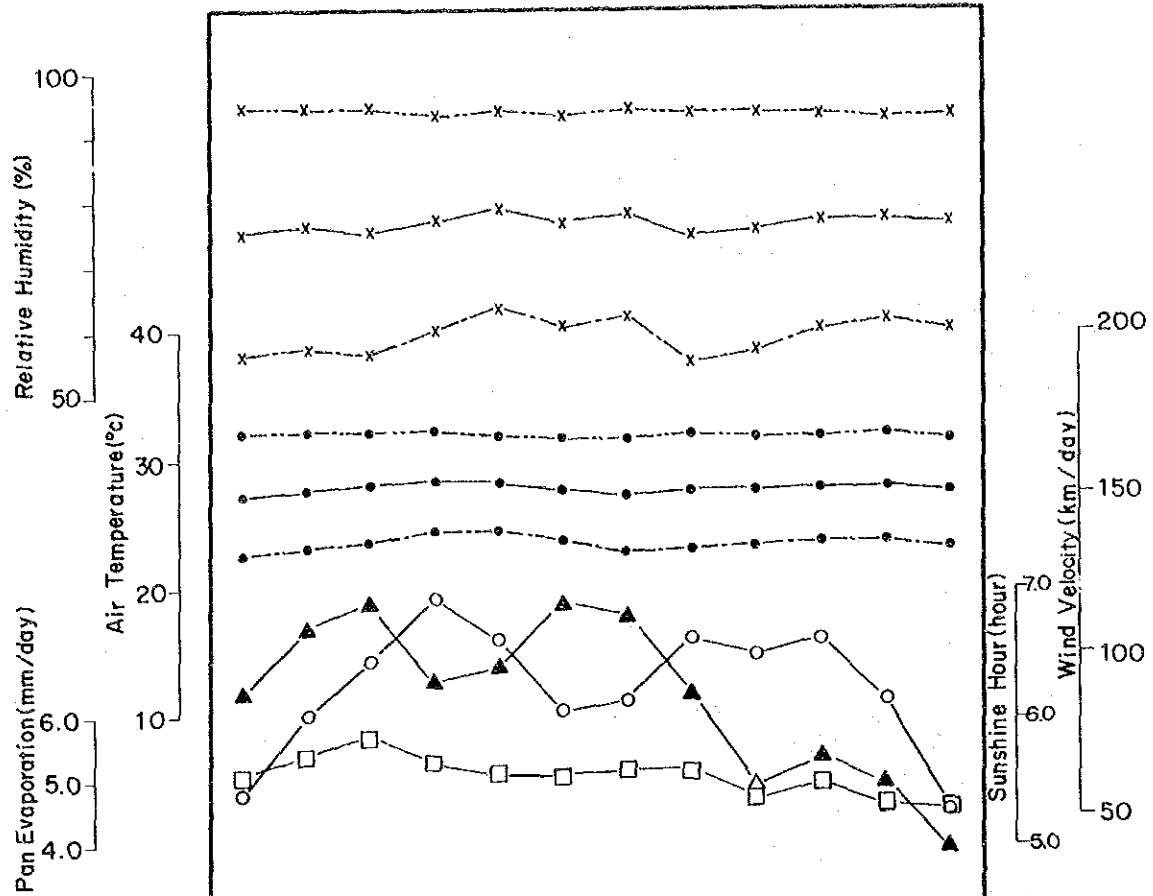


Fig. 3 Isohyetal Map in Bernam River Basin

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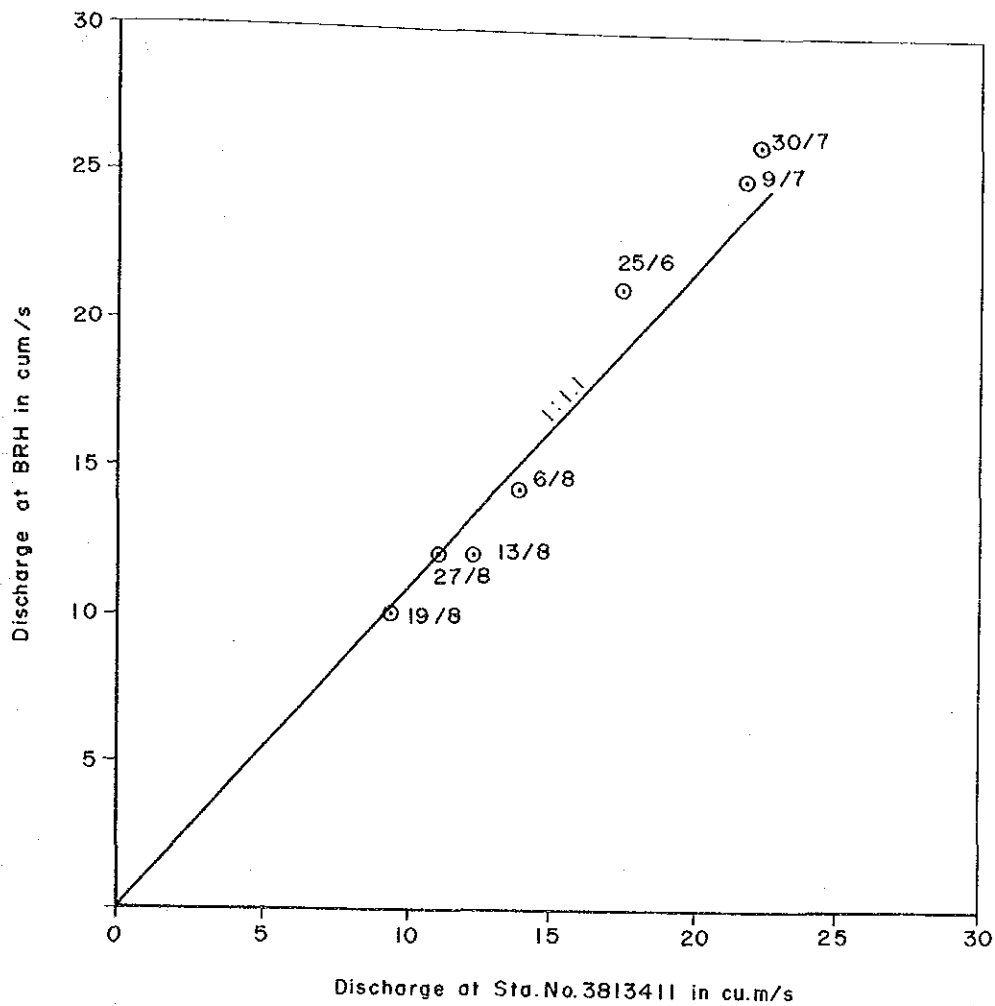
Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
Air Temperature Max(°C)	32.0	32.1	32.4	32.4	31.9	31.7	31.6	32.1	31.8	31.8	32.2	31.7	32.0
Min.(°C)	22.7	23.2	23.6	24.5	24.5	23.9	22.9	23.1	23.4	23.7	23.8	23.3	23.6
Mean(°C)	27.3	27.6	28.0	28.5	28.2	27.8	27.3	27.6	27.7	27.8	28.0	27.6	27.8
Relative Humidity Max(%)	94.9	94.7	94.6	93.7	94.3	93.5	94.3	93.8	94.0	94.2	93.8	94.0	94.2
Min.(%)	56.2	57.6	56.8	60.4	64.1	60.6	62.0	55.4	57.2	60.5	62.1	60.6	59.5
Mean(%)	75.6	76.2	75.7	77.1	79.2	77.1	78.2	74.6	75.6	77.4	78.0	77.3	76.8
Sunshine Hour (hour)	6.2	6.7	6.9	6.3	6.4	6.9	6.8	6.2	5.5	5.7	5.5	5.0	6.2
Wind Velocity (km/day)	56.1	80.6	97.2	117.0	104.7	82.0	85.4	104.4	99.8	104.4	85.5	51.5	89.1
Pan Evaporation(mm/day)	5.1	5.4	5.7	5.3	5.1	5.1	5.2	5.2	4.8	5.0	4.7	4.6	5.1

**LEGEND**

- Air Temperature
- x—x Relative Humidity
- ▲—▲ Sunshine Hour
- Wind Velocity
- Pan Evaporation

Note: Data except pan evaporation are mean values observed at Tanjong Karang Meteorological Station(Station No. 3511201), Selangor from Sept. 1980 to Mar. 1985. Pan evaporation data are averages for recent 10 years at Bagan Terap(Station No. 3710306).

Fig. 4 Climate in the Project Area



Note: Discharge measurement at Sta. No. 3813411 was made one day before that at BRH

Fig. 5 Relationship of Runoff at SKC Bridge Station and BRH

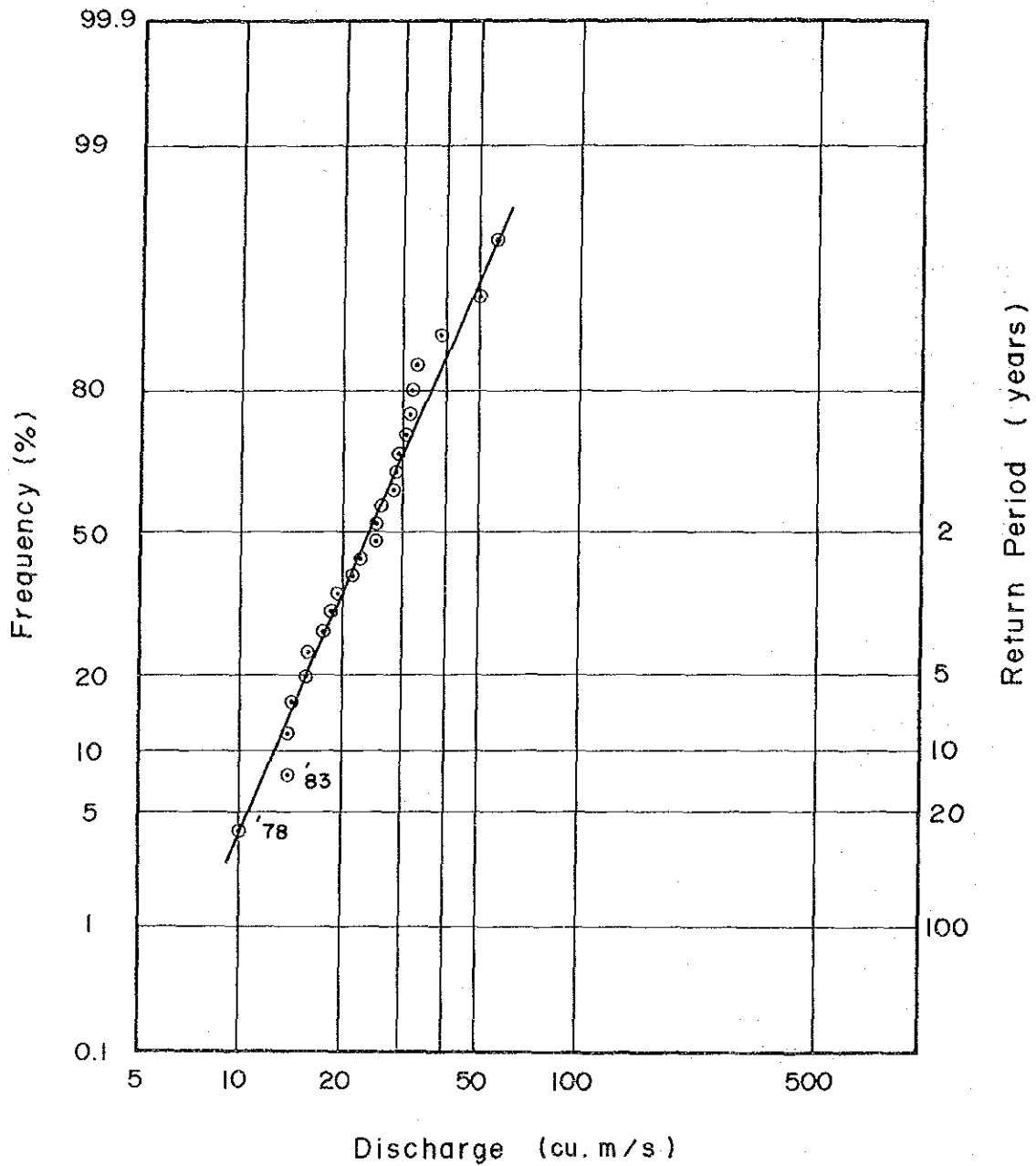
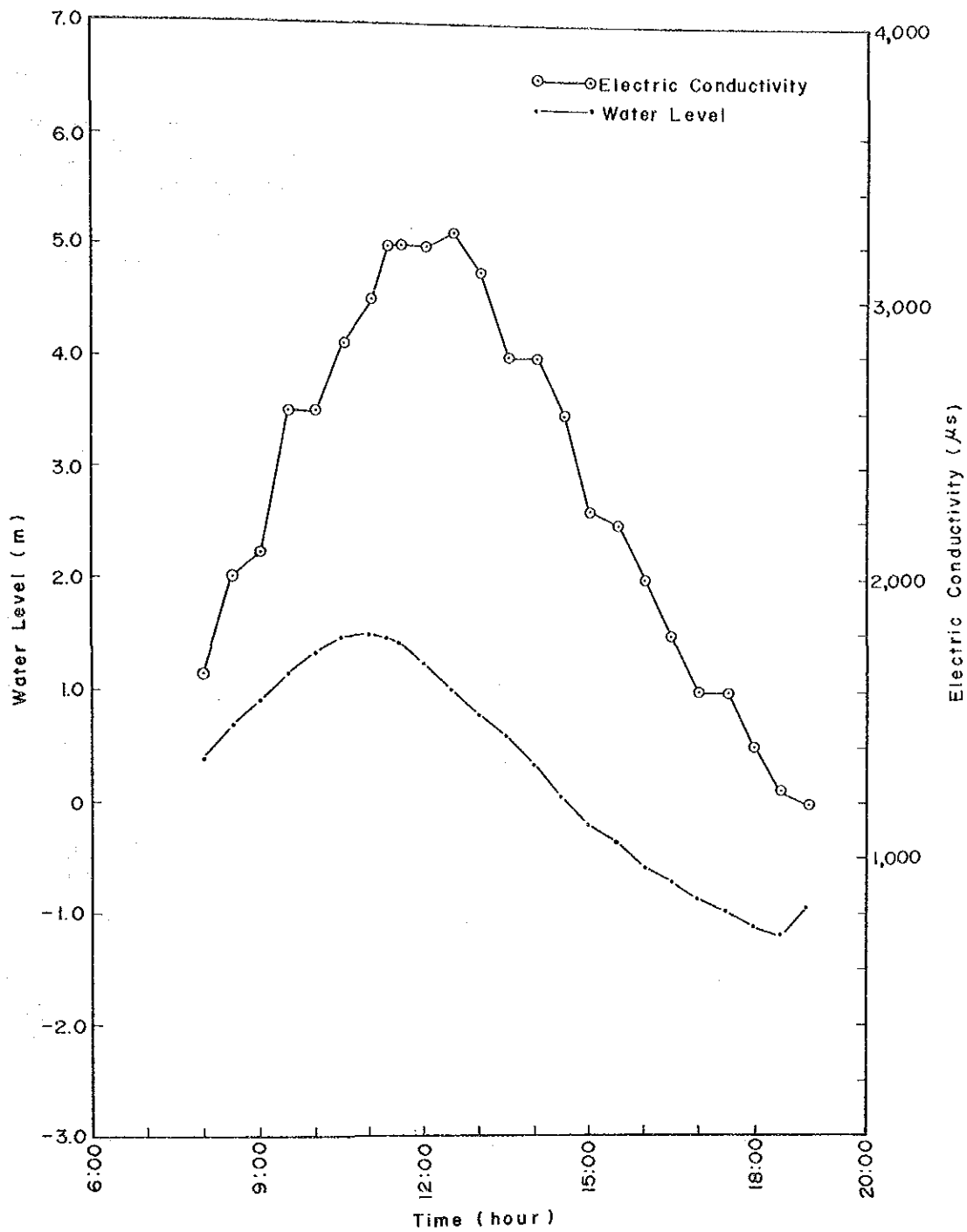
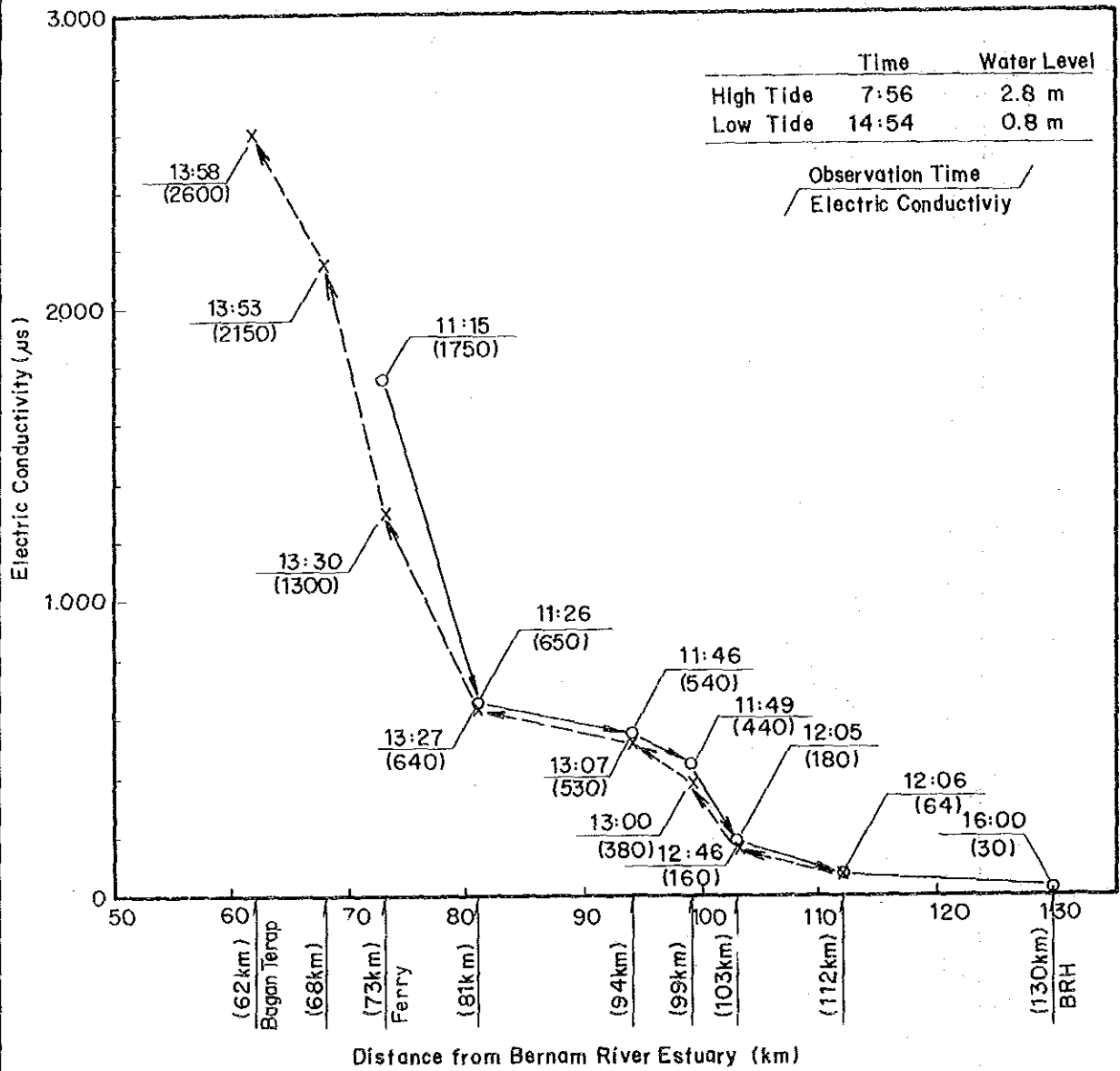


Fig. 6 Frequency Analysis on Annual Drought Runoff at BRH



Observation Date ; 11 September, 1986

Fig. 7 Electric Conductivity and Water Level at Bagan Terap



Note : Observation Date - 10 September, 1986

Fig. 8 Electric Conductivity along Lower Reaches of Bernam River

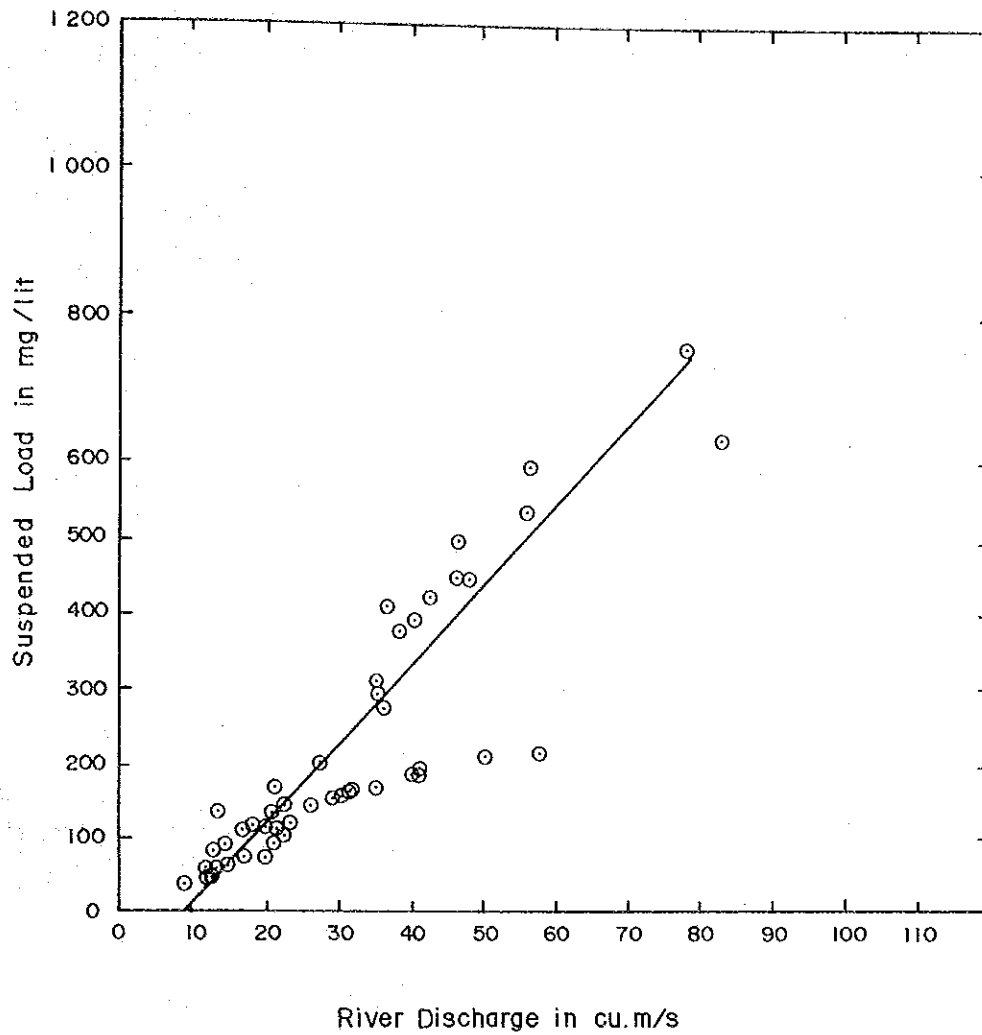


Fig. 9 Relationship between River Discharge and Suspended Load at SKC Bridge Station

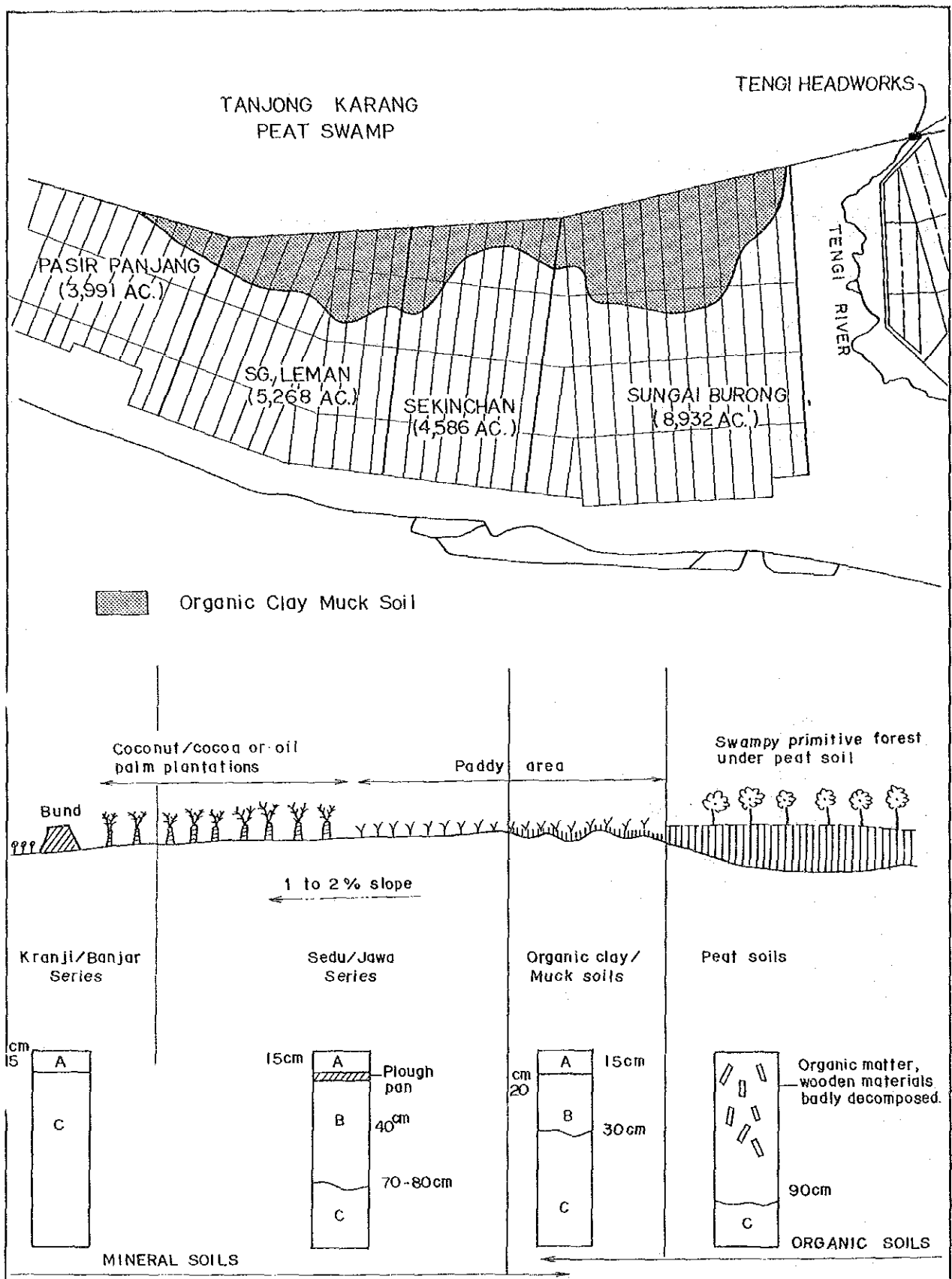


Fig. 10 Distribution of Organic Clay and Muck Soil



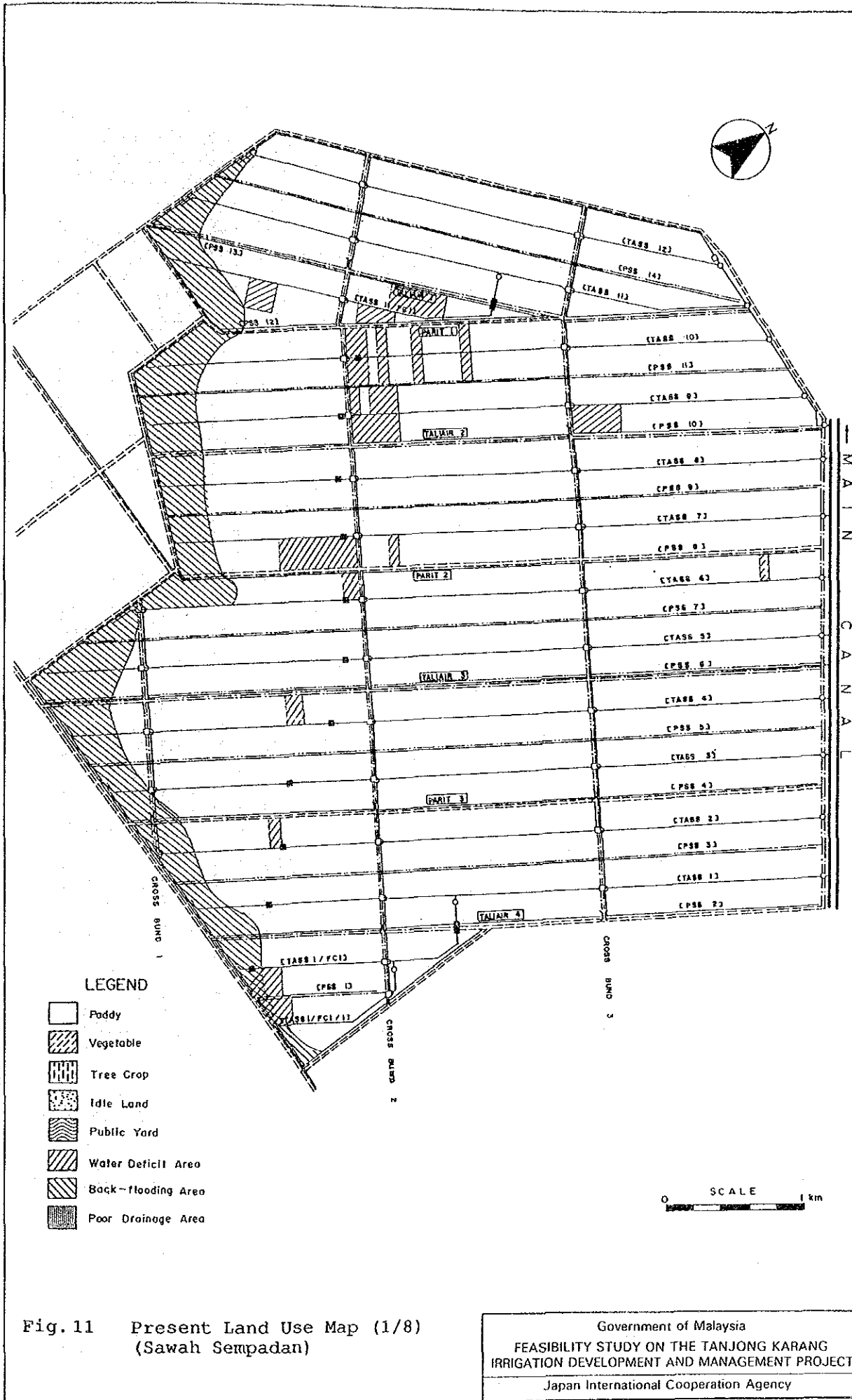


Fig. 11 Present Land Use Map (1/8)  
(Sawah Sempadan)

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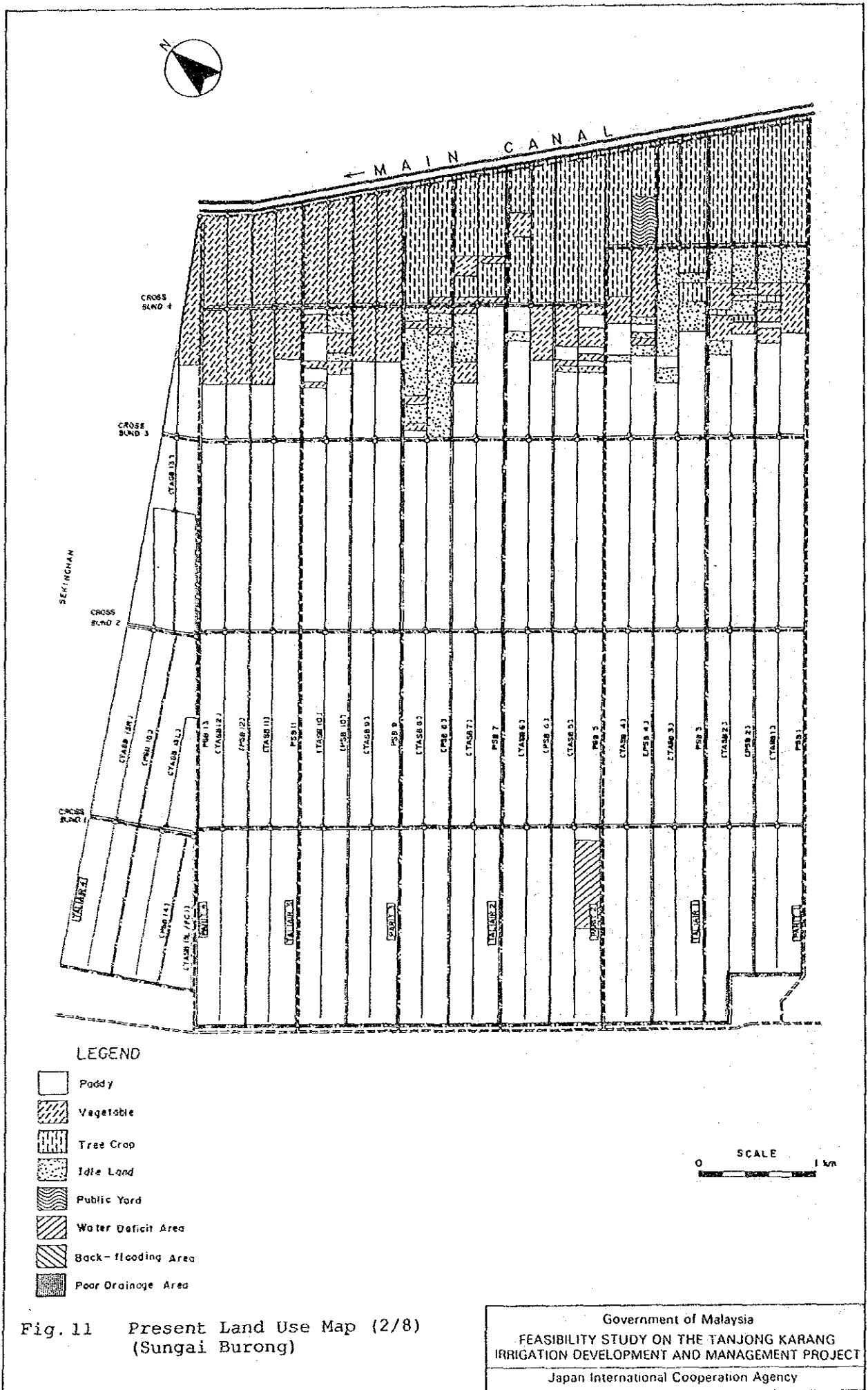


Fig. 11 Present Land Use Map (2/8)  
(Sungai Burong)

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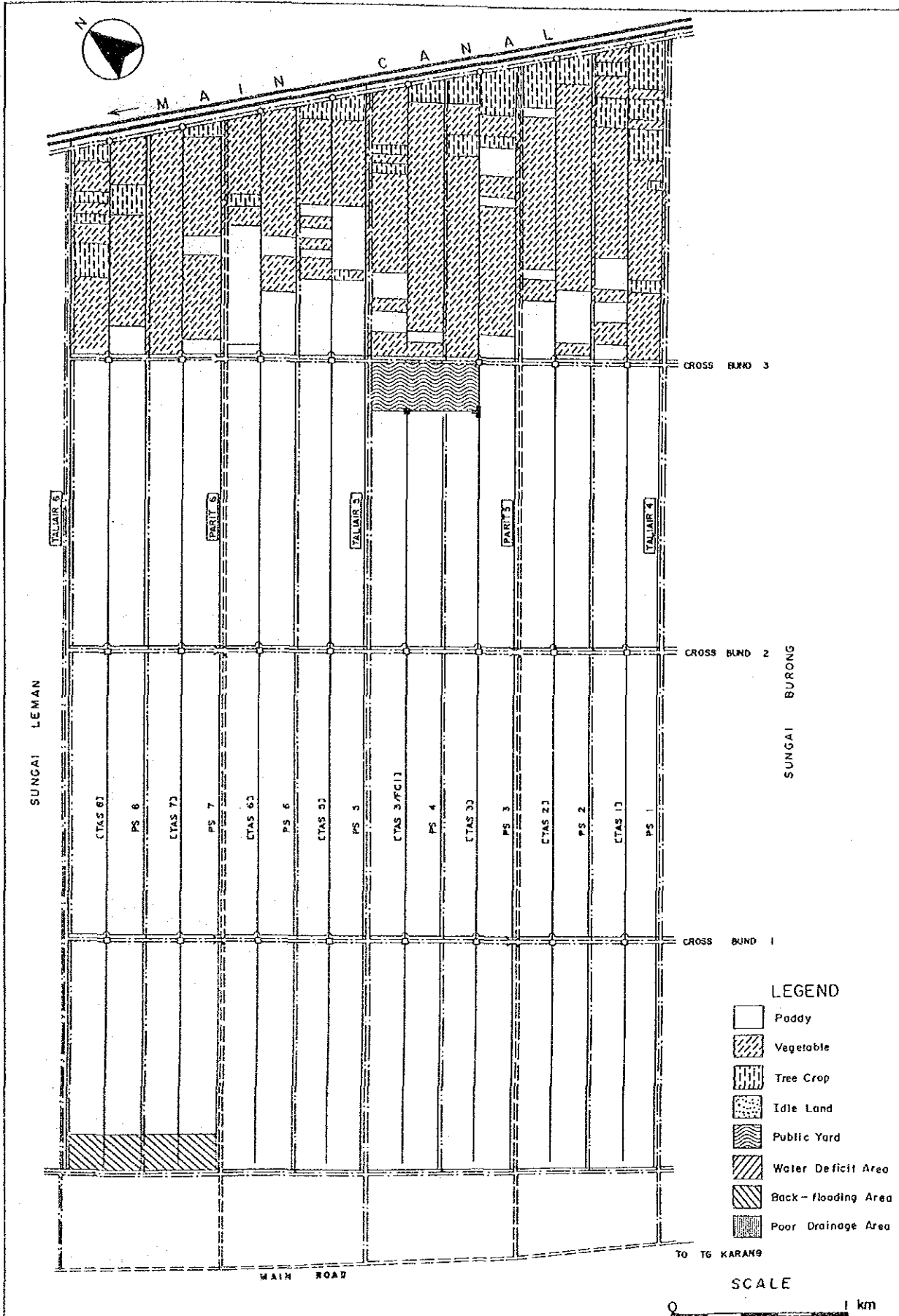


Fig. 11 Present Land Use Map (3/8) (Sekinchan)

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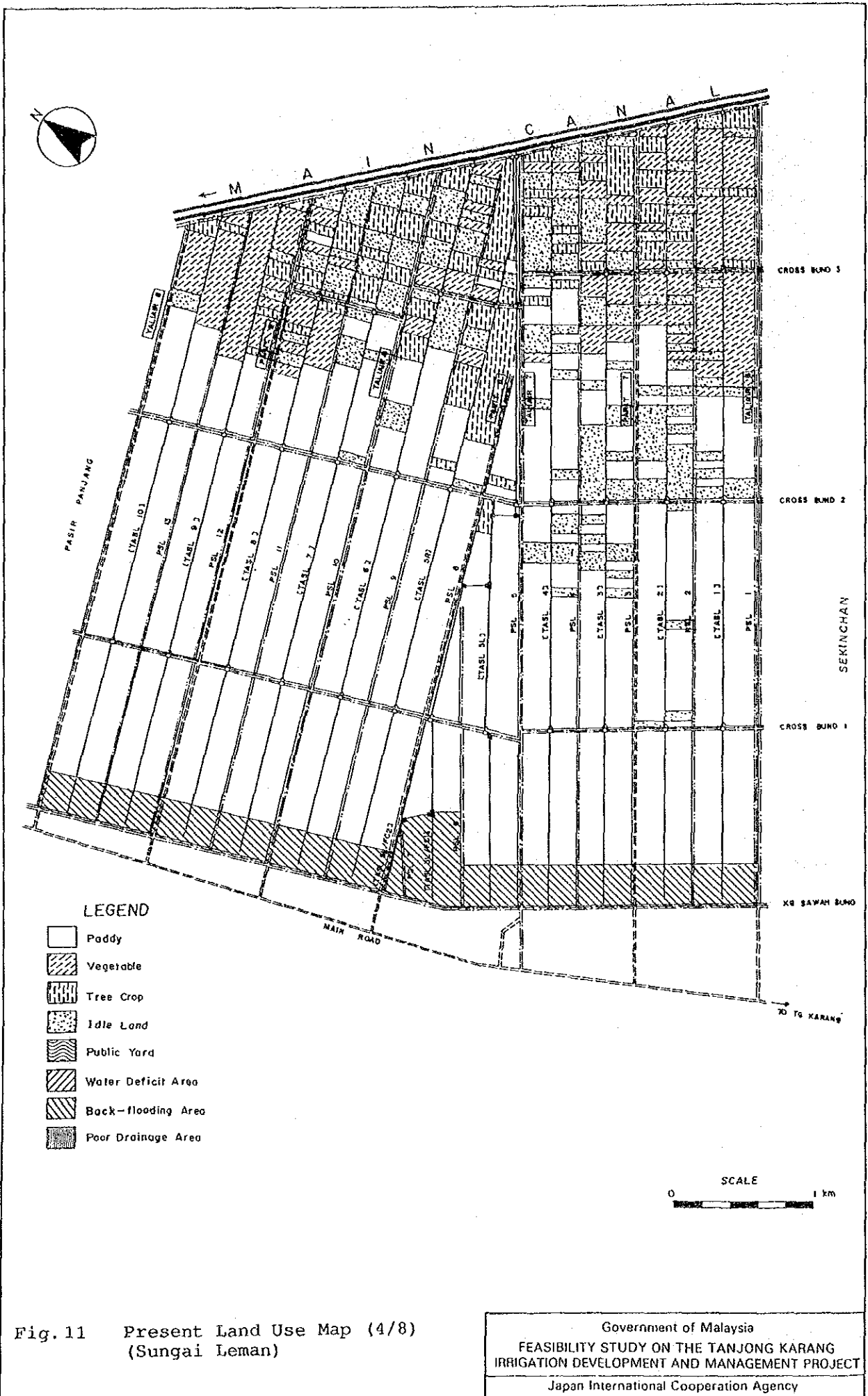
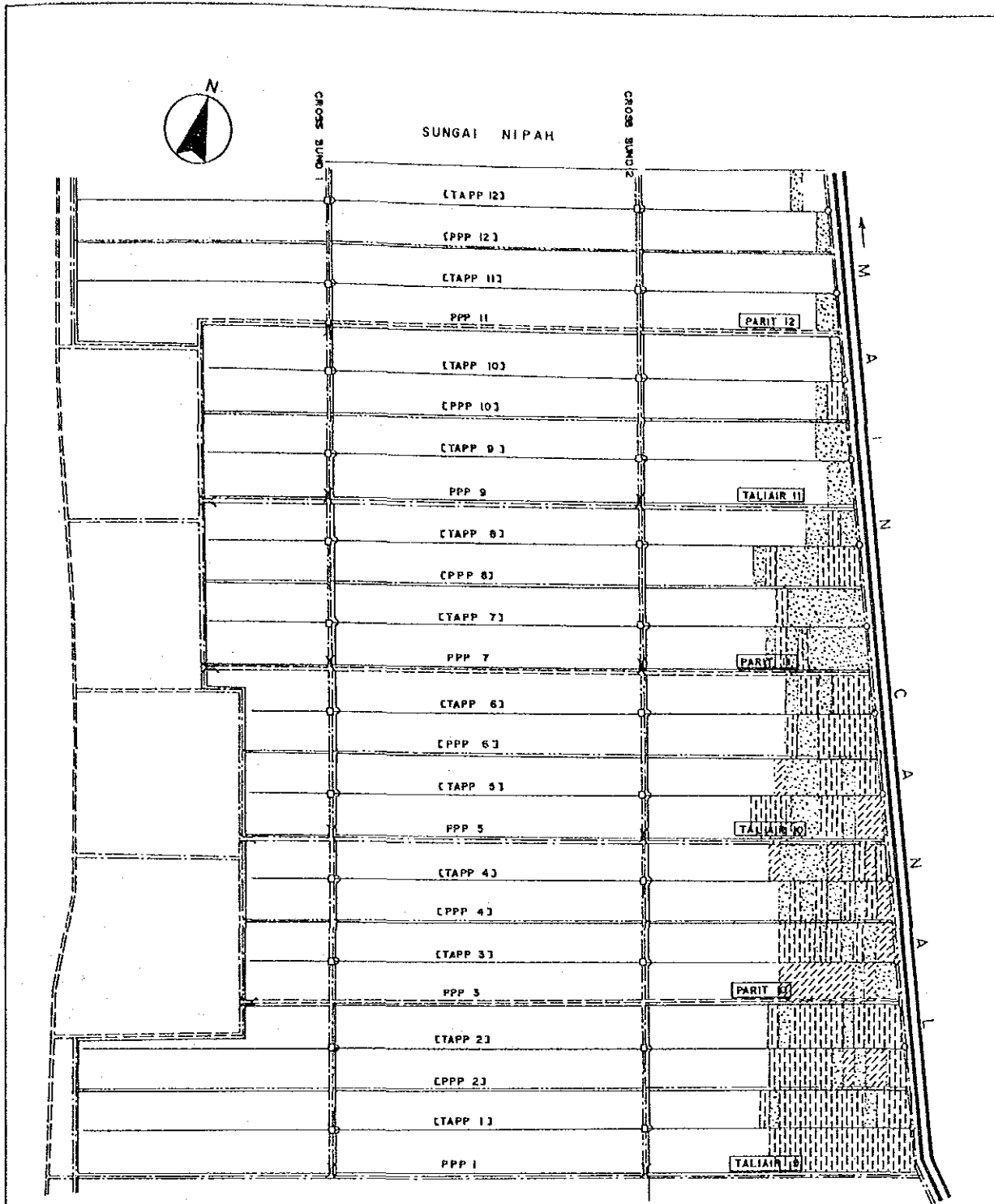










Fig. 11 Present Land Use Map (4/8)  
(Sungai Leman)

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LEGEND

-  Paddy
-  Vegetable
-  Tree Crop
-  Idle Land
-  Public Yard
-  Water Deficit Area
-  Back-flooding Area
-  Poor Drainage Area

SUNGAI LEMAN

SCALE 0 1 km

Fig. 11 Present Land Use Map (5/8)  
(Pasir Panjang)

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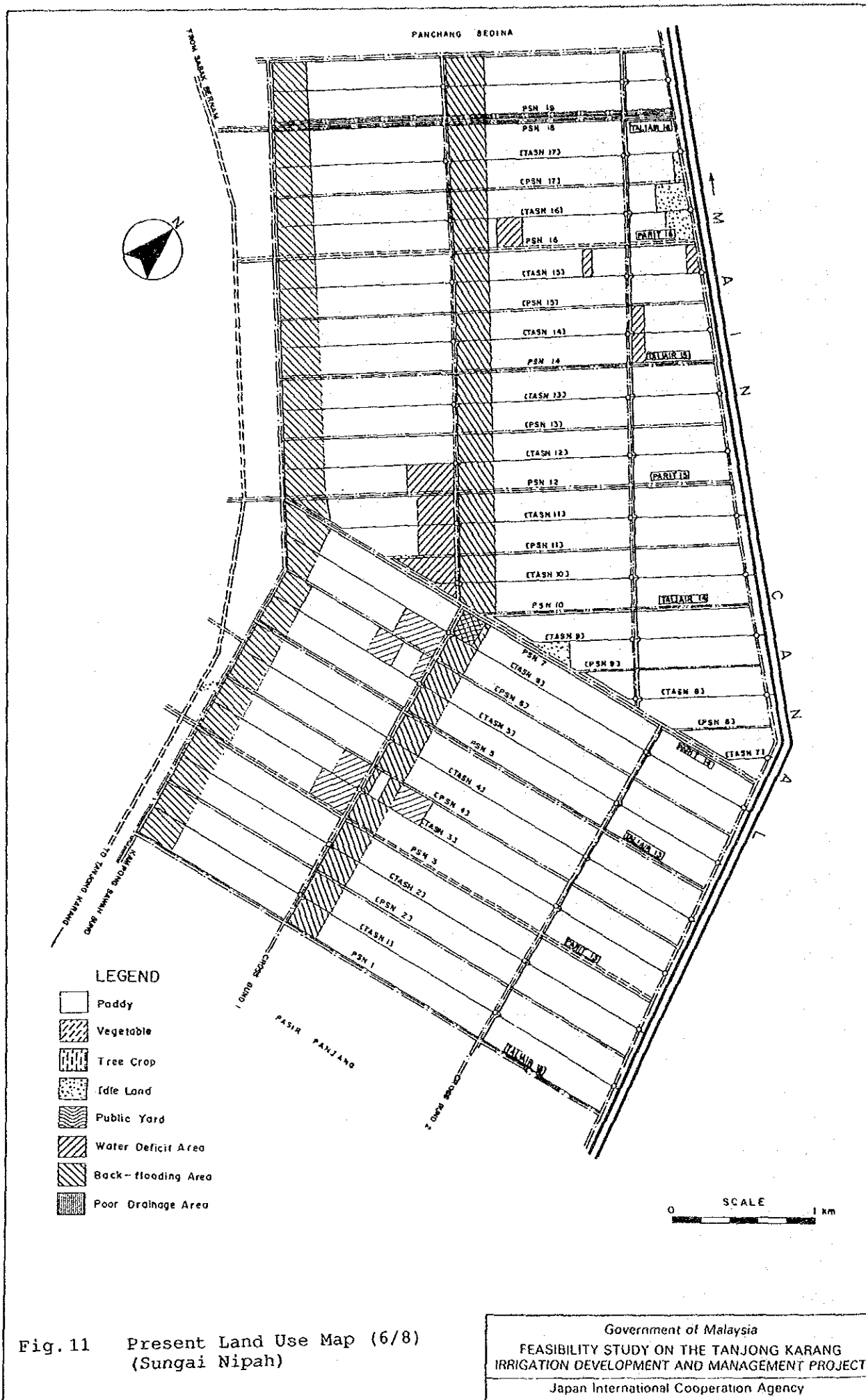


Fig.11 Present Land Use Map (6/8)  
(Sungai Nipah)

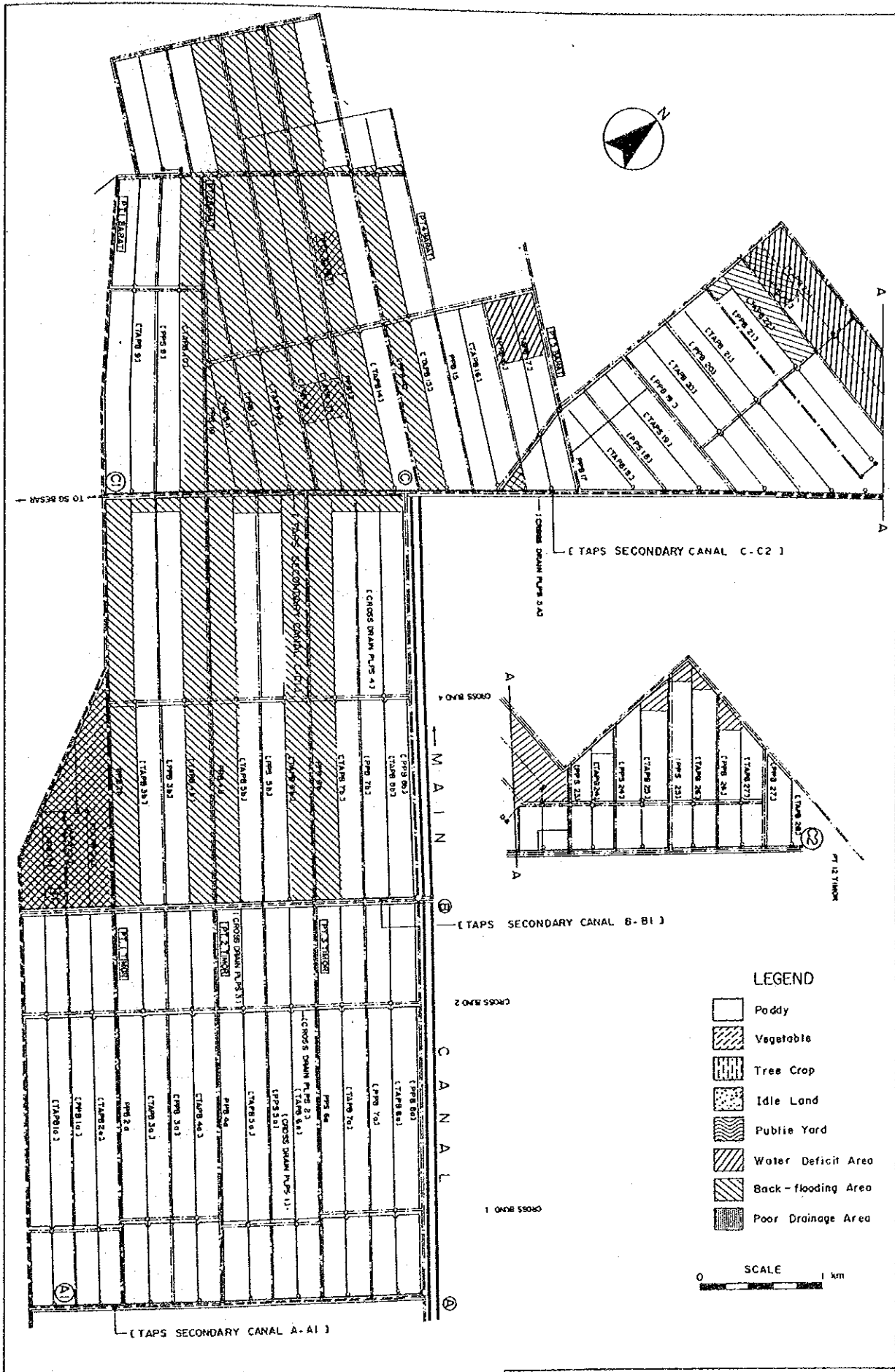


Fig. 11 Present Land Use Map (7/8)  
(Panchan Bedena)

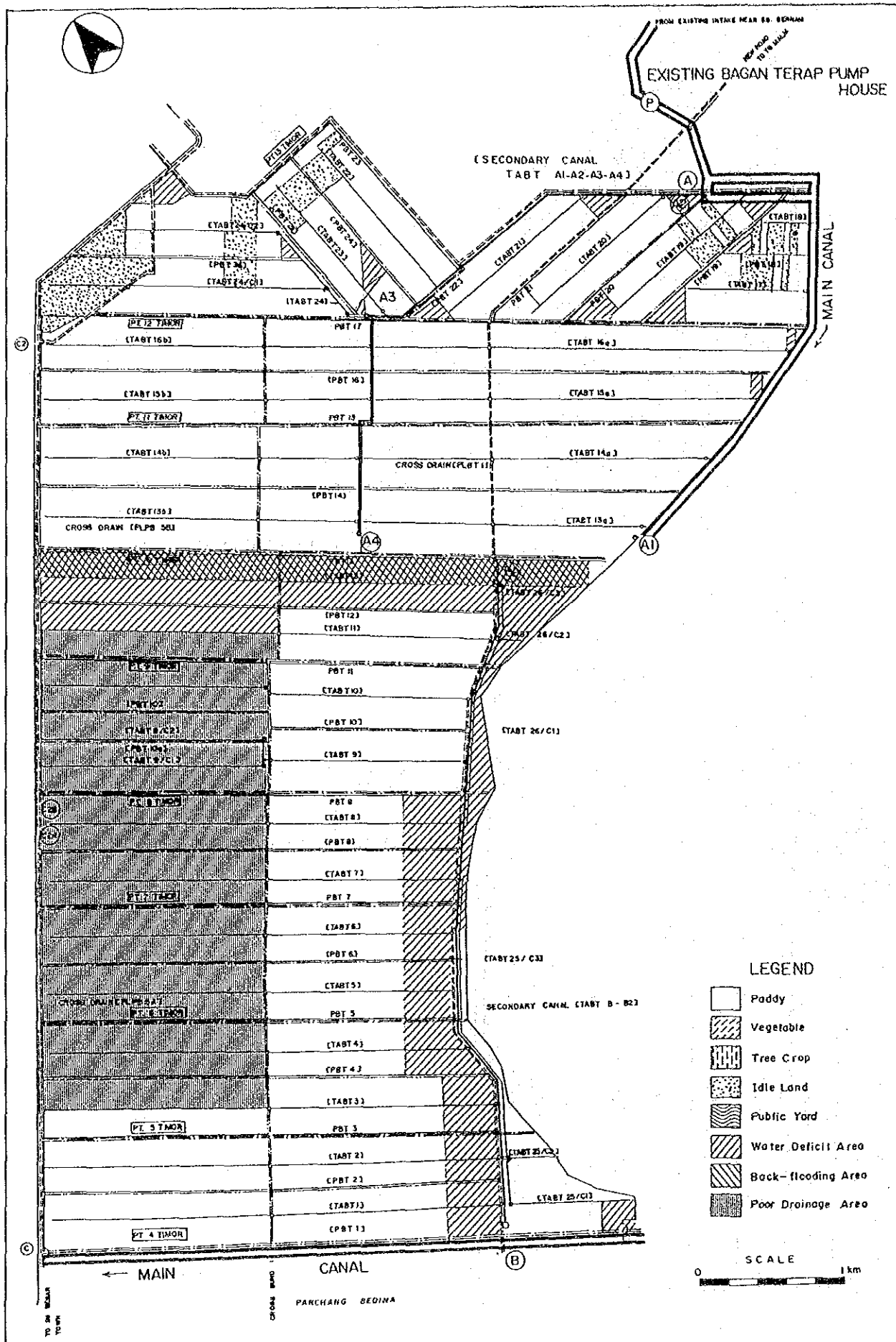


Fig. 11 Present Land Use Map (8/8)  
(Bagan Terap)



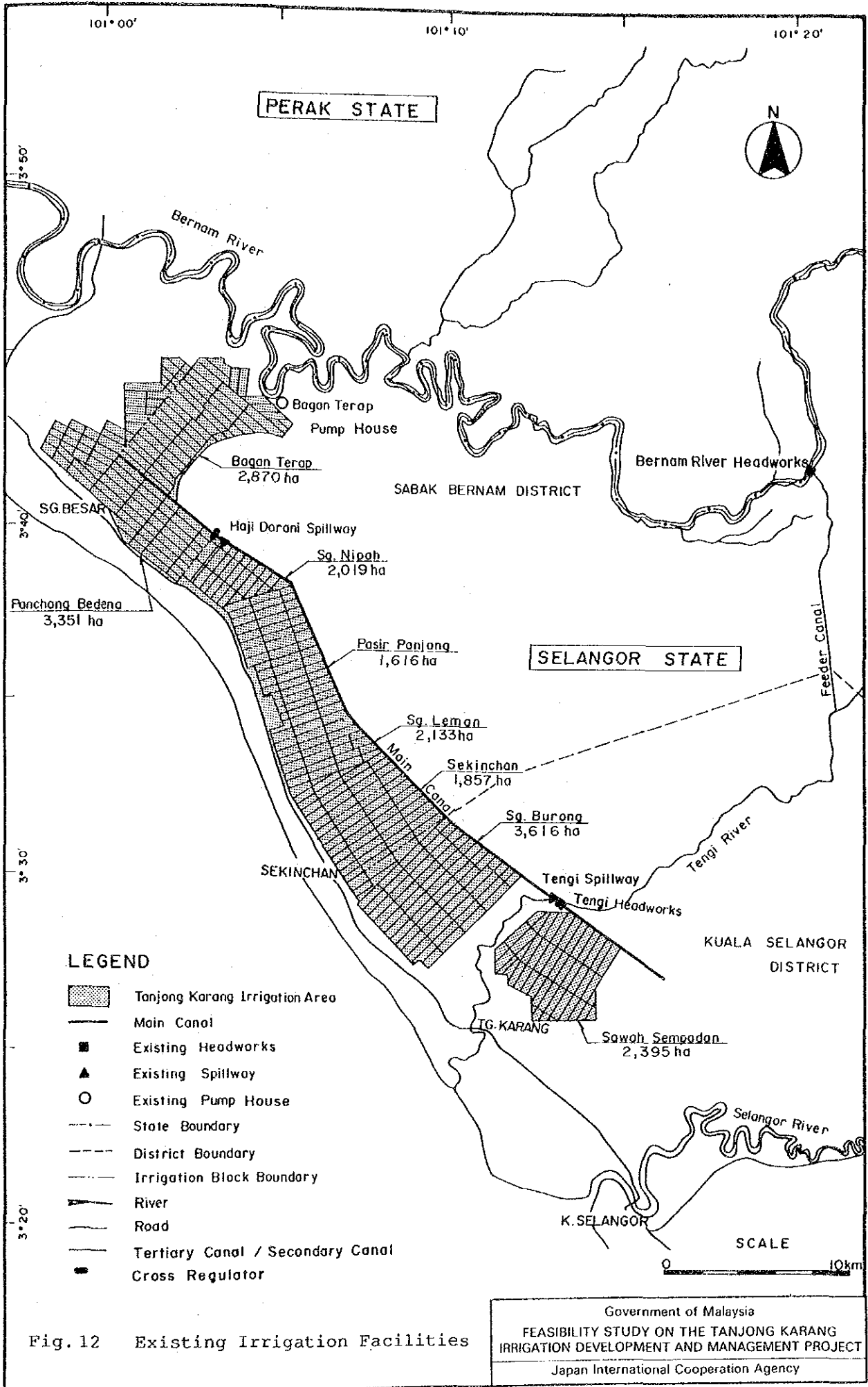


Fig. 12 Existing Irrigation Facilities

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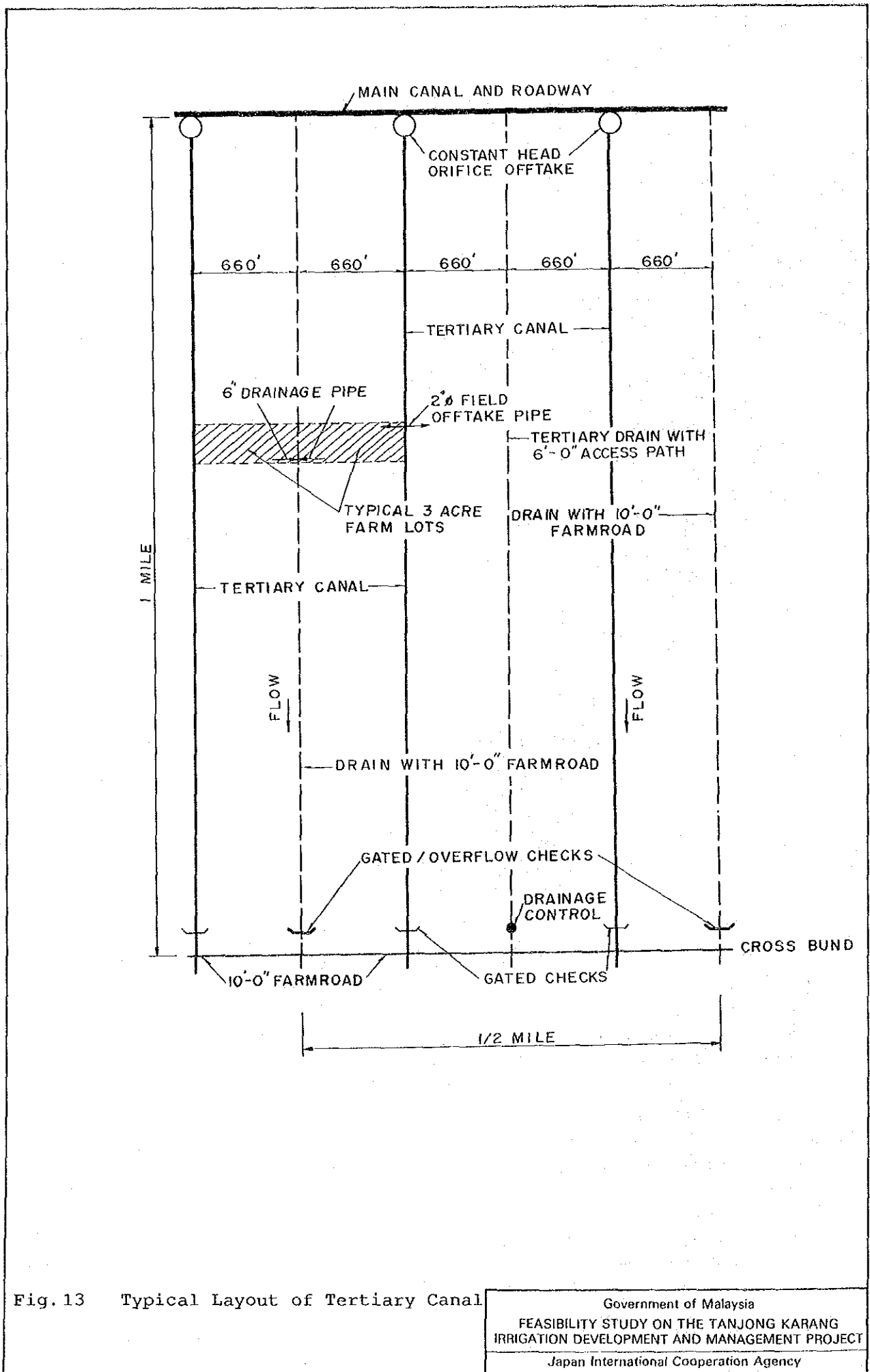
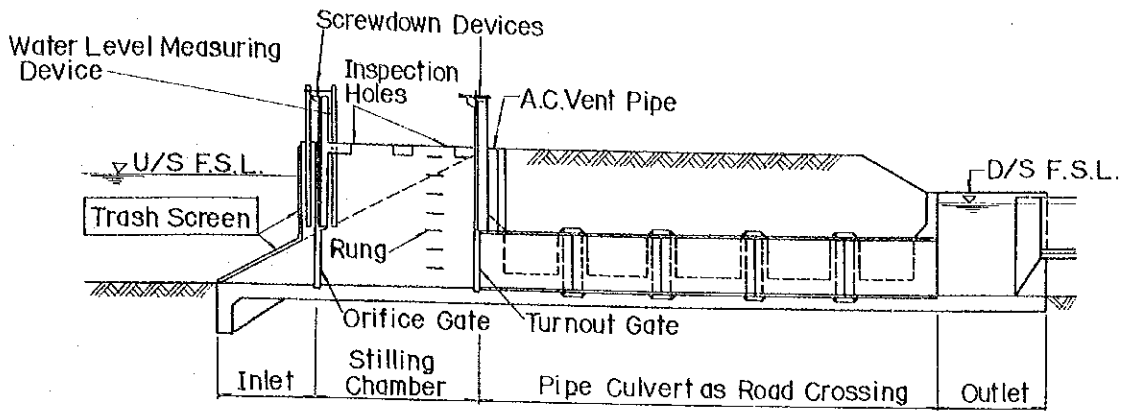
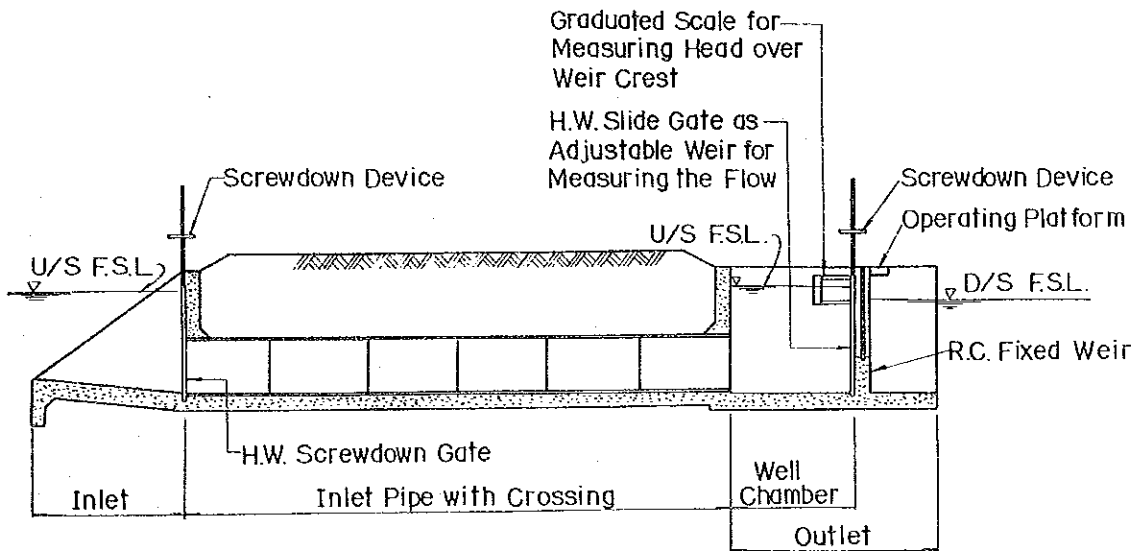


Fig. 13 Typical Layout of Tertiary Canal



TYPICAL CONSTANT HEAD ORIFICE OFFTAKE



TYPICAL ADJUSTABLE WEIR OFFTAKE

Fig.14 Typical Offtakes

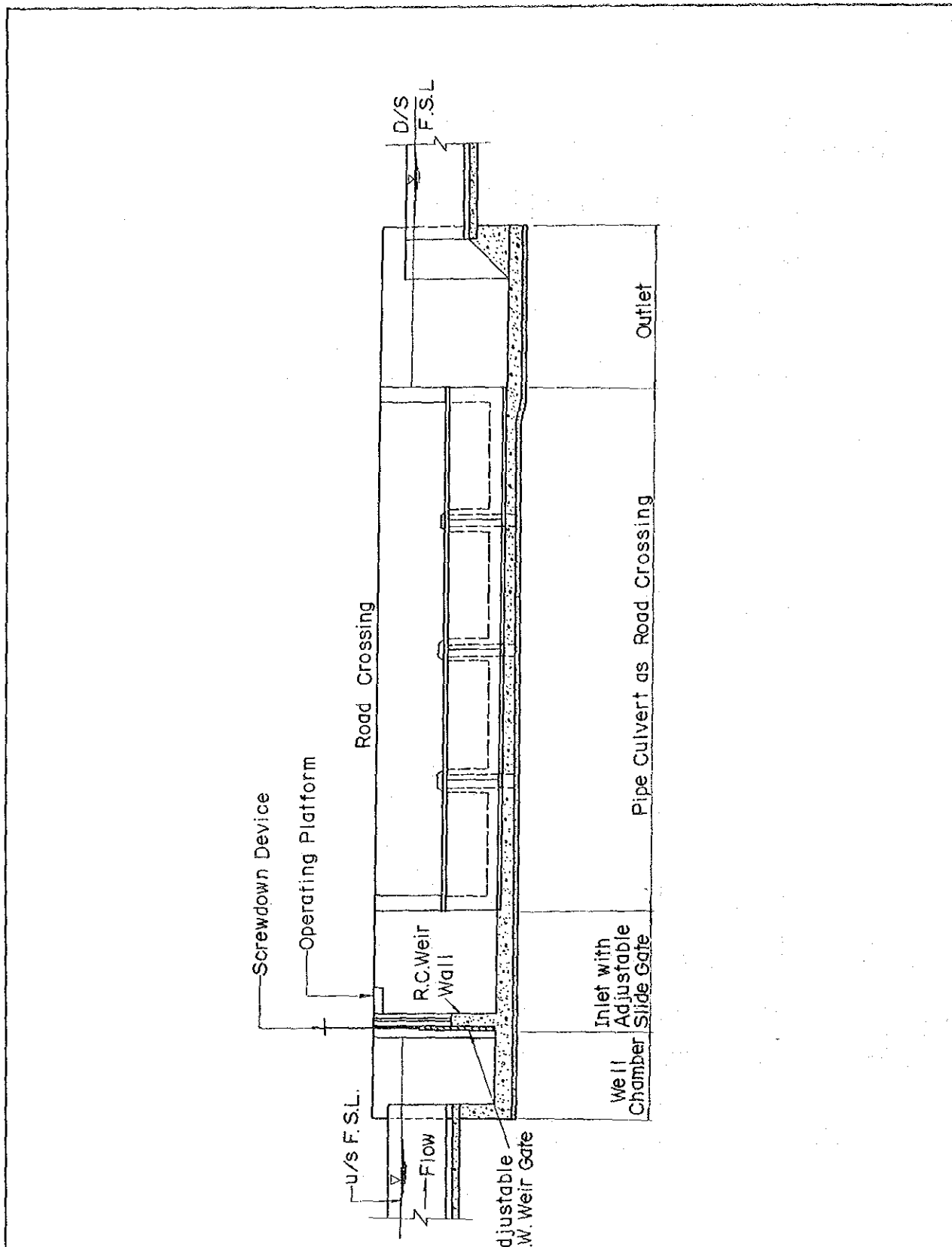


Fig.15 Typical Check Structure

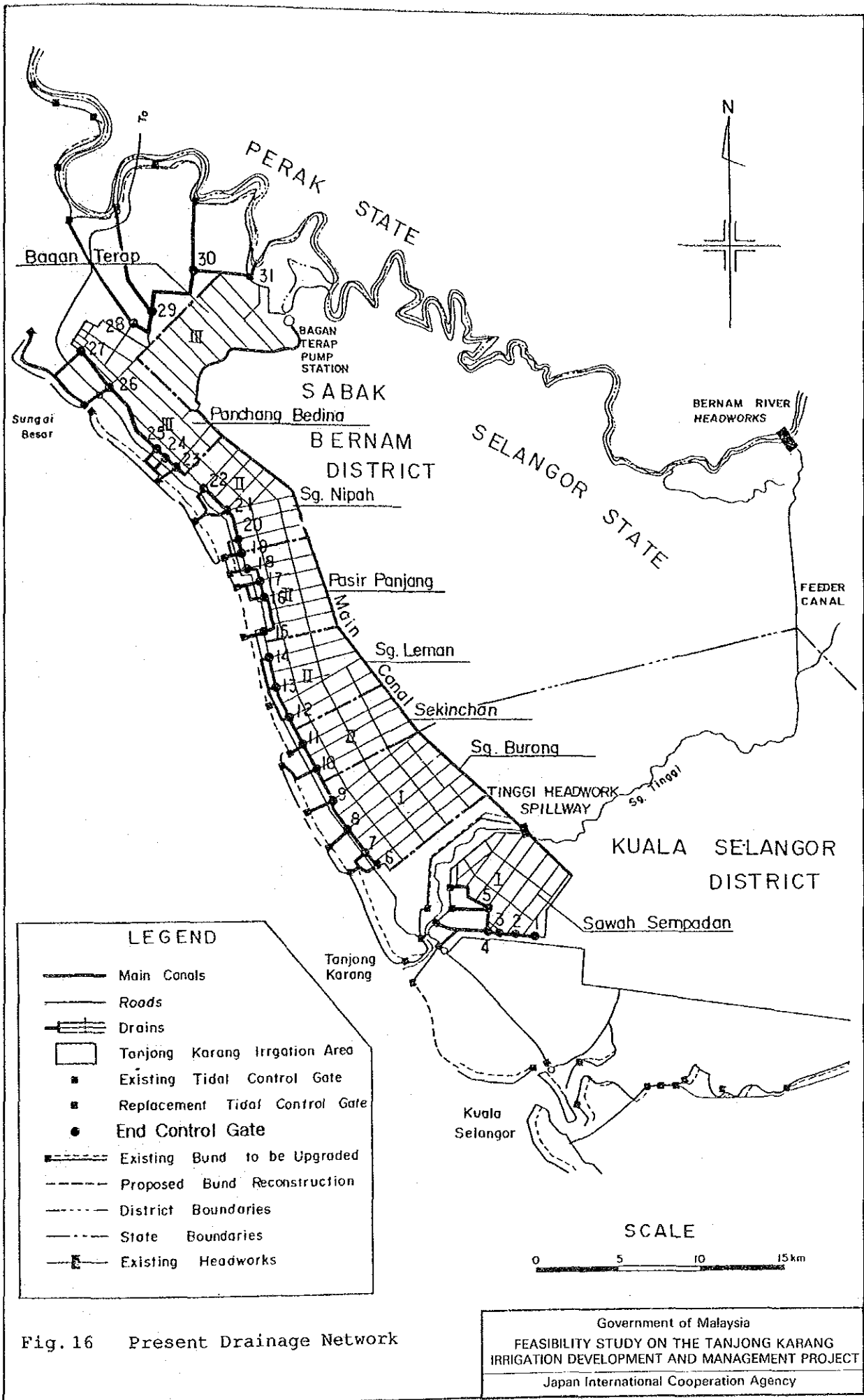


Fig. 16 Present Drainage Network

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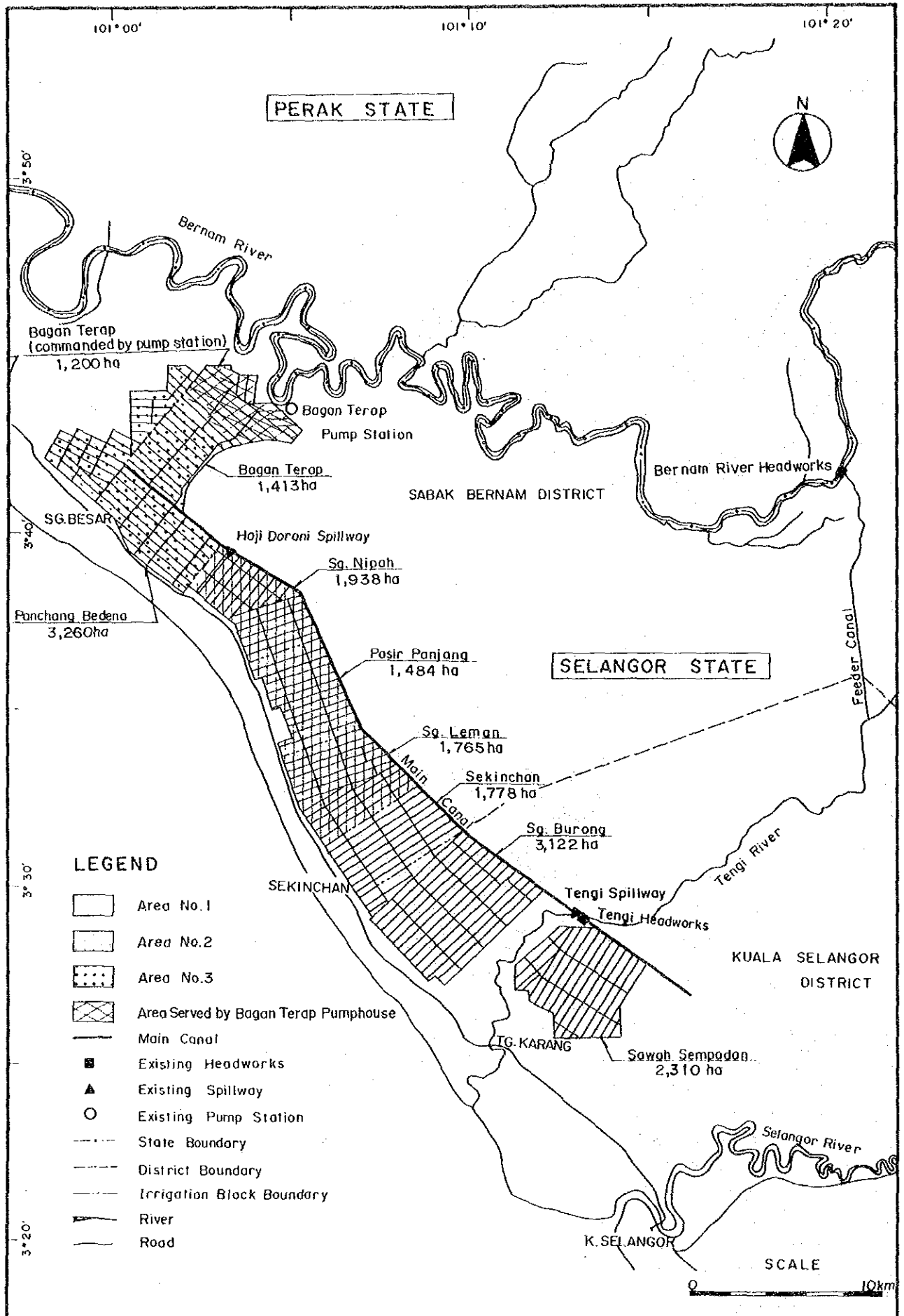


Fig.17 Present Irrigation Schedule Area

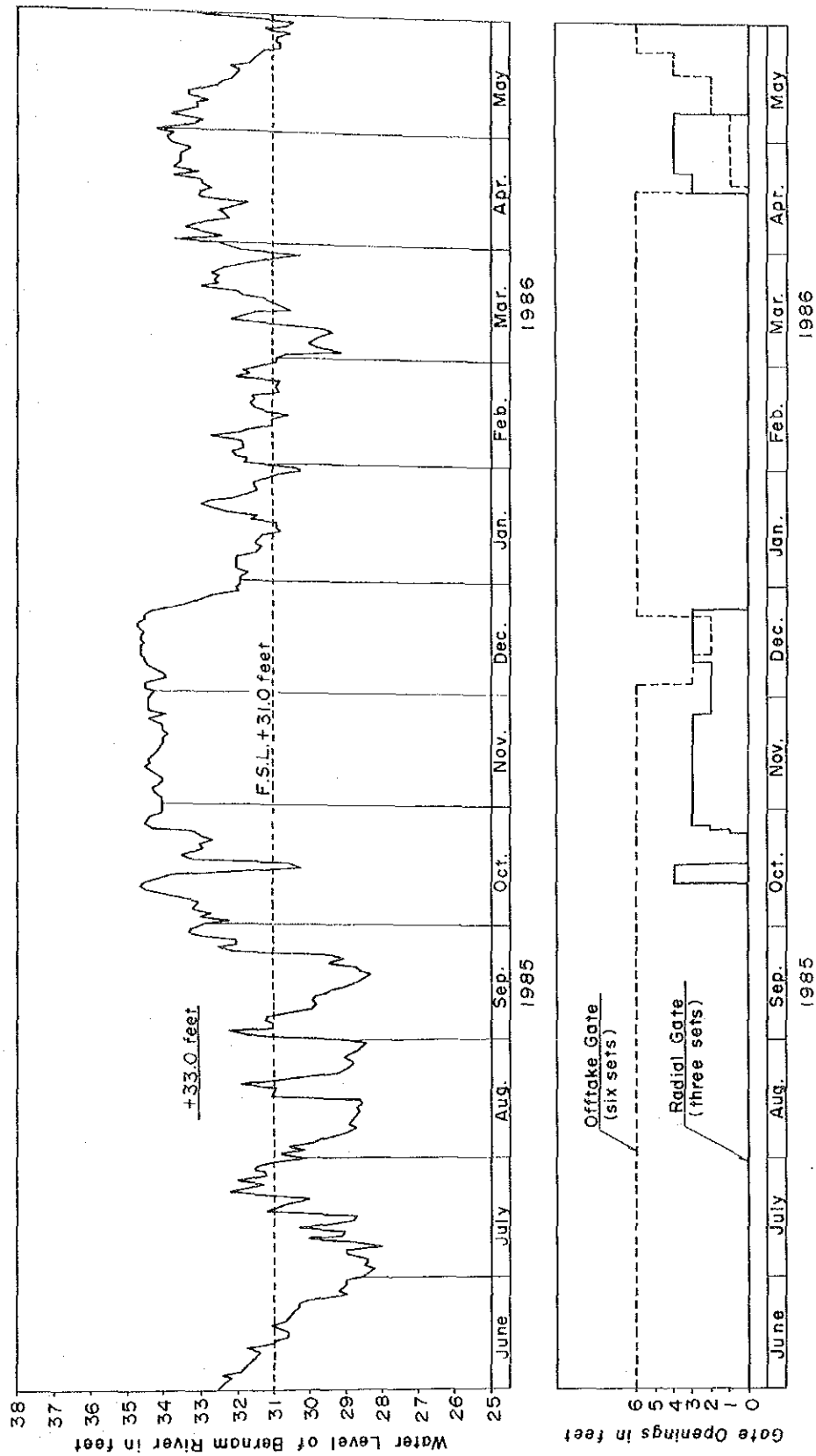


Fig.18 Operation of Gates at BRH

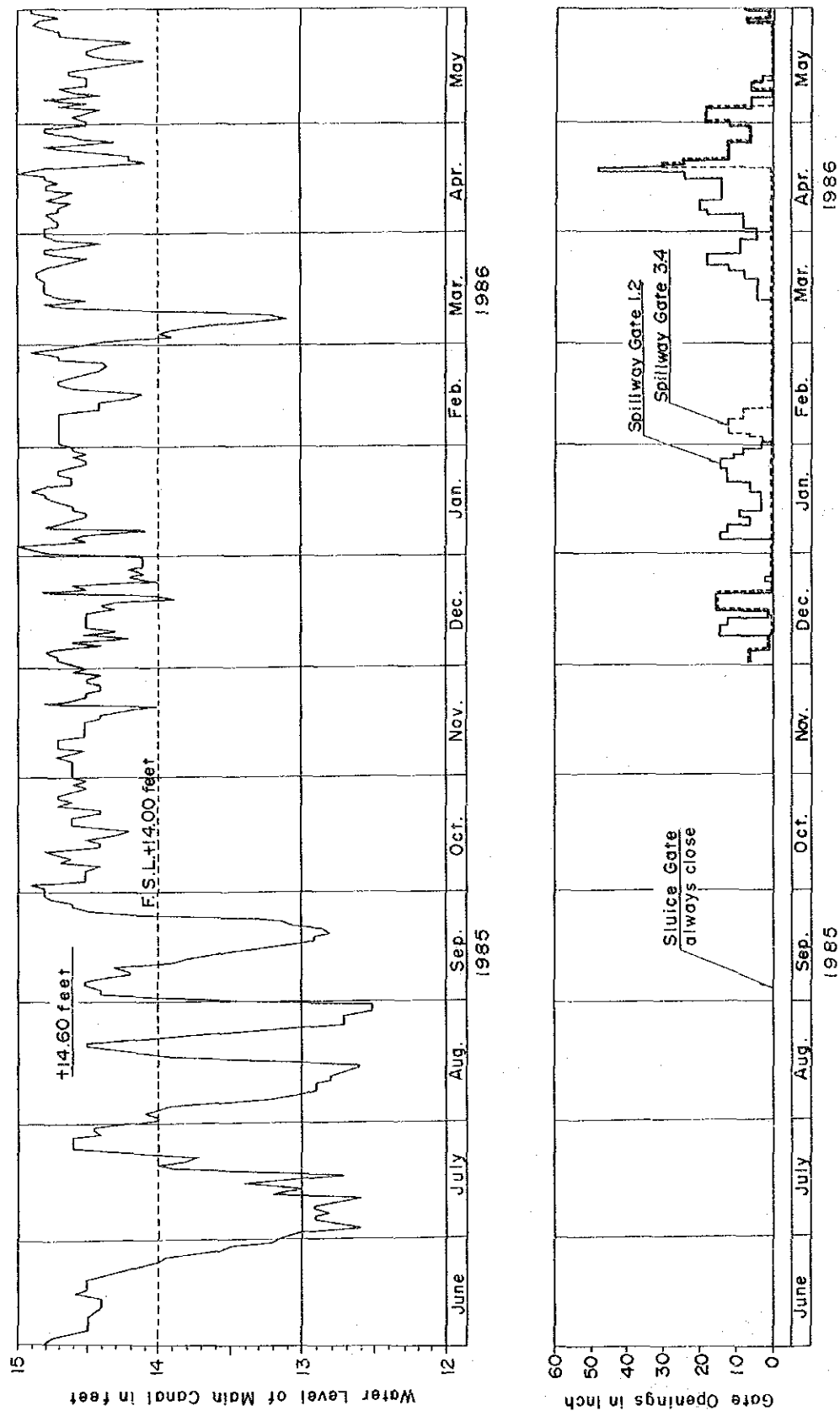


Fig.19 Daily Fluctuation of Water Level in Main Canal



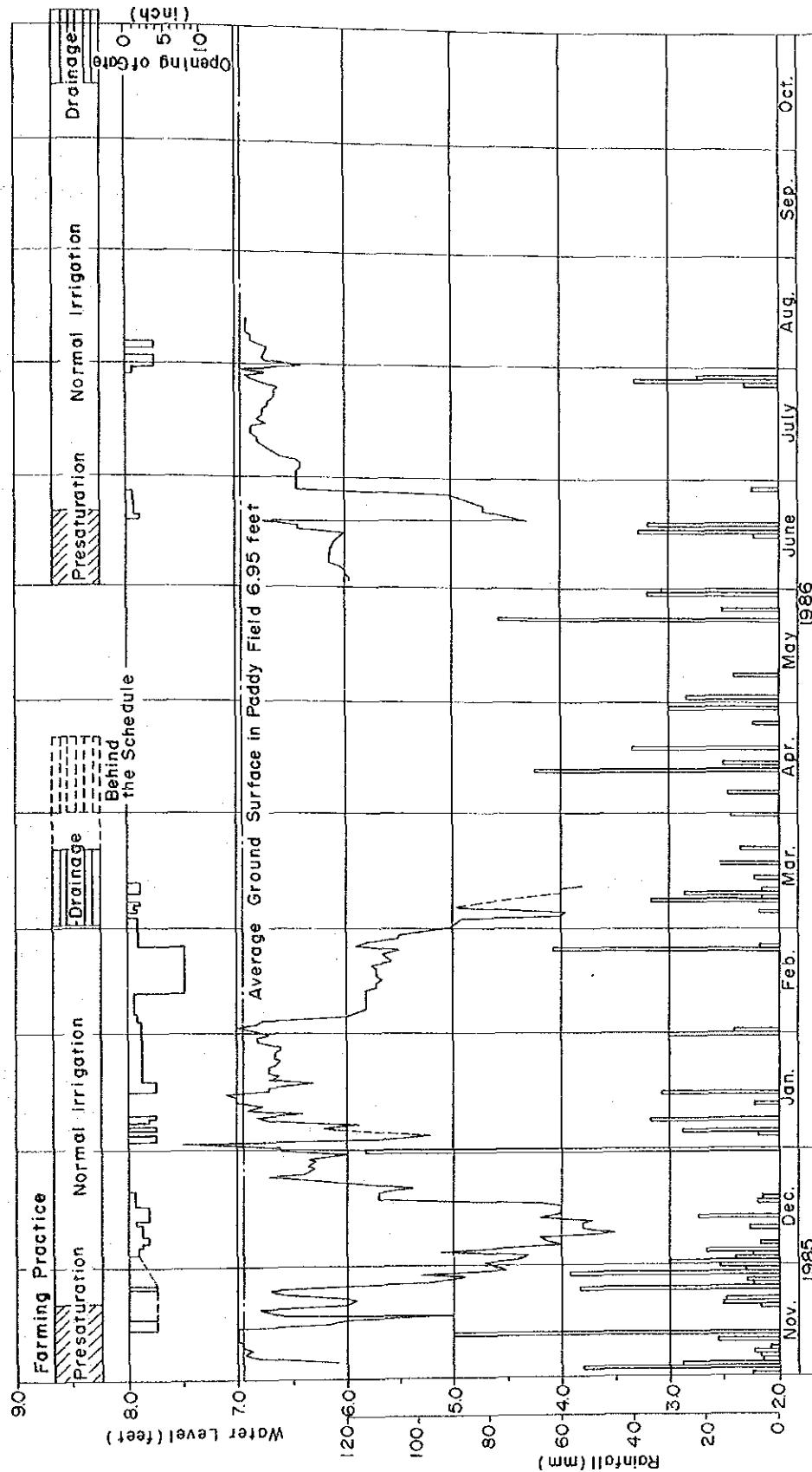
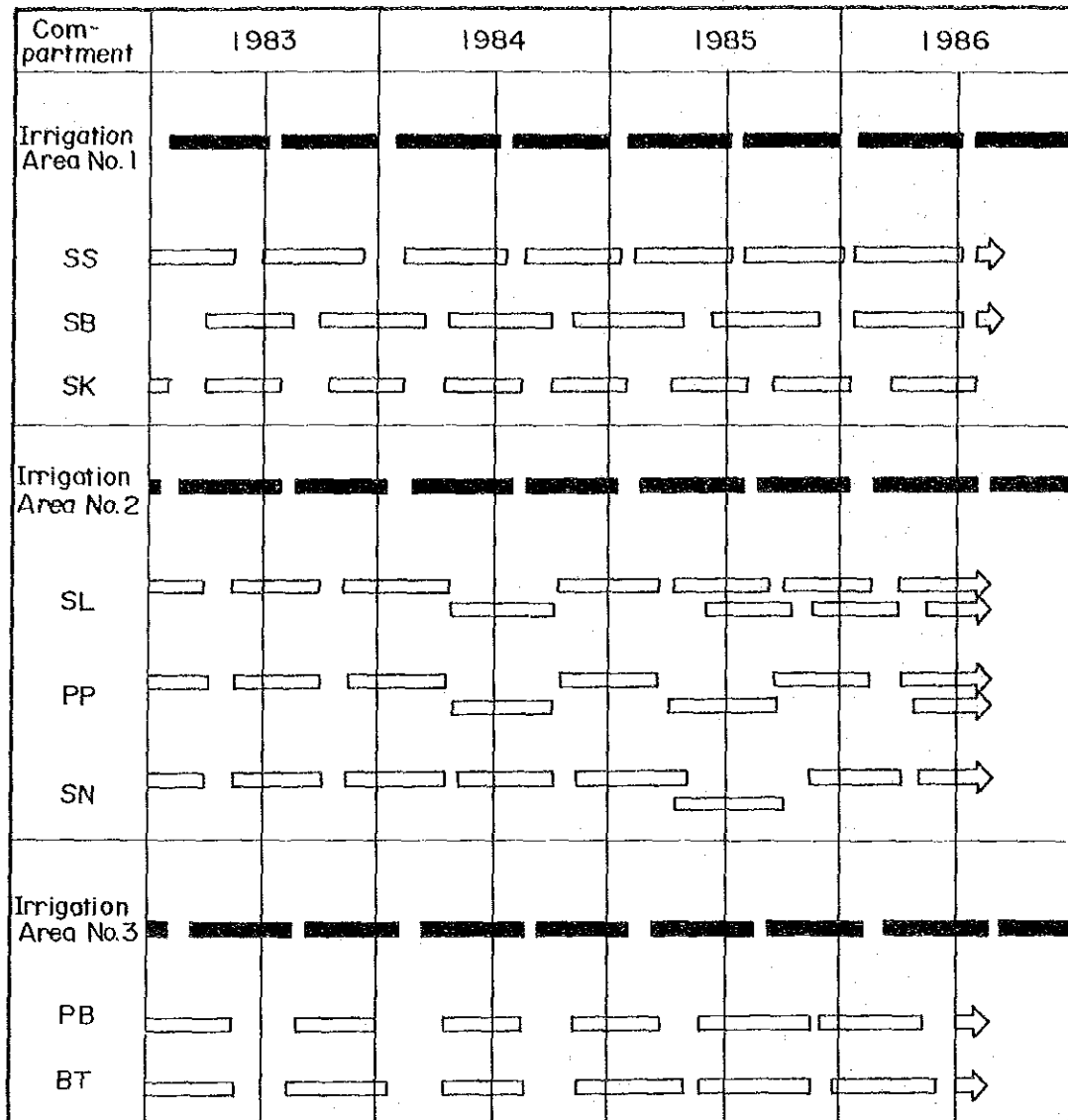


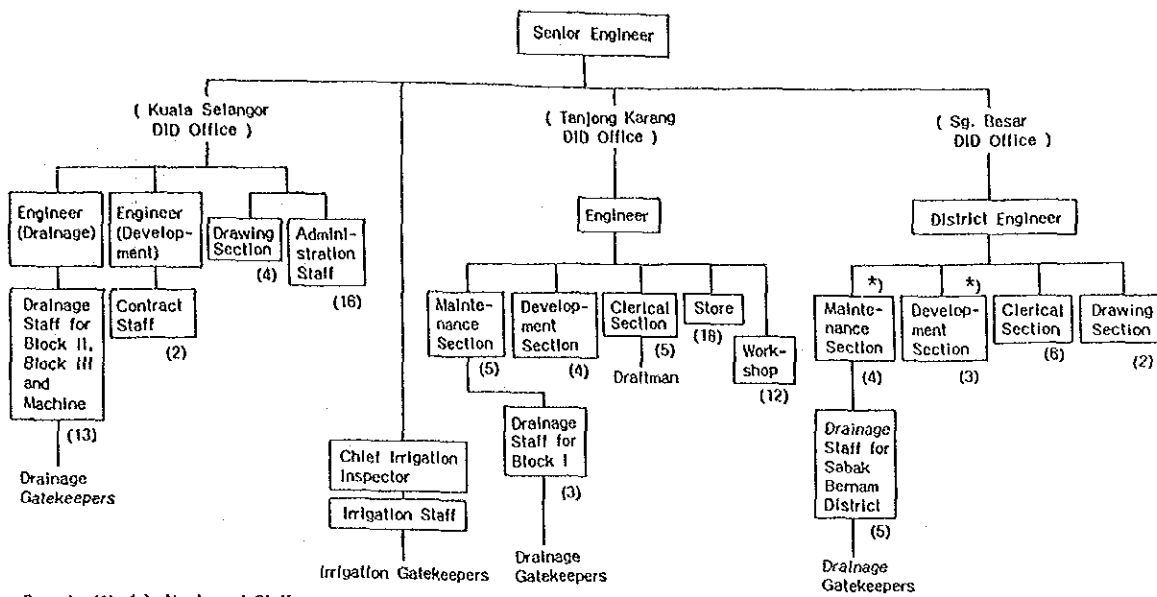
Fig.20 Record of Water Level in Main Drain at Sungai Hj.Dorani



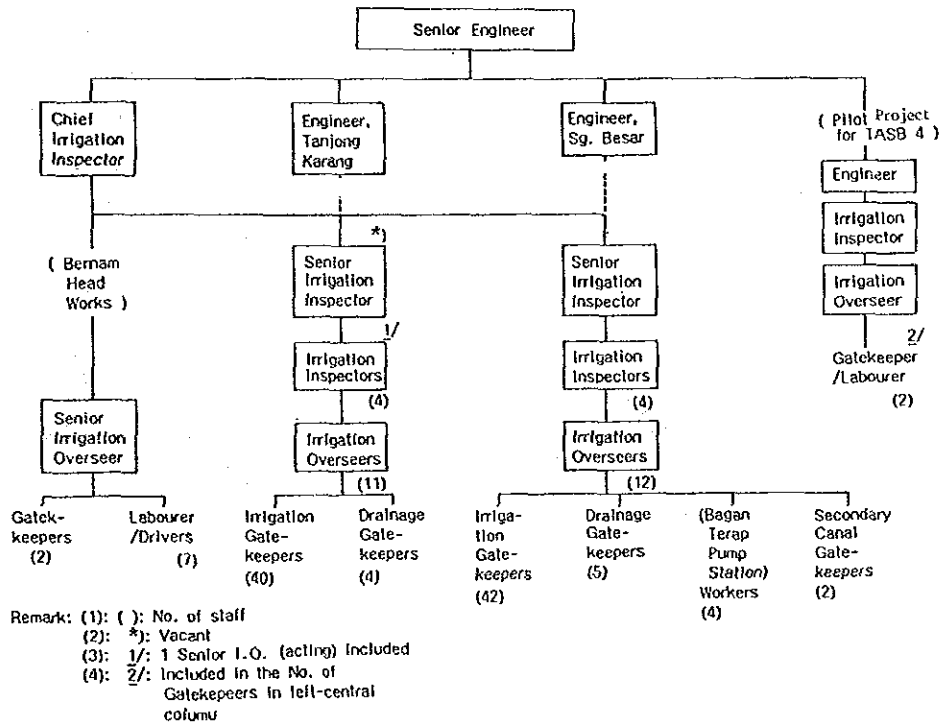
Remarks: Compartment  
 SS: Sawah Sempadan      SB: Sungai Burong  
 SK: Sekinchan            SL: Sungai Leman  
 PP: Pasir Panjang        SN: Sungai Nipah  
 PB: Panchang Bedena     BT: Bagan Terap

[Thick black bar] Irrigation Schedule  
 [Thin black bar] Actual Cropping Calendar

Fig. 21 Present Irrigation Schedule and Actual Cropping Calendar



Remark: (1): ( ): Number of Staff  
(2): \* : Vacant



Remark: (1): ( ): No. of staff  
(2): \*): Vacant  
(3): 1/: 1 Senior I.O. (acting) Included  
(4): 2/: Included in the No. of Gatekeepers in left-central column

Fig.22 Organization for Operation and Maintenance

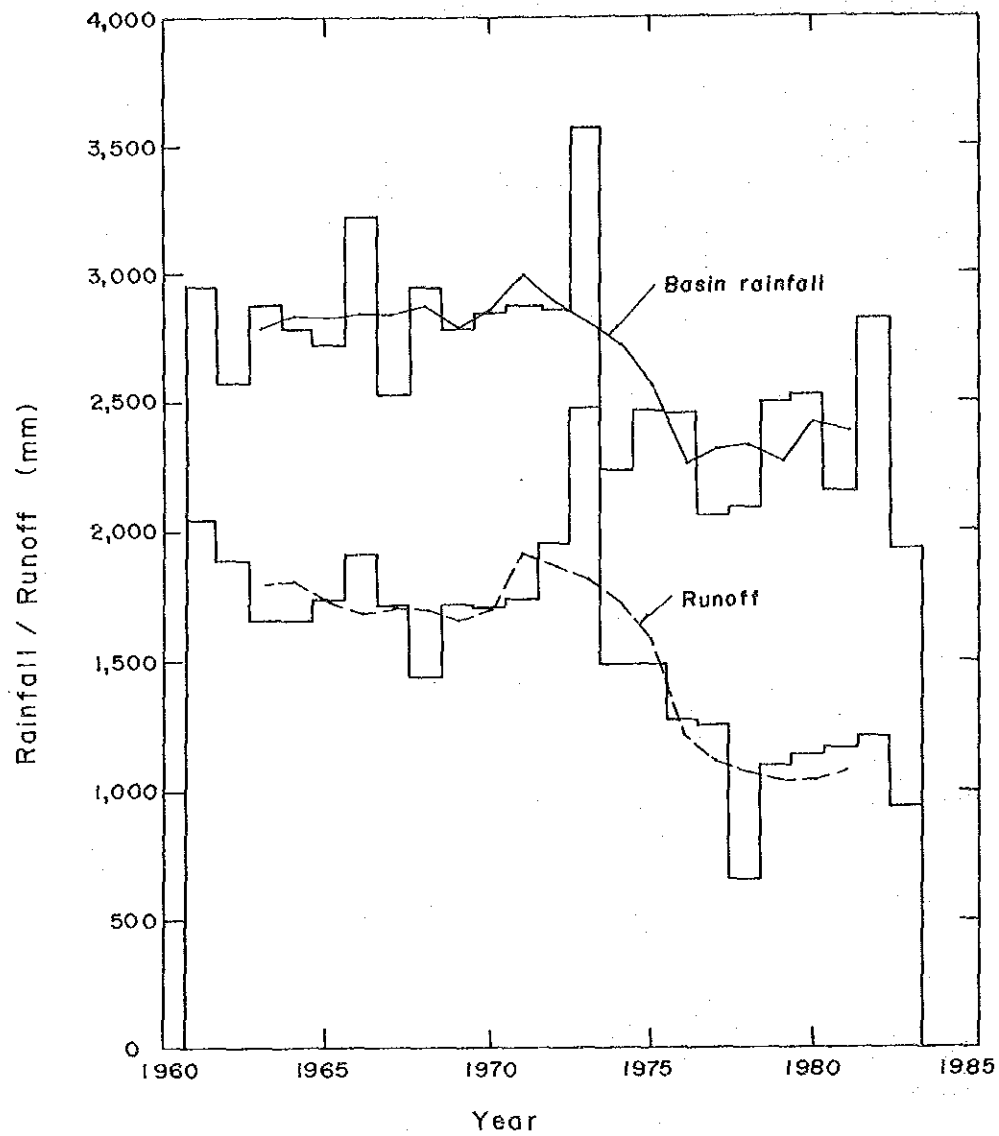


Fig. 23 Trend of Basin Rainfall and Runoff of Bernam River

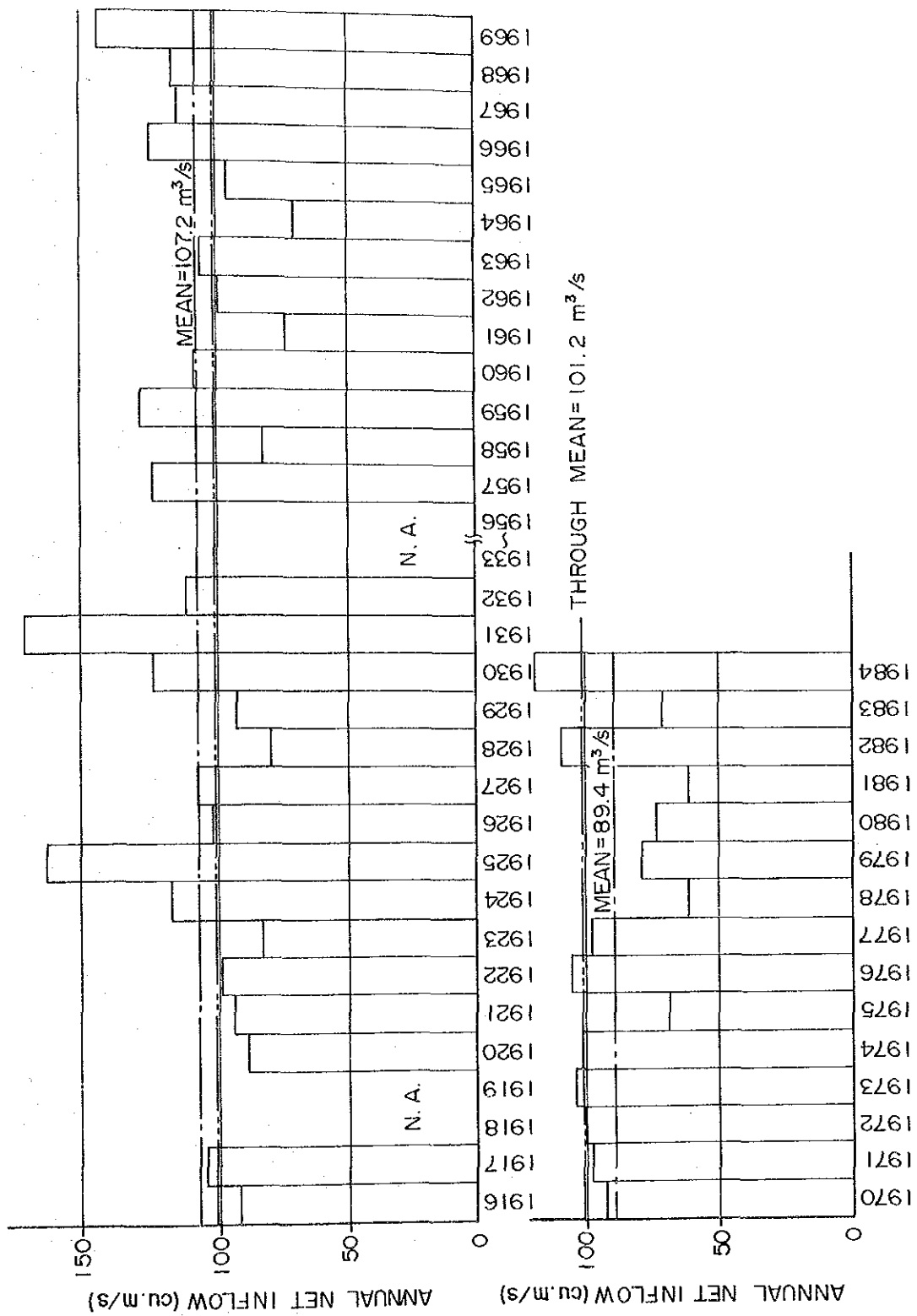


Fig. 24 Net Inflow to Lake Toba in Sumatra

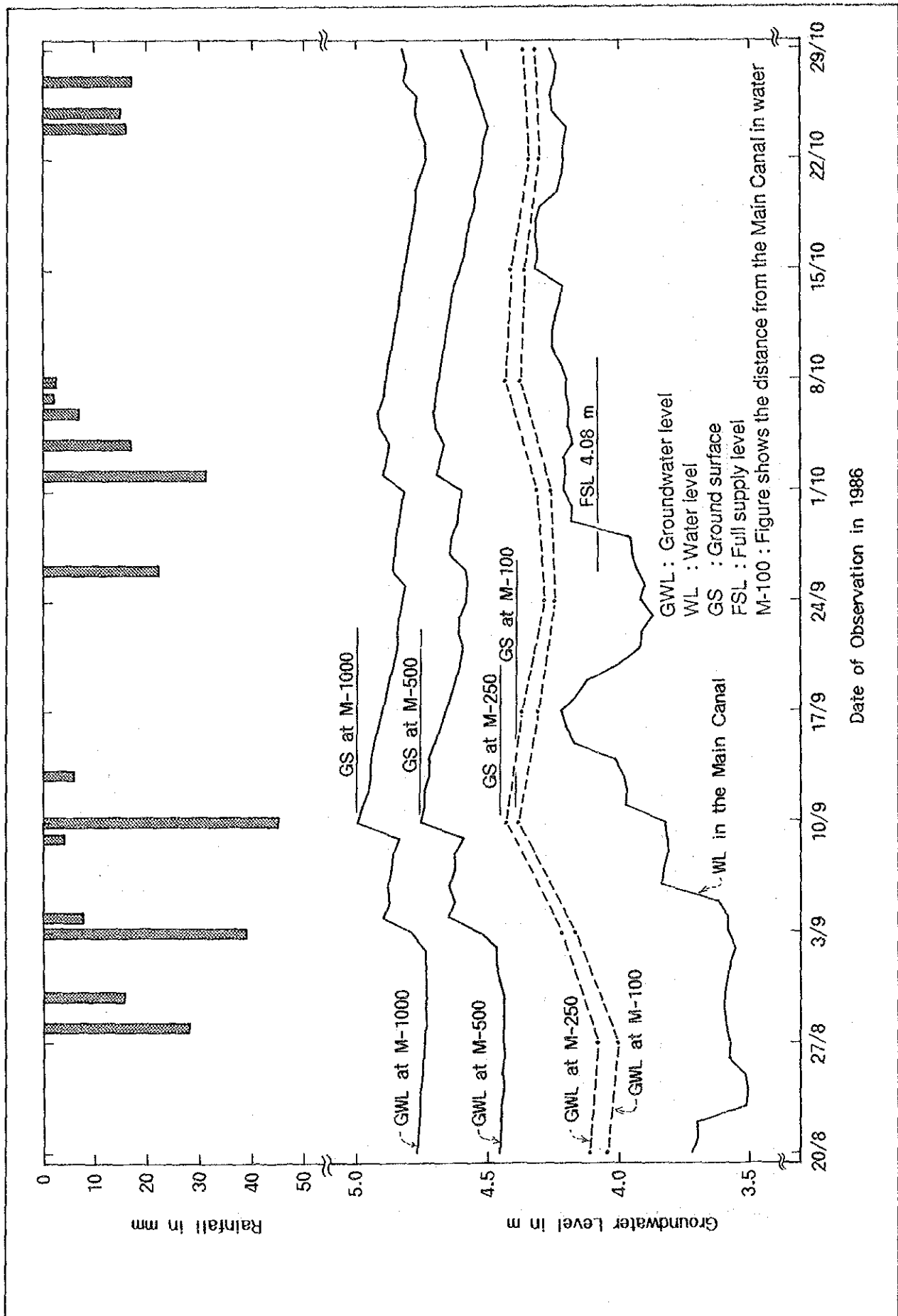


Fig.25 Result of Observation of Groundwater Table and Rainfall in Swamp

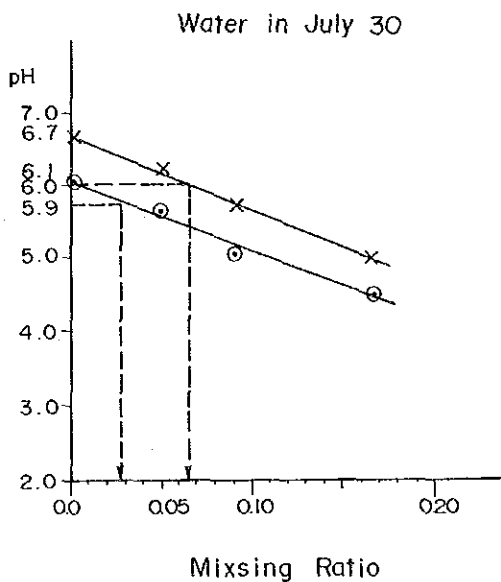
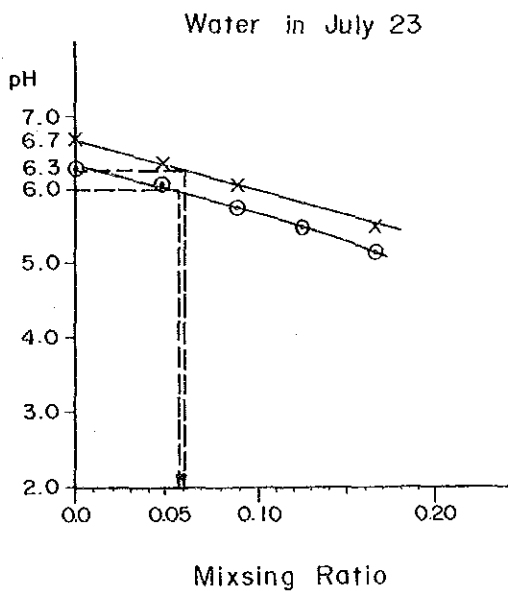
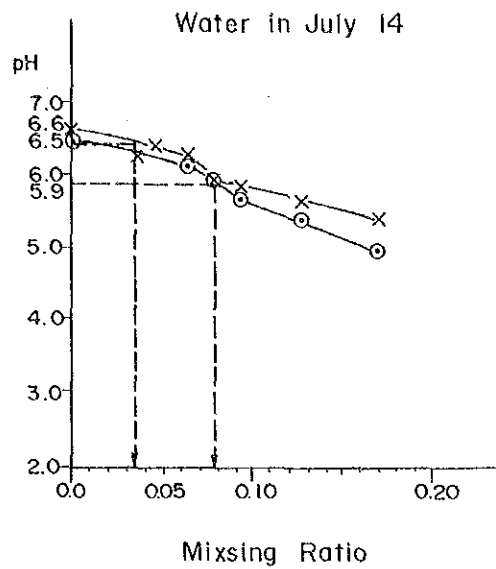
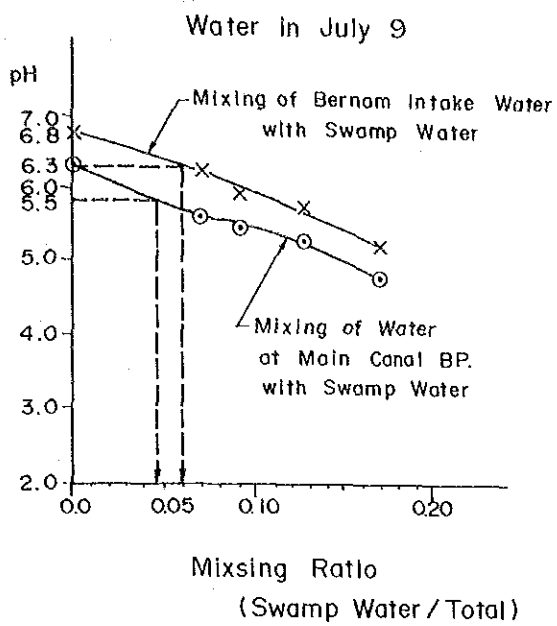
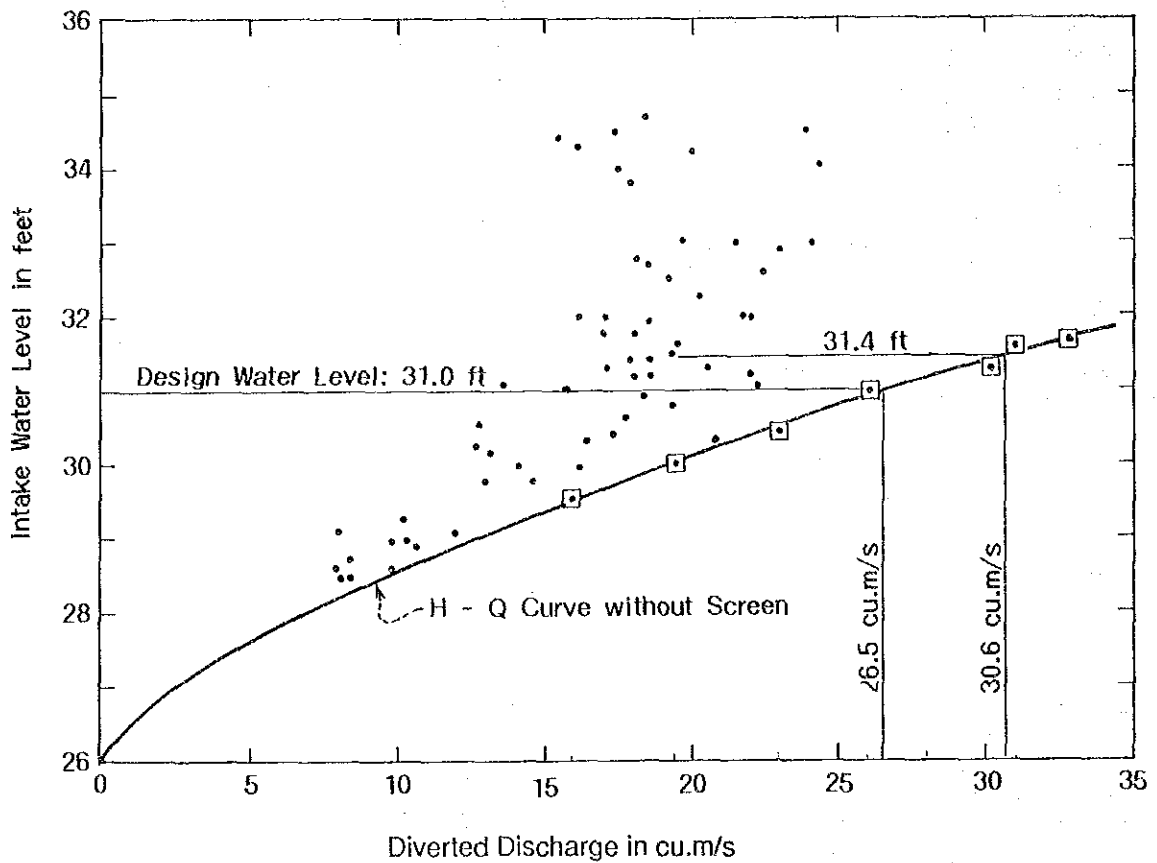


Fig. 26 Change in PH Value by Mixing Swamp Water with River Water



- : Measurement Records from Dec., 1984 to Sept., 1986 with screen condition
- ◻ : Measurement Records in November, 1986 without screen condition

Fig. 27 Relationship between Diverted Discharge and Water Level in Upstream of BRH



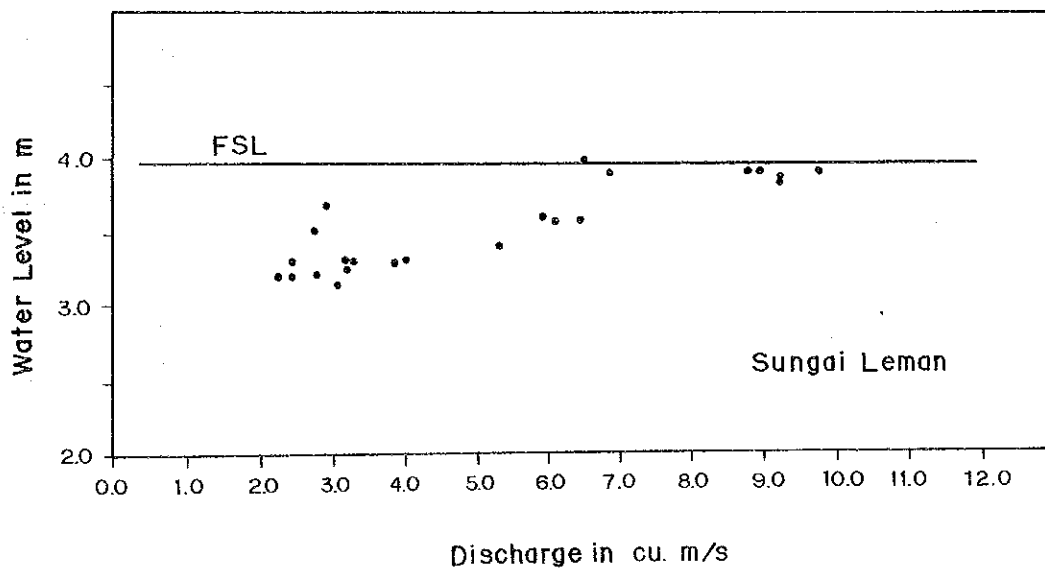
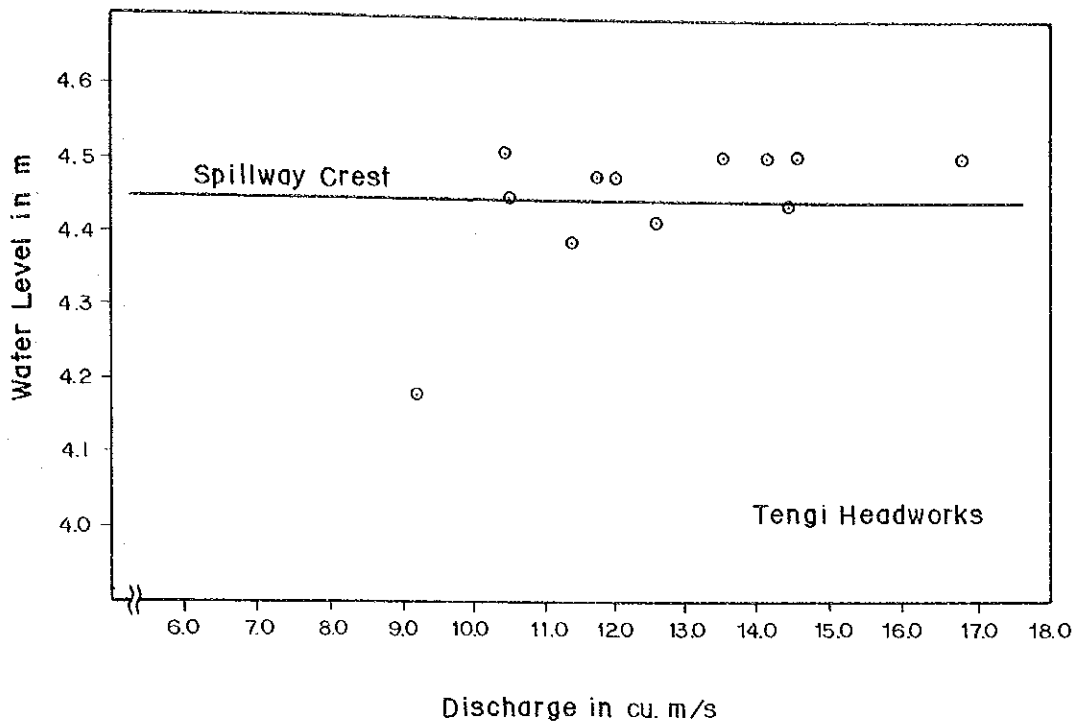


Fig.28 Comparison between Water Level and Discharge of Main Canal

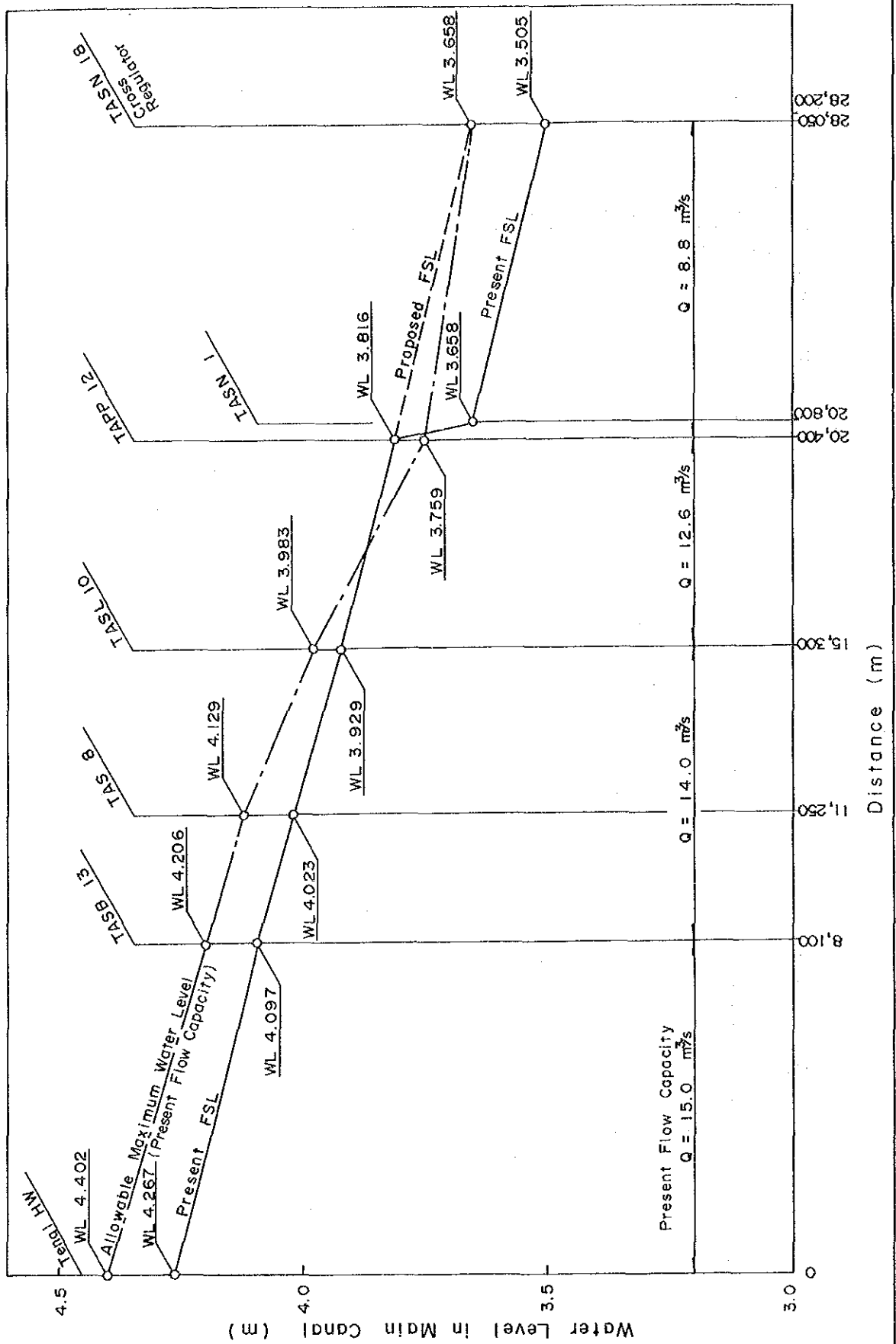


Fig. 29 Present Flow Capacity of Main Canal

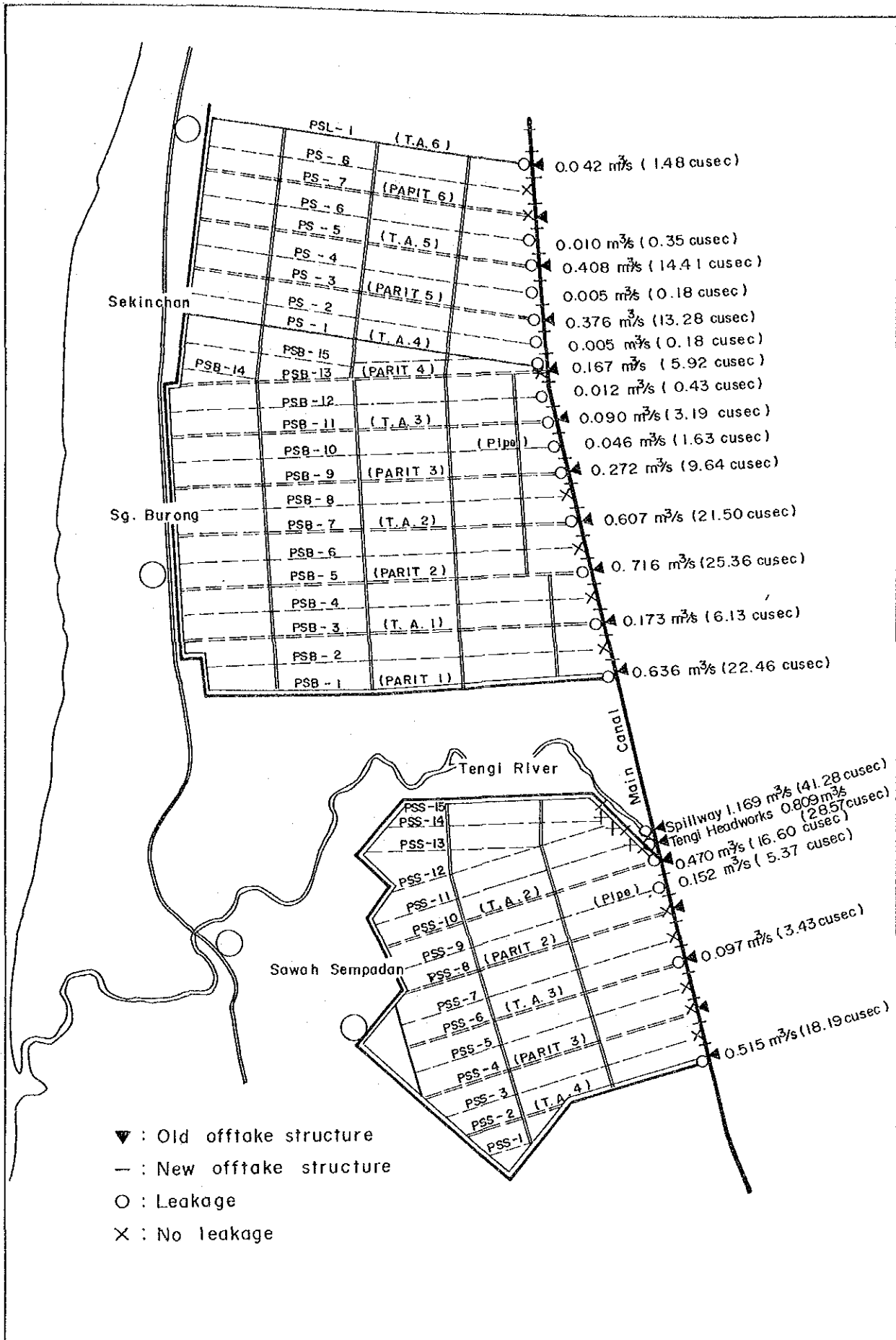


Fig. 30 Location of Leakage Point along Main Canal (1/2)

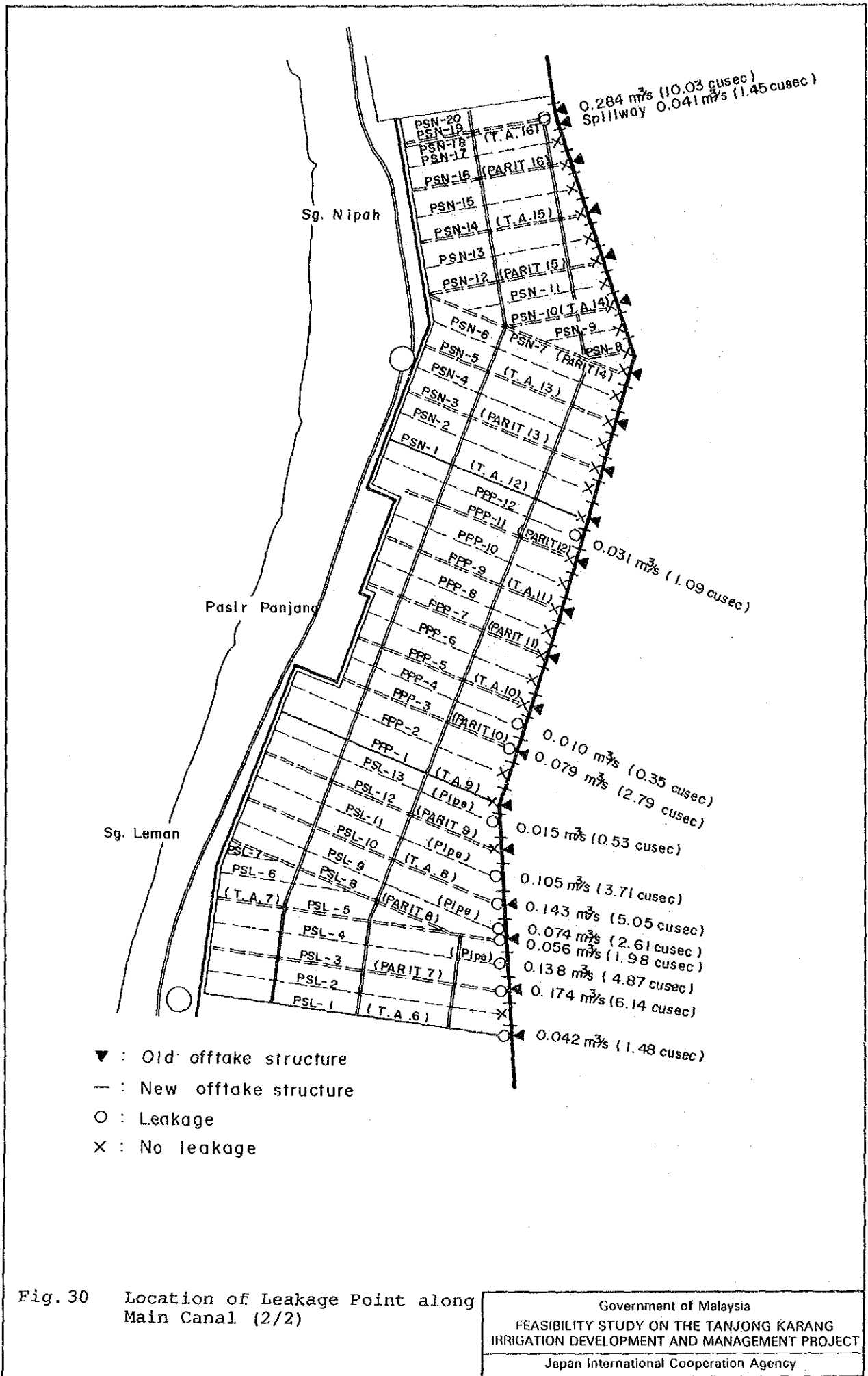
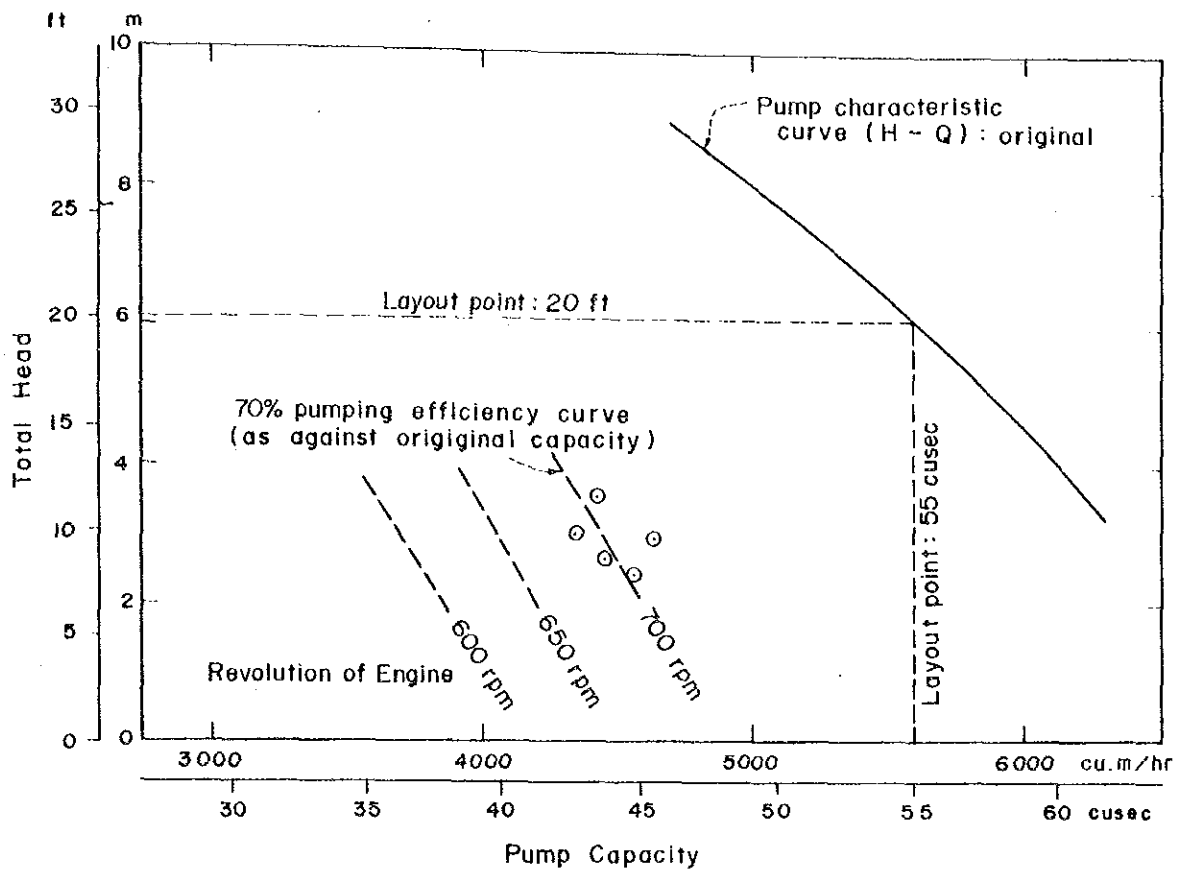


Fig. 30 Location of Leakage Point along Main Canal (2/2)



Remarks : Measurement date : July 10, 14 and 15 , 1986

Fig. 31 Pumping Efficiency of Bagan Terap Pumphouse

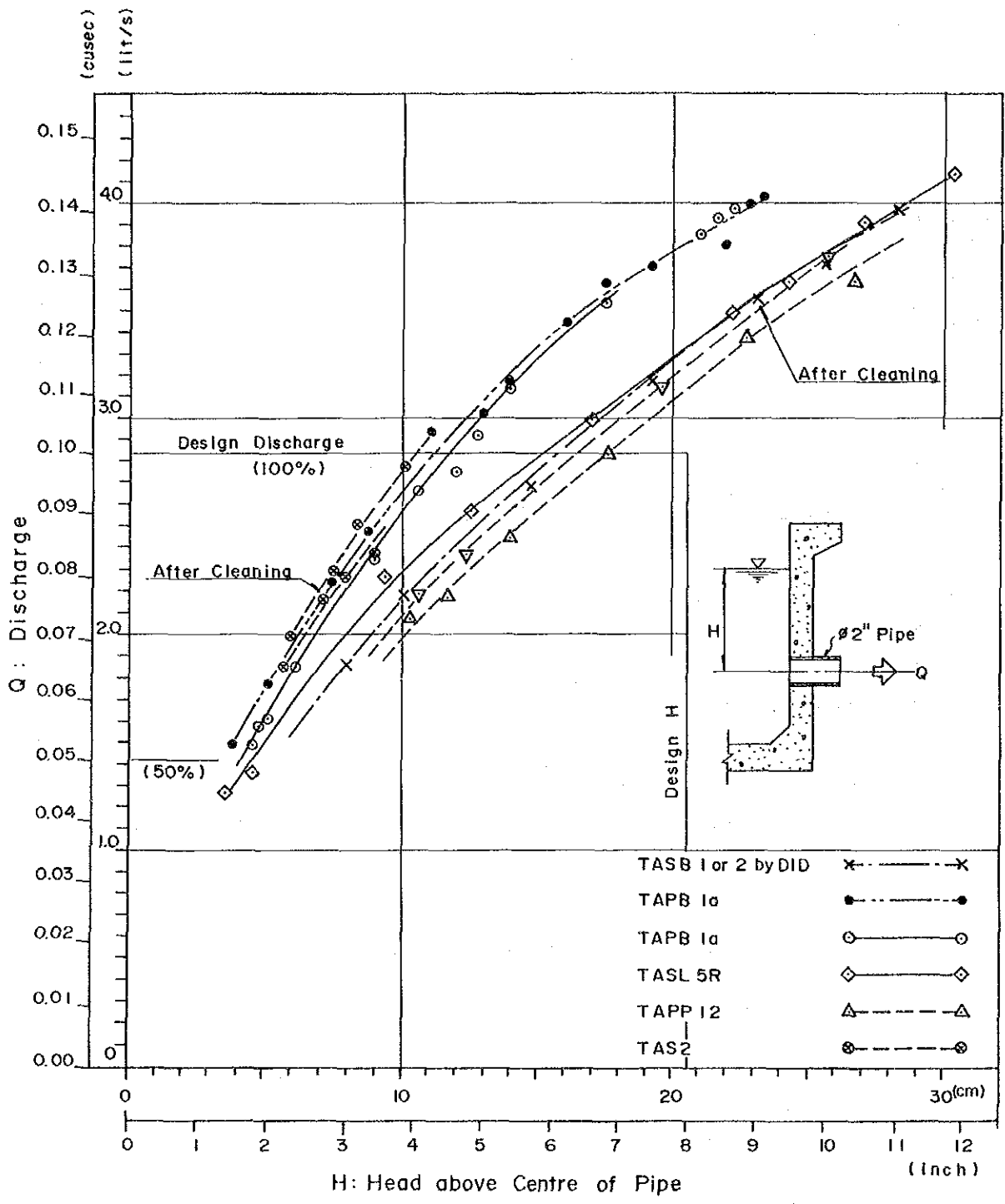
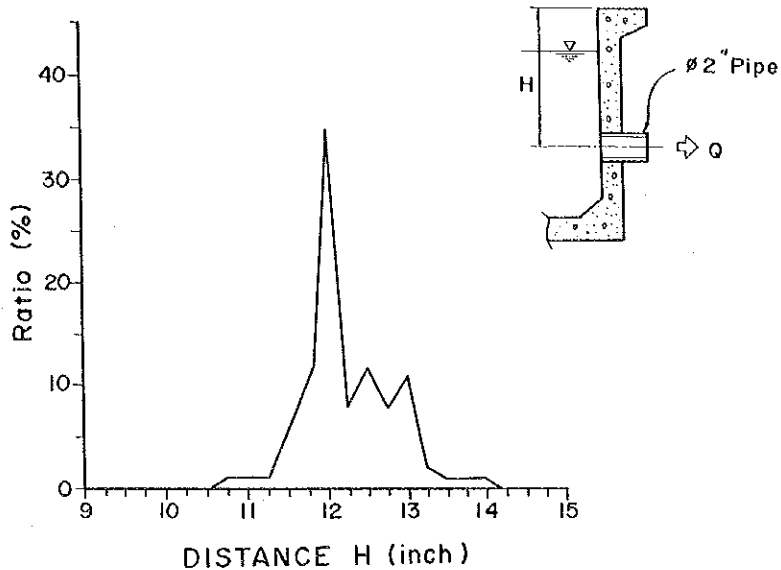


Fig. 32 Discharge from Field Offtake Pipe



H	TASB3	TASB4	TAS1	TAS2	TASL1	TASL2	TASL8	TAPB1	TAPB2	TABT1	TABT2	TOTAL	RATIO (%)
8.25											1	1	0
9.00									1			1	0
9.75											1	1	0
10.00				1							2	3	0
10.25											1	1	0
10.50								1			2	3	0
10.75			2	1							3	6	0
11.00			5	1	2				1	2	1	12	1
11.25	3	2	4	8	1	4	2				2	26	1
11.50	10	35	24	2	5	4	1	3	3	13	3	103	6
11.75	35	61	44	23	11	11	8		2	5	7	207	12
12.00	128	84	74	126	42	33	21	42	32	18	21	621	35
12.25	25	5	12	28	17	15	22		1	10	10	145	8
12.50	12	9	11	6	32	33	30	26	19	13	24	215	12
12.75	8	5	6	2	33	26	35		5	11	5	136	8
13.00	2	28	15		32	27	19	16	19	13	14	185	11
13.25	1	3	2		1	19	9		1	3	2	41	2
13.50	4		1			2	3	2	5	5		22	1
13.75	2					4	1		1	1	1	11	1
14.00			2				1				1	5	0
14.25										2		2	0
14.50	1									1		2	0
15.00	1											1	0
TOTAL	232	232	202	198	176	178	152	90	90	98	102	1750	100

Fig. 33 Location of Field Offtake Pipe

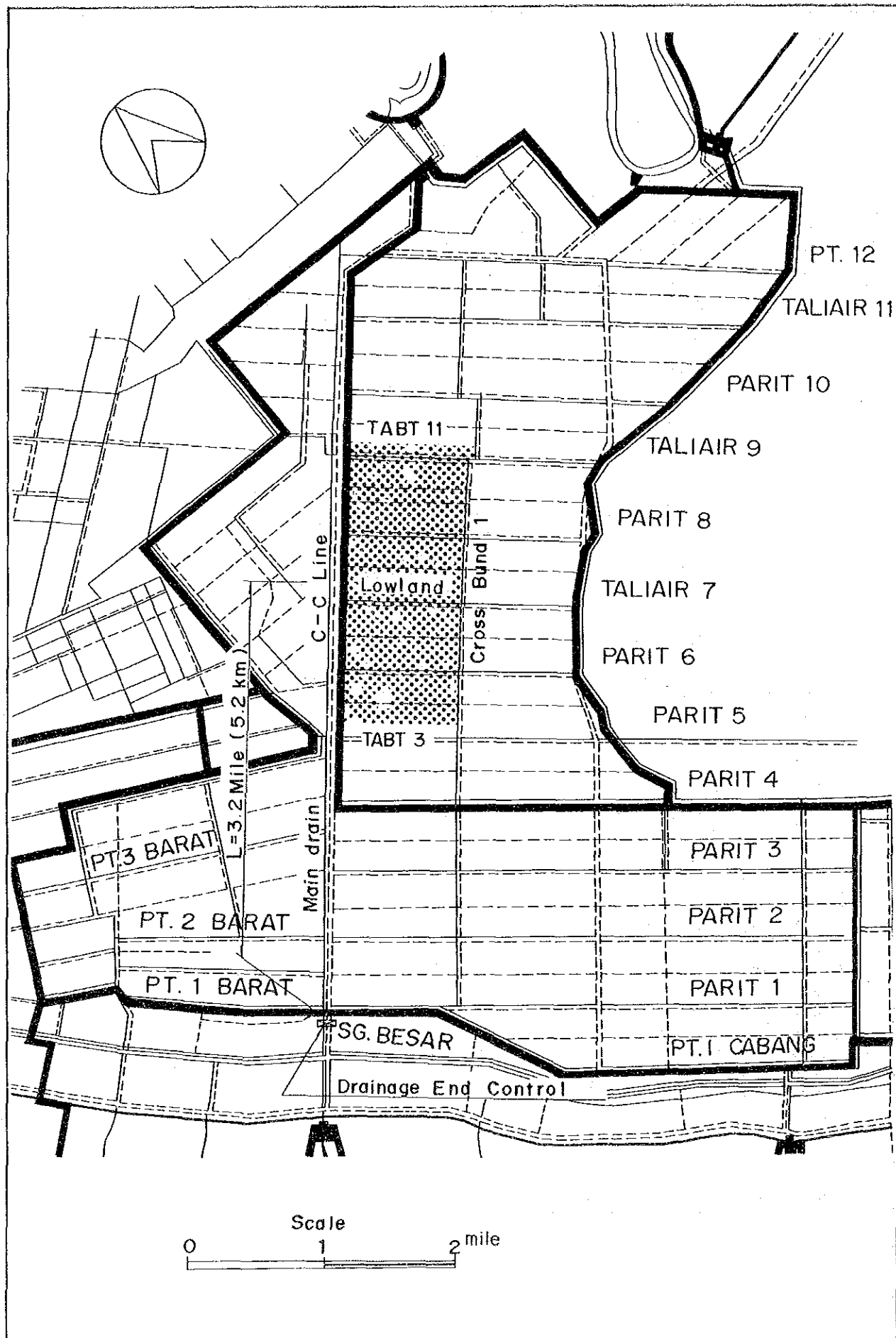


Fig.34 Location of Poor Drainage Area

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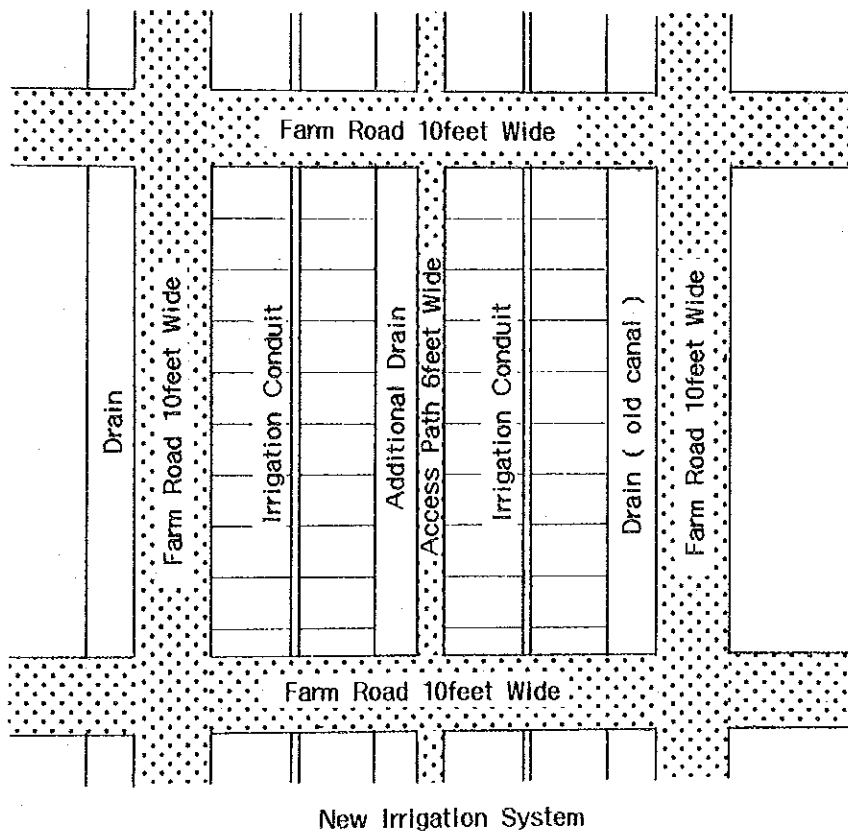
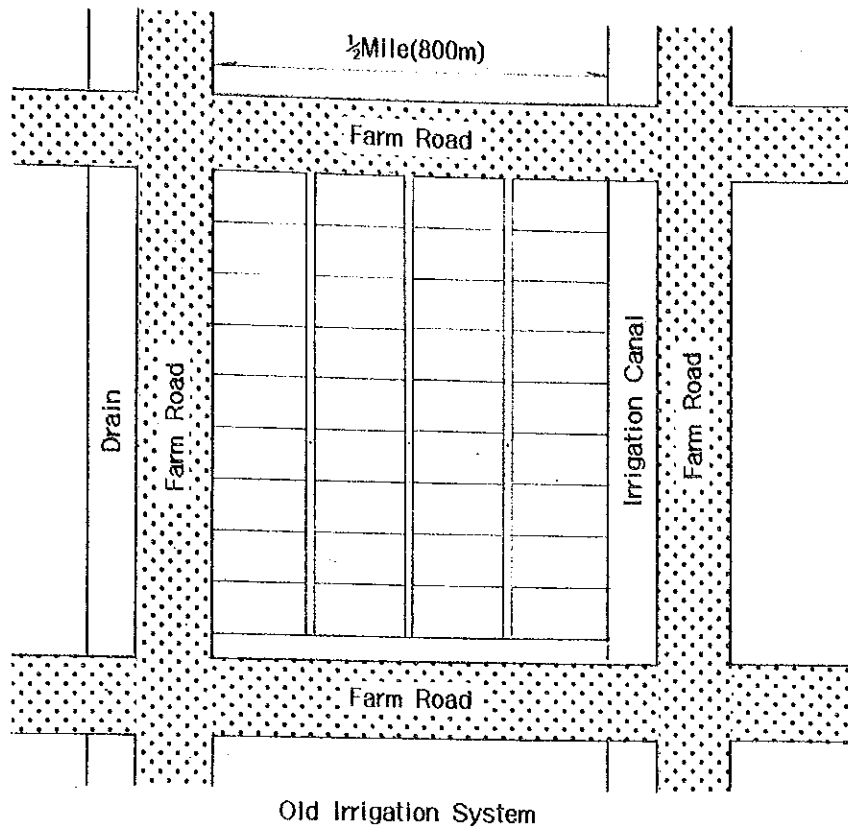


Fig. 35 Typical Layout of Farm Road before and after PBLs

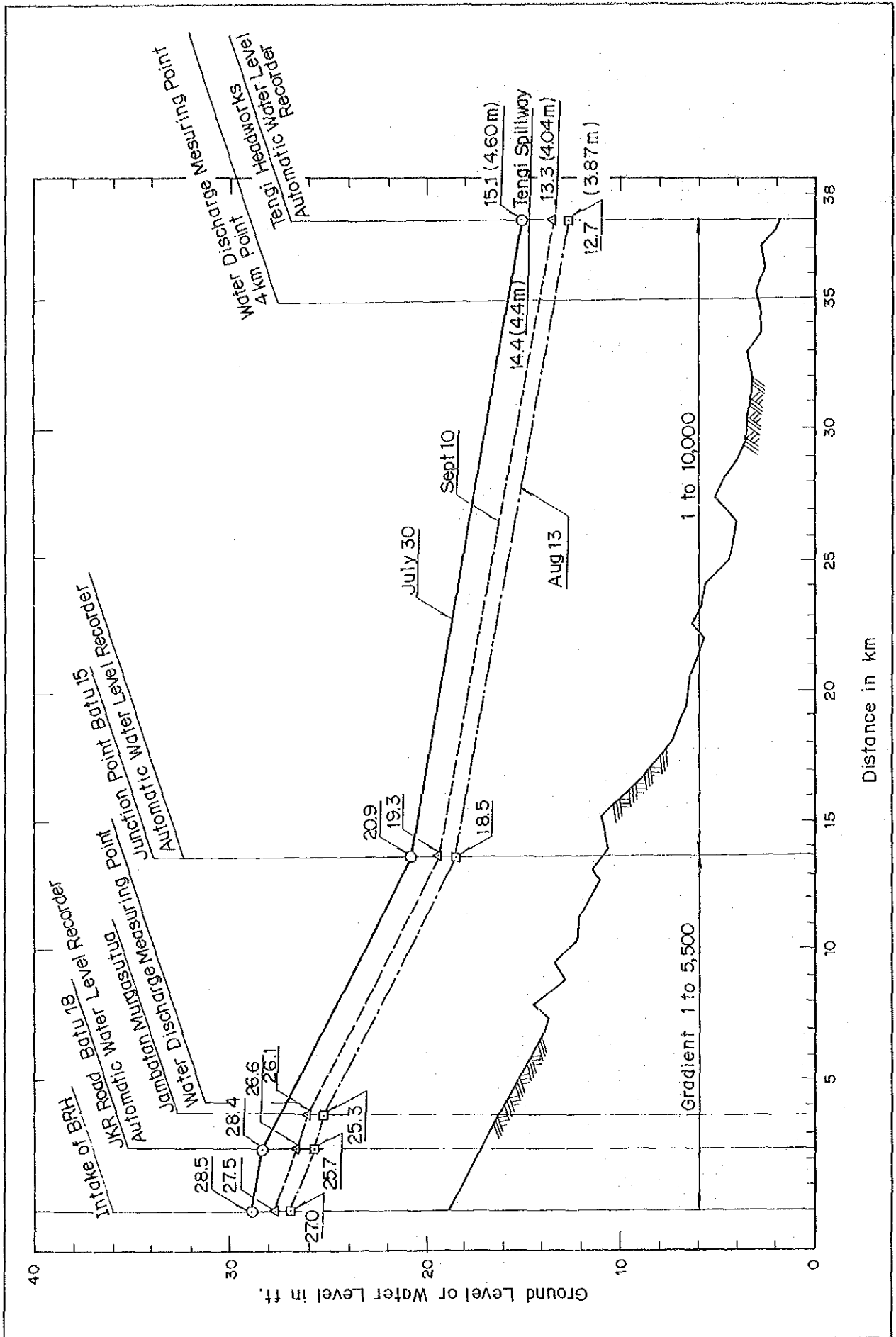


Fig. 36 Longitudinal Section of Feeder Canal and Tengri River

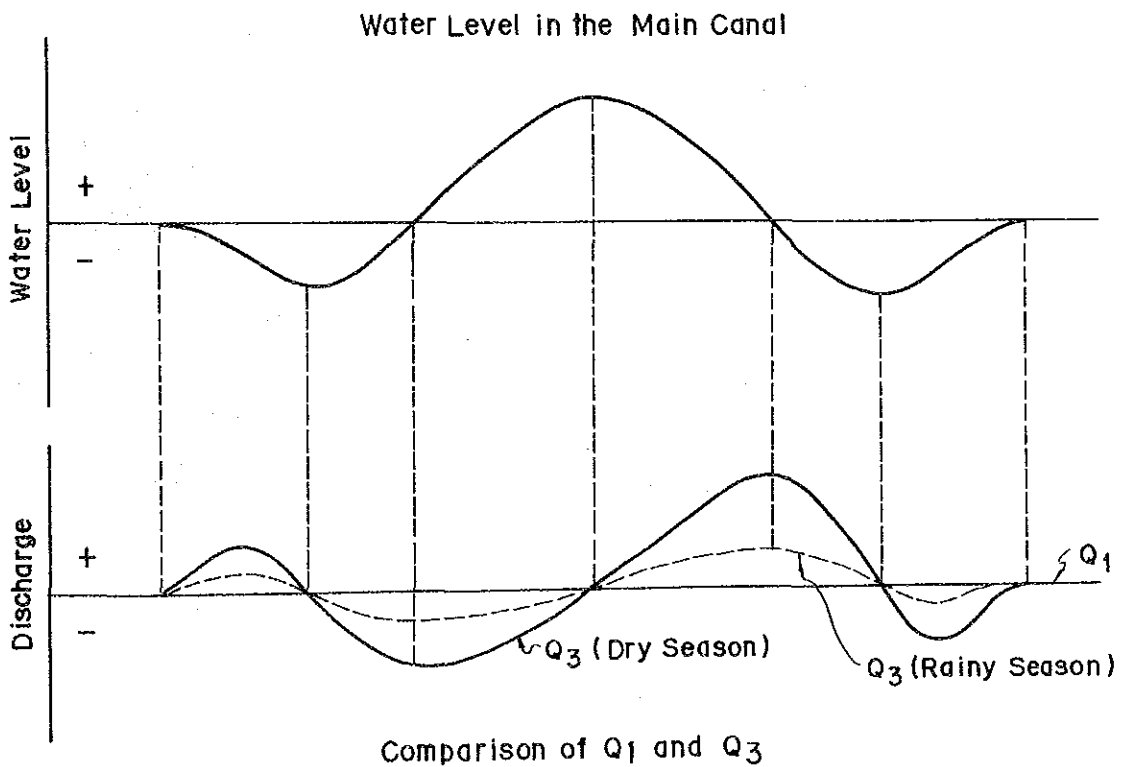
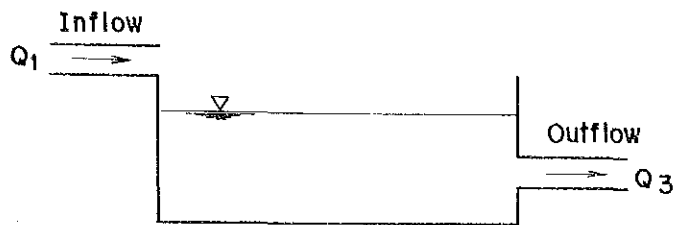
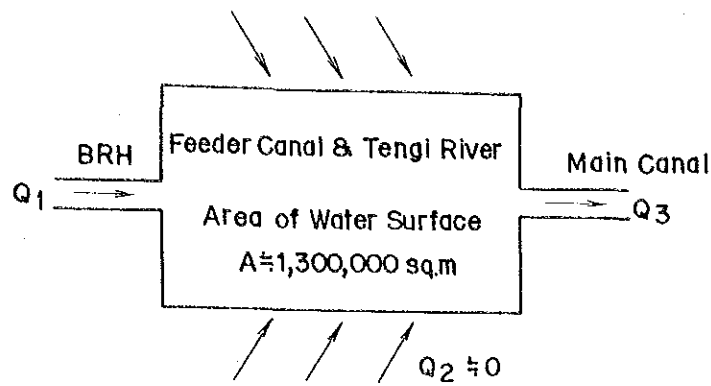


Fig.37 Flow Model in Feeder Canal and Tengli River

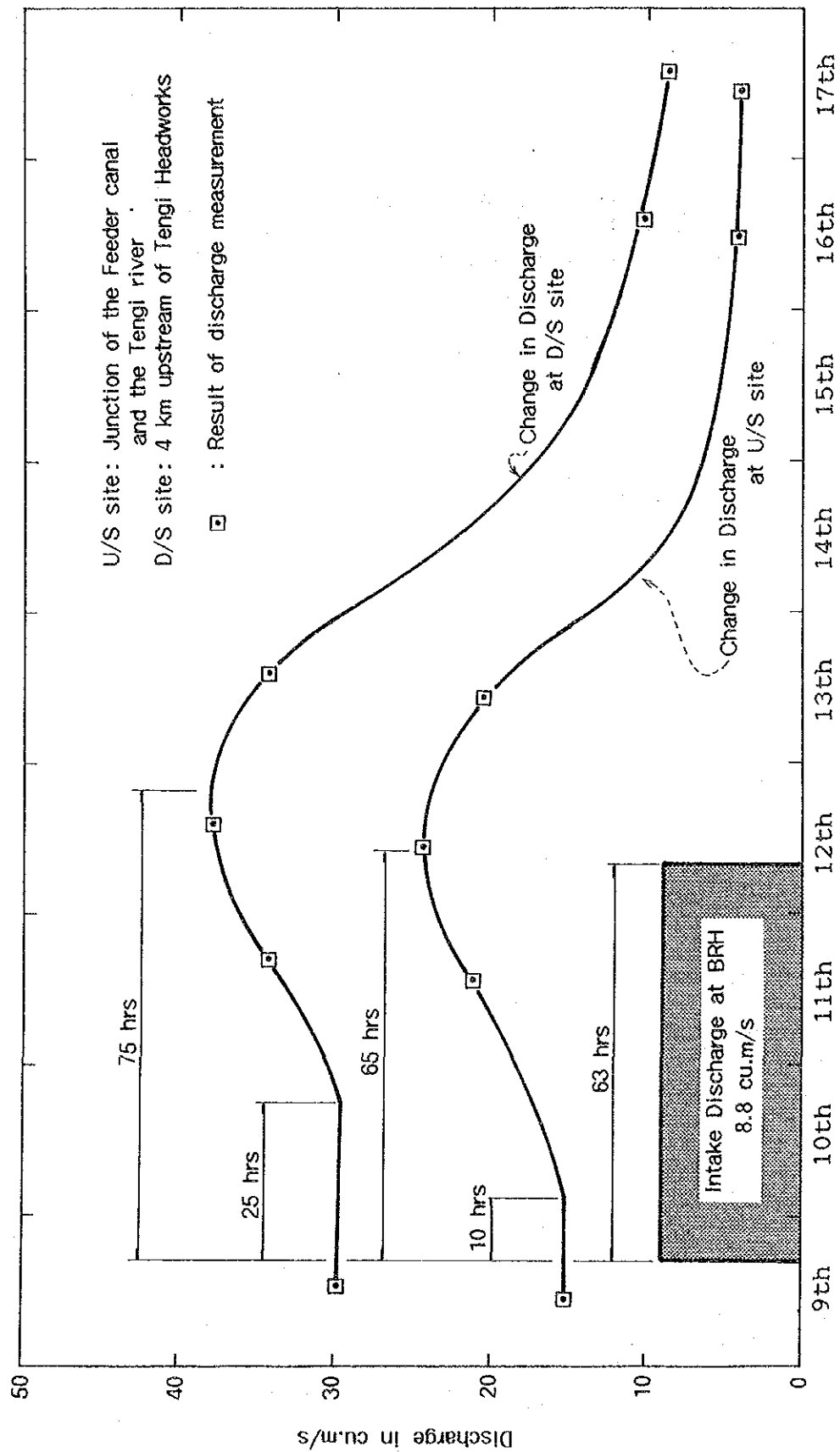


Fig. 38 Flow Characteristics in Tengi River

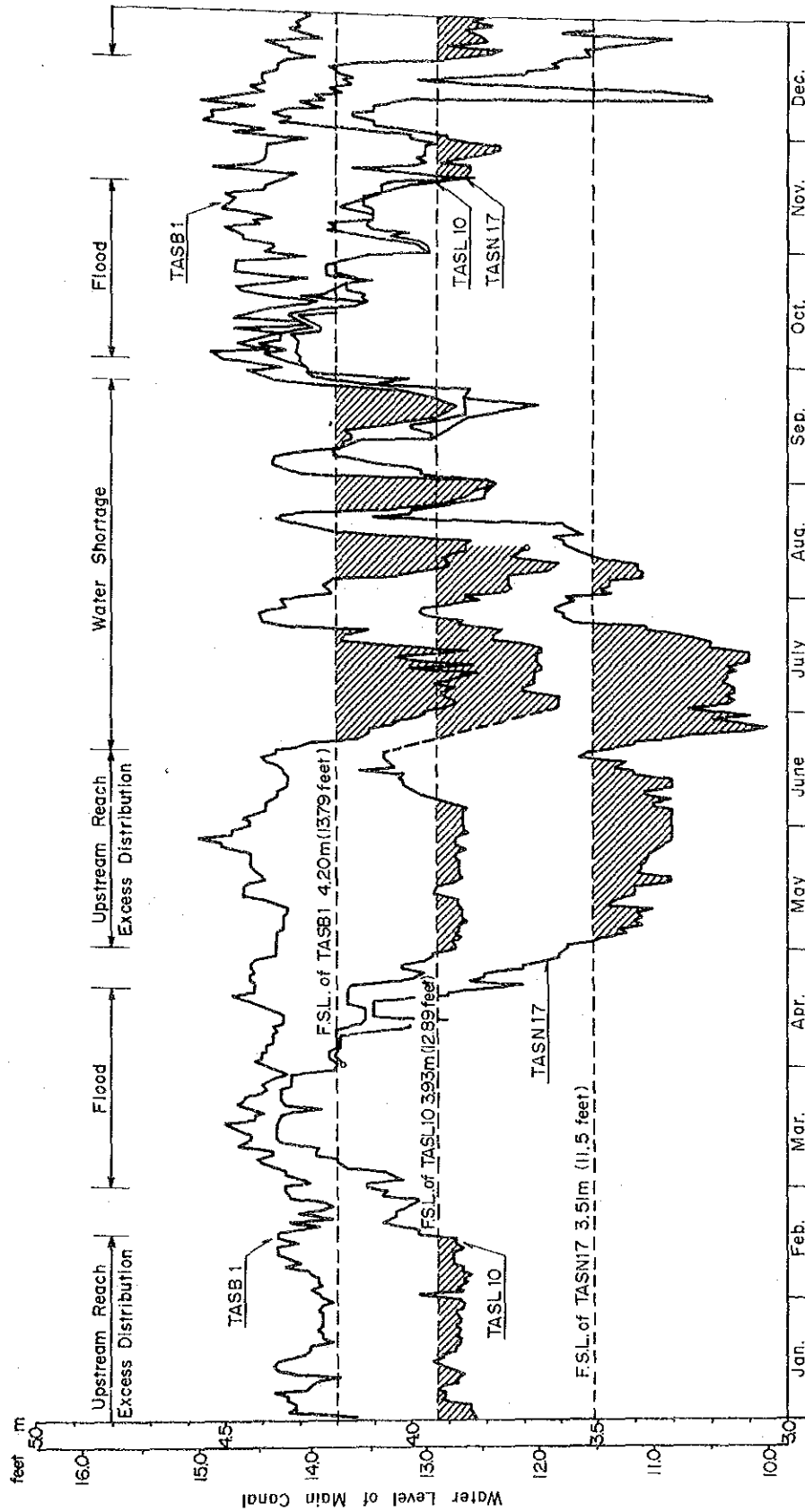


Fig. 39 Water Level of Main Canal in 1985

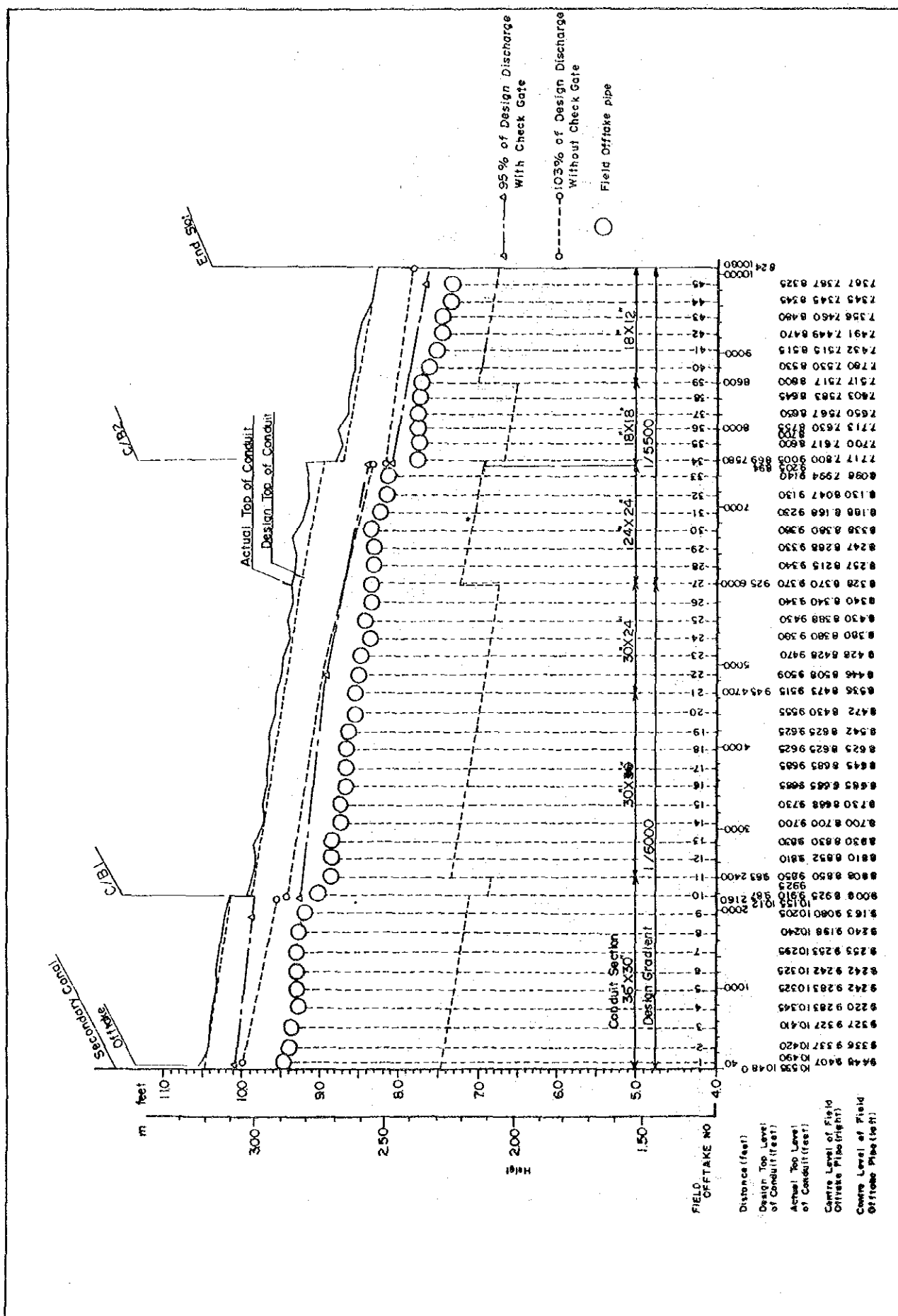


Fig. 40 Trial Operation in TAPB 2a under Design Discharge

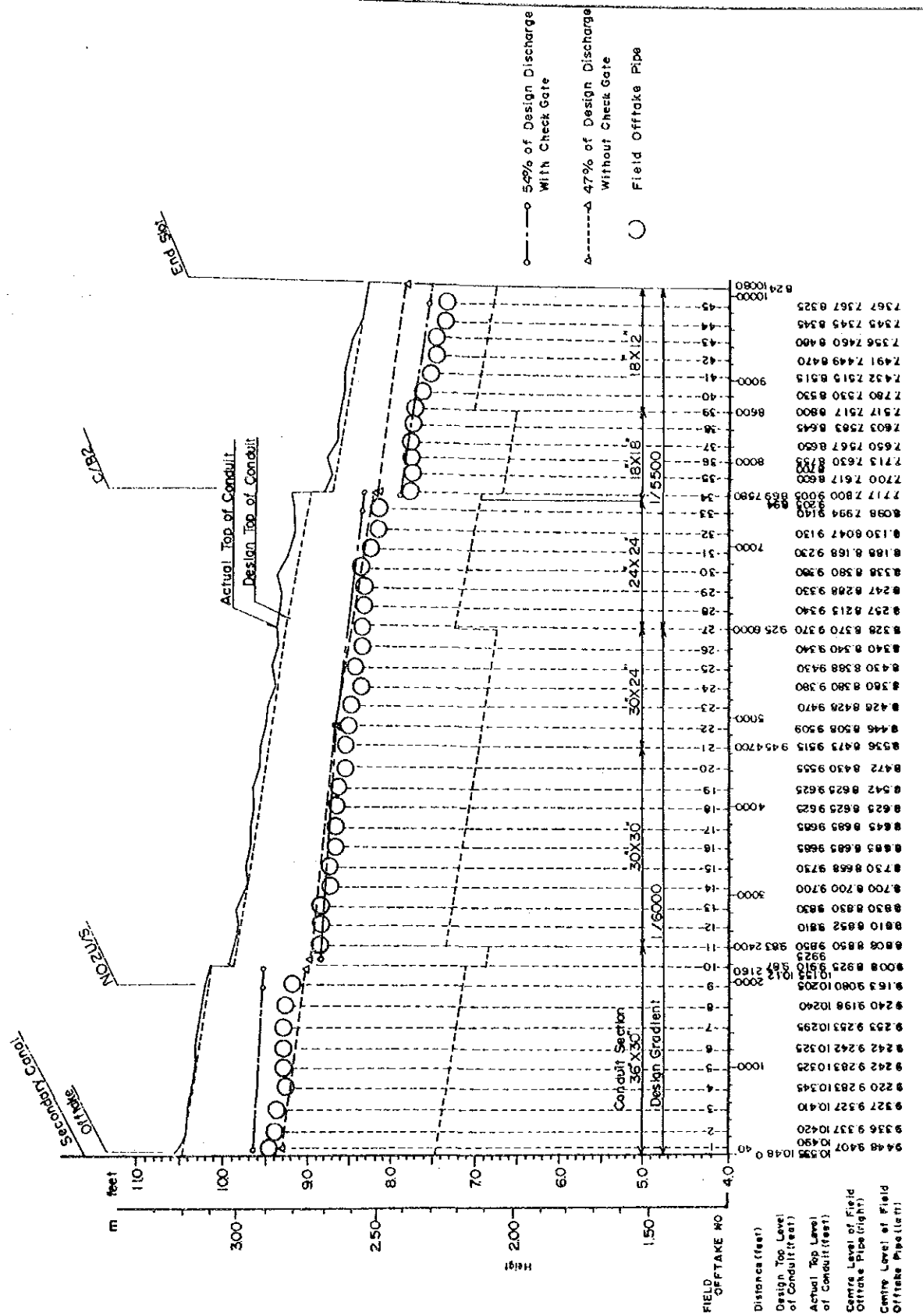
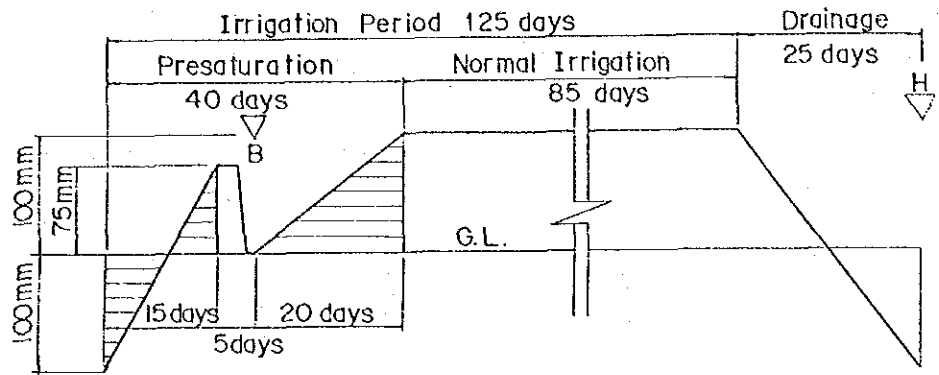
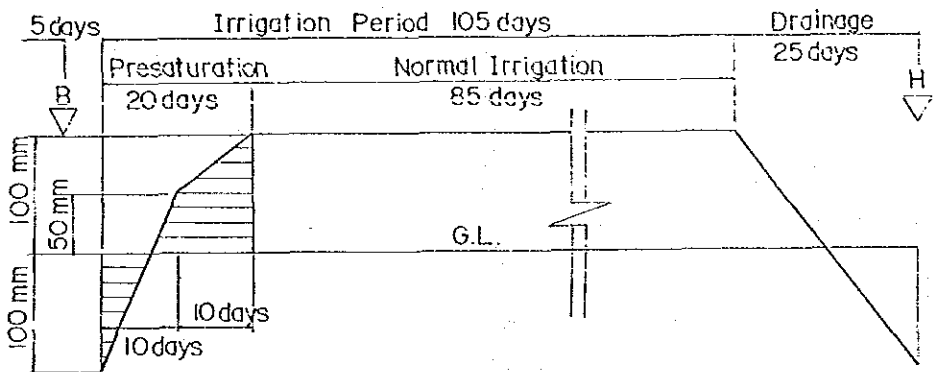


Fig. 41 Trial Operation in TAPB 2a under half of Design Discharge

Direct Seeding  
under wet  
Field Condition



Direct Seeding  
under Dry  
Field Condition



Remarks ; B = Broadcasting  
H = Harvesting

Fig. 42 On Farm Water Management



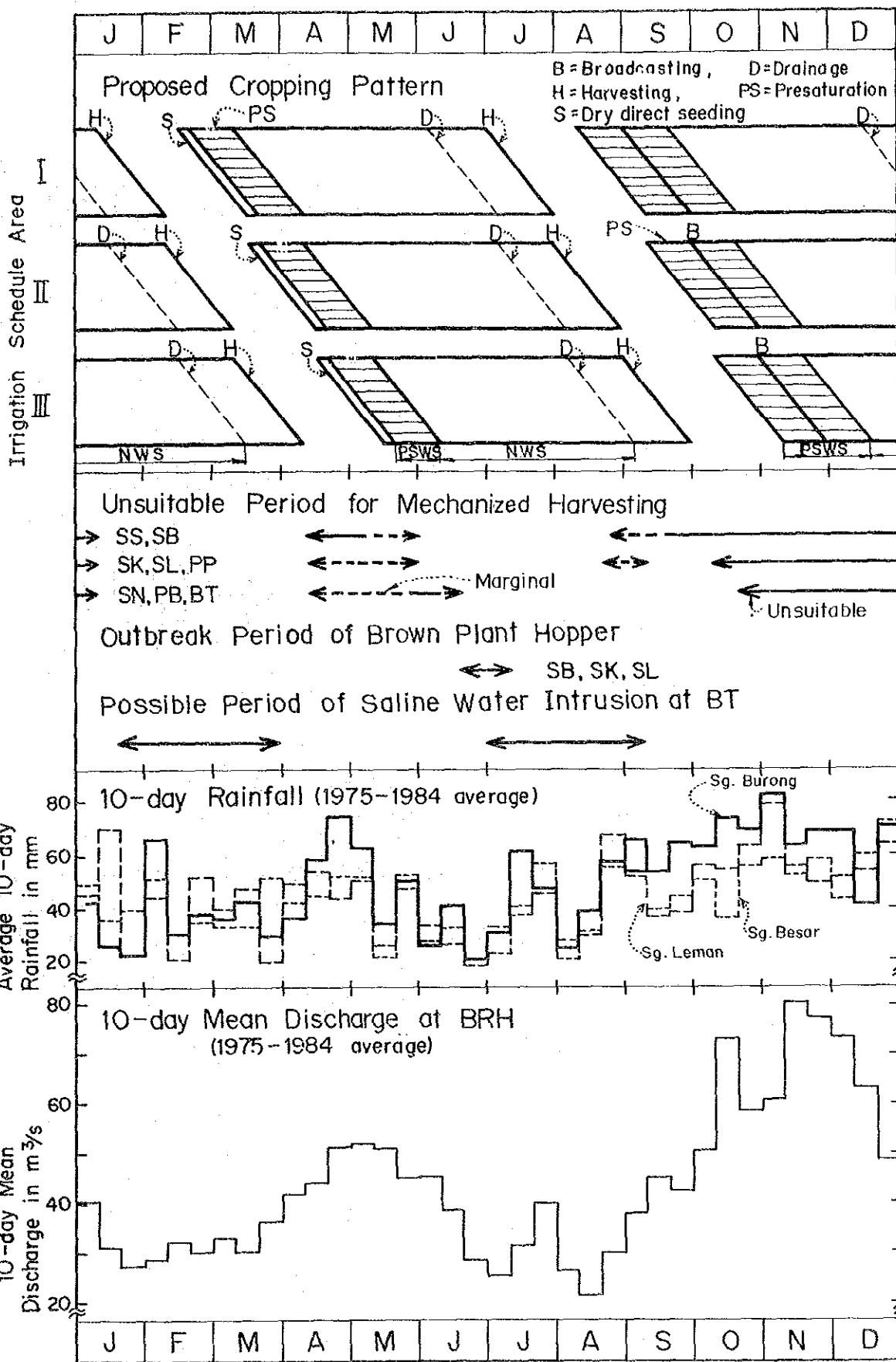


Fig. 43 Proposed Cropping Schedule



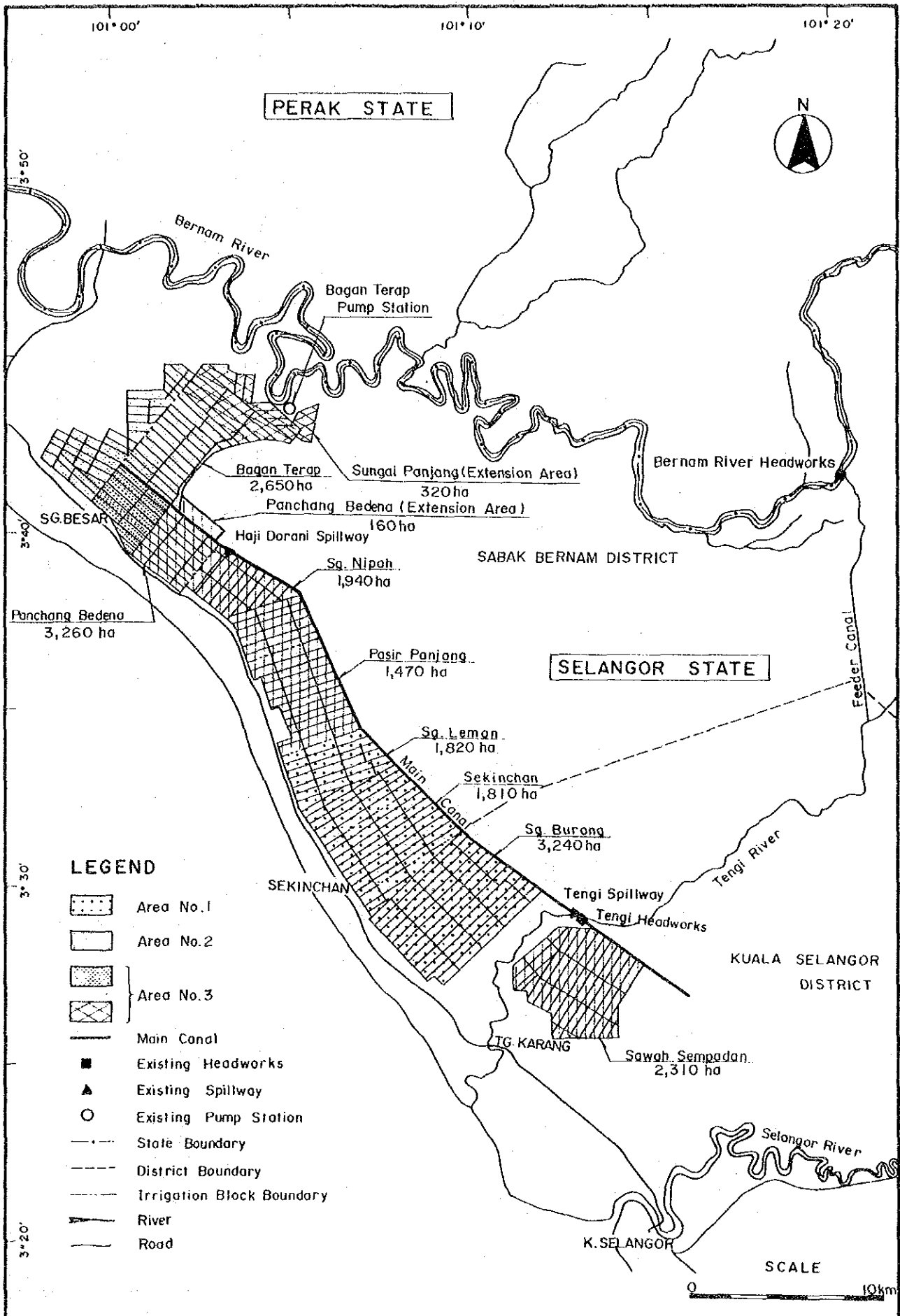


Fig. 45 Fixed Irrigation Schedule Area

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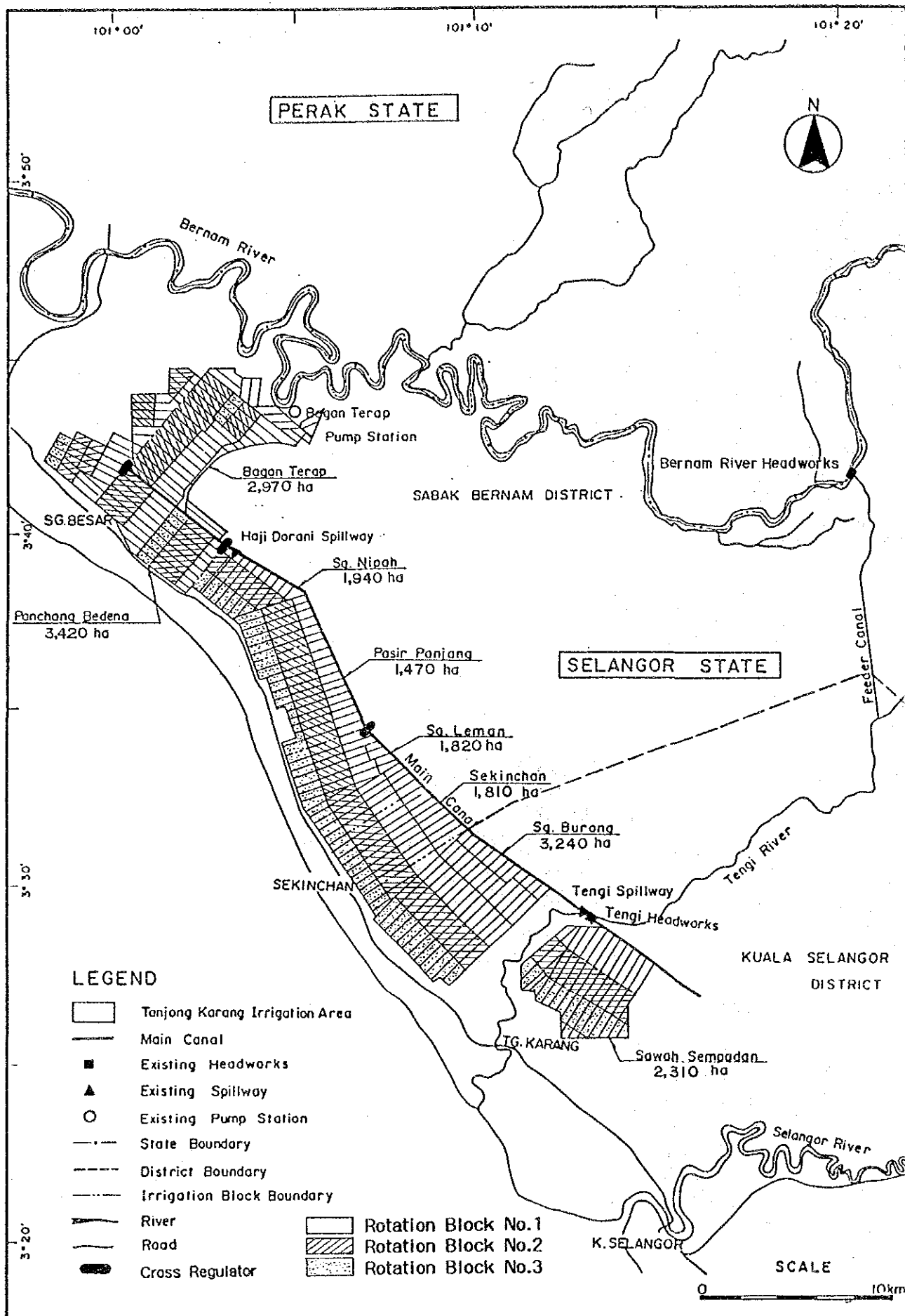


Fig.46 Proposed Rotation Block

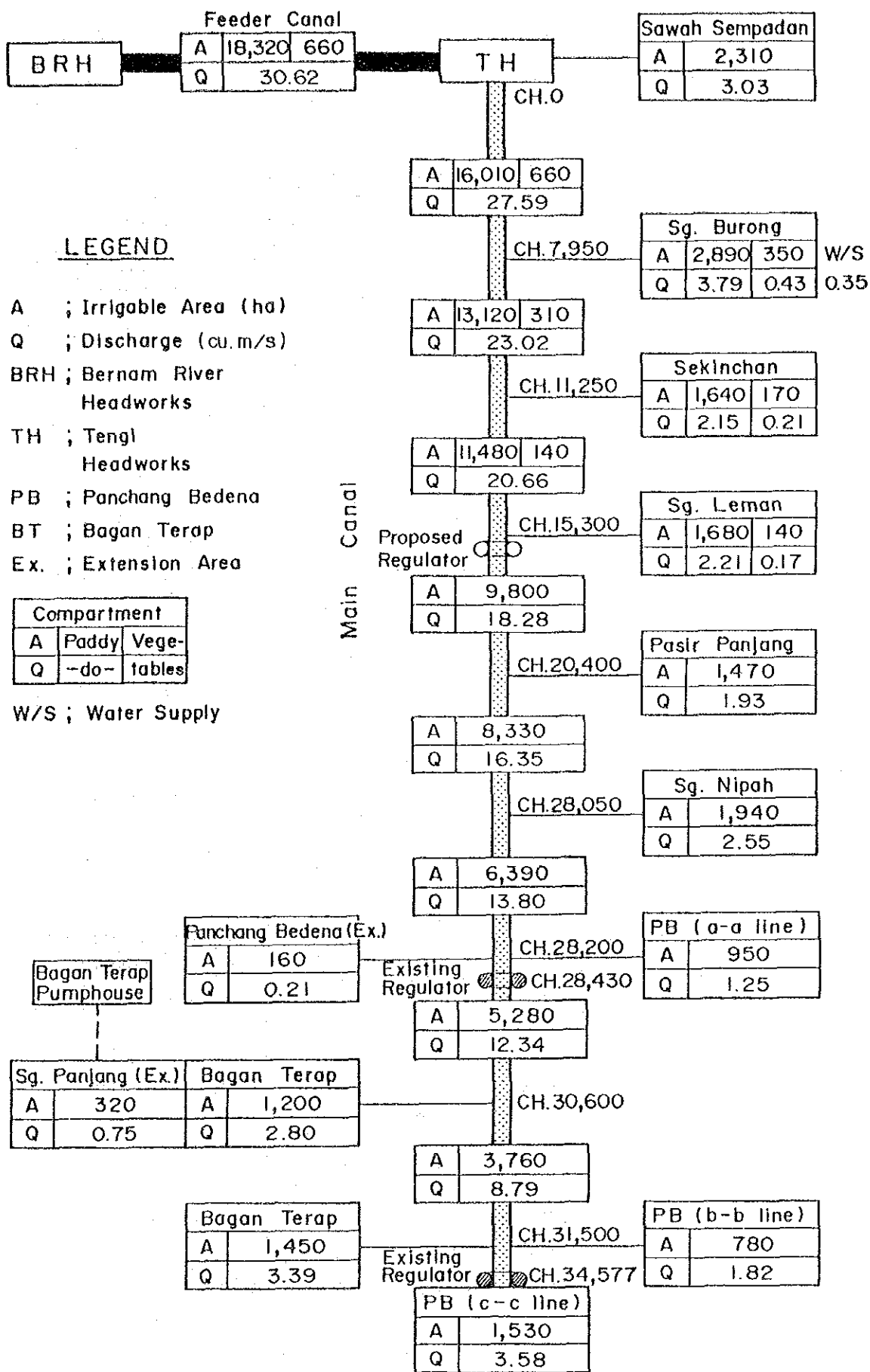


Fig. 47 Irrigation Diagram of Main Canal (1/4) (Design Discharge, Presaturation in ISA-3)

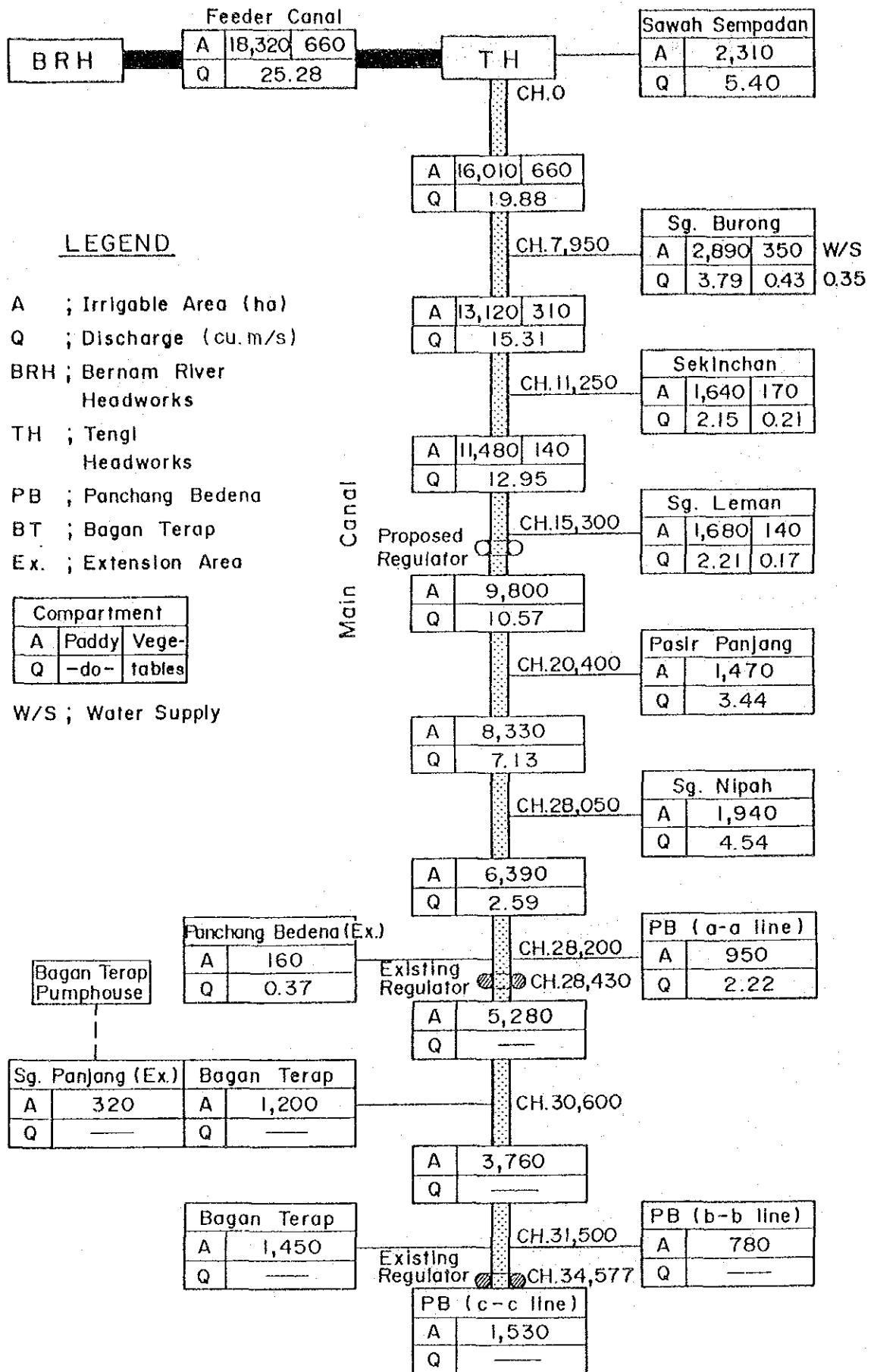


Fig.47 Irrigation Diagram of Main Canal (2/4) (Case 1, Presaturation in ISA-2)

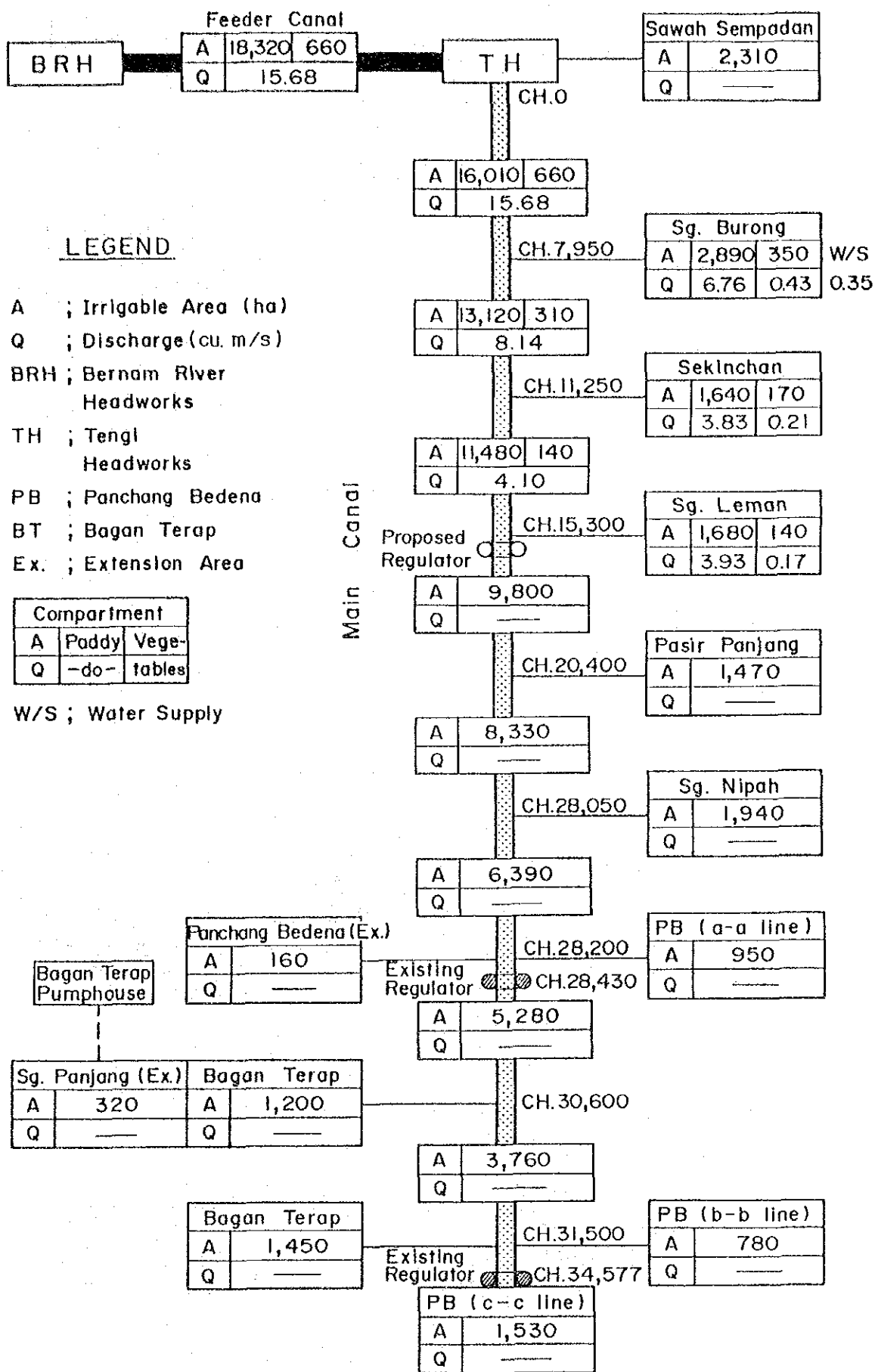


Fig. 47 Irrigation Diagram of Main Canal (3/4) (Case 2, Presaturation in ISA-1)

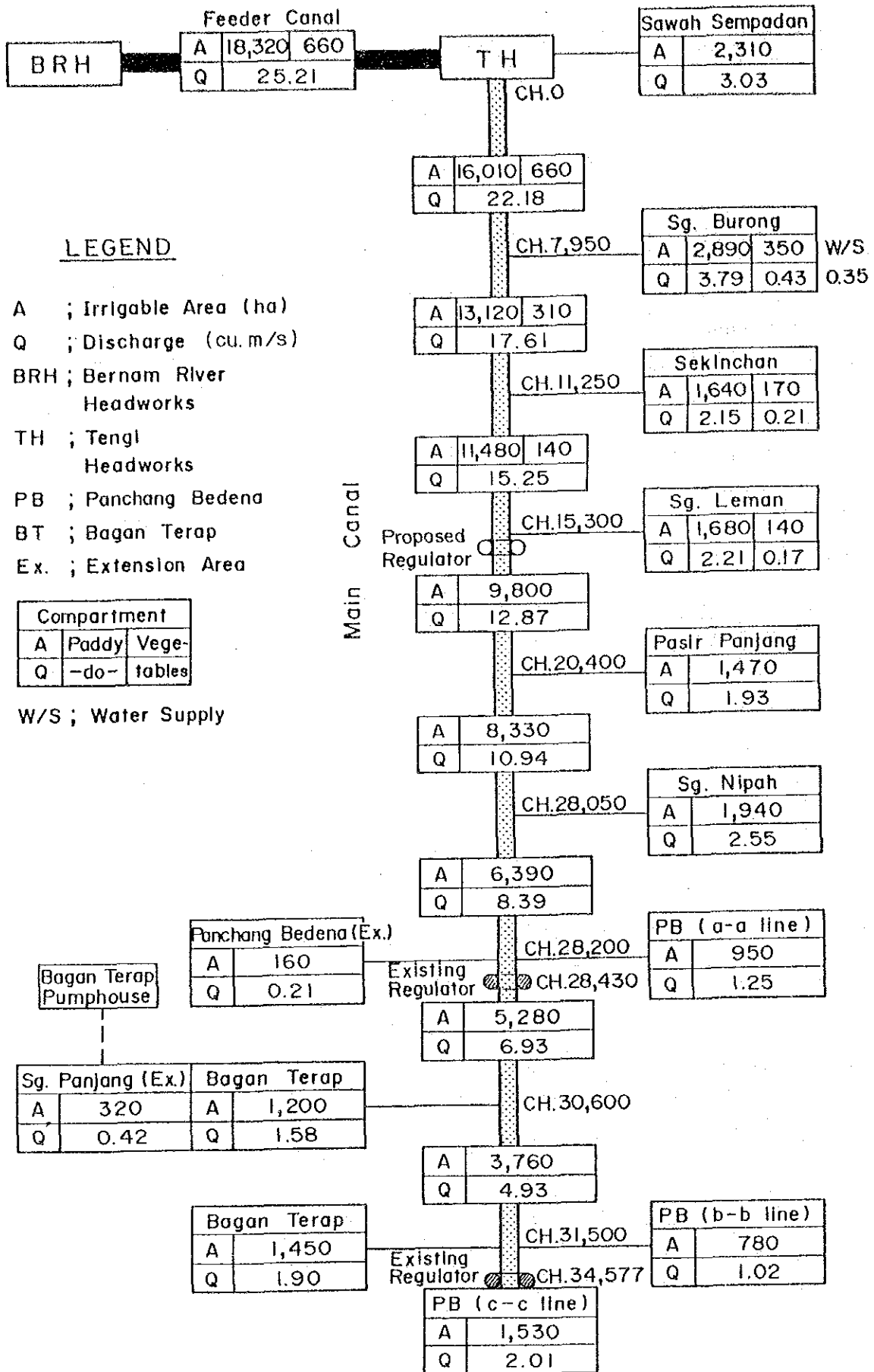


Fig.47 Irrigation Diagram of Main Canal (4/4) (Case 3, Normal Irrigation for Whole Area)



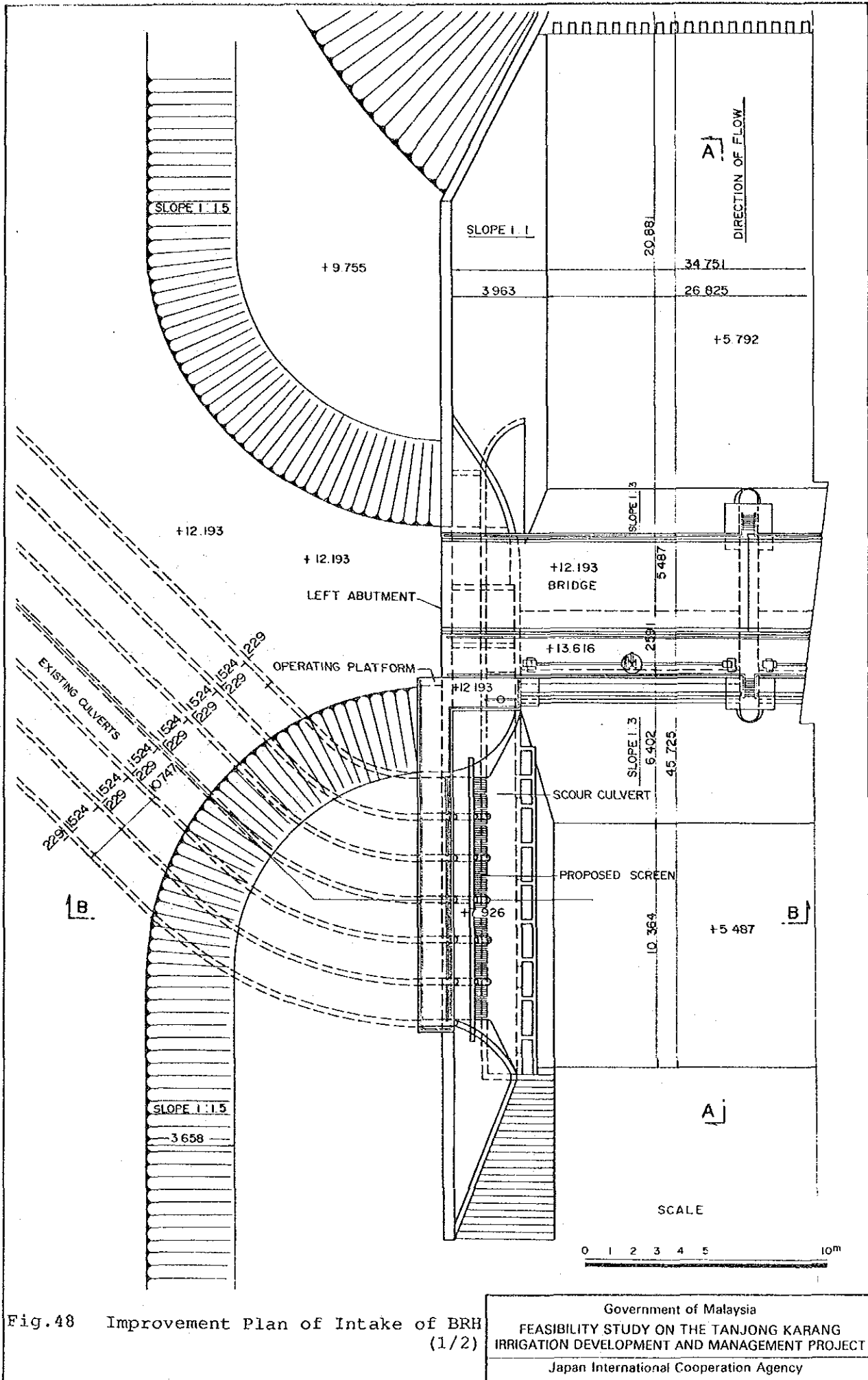


Fig.48 Improvement Plan of Intake of BRH (1/2)

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 IRRIGATION DEVELOPMENT AND MANAGEMENT PROJECT  
 Japan International Cooperation Agency

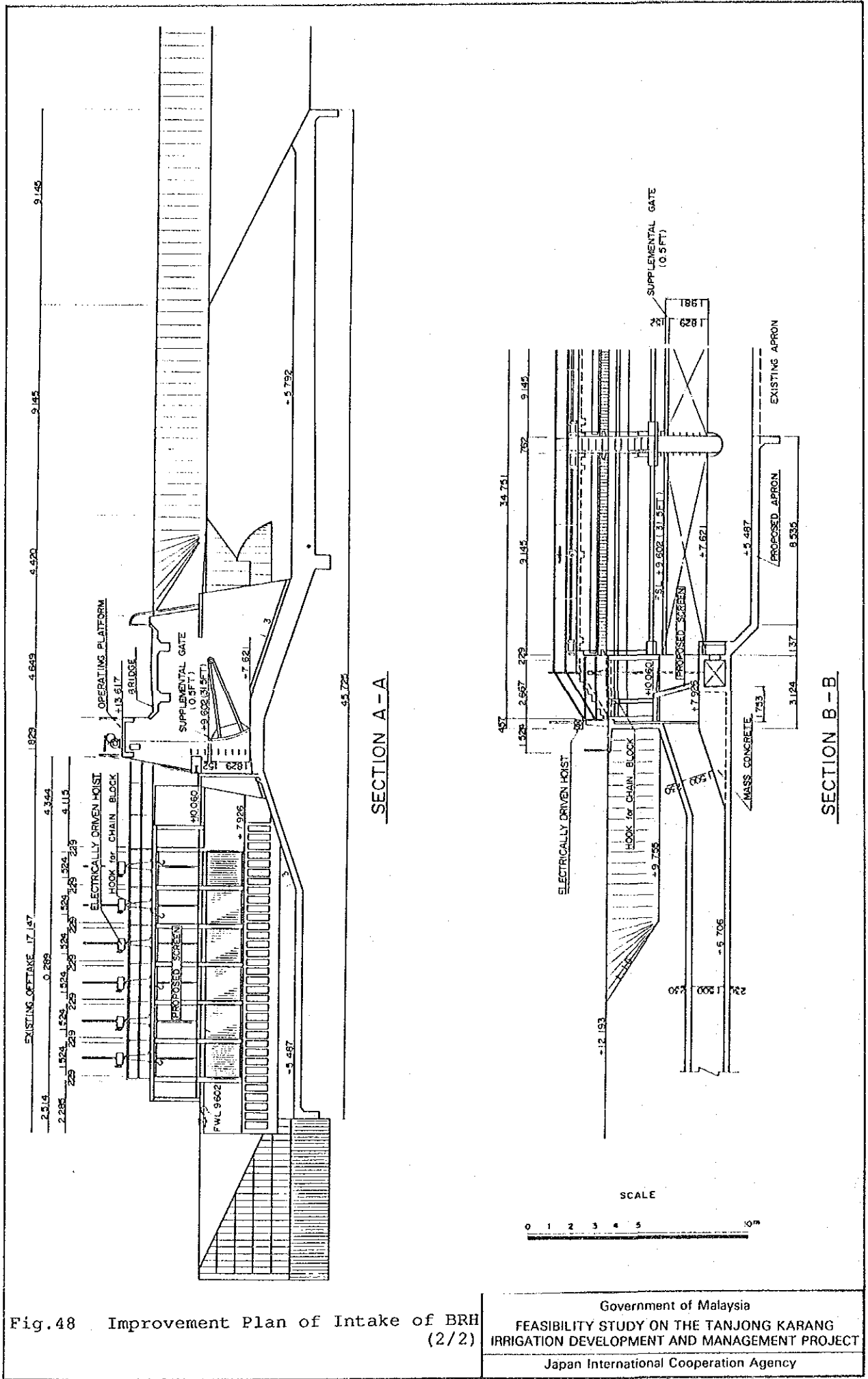
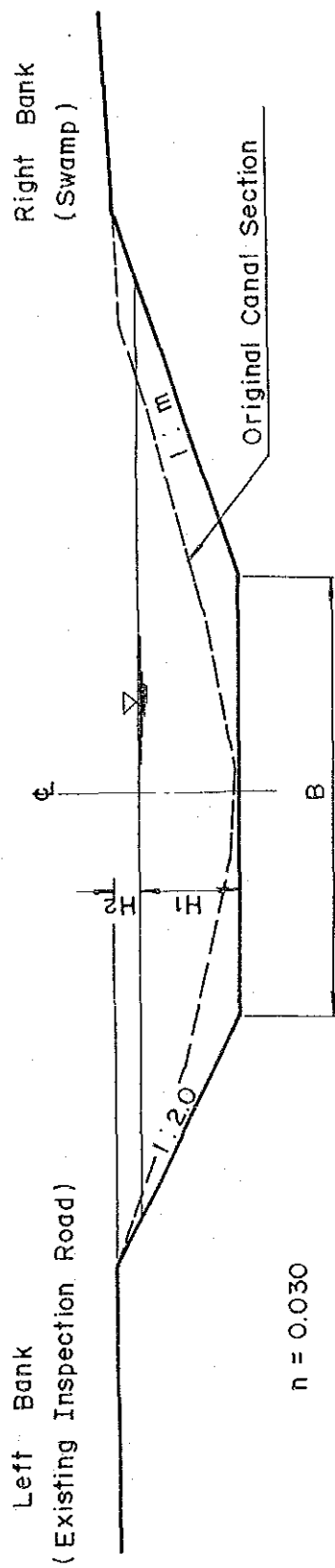


Fig.48 Improvement Plan of Intake of BRH (2/2)



Location	Discharge (cu. m/s)	Hydraulic gradient	Canal base slope	B (m)	H1 (m)	H2 (m)	m
CH.0							
CH.7950	27.6	1/44,000	1/47,000	27	2.9	0.6	3.0
CH.11250	23.0	1/52,000	1/47,000	24	2.9	0.6	3.0
CH.15300	20.7	1/55,000	1/47,000	22	2.9	0.6	3.0
CH.20400	18.3	1/57,000	1/47,000	20	2.9	0.6	3.0
CH.28050	16.4	1/55,000	1/47,000	17	2.9	0.6	3.0
CH.28200	13.8	1/75,000	1/47,000	17	2.9	0.6	3.0
CH.28430	12.3	1/115,000	1/47,000	17	2.9	0.6	3.0
CH.30600	12.3	1/57,000	Level	14	2.8	0.6	2.0
CH.31500	8.8	1/113,000	Level	14	2.8	0.6	2.0
CH.34577	3.6	1/147,000	Level	5	2.8	0.6	2.0

Fig. 49 Proposed Cross Section of Main Canal

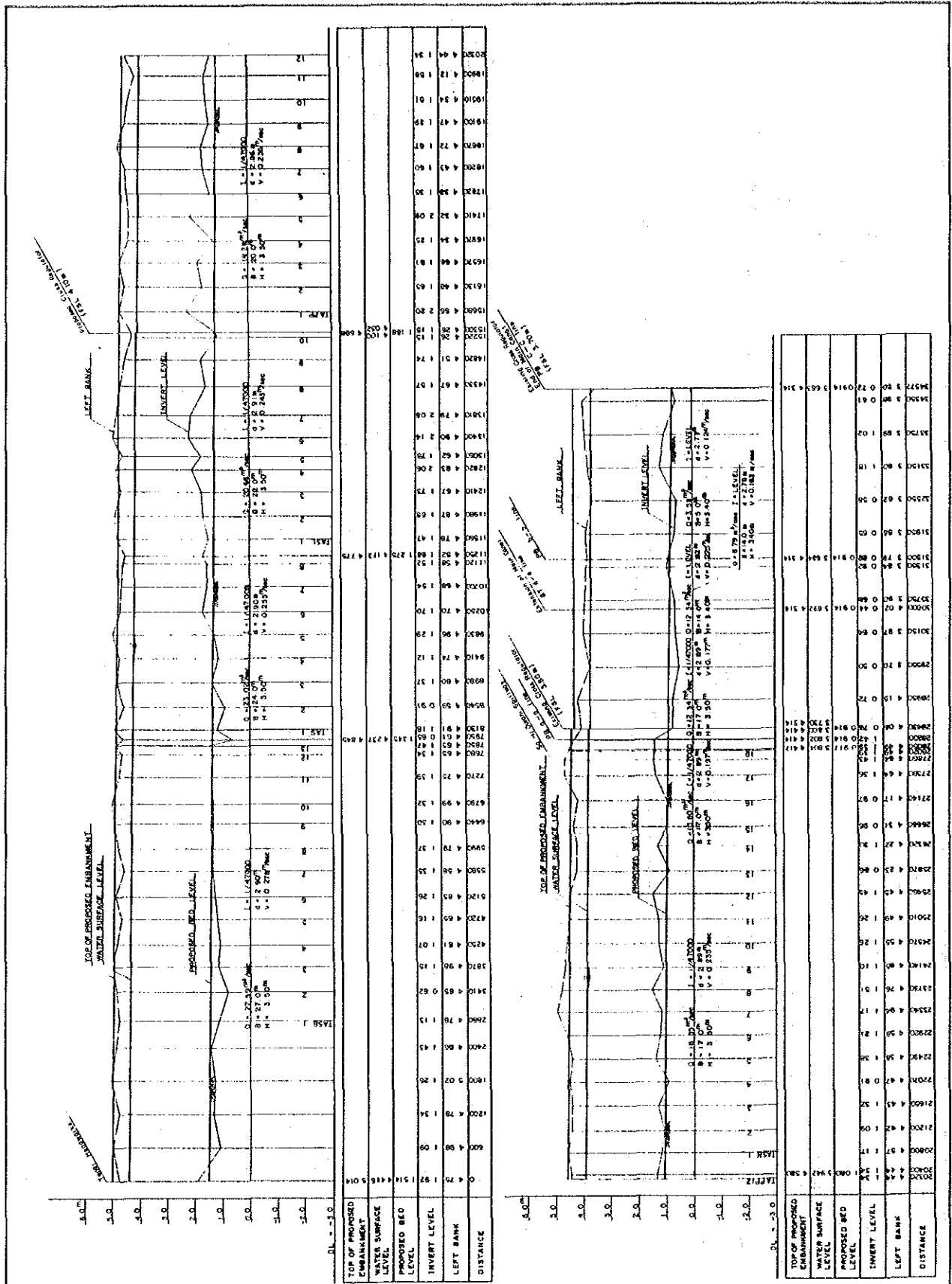


Fig. 50 Proposed Longitudinal Section of Main Canal

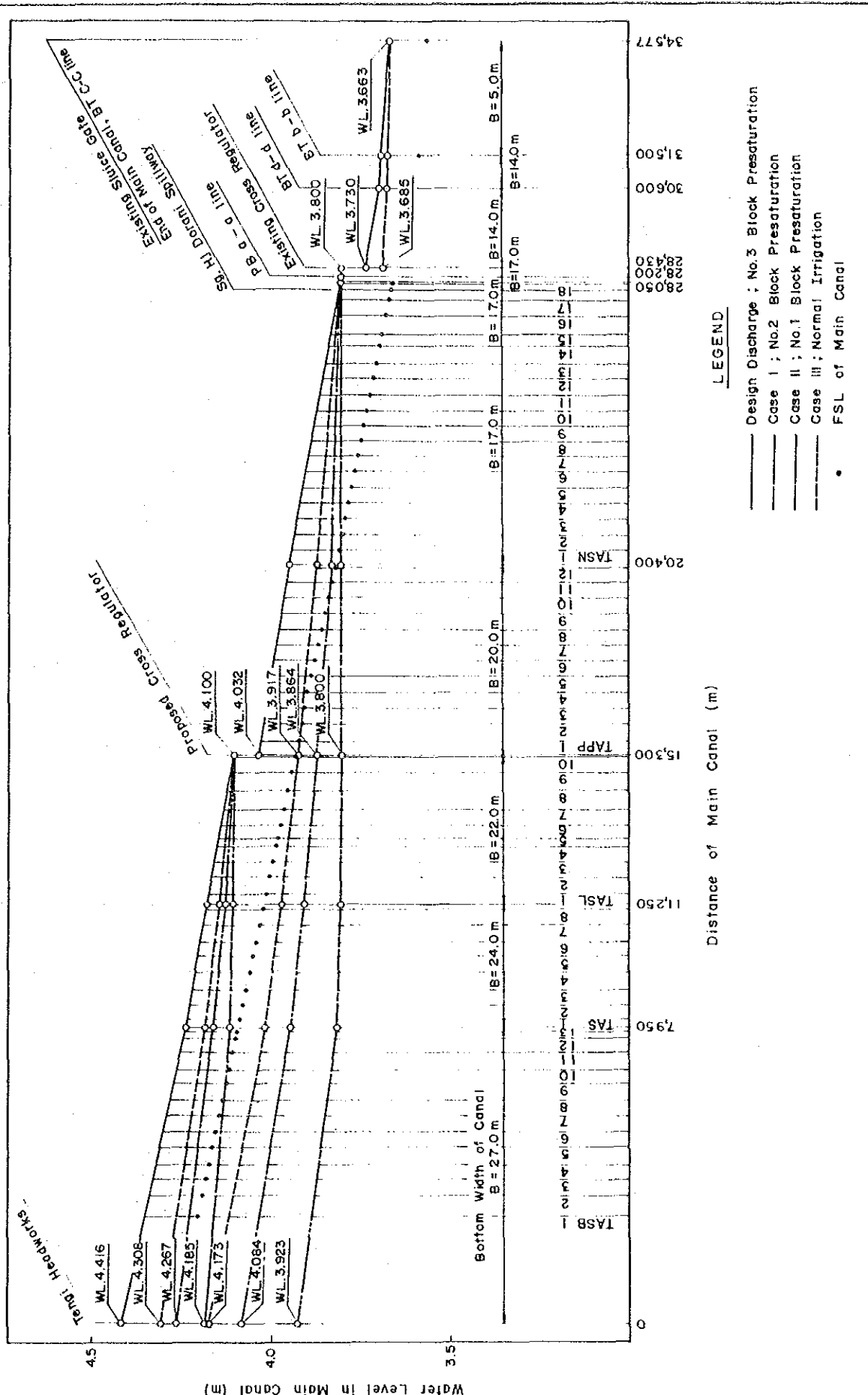
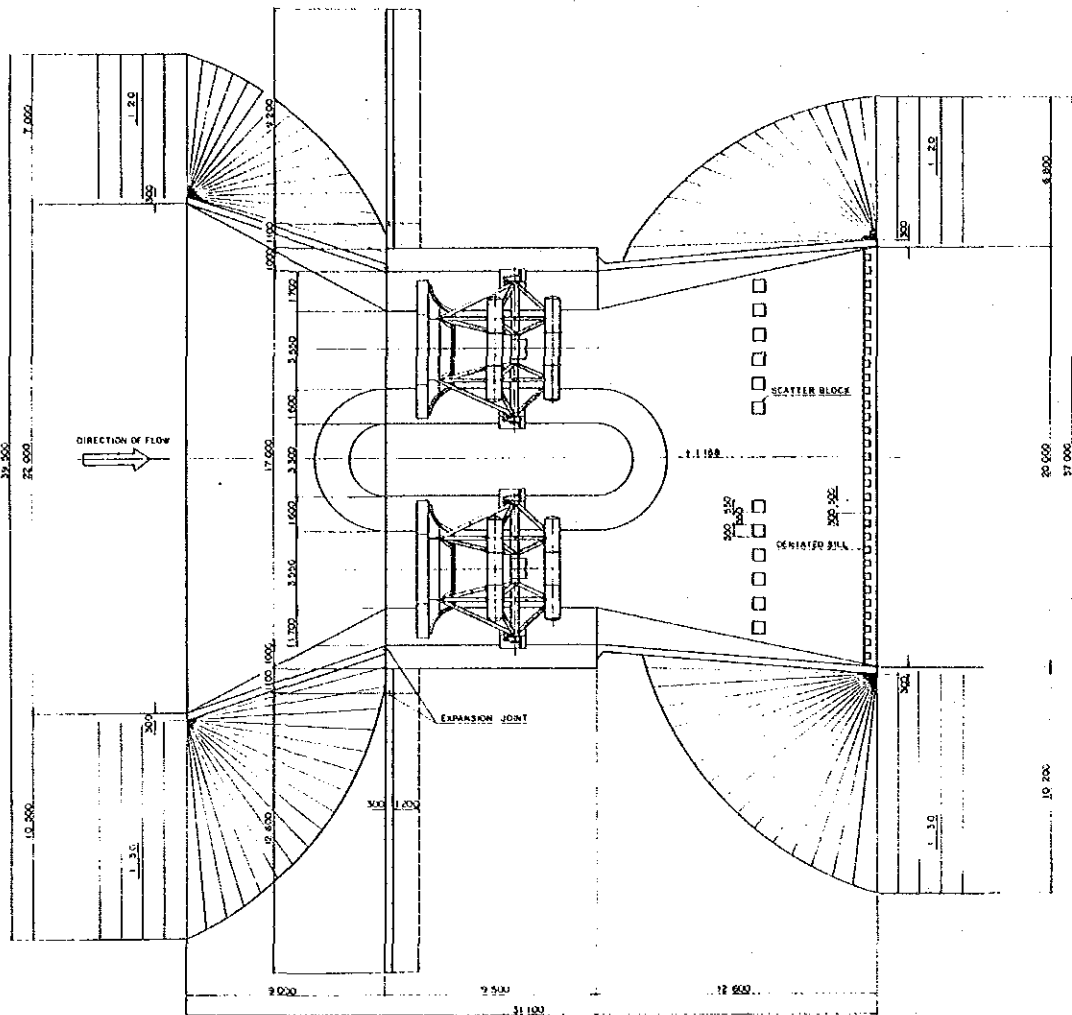
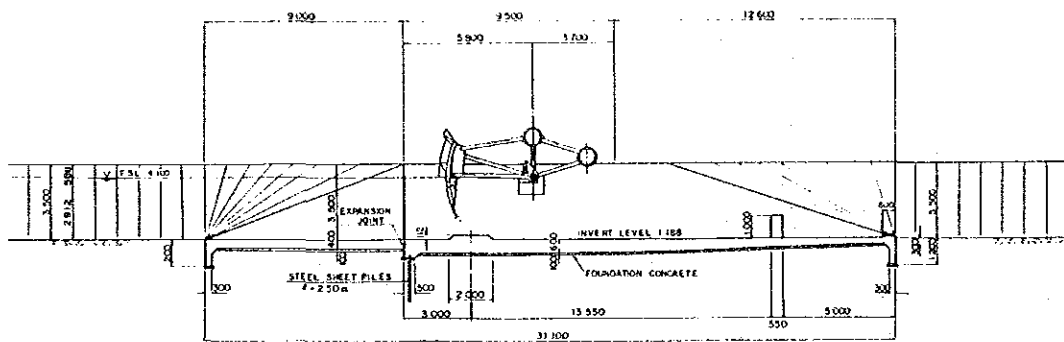
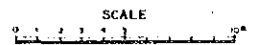


Fig.51 Water Level of Main Canal under Various Water Discharges



PLAN



PROFILE

Fig. 52 Proposed Cross Regulator

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 IRRIGATION DEVELOPMENT AND MANAGEMENT PROJECT  
 Japan International Cooperation Agency



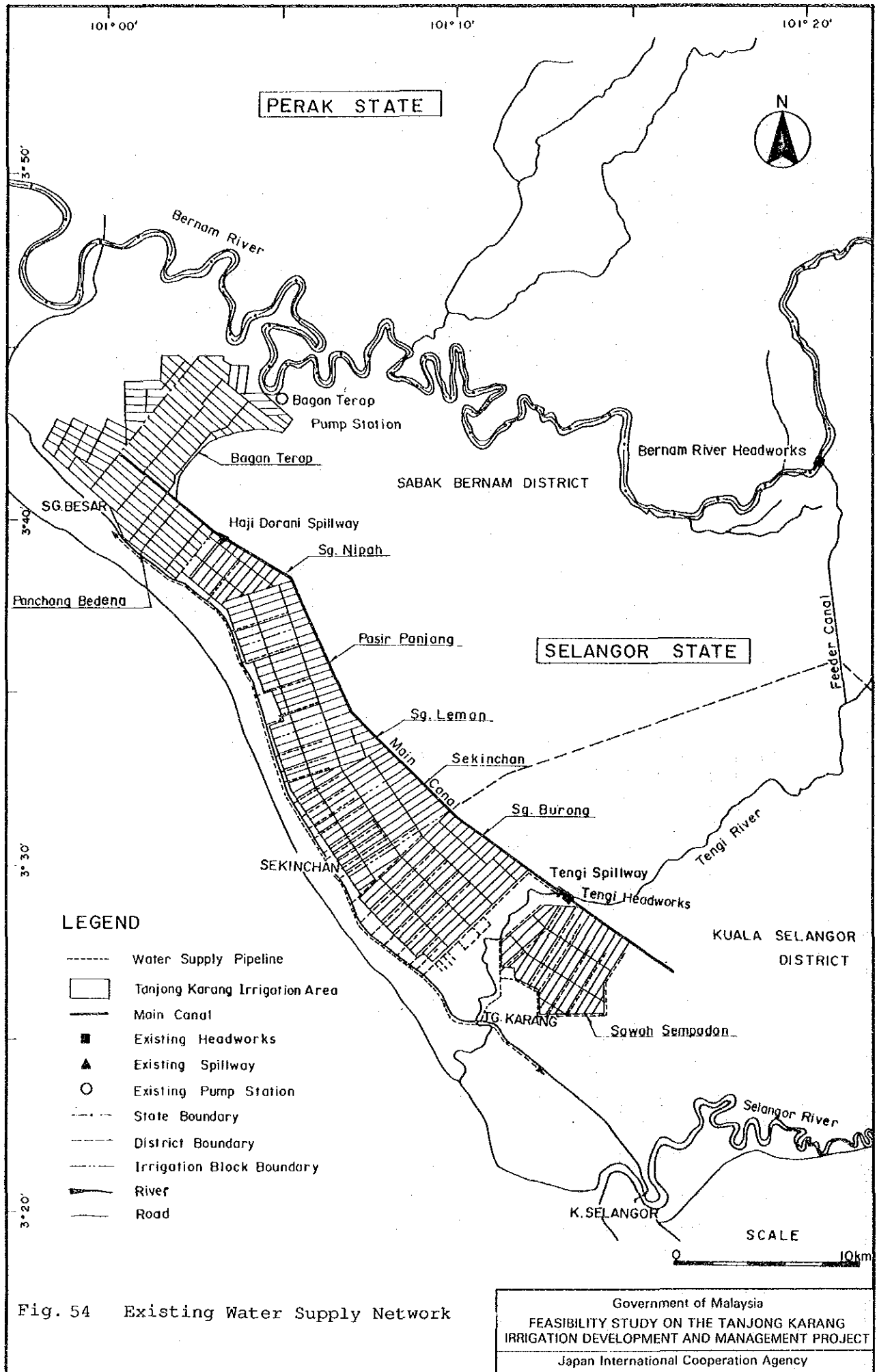


Fig. 54 Existing Water Supply Network



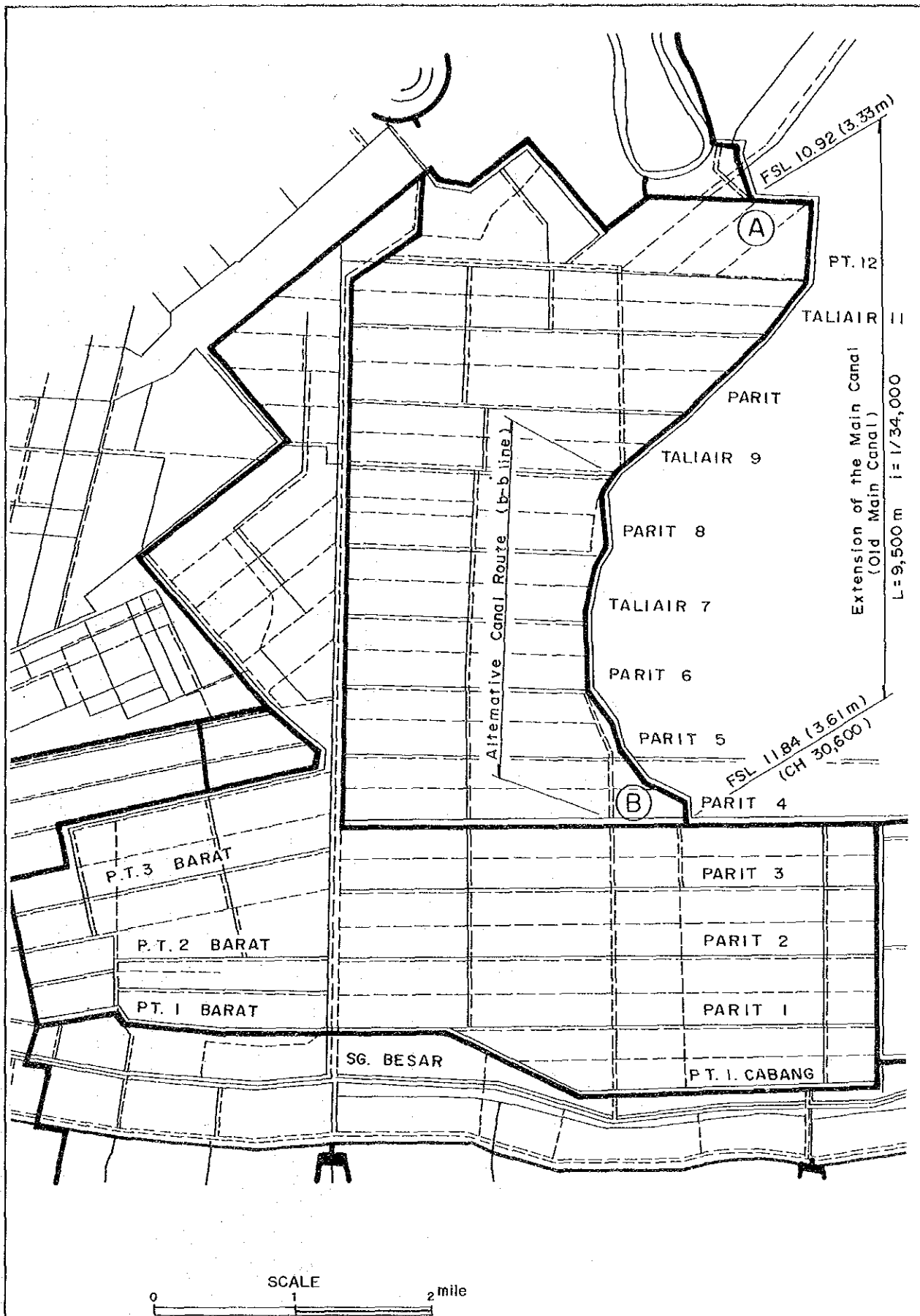


Fig.55 Alternative Routes of Extension of Main Canal

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 IRRIGATION DEVELOPMENT AND MANAGEMENT PROJECT  
 Japan International Cooperation Agency

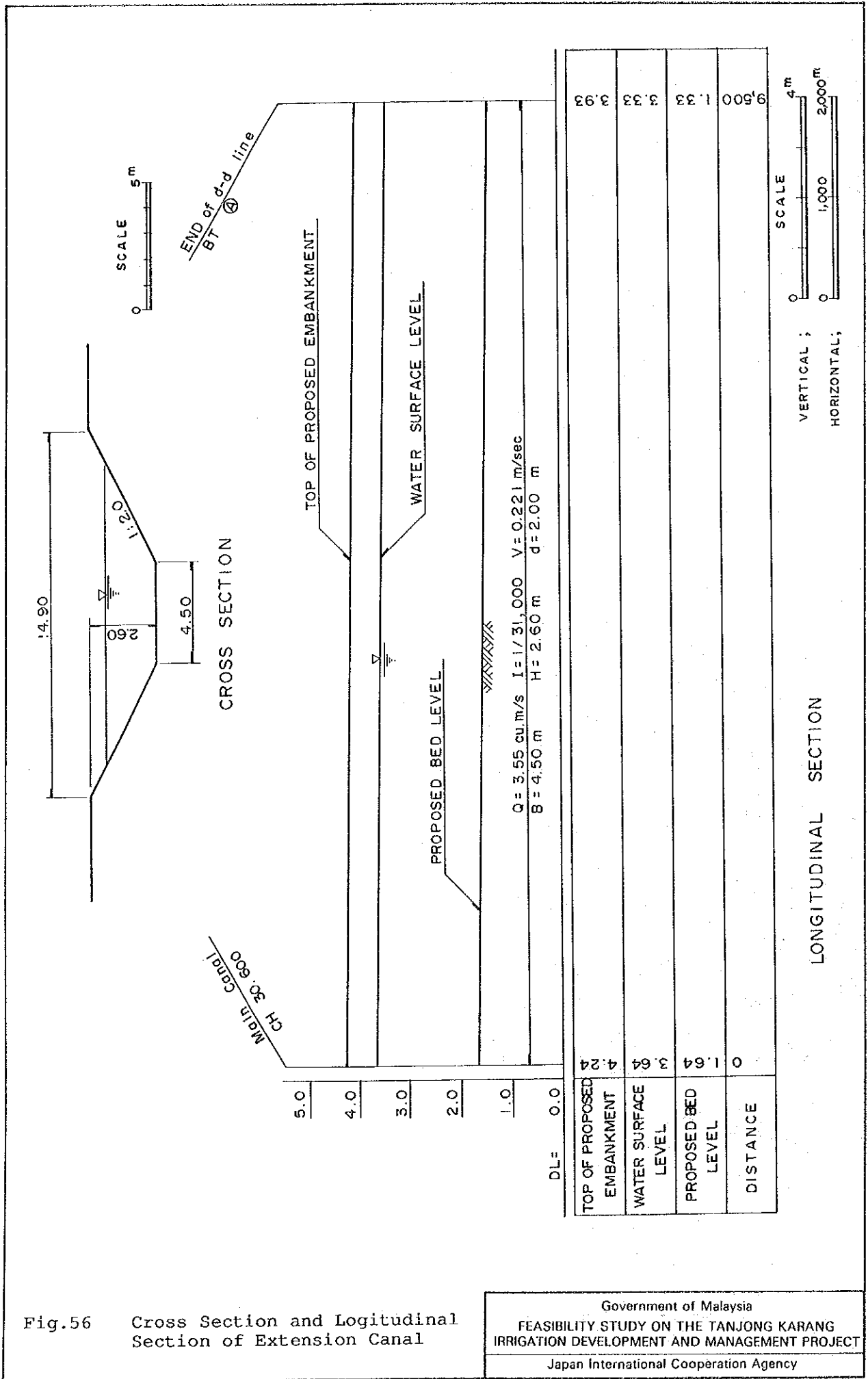
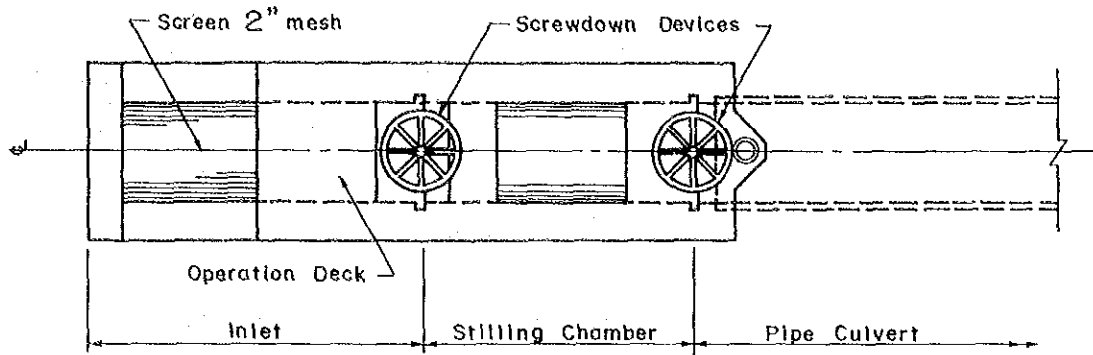
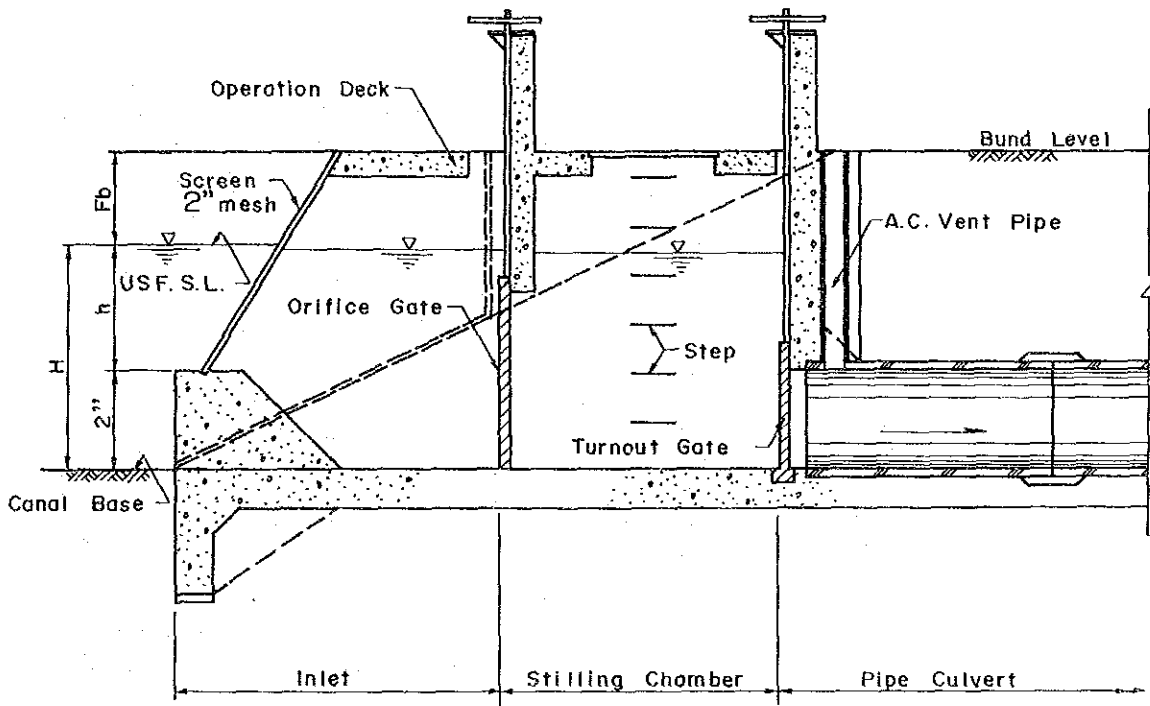


Fig.56 Cross Section and Logitudinal Section of Extension Canal



PLAN



PROFILE

DIMENSION TABLE

Type	Concrete Pipe	Orifice Gate	H	Fb	h
2'-0"	2'-0"	2'-4" x 2'-4"	4'-6"	2'-0"	2'-6"
3'-0"	3'-0"	4'-10" x 3'-8"	5'-6"	2'-0"	3'-6"
4'-0"	4'-0"	4'-4" x 4'-5"	6'-6"	2'-0"	4'-6"

Fig.57 Improvement Plan of CHO

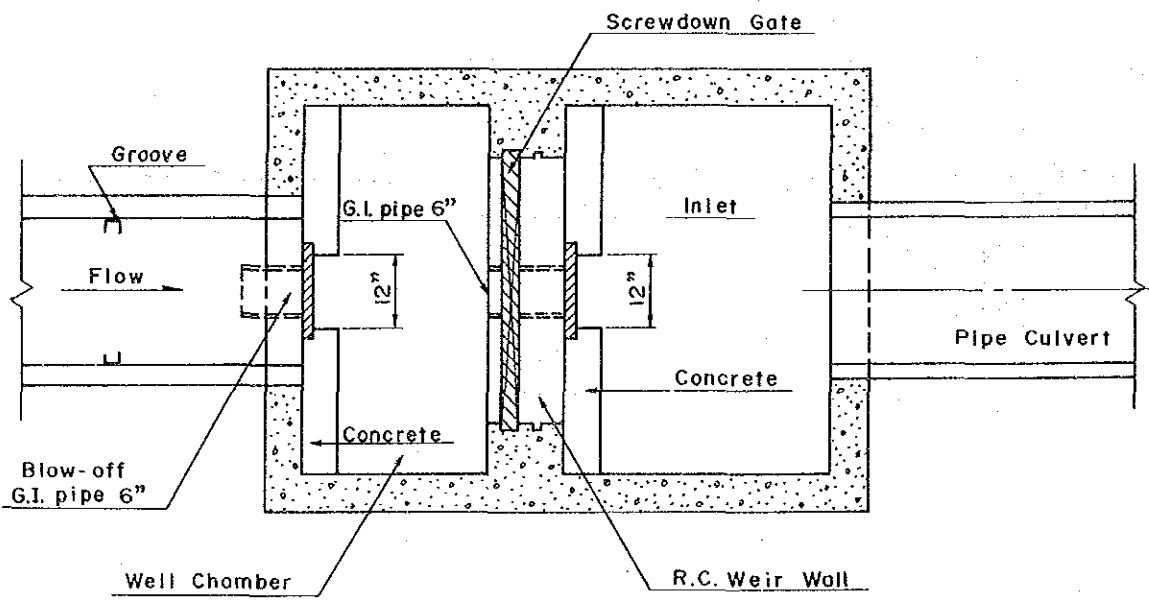
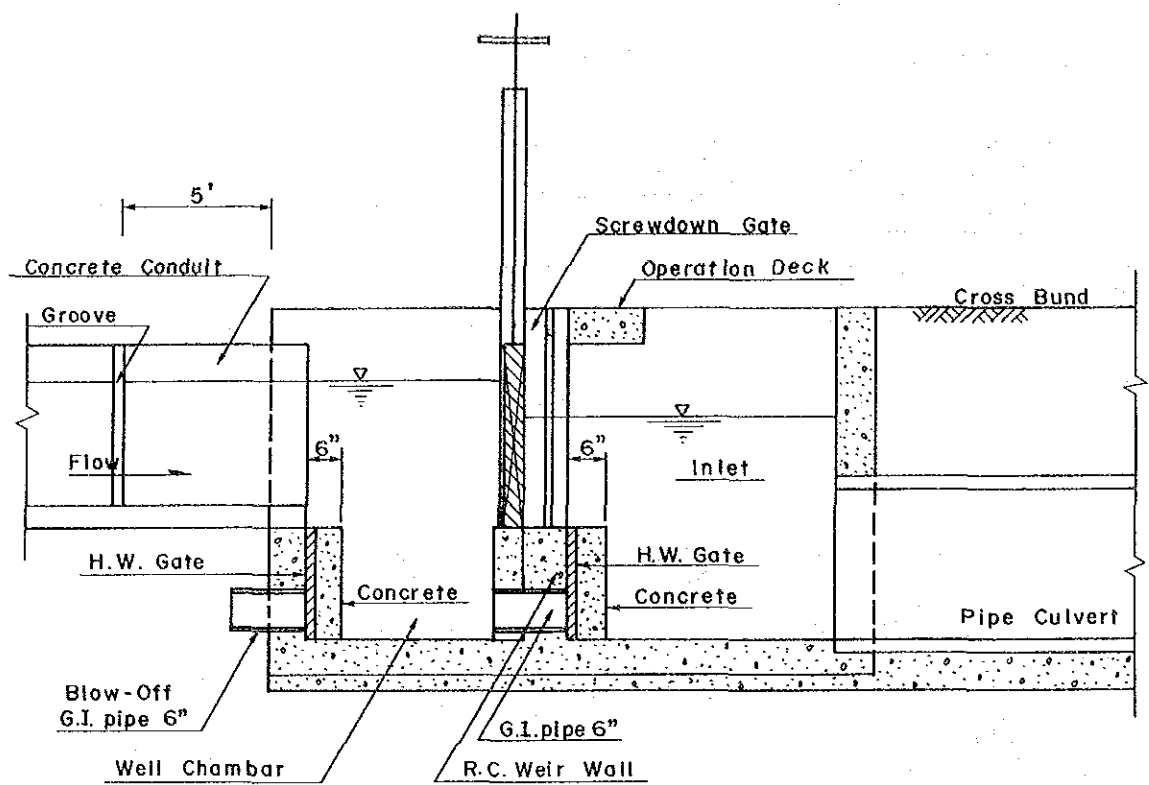
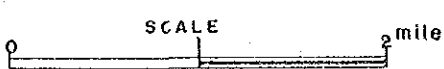
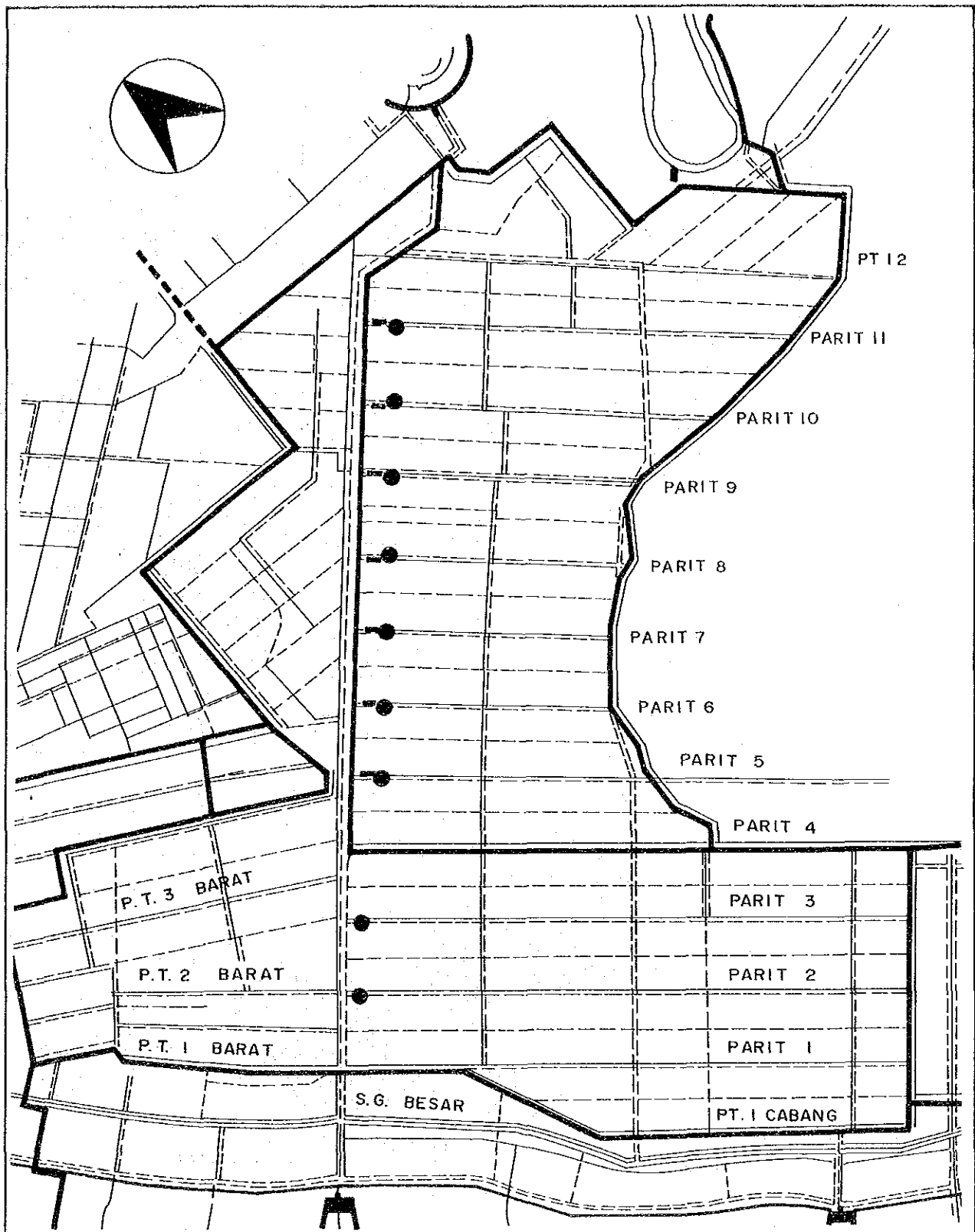


Fig.58 Improvement Plan of Check Structure



LEGEND

- Proposed Drainage Control
- - - Proposed Culvert or Bridge
- - - - - Drain Under Construction

Fig.59 Location of Proposed Drainage Control Gate

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 IRRIGATION DEVELOPMENT AND MANAGEMENT PROJECT  
 Japan International Cooperation Agency

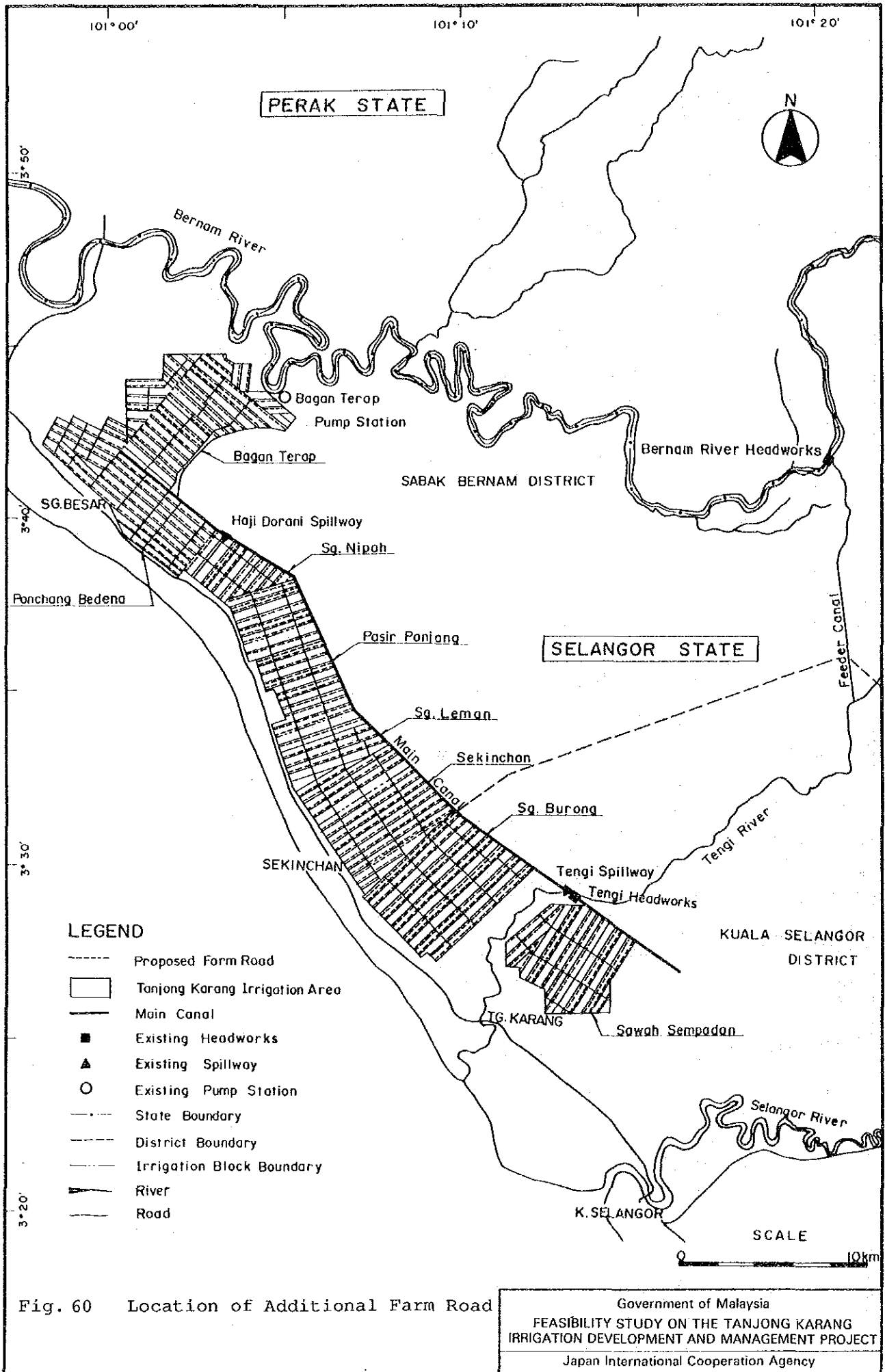
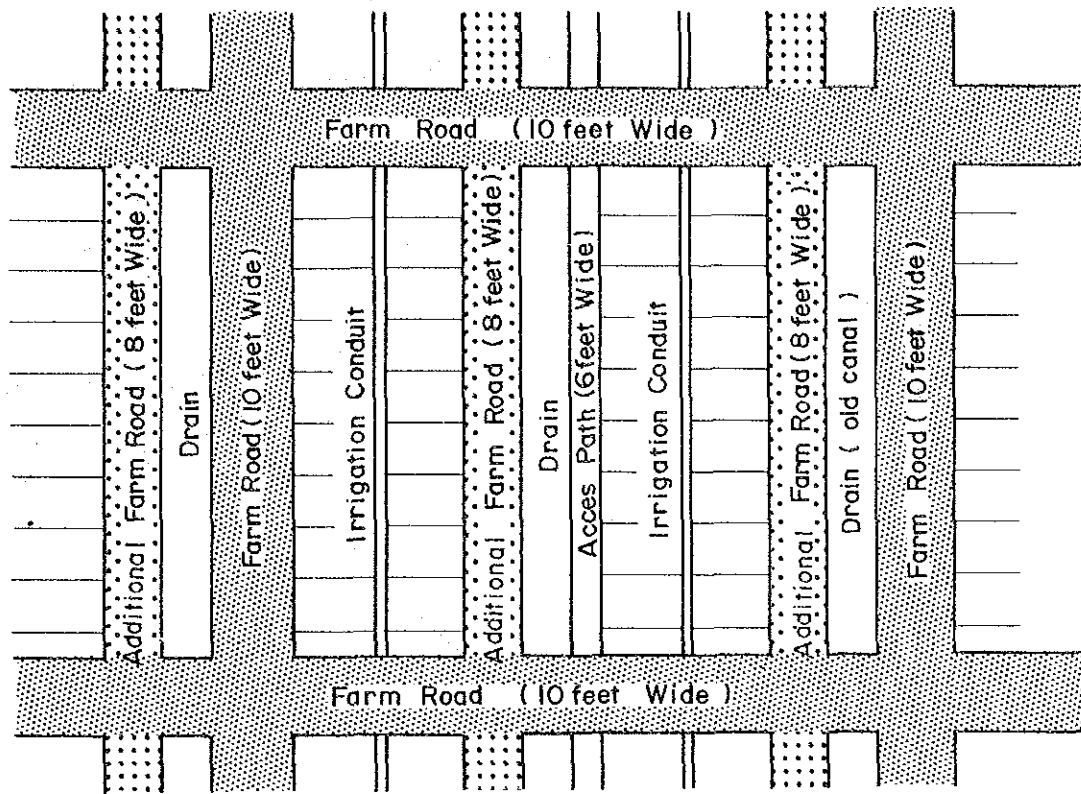
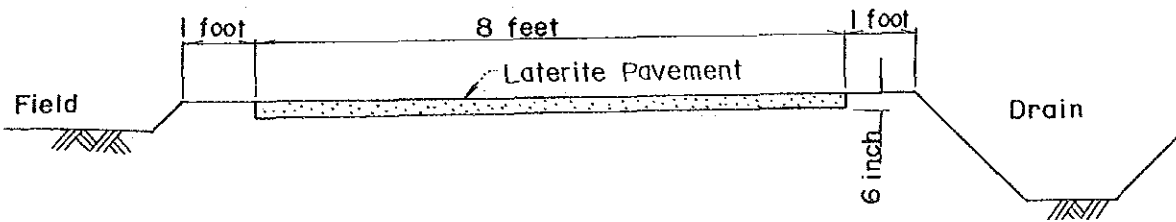


Fig. 60 Location of Additional Farm Road

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 IRRIGATION DEVELOPMENT AND MANAGEMENT PROJECT  
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Typical Layout of Additional Farm Road



Typical Cross Section of Additional Farm Road

Fig. 61 Typical Layout and Cross Section of Proposed Farm Road

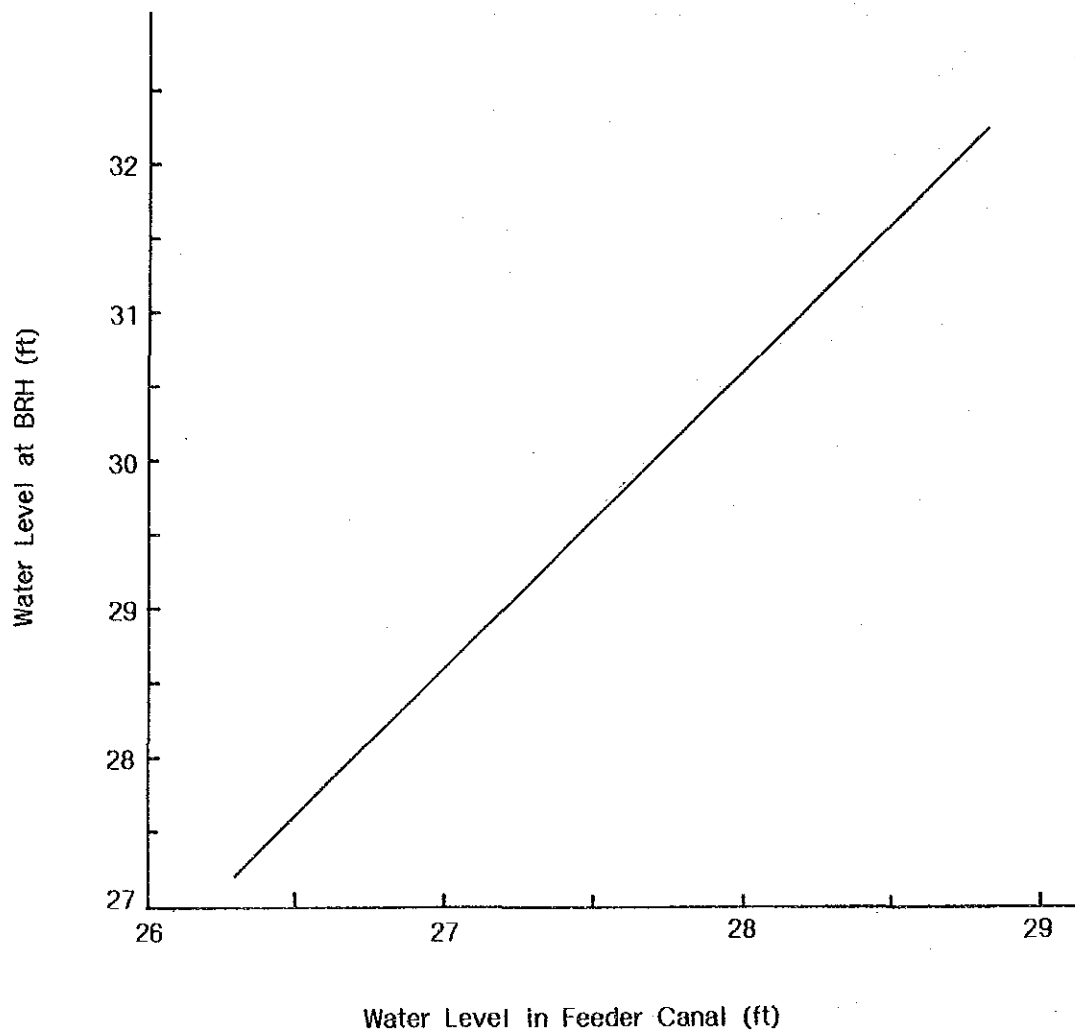


Fig. 62 Relationship of Water Levels between BRH and Feeder Canal



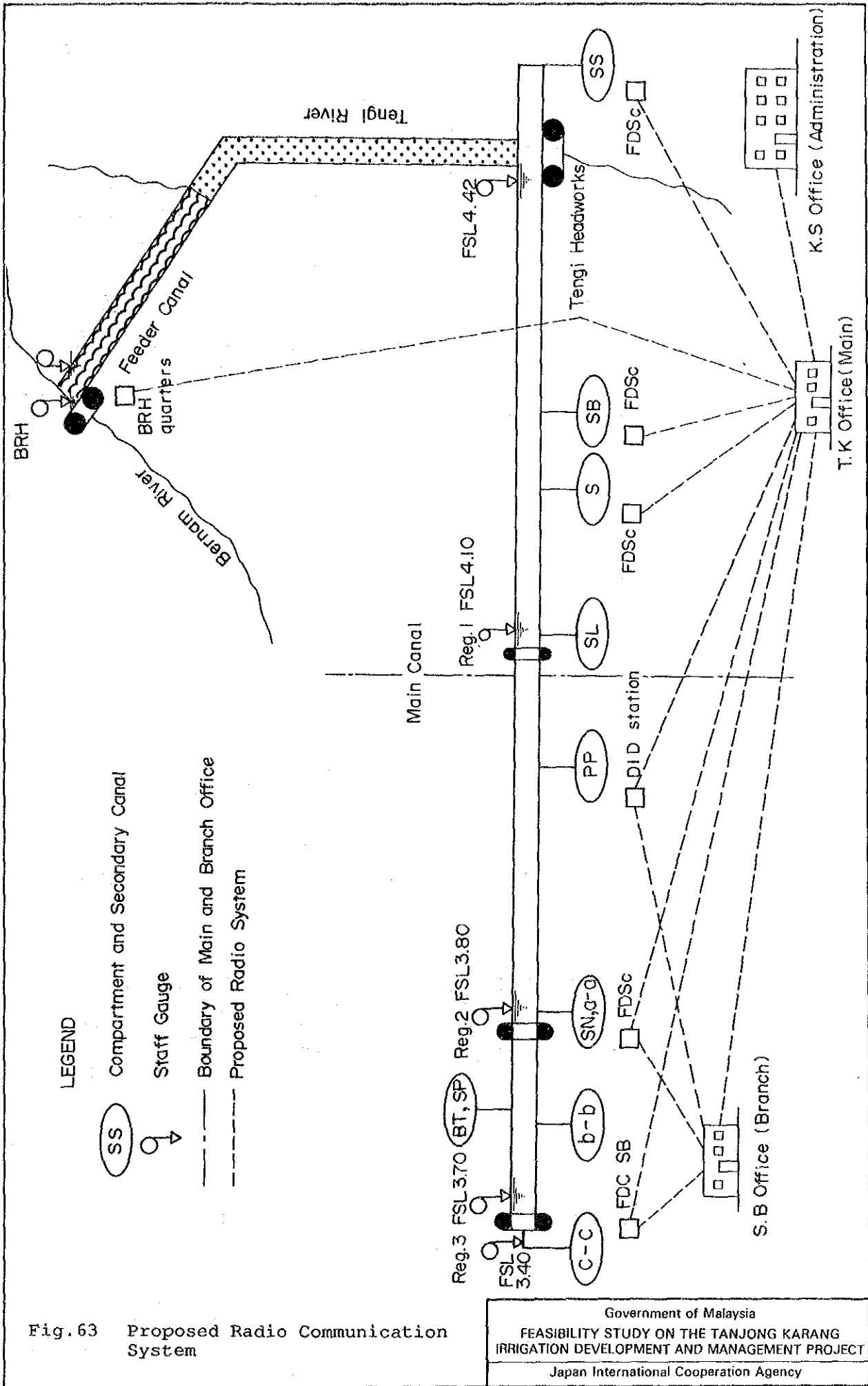
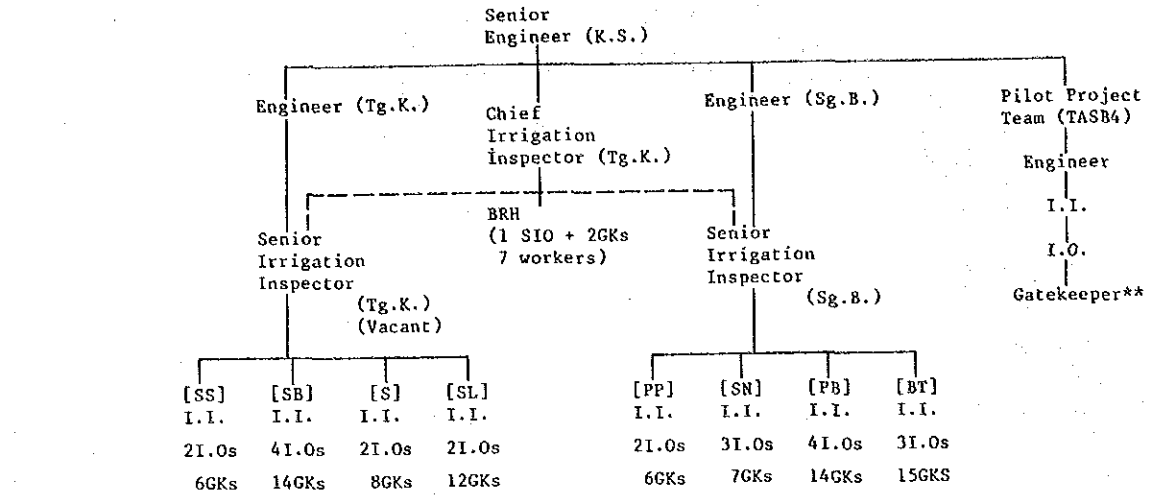


Fig. 63 Proposed Radio Communication System

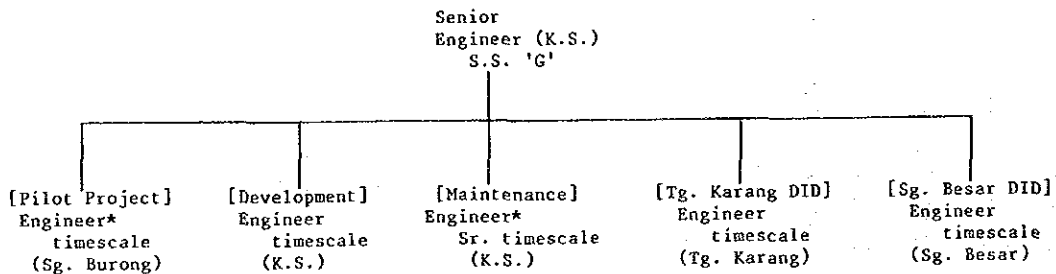
(1) Irrigation staff



	[SS] I.I. 2I.Os 6GKs	[SB] I.I. 4I.Os 14GKs	[S] I.I. 2I.Os 8GKs	[SL] I.I. 2I.Os 12GKs	[PP] I.I. 2I.Os 6GKs	[SN] I.I. 3I.Os 7GKs	[PB] I.I. 4I.Os 14GKs	[BT] I.I. 3I.Os 15GKs
Spillway Operators	2	-	-	-	-	-	1	-
Cross Regulator Operators	-	-	-	-	-	-	(1)*	-
Secondary Canal Gatekeepers	-	-	-	-	-	-	2	-
Drainage Control Gatekeepers	1	2	1	-	1	1	3	-

Remark: \*: Operated by a-a line gatekeeper who is included in secondary canal gatekeepers.  
 \*\*: Included in the number of GK in SB.  
 GK: Gatekeeper  
 I.I.: Irrigation Inspector  
 I.O.: Irrigation Overseer

(2) Dispositon of Engineer

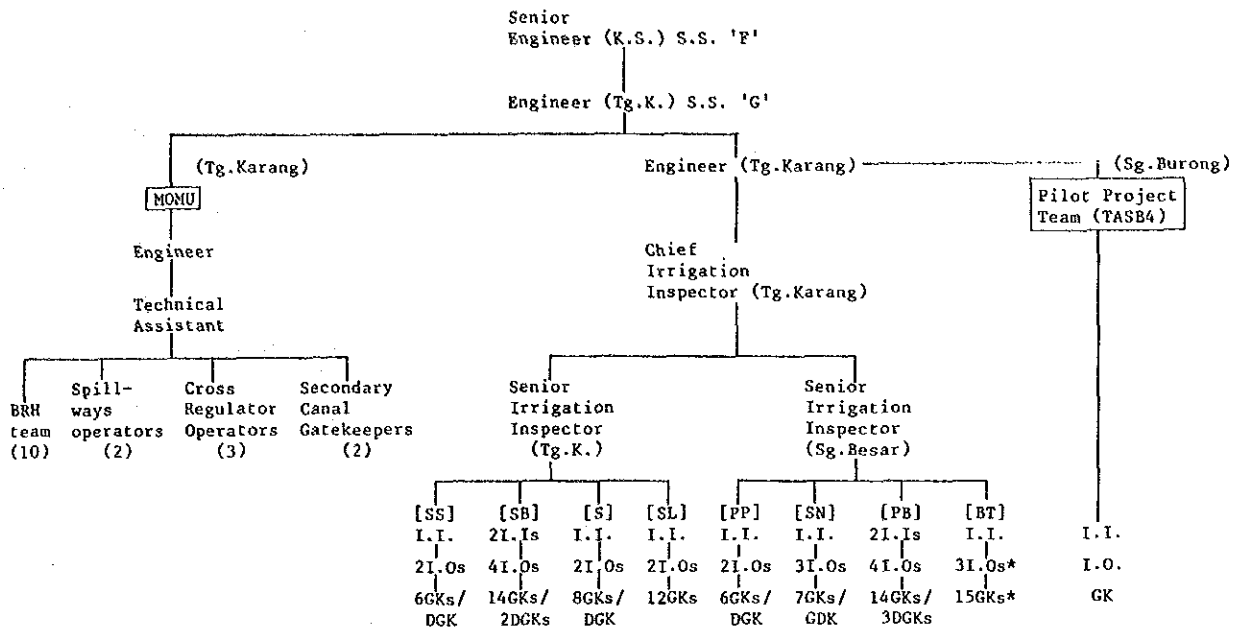


\*: Seconded from the Federal DID, PBLs

Superscale 'G'	1
Senior Timescale	1
Timescale	4
<b>Total</b>	<b>6</b>

Fig.64 Existing Organization Structure

(1) Irrigation staff



- Remarks: (1): MOMU: Main Conveyance System Operation/Maintenance Unit  
 (2): \*: Including Irrigation Overseer and gatekeepers for Sg. Panjang  
 (3): ( ): location or number of staff  
 (4): I.I.: Irrigation Inspector I.O.: Irrigation Overseer  
 (5): GK: Gatekeeper, DGK: Drainage Gatekeeper

(2) Disposition of Engineer

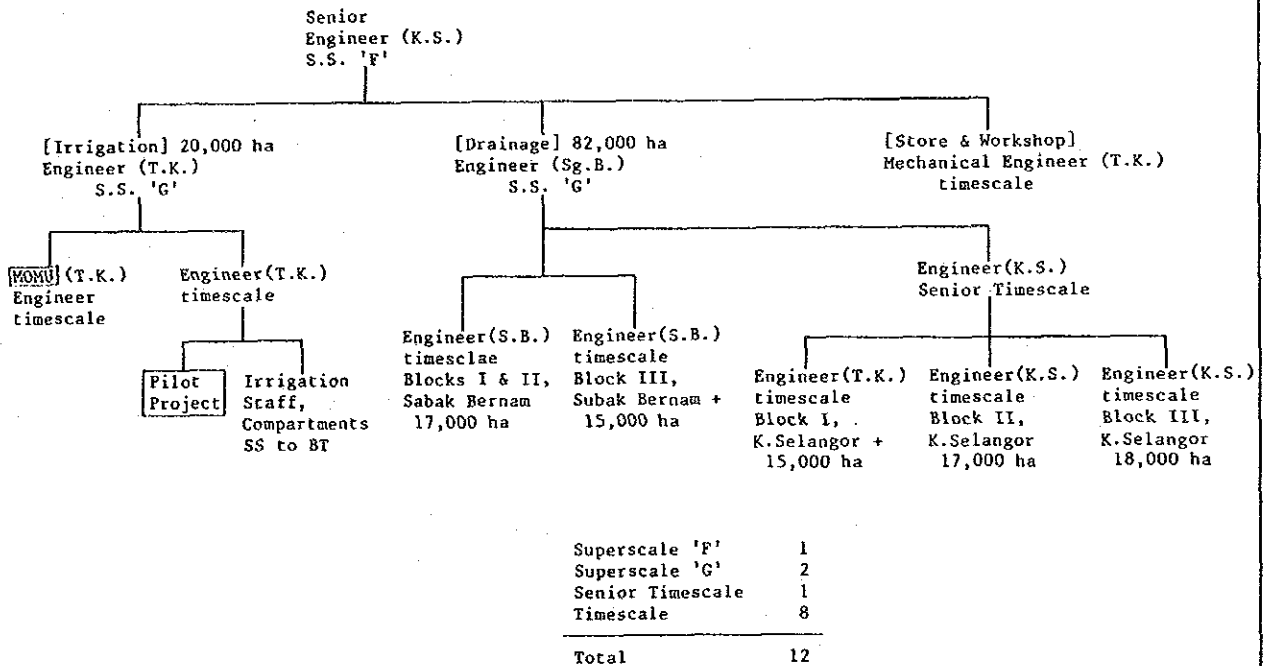


Fig.65 Proposed Organization Structure



# ***APPENDIX***



APPENDIX A SCOPE OF WORK FOR THE STUDY

SCOPE OF WORK  
FOR  
FEASIBILITY STUDY  
ON  
THE TANJONG KARANG IRRIGATION DEVELOPMENT  
AND MANAGEMENT PROJECT  
IN  
MALAYSIA

AGREED UPON BETWEEN  
THE ECONOMIC PLANNING UNIT  
OF  
THE PRIME MINISTER'S DEPARTMENT  
ON BEHALF OF  
THE GOVERNMENT OF MALAYSIA  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY

14th March, 1986  
KUALA LUMPUR



(Dato Seri Radin Soenarno Al-Haj)  
Director General  
Economic Planning Unit  
Prime Minister's Department  
on behalf of  
The Government of Malaysia



(Masakuni Kawamata)  
Leader of the Japanese  
Preliminary Study Team  
on behalf of  
The Japan International  
Cooperation Agency

## **I. INTRODUCTION**

In response to the request of the Government of Malaysia, the Government of Japan has decided to conduct a Feasibility Study on the Tanjong Karang Irrigation Development and Management Project (hereinafter referred to as "the Study"), and in accordance with the relevant laws and regulations in force in Japan, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programme of the Government of Japan will undertake the Study in close cooperation with the relevant Government authorities of Malaysia, at both the Federal and State levels.

The present document sets forth the Scope of Work with regard to the Study.

## **II. OBJECTIVE OF THE STUDY**

The objective of the Study is:

To identify water-related problems faced in the irrigation management of the Tanjong Karang Irrigation Project and recommend a solution to these problems in order to stabilize and sustain rice production in the project area as a national "granary".

## **III. SCOPE OF THE STUDY**

### **1. Project Area**

The project area covers the existing Tanjong Karang Irrigation Project of approximately 20,000 ha in the Northwest Selangor Integrated Agricultural Development Project and is located in the districts of Sabak Bernam and Kuala Selangor in the State of Selangor, Malaysia.

### **2. Scope of the Study**



The activities to be undertaken by the Japanese Study Team will be in two phases as follows:

(1) Phase I - Prefeasibility Study

To identify water-related problems by reviewing prevailing conditions in and around the project area, develop various alternatives for resolving these problems and recommend a preferred solution.

(2) Phase II - Feasibility Study

To proceed with a feasibility study of the selected solution following discussion with the government, with a view to establishing technical feasibility, economic viability and socio-economic acceptability.

## 2.1 Work Plan for the Phase I Study

The Study will cover the following items:

- (1) To collect, review and evaluate data and information necessary for the Study including but not restricted to the following:
  - a) land use data, present and future projection
  - b) topography
  - c) meteorology
  - d) hydrology
  - e) geology and hydrogeology
  - f) soil
  - g) irrigation and drainage, and water management systems
  - h) agricultural practices and management
  - i) agro and regional economy, and agro-based institutions
  - j) construction materials and costs
  - k) socio-economic and demographic situation
- (2) To undertake the necessary surveys in and around the project area for additional data required for the Study.

(3) To prepare and present the prefeasibility report.

## 2.2 Work Plan for the Phase II Study

The Study will cover the following items:

- (1) To undertake field survey for additional data including but not restricted to the following:
  - a) soil and land classification survey
  - b) geological survey
  - c) socio-economic survey
  - d) regional economic and agro-institutional survey
  - e) water quality survey
- (2) To determine for the recommended irrigation development and management plan the following:
  - a) water requirement
  - b) land use and cropping pattern
  - c) irrigation and drainage canal networks and other necessary facilities
  - d) agro-institutional plan
  - e) others
- (3) To formulate and present the following:
  - a) farming practices including farm mechanization programme
  - b) a layout for the project works including preliminary design of major structures, if such structures are necessary
  - c) the operation and maintenance plan for the project
- (4) To prepare and present the following:
  - a) estimated project cost and benefits
  - b) project implementation schedule
  - c) manpower requirements for project implementation
- (5) To conduct and present project evaluation

- (6) To identify and present the main adverse and beneficial socio-economic and environmental impacts of the proposed irrigation development and management plan.

#### IV. SCHEDULE OF THE STUDY

The Study shall be undertaken in accordance with the tentative schedule as referred to in the Annex.

#### V. REPORTS

JICA shall prepare and submit the following reports in English to the Government of Malaysia in the course of the Study:

Inception Report : twenty (20) copies, at the commencement of the Phase I Study.

Progress Report : twenty (20) copies, at the end of the field works of the Phase I Study.

Pre-feasibility Report : fifty (50) copies, at the commencement of the Phase II Study.

Interim Report : twenty (20) copies, at the end of the field works of the Phase II Study.

Draft Final Report : fifty (50) copies, at the end of the home office work of the Phase II Study.

The Government of Malaysia will provide JICA with its comments within six (6) weeks after the receipt of the Draft Final Report.

Final Report : one hundred (100) copies, within eight (8) weeks after the receipt of the Government of Malaysia's comments on the Draft Final Report.

The Japanese Study Team should ensure that all data, information, maps, materials and findings connected with the Study are kept confidential and not disposed of or revealed to any third party except with the prior written consent of the Government of Malaysia. Such maps and aerial photographs are to be returned to the Government of Malaysia immediately upon completion of the Study. All reports when finalized and submitted to the Government of Malaysia shall remain the property of the Government of Malaysia.

## **VI. UNDERTAKINGS OF THE GOVERNMENT OF MALAYSIA**

To facilitate the smooth conduct of the Study, the Government of Malaysia shall take the following necessary measures:

- (1) To inform the members of the Japanese Study Team of any existing risk in the Study area and to take any measures deemed necessary to secure the safety of the Japanese Study Team.
- (2) To secure the necessary entry permits for the Japanese Study Team to conduct field survey in Malaysia and exempt them from consular fees.
- (3) To exempt the members of the Japanese Study Team from taxes and duties, as normally accorded under the provision of Malaysian General Circular No.1 of 1979, on equipment, machinery and other materials brought into and out of Malaysia for the conduct of the Study.
- (4) To exempt the members of the Japanese Study Team from Malaysian income tax on their official emoluments in respect of their period of assignment in Malaysia in connection with the conduct of the Study but the Government of Malaysia shall retain the right to take such emoluments into account for the purpose of assessing the amount to be applied to income from other sources.
- (5) To provide the necessary facilities to the Japanese Study Team for remittance as well as utilization of funds introduced into Malaysia from Japan in connection with the conduct of the Study.

- (6) To secure permission for entry into private properties or restricted areas for the conduct of the Study.
- (7) To provide the Japanese Study Team with medical services when needed but the expenses will be chargeable to the members of the Japanese Study Team.
- (8) To make arrangements for the Japanese Study Team to take back to Japan the data, maps and materials connected with the Study, subject to the approval of the Government of Malaysia, in order to prepare the reports.
- (9) To provide the Japanese Study Team with available data, maps and information necessary for the execution of the Study.
- (10) To appoint counterpart personnel to the Japanese Study Team during the Study period.
- (11) To provide the Japanese Study Team with suitable office space with clerical service and necessary office equipment in Kuala Lumpur and the project area.
- (12) To provide the Japanese Study Team with adequate means of local transport for official travel only.
- (13) To indemnify any member of the Japanese Study Team in respect of damages arising from any legal action against him in relation to any act performed or omissions made in undertaking the Study except when the two Governments agree that such a member is guilty of gross negligence or wilful misconduct.
- (14) To nominate the Drainage and Irrigation Department, Malaysia to act as the main counterpart agency for the Study and the Economic Planning Unit as the main coordinating body in relation to other relevant Government and non-Governmental organizations.

## **VII. UNDERTAKINGS OF JICA**

In order to conduct the Study, JICA shall take the following measures:

- (1) To despatch, at its own expense, the Japanese Study Team to Malaysia.
- (2) To pursue technology transfer to the Malaysian counterpart personnel in the course of the Study.

## **VIII. CONSULTATION**

JICA and the Government of Malaysia shall consult each other in respect of any matter that is not agreed upon in this document and which may arise from or in connection with the Study.

## APPENDIX B THE STUDY ORGANIZATIONS

Personnel directly involved in or concerned to the Study are as follows:

<u>Name</u>	<u>Speciality</u>	<u>Assignment Period (in Malaysia)</u>
<b>Advisory Committee, Japan</b>		
(1) Mr. M. Kawamata	Chairman	June 1 - 18, 1986 Nov. 2 - 7, 1986 Mar.16 - 21, 1987
(2) Mr. Y. Yamamoto	Irrigation	June 1 - 18, 1986
(3) Mr. H. Yoshino	Water management	June 1 - 18, 1986 Nov. 2 - 7, 1986
(4) Mr. S. Imai	Coordinator	June 1 - 18, 1986 Nov. 2 - 7, 1986 Mar. 14 - 21, 1987
<b>JICA Study Team</b>		
(1) Mr. K. Irie	Team leader	June 1 - July 9, 1986 July 31 - Aug. 29, 1986 Oct. 29 - Nov. 27, 1986 Jan. 6 - 20, 1987 Mar.16 - 21, 1987
(2) Mr. Y. Matsumoto	Agricultural development planner/ Co-team leader	June 1 - Dec. 24, 1986 Mar.16 - 21, 1987
(3) Mr. H. Tomiyama	Water management	June 1 - Aug. 29, 1986 Oct. 29,'86 - Jan. 20,'87 Mar.16 - 21, 1987
(4) Mr. S. Sato	Irrigation & drainage	June 1 - Aug. 29, 1986 Oct. 29,'86 - Jan. 20,'87
(5) Mr. H. Matsuura	Hydrology	June 16 - Aug. 29, 1986
(6) Mr. A. Yuasa	Hydraulic simulation	Oct. 13 - Dec. 24, 1986
(7) Mr. T. Murono	Agro-economy	July 31 - Aug. 29, 1986 Nov. 13 - Dec. 24, 1986

<u>Name</u>	<u>Specialty</u>	<u>Assignment Period (in Malaysia)</u>
(8) Mr. N. Tsuchihashi	Institution	June 1 - Aug. 29, 1986 Nov. 13, - Dec. 24, 1986
(9) Mr. S. Azegami	Irrigation & drainage	June 16 - Aug. 29, 1986 Nov. 13,'86 - Jan. 20,'87
(9) Mr. S. Otani	Structural design	June 16,'86 - Jan. 5,'87
(10) Mr. T. Kajimoto	Survey	June 1 - Aug. 10, 1986



## Officials of the Government of Malaysia

### Steering Committee, Malaysia

- (1) Dr. Nik Ibrahim Nik Mahmood  
Former Director of Agriculture, EPU
- (2) Dr. Abdul Aziz bin Mohd. Yaacob  
Director of Agriculture, EPU
- (3) Miss Lim Mui Kiang  
Principal Assistant Director,  
Agriculture Section, EPU
- (4) Miss Wong Peg Har  
Principal Assistant Director,  
External Assistant Section, EPU
- (5) Mr. Abdul Latib Markom  
Assistant Director,  
Agriculture Section, EPU

### Technical Committee and Counterpart Team, Malaysia

- (1) Mr. Cheong Chup Lim  
Deputy Director General, DID
- (2) Mr. D. N. Welch  
Assistant Director General, DID
- (3) Mr. Lung Heng Toh  
Assistant Director General, DID
- (4) Mr. Quah Tek Hoe  
Chief Design Engineer, DID
- (5) Mr. Tan Leong Tiam  
Director, State DID, Selangor
- (6) Mr. A. Thurai Raj  
Project Engineer, PBLs, Kuala Selangor
- (7) Mr. Sardar Ali bin Raunkee  
Chief Planning Engineer, DID
- (8) Mr. Sieh Kok Chi  
Director of Coastal Engineering  
Technical Unit, DID
- (9) Mr. Tan Jiak Kim  
District Engineer, Kuala Selangor, DID
- (10) Mr. Lee Chock Seng  
Senior Planning Engineer, DID
- (11) Mr. Wong Kok Fui  
Senior Design Engineer, DID
- (12) Mr. Ng Sin Fook  
Senior Engineer, PBLs, Sungai Besar
- (13) Mr. Khoo Chee Ngion  
Senior Engineer, PBLs, Kuala Selangor
- (14) Mr. Abd. Mutalib bin Mat Hassan  
Engineer, PBLs, Kuala Selangor
- (15) Mr. Zulkifli bin Hassan  
Engineer, DID, Sungai Besar
- (16) Tuan Hj. Shaharuddin bin Ibrahim  
Engineer, DID, Sungai Burong
- (17) Mr. Soong Sin Onn  
Engineer, DID, Tanjong Karang
- (18) Mr. Ismail Md. Said  
Chief Irrigation Inspector, DID, Tanjong

- (19) Tuan Hj. Hamed Puasa Karang  
Senior Irrigation Inspector, DID, Sungai  
Besar
- (20) Mr. K. Harada JICA Expert, DID
- (21) Mr. A. Makino JICA Expert, DID
- (22) Mr. Hamzah bin Chin Project Manager, PBLs, Kuala Selangor
- (23) Mr. Faizal bin Abdullah Deputy Project Manager, PBLs, Kuala  
Selangor
- (24) Mr. Chew Teck Boon Project Agricultural Officer, PBLs, Kuala  
Selangor
- (25) Mr. ZaniI Abdin bin Hj. Yusof Senior Sociologist, PBLs, Kuala Selangor
- (26) Miss Zabidah bt. Awang Senior Economist, PBLs, Kuala Selangor
- (27) Mr. Salehuddin bin Hj. Yahya Rice Specialist, DOA, Sungai Burong



JICA