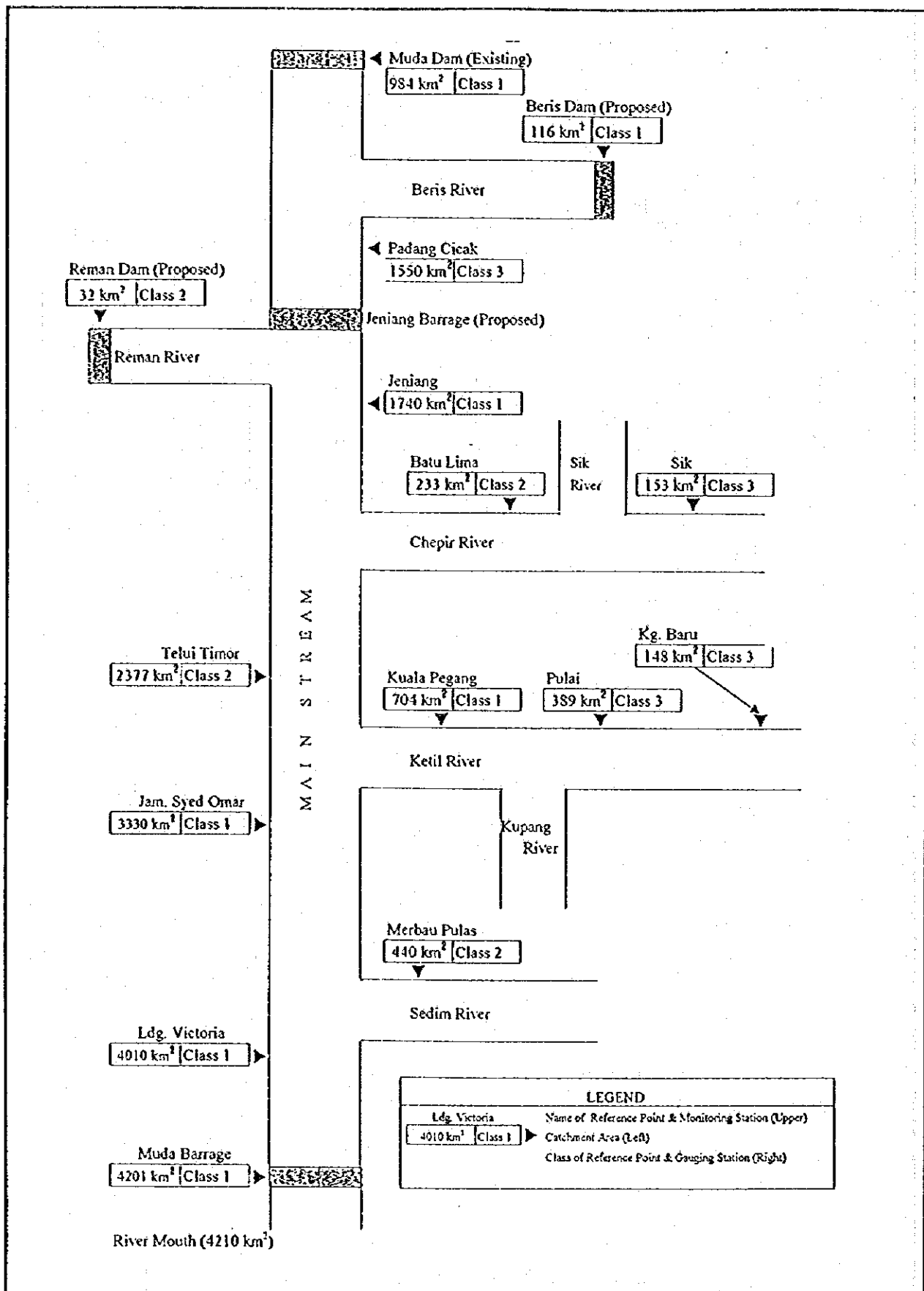


COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 9.3.1 (2/2)

DIAGRAM OF PROPOSED MONITORING SYSTEM

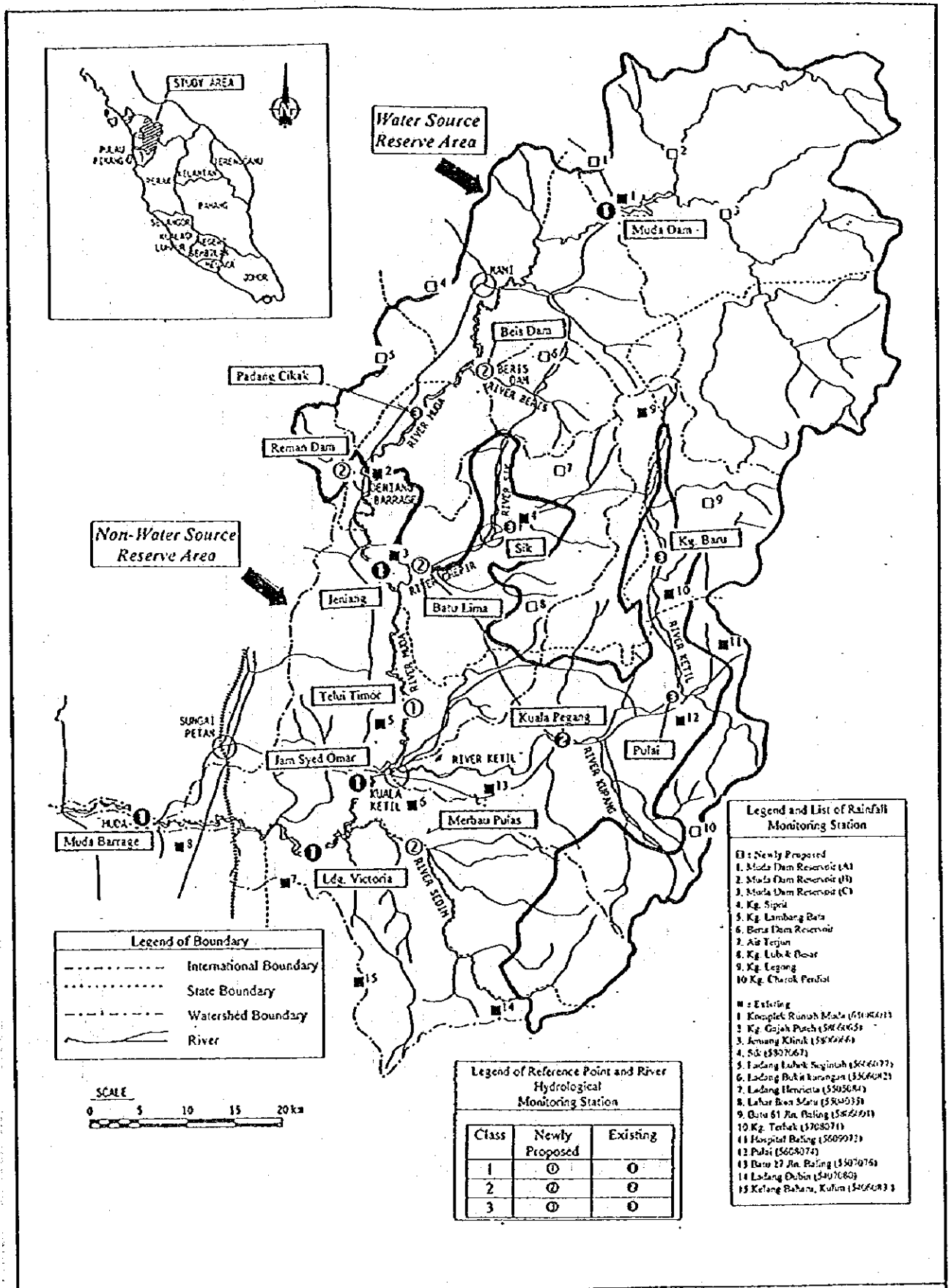


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 9.4.1

CONCEPTUAL DIAGRAM OF PROPOSED REFERENCE
POINTS AND RIVER HYDROLOGICAL GAUGING STATIONS



COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN

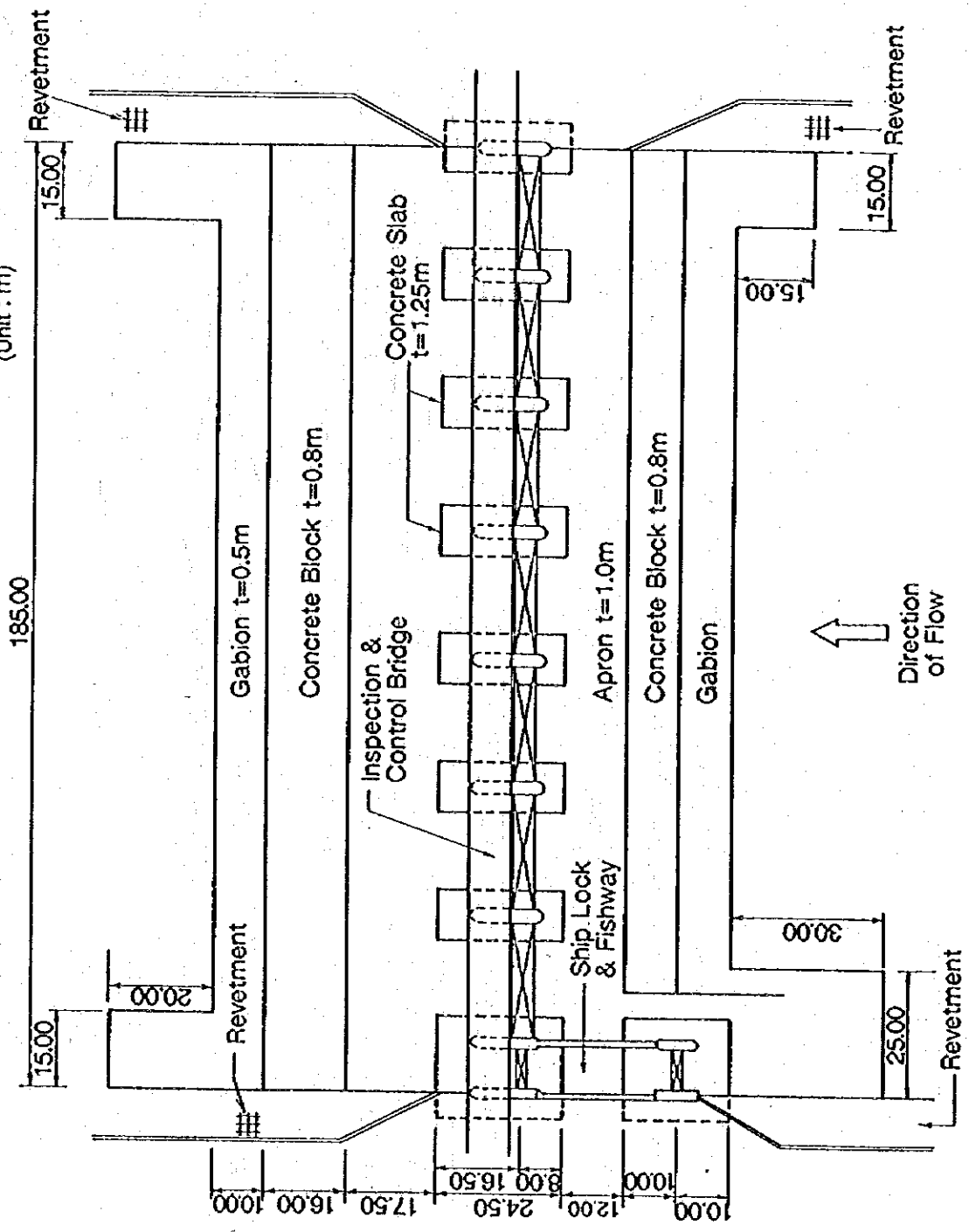
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 9.4.2

LOCATION OF PROPOSED REFERENCE POINTS AND HYDROLOGICAL MONITORING STATIONS

Plan

(Unit : m)

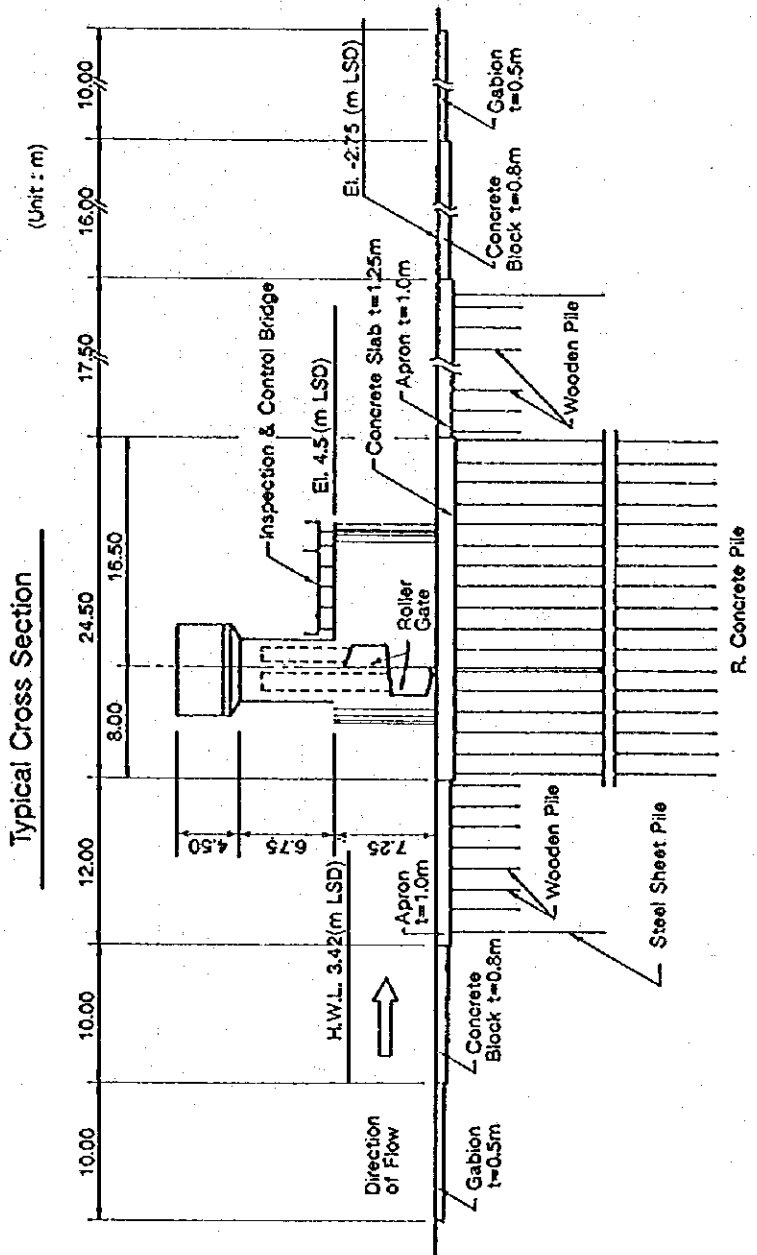
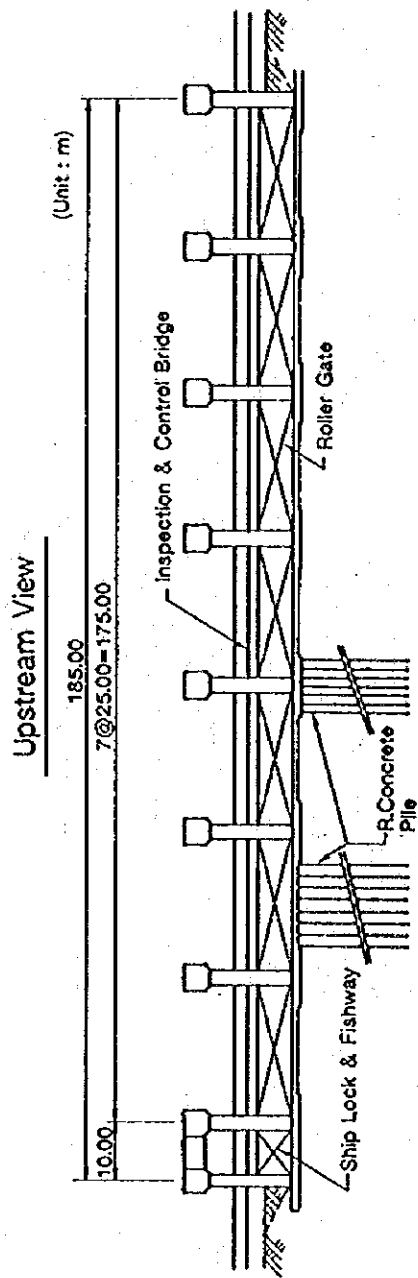


COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN

FIG. 11.1.1

PLAN OF NEW MUDA BARRAGE (LAYOUT)

JAPAN INTERNATIONAL COOPERATION AGENCY

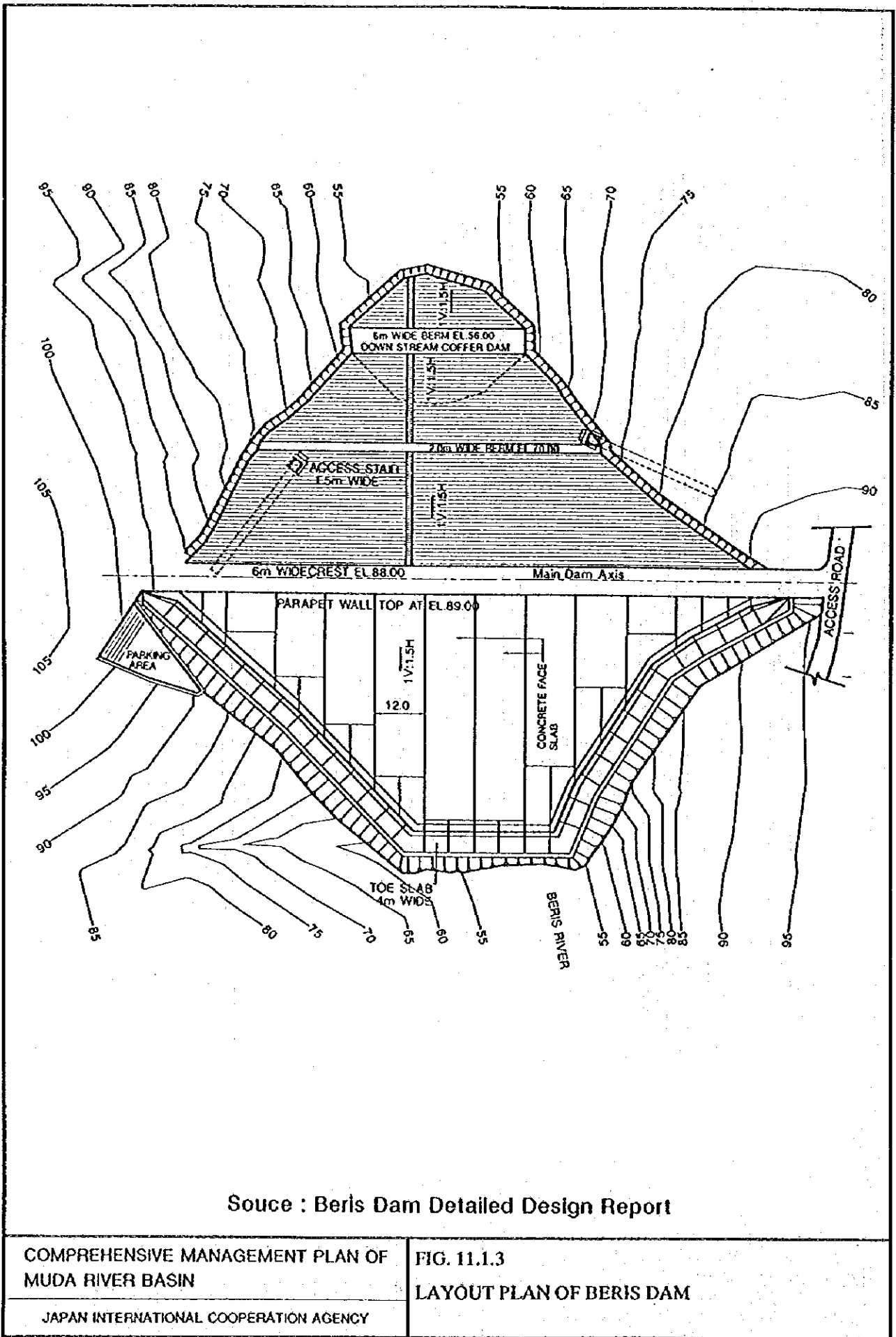


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 11.1.2

PLAN OF NEW MUDA BARRAGE (UPSTREAM
VIEW)

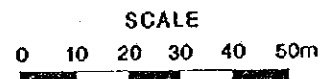
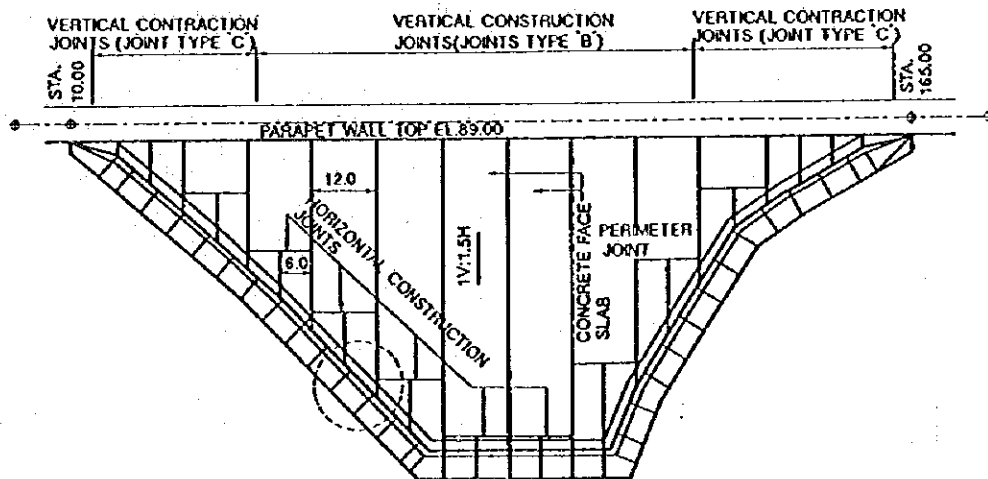
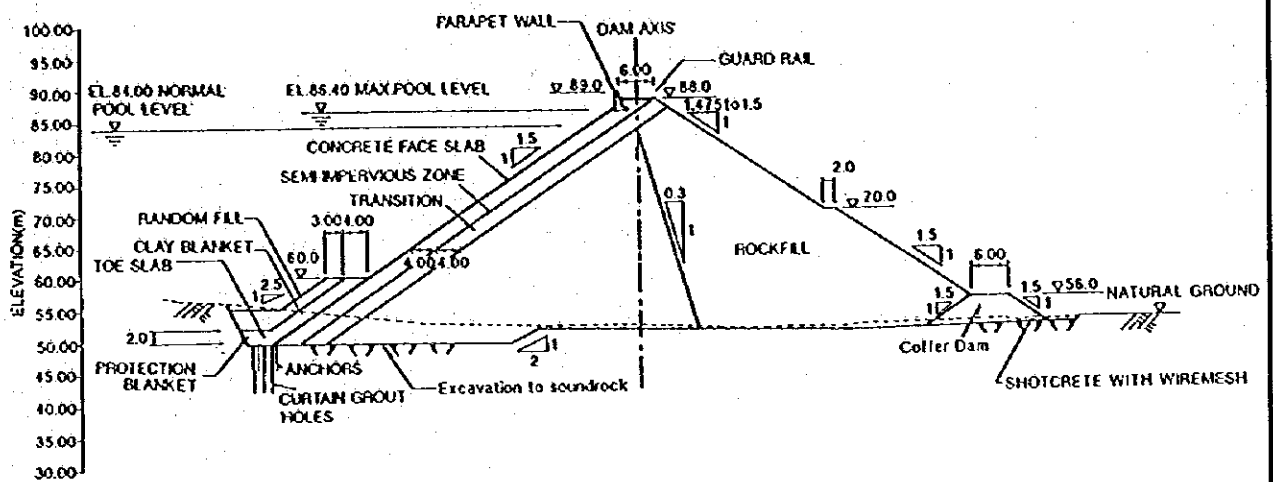


Source : Beris Dam Detailed Design Report

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

FIG. 11.1.3
LAYOUT PLAN OF BERIS DAM

JAPAN INTERNATIONAL COOPERATION AGENCY



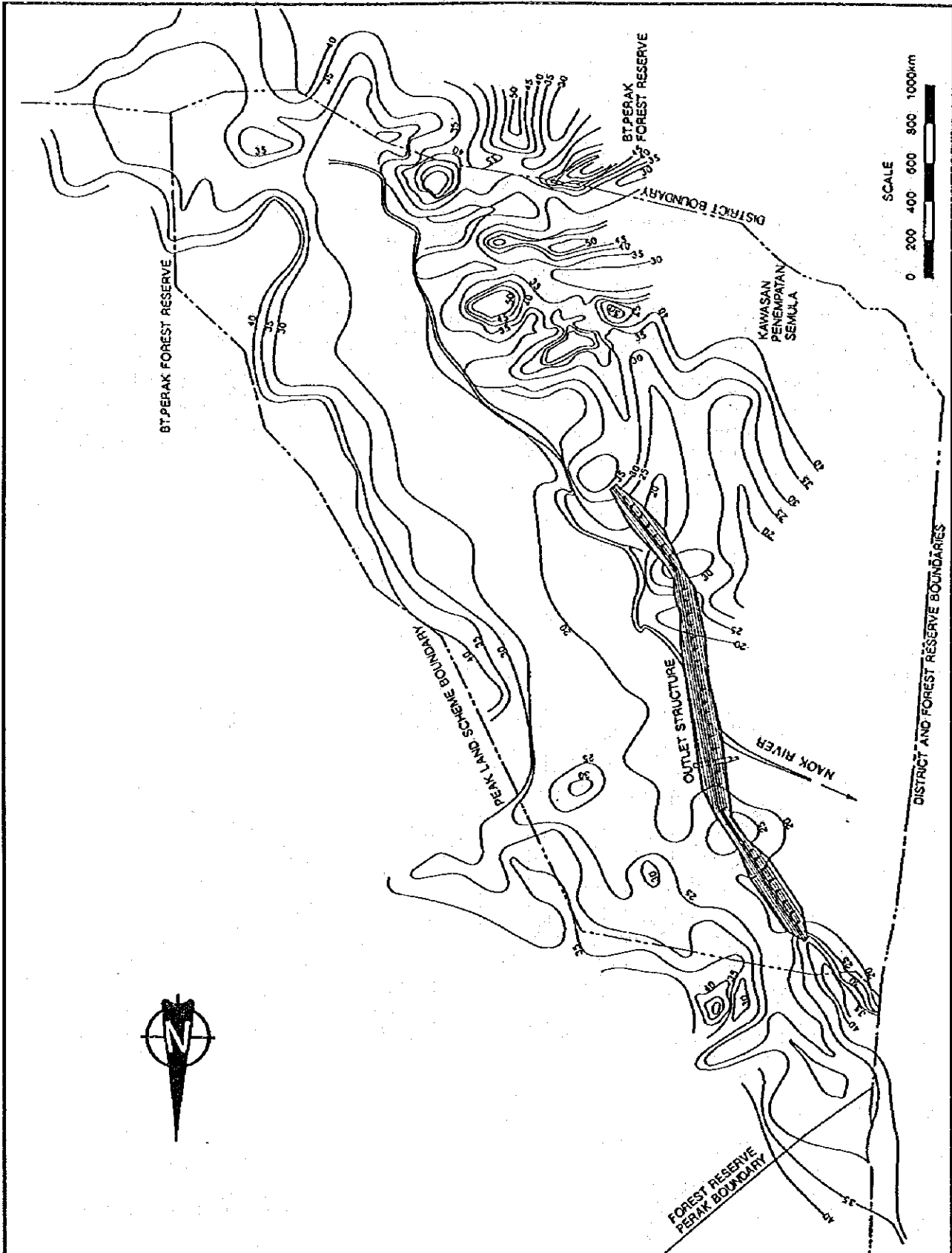
Source : Beris Dam Detailed Design Report

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 11.1.4

TYPICAL CROSS SECTION AND FACE-SLAB PLAN
BERIS DAM

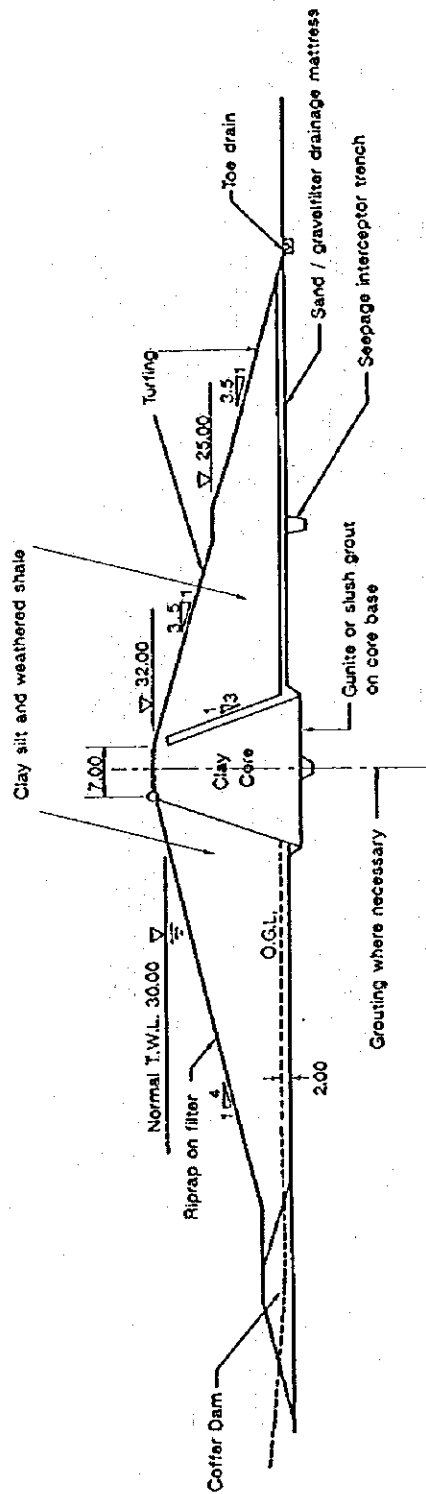


Source : F/S for Proposed Jenlang Diversion, Naok Reservoir and Transfer Canal

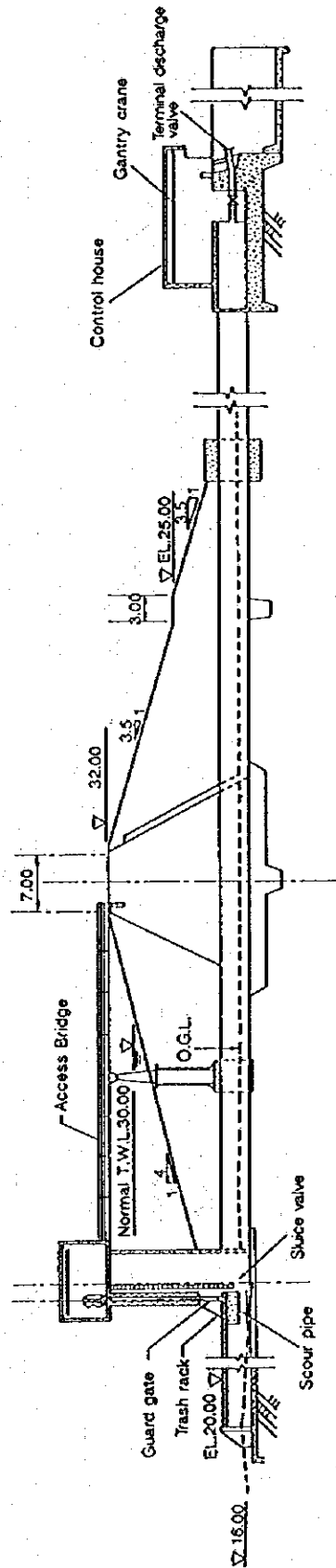
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

FIG. 11.1.5
SITE PLAN OF NAOK DAM (RESERVOIR)

JAPAN INTERNATIONAL COOPERATION AGENCY



CROSS SECTION OF DAM EMBANKMENT



CROSS SECTION OF DAM ALONG OUTLET WORKS/DIVERSION CULVERT

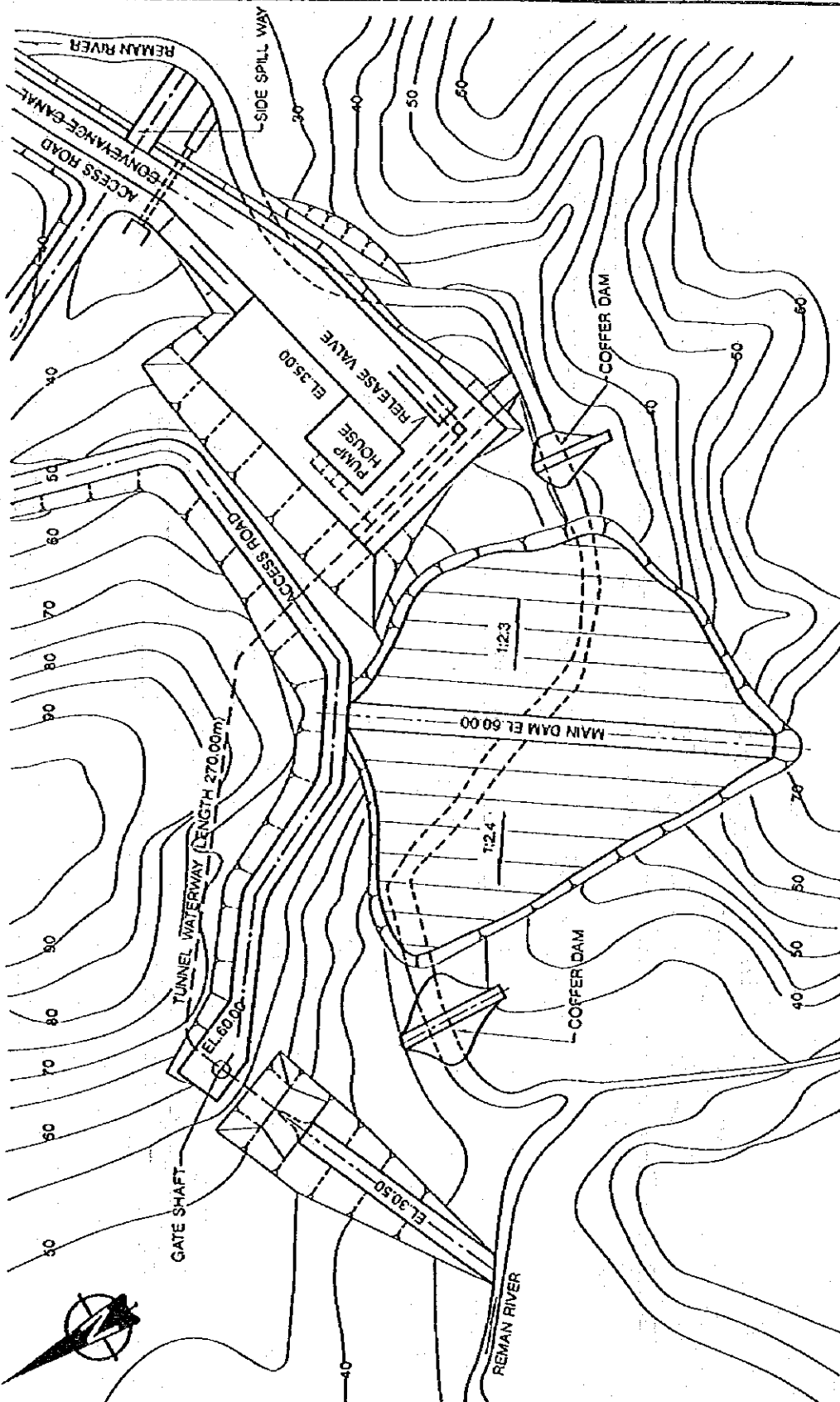
Source : F/S for Proposed Jenlang Diversion, Naok Reservoir and Transfer Canal

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 11.1.6

TYPICAL CROSS SECTION OF NAOK DAM



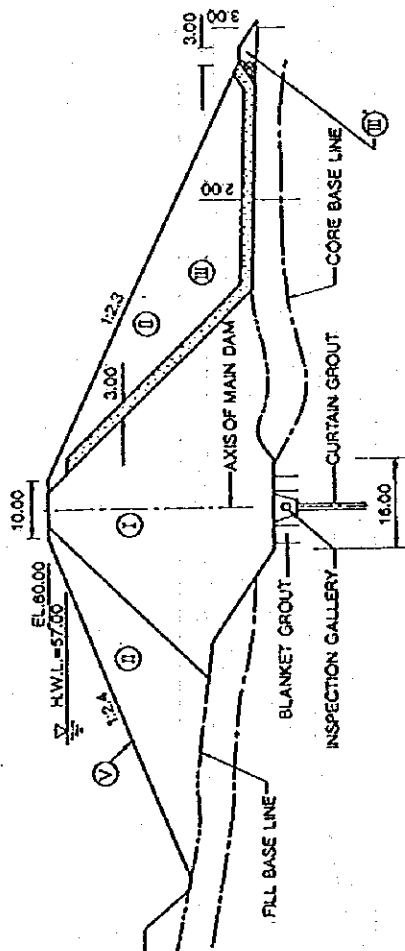
Source : Feasibility Study of Reman Reservoir Project

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

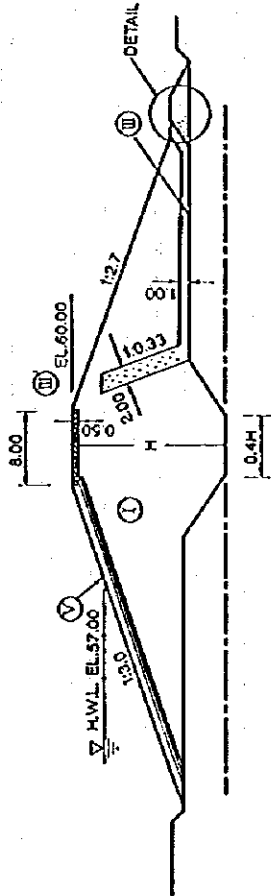
FIG. 11.1.7
LAYOUT PLAN OF REMAN DAM

JAPAN INTERNATIONAL COOPERATION AGENCY

- LEGEND**
- (I) IMPERVIOUS EARTHFILL
 - (II) SOFT ROCK SHELL
 - (III) FILTER
 - (IV) ROCK TRANSITION
 - (V) RIPRAP

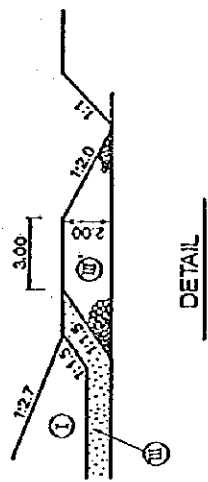


Main Dam



Saddle Dam

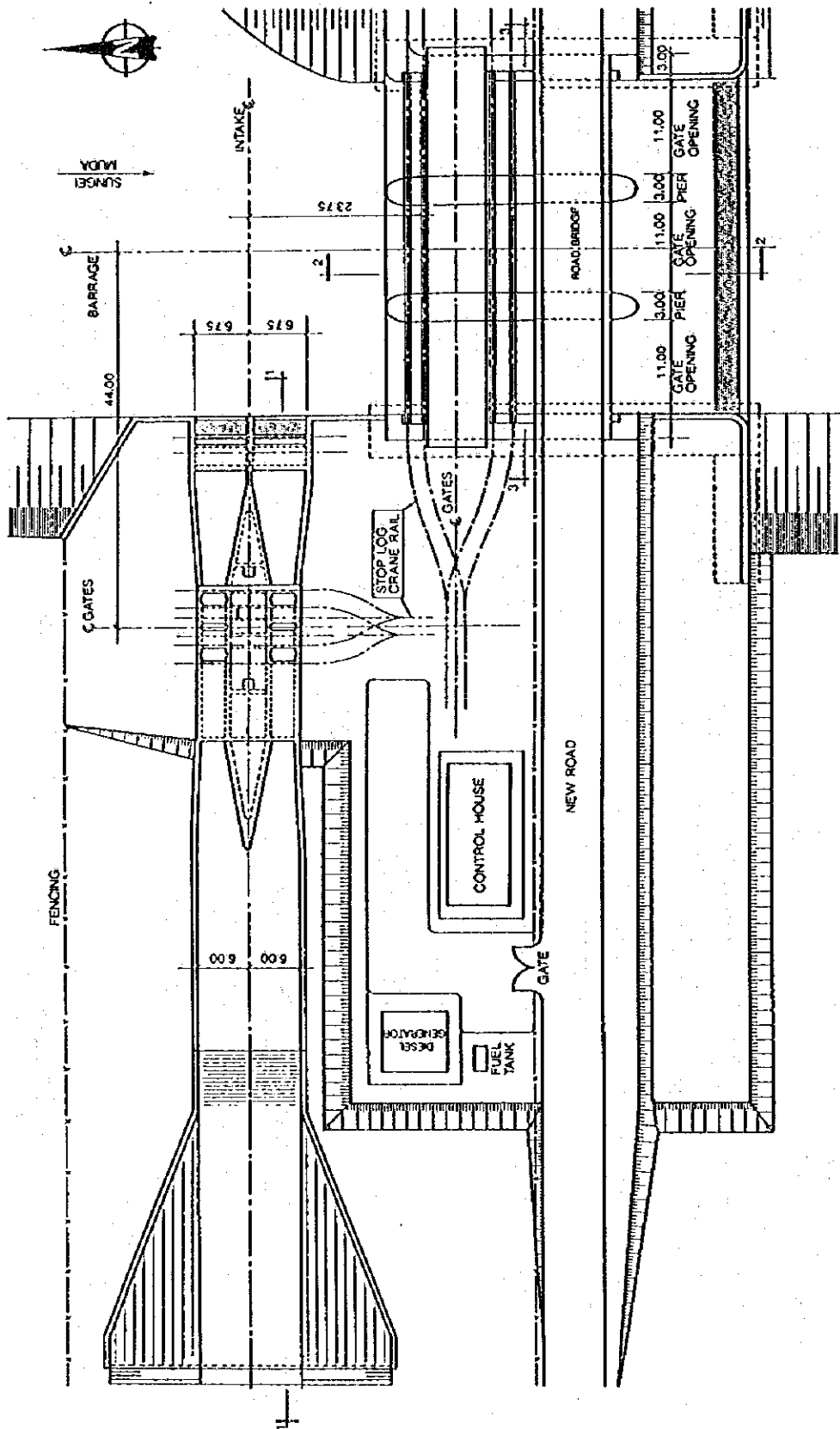
- LEGEND**
- (I) IMPERVIOUS
 - (II) FINE FILTER
 - (III) COARSE FILTER
 - (V) RIPRAP



DETAIL

Source : Feasibility Study of Reman Reservoir Project

<p>COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN</p>	<p>FIG. 11.1.8 TYPICAL CROSS SECTION OF REMAN DAM AND SADDLE DAM</p>
<p>JAPAN INTERNATIONAL COOPERATION AGENCY</p>	

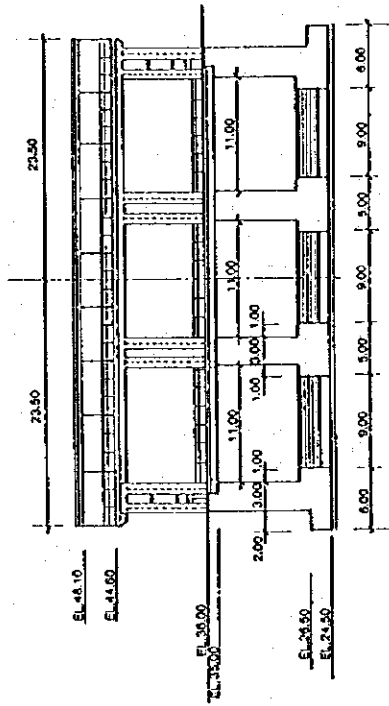
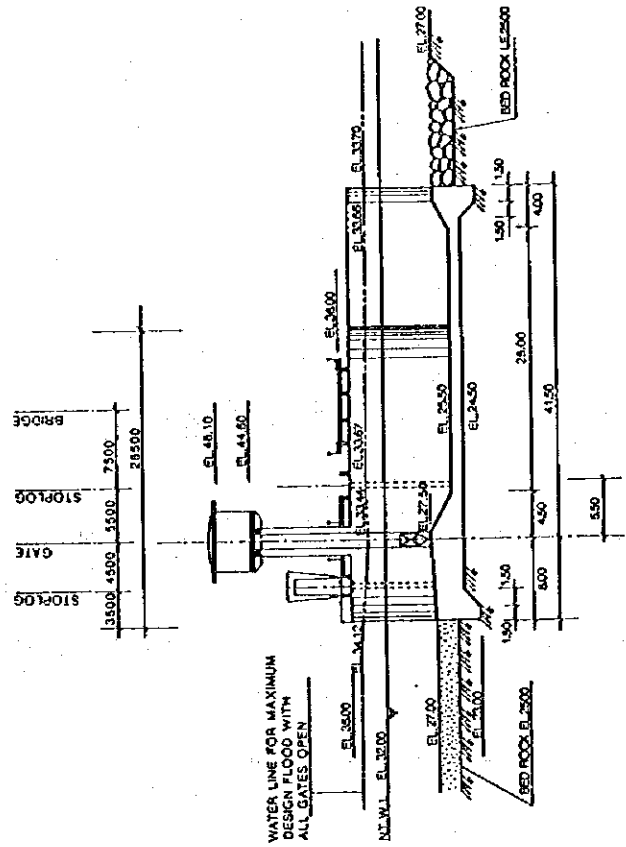
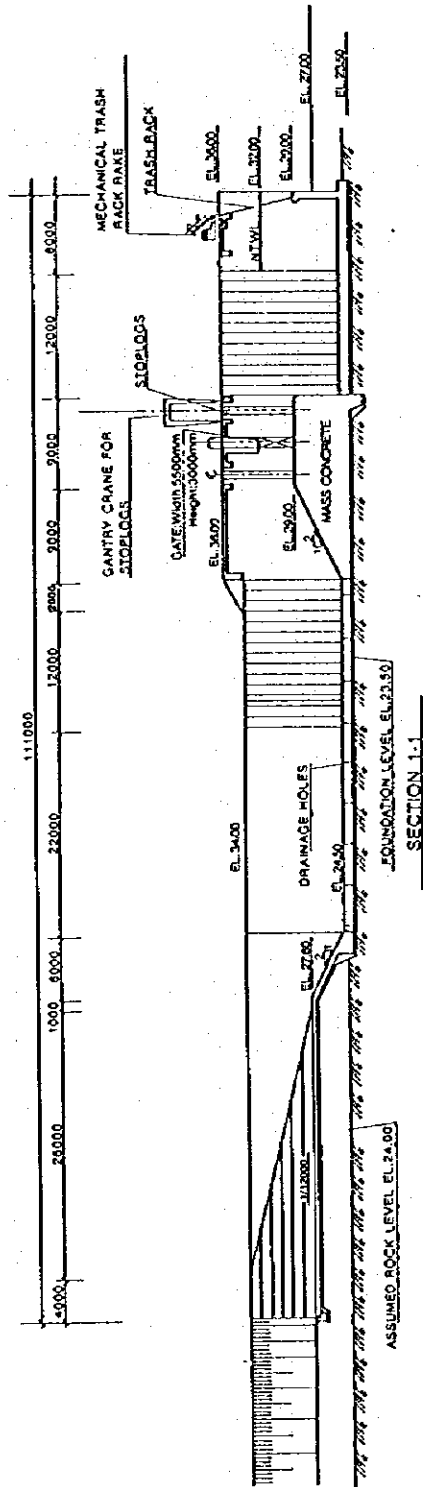


Source : F/S for Proposed Jeniang Diversion, Naok Reservoir and Transfer Canal

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

FIG. 11.1.9
PLAN VIEW OF JENIANG DIVERSION BARRAGE

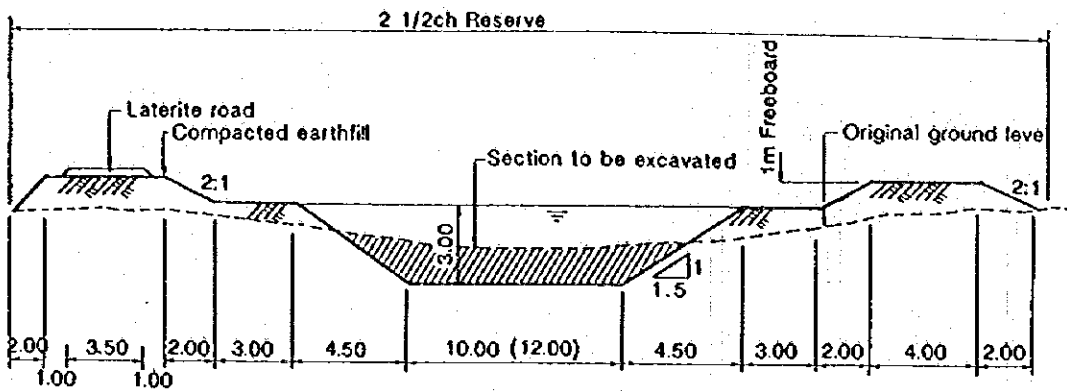
JAPAN INTERNATIONAL COOPERATION AGENCY



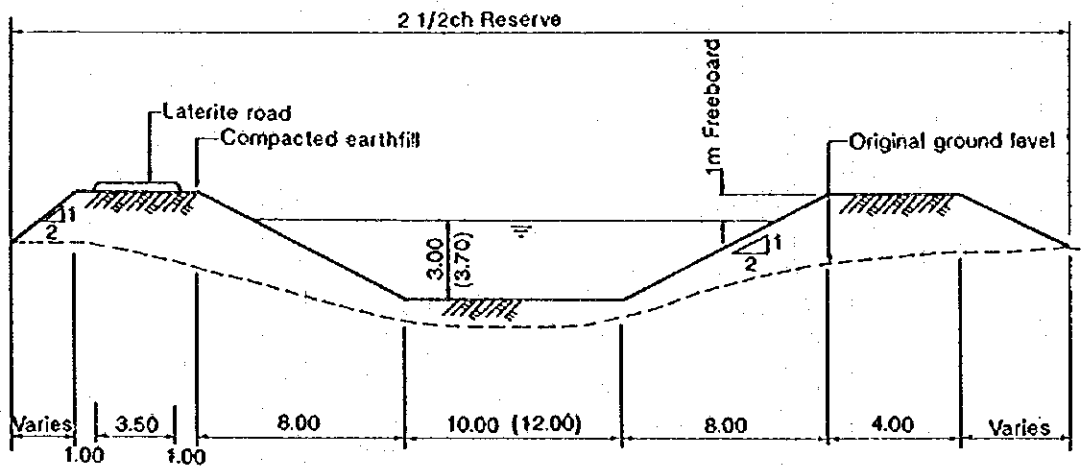
Source : F/S for Proposed Jenlang Diversion, Naok Reservoir and Transfer Canal

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 11.1.10
TYPICAL CROSS SECTION OF JENIANG DIVERSION
BARRAGE



CANAL SECTION IN CUT



CANAL SECTION IN FILL

Note:

Figures in parentheses refer to transfer canal

Source : F/S for Proposed Jeniang Diversion, Naok Reservoir and Transfer Canal

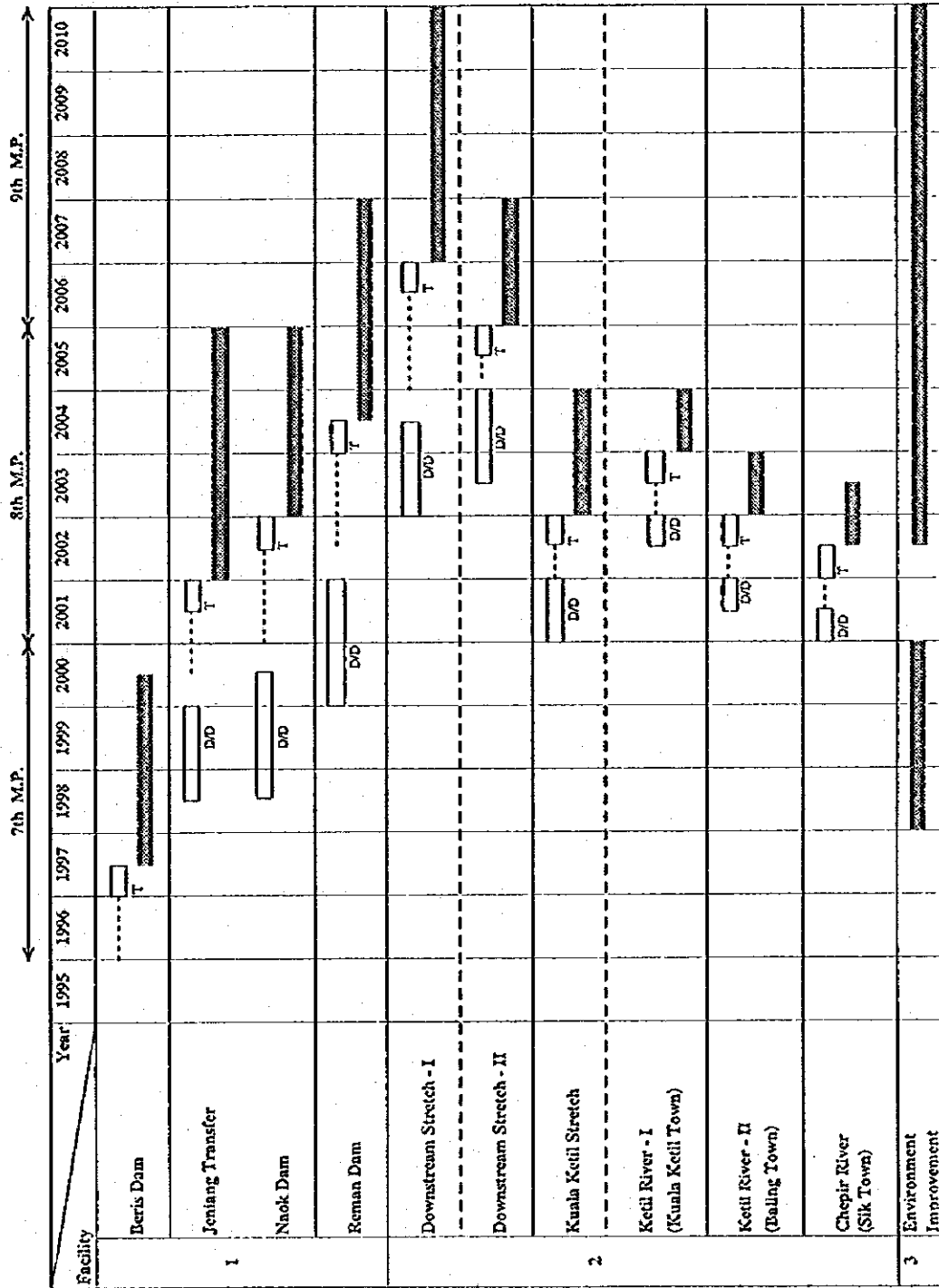
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

FIG. 11.1.11

TYPICAL CANAL SECTIONS OF JENIANG TRANSFER
SYSTEM

JAPAN INTERNATIONAL COOPERATION AGENCY

IMPLEMENTATION SCHEDULE



Legend: Land Acquisition
 Construction
 Design & Tender

Note: 1. Water Supply Facility
 2. Final Consent facility
 3. Environmental Improvement Facility
 D/D = Detailed Design
 T = Tender & Negotiation
 M.P. = Malaysian Plan

Stretch - I = River mouth to Loh - Victoria except for Stretch - II
 Stretch - II = Muah Dam and its adjacent section

COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN

FIG. 11.1.12 IMPLEMENTATION SCHEDULE

JAPAN INTERNATIONAL COOPERATION AGENCY

ANNEX
VOLUME 2
MAIN REPORT

**MEMBERS FOR STUDY ON COMPREHENSIVE MANAGEMENT PLAN
OF MUDA RIVER BASIN (1/3)**

Steering Committee

Name	Organization	Remarks
Mr. Kassim Sarbani	Economic Planning Unit	Chairman (Mar. 1994 - Aug. 1995)
Mr. Md. Rosnan Sulaiman	Economic Planning Unit	Chairman (Aug. 1995 - Present)
Puan Rosmah bte Jentra	Ministry of Agriculture	
Dato Hj. Mohd. Zain Osman	Economic Planning Unit, Kedah	
Ms. Siti Balkish Shariff	Economic Planning Unit, Penang	
Mr. Aminuddin Shah Hj. Ahmad	Department of Environment, Malaysia	
Ir. Teh Siew Keat	Department of Irrigation and Drainage, Malaysia	Secretary (Mar. 1994 - Sep. 1994)
Ir. Ahmad Fuad bin Embi	Department of Irrigation and Drainage, Malaysia	Secretary (Sep. 1994 - Present)

Technical Committee

Name	Organization	Remarks
Ir. Teh Siew Keat	Department of Irrigation and Drainage, Malaysia	Chairman (Mar. 1994 - Sep. 1994)
Ir. Ahmad Fuad bin Embi	Department of Irrigation and Drainage, Malaysia	Chairman (Sep. 1994 - Present)
	Federal Departments and Agencies	
Not Fixed	Ministry of Agriculture	
Not Fixed	Department of Environment	
Not Fixed	Department of Forestry	
Not Fixed	Malaysian Fisheries Development Authority	
Not Fixed	Department of Irrigation and Drainage, Muda Office	
	DID Headquarters	
Not Fixed	River Engineering Division	
Not Fixed	Irrigation Division	
Not Fixed	Coastal Engineering Division	
Not Fixed	Hydrology Division	
	Kedah State	
Not Fixed	Muda Agriculture Development Authority	
Not Fixed	Public Works Department	
Not Fixed	Department of Forestry	
Not Fixed	Department of Agriculture	
Not Fixed	Malaysian Fisheries Development Authority	
Not Fixed	Marine Department	
	Penang State	
Not Fixed	Penang Water Authority	
Not Fixed	Department of Forestry	
Not Fixed	Department of Environment	
Not Fixed	Department of Agriculture	
Not Fixed	Malaysian Fisheries Development Authority	
Not Fixed	Marine Department	

**MEMBERS FOR STUDY ON COMPREHENSIVE MANAGEMENT PLAN
OF MUDA RIVER BASIN (2/3)**

Counterparts for the Study from DID Headquarters Malaysia

Name	Organization	Remarks
Ir. Chop Ai Kuang	River Engineering Division	
Mr. Ng. Kim Hoy	River Engineering Division	
Mr. Mohd. Redzuan Husin	River Engineering Division	
Mr. Abdul Razak Rashid	River Engineering Division	
Ir. Chan Choong Cheong	Irrigation Department	
Ir. Chiew Kee Lin	Irrigation Department	
Ir. Law Kong Fook	Hydrology Division	
Ir. Chong Sun Patt	Hydrology Division	
Mr. Hideaki KAWASAKI	JICA Expert	
Mr. Hiroyuki SHINDO	JICA Expert	

Counterparts for the Study from Kedah State

Name	Organization	Remarks
Ir. John Abraham	Department of Irrigation and Drainage	
Mr. Mohd. Abdul Nasir Bidin	Department of Irrigation and Drainage, Muda Office	
Ir. Tajuddin Harun	Water Works	
Ir. Foong Kam Cheong	Muda Agricultural Department Authority	
Mr. Lee Kee Hock	Department of Irrigation and Drainage	
Mr. Khalid Ahmad	Department of Irrigation and Drainage	

Counterparts for the Study from Penang State

Name	Organization	Remarks
Mr. Kan Cheong Weng	Penang Water Authority	
Ir. Nasir Merican	Department of Irrigation and Drainage	

**MEMBERS FOR STUDY ON COMPREHENSIVE MANAGEMENT PLAN
OF MUDA RIVER BASIN (3/3)**

JICA Advisory Committee

Name	Organization	Remarks
Mr. Junzo SAGO	Ministry of Construction	Chairman/ Watershed Management Planner
Mr. Kiyohiko UJIE	Ministry of Construction	Institutional Planner
Mr. Kesajiro YANAGISAWA	Ministry of Construction	River Planner
Mr. Kiyotaka OTSUKI	JICA	Coordinator (Mar. 1994 - Mar. 1995)
Mr. Hedeki TANABE	JICA	Coordinator (Jan. 1994 - Present)

JICA Study Team

Name	Organization	Remarks
Mr. Katsuhisa ABE	CTI Engineering Co., LTD.	Team Reader
Mr. Makihiko OTOGAWA	CTI Engineering Co., LTD.	Asst. Team Leader/ Watershed Management Planner
Mr. Masami KATAYAMA	CTI Engineering Co., LTD.	Flood Mitigation Planner
Mr. Kenichiro KONDO	CTI Engineering Co., LTD.	Hydrologist/Hydraulic Engineer
Mr. Kazuhiko HONDA	INA Corporation	Water Resources Management Planner
Mr. Hiroshi OKADA	INA Corporation	River Environmental Management Planner
Mr. Seiichi YAMAKAWA	INA Corporation	Structural Engineer/Cost Estimator
Mr. Kinichi OHNO	CTI Engineering Co., LTD.	Socio-economist/Project Evaluator
Mr. Sich Kou Chi	CTI Engineering Co., LTD.	Institutional Planner
Mrs. Tomoko SUZUKI	CTI Engineering Co., LTD.	Coordinator

JICA