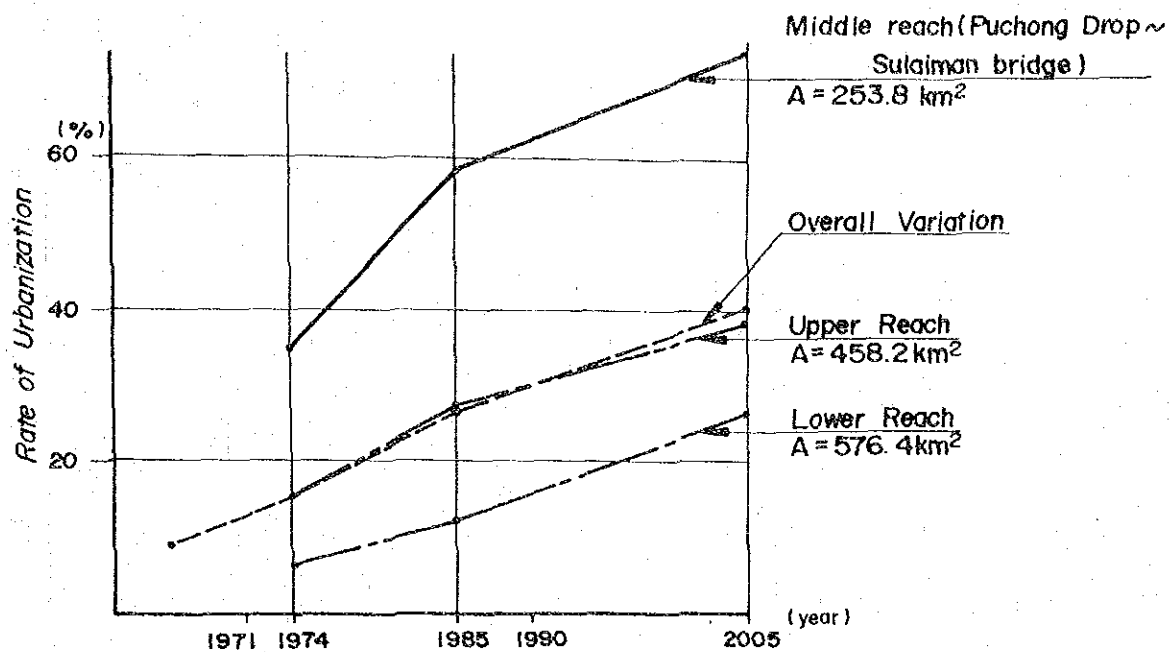


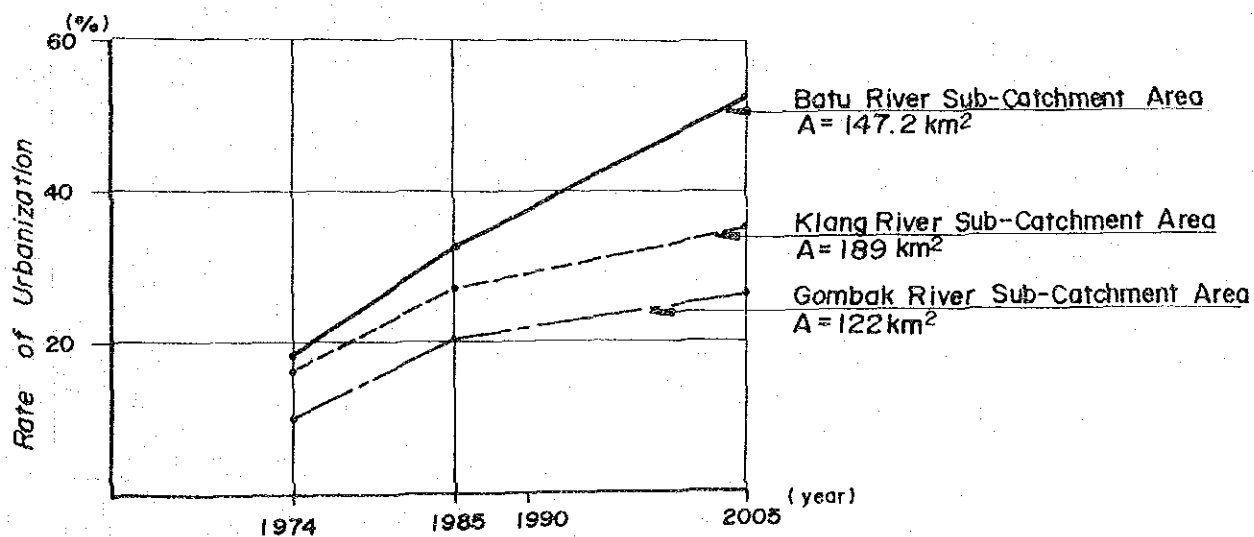
FIG. 2-8

FUTURE LAND USE PATTERN IN THE FLOOD PRONE AREA, 2005

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



Urbanization Rate by Upper , Middle and Lower Reaches of the Klang River Basin



Urbanization Rate by 3 Sub-Catchment Areas in the Upper Reach

FIG. 2-9

FUTURE URBANIZATION TREND

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

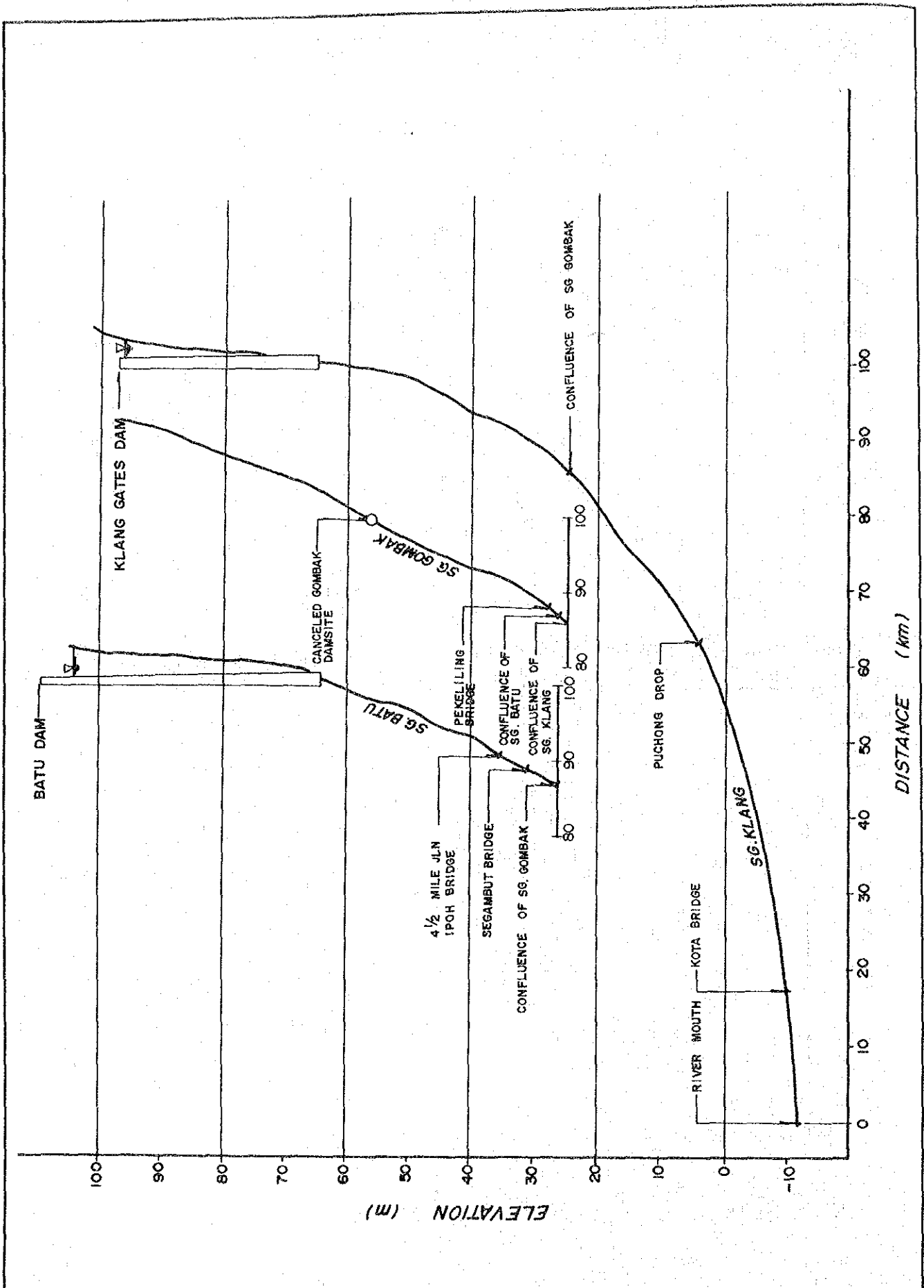


FIG. 2-10

LONGITUDINAL PROFILE OF KLANG RIVER AND TRIBUTARIES

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

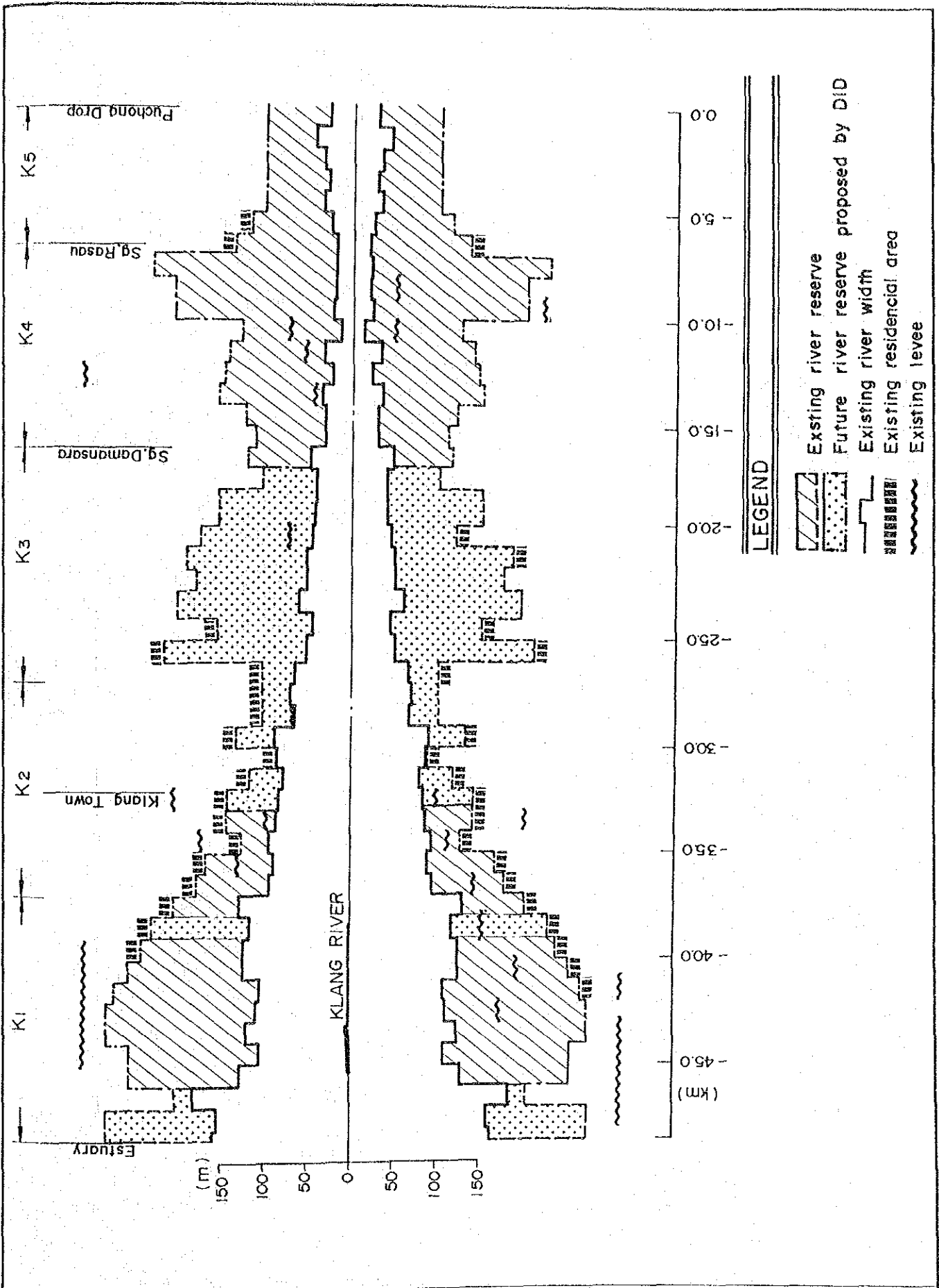


FIG. 2-11

EXISTING RIVER RESERVE FOR DOWNSTREAM OF KLANG RIVER

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



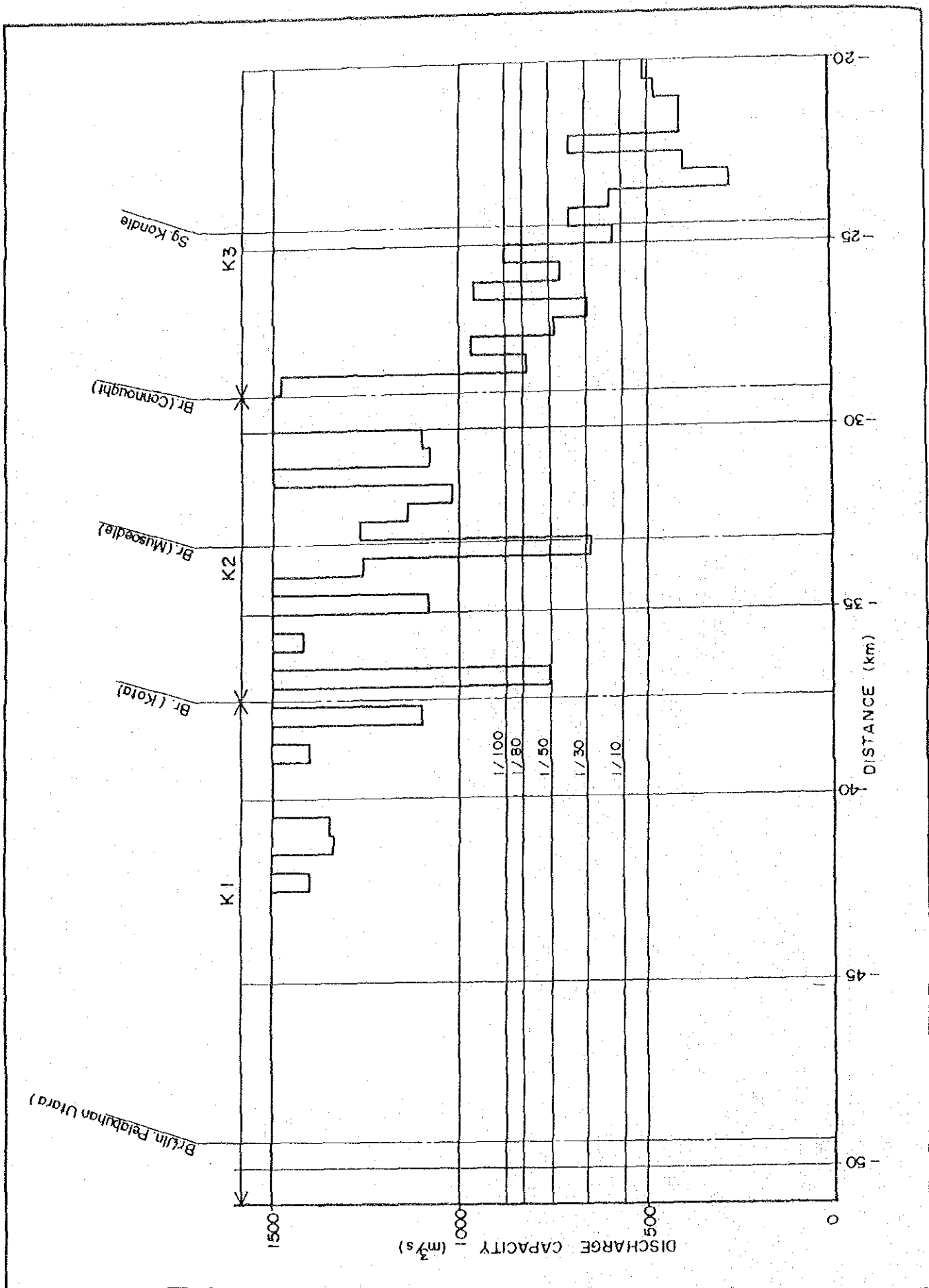


FIG. 2-12

DISCHARGE CAPACITY OF SG. KLANG (1/3)

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

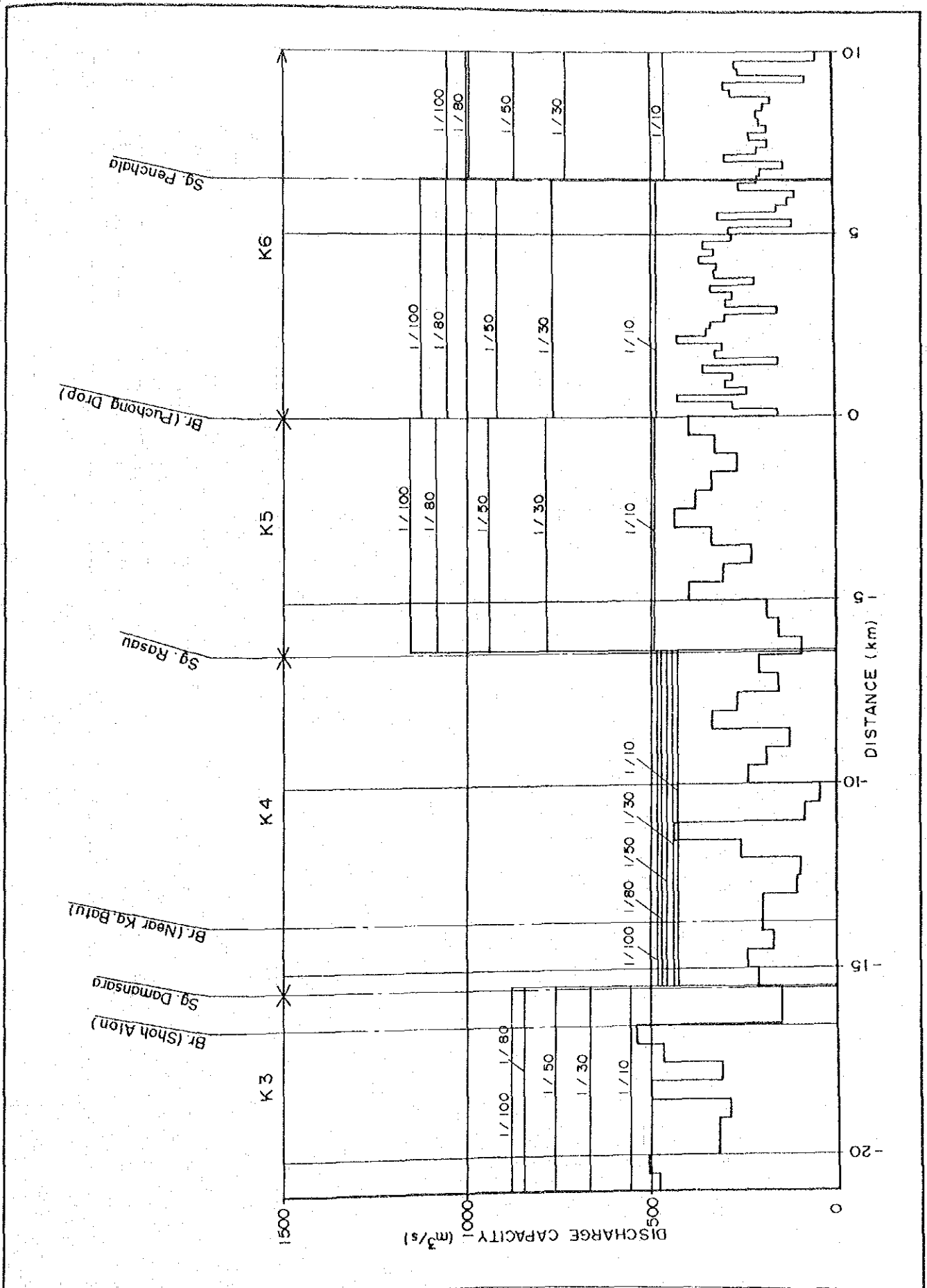


FIG. 2-12

DISCHARGE CAPACITY OF SG. KLANG (2/3)

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

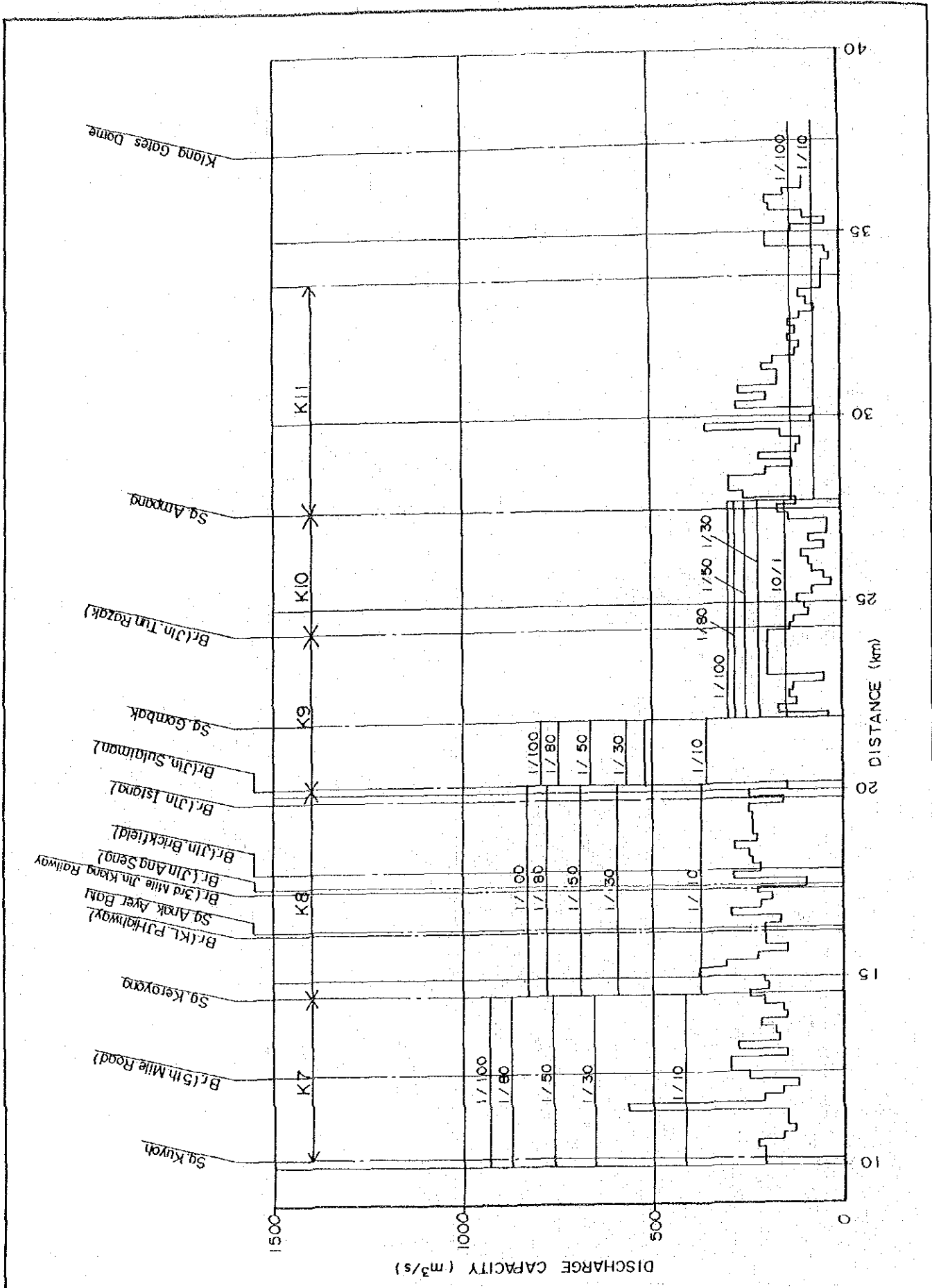


FIG. 2-12

DISCHARGE CAPACITY OF SG. KLANG (3/3)

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

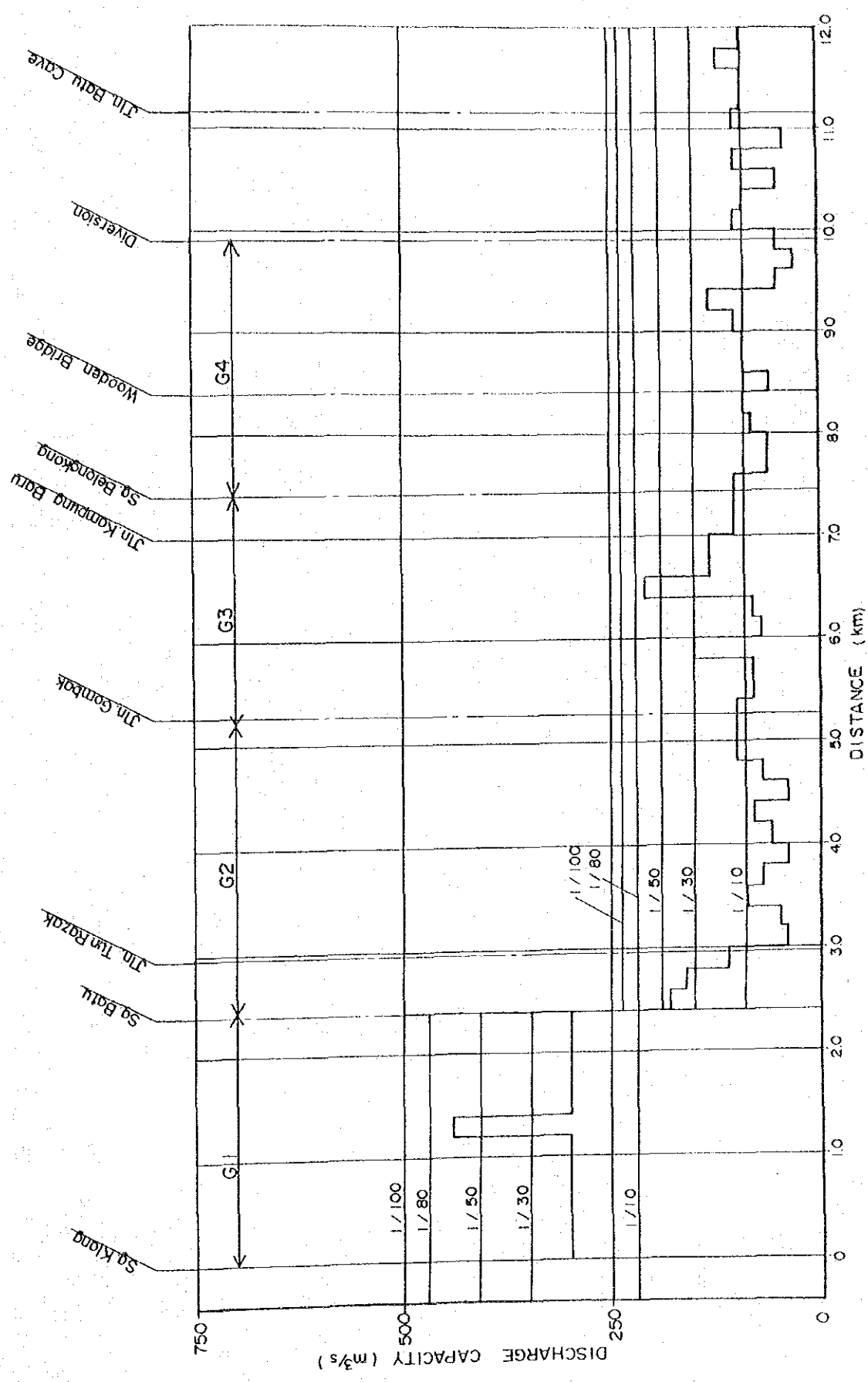


FIG. 2-13

DISCHARGE CAPACITY OF SG. GOMBAK

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



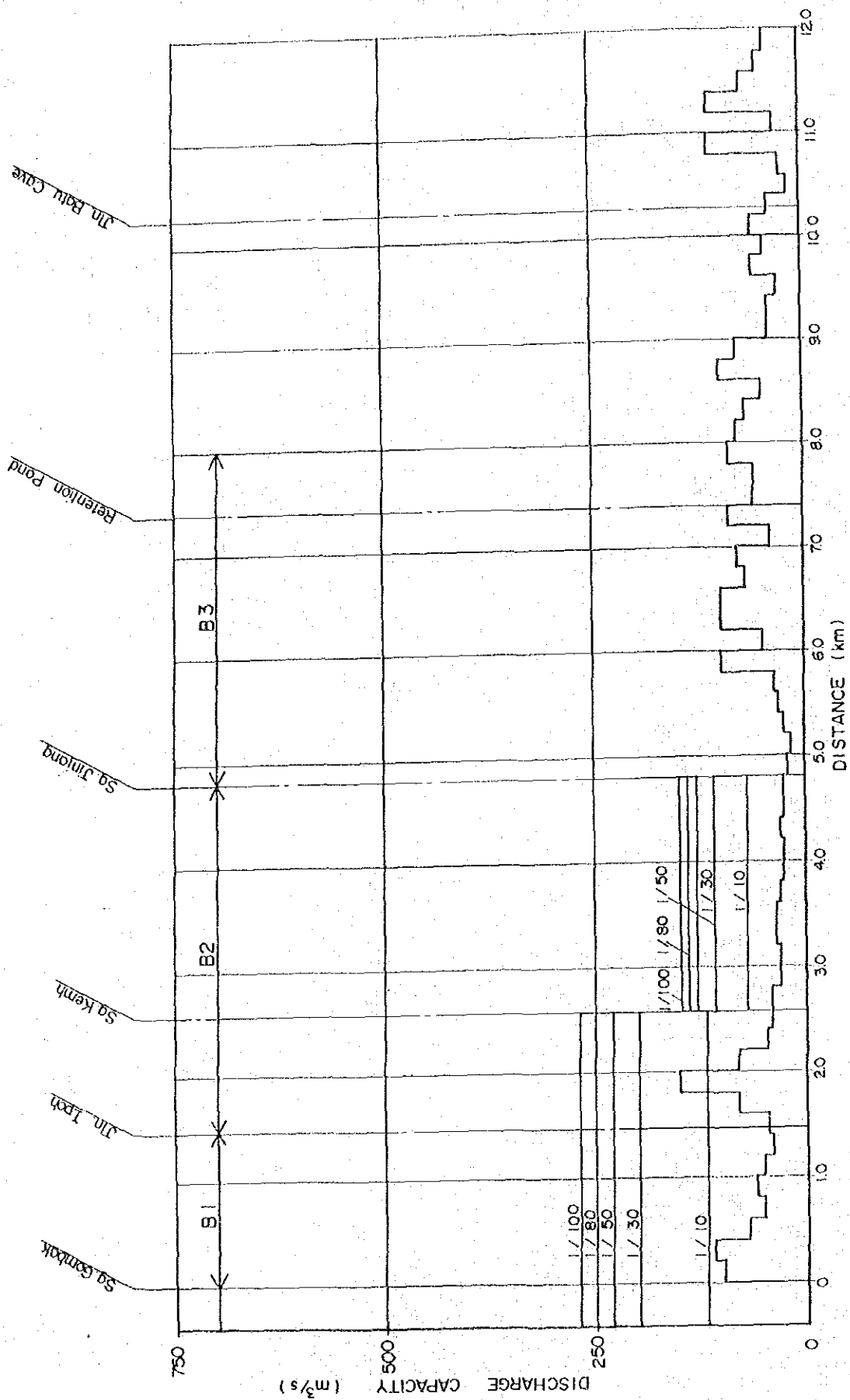


FIG. 2-14

DISCHARGE CAPACITY OF SG. BATU

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

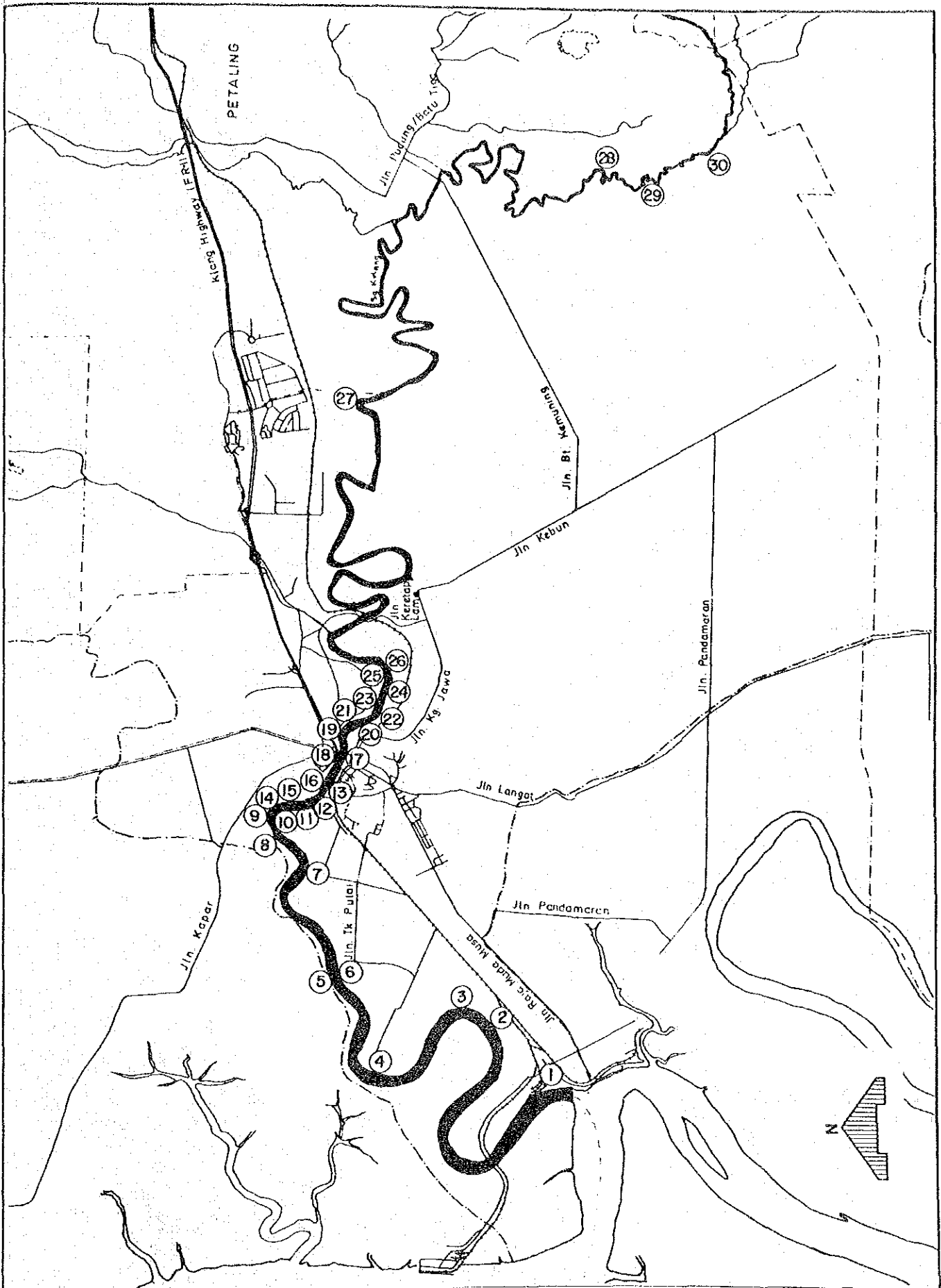


FIG. 2-15

LOCATION MAP OF TIDAL GATE

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

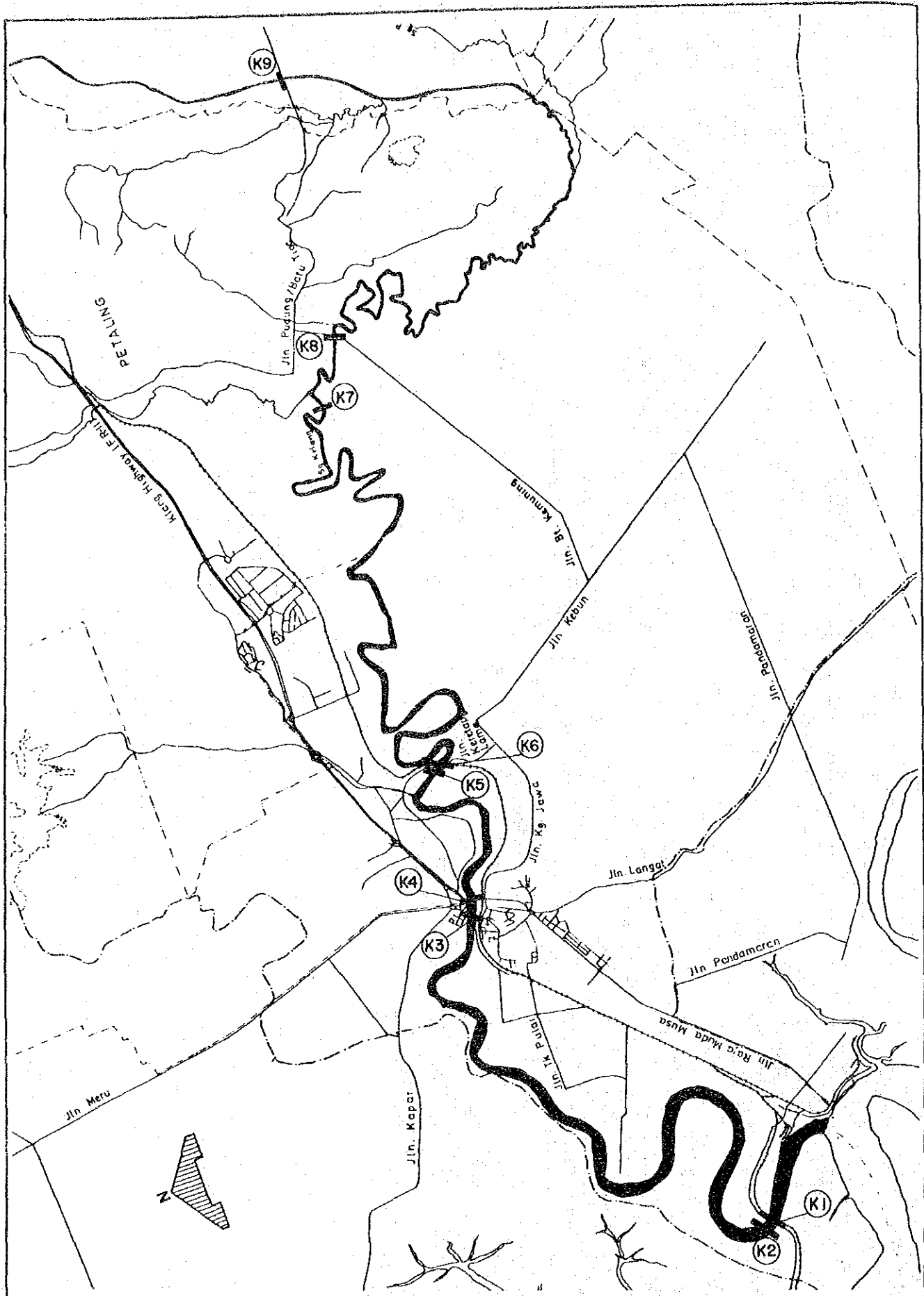


FIG. 2-16

LOCATION MAP OF BRIDGE (1/2)

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

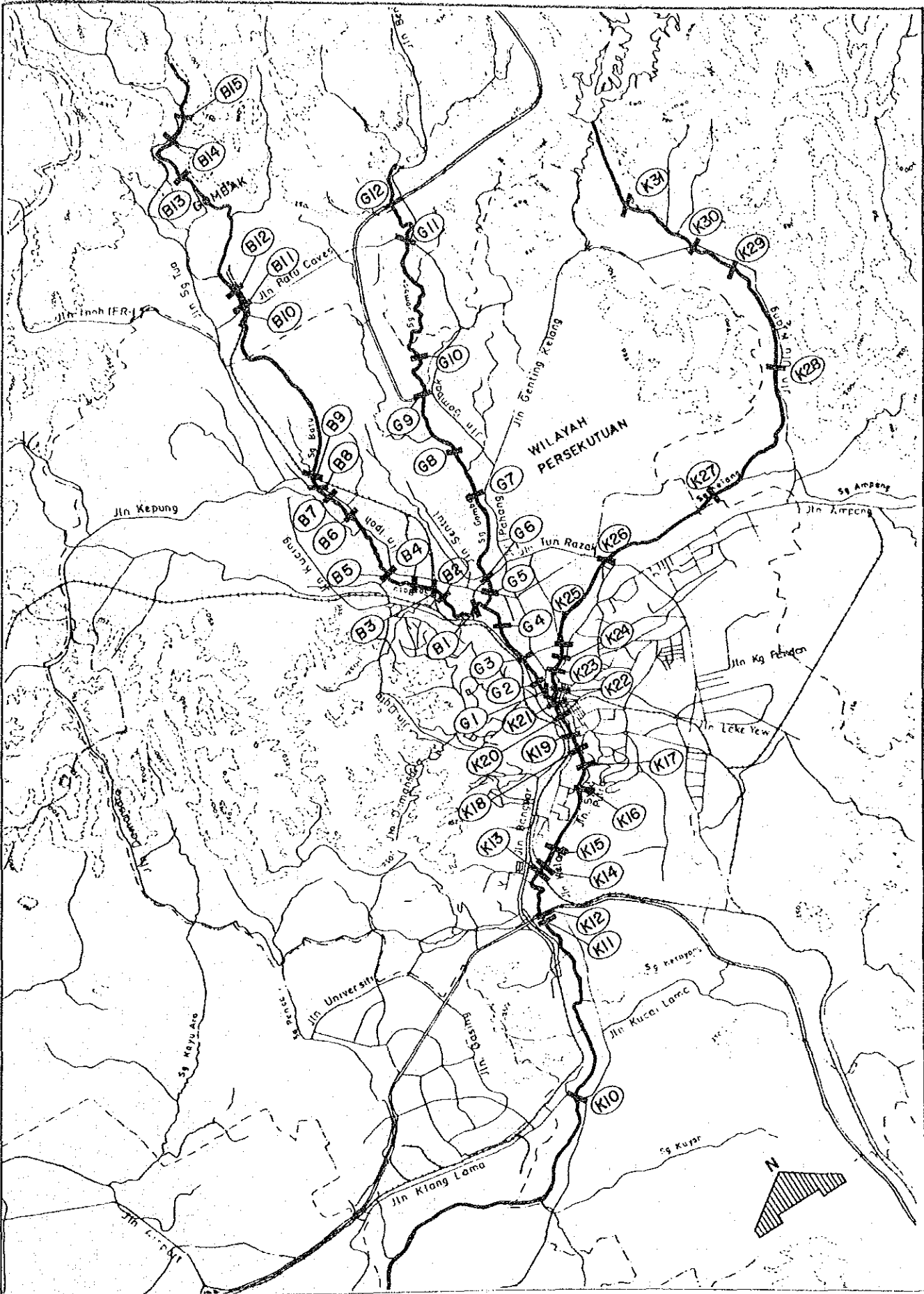


FIG. 2-16

LOCATION MAP OF BRIDGE (2/2)

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



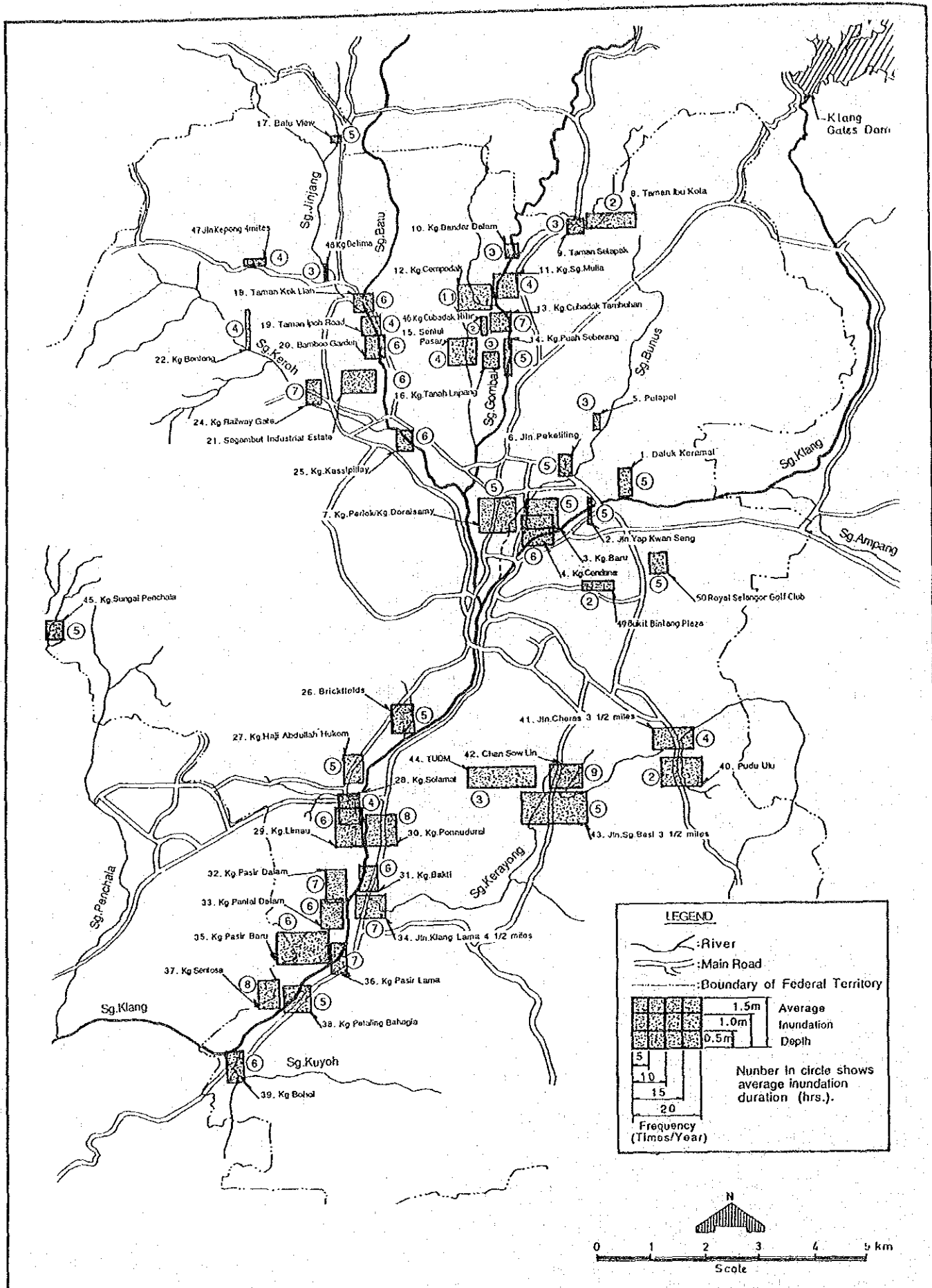
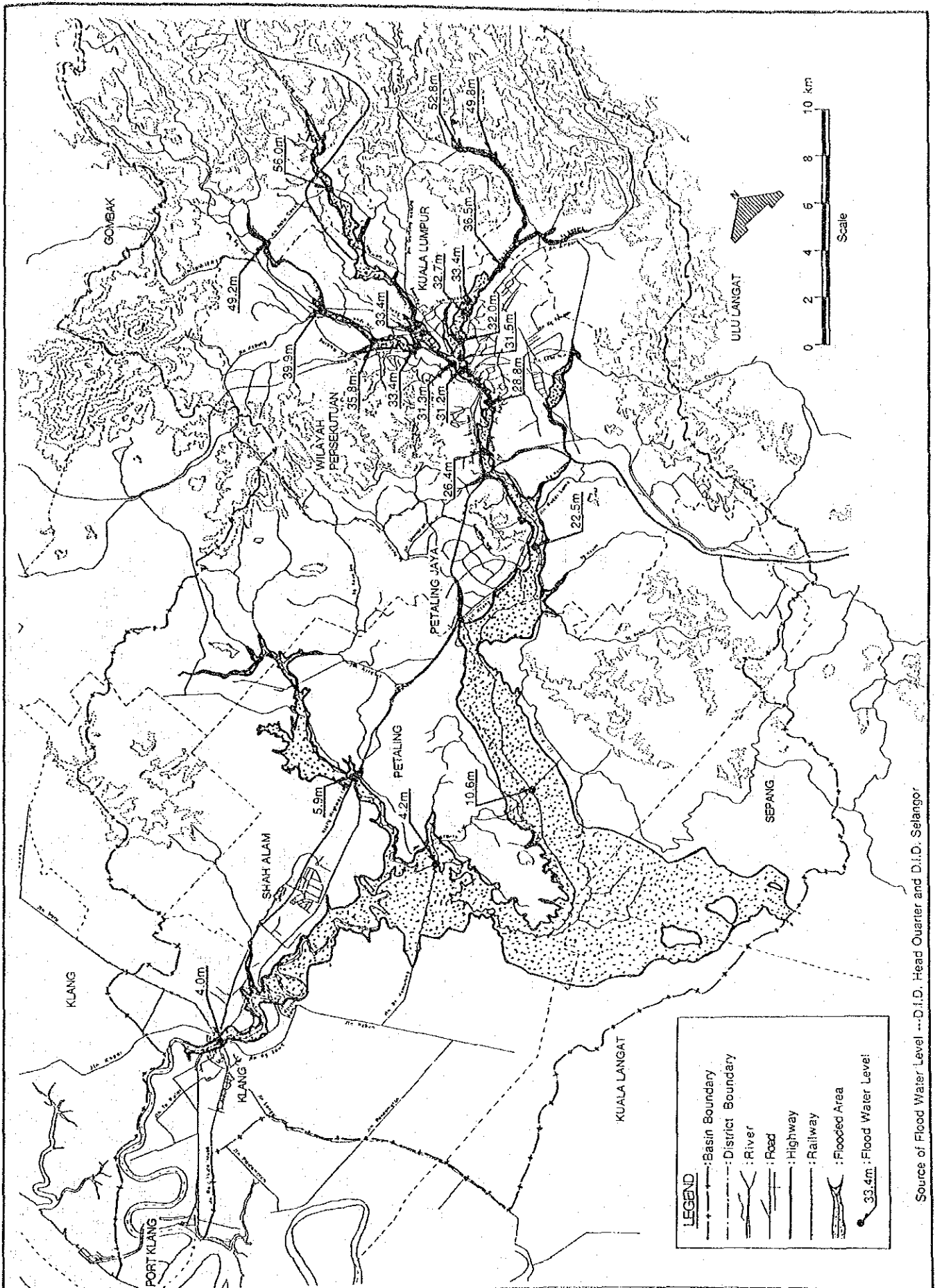


FIG. 2-17

AVERAGE INUNDATION DEPTH, DURATION AND FREQUENCY OF FLASH FLOOD IN FEDERAL TERRITORY

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



Source of Flood Water Level ---D.I.D. Head Quarter and D.I.D. Selangor.



FIG. 2-18

FLOOD AREA IN JANUARY 4 & 5, 1971 FLOOD

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



Note :

-  Completed by RTB K/L
-  Under implementation of RTB K/L

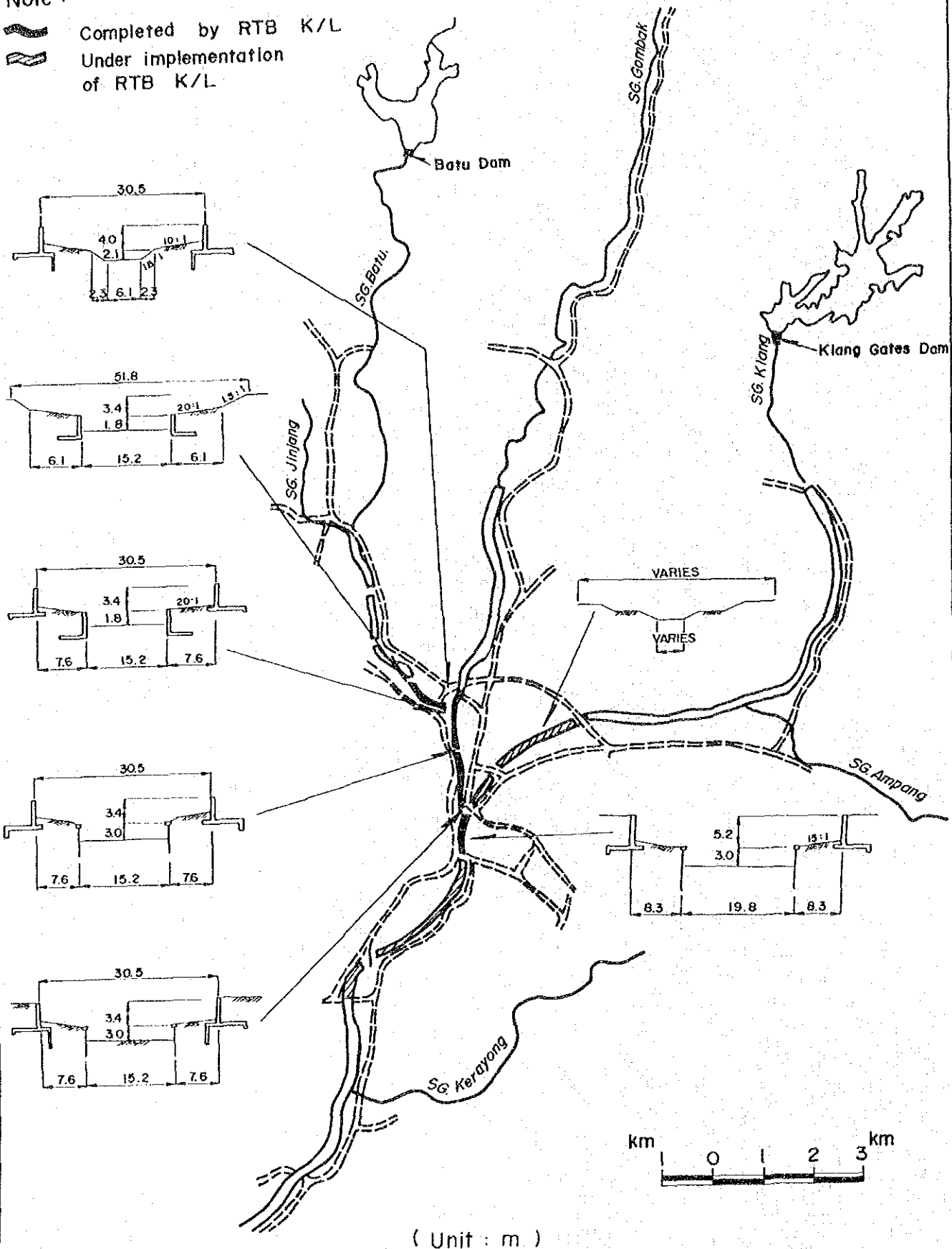


FIG. 3-1

PRESENT STATUS OF RIVER IMPROVEMENT WORKS

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

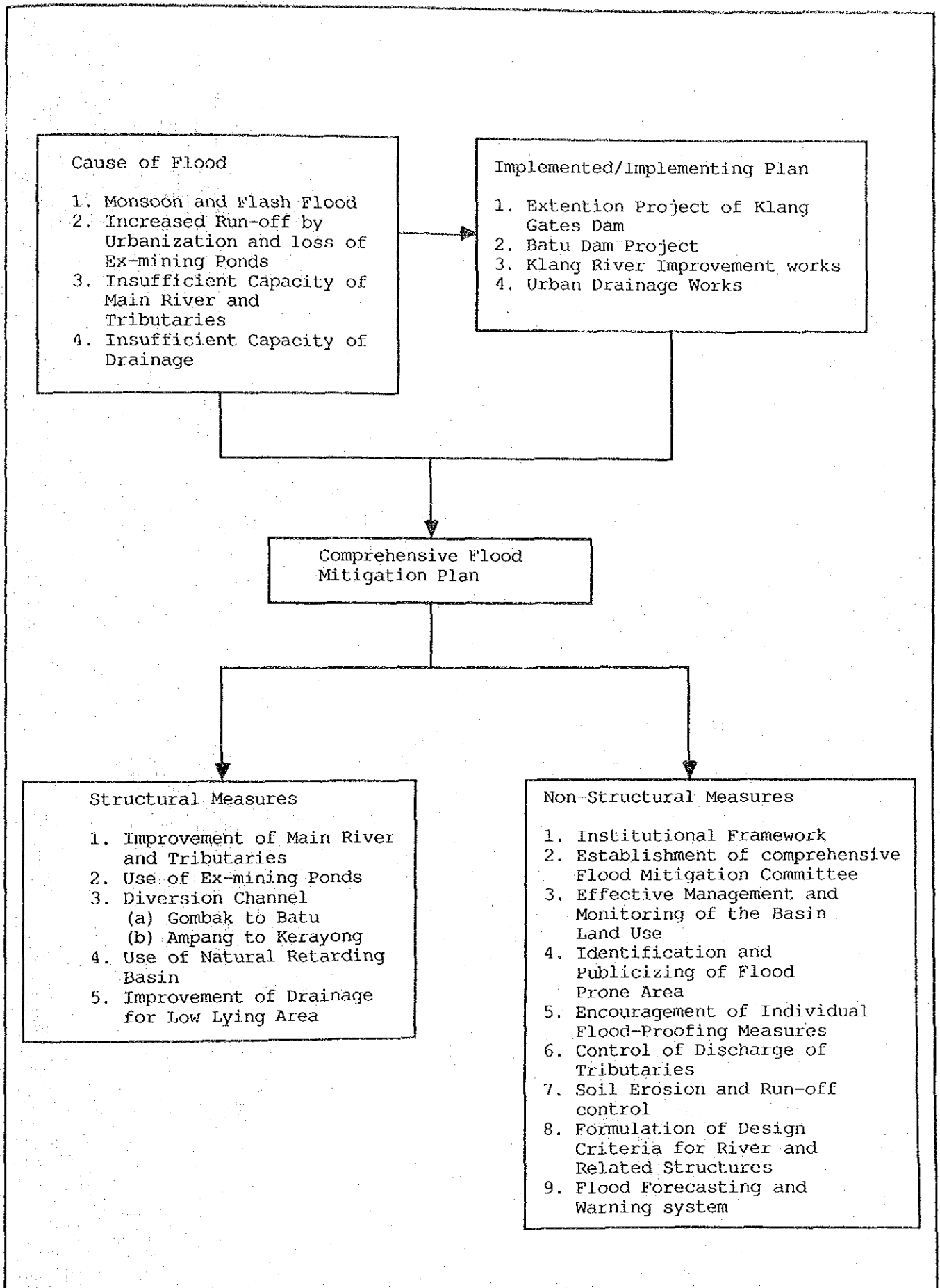


FIG. 4-1

CONCEPT FOR COMPREHENSIVE FLOOD MITIGATION SYSTEM

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

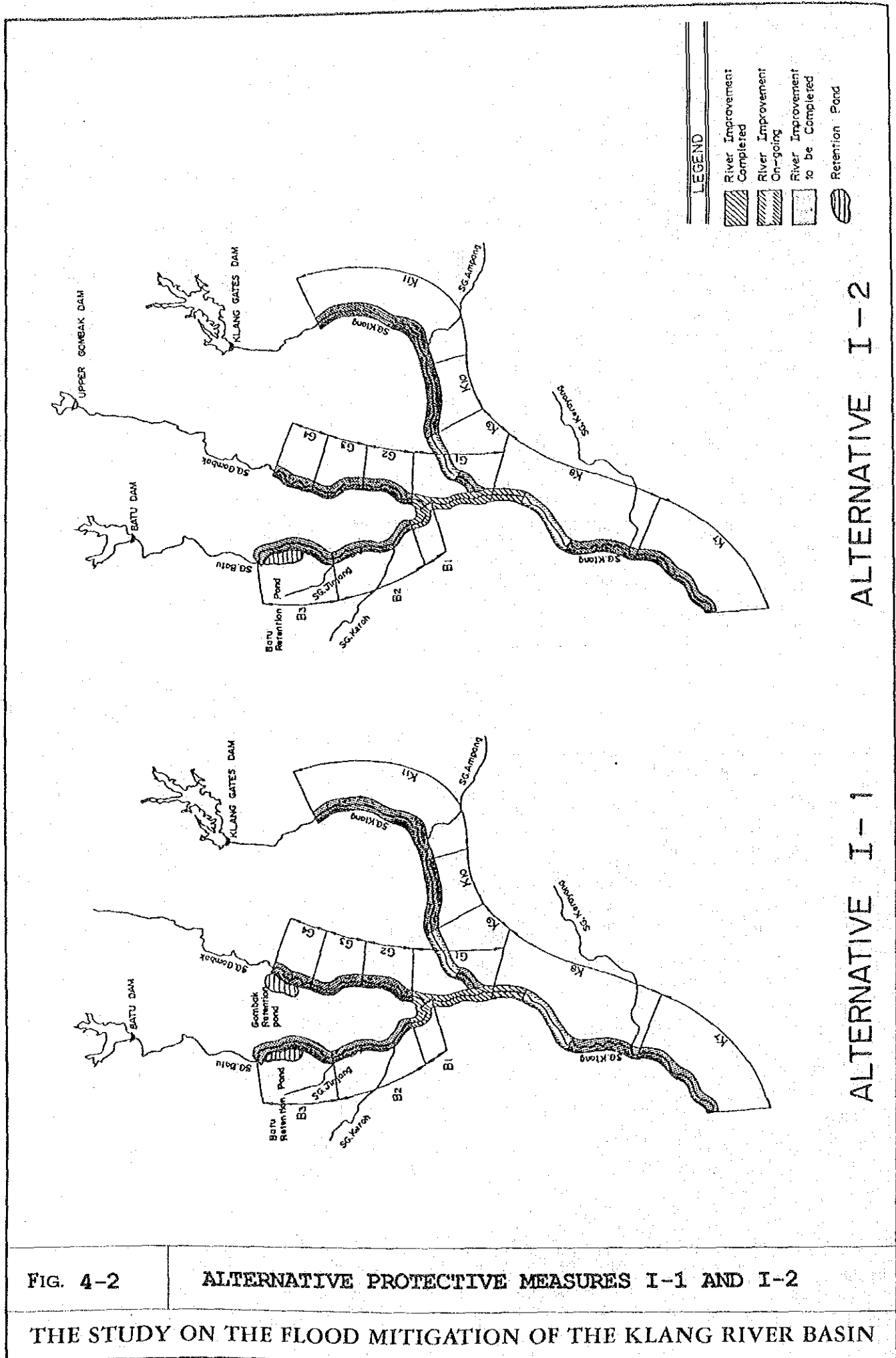
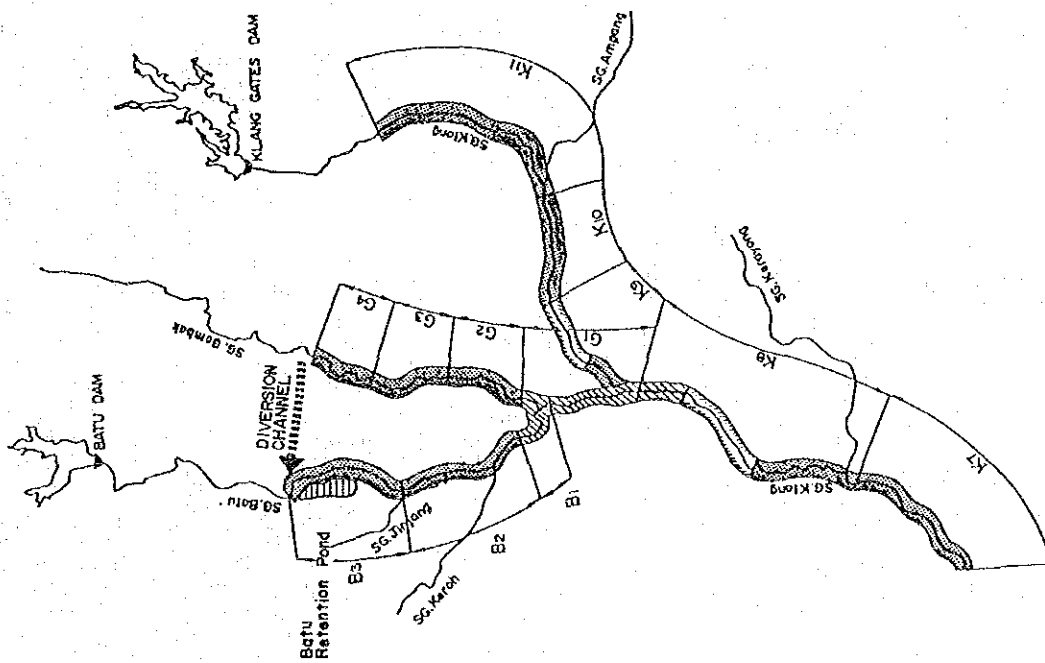


FIG. 4-2

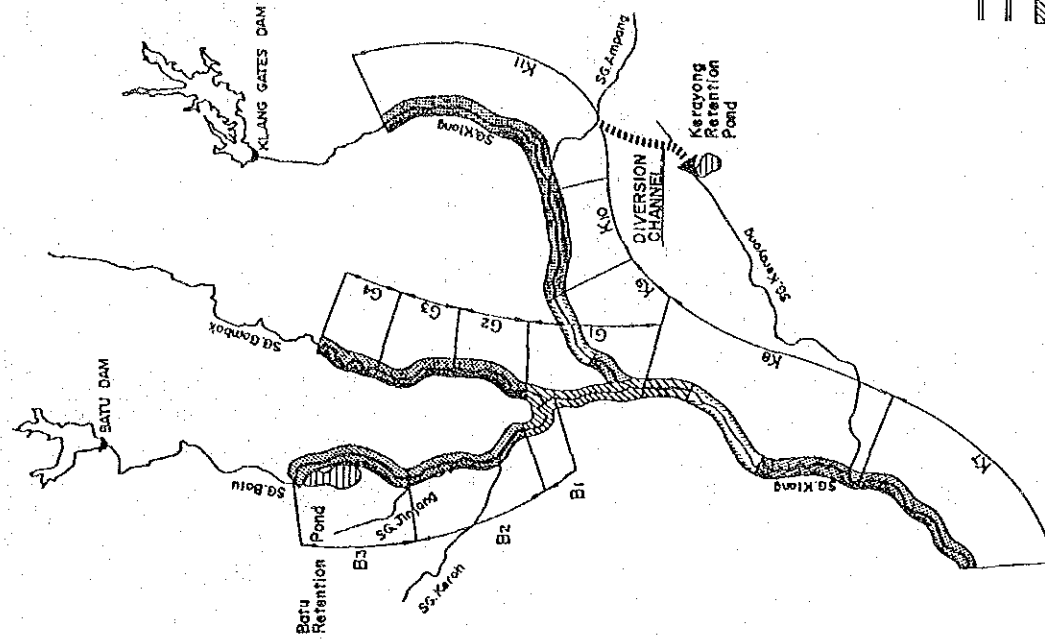
ALTERNATIVE PROTECTIVE MEASURES I-1 AND I-2

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN





ALTERNATIVE II



ALTERNATIVE III

LEGEND





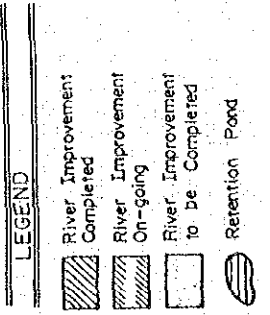
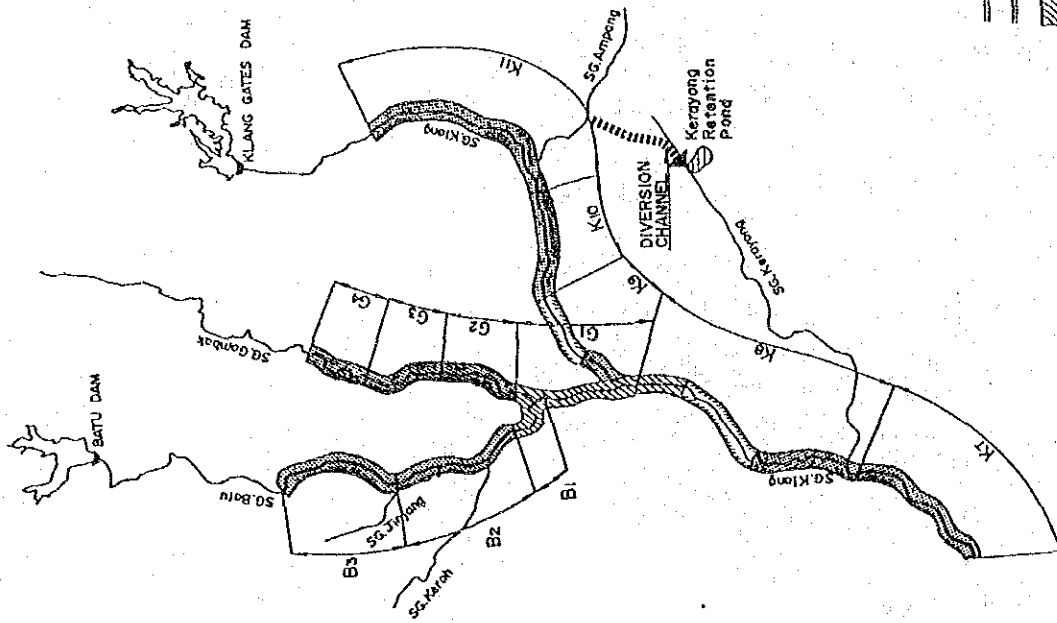
-  River Improvement Completed
-  River Improvement On-going
-  River Improvement to be Completed
-  Retention Pond

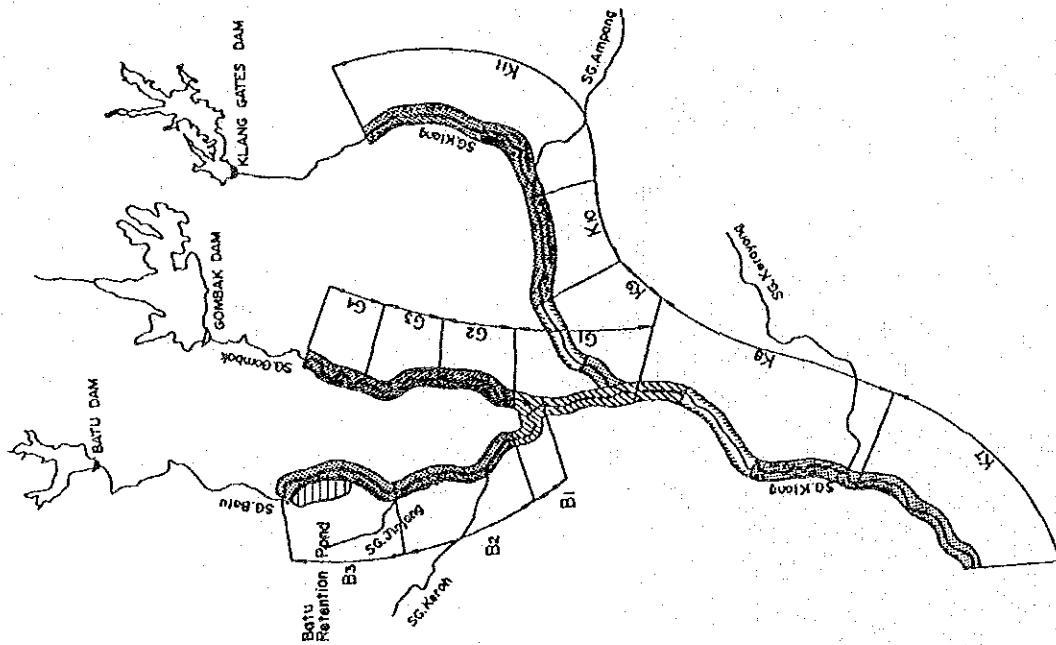
FIG. 4-3

ALTERNATIVE PROTECTIVE MEASURES II AND III

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



ALTERNATIVE V



ALTERNATIVE IV

FIG. 4-4

ALTERNATIVE PROTECTIVE MEASURES IV AND V

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

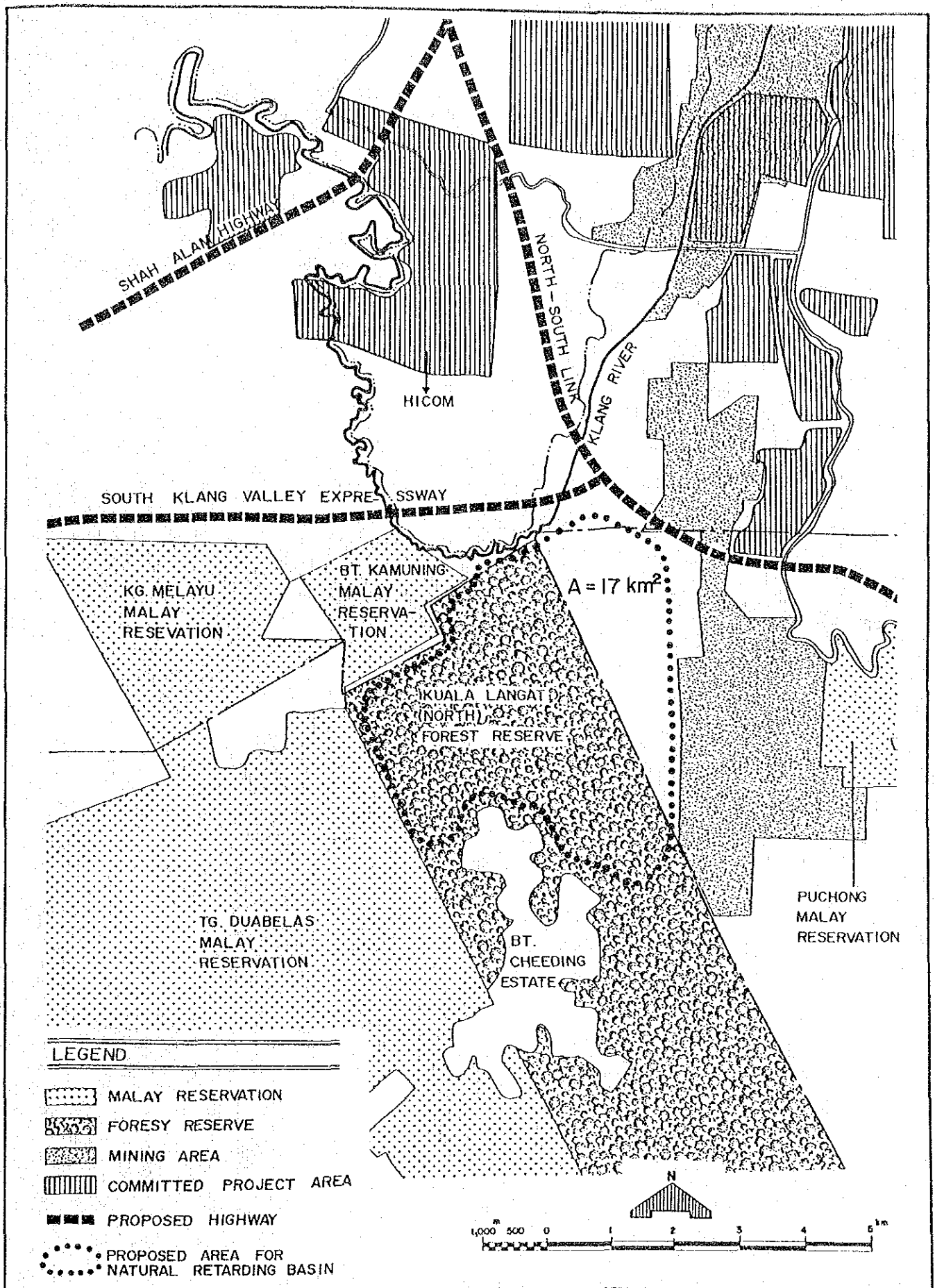
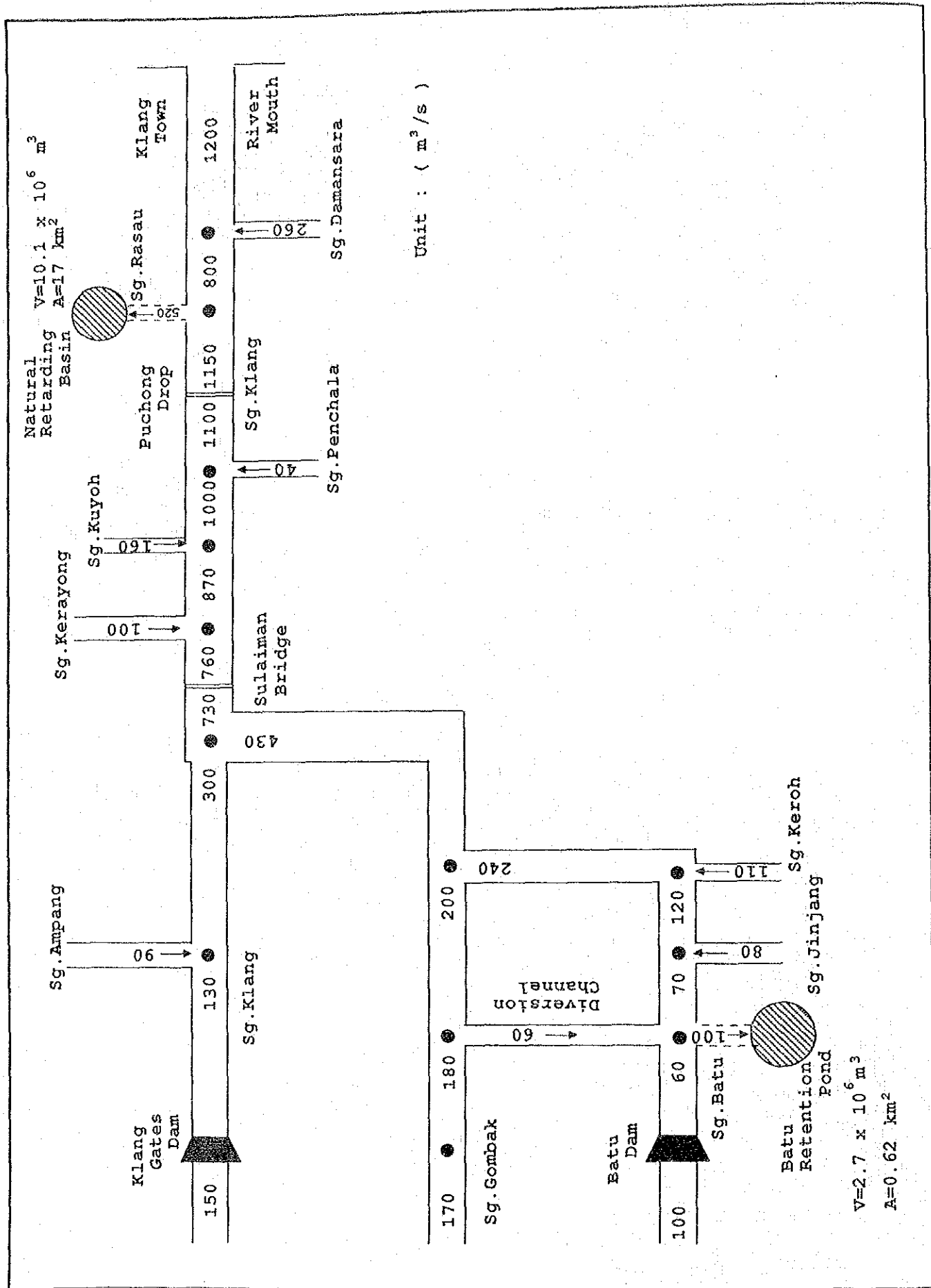


FIG. 4-5

PROPOSED NATURAL RETARDING AREA

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



Unit : (m³/s)

FIG. 4-6 DESIGN FLOOD DISCHARGE DISTRIBUTION
 THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



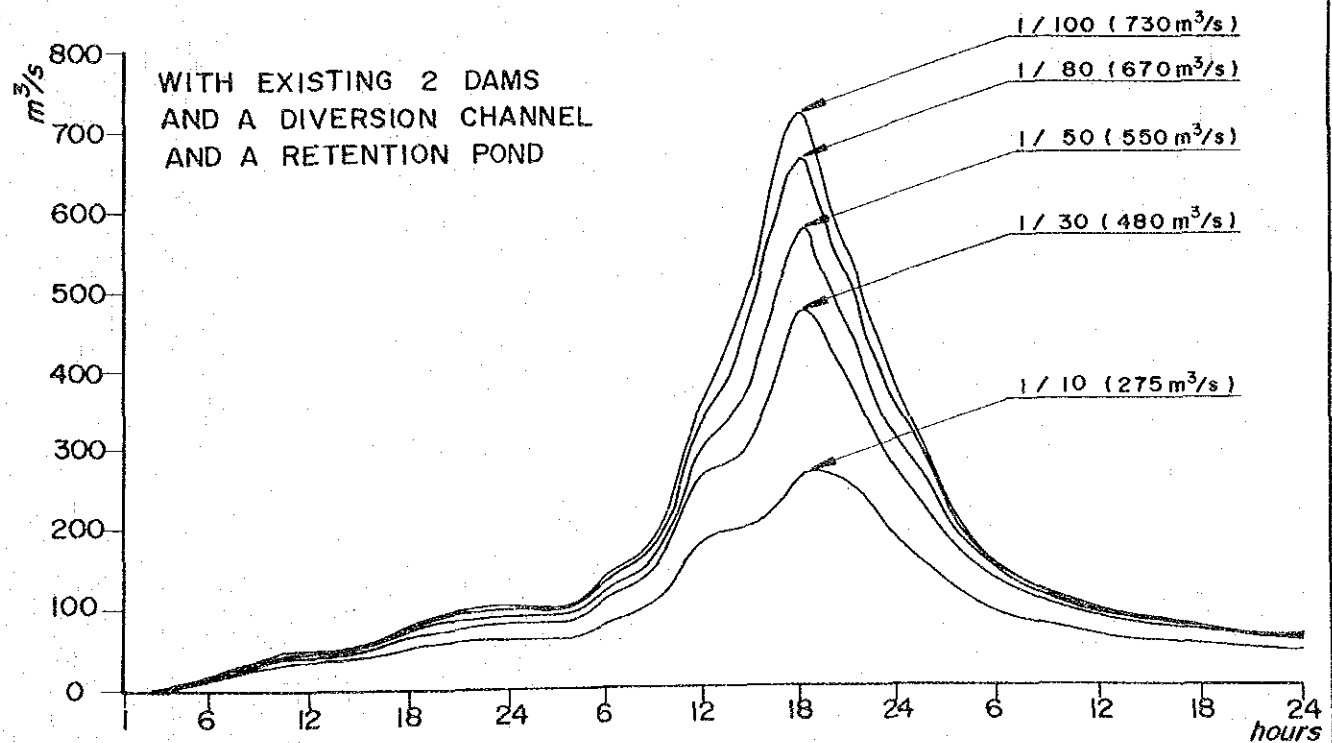
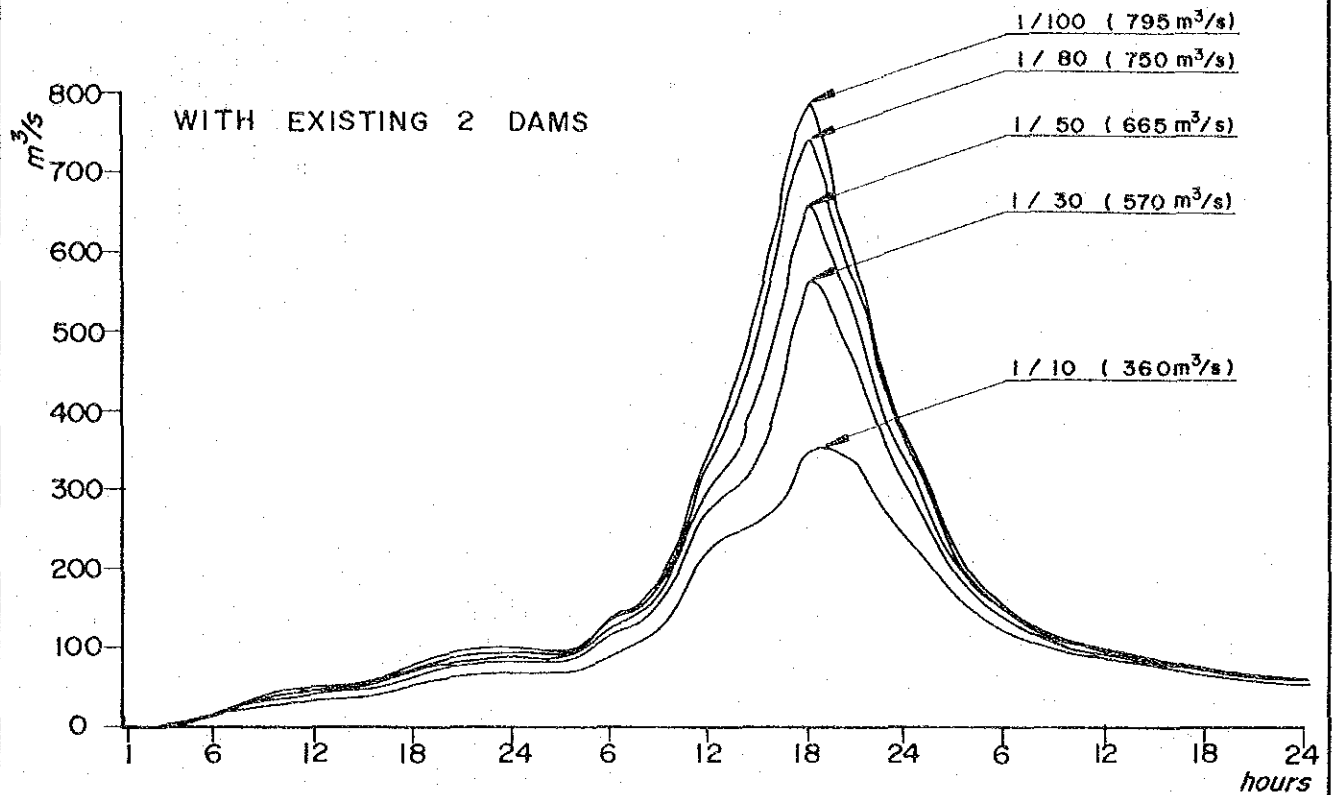
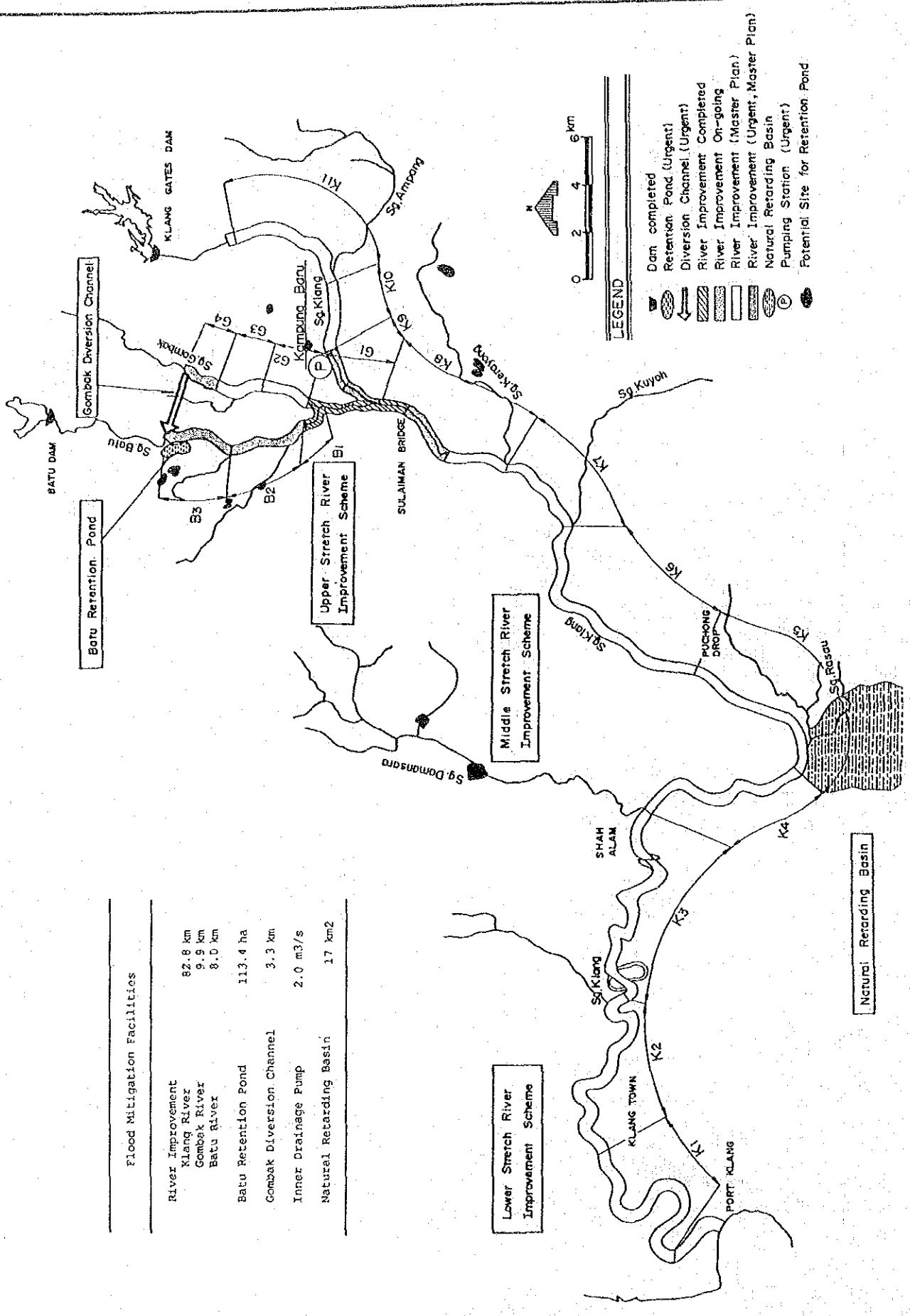


FIG. 4-7

PROBABLE FLOOD HYDROGRAPH AT SULAIMAN
BRIDGE - 2005

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



Flood Mitigation Facilities

River Improvement	82.8 km
Klang River	9.9 km
Gombak River	8.0 km
Batu Retention Pond	113.4 ha
Gombak Diversion Channel	3.3 km
Inner Drainage Pump	2.0 m ³ /s
Natural Retarding Basin	17 km ²

FIG. 4-8

PROPOSED FLOOD MITIGATION FACILITIES FOR MASTER PLAN

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



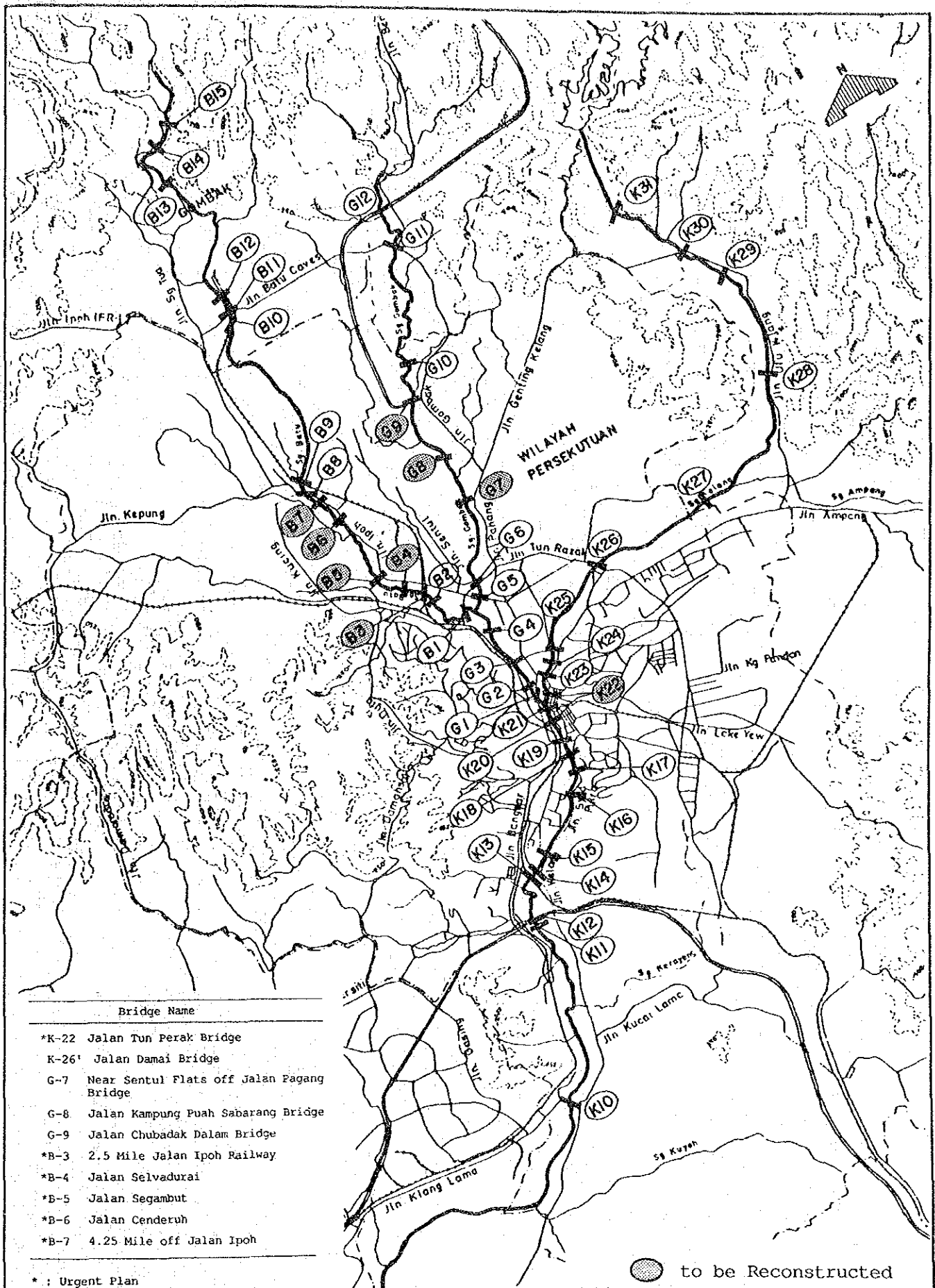


FIG. 4-9

LOCATION OF BRIDGES TO BE RECONSTRUCTED

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

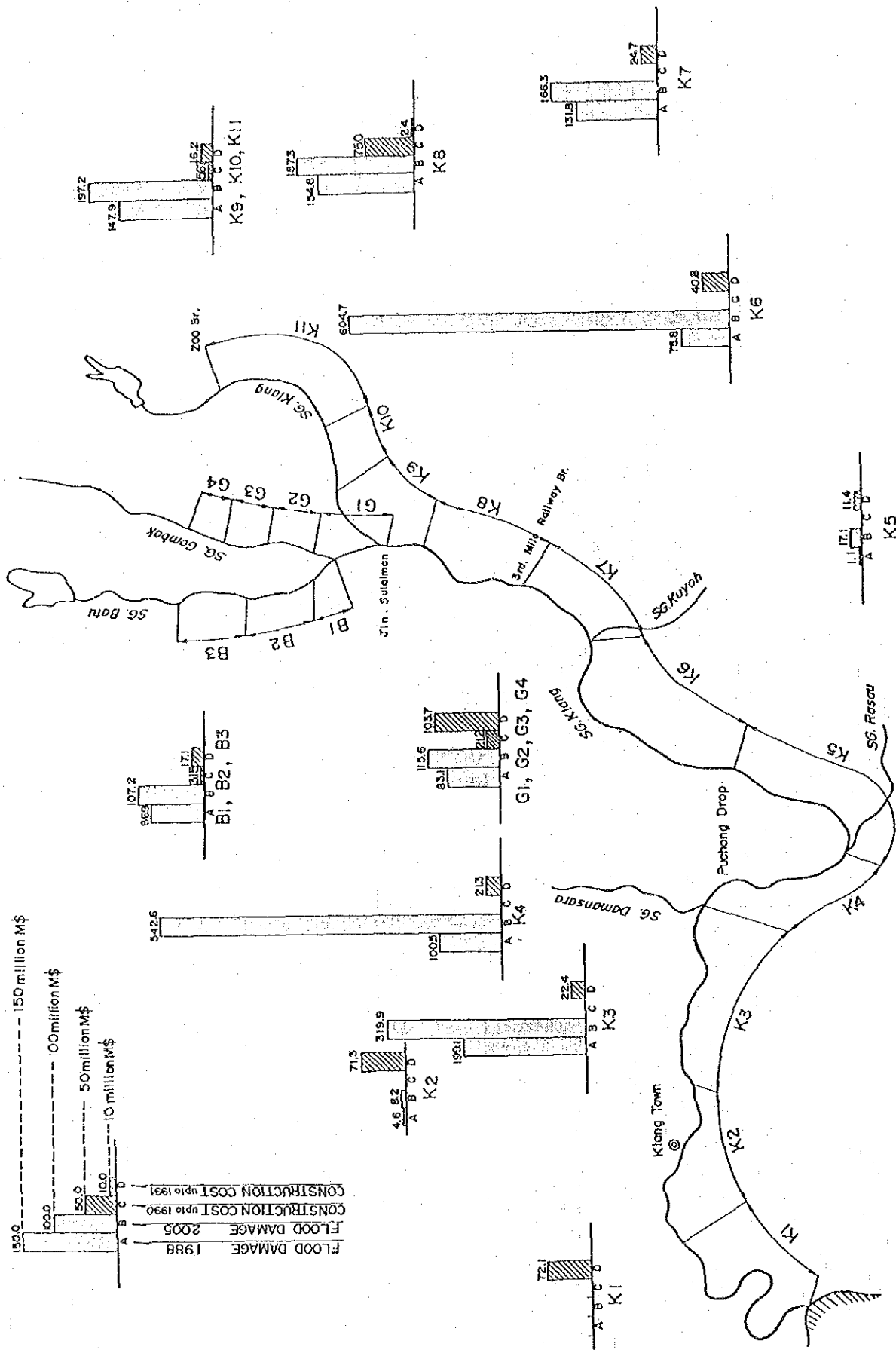


FIG. 4-10

COMPARISON OF DAMAGE AND CONSTRUCTION COST

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

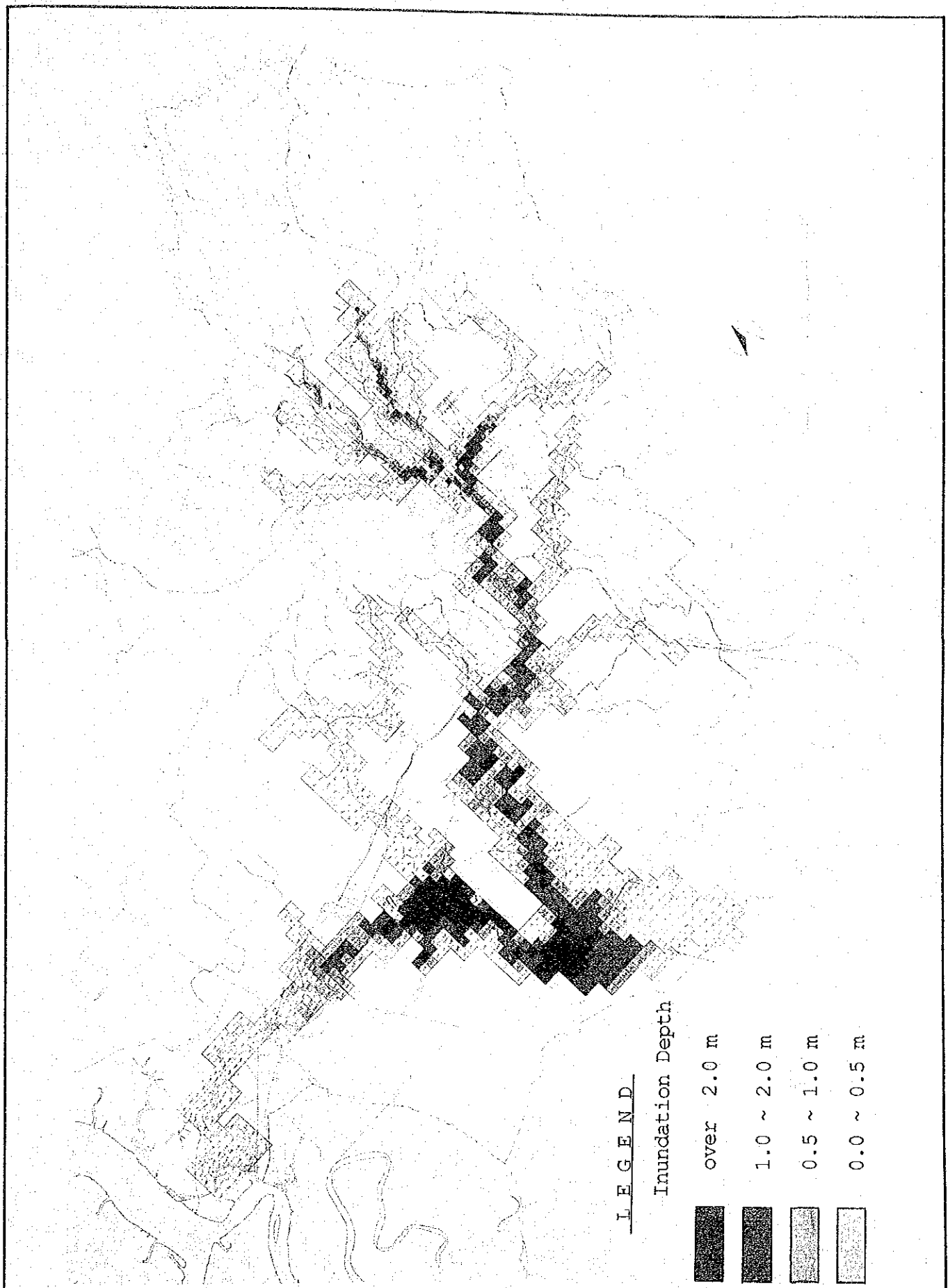
Discription	Unit	Q'ty	Short Term						Mid Term						Long Term				
			93	94	95	96	97	98	99	2000	2001	2002	2003	2004	2005	2006	2007		
PHASE -1 (Urgent Project) 1. Batu retention pond 2. Diversion channel 3. River improvement - Batu river B2 (R2, 3.4) Winding & Deepening B3 - Gombak river G4 (R7) Widening & Deepening - Klang river K9 (R10, 11) Widening & Deepening 4. Inner water Drainage	ha	113.4																	
	km	3.3																	
	km	3.4																	
	km	3.2																	
	km	2.5																	
	km	4.1																	
	m3/sec	2.0																	
	PHASE -2 1. River improvement - Klang river K7 Widening K6 Widening K2 Widening & Deepening K10 Widening & Deepening K4 Widening & Deepening K5 Widening & Deepening K3 Embankment	km	4.4																
		km	10.1																
		km	8.4																
km		3.3																	
km		9.1																	
km		6.4																	
km		13.5																	
PHASE -3 1. Puchong Drop Removal 2. River Improvement - Klang river K6 Deepening K7 Deepening K8 Deepening - Gombak river G1 Deepening G2 Widening & Deepening G3 Widening & Deepening Klang river K1 Widening & Deepening K3 Widening & Deepening K11 Widening & Deepening - Batu river B1 Deepening		km	10.1																
		km	4.4																
		km	5.7																
	km	2.4																	
	km	2.8																	
	km	2.2																	
	km	11.4																	
	km	13.5																	
	km	6.2																	
	km	1.4																	

FIG. 4-11

OVERALL CONSTRUCTION TIME SCHEDULE

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN





L E G E N D

Inundation Depth

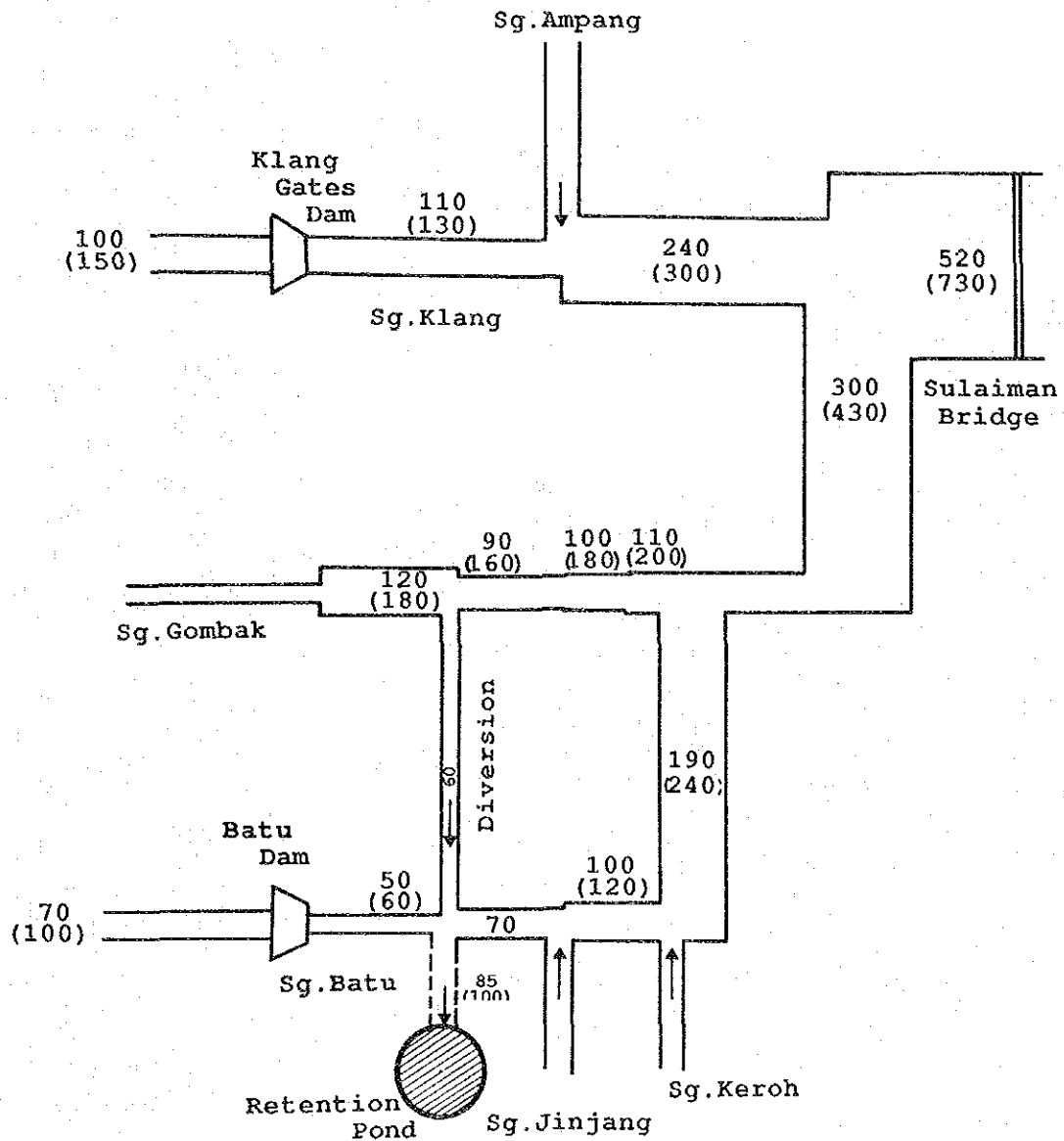
	over 2.0 m
	1.0 ~ 2.0 m
	0.5 ~ 1.0 m
	0.0 ~ 0.5 m

FIG. 4-12

FLOOD RISK MAP OF 100 YEAR RETURN PERIOD

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN





DESIGN RETURN PERIOD: 35 YEARS

() : Indicate 100-year design flood

FIG. 5-1

DESIGN FLOOD DISTRIBUTION FOR URGENT PROJECT

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

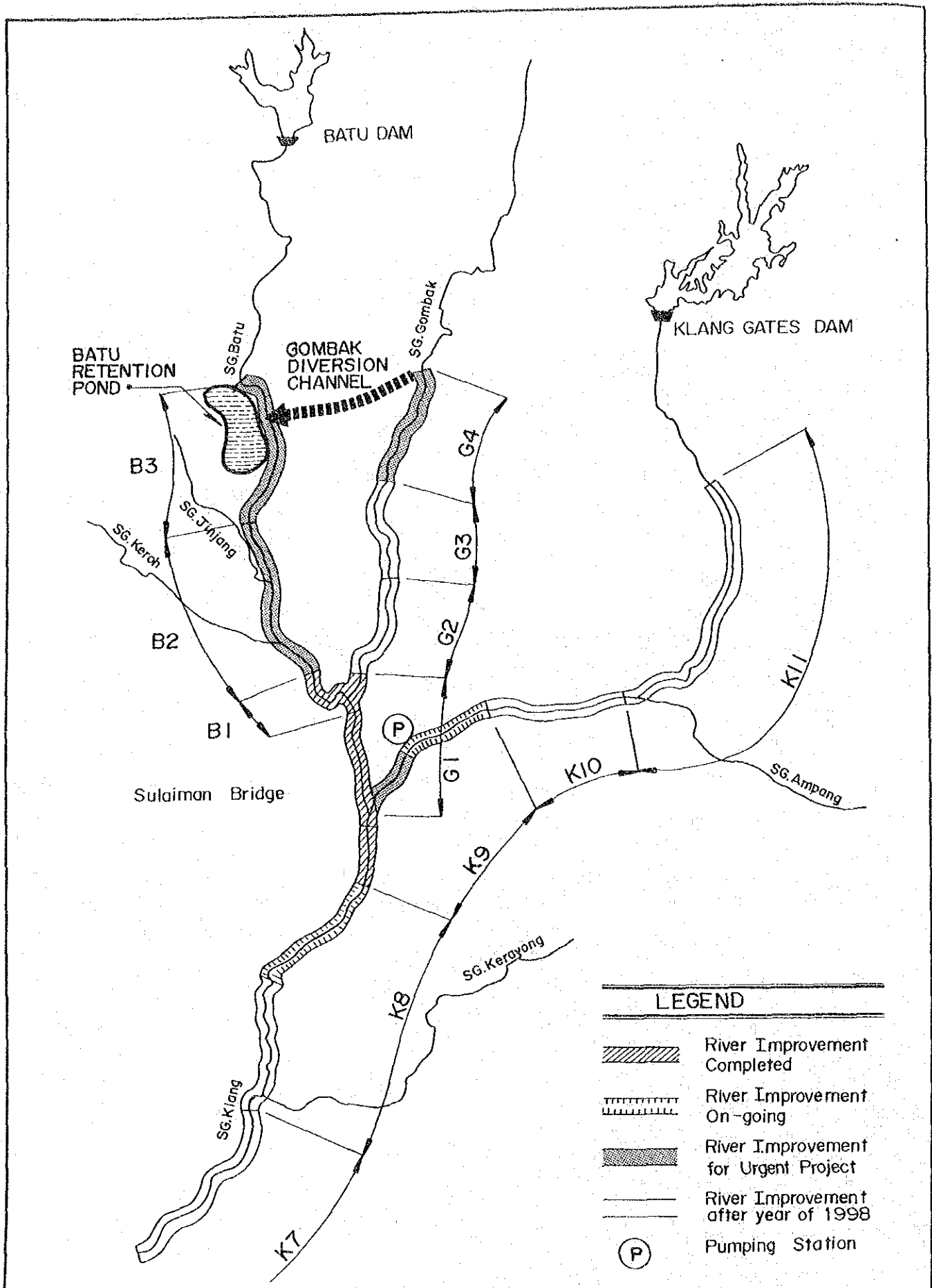


FIG. 5-2

FLOOD MITIGATION FACILITIES OF URGENT PROJECT

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

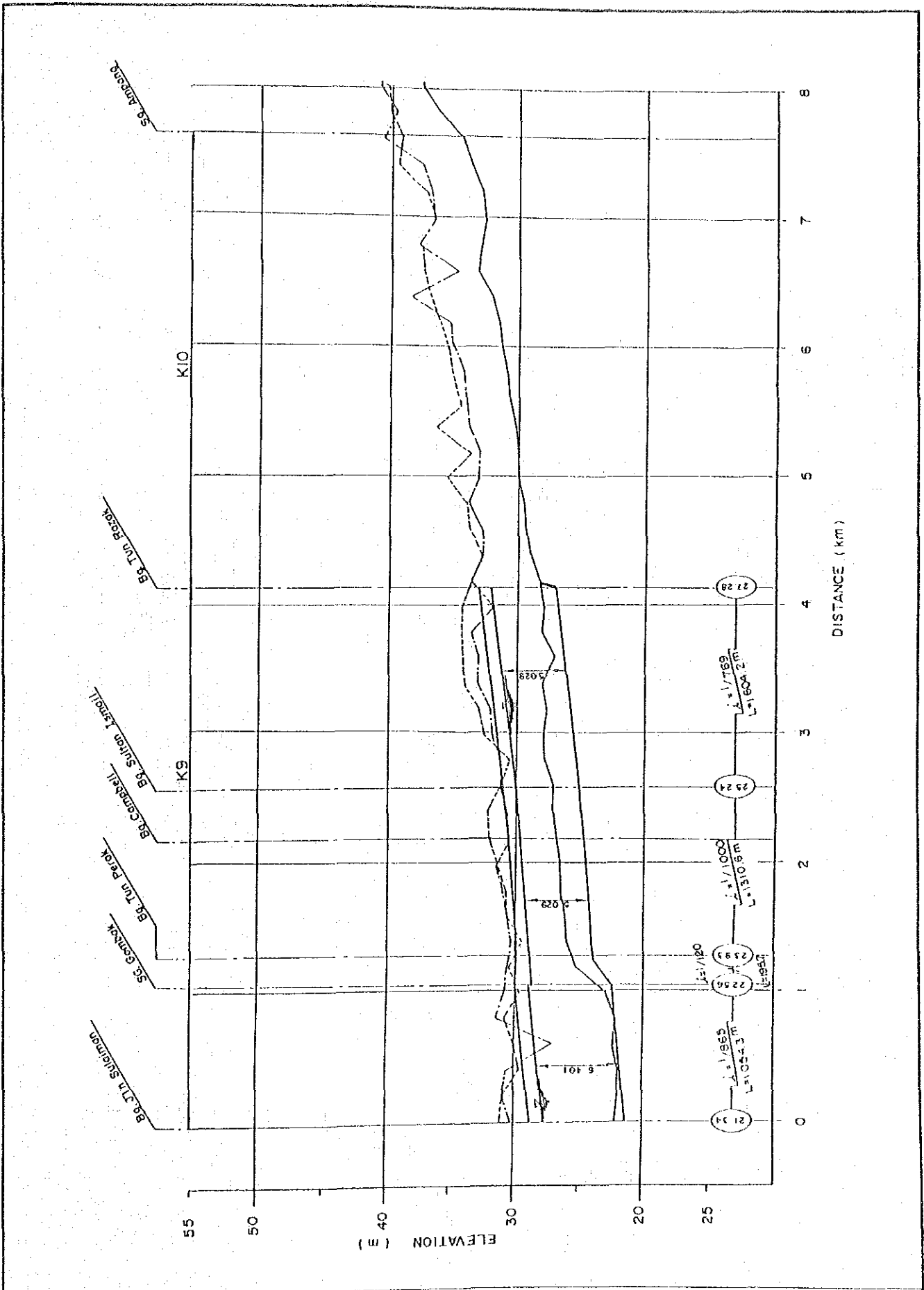


FIG. 5-3

PROPOSED LONGITUDINAL PROFILE OF SG. KLANG

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

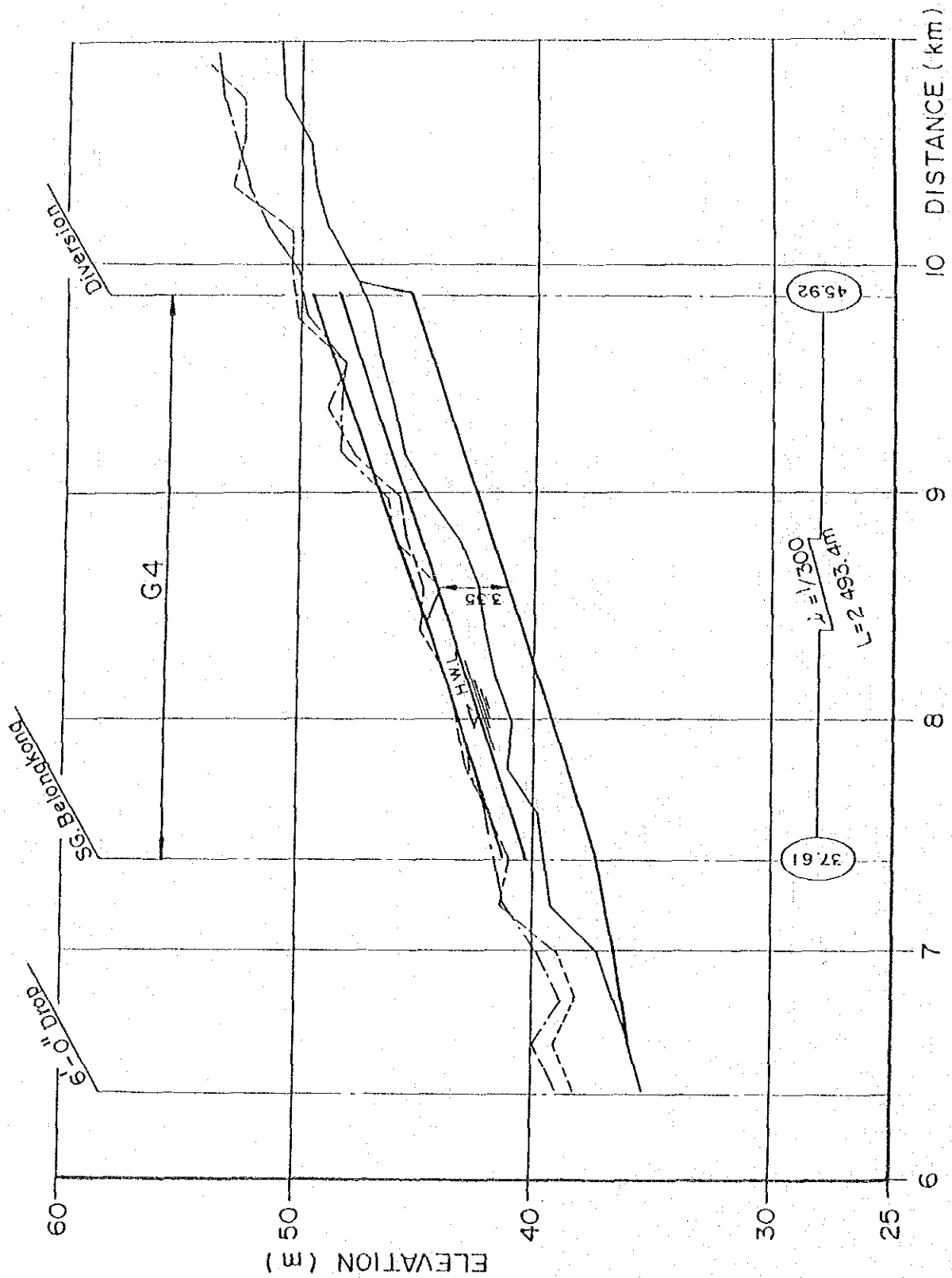


FIG. 5-4

PROPOSED LONGITUDINAL PROFILE OF SG. GOMBAK

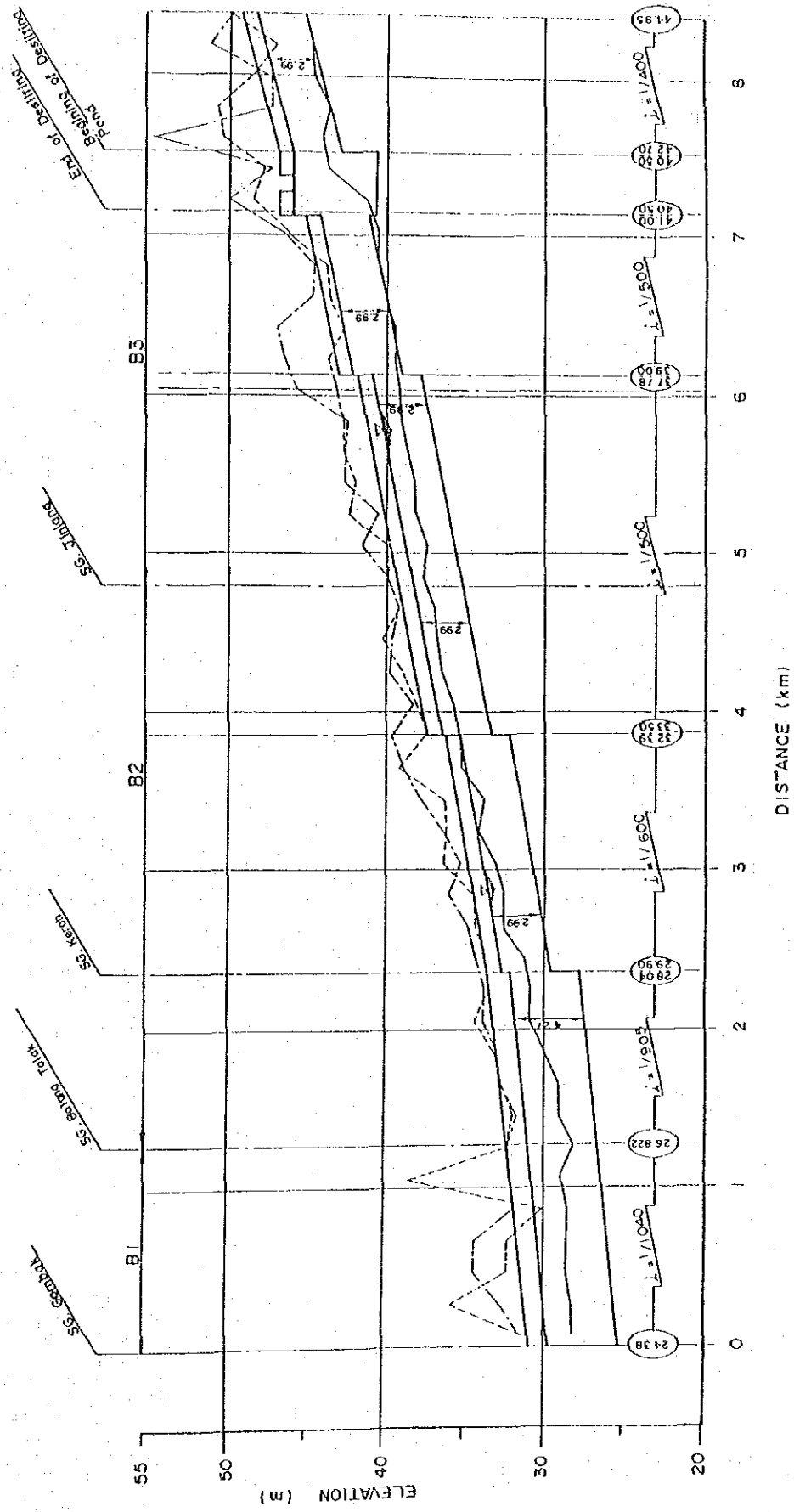


FIG. 5-5

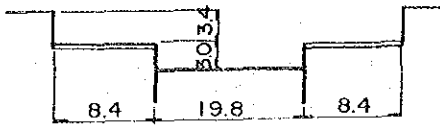
PROPOSED LONGITUDINAL PROFILE OF SG. BATU

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



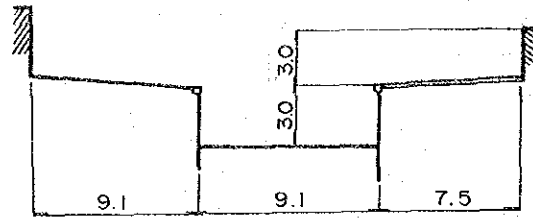
THE KLANG RIVER

Q= 730 m³/s
 V= 4.11 m/s
 I= 1/865



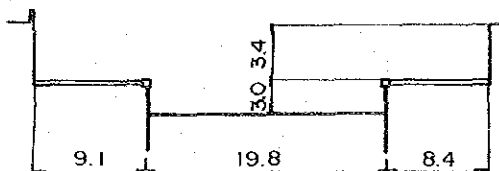
Sulaiman Bridge - Lebuah Pasar

Q= 300 m³/s
 V= 3.79 m/s
 I= 1/120



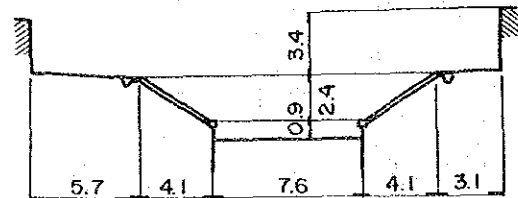
Sg. Gombak Confluence - Jln Tun Perak Bridge

Q= 730 m³/s
 V= 4.11 m/s
 I= 1/865



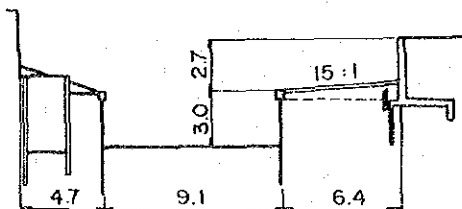
Lebuah Pasar - Sg. Gombak Confluence

Q= 300 m³/s
 V= 3.56 m/s
 I= 1/120



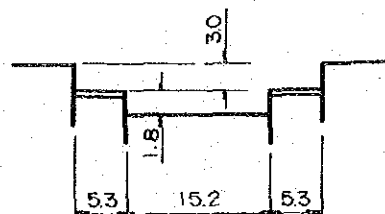
Sg. Gombak Confluence - Jln Tun Perak Bridge

Q= 300 m³/s
 V= 4.57 m/s
 I= 1/120



Sg. Gombak Confluence - Jln Tun Perak Bridge

Q= 300 m³/s
 V= 2.96 m/s
 I= 1/1000



Jln Tun Perak Bridge - Jln Sultan Ismail Bridge

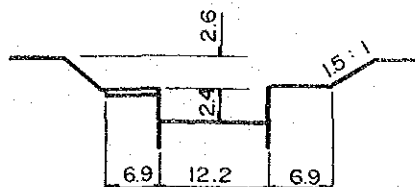
FIG. 5-6

CROSS SECTIONS OF RIVER IMPROVEMENT (1/5)

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

THE KLANG RIVER

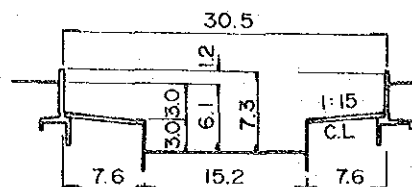
Q= 300 m³/s
 V= 2.90 m/s
 I= 1/769



Jln Sultan Ismail Bridge - Jln Tun Razak Bridge

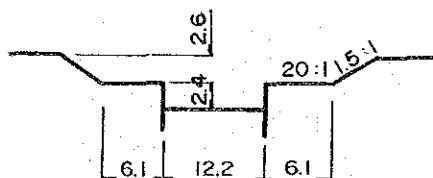
THE GOMBAK RIVER

Q= 430 m³/s
 V= 3.02 m/s
 I= 1/1370



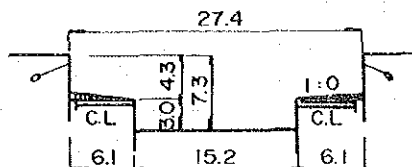
Sg. Klang Confluence - Raja Bridge

Q= 300 m³/s
 V= 3.18 m/s
 I= 1/640



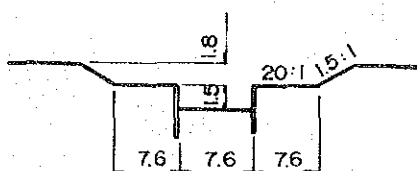
Jln Tun Razak Bridge - Sg. Ampang Confluence

Q= 430 m³/s
 V= 3.13 m/s
 I= 1/1100



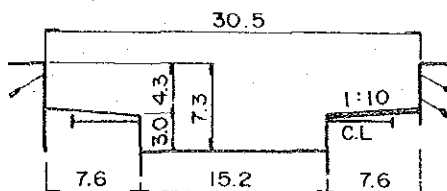
Raja Bridge - Sg. Batu Confluence

Q= 130 m³/s
 V= 2.65 m/s
 I= 1/422



Sg. Ampang Confluence - Ulu Klang Bridge near Zoo

Q= 430 m³/s
 V= 3.01 m/s
 I= 1/1100



Raja Bridge - Sg. Batu Confluence

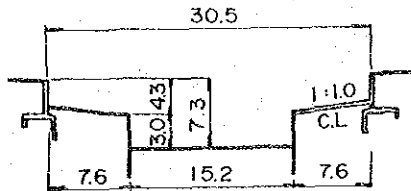
FIG. 5-6

CROSS SECTIONS OF RIVER IMPROVEMENT (2/5)

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

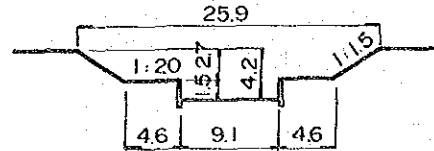
THE GOMBAK RIVER

Q= 430 m³/s
 V= 3.11 m/s
 I= 1/1100



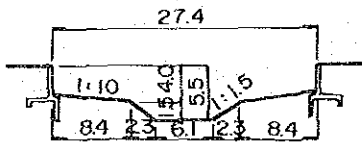
Raja Bridge - Sg. Batu Confluence

Q= 180 m³/s
 V= 2.85 m/s
 I= 1/600



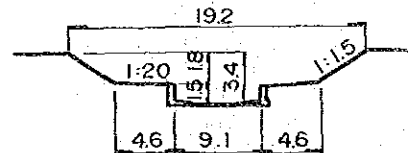
Wooden Bridge - Drop 6'-0

Q= 200 m³/s
 V= 2.79 m/s
 I= 1/655



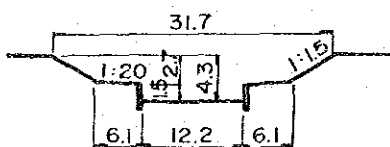
Sg. Batu Confluence - Tun Razak Bridge

Q= 160 m³/s
 V= 3.26 m/s
 I= 1/400



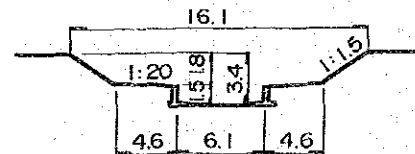
Drop 6'-0 - Sg. Belongkong Confluence

Q= 200 m³/s
 V= 2.80 m/s
 I= 1/692



Tun Razak Bridge - Wooden Bridge

Q= 120 m³/s
 V= 3.14 m/s
 I= 1/300



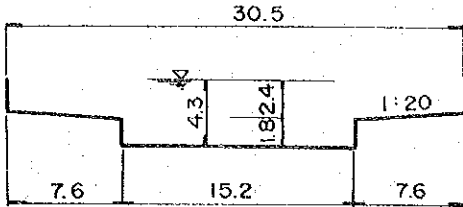
Sg. Belongkong Confluence - Retention Pond

FIG. 5-6

CROSS SECTIONS OF RIVER IMPROVEMENT (3/5)

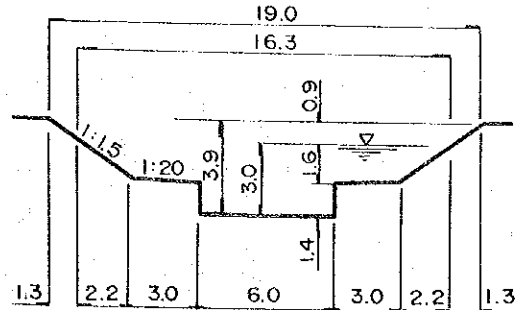
THE BATU RIVER

Q= 240 m³/s
 V= 2.43 m/s
 I= 1/1040



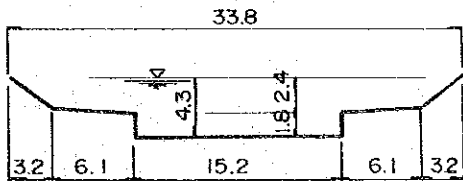
Sg. Gombak Confluence - Sg. Batang Tolak

Q= 70 m³/s
 V= 2.36 m/s
 I= 1/500



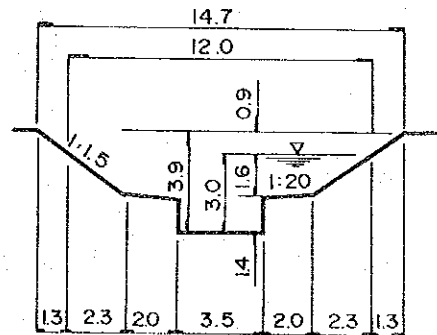
Sg. Jinjang - Outlet of Batu Pond

Q= 240 m³/s
 V= 2.53 m/s
 I= 1/905



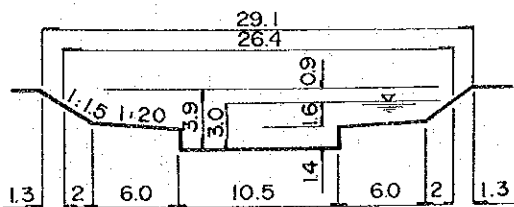
Sg. Batang Tolak - Sg. Keroh

Q= 40 m³/s
 V= 2.03 m/s
 I= 1/500



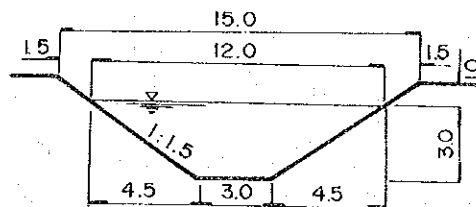
Outlet of Batu Pond - Regulation Pond

Q= 120 m³/s
 V= 2.37 m/s
 I= 1/600



Sg. Keroh - Sg. Jinjang

Q= 60 m³/s
 V= 2.92 m/s
 I= 1/400



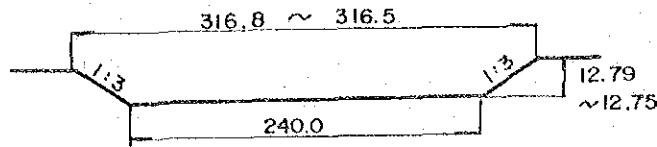
Regulation Pond - End of improvement Works

FIG. 5-6

CROSS SECTIONS OF RIVER IMPROVEMENT (4/5)

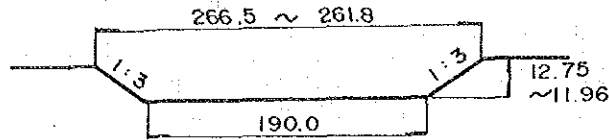
THE KLANG RIVER

NO.-49.0 ~ NO.-48.5



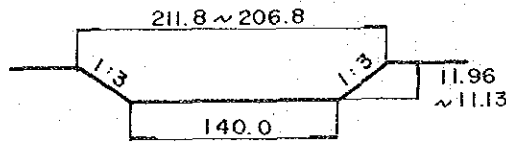
$Q = 1,200 \text{ m}^3/\text{s}$
 $I = 1/10,000$

NO.-48.5 ~ NO.-39.0



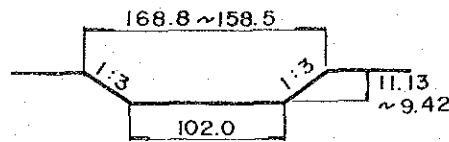
$Q = 1,200 \text{ m}^3/\text{s}$
 $I = 1/10,000$

NO.-39.0 ~ NO.-29.0



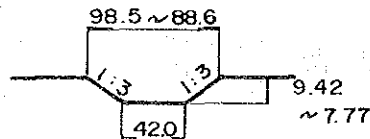
$Q = 1,200 \text{ m}^3/\text{s}$
 $I = 1/10,000$

NO.-29.0 ~ NO.-15.5



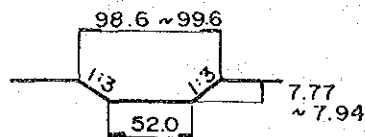
$Q = 1,200 \text{ m}^3/\text{s}$
 (NO.-29.0 ~ NO.-27.0) ~ $I = 1/10,000$
 (NO.-27.0 ~ NO.-15.5) ~ $I = 1/5,000$

NO.-15.5 ~ NO.-6.4



$Q = 800 \text{ m}^3/\text{s}$
 $I = 1/2,000$

NO.-6.4 ~ NO. 0.0



$Q = 1,150 \text{ m}^3/\text{s}$
 $I = 1/2,000$

Downstream Stretch of Puchong Drop

FIG. 5-6

CROSS SECTIONS OF RIVER IMPROVEMENT (5/5)

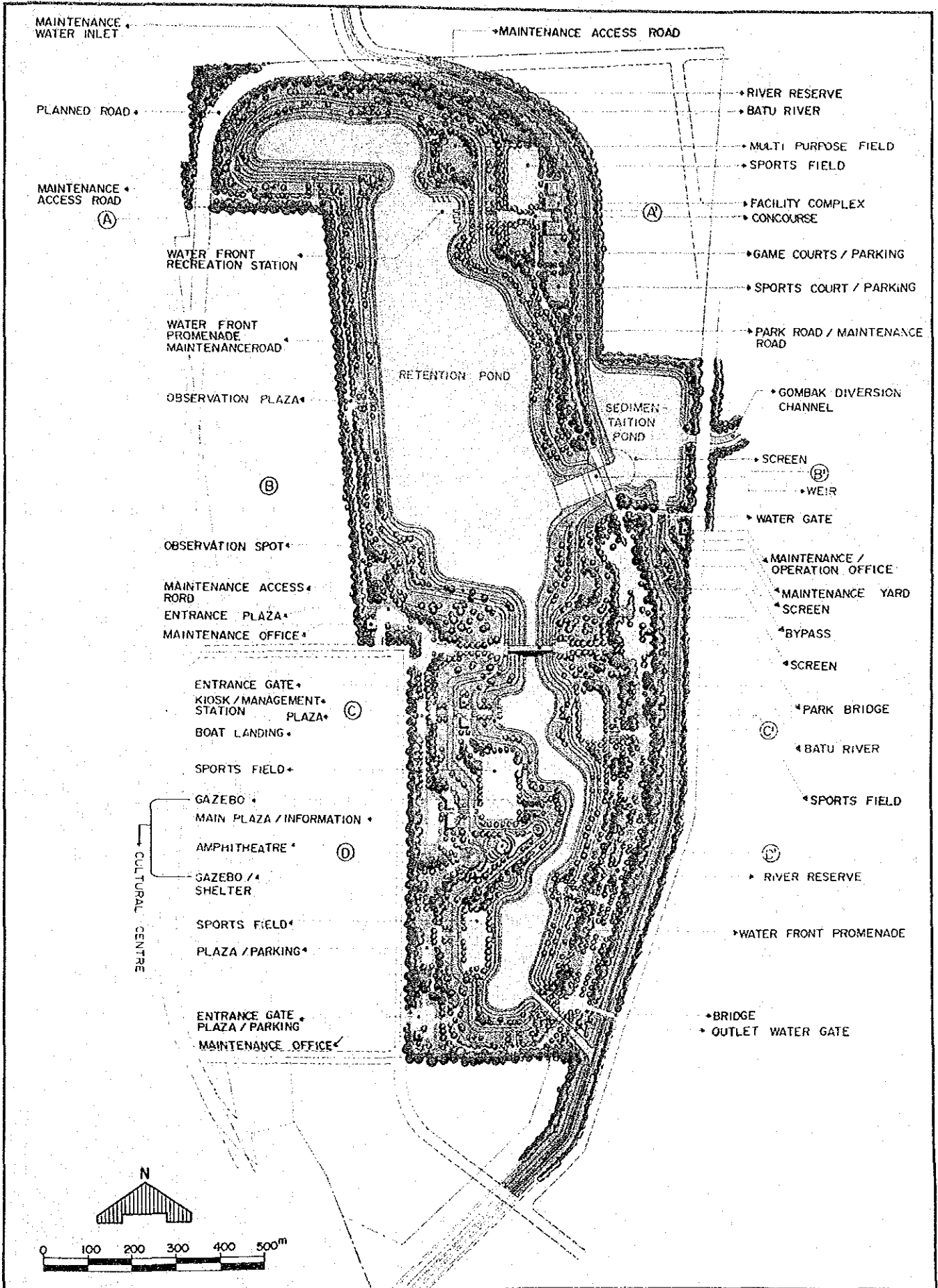


FIG. 5-7

LAYOUT PLAN OF BATU RETENTION POND

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

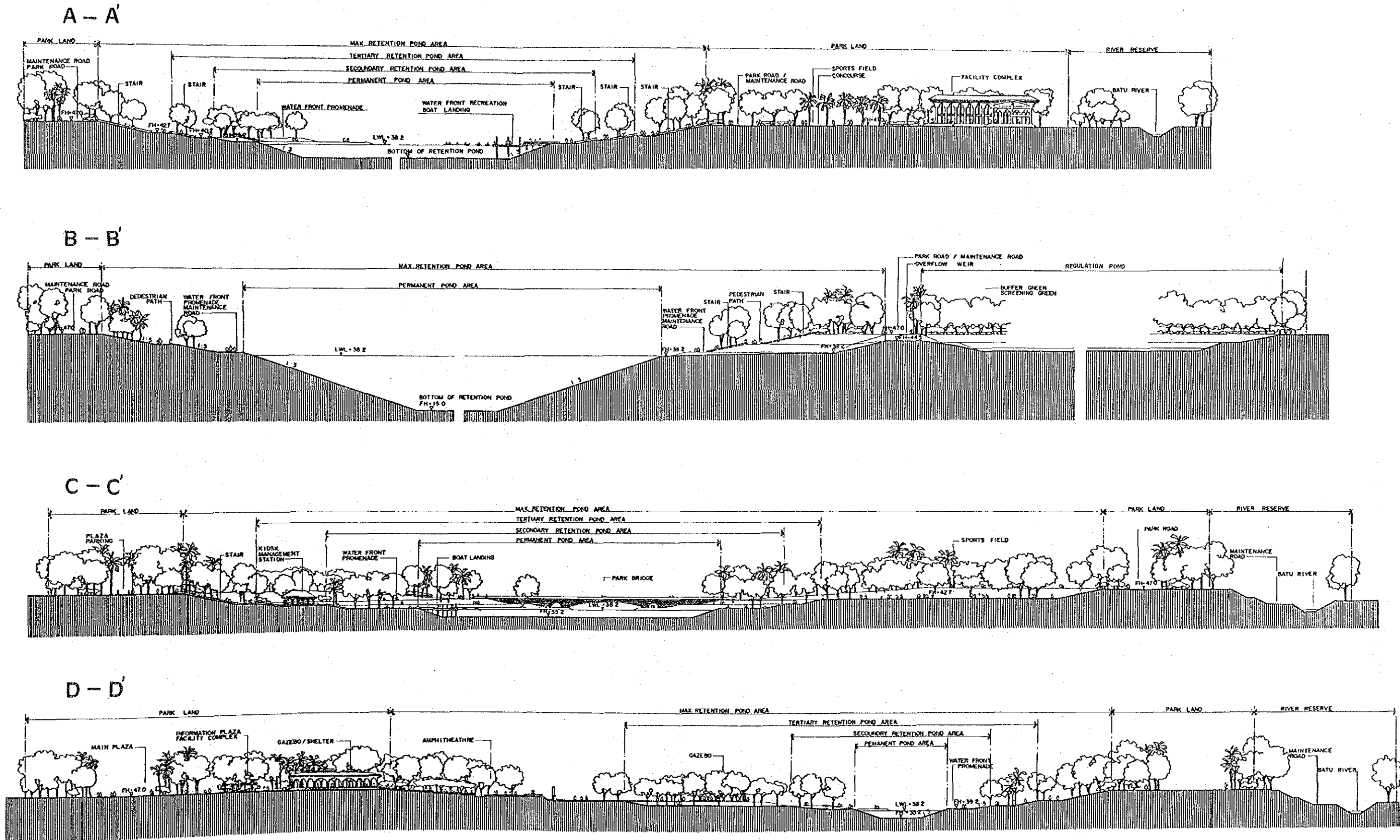


FIG. 5-8

TYPICAL CROSS SECTIONS OF BATU RETENTION POND

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

FUNCTIONAL LAND USE FOR BATU RETENTION POND AND PARK AREA

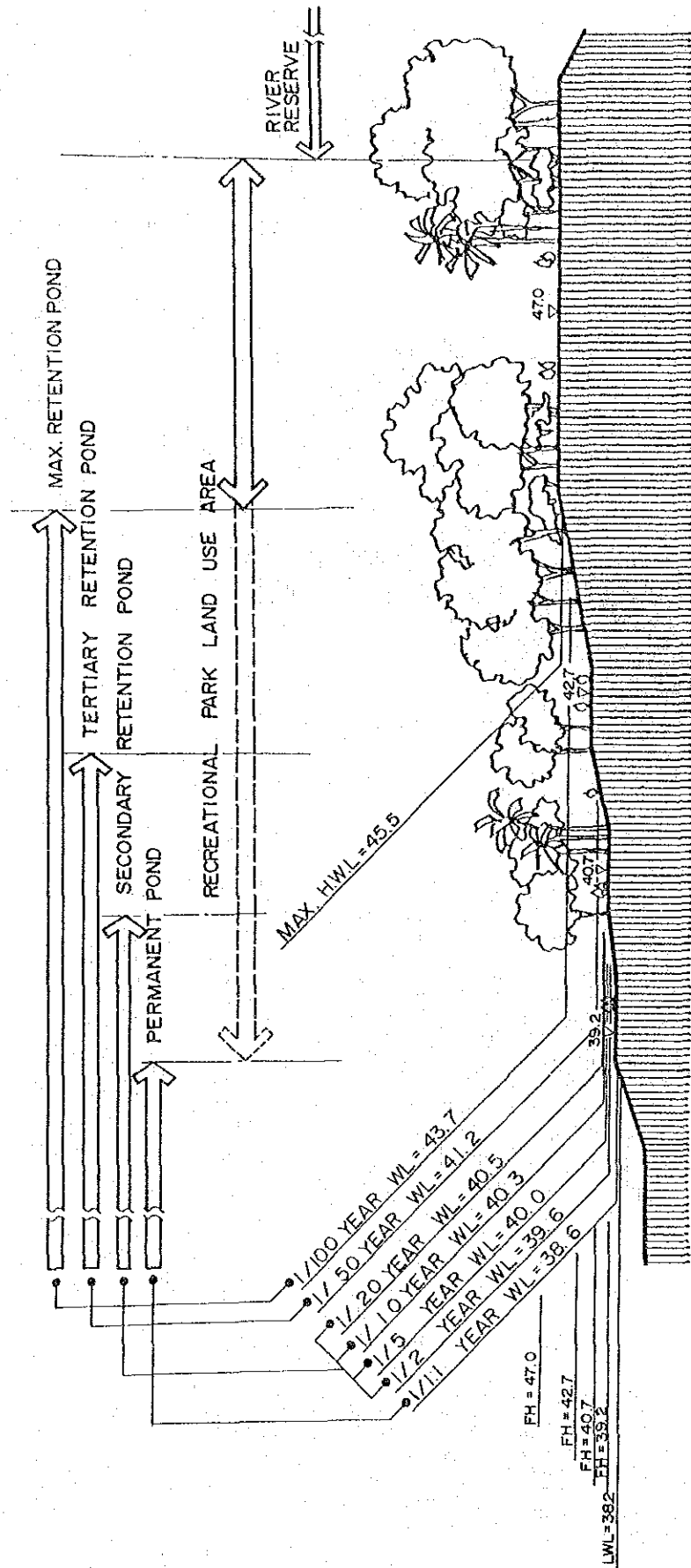


FIG. 5-9

FUNCTIONAL LAND USE FOR BATU RETENTION POND AND PARK AREA

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

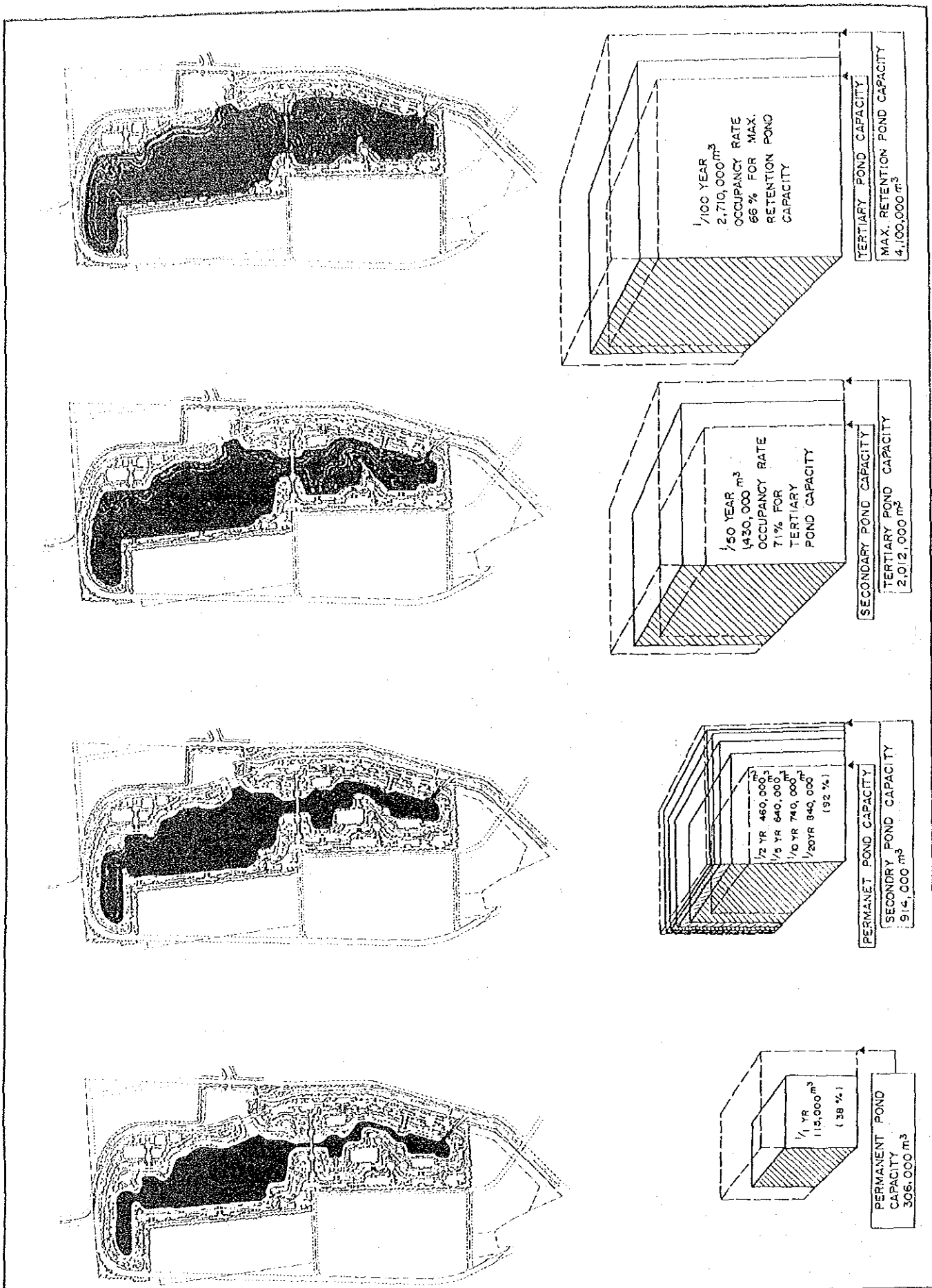


FIG. 5-10

WATER SURFACE FOR VARIOUS PROBABLE FLOODS

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

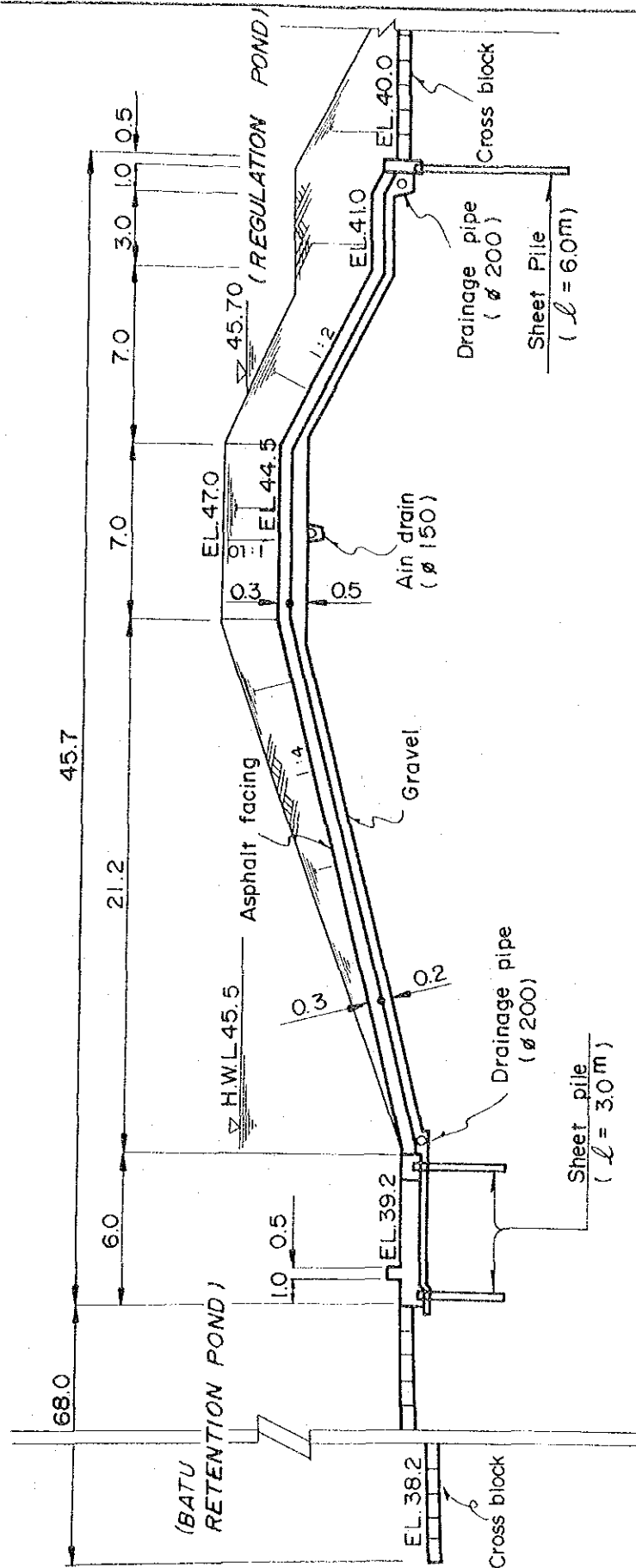


FIG. 5-11

LONGITUDINAL SECTION OF DIVERSION WEIR

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

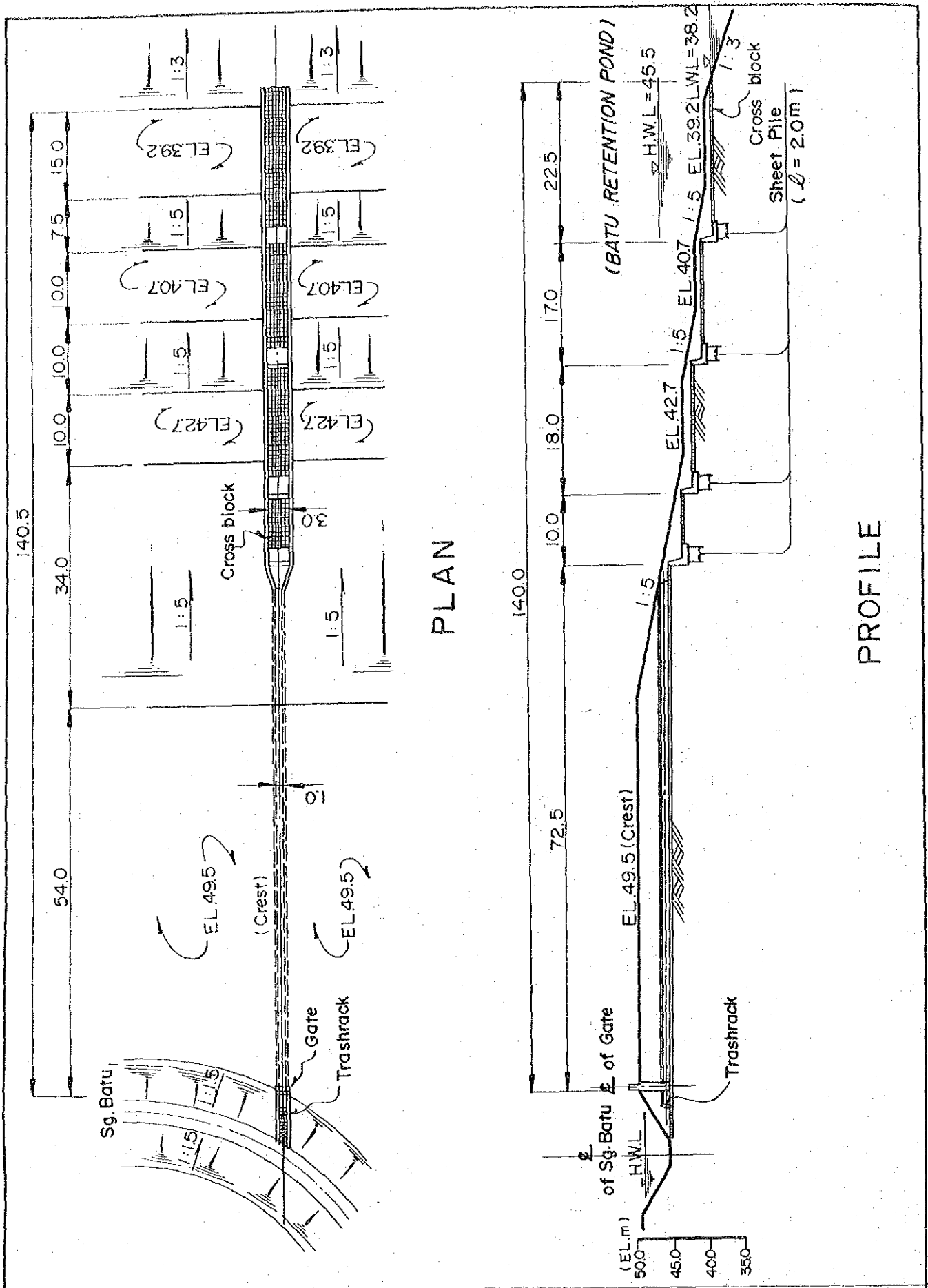
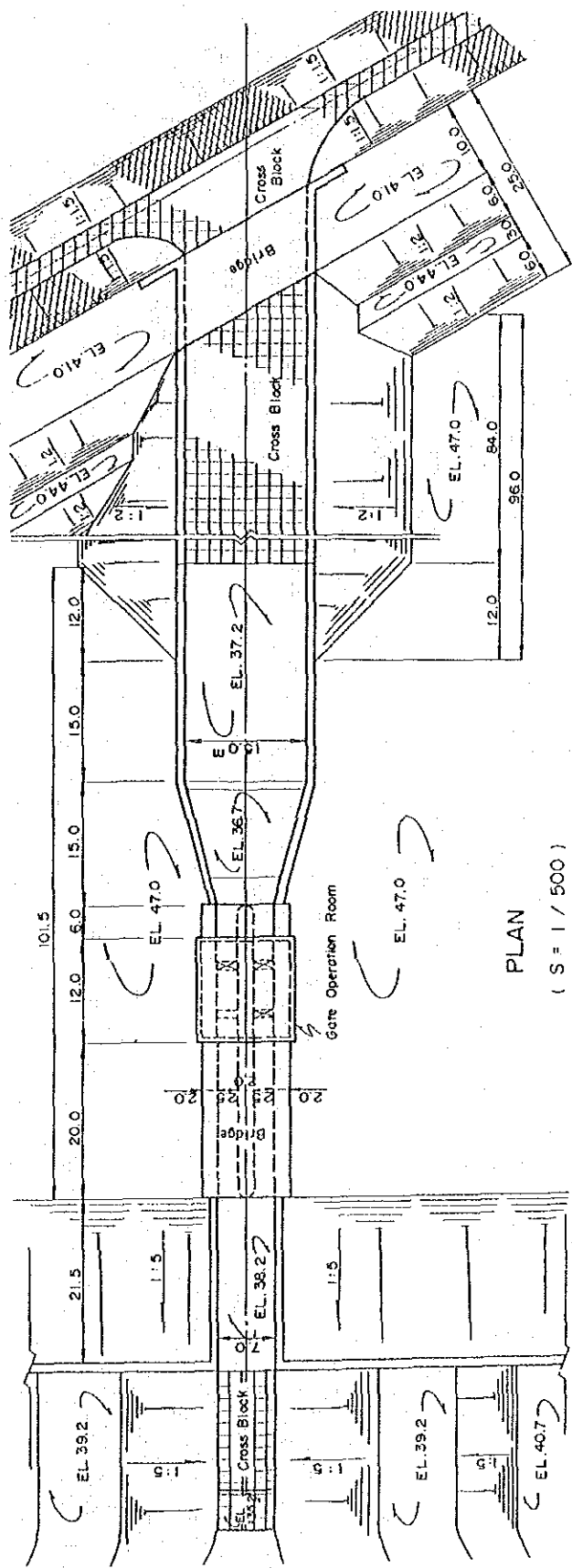
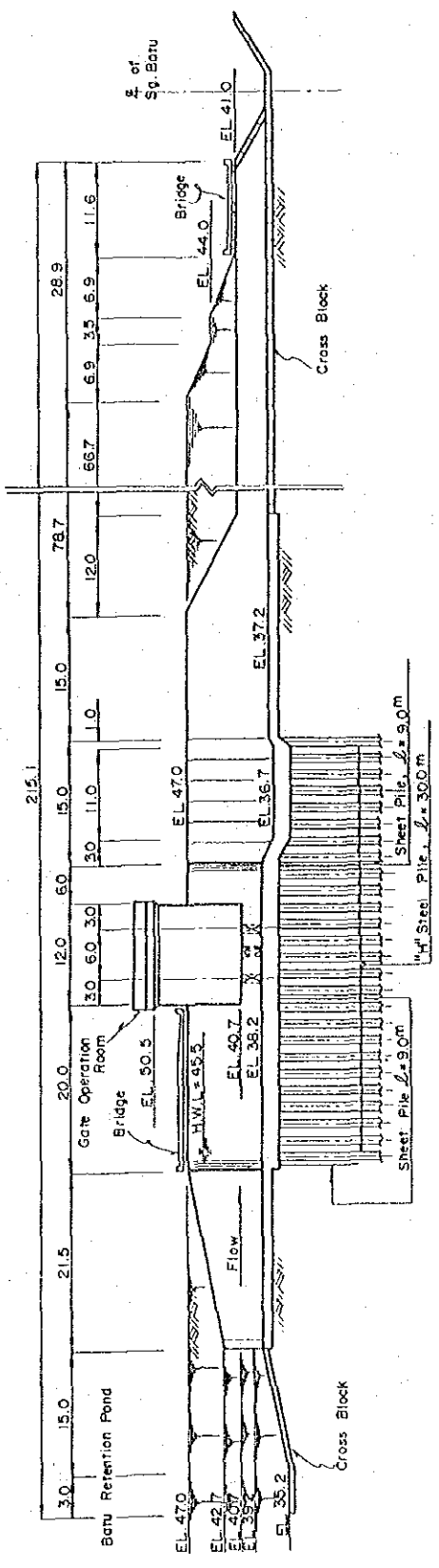


FIG. 5-12 LONGITUDINAL AND CROSS SECTIONS OF INLET SLUICE GATE





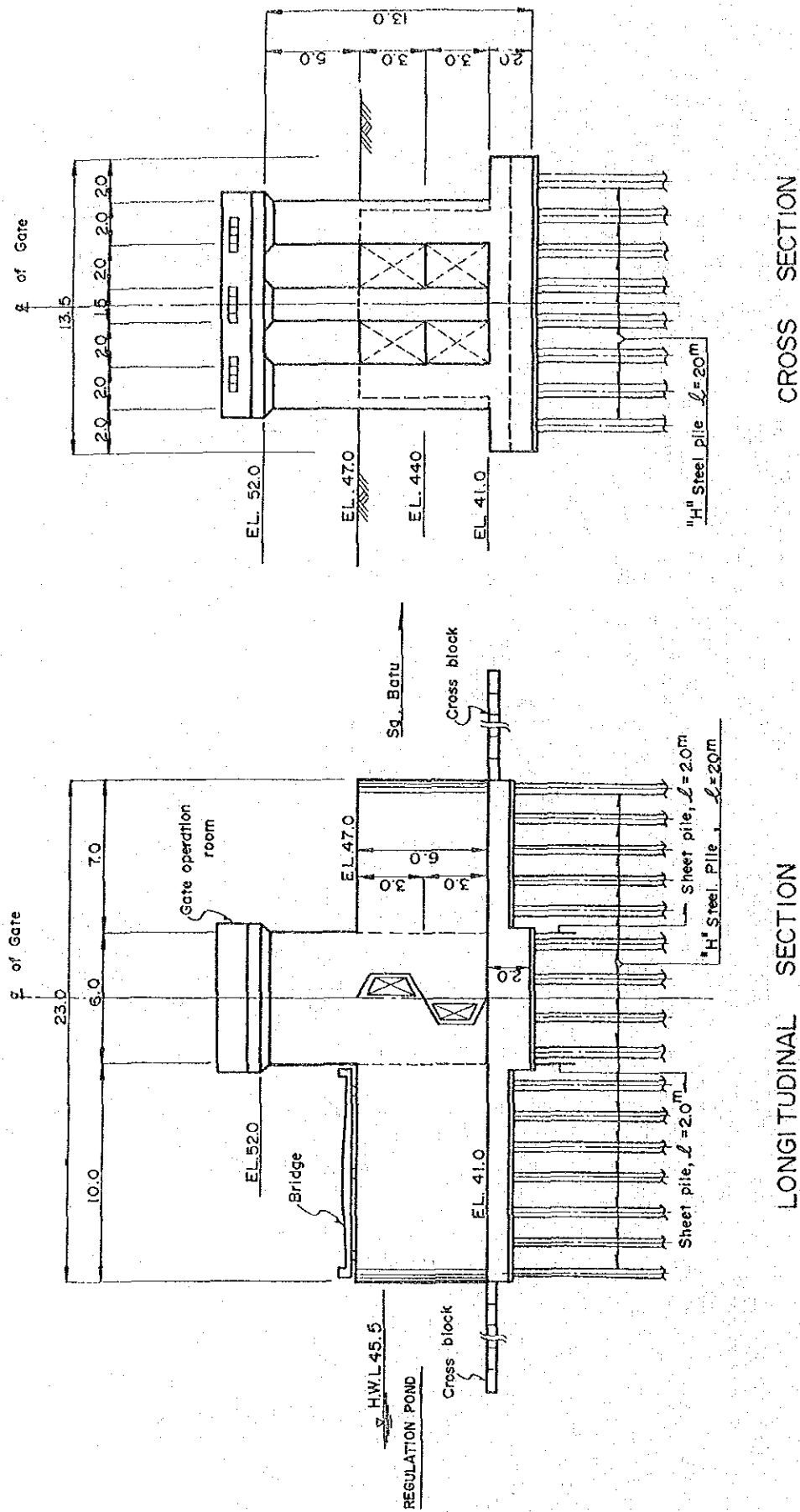
PLAN
(S = 1 / 500)



LONGITUDINAL SECTION
(S = 1 / 500)

FIG. 5-13 PLAN AND LONGITUDINAL SECTION OF OUTLET GATE
THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN





CROSS SECTION

LONGITUDINAL SECTION

FIG. 5-14

LONGITUDINAL AND CROSS SECTION OF BATU WATER GATE

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



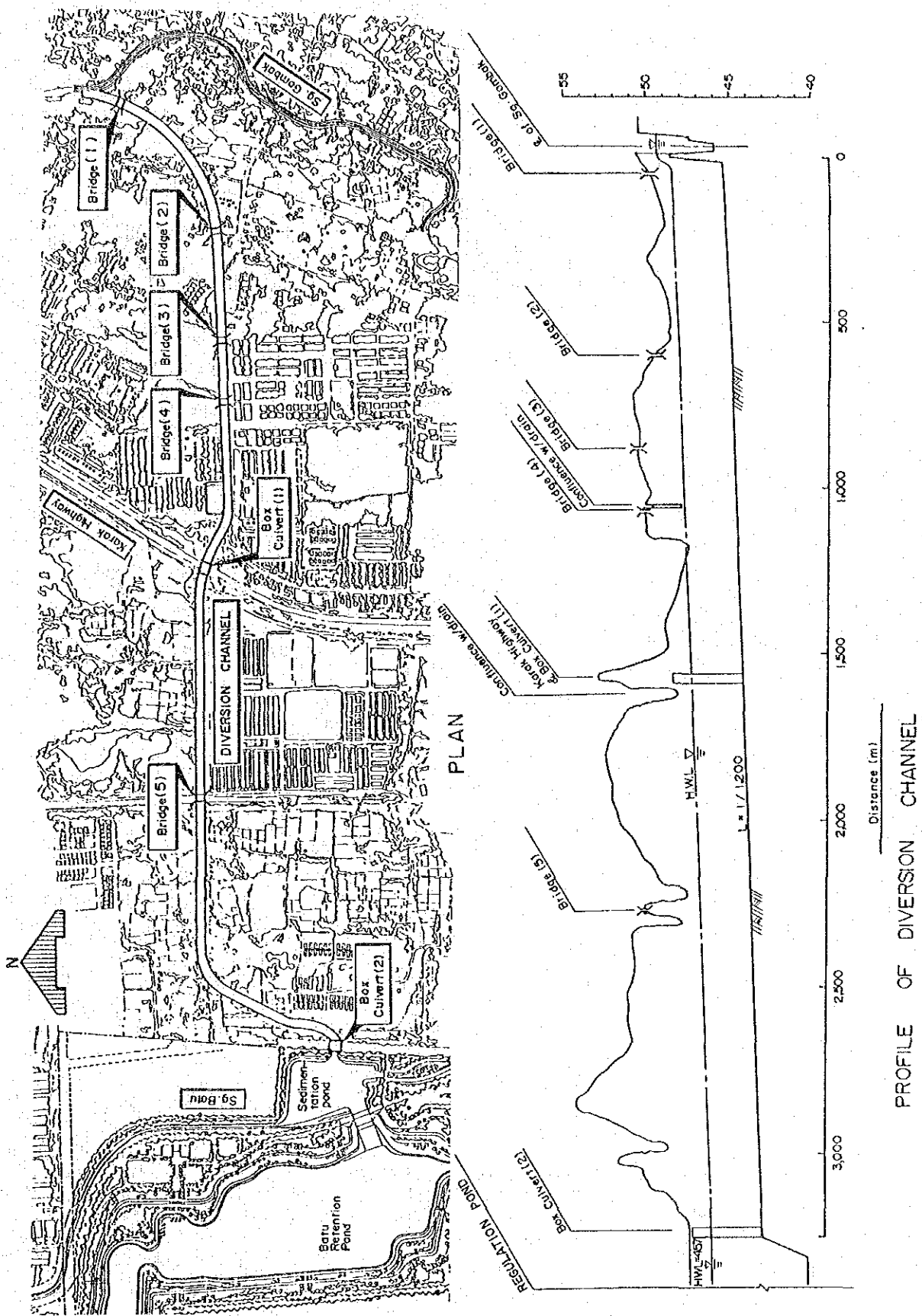
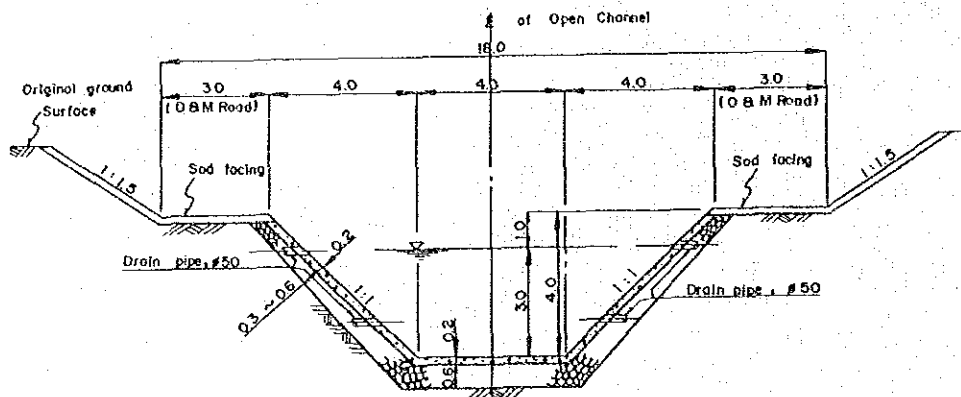
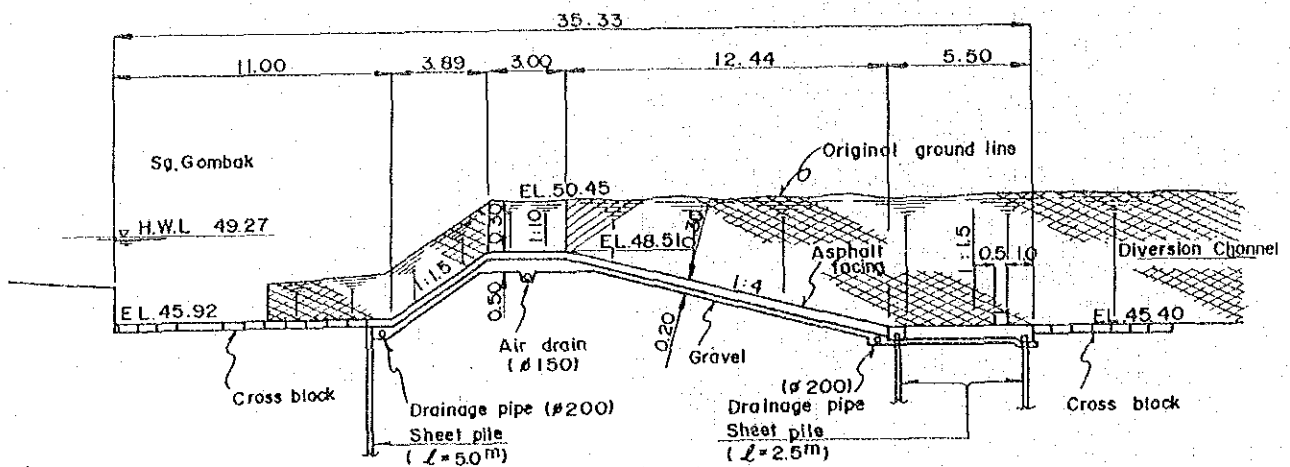
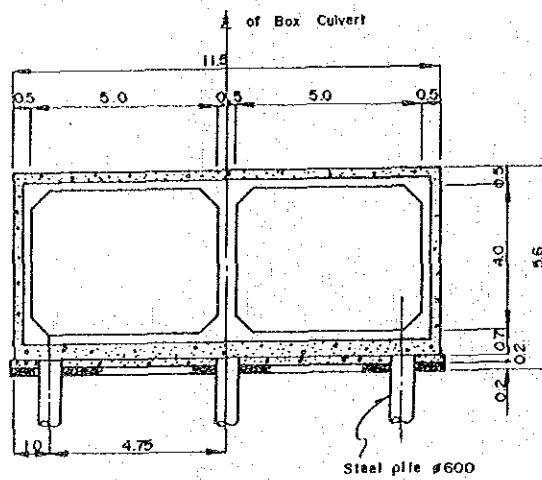


FIG. 5-15 PLAN AND LONGITUDINAL PROFILE OF GOMBAK DIVERSION CHANNEL



TYPICAL SECTION OF OPEN CHANNEL



TYPICAL SECTION OF BOX CULVERT

FIG. 5-16

TYPICAL CROSS SECTIONS OF GOMBAK DIVERSION WEIR AND DIVERSION CHANNEL

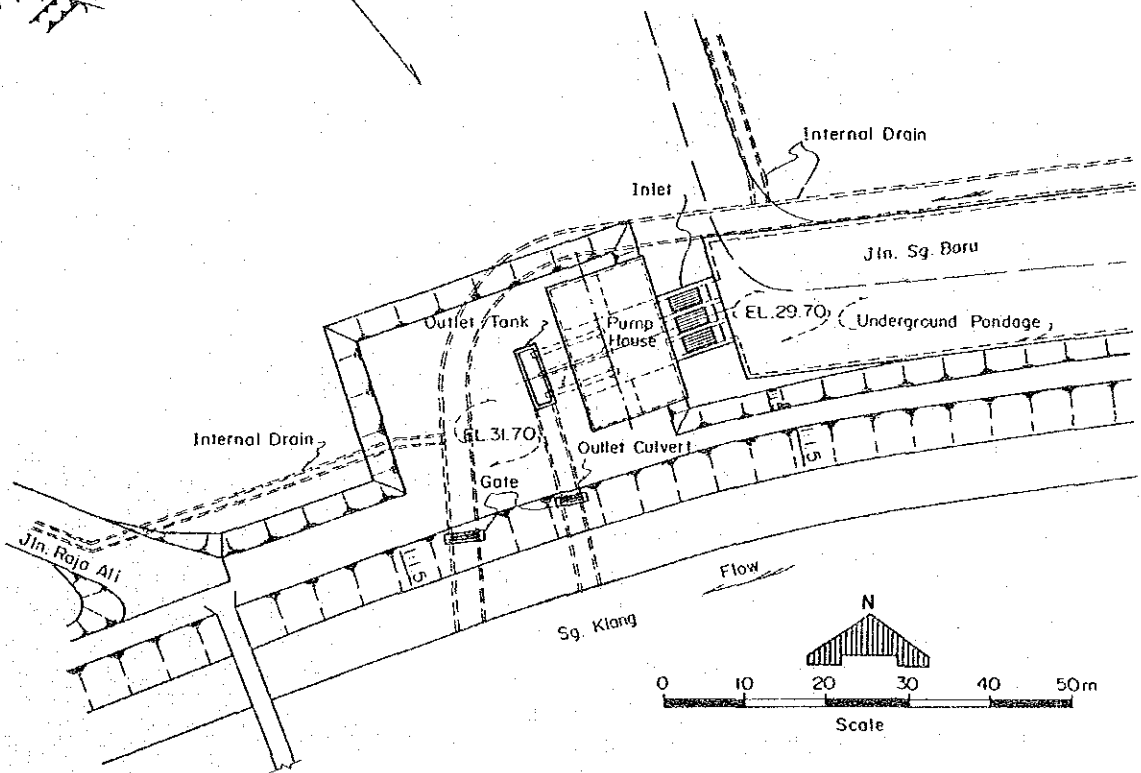
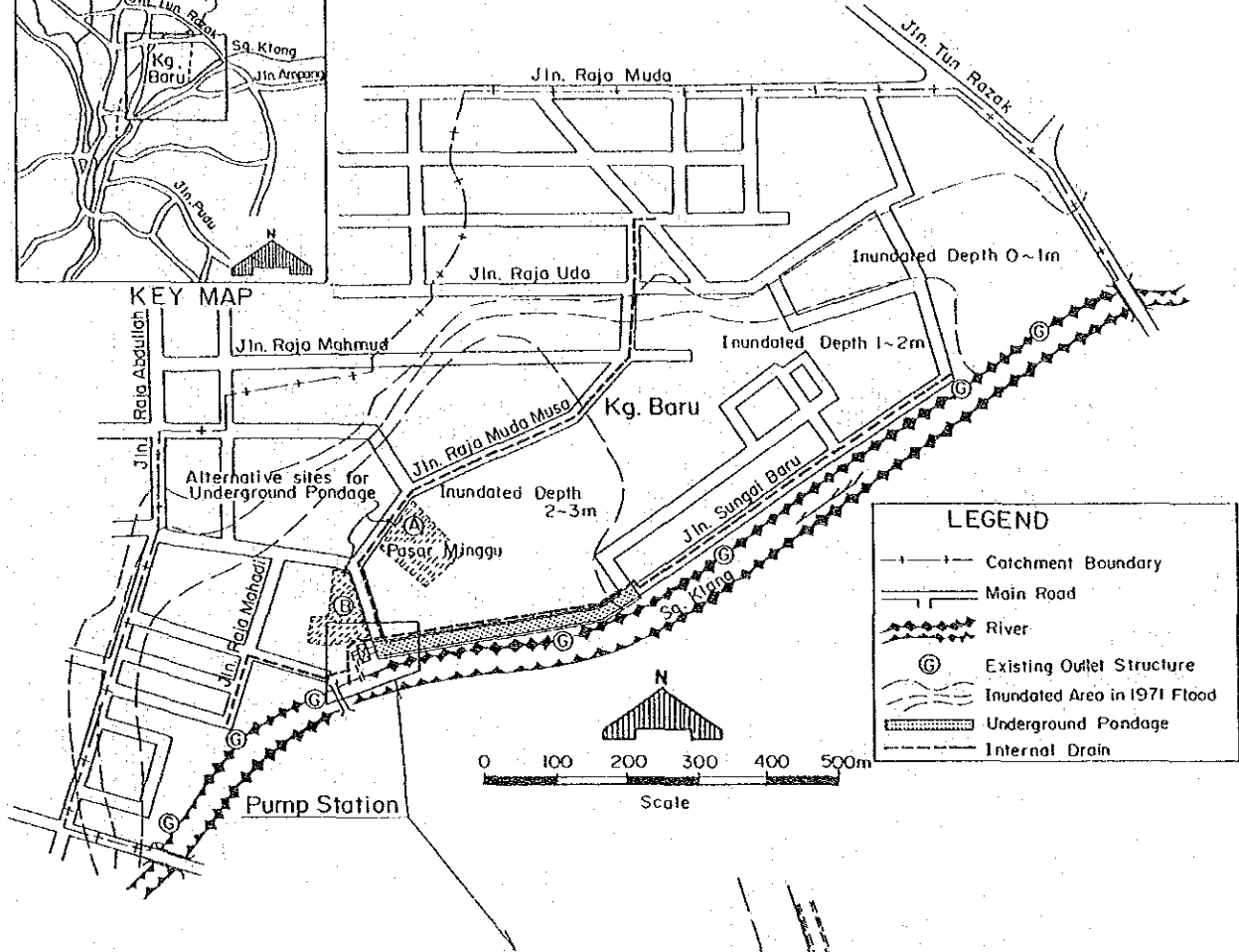
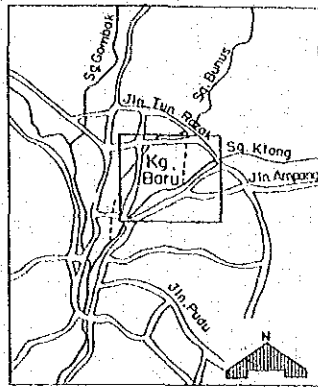
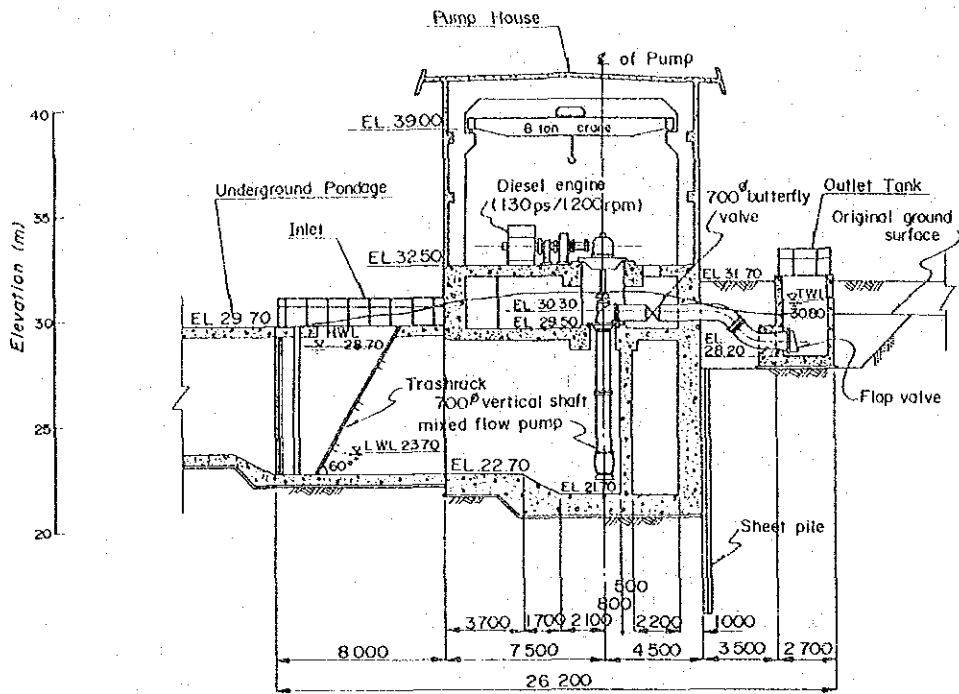
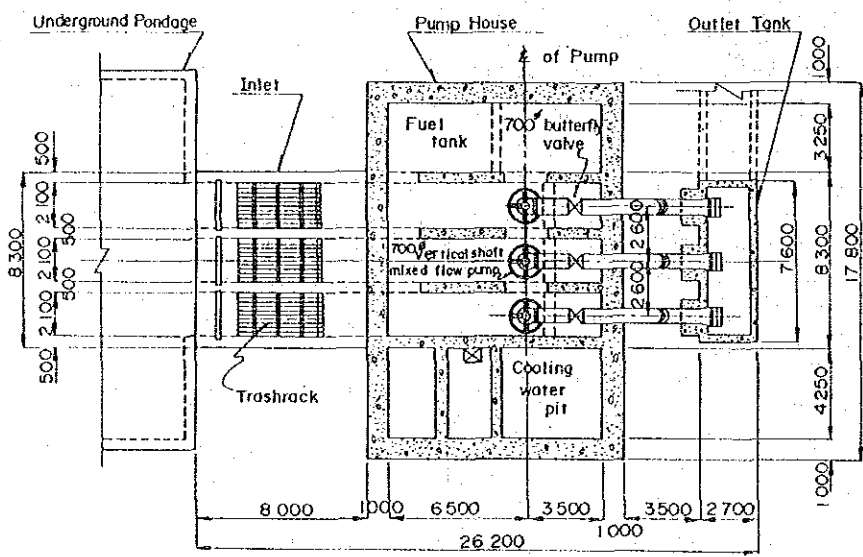


FIG. 5-17 LOCATION OF EXISTING OUTLET STRUCTURES AND PROPOSED DRAINAGE STRUCTURES IN KAMPUNG BARU

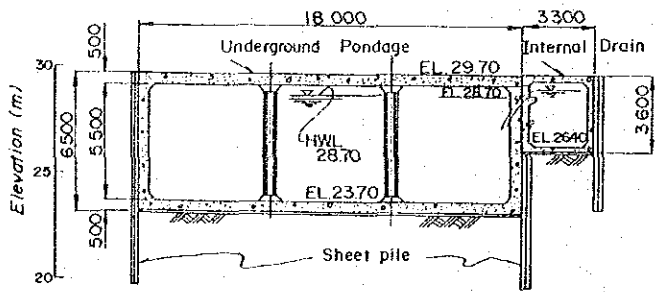
THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



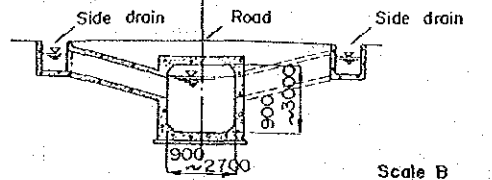
TRANSVERSE SECTION OF PUMP STATION Scale A



PLAN OF PUMP STATION Scale A



TYPICAL SECTION OF UNDERGROUND PONDAGE Scale A



TYPICAL SECTION OF INTERNAL DRAIN Scale B

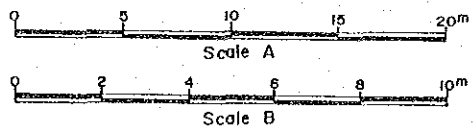


FIG. 5-18 STRUCTURES FOR KAMPUNG BARU DRAINAGE PLAN



Description	Work Period (mth)	P H A S E - 1				
		1st Year 1993	2nd Year 1994	3rd Year 1995	4th Year 1996	5th Year 1997
(1) River Improvement 1. Klang River Section K9 (3.1 km) 2. Gombak River Section G4 (3.5 km) 3. Batu River Section B2, B3 (6.1 km)	18 20 30		B3		B2	
(2) Batu Retention Pond 1. Retention Pond 2. Batu Outlet Gate 3. Batu Sluice Way	36 16 8					
(3) Diversion Channel 1. Channel Intake 2. Diversion Channel 3. Regulation Pond 4. Overflow Weir 5. Batu River Gate	8 24 16 12 12					
(4) Drainage Plan of Kampung Baru 1. Underground Pondage 2. Inlet Structure 3. Pump House 4. Outlet Tank 5. Outlet Culvert/ Gate Structure 6. Inner Drainage System	20 8 20 8 8 12					

FIG. 6-1

CONSTRUCTION SCHEDULE OF URGENT PROJECT

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



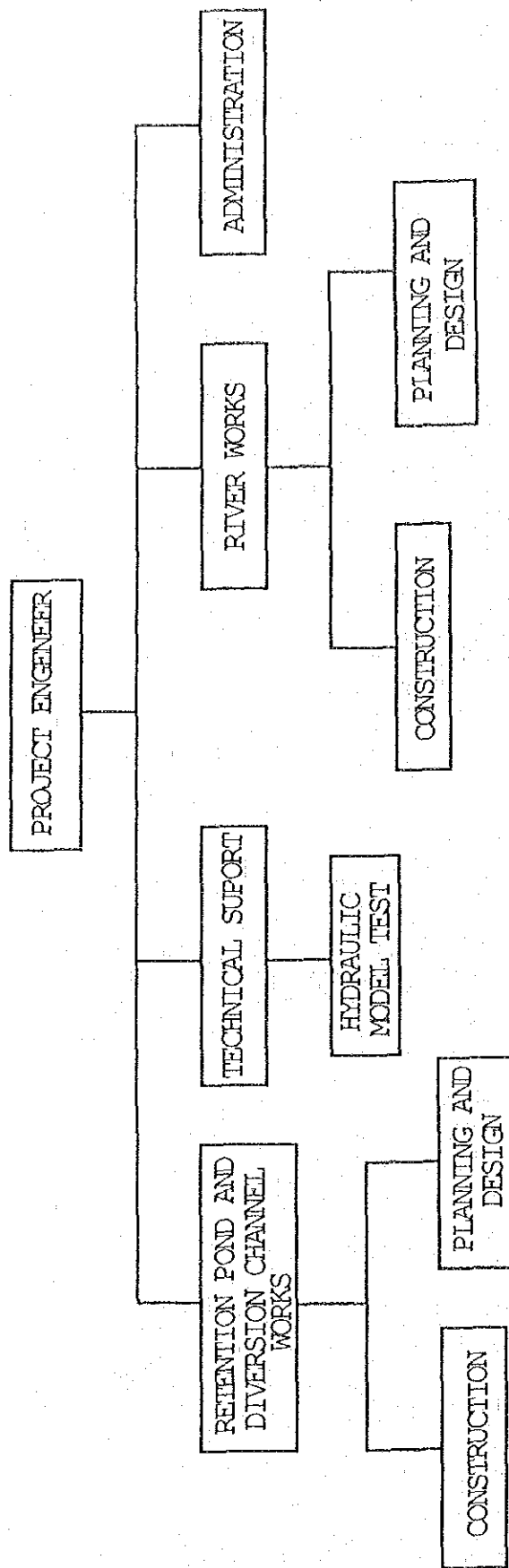


FIG. 7-1

REQUIRED ORGANIZATION FOR THE PROPOSED URGENT PROJECT

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

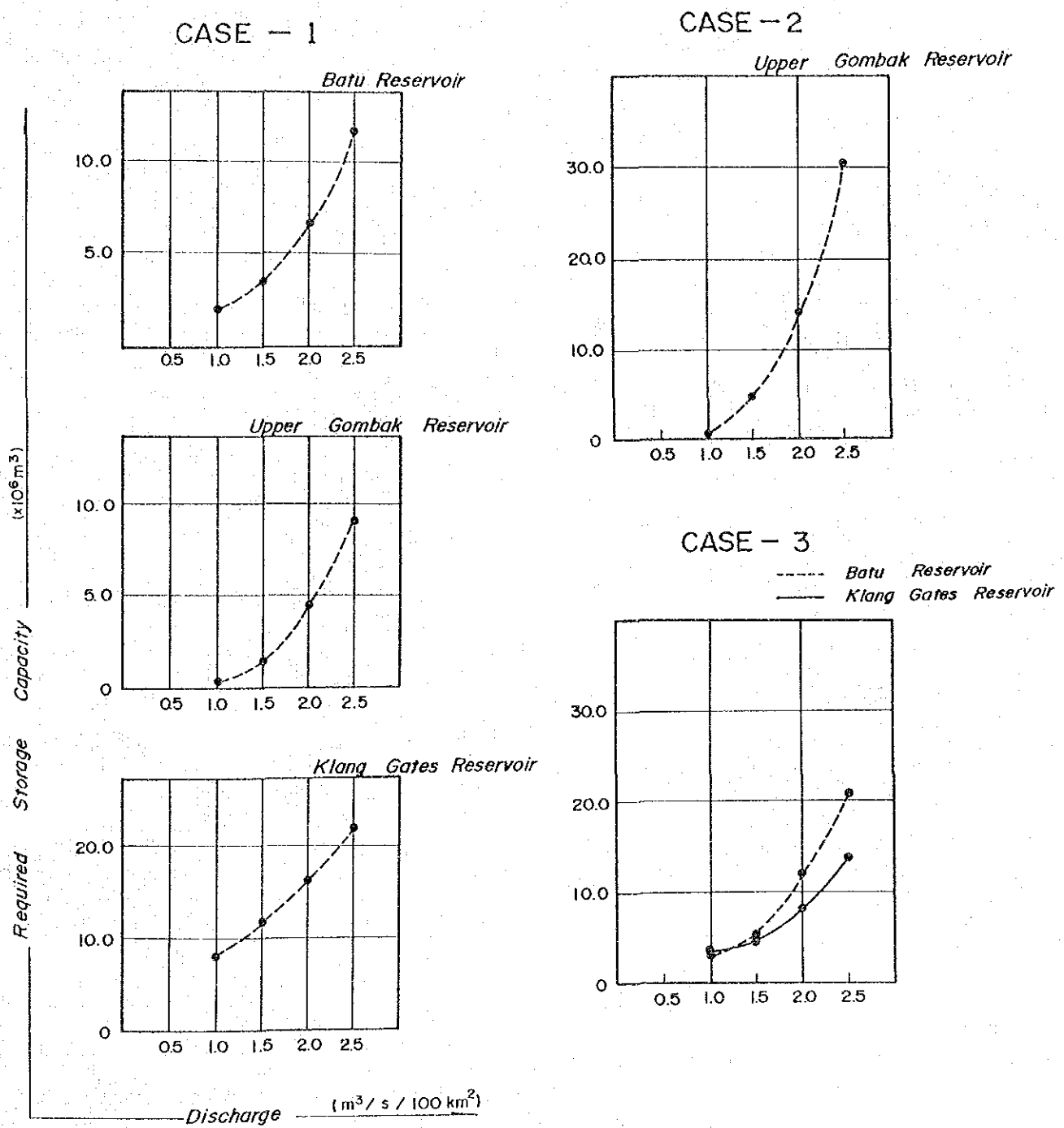


FIG. 9-2

SECURED DISCHARGE CAPACITY RELATION

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN

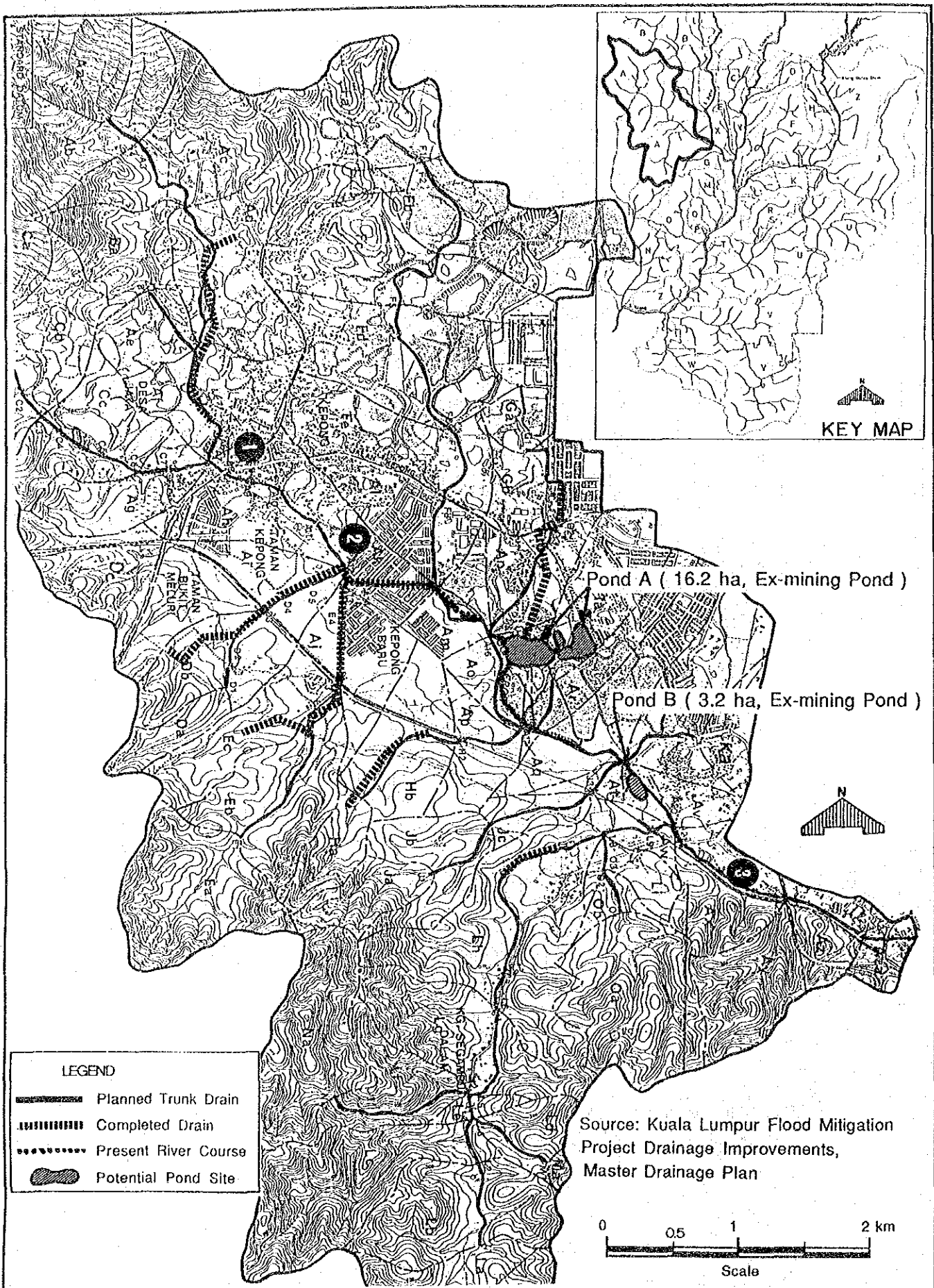
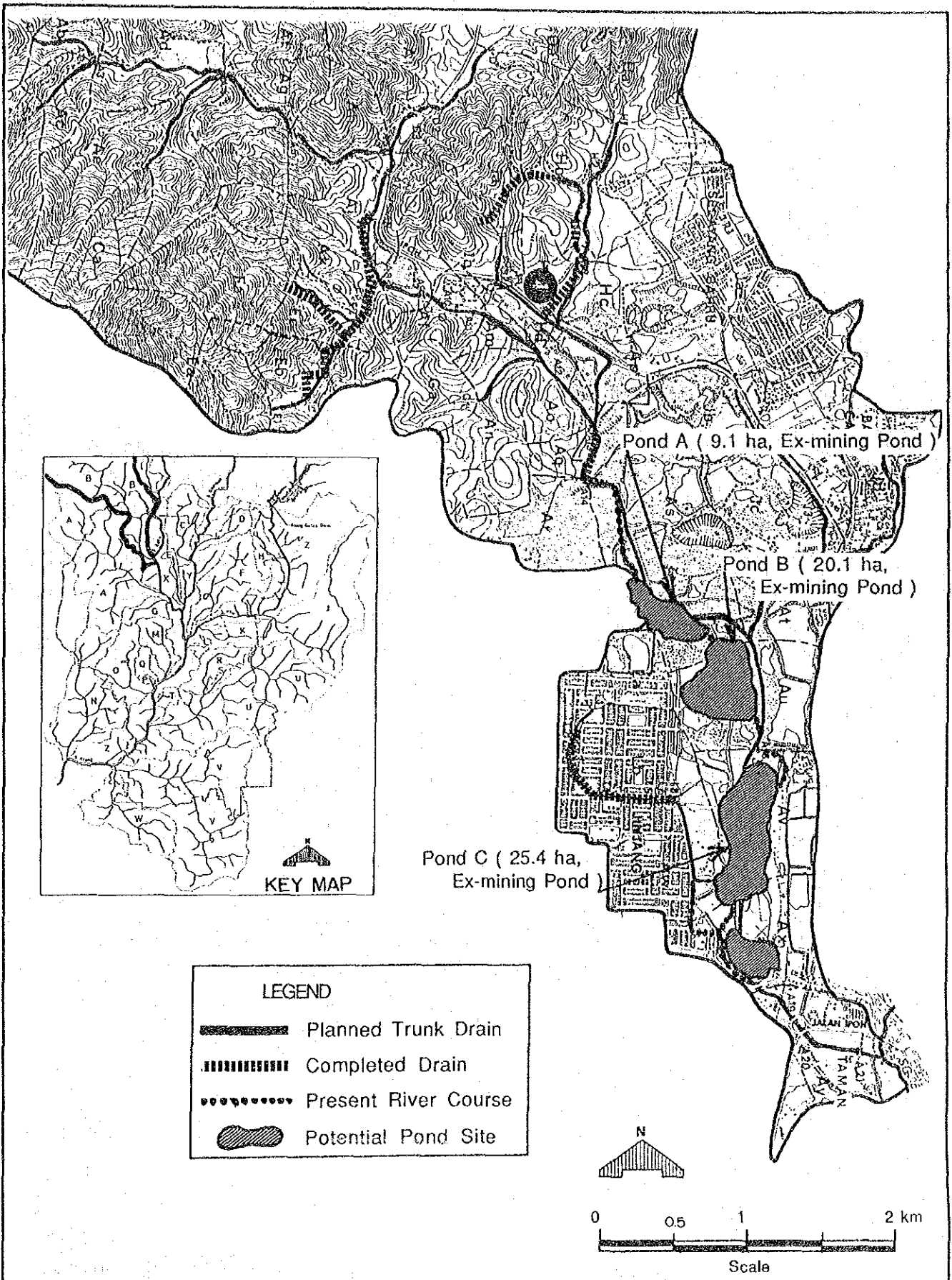


FIG. 10-1

LOCATION OF IMPROVED DRAINS AND POTENTIAL SITES FOR RETENTION POND IN SG. KEROH BASIN

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN



Source: Kuala Lumpur Flood Mitigation Project Drainage Improvements, Master Drainage Plan

FIG. 10-2 LOCATION OF IMPROVED DRAINS AND POTENTIAL SITES FOR RETENTION POND IN SG. JINJANG BASIN

THE STUDY ON THE FLOOD MITIGATION OF THE KLANG RIVER BASIN