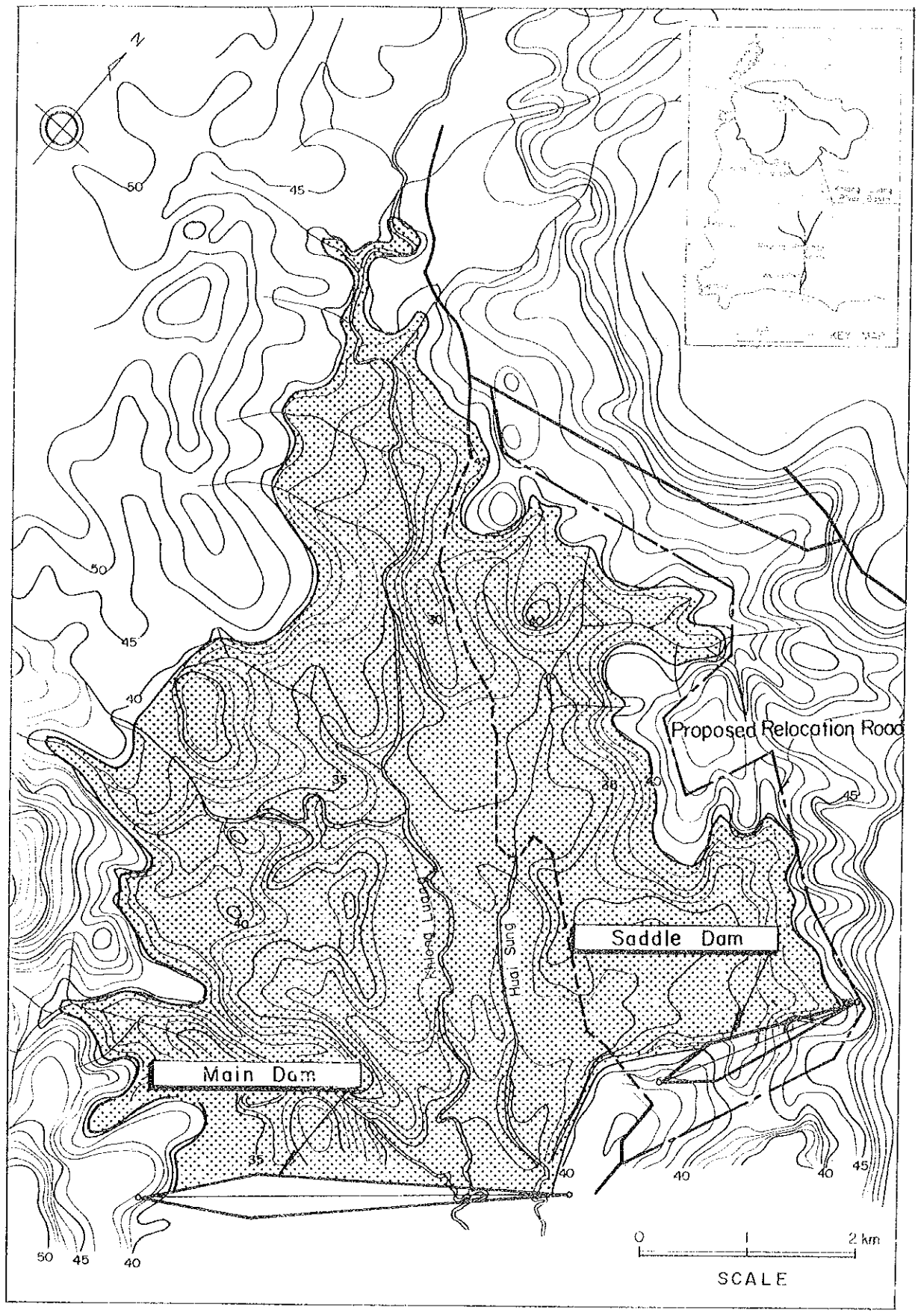
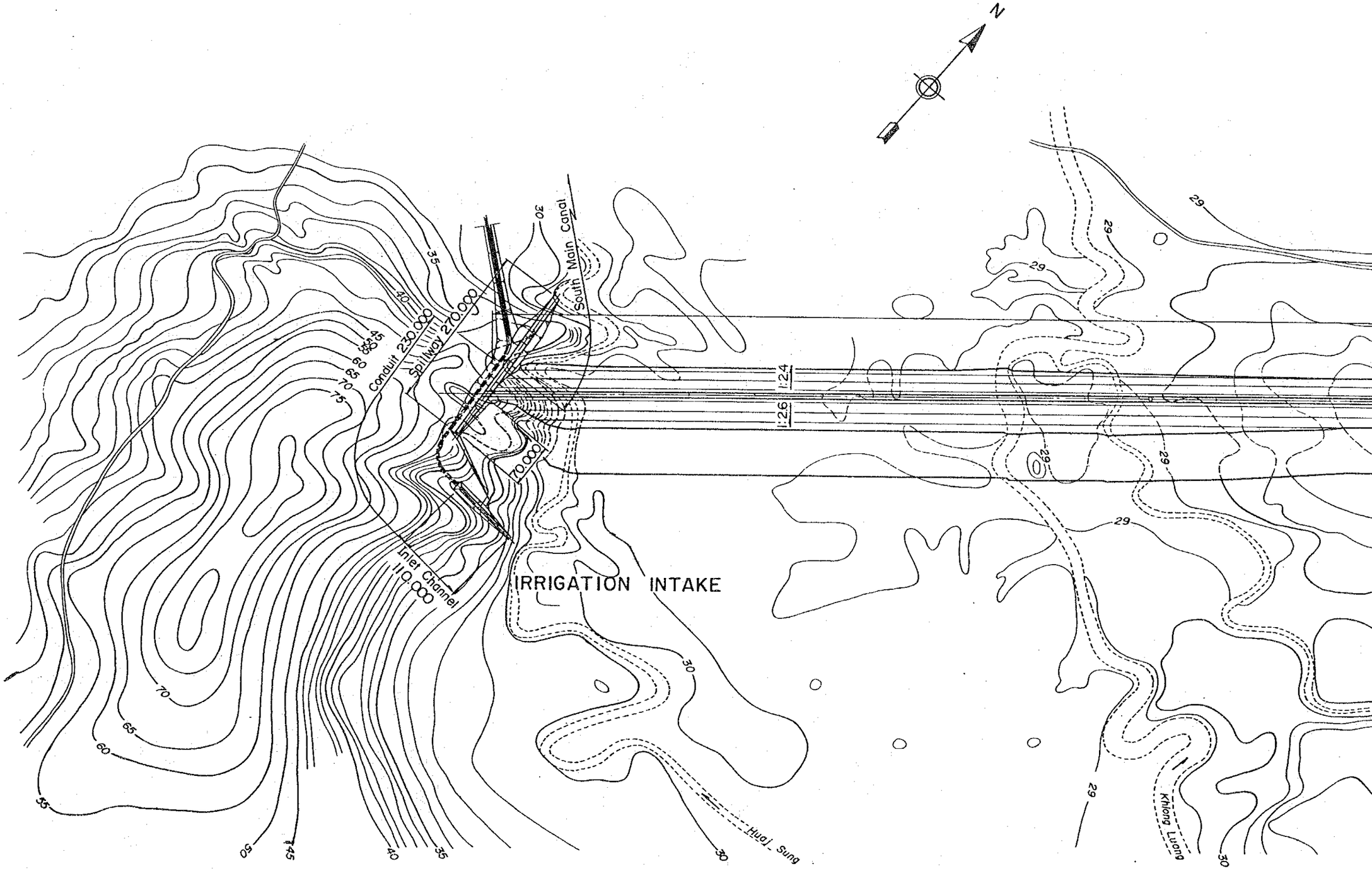
DRAWINGS



KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG MAP OF RESERVOIR AREA
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. No. I-1


N
Conduit 230.000
Spillway 270.000
South Main Canal
Inlet Channel
110.000
170.000
IRRIGATION INTAKE
1:2.6
1:2.4
1:2.1
Huai Sung
Khlong Luang
30
35
40
45
50
55
60
65
70
29

N

Crest Length 3,820.000

North Main Canal

Conduit 60.000

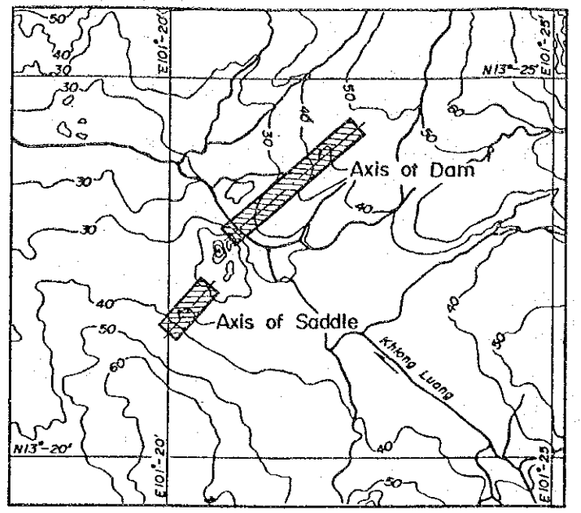
IRRIGATION INTAKE

Approach Channel 970.000

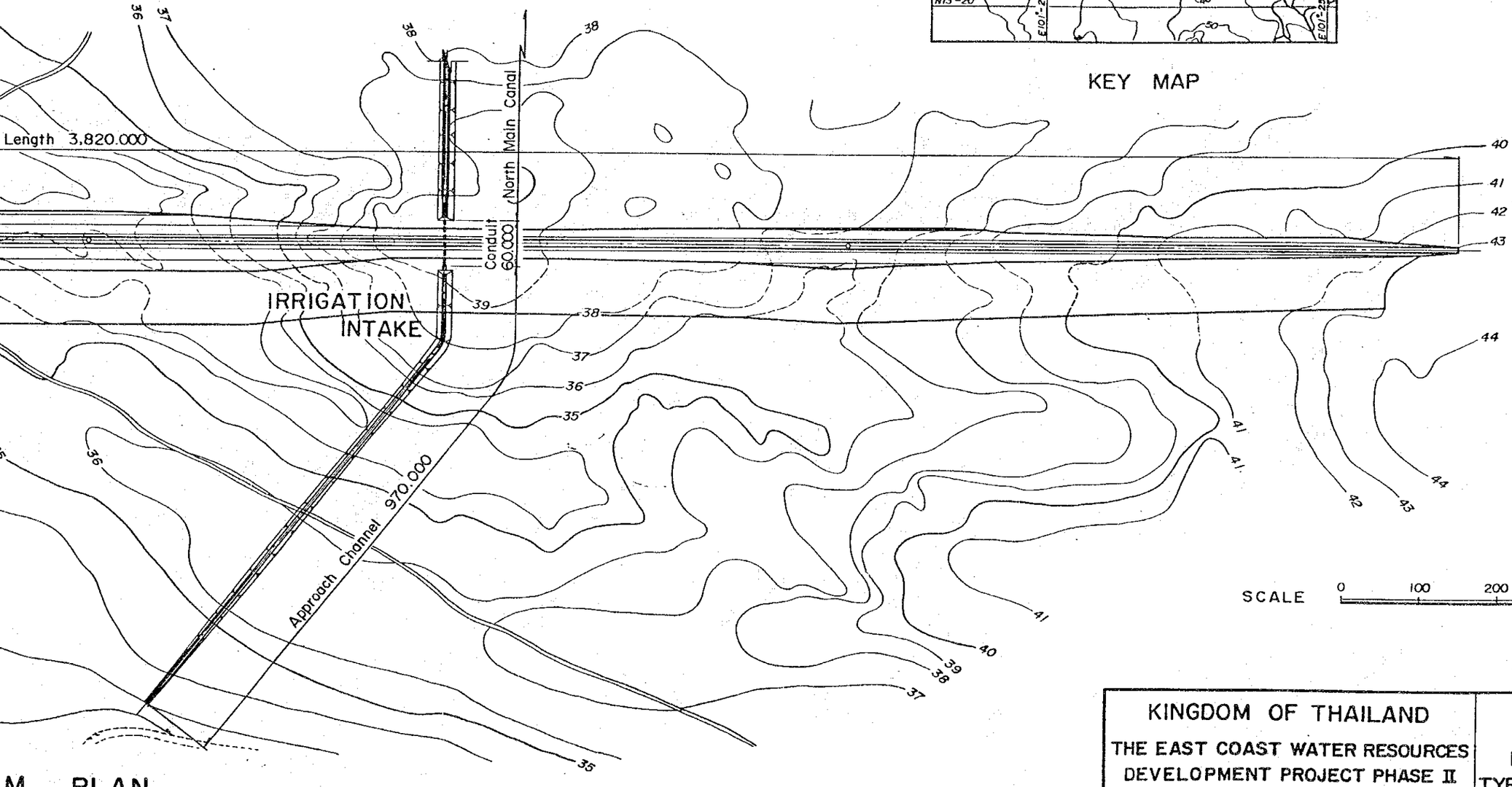
Khlong Luang

N13°-20'

MAIN DAM , PLAN

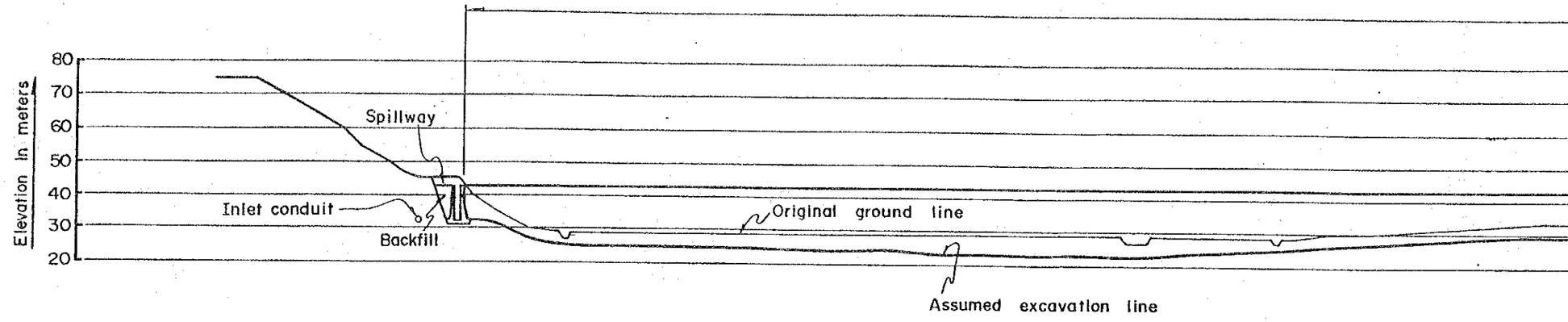


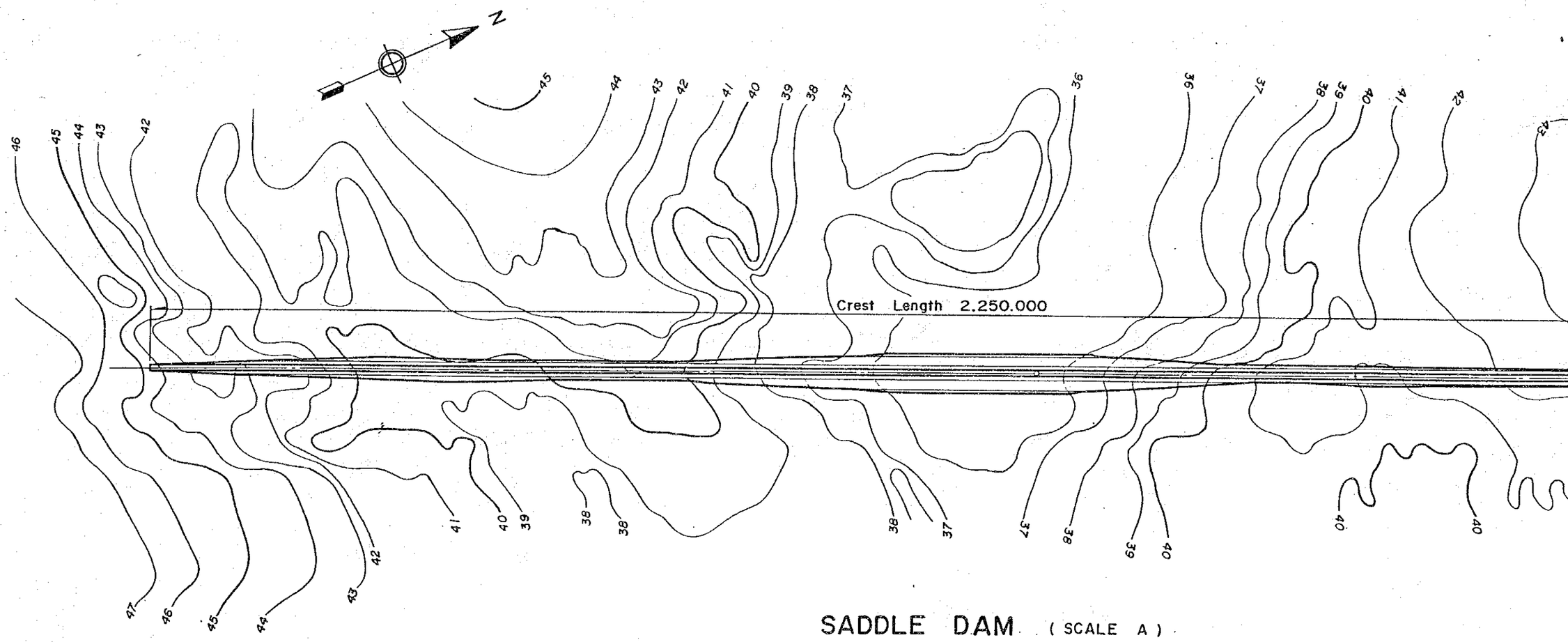
KEY MAP



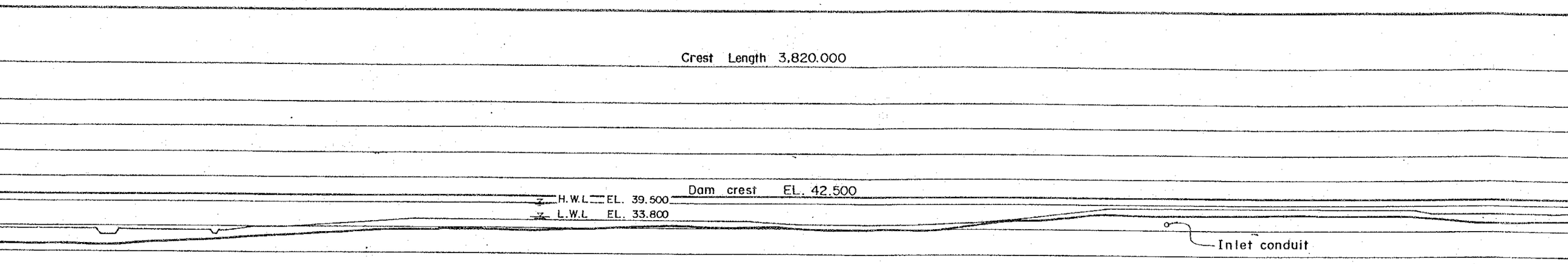
AM , PLAN

KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG DAM PLAN, PROFILE AND TYPICAL CROSS SECTION(1/2)
JAPPAN INTERNATIONAL COOPERATION AGENCY	D.W.G. NO. 1-2



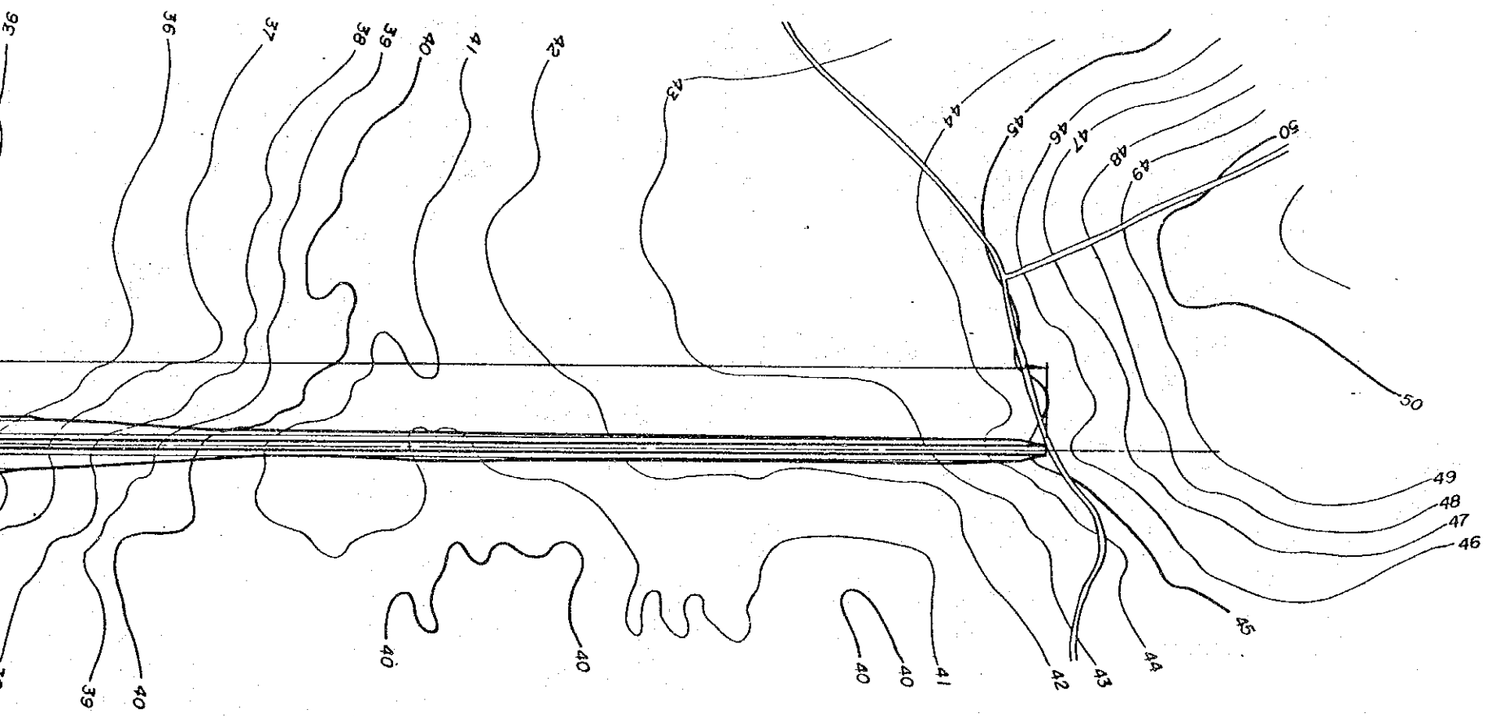


SADDLE DAM (SCALE A)

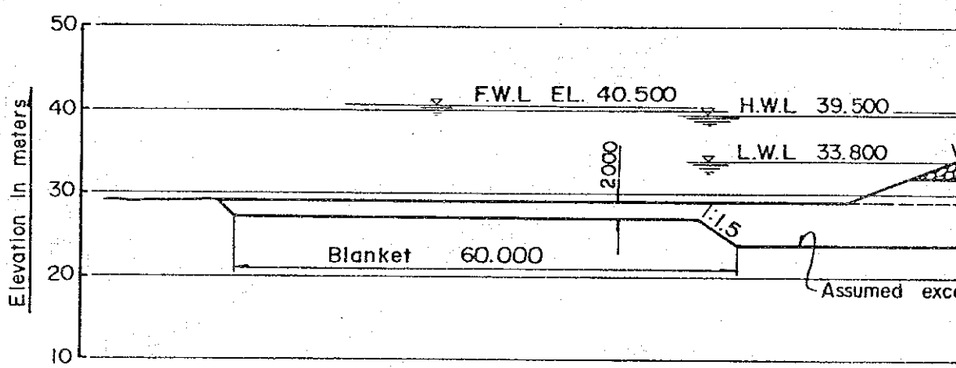


d excavation line

MAIN DAM, PROFILE (SCALE A)



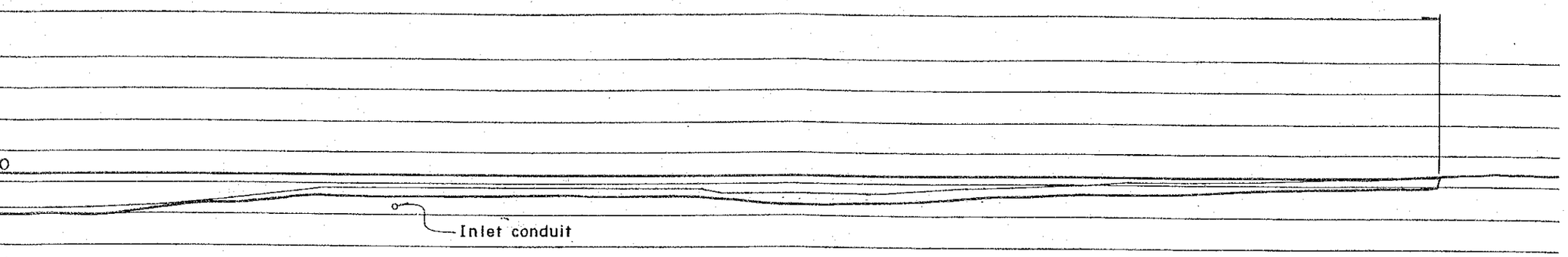
SCALE A)



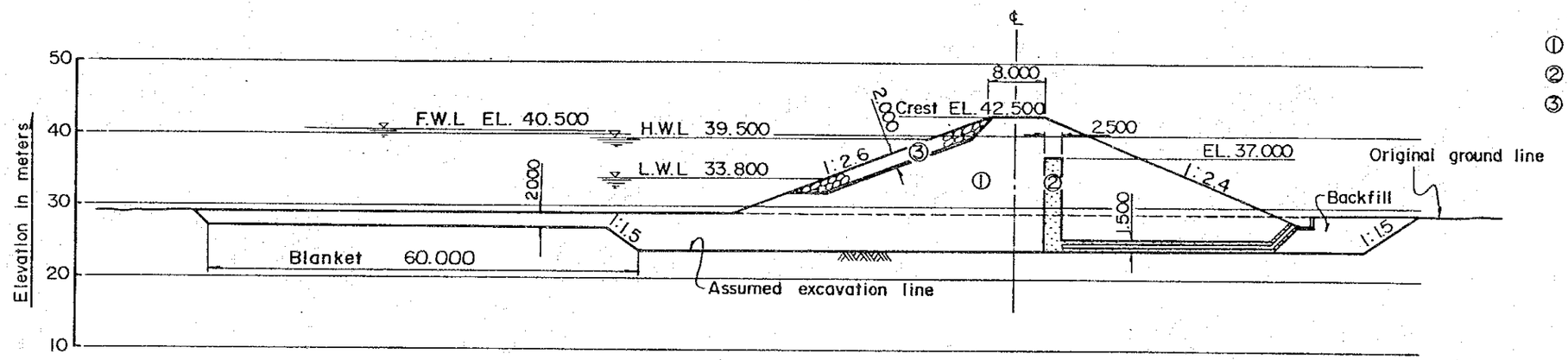
TYPICAL CR

SCALE A 0 100 200 300

SCALE B 0 10 20 30 40



ROFILE (SCALE A)

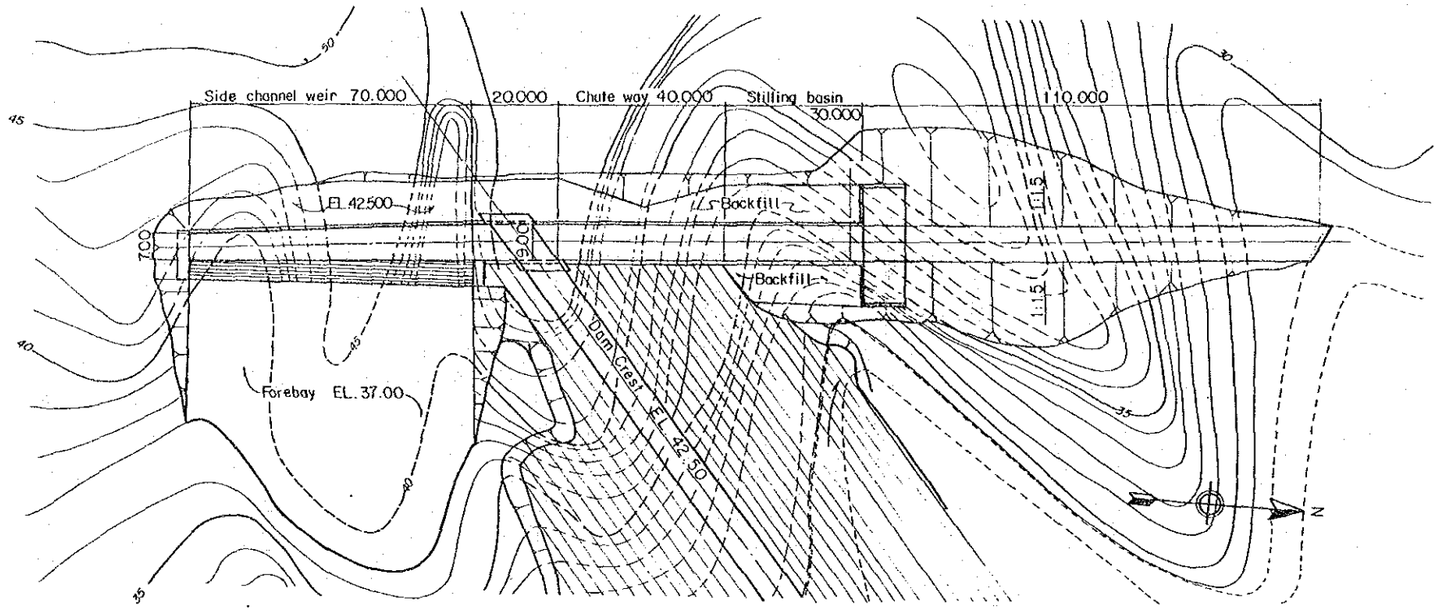


TYPICAL CROSS SECTION (SCALE B)

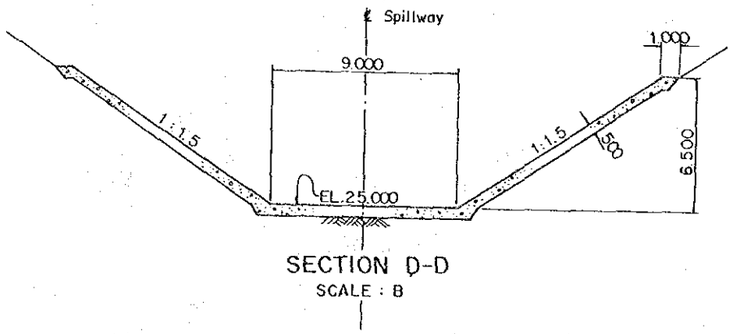
SCALE A 0 100 200 300 400 m

SCALE B 0 10 20 30 40 50 m

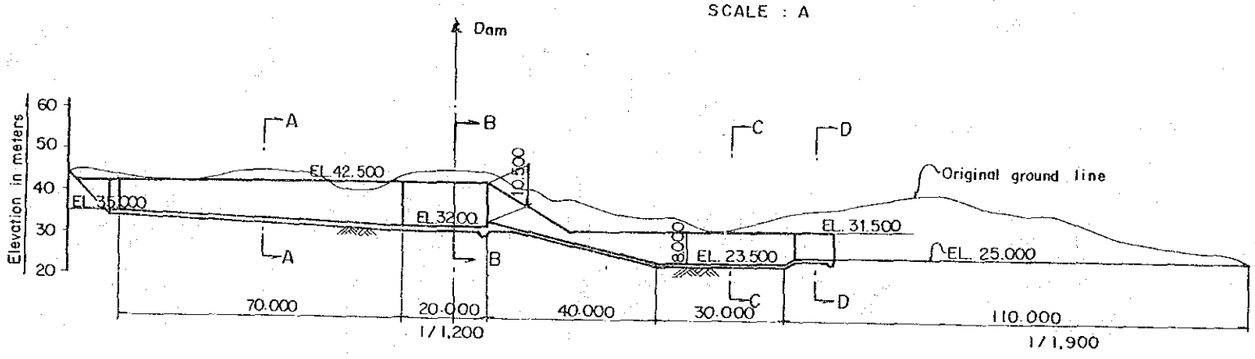
KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG DAM PLAN, PROFILE AND TYPICAL CROSS SECTION (2/2)
JAPPAN INTERNATIONAL COOPERATION AGENCY	D.W.G. NO. 1-2



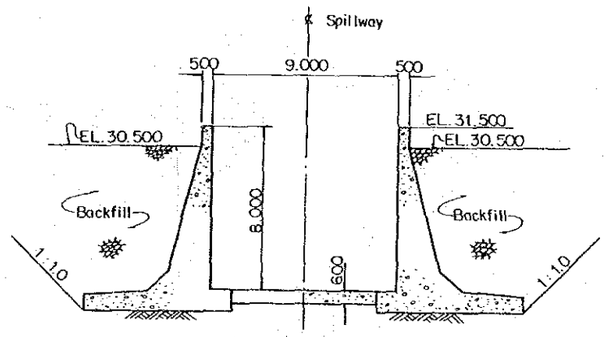
PLAN
SCALE : A



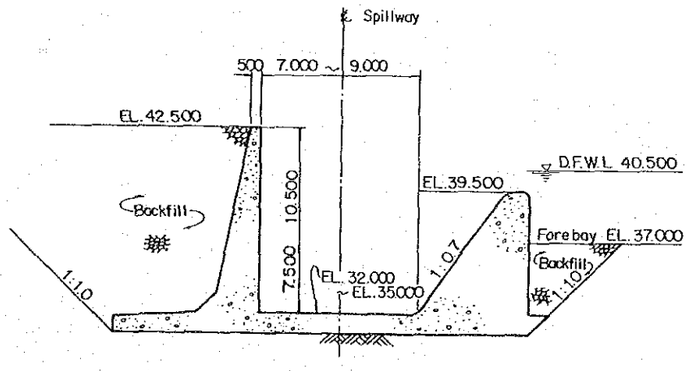
SECTION D-D
SCALE : B



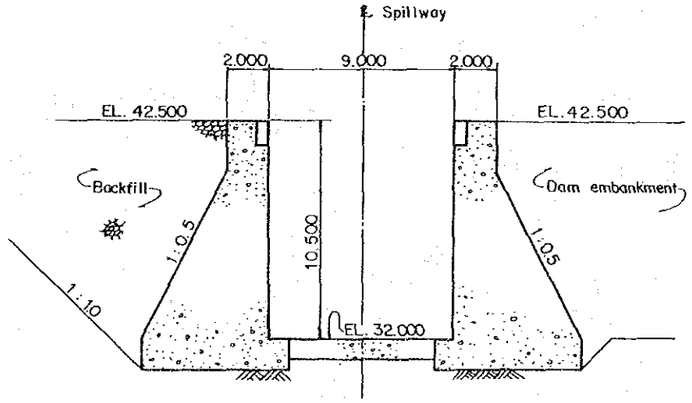
PROFILE
SCALE : A



SECTION C-C
SCALE : B



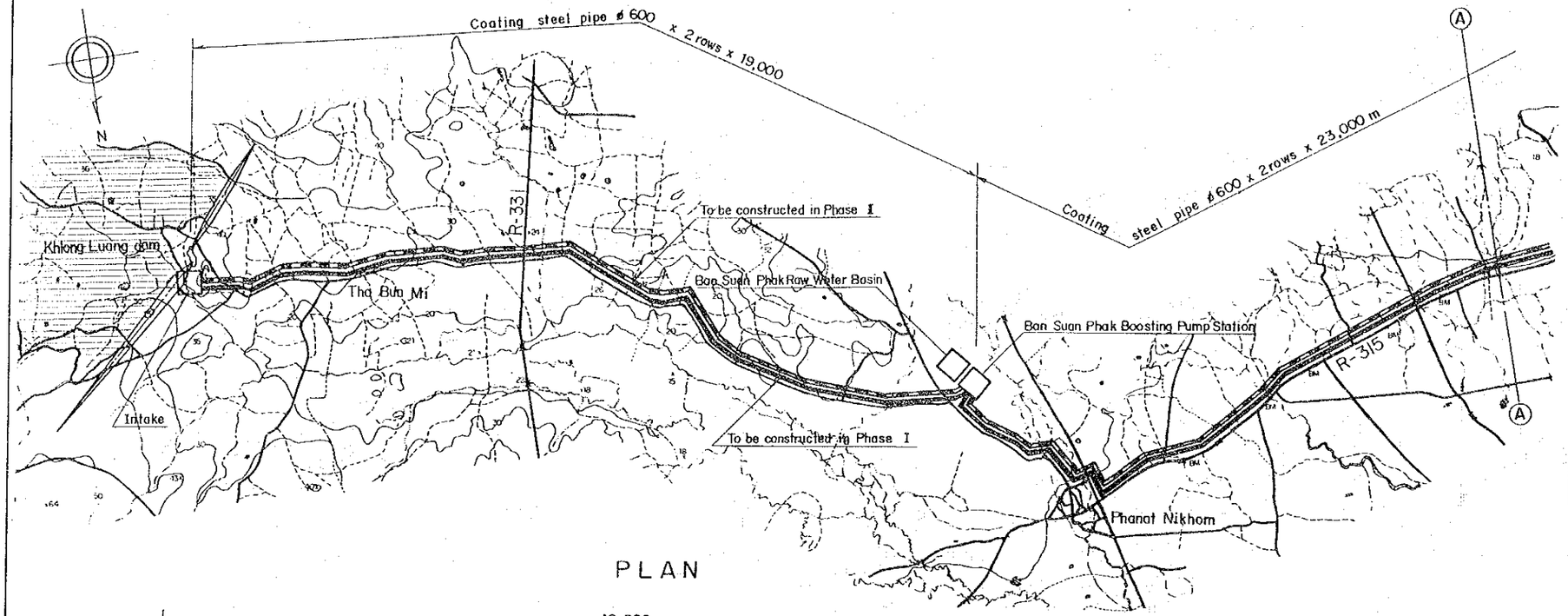
SECTION A-A
SCALE : B



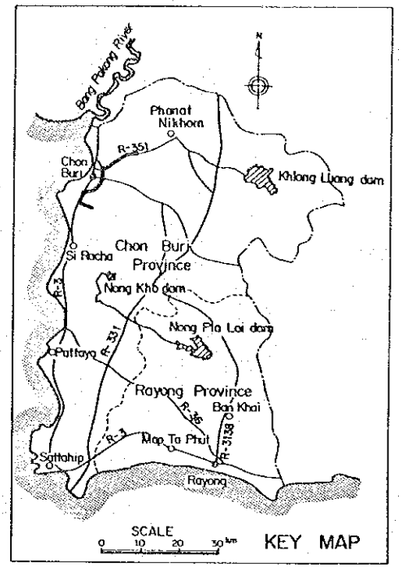
SECTION B-B
SCALE : B

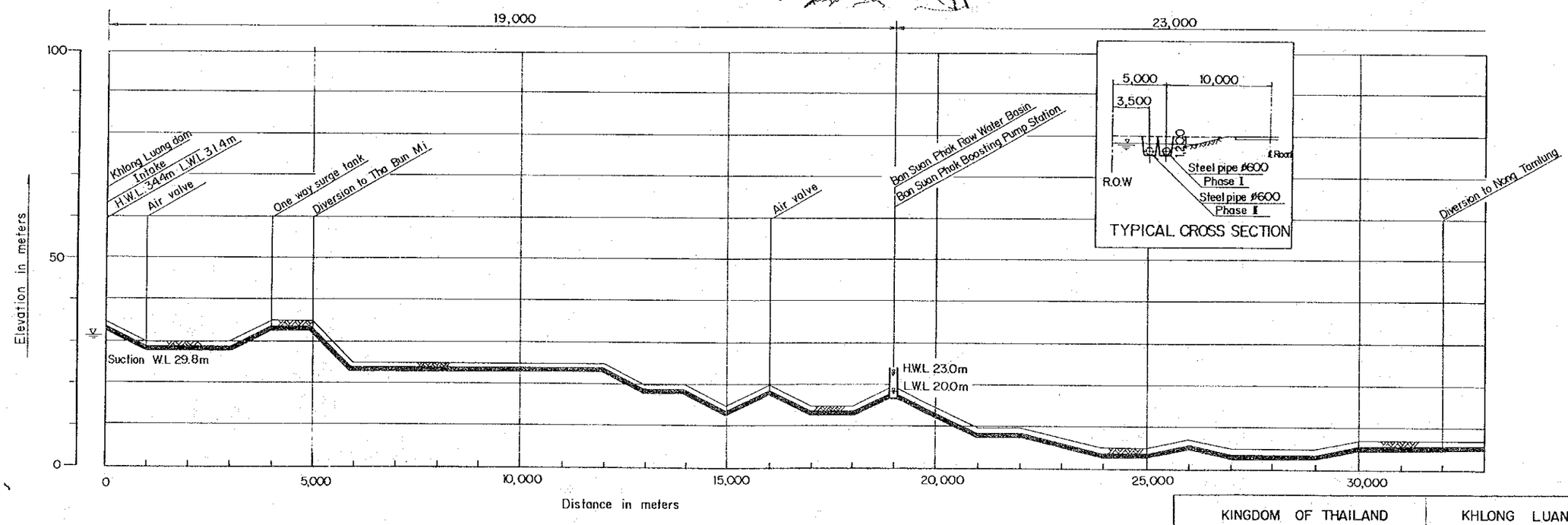
SCALE : A 0 50m
SCALE : B 0 10m

KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG SPILLWAY PLAN AND PROFILE
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. NO. 1-3



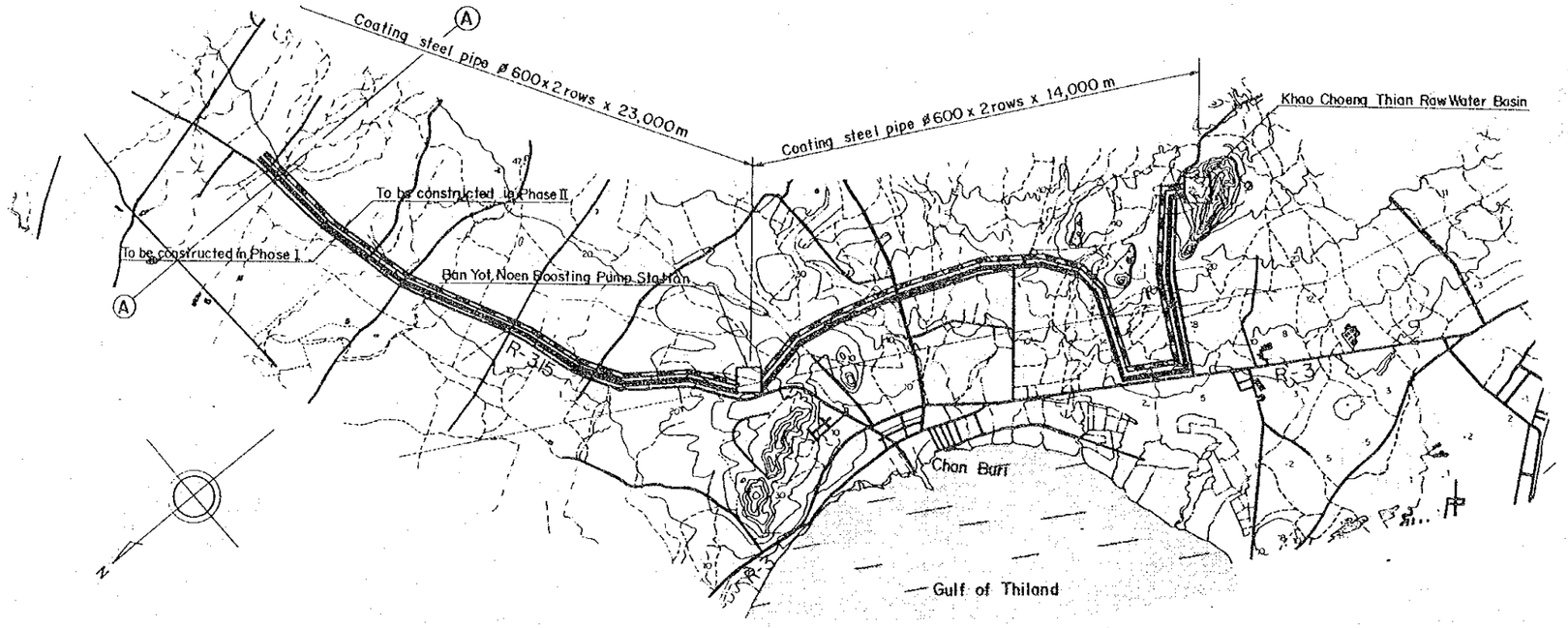
PLAN



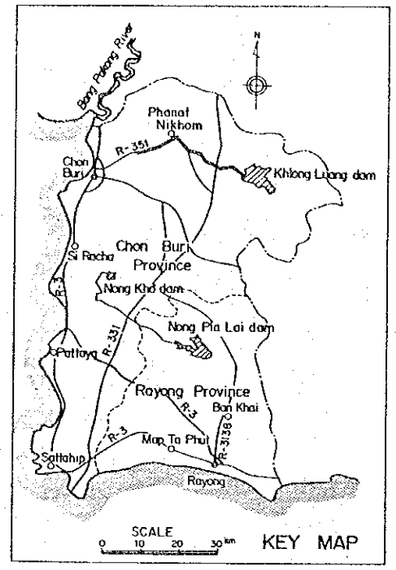


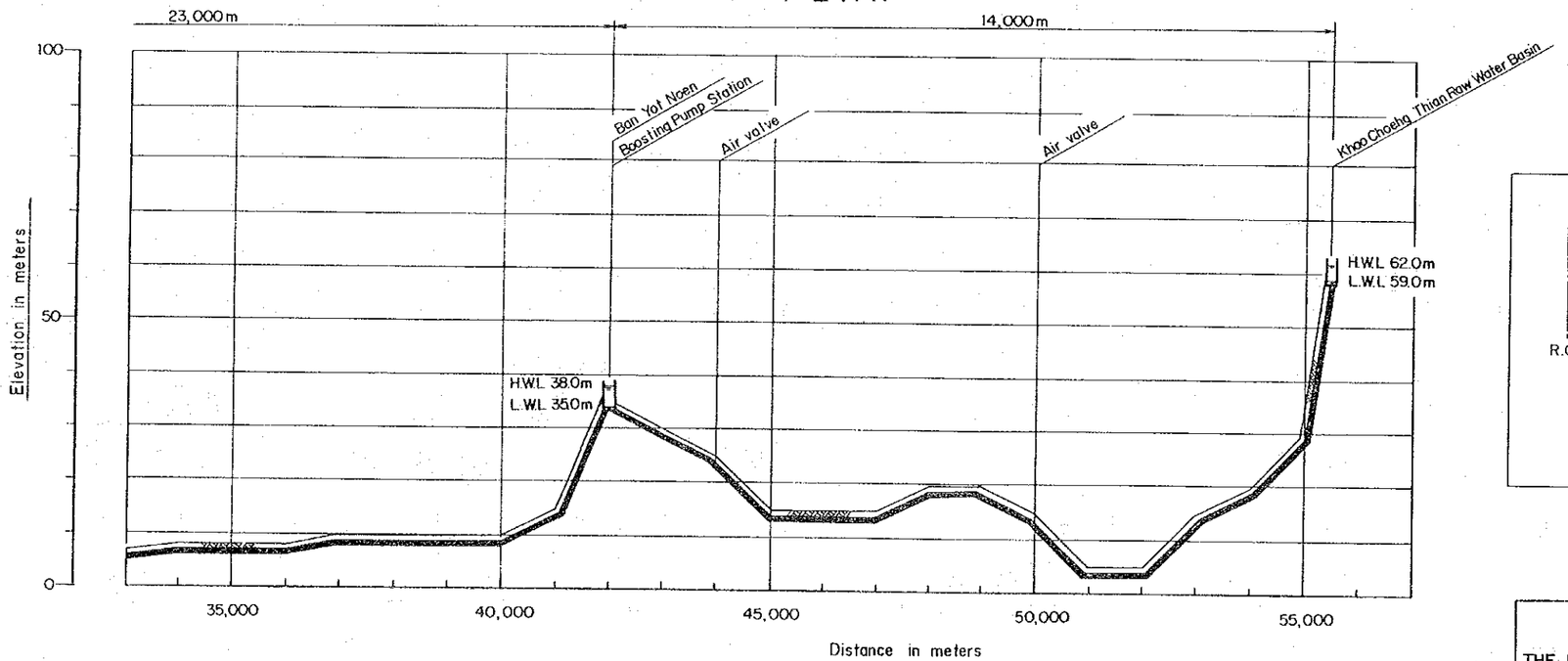
PROFILE

KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG PIPELINE PLAN AND PROFILE (1/2)
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. NO. 2-1

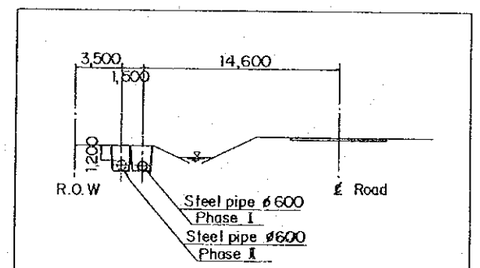


PLAN



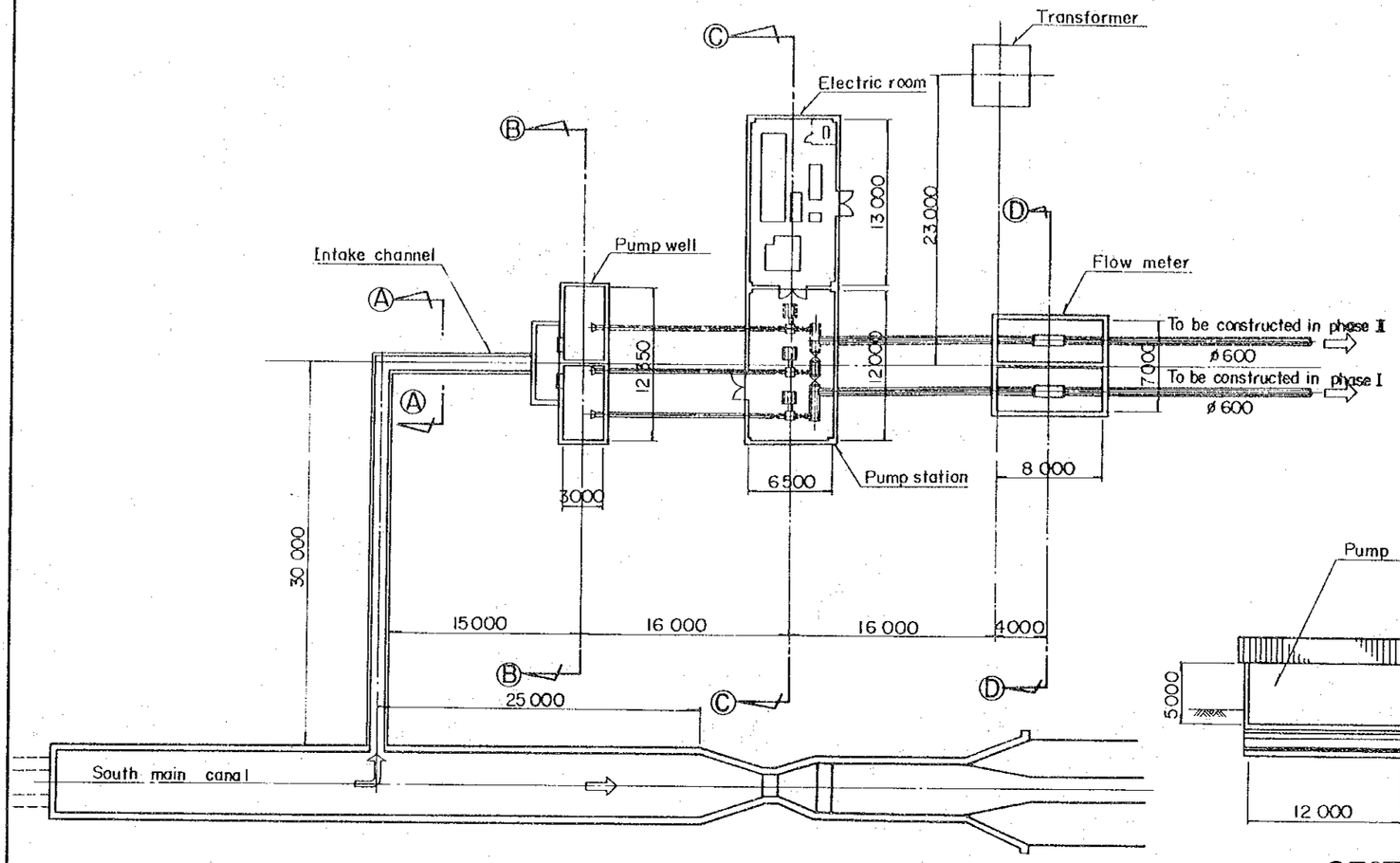


PROFILE

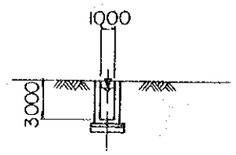


TYPICAL CROSS SECTION

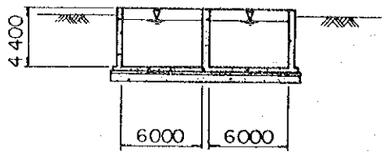
KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG PIPELINE PLAN AND PROFILE (2/2)
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. NO. 2-1



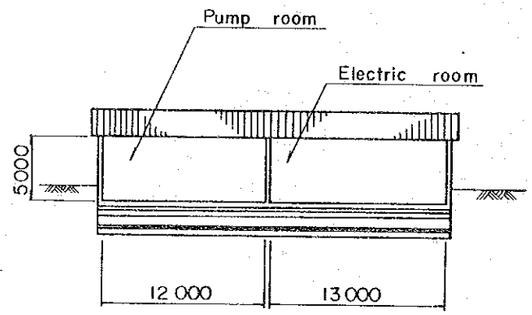
PLAN
SCALE B



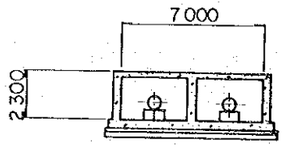
SECTION A
SCALE B



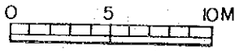
SECTION B
SCALE B



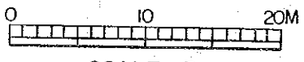
SECTION C
SCALE B



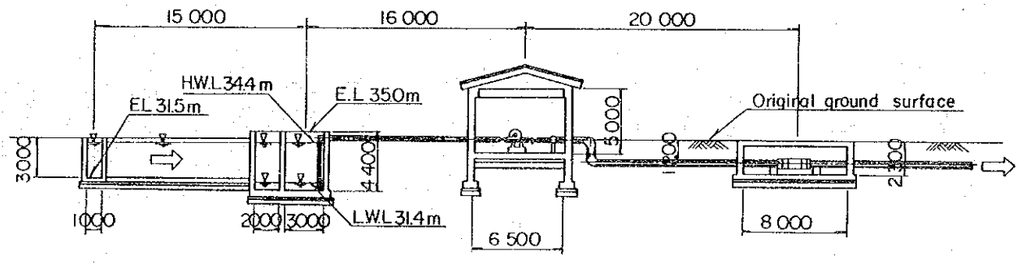
SECTION D
SCALE A



SCALE A



SCALE B

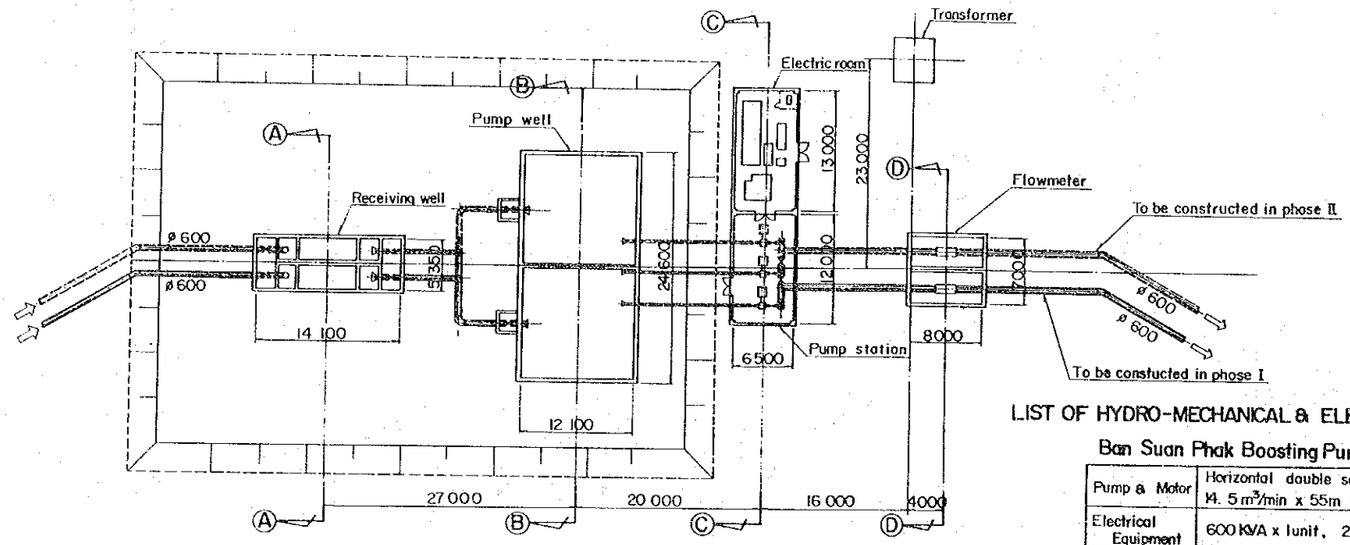


PROFILE
SCALE B

LIST OF HYDRO-MECHANICAL & ELECTRICAL EQUIPMENT

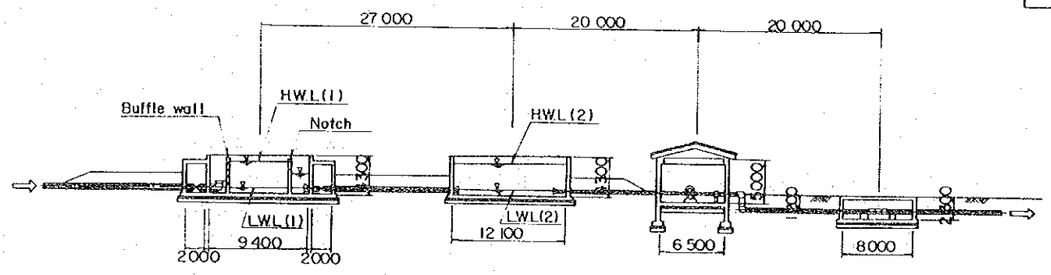
Pump & Motor	Horizontal double suction volute pump 15.6 m³/min x 30 m x 110 kw x 3 unit
Electrical Equipment	400 KVA x 1 unit, 22KV / 3 KV / 380 V
Emergency Generator	100 KVA x 1 unit
Flow meter	ø600 x 2 unit, Max velocity 10 m/s

KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG INTAKE OF WATER CONVEYANCE SYSTEM
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. NO. 2 – 2



BOOSTING PUMP STATION PLAN

SCALE B



BOOSTING PUMP STATION PROFILE

SCALE B

LIST OF HYDRO-MECHANICAL & ELECTRICAL EQUIPMENT

Ban Suan Phak Boosting Pump Station

Pump & Motor	Horizontal double suction volute pump 14.5 m³/min x 55m x 190kw x 3 unit
Electrical Equipment	600 KVA x 1unit, 22KV/3KV/380V
Energency Generator	100 KVA x 1unit
Flow meter	ø 600 x 2 unit, Max velocity 10 m/s

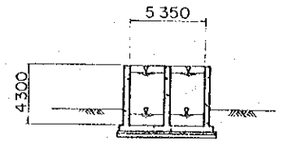
Ban Yot Noen Boosting Pump Station

Pump & Motor	Horizontal double suction volute pump 13.6 m³/min x 50m x 160kw x 3unit
Electrical Equipment	500 KVA x 1unit, 22KV/3KV/380V
Energency Generator	100KVA x 1unit
Flow meter	ø 600 x 2unit, Max velocity 10 m/s

TABLE OF WATER LEVELS

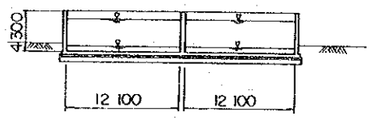
Station	Receiving well		Pump well	
	HWL (1) (EL.m)	LWL (1) (EL.m)	HWL (2) (EL.m)	LWL (2) (EL.m)
Ban Suan Phak	23.0	20.0	21.8	18.8
Ban Yot Noen	38.0	35.0	36.8	33.8

Note: (1) Ban Suan Phak B/s
(2) Ban Yot Noen B/s



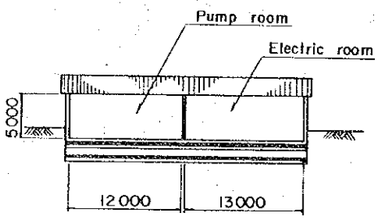
SECTION A

SCALE A



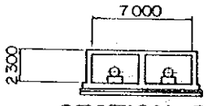
SECTION B

SCALE B



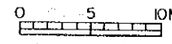
SECTION C

SCALE B

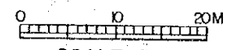


SECTION D

SCALE A

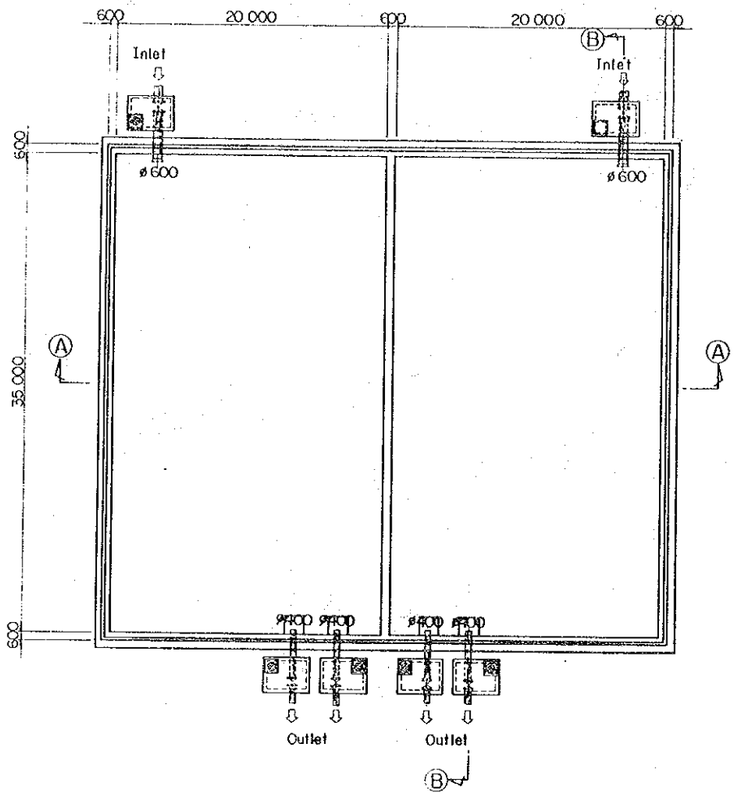


SCALE A



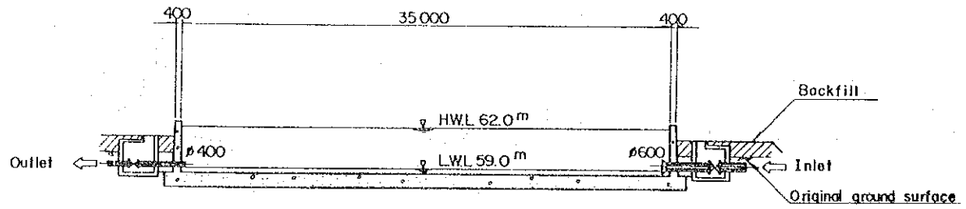
SCALE B

KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG BOOSTING PUMP STATION OF WATER CONVEYANCE SYSTEM
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. NO. 2-3



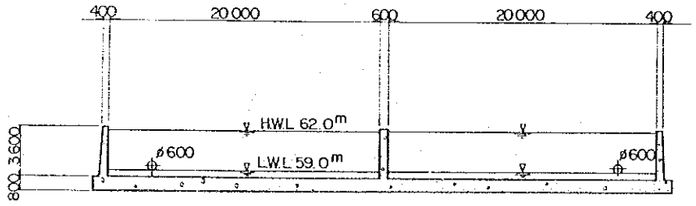
KHAO CHOENG THIAN RAW WATER BASIN PLAN

SCALE B



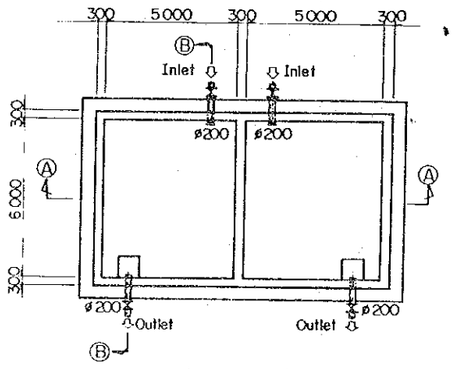
KHAO CHOENG THIAN RAW WATER BASIN SECTION B

SCALE B



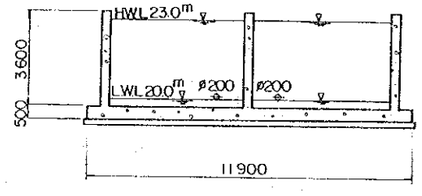
KHAO CHOENG THIAN RAW WATER BASIN SECTION A

SCALE B



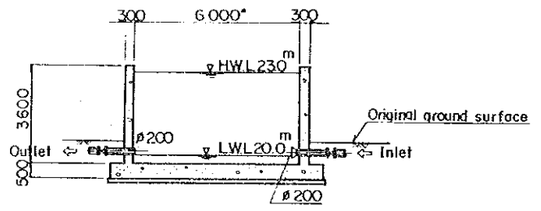
BAN SUAN PHAK RAW WATER BASIN PLAN

SCALE A



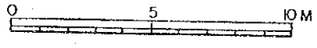
BAN SUAN PHAK RAW WATER BASIN SECTION A

SCALE A

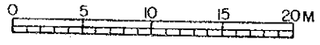


BAN SUAN PHAK RAW WATER BASIN SECTION B

SCALE A

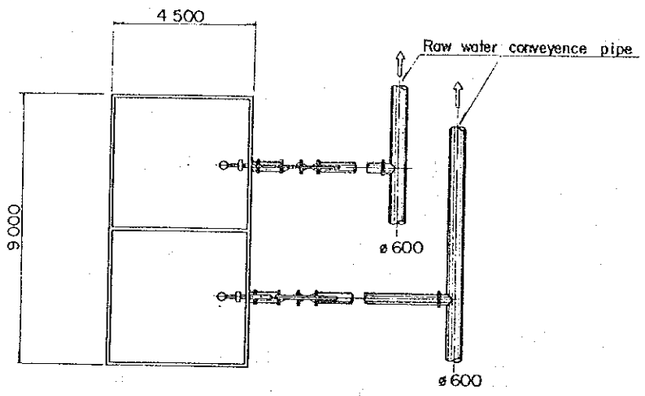


SCALE A

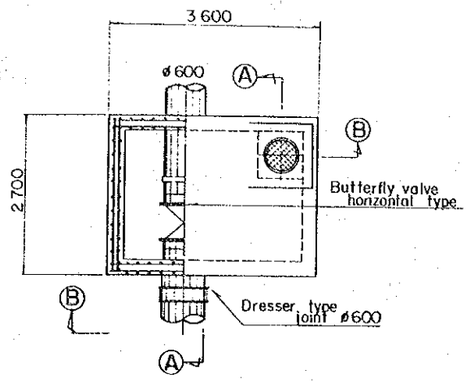


SCALE B

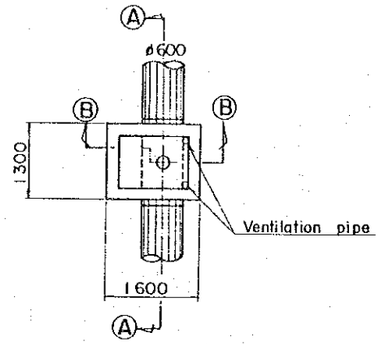
KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG RAW WATER BASIN OF WATER CONVEYANCE SYSTEM
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. NO. 2 - 4



SURGE TANK PLAN
SCALE B



BUTTERFLY VALVE PLAN
SCALE A



AIR VALVE PLAN
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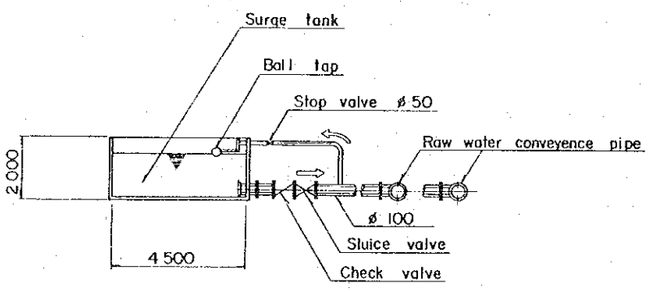

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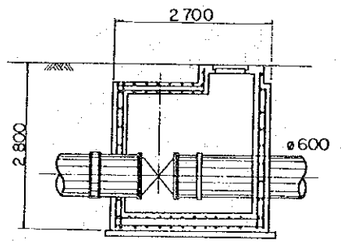

BUTTERFLY VALVE SECTION A
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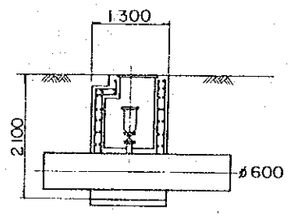

AIR VALVE SECTION A
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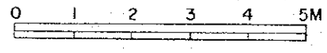

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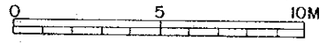

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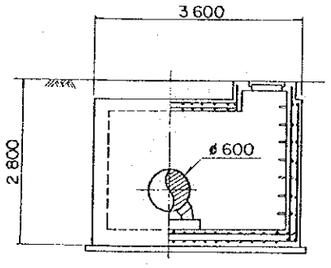
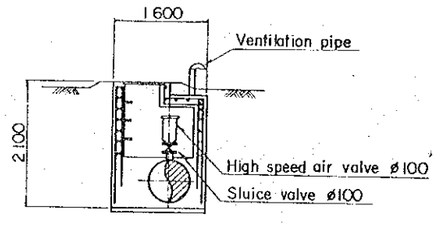


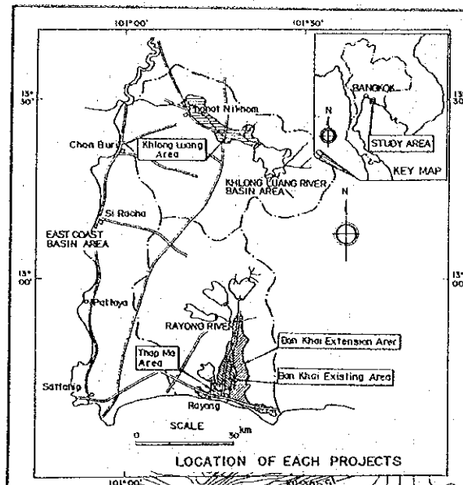
BUTTERFLY VALVE SECTION B
SCALE A



AIR VALVE SECTION B
SCALE A

KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG APPURTENANT FACILITIES OF WATER CONVEYANCE SYSTEM
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. NO. 2-5

LOCATION OF EAGH PROJECTS



LEGEND

- Khlong Luang Dam
- Intake Facilities
- Main Canal
- Lateral Canal
- Main Inspection Road
- Drainage Canal
- Project Boundary
- Turnout
- Farm Turnout
- Check Structure
- Drop
- Culvert
- Syphon
- Cross Drain
- Spillway
- Over Chute

KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG LAYOUT MAP OF IRRIGATION SCHEME
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. NO. 3 - 1

Intake Facilities for South Main Canal

FEATURES OF INTAKE FACILITIES

1. South Main Canal

1) Inlet

Inlet Channel	110 m
Intake Tower	2.0x2.0 x 10.2 m
Pressure Gate	2.0 x 2.0 m
Bed EL.	EL. 31.8 m
Design Intake Discharge	5.94 m^3/sec

2) Conduit

Type	Open Channel Type
Length	300.0 m
Diameter	ϕ 2.0 m
Gradient	i = 0.00136

3) Outlet

Length	76.0 m
Parshall Flume	W = 10ft Type
Head WL of Main Canal	WL. 32.00 m

2. North Main Canal

1) Inlet

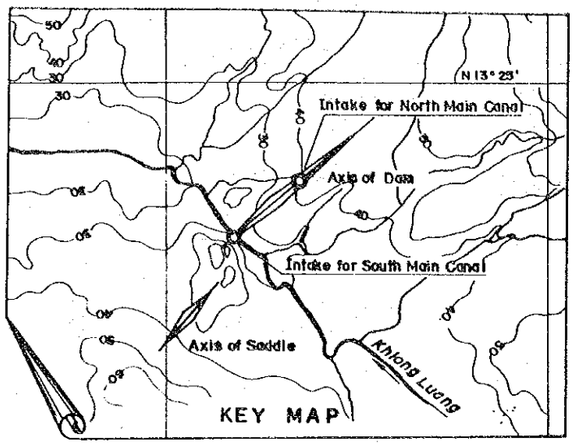
Approach Cannal	708 m
Intake Tower	2.0x2.0x10.2 m
Pressure Gate	2.0x2.0m
Bed EL.	EL. 31.8m
Design Intake Discharge	4.81 m^3/sec

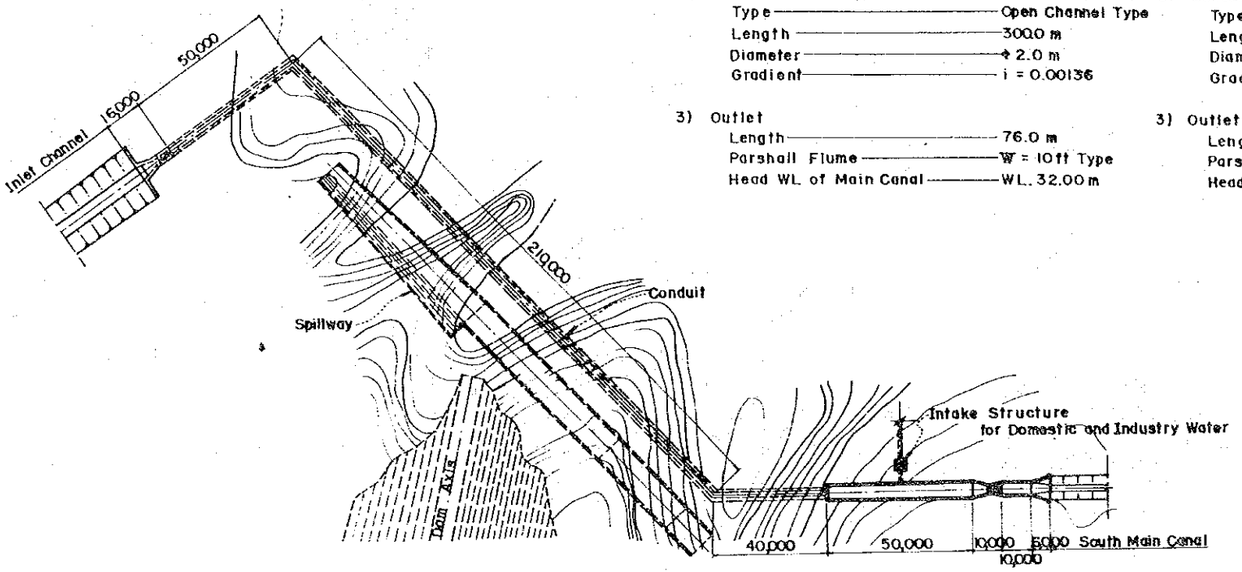
2) Conduit

Type	Open Channel Type
Length	54.0 m
Diameter	ϕ 2.0 m
Gradient	i = 0.00083

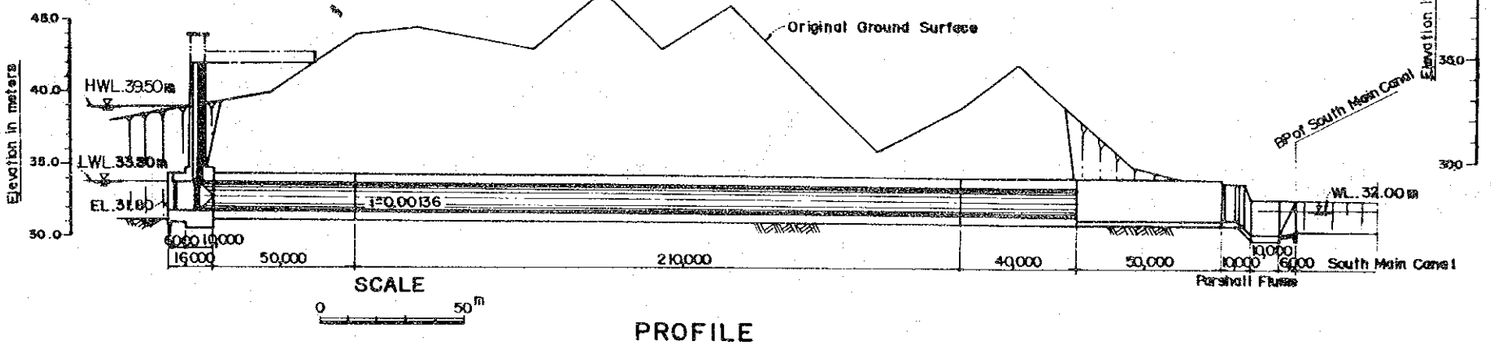
3) Outlet

Length	35.21 m
Parshall Flume	W = 10 ft Type
Head WL of Main Canal	WL = 32.00 m





PLAN



SCALE

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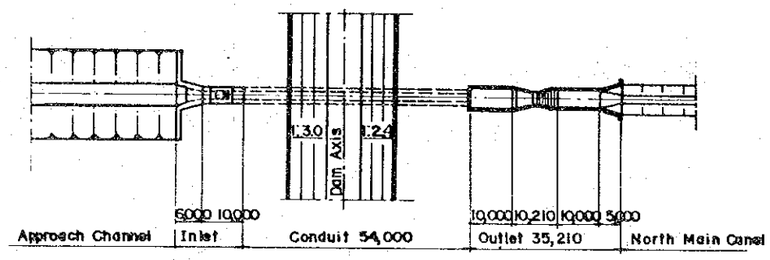
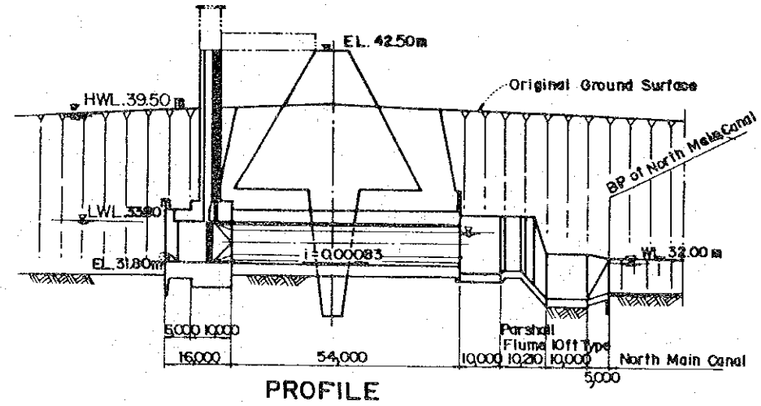
PROFILE

Intake Facilities for North Main Canal



PLAN



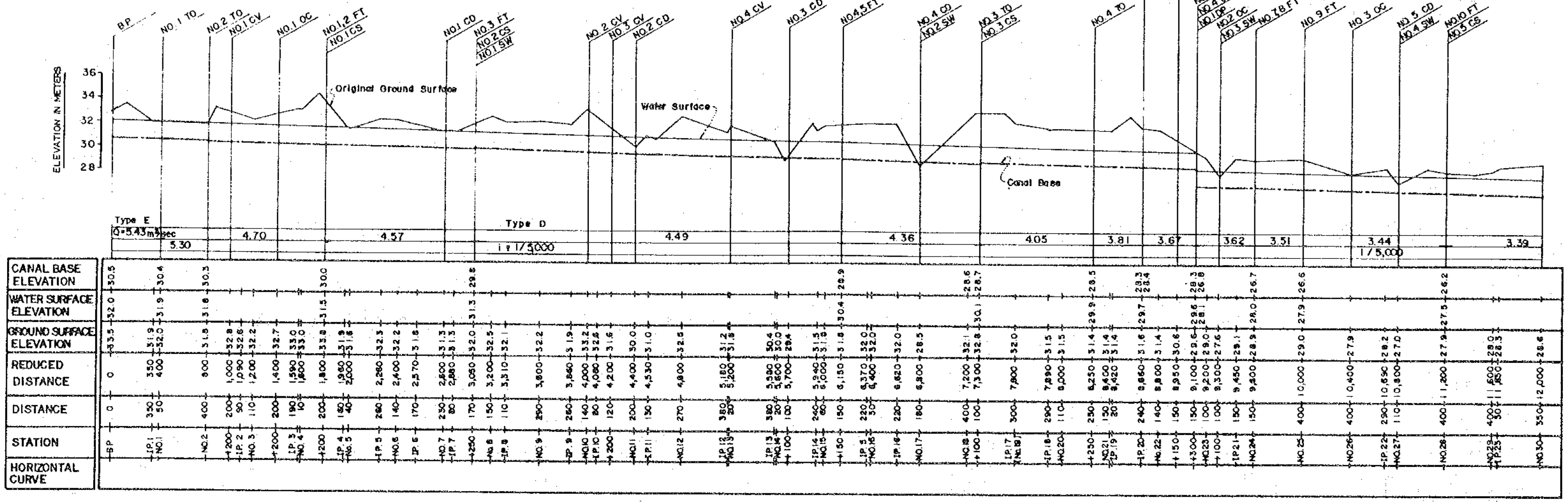
PROFILE

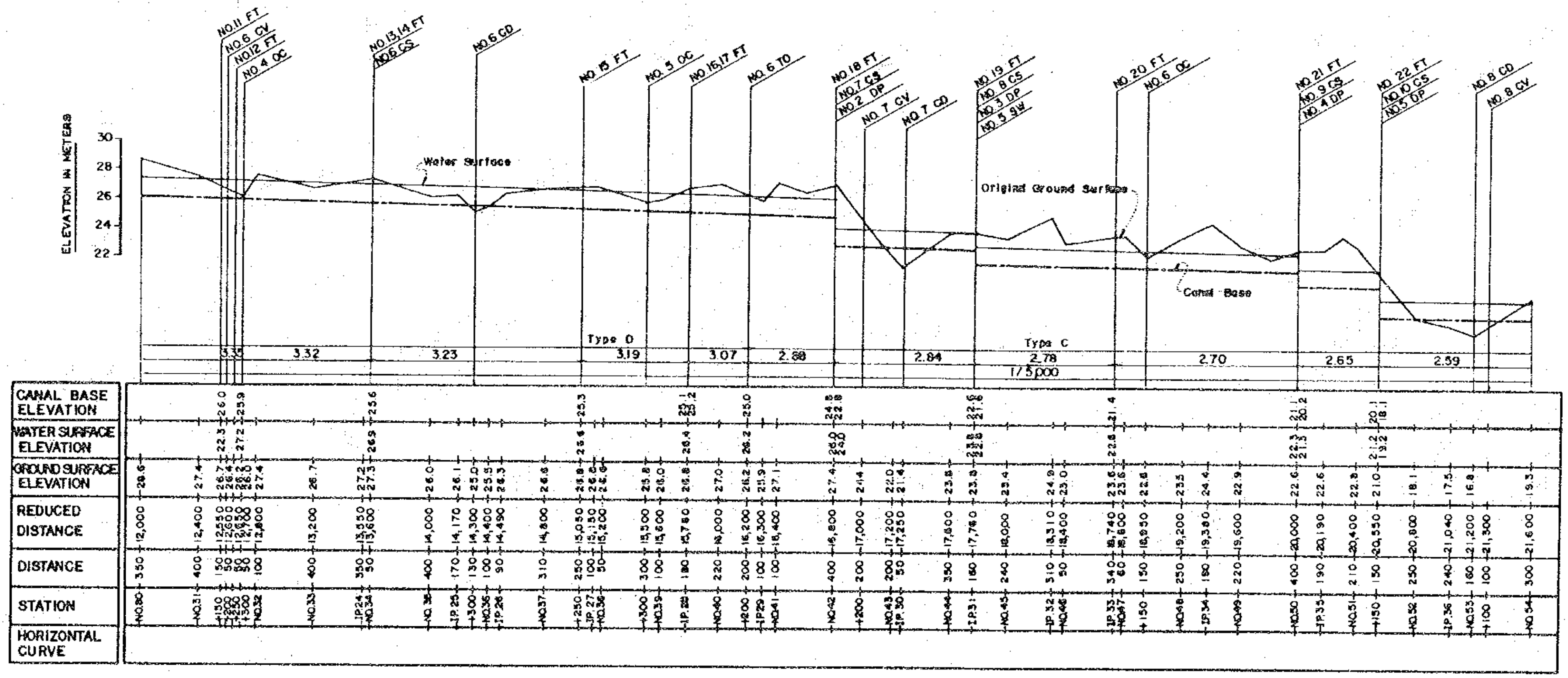
SCALE

0 50m

KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG IRRIGATION INTAKE STRUCTURES PLAN AND PROFILE
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG. NO 3-2

South Main Canal





ABBREVIATION

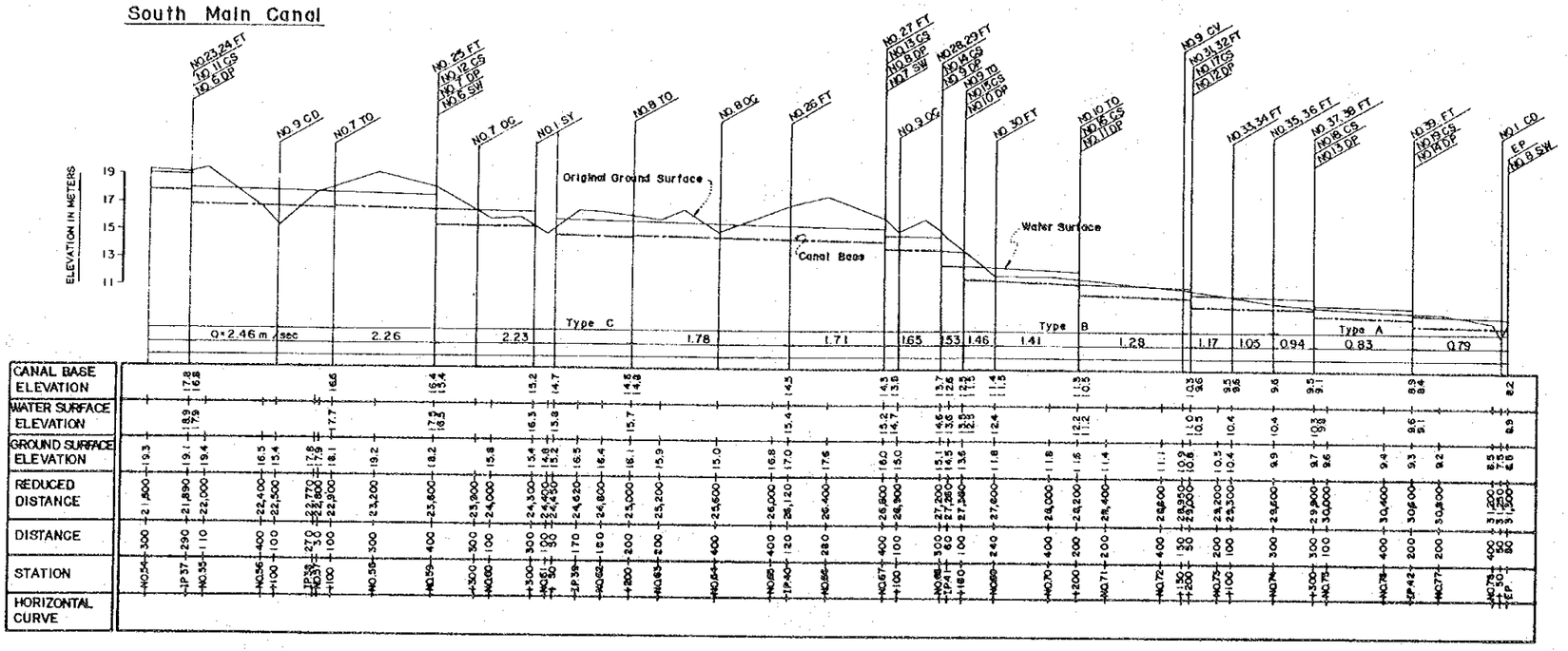
TO	:	Turnout
FT	:	Farm Turnout
CS	:	Check Structure
DP	:	Drop Structure
SY	:	Inverted Syphon
BG	:	Bridge
CV	:	Culvert
SW	:	Spillway
OC	:	Over Chute
CD	:	Cross Drain
BP	:	Beginning Point
IP	:	Intersection Point
EP	:	End Point

SCALE

0 1.0 2.0 m

KINGDOM OF THAILAND THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II	KHLONG LUANG MAIN IRRIGATION CANAL LONGITUDINAL PROFILE (1/3)
JAPAN INTERNATIONAL COOPERATION AGENCY	DWG.NO. 3-3

South Main Canal



ABBREVIATION

TO	:	Turnout
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CS	:	Check Structure
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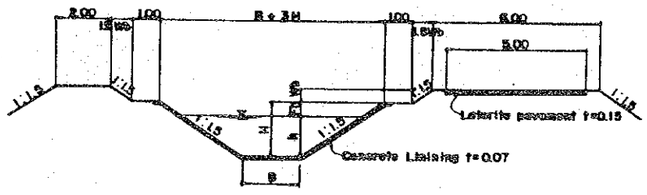
SY	:	Inverted Syphon
BG	:	Bridge
CV	:	Culvert
SW	:	Spillway
OC	:	Over Chute
CD	:	Cross Drain
BP	:	Beginning Point
IP	:	Intersection Point
EP	:	End Point

SCALE

0 1.0 2.0m



MAIN CANAL & MAIN INSPECTION ROAD

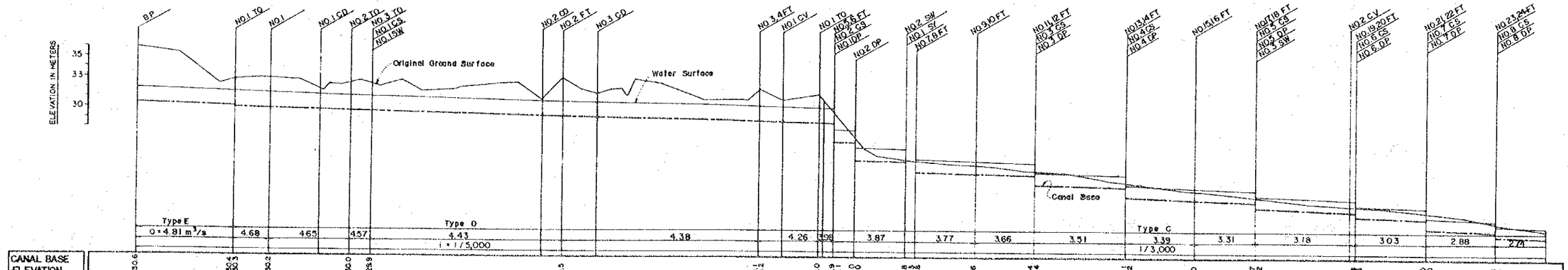
(Unit : m)

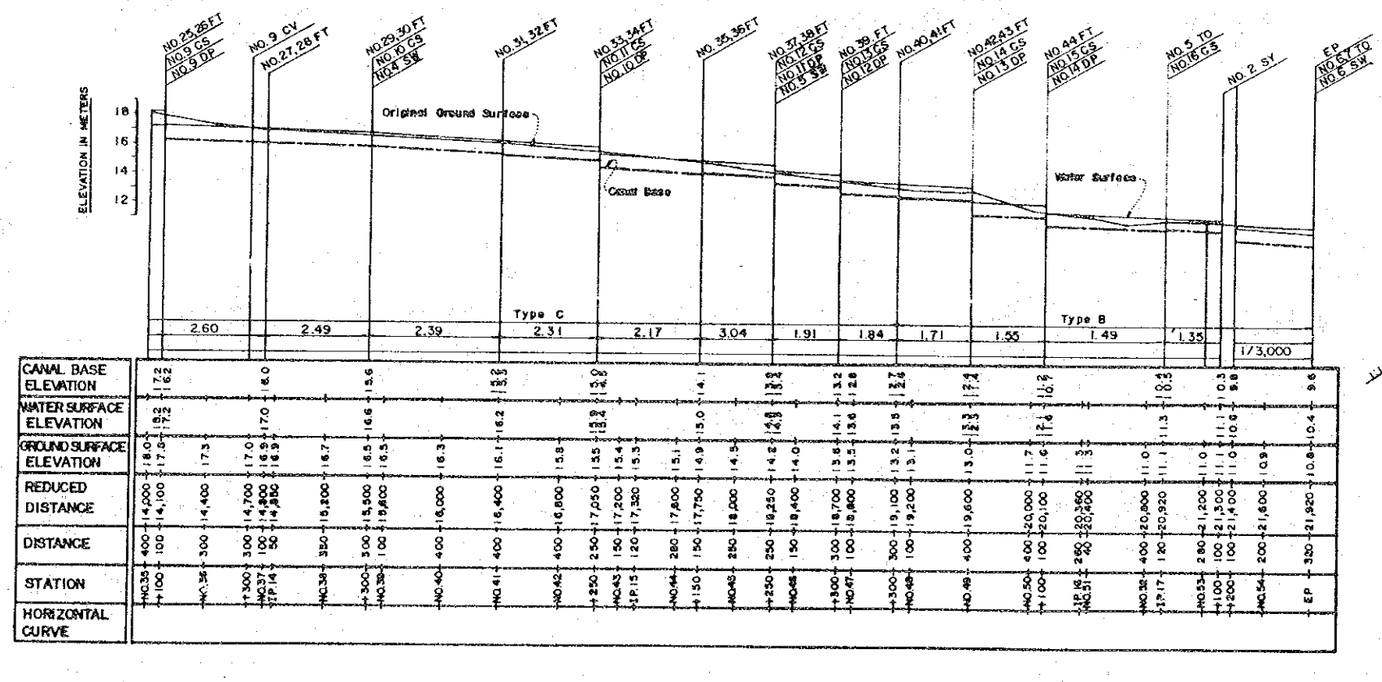
Canal Type	B	H	Wb
A	1.0	1.0	0.2
B	1.0	1.2	0.2
C	1.5	1.5	0.3
D	1.5	1.8	0.3
E	2.0	1.8	0.3
F	2.0	2.0	0.5
G	2.5	2.3	0.5

KINGDOM OF THAILAND
THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II
JAPAN INTERNATIONAL COOPERATION AGENCY

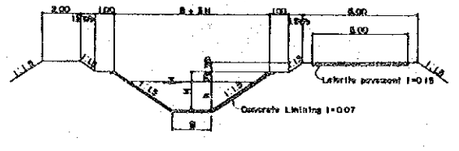
KHLONG LUANG
MAIN IRRIGATION CANAL
LONGITUDINAL PROFILE (2/3)
DWG. NO. 3-3

North Main Canal





MAIN CANAL & MAIN INSPECTION ROAD



(Unit : m)

Canal Type	B	H	Wb
A	1.0	1.0	0.2
B	1.0	1.2	0.2
C	1.5	1.5	0.3
D	1.5	1.5	0.3
E	2.0	1.5	0.3
F	2.0	2.0	0.5
G	2.5	2.5	0.5

ABBREVIATION

TO	:	Turnout
FT	:	Farm Turnout
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DP	:	Drop Structure
SY	:	Inverted Syphon
BG	:	Bridge
CV	:	Culvert
SW	:	Spillway
OC	:	Over Chute
CD	:	Cross Drain
BP	:	Beginning Point
IP	:	Intersection Point
EP	:	End Point

SCALE

0 1.0 2.0 m

KINGDOM OF THAILAND
THE EAST COAST WATER RESOURCES DEVELOPMENT PROJECT PHASE II
JAPAN INTERNATIONAL COOPERATION AGENCY

KHLONG LUANG
MAIN IRRIGATION CANAL
LONGITUDINAL PROFILE (3/3)
DWG. NO. 3-3

APPENDIX

APPENDIX I

KHLONG LUANG WATER CONVEYANCE SYSTEM

DRAFT TERMS OF REFERENCE FOR
ENGINEERING SERVICES

1. BACKGROUND AND OBJECTIVE

1.1 The Government of Kingdom of Thailand (the Government) is intending to implement the Khlong Luang Water Conveyance System (the Scheme), which aims at supplying the raw water for the domestic and industrial use from Khlong Luang reservoir to Chon Buri area. The Scheme includes the following components:

(i) An intake in the irrigation outlet at the Khlong Luang dam

(ii) A 56 km long water conveyance pipeline between the intake and the raw water basin, including various appurtenant structures.

(iii) Two booster pumping stations

(iv) A raw water basin, 180 m^3 capacity, at Ban Suan Phak

(v) Raw water basin, 4,200 m^3 capacity, at Khao Choeng Thian near Chon Buri

1.2 The Government will engage the Consultants for a period of months to prepare the detailed design, drawings and tender documents for the construction and implementation of the Project, including detailed surveys, field investigation and laboratory tasks and whatever else is required to meet the objective.

2. EXECUTIVE AGENCY

2.1 The Government will appoint _____ as an executive agency for the performance of the engineering services.

2.2 The Center for the Integrated Plan of Operation of National Economic and Social Development Board will be appointed by the Government as a coordinator of the other activities to be taken by the Eastern Seaboard Committee.

2.3 The Public Water Works Authority is responsible for the supply of treated water for domestic, commercial and industrial use in the Scheme area.

3. SCOPE OF WORKS

3.1 Review of Report and Data

The Consultant shall review the available reports and documents relevant to the Scheme, including evaluation on validity of the previous surveys and investigations, and review of the domestic and industrial water demand projection.. Based on the review, the Consultants shall prepare a detailed programme for the additional surveys and investigations required for the performance of the detail design of the Scheme.

3.2 Detailed Surveys and Investigations

The detailed surveys and investigations may consist of, but not be limited to the following:

(a) Route alignment surveys along the proposed pipeline.

(b) Topographical and geological surveys and mapping on the site of major structure.

(c) Soil and foundation investigations, including test pitting, penetration test, and other field tests.

3.3 Pipeline Location and Sizing

3.3.1 The Consultant shall conduct a study on alignment of pipeline, taking into account the topographical and geological conditions and right of way. The alignment of the pipeline shall be subject to the DPW's approval prior to the commencement of the detail design.

3.3.2 In sizing the pipeline, the Consultants shall carefully review the previous studies in comparison to the latest projected water demand and thereafter recommend the most appropriate implementation plan to the executive agency.

3.3.3 The Consultants shall recommend the executive agency the most economical configulation of the Scheme by means of the economic comparative study of various configurations.

3.4 Detail Design

The Consultant shall prepare the detailed design of the various components of the Scheme.

3.4.1 The detailed design shall include complete and detailed drawings and design computations relating to structure, foundations and hydraulics.

3.4.2 The hydraulic analysis shall include:

(a) Simulation analyis of hydraulic pressure in accordance with the variation of water flow, and

(b) Simulation analysis of water hammer caused by the operation of pumps and valves.

3.4.3 The design drawing shall be prepared in necessary and sufficient details for international bidding.

3.4.4 The bill of quantities shall be prepared for the respective component of the Scheme and thereafter the construction cost shall be estimated, which shall be divided into foreign currency component and local currency component. The unit prices should be supported by detailed analysis and based on competitive prices prevailing in the local and international market.

3.5 Report, Drawings and Tender Documents

3.5.1 The Consultants shall prepare the under-listed documents for each component of the Scheme:

(a) Design Report

(b) Detailed Design Drawings

(c) Tender Documents, including:
- Pre-qualification Document
- Instruction to Tenderers
- Form of Tender
- Form of Bid Bond
- General Conditions of Contract
- General Specifications
- Technical Specifications
- Bill of Quantities
- Form of Agreement
- Form of Performance Bond

The above report, drawings and documents shall be submitted by the Consultant in draft form for review by the executive agency.

3.4.2 The Consultant shall submit an Inception Report, summarizing the result on review of the previous studies and available documents and the plan of operation.

3.4.3 The Consultant shall quarterly submit progress report of his work to the executive agency throughout the period of the services.

4. REPORTING

4.1 Inception Report (20 copies)

Within ____ months after commencement of the services.

4.2 Draft Design Report, Draft Design Drawings and Draft Tender Documents (20 copies)

Within ___ months after the Inception Report.

4.3 Final Design Report, Final Design Drawing and Final Tender Documents (50 copies)

Within ___ months after receipt of comments on the draft documents by the RID.

4.4 Quarterly Progress Report (10 copies)

At the end of each three-month period after commencement of the services.

APPENDIX II.

KHLONG LUANG DAM AND IRRIGATION SCHEME

DRAFT TERMS OF REFERENCE FOR

ENGINEERING SERVICES

1. BACKGROUND AND OBJECTIVE

1.1 The Government of Kingdom of Thailand (the Government) is intending to implement the Khlong Luang Dam and Irrigation Scheme (the Scheme), which is located in Chon Buri Province. The Scheme aims at constructing a multiple-purpose dam on the Khlong Luang river and developing irrigation and drainage system for 6,600 ha (net) of lands. The Scheme includes the following components:

Multiple-purpose Dam

(i) A main dam, an earth-fill type, 17.1 m high above the river bed, 3,800 m long and spillway.

(ii) A saddle dam, an earth-fill type, 7.5 m high above the original ground surface, 2,300 m long.

Irrigation and Drainage System

(i) Two intake structures.

(ii) Two main canal systems, approximately 53 km in total length, including various appurtenant structures.

(iii) Lateral canal systems, approximately 34 km in total length, including various canal structures.

(iv) Approximately 37 km long drainage channel, incuding an improvement of existing small streams.

(v) On-farm development over 6,600 ha of lands.

1.2 The Government will engage the Consultants for a period of approximately ____ months to prepare the detailed design, drawings and tender documents for the construction and implementation of the Scheme, including detailed surveys, field investigations and laboratory tests and whatever else is required to meet the objective.

2. EXECUTIVE AGENCY

2.1 The Government will appoint Royal Irrigation Department (RID) as an executive agency for the performance of the engineering services.

2.2 The Center for the Integrated Plan of Operation (the CIPO) of National Economic and Social Development Board will be appointed by the Government as a coordinator of all the other activities to be taken by the Eastern Seaboard Committee.

3. SCOPE OF WORKS

3.1 Review of Data and Report

The Consultant shall review the available reports and documents relevant to the Scheme, including evaluation on validity of the previous surveys and investigations, hydrological and other design studies. Based on the review, the Consultant shall prepare a detailed programme for the additional surveys and investigations required for the performance of the detail design of the Scheme.

3.2 Detailed Surveys and Investigations

The detailed surveys and investigations may consist of, but not be limited to the following:

(a) Geological investigation, including drilling, field permeability tests, standard penetration test, grouting and other field tests.

(b) Soil and foundation investigations.

(c) Investigation on quality and quantity of materials for embankment fill.

(d) Investigations of materials for concrete aggregates, filter and rock riprap.

(e) Topographical and geological surveys and mapping on the site of major structures.

(f) Aerial-photo mapping covering the entire irrigation service area.

(g) Hydrological investigation.

(h) Investigations on environmental and ecological impacts.

3.3 Detail Design

The Consultant shall prepare the detailed design of the various components of the Scheme.

3.3.1 The Consultant shall prepare several alternatives of the dam design based on the detailed surveys and investigations and recommend the best alternative for the detailed design considering both technical and economical aspects.

3.3.2 The detailed design of the dam and its appurtenant structures and irrigation and drainage facilities shall include complete and detailed drawings and design computations relating to hydraulics, structures and foundations.

3.3.3 The design drawing shall be prepared in necessary and sufficient details for international bidding.

3.3.4 The Consultant shall carry out the laboratory test of spillway and other major facilities deemed necessary to be model-tested.

3.3.5 The Consultant shall prepare the bill of quantities for the respective component of the Scheme and shall thereafter estimate the construction cost, which shall be divided into foreign currency component and local currency component. The unit prices to be used should be supported by detailed analysis and based on competitive prices prevailing in the local and international market.

3.4 Report, Drawings and Tender Documents

3.4.1 The Consultant shall prepare the under-listed documents for each component of the Scheme:

(a) Design Report

(b) Detailed Design Drawings

(c) Tender Documents, including:
- Pre-qualification Document
- Instruction to Tenderers
- Form of Tender
- Form of Bid Bond
- General Conditions of Contract
- General Specifications
- Technical Specifications
- Bill of Quantities
- Form of Agreement
- Form of Performance Bond

The above report, drawings and documents shall be submitted by the Consultant in draft form for review by the RID.

3.4.2 The Consultant shall submit an Inception Report, summarizing the result of review on the previous studies and available documents and the plan of operation.

3.4.3 The Consultant shall quarterly submit progress report of his work to the RID throughout the period of the services.

4. REPORTING

4.1 Inception Report (20 copies)

Within ____ months after commencement of the services.

4.2 Draft Design Report, Draft Design Drawings and Draft Tender Documents (20 copies)

Within ___ months after the Inception Report.

4.3 Final Design Report, Final Design Drawing and Final Tender Documents (50 copies)

Within ___ months after receipt of comments on the draft documents by the RID.

4.4 Quarterly Progress Report (10 copies)

At the end of each three-month period after commencement of the services.

4.4 Quarterly Progress Report (10 copies)

At the end of each three-month period after commencement of the services.

APPENDIX III

ADDITIONAL SURVEYS & INVESTIGATION

1. Future Survey and Investigation

The following survey and investigation are deemed necessary for the performance of detail design of the respective scheme.

(1) Topographic Survey

	Description	Unit	Quantity
(a)	Dam & Reservoir		
	Topo-mapping	10^3m^2	320
(b)	Water Conveyance System		
	Topo-mapping	10^3m^2	72
	Route alignment survey	km	56
(c)	Irrigation and Drainage System		
	Aerial-photo-mapping	km^2	100
	Topo-mapping	km^2	1.5
	Route alignment survey		
	Main canal	km	53
	Lateral canal	km	34
	Drain	km	37

(2) Geological Investigation

	Description	Unit	Quantity
(a)	Core Drillng with S.P.T. and Permeability Test, @ 30 m, at Damsite	m	1,500
(b)	Trench Cutting at Damsite	m	400

(3) Material Survey

Description	Quantity	
(a) Borrow Area for Earth Embankment		
Test Pit	5 m x 3 spots	(15 m)
Auger Boring	5 m x 15 spots	(75 m)
(Core Drilling)	(75 m)	
Moisture Content	10 Nos. x 18 spots	(180 Nos.)
Specific Gravity	3 Nos. x 18 spots	(54 Nos.)
Gradation	- ditto -	
Atterberg's Limit	- ditto -	
Compaction	- ditto -	
Triaxial Comp. ($\overline{CU}$)	- ditto -	
Permeability	- ditto -	
(b) Borrow Area for Drain Material		
Specific Gravity	3 Nos.	
Gradation	9 Nos.	
Relative Density	9 Nos.	
Triaxial Comp. (CU)	3 Nos.	
(c) Foundation		
Test Pit	5 m x 3 spots	(15 m)
Sampling	3 Nos. x 3 spots	(9 Nos.)
Moisture Content	5 Nos. x 3 spots	(15 Nos.)
Specific Gravity	5 Nos. x 3 spots	(15 Nos.)
Gradation	- ditto -	
Atterberg's	- ditto -	
Triaxial Comp. ($\overline{CU}$)	- ditto -	
Triaxial Comp. ($\overline{UU}$)	- ditto -	
Consolidation	- ditto -	