



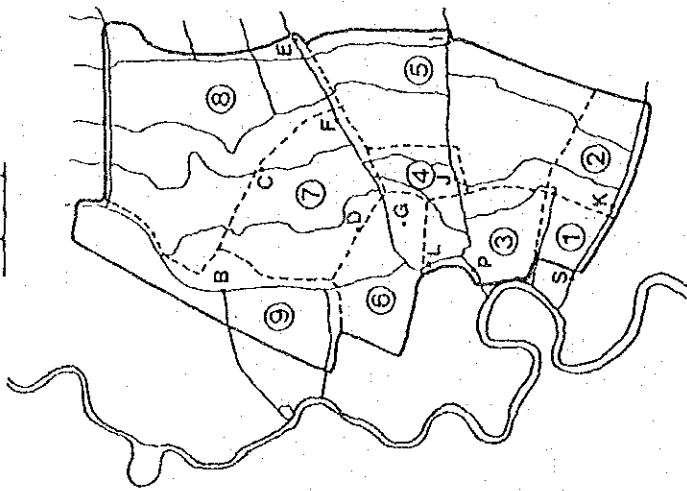
Fig. H.17 CALIBRATION FOR FLOODING IN 1983 BY STORAGE BASIN MODEL--(1)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

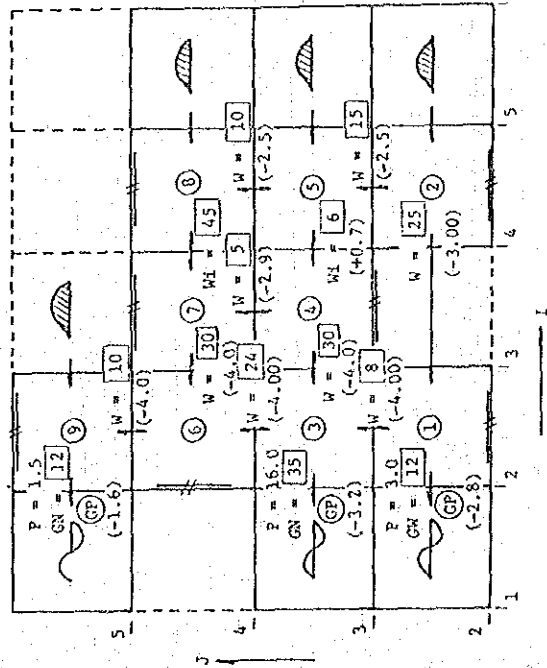
Legend

- [⑦] : Basin ⑦
- B : Water Gauge Station
- GP : Gate/pump
- P=1.5 : Pump Capacity with 1.5CMS
- GW=12 : Gate Width with 12meter
- W=30 : Klong Width with 30meter
-  : Inflow From Outer Area
-  : Water Level in Chao Phraya R.

Keo Map



Basin Component



Calibrated Water Level

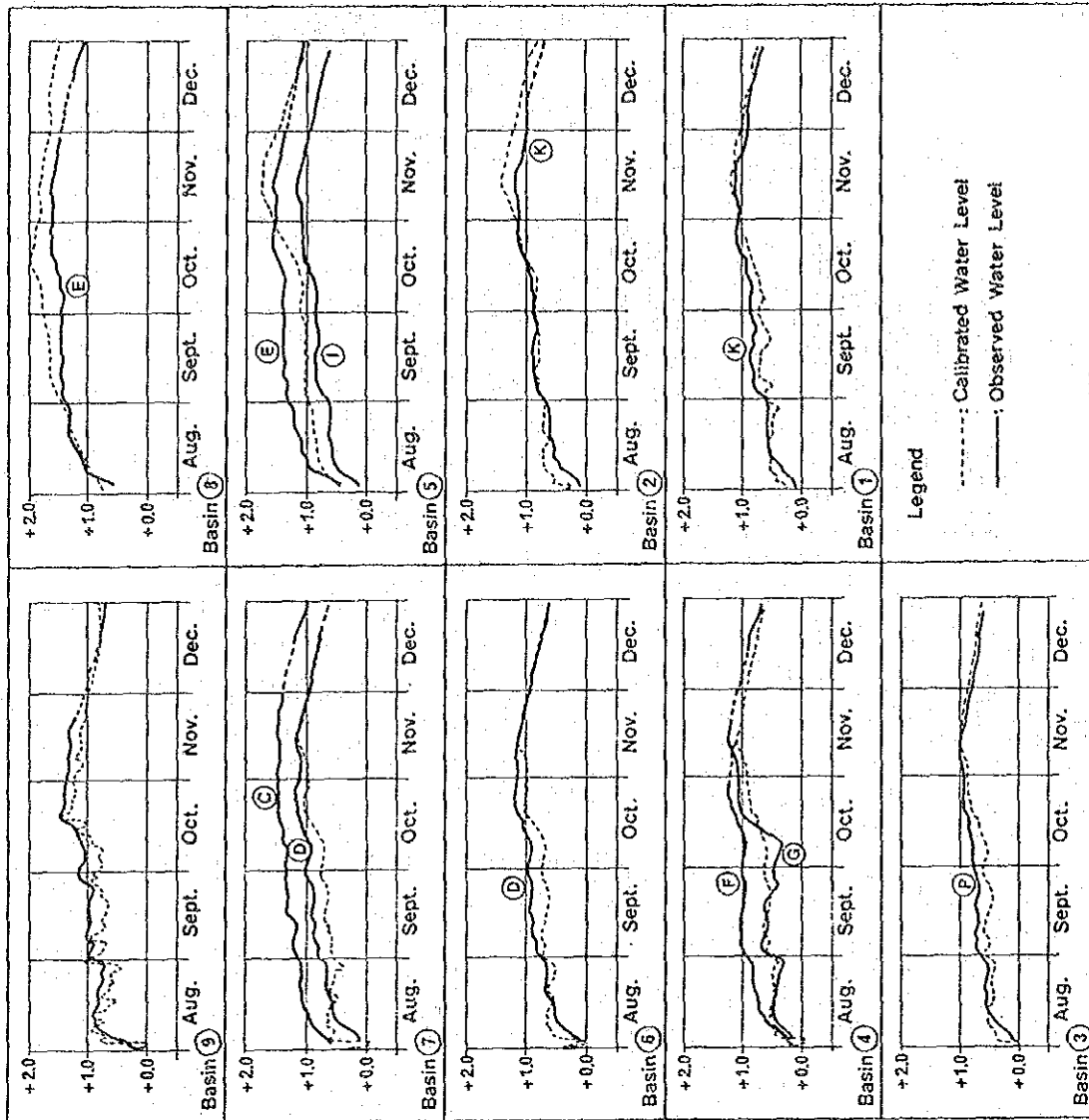


Fig. H.18 CALIBRATION FOR FLOODING IN 1983 BY STORAGE BASIN MODEL---(2)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

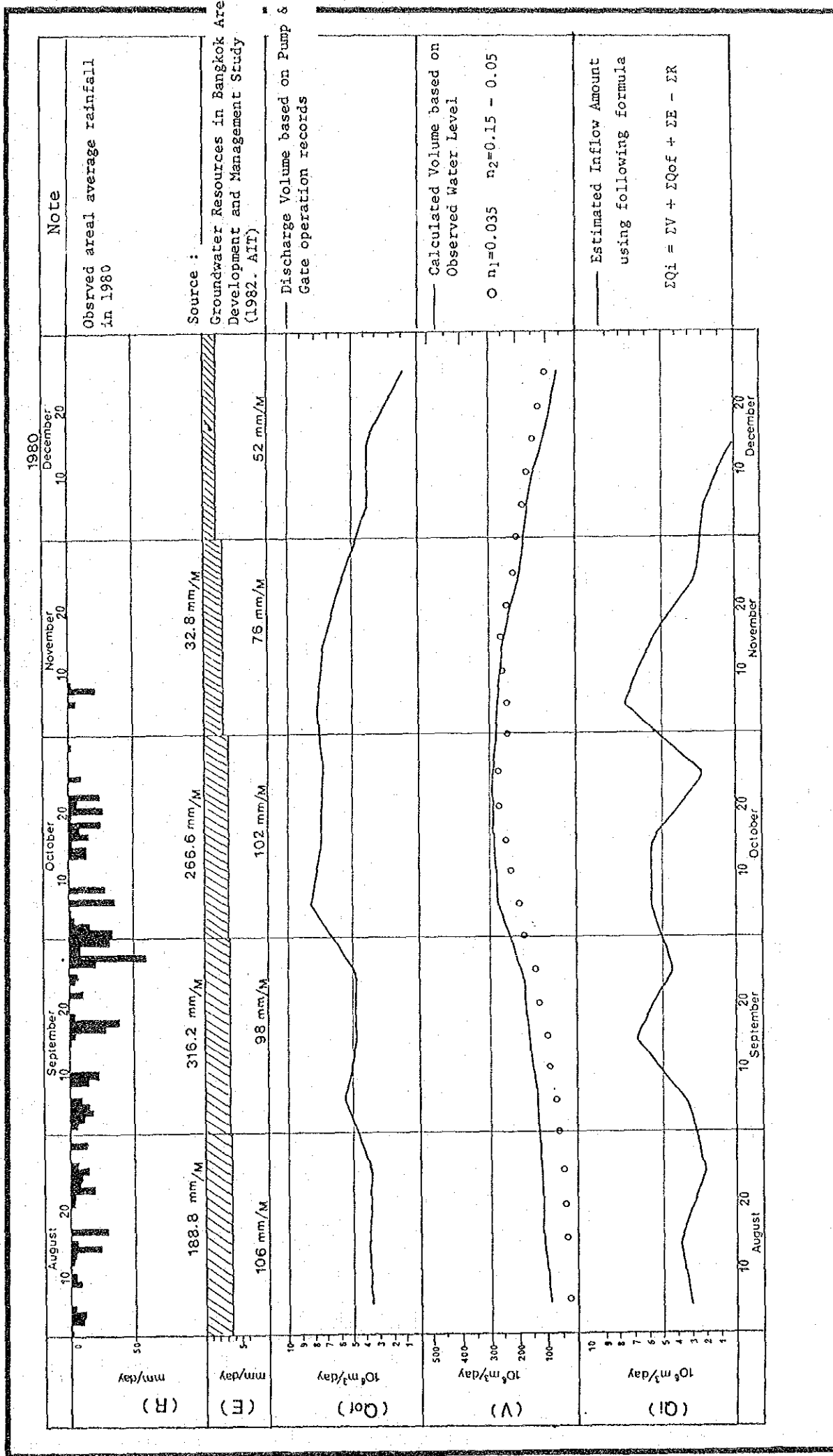


Fig. H.19 VERIFICATION FOR FLOODING IN 1980 BY STORAGE BASIN MODEL--(1)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Legend

[⑦] : Basin ⑦

B : Water Gauge Station

GP : Gate/pump

P=1.5 : Pump Capacity with 1.5CMS

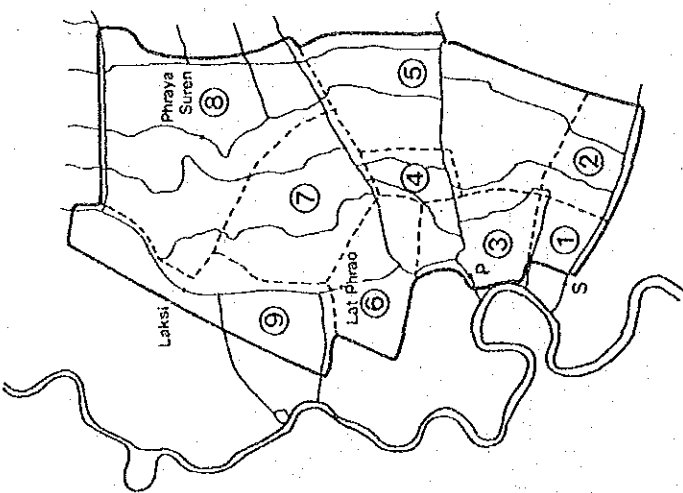
CW=12 : Gate Width with 12meter

W =30 : Klong Width with 30meter

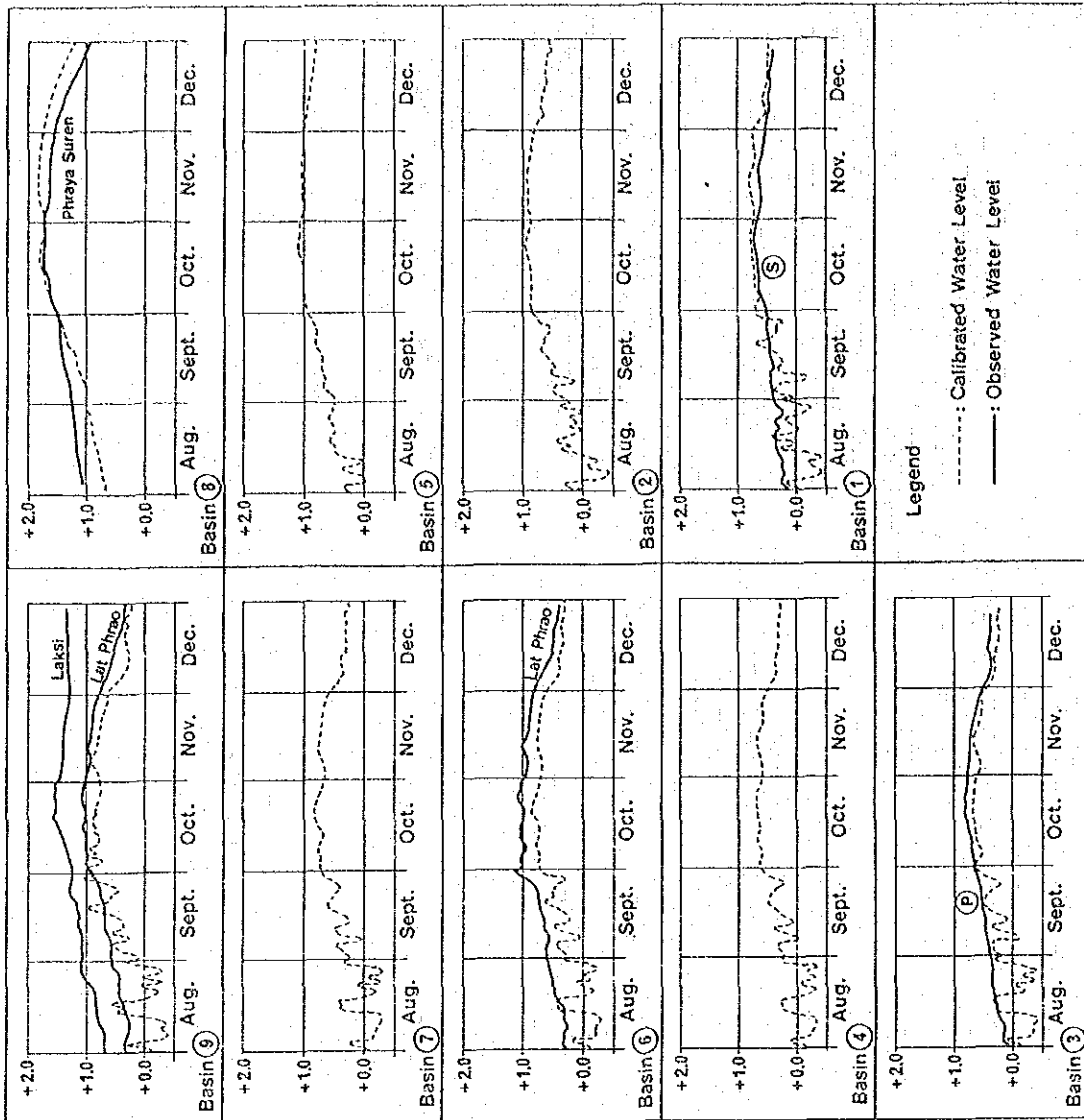
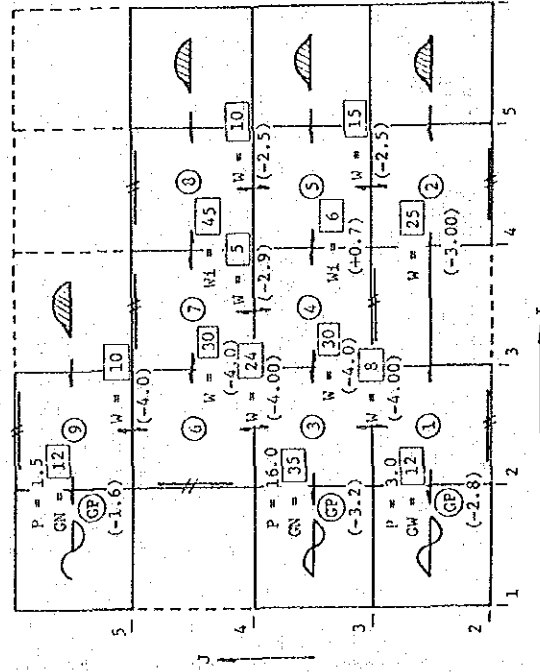
∩ : Inflow From Outer Area

∩ : Water Level in Chao Phraya R.

Map



Basin Component

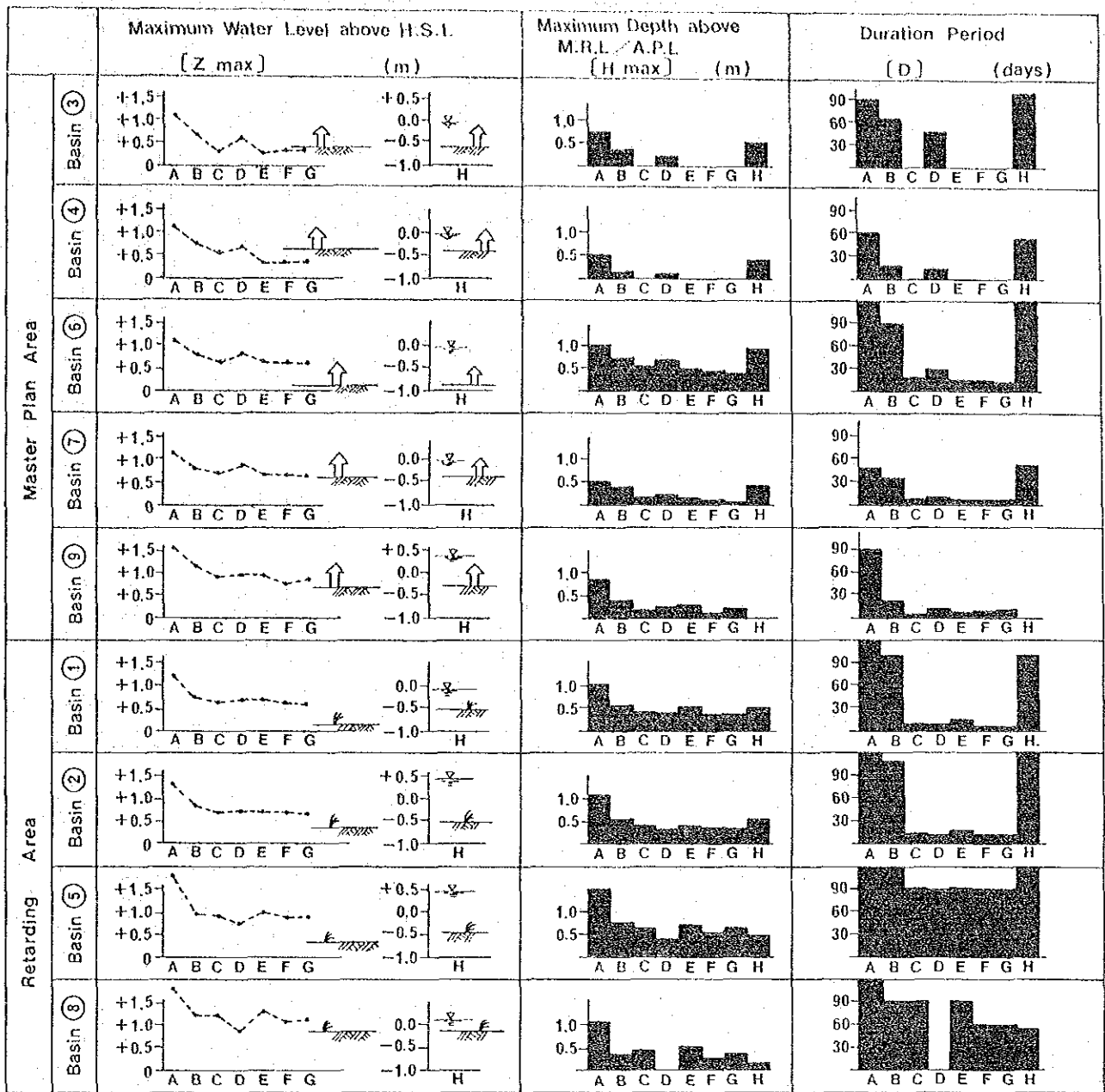


Legend

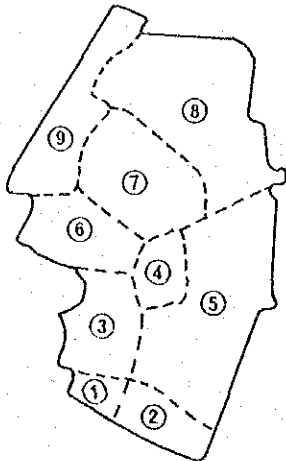
-----: Calibrated Water Level
 ———: Observed Water Level

Fig. H.20
 VERIFICATION FOR FLOODING IN 1980
 BY STORAGE BASIN MODEL --(2)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN - BANGKOK



1. Key Map of Basins



③ : Number of Basin

2. Area size of Basin

	No. of Basin	Area (km ²)	M.R.L./A.P.L.	
			in 1983	in 2000
Master Plan Area	③	52	+0.4	-0.6
	④	22	+0.6	-0.4
	⑥	42	+0.1	-0.9
	⑦	80	+0.6	-0.4
	⑨	64	+0.7	+0.3
Retarding Area	①	19	+0.3	-0.6
	②	35	+0.3	-0.5
	⑤	105	+0.4	-0.6
	⑧	160	+0.8	-0.2

M.R.L. : Minimum Residential-Land Level above NSL(m)

A.P.L. : Average Paddy Field Land Level above MSL(m)

3. Condition of Calculation Case

case	A	B	C	D	E	F	G	H
Rain fall	Areal Average Rainfall in 1983						Design Rainfall 1/N=1/5	
	ΣR=1078mm/3H						ER=872mm/3H	
Topo-graphy	Existing (1983)							Future (2000)
	Green Belt	×	○	○	○	○	○	○
Urgent Pump	×	×	○	○	○	○	○	
Inner Barrier	△	△	△	×	○	△	○	
Pump Capacity	CMS 21	CMS 21	CMS 159	CMS 159	CMS 159	CMS 159	CMS 159	

×: Not considered

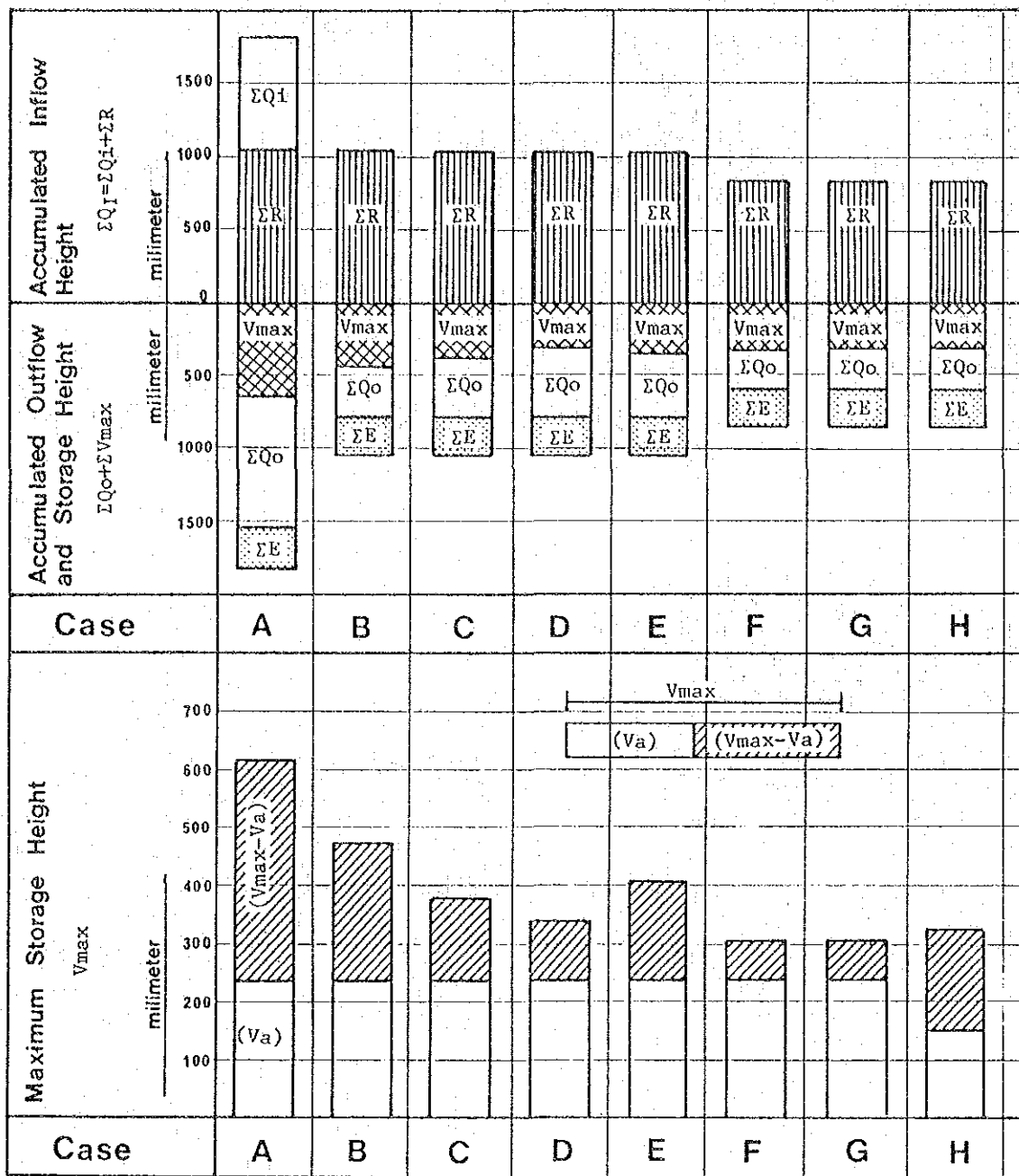
○: Considered

△: Existing Cofferdam in Klong Saen Saep and Klong Phrakhanong considered

Fig. H.21

EFFECT OF URGENT MEASURES--(1)
(MAXIMUM WATER LEVEL DEPTH DURATION PERIOD)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Legend

ΣQ_i : Inflow from Outer Area

ΣER : Rainfall

V_{max} : Maximum Storage Volume

ΣQ_o : Discharge Volume

ΣE : Evapotranspiration

V_a : Allowable Storage Capacity

(under lowest residential-land level)

Study Case

case	A	B	C	D	E	F	G	H
Rain fall	Areal Average Rainfall in 1983 $ER=1078\text{mm}/3\text{ month}$					Design Rainfall $1/N=1/5$ $ER=872\text{mm}/3\text{ month}$		
Topography	Existing (1983)							Future (2000)
Green Belt	x	o	o	o	o	o	o	o
Urgent Pump	x	x	o	o	o	o	o	o
Inner Barrier	Δ	Δ	Δ	x	o	Δ	o	o
Pump Capacity	CMS 21	CMS 21	CMS 159	CMS 159	CMS 159	CMS 159	CMS 159	CMS 159

X : Not considered

O : Considered

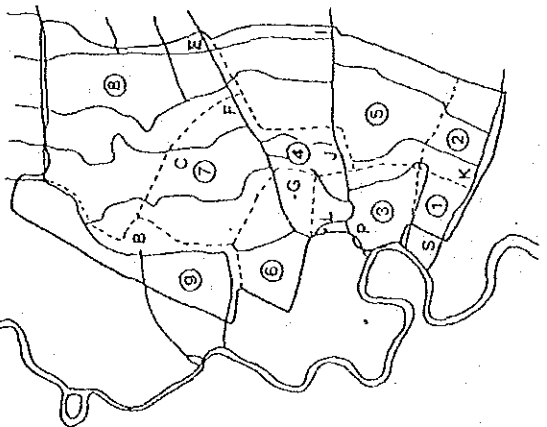
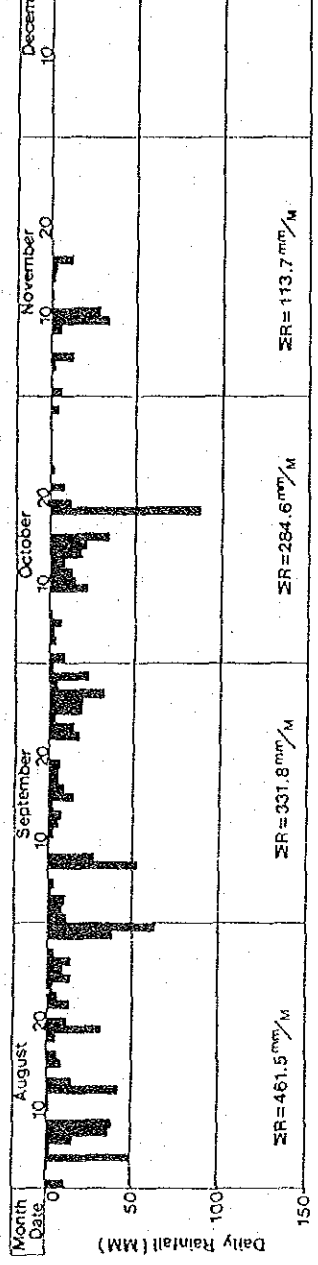
Δ : Existing Cofferdam in Klong Saen Saep and Klong Phirakhanong considered

AREA : Preliminary Study Area (including Master Plan Area) + Surrounding Area (605 km²)

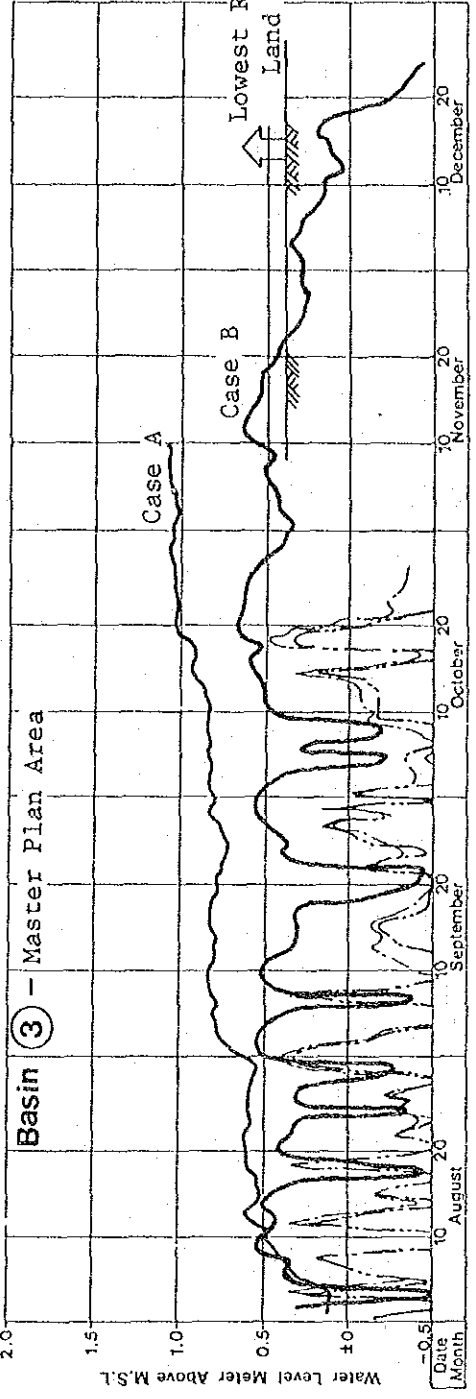
Fig. H.22

EFFECT OF URGENT MEASURES--(2)
(MAXIMUM STORAGE HEIGHT)

1983



Key Map



Legend

- ① : Basin Number
- B Water Level Gauge Station

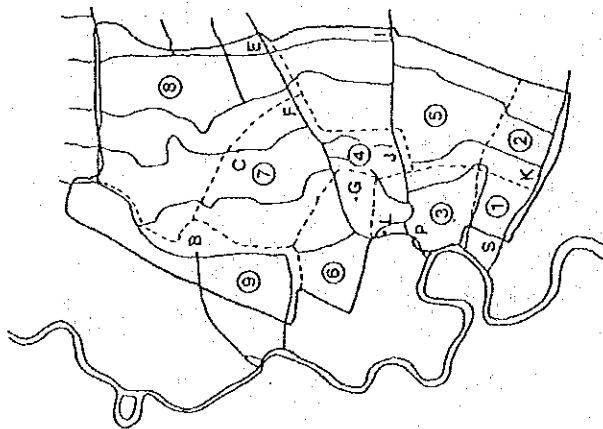
	Date	Rain fall	Topo- graphy	Green Belt	Urgent Pump	Inner Barrier	Pump Capacity
CaseA	Observed	1983	Existing	X	X	△	21
CaseB	Calculated	"	"	○	X	△	21
CaseC	"	"	"	○	○	△	159
CaseD	"	"	"	○	○	○	159

[Estimated by 9-Basin Model]

Fig. H.23 EFFECT OF URGENT MEASURES---(3)
(VARIATION OF WATER LEVEL IN BASIN 3)

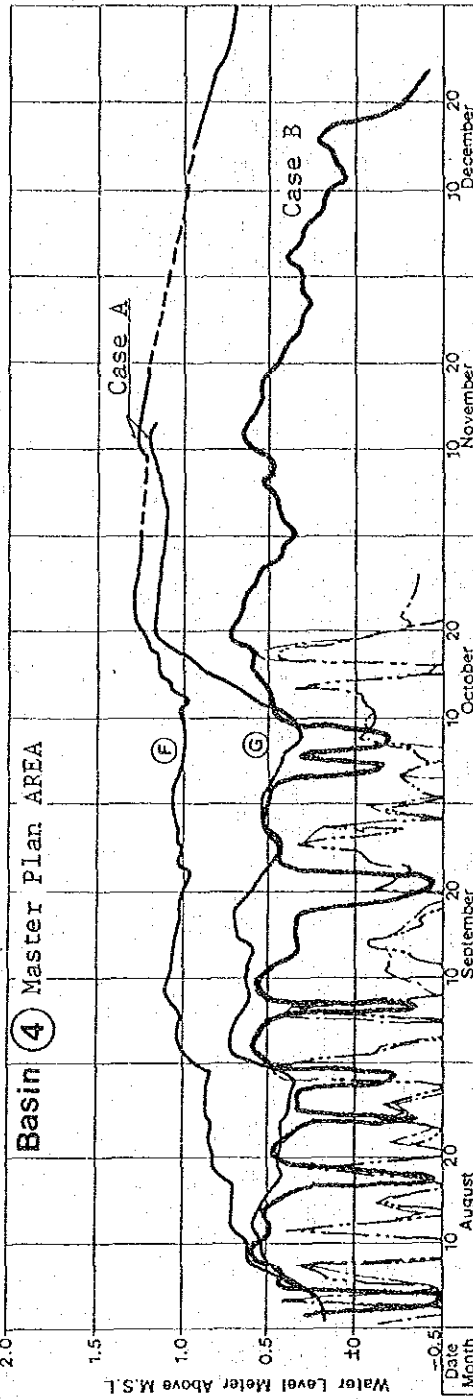
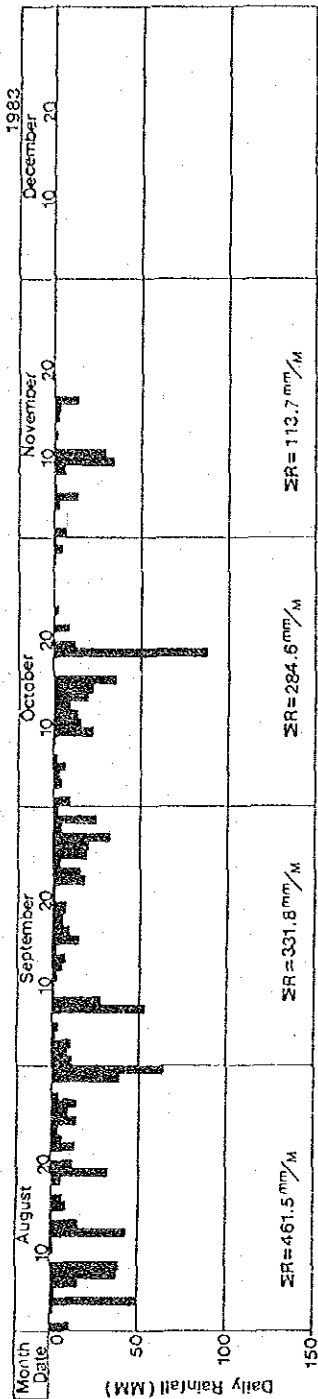
MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Key Map



Legend

- ① : Basin Number
- A : Water Level Gauge Station

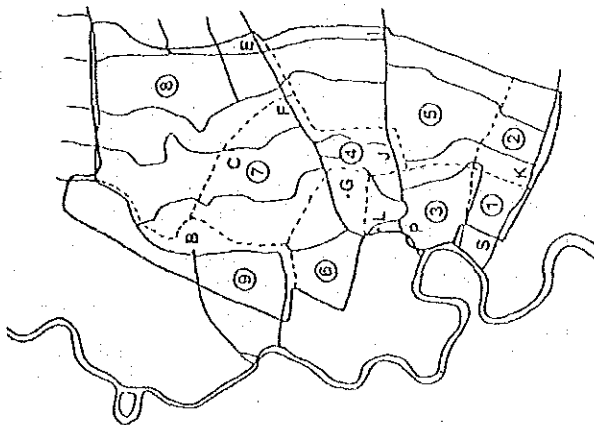


	Rain fall 1983	Topography	Green Belt	Urgent Pump	Inlet Diameter	Pump Capacity m ³ /s
CaseA	Observed Water Level	Exist	X	X	Δ	21
CaseB	Calculated Water Level		O	X	Δ	21
CaseC			O	O	Δ	159
CaseD			O	O	O	159

Fig. H.24 EFFECT OF URGENT MEASURES--(4)
(VARIATION OF WATER LEVEL IN BASIN 4)

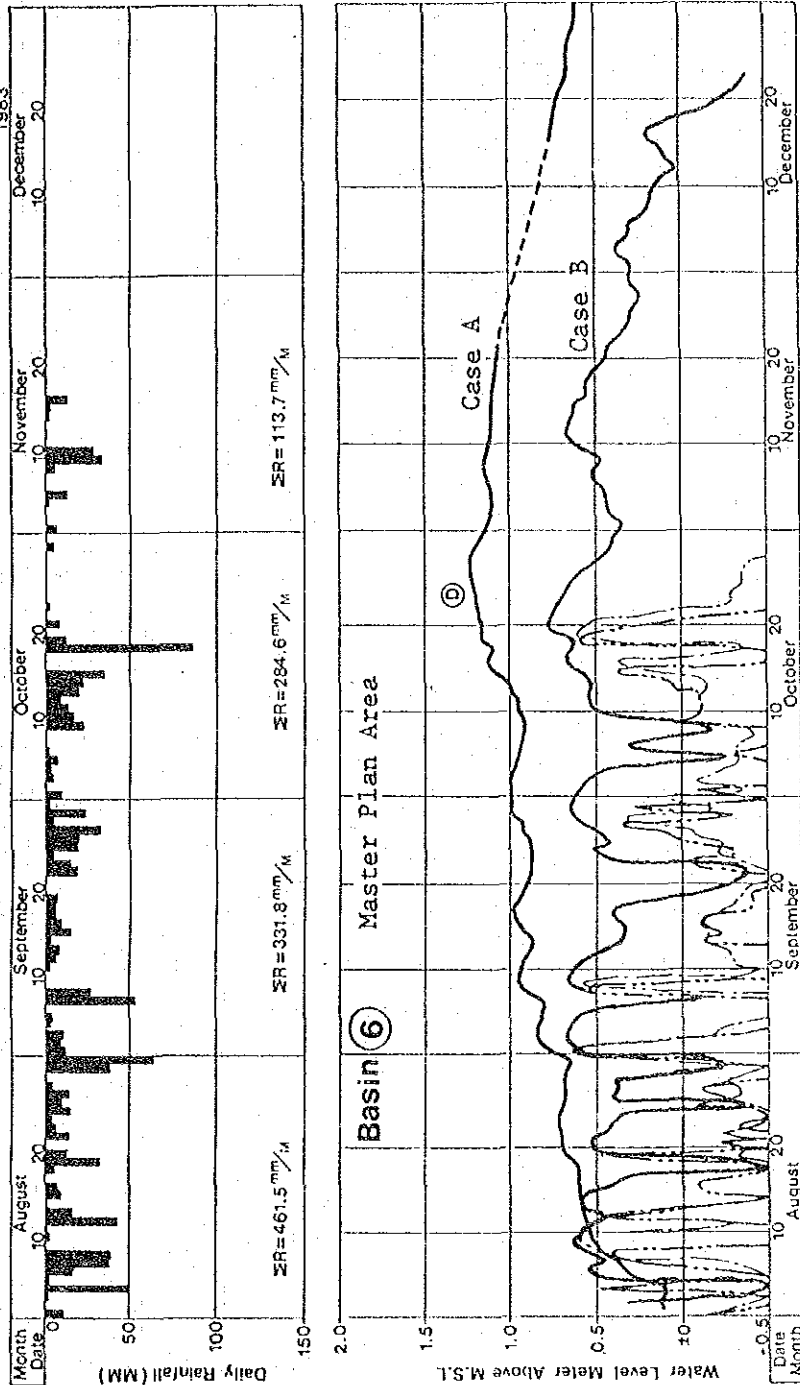
MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Key Map



Legend

- ① : Basin Number
- B : Water Level Gauge Station

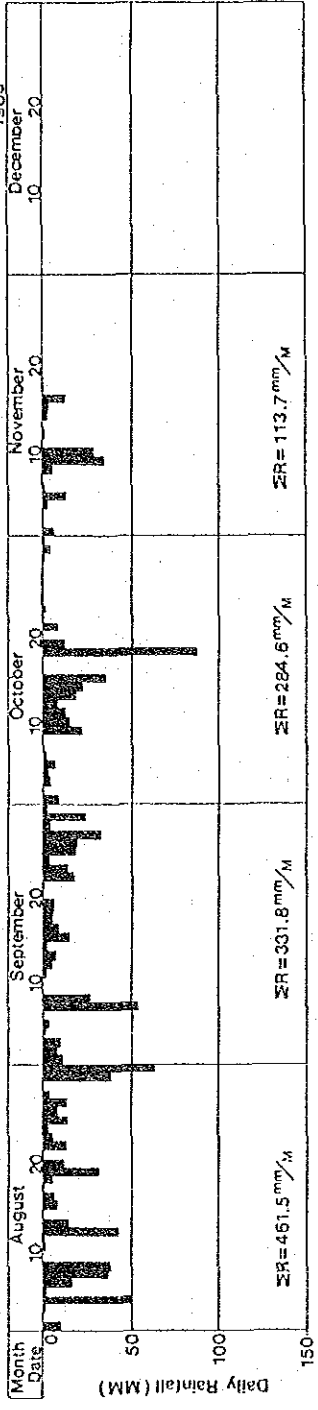


	Rain fall 1983	Topography	Green Belt	Urgent Pump	Inner Darruet	Pump Capacity m ³ /s
CaseA	Observed	Existing	X	X	△	21
CaseB	Calculated	Existing	O	X	△	21
CaseC	---	---	O	O	△	159
CaseD	---	---	O	O	O	159

Fig. H.25 EFFECT OF URGENT MEASURES--(5)
(VARIATION OF WATER LEVEL IN BASIN 6)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

1983

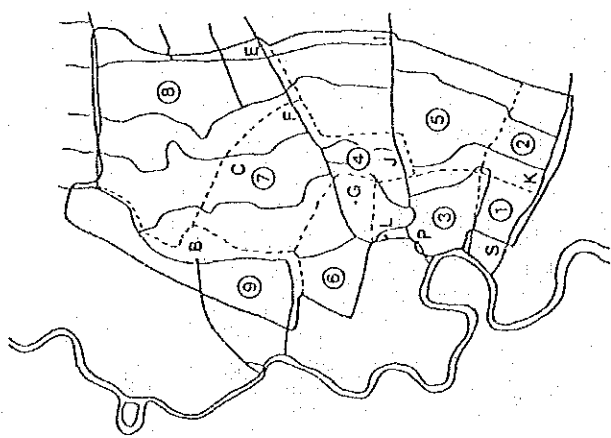


ΣR = 461.5 mm/M

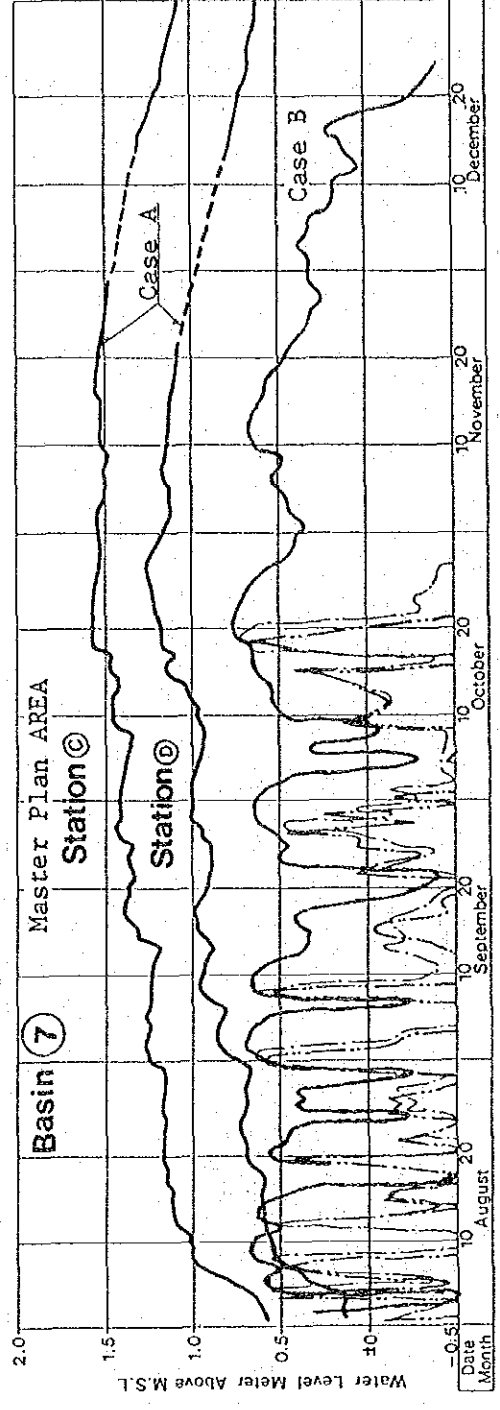
ΣR = 331.8 mm/M

ΣR = 284.6 mm/M

ΣR = 113.7 mm/M



Key Map



Basin 7

Master Plan Area Station 7

Case A

Case B

Legend

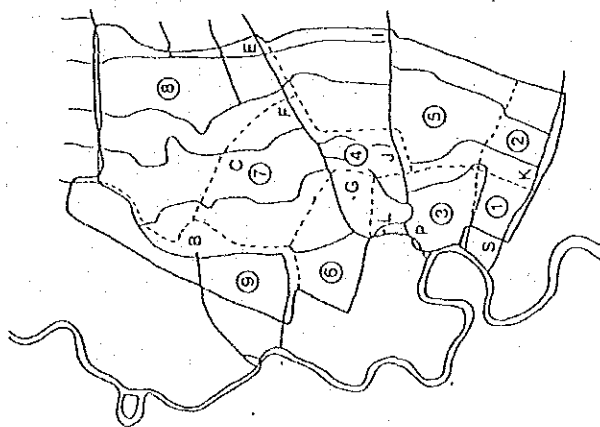
- ① : Basin Number
- ⊙ : Water Level Gauge Station

	Rain Fall	Topography	Green Belt	Urgent Pump	Inner Pump	Pump Capacity
CaseA	Observed 1983	Exist.	X	X	Δ	21
CaseB	Calculated		○	X	Δ	21
CaseC			○	○	Δ	159
CaseD			○	○	○	159

Fig. H.26 EFFECT OF URGENT MEASURES--(6)
(VARIATION OF WATER LEVEL IN BASIN 7)

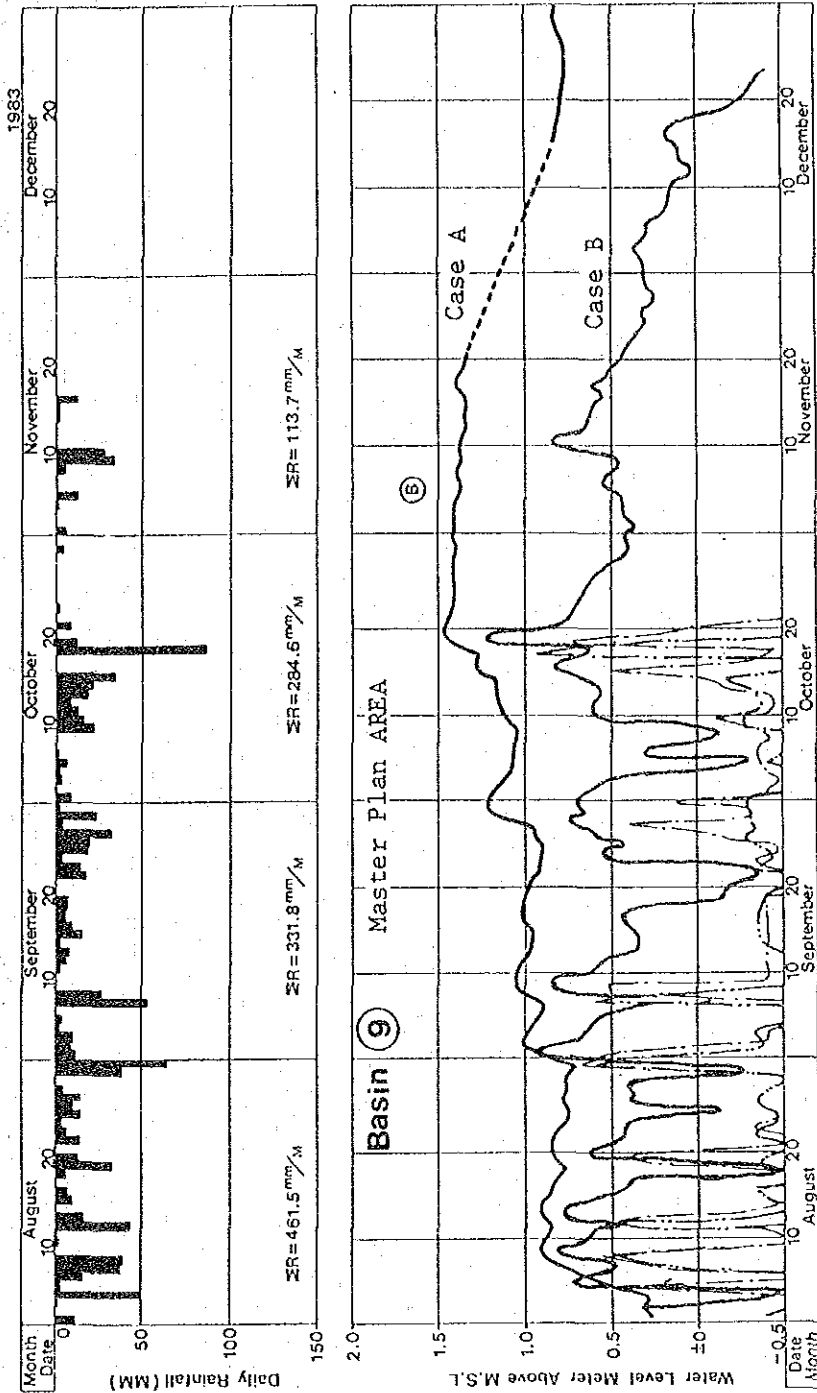
MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Key Map



Legend

- ① : Basin Number
- B : Water Level Gauge Station

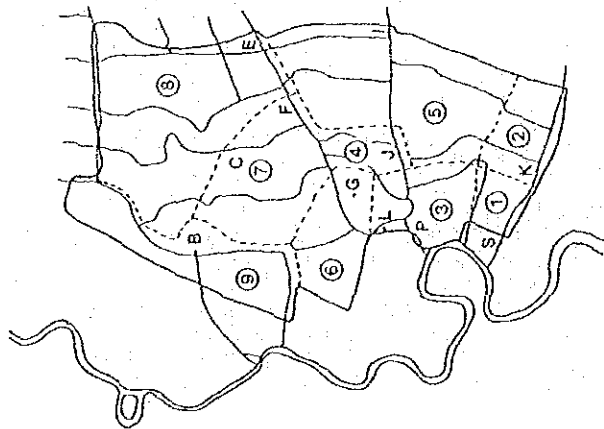


Case	Observed Water Level	Calculated Water Level	Rain fall 1983	Topo-graphy	Green Belt	Urgenc Pump	Inner Pump	Pump Capa-3 city m ³ /s
CaseA	—	---		Exist	X	X	Δ	21
CaseB	---	---			O	X	Δ	21
CaseC	---	---			O	O	Δ	159
CaseD	---	---			O	O	O	159

Fig. H.27 EFFECT OF URGENT MEASURES---(7)
(VARIATION OF WATER LEVEL IN BASIN 9)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN - BANGKOK

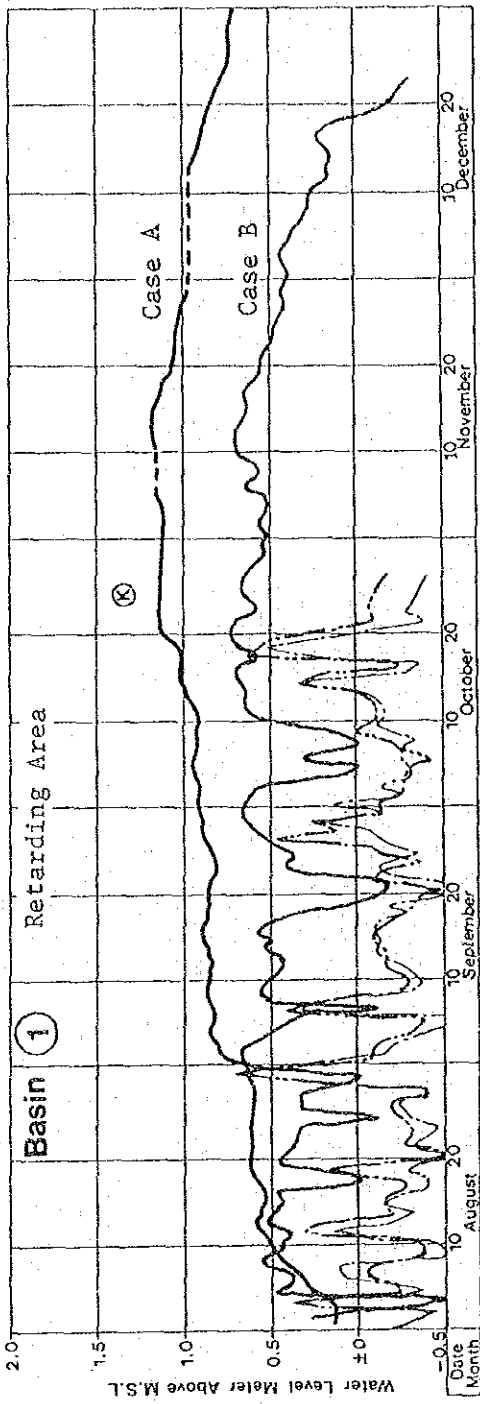
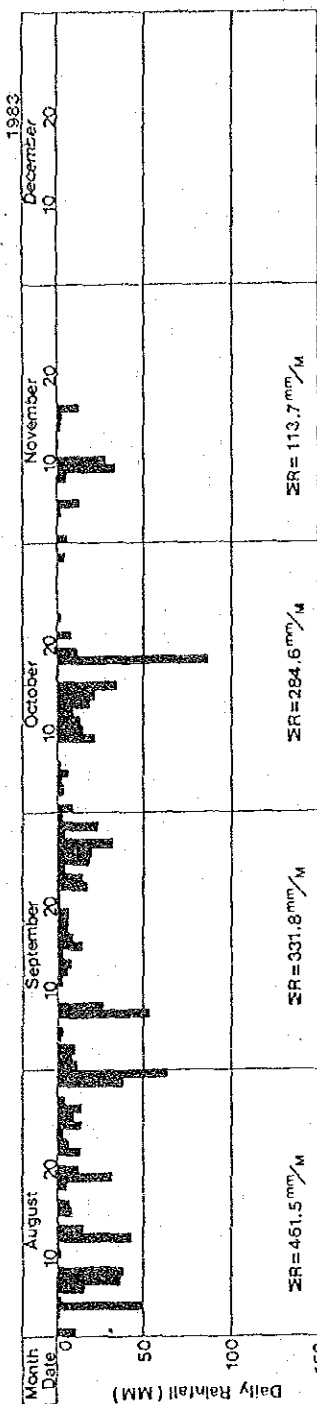
Key Map



Legend

① : Basin Number

B : Water Level Gauge Station

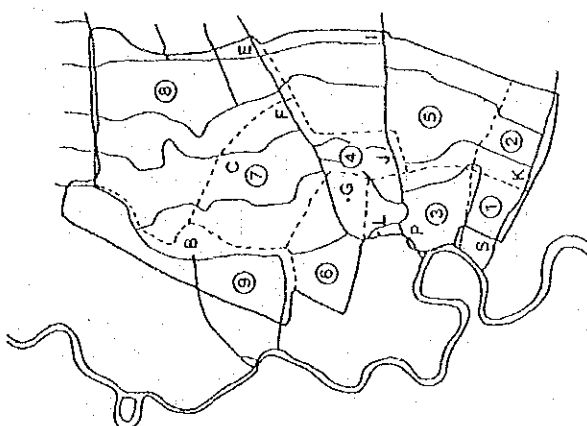
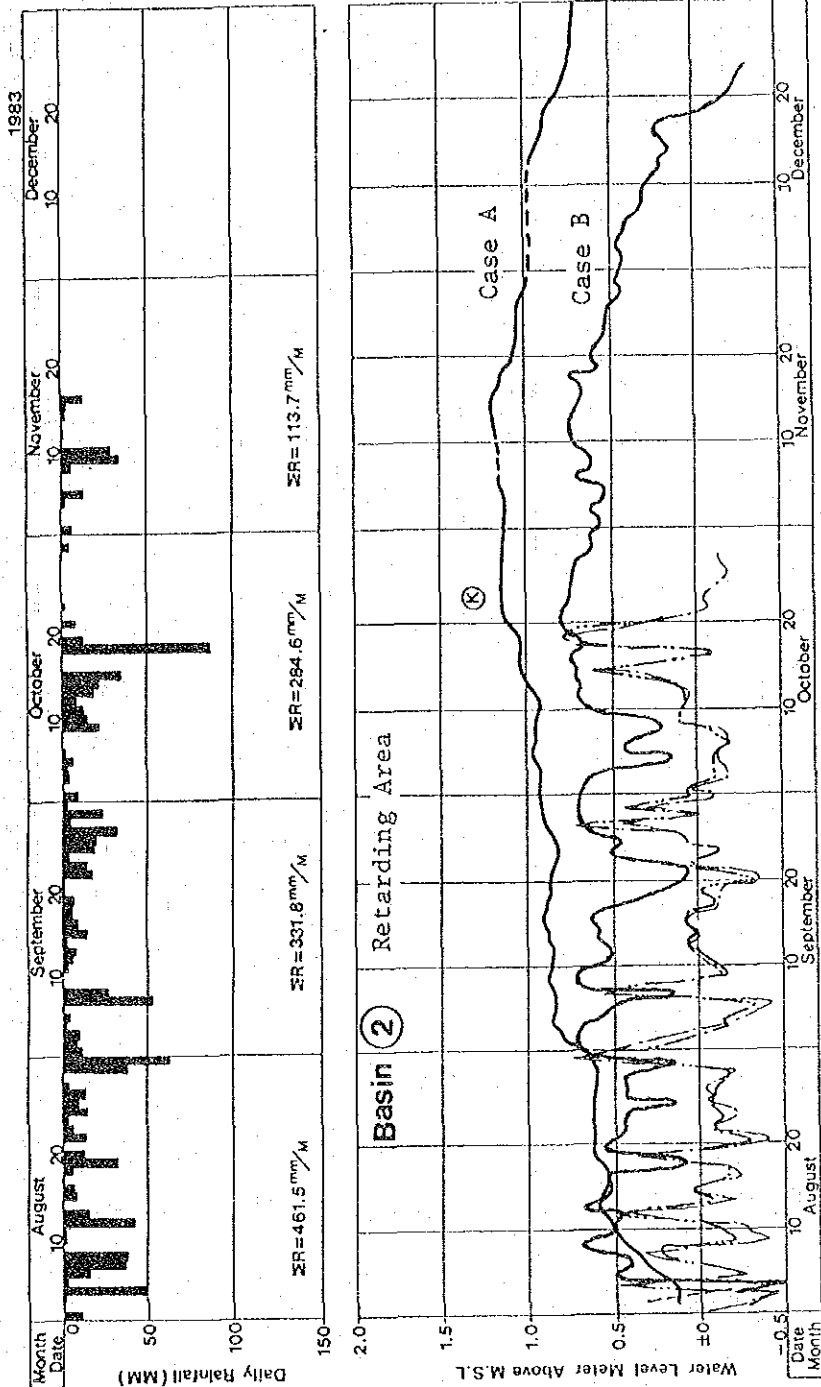


Case	Observed Water Level	Calculated Water Level	Rain Fall 1983	Topography	Green Belt	Urgent Pump	Inner Barrier	Pump Capacity m ³ /s
CaseA	---	---	1583	Exist	X	X	△	21
CaseB	---	---			O	X	△	21
CaseC	---	---			O	O	△	159
CaseD	---	---			O	O	O	159

[Estimated by 9-Basin Model]

Fig. H.28 EFFECT OF URGENT MEASURES--(8)
(VARIATION OF WATER LEVEL IN BASIN 1)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN - BANGKOK



Key Map

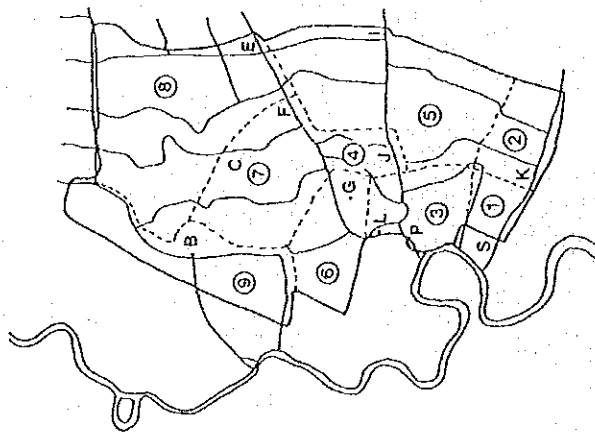
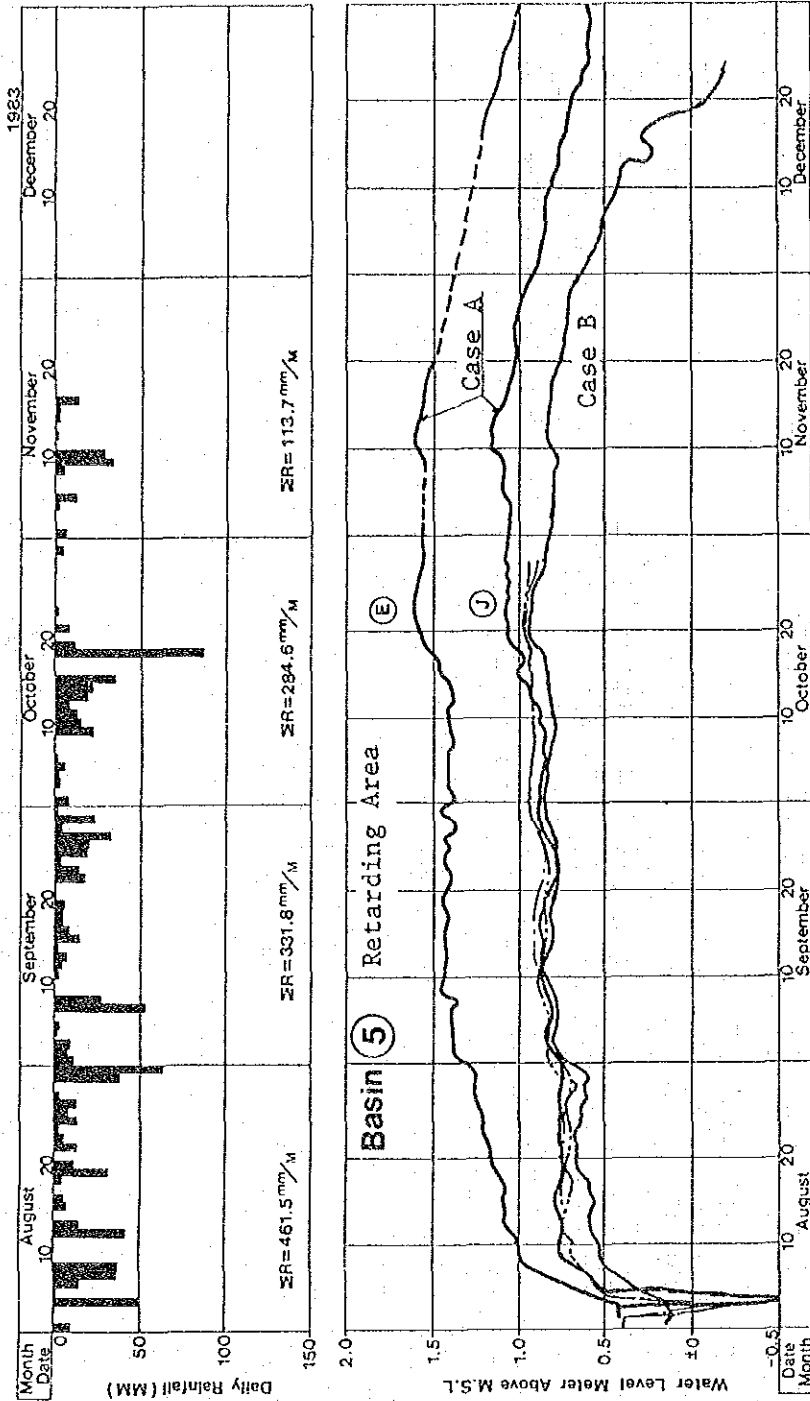
Date	Observed Water Level	Calculated Water Level	Urgent Pump	Green Belt	Topography	Rain fall	Topography	Urgent Pump	Pump Capacity
Case A	—	- - -	X	X	Exist-ing	1983	Exist-ing	X	21
Case B	—	- - -	X	O				X	21
Case C	—	- - -	O	O				O	159
Case D	—	- - -	O	O				O	159

- ① : Basin Number
- B : Water Level Gauge Station

Legend

Fig. H.29 EFFECT OF URGENT MEASURES--(9)
(VARIATION OF WATER LEVEL IN BASIN 2)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Key Map

Legend

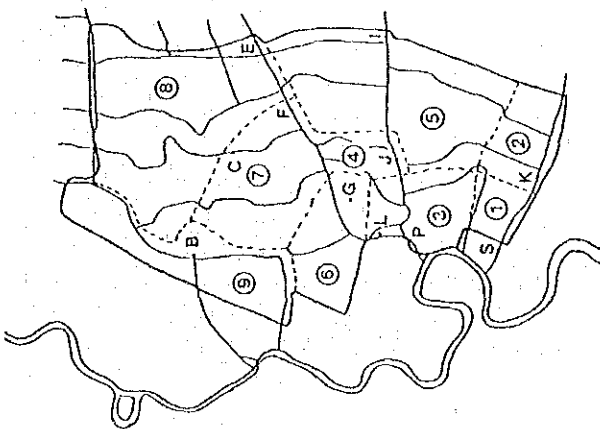
- ① : Basin Number
- B : Water Level Gauge Station

Case	Observed Water Level	Basin Fall 1983	Topo- graphy	Green Belt	Urgent Pump	Inner Drainage	Pump Capacity m ³ /s
CaseA	---			X	X	Δ	21
CaseB	---			O	X	Δ	21
CaseC	---			O	O	Δ	159
CaseD	---			O	O	O	159

Fig. H.30 EFFECT OF URGENT MEASURES--(10)
(VARIATION OF WATER LEVEL IN BASIN 5)

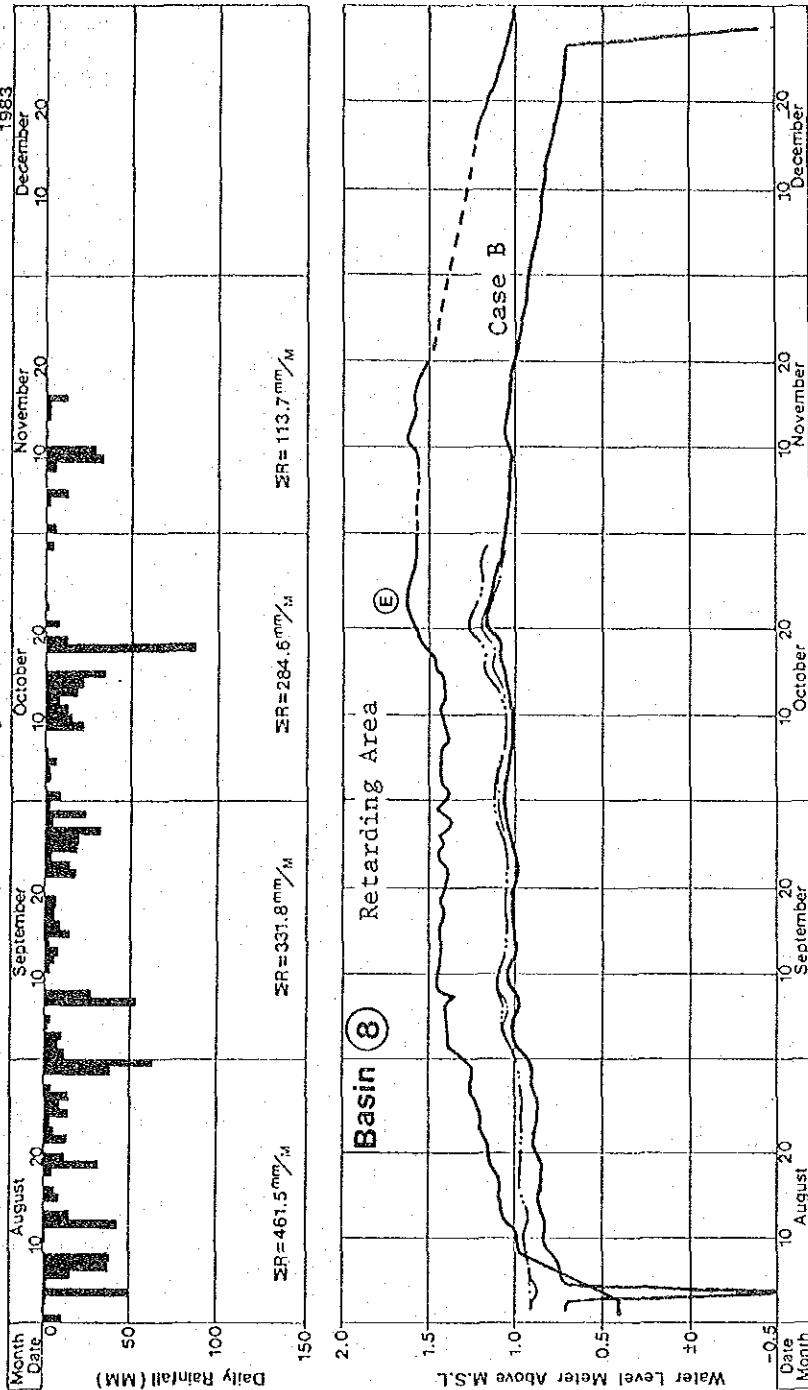
MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Key Map



Legend

- ① : Basin Number
- B : Water Level Gauge Station



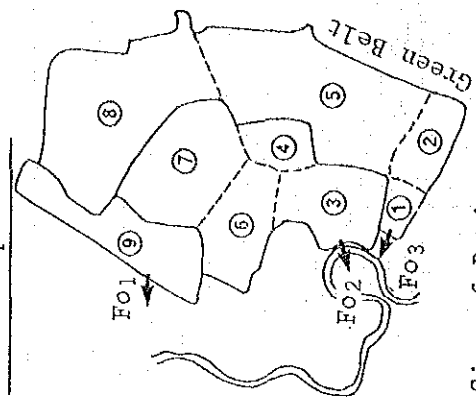
Case	Rain fall 1983		Topo- graphy Exist -line	Green Belt	Urgent Pump	Inner Pump	Pump Capacity m ³ /s
	Observed	Calculated					
CaseA	—	---	Exist	X	X	△	21
CaseB	---	---		O	X	△	21
CaseC	---	---		O	O	△	159
CaseD	---	---		O	O	O	159

Fig. H.31 EFFECT OF URGENT MEASURES--(11)
(VARIATION OF WATER LEVEL IN BASIN 8)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Remarks

1. Basin Components



2. Size of Basin

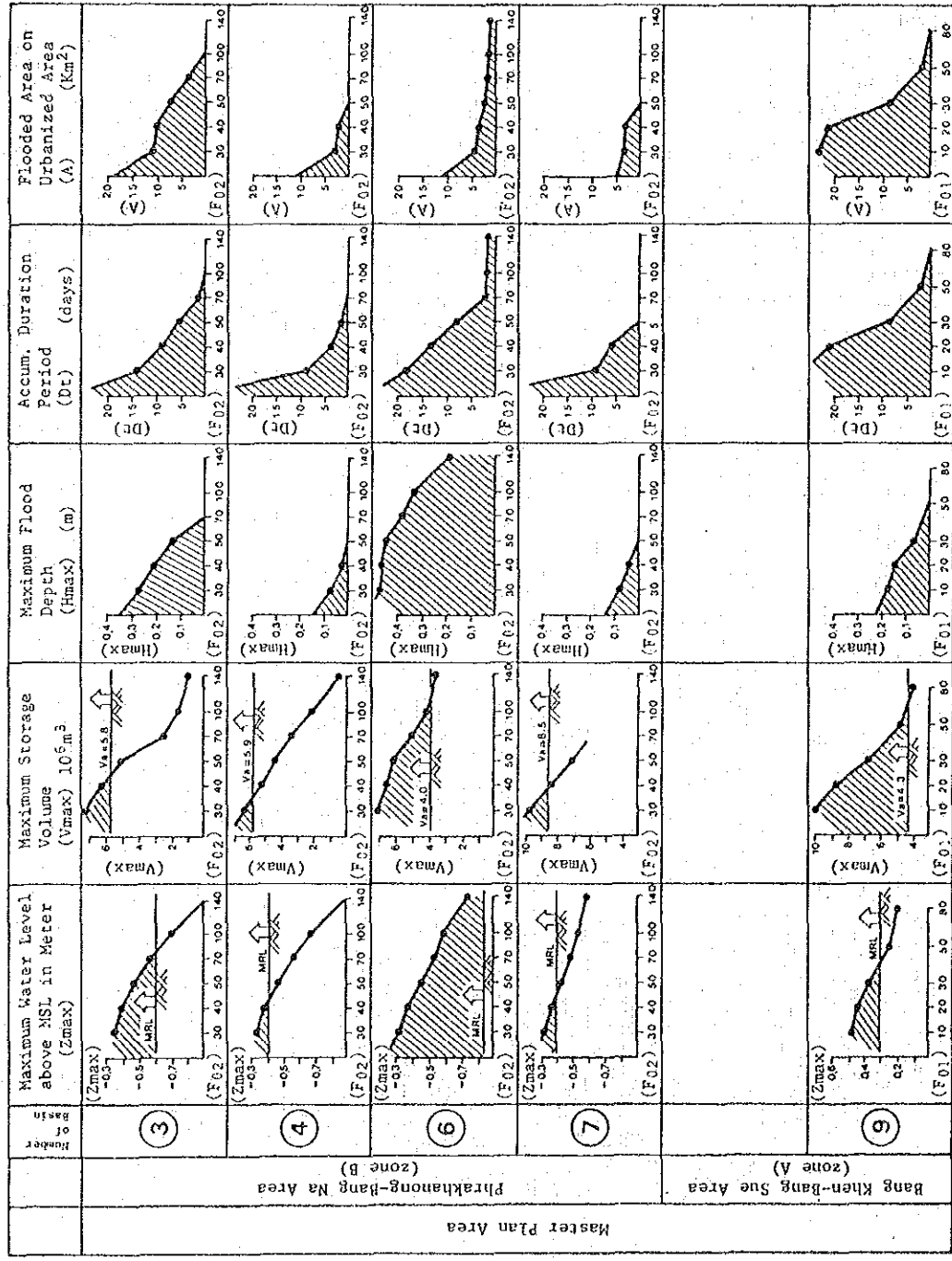
No. of Basin	Area (km ²)	MRL/APL (+M.S.L.)
③	52	MRL -0.6
④	22	MRL -0.4
⑥	42	MRL -0.9
⑦	80	MRL -0.4
⑨	64	MRL +0.3

M.R.L : Minimum Residential Land Level

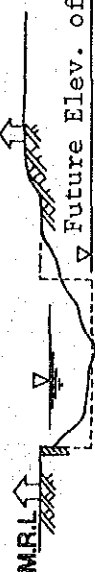
A.P.L : Average Paddy Field Level

3. Conditions of Analysis

- 1) Model : Storage Basin Model
- 2) Topography : AD2000
- 3) Land Use : AD2000
- 4) Rainfall : 5year Freq. AD1980
3Month Distribution



4. Assumed Sectional Area of Klong Connection



- Existing Shape of Sectional Area
- Assumed Shape of Sectional Area.

M.R.L : Minimum Residential Land Level

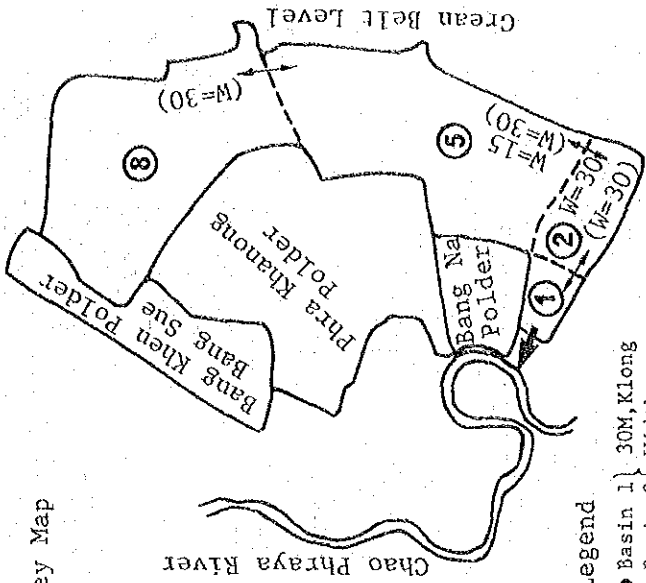
[Estimated by 9-Basin Model]

Fig. H.32 INUNDATION STATUS VS. SCALE OF TRUNK DRAINAGE FACILITY (RESULT OF STEP I ANALYSIS FOR THE MASTER PLAN AREA)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



1. Key Map



2. Legend

- Basin 1 30M, Klong
- ▲ Basin 2 Width
- Basin 5 15M, Klong
- △ Basin 8 Width
- ⊙ Basin 5 30M, Klong
- ⊙ Basin 8 Width

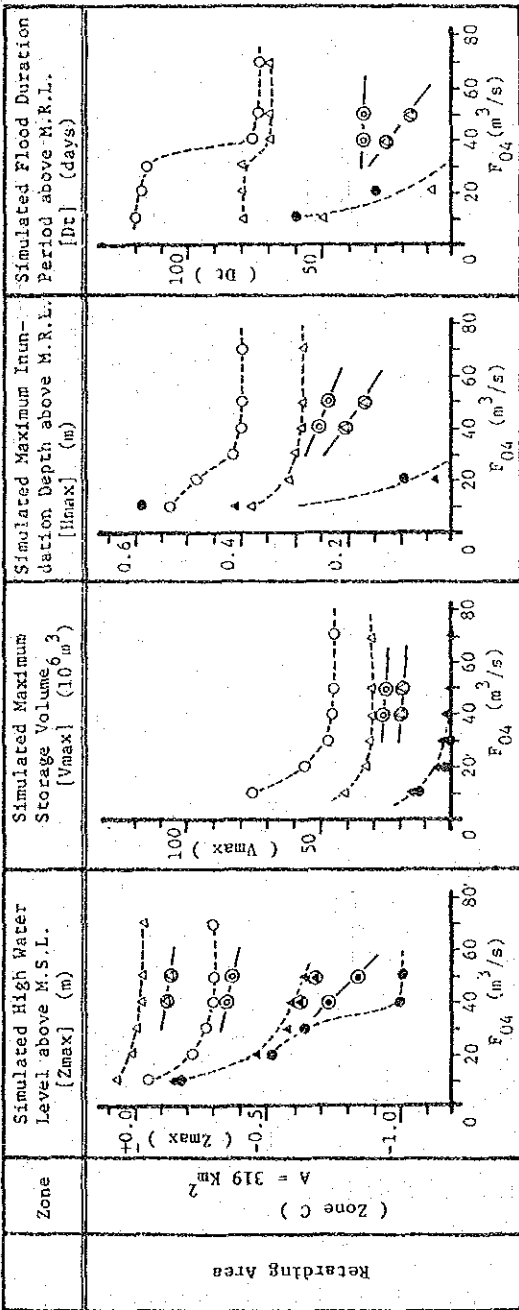
3. Conditions of Analysis

- 1) Model : Storage Basin Model
- 2) Topography : AD2000
- 3) Land Use : AD2000
- 4) Rainfall : 5year Freq. AD1980
3Month Distribution

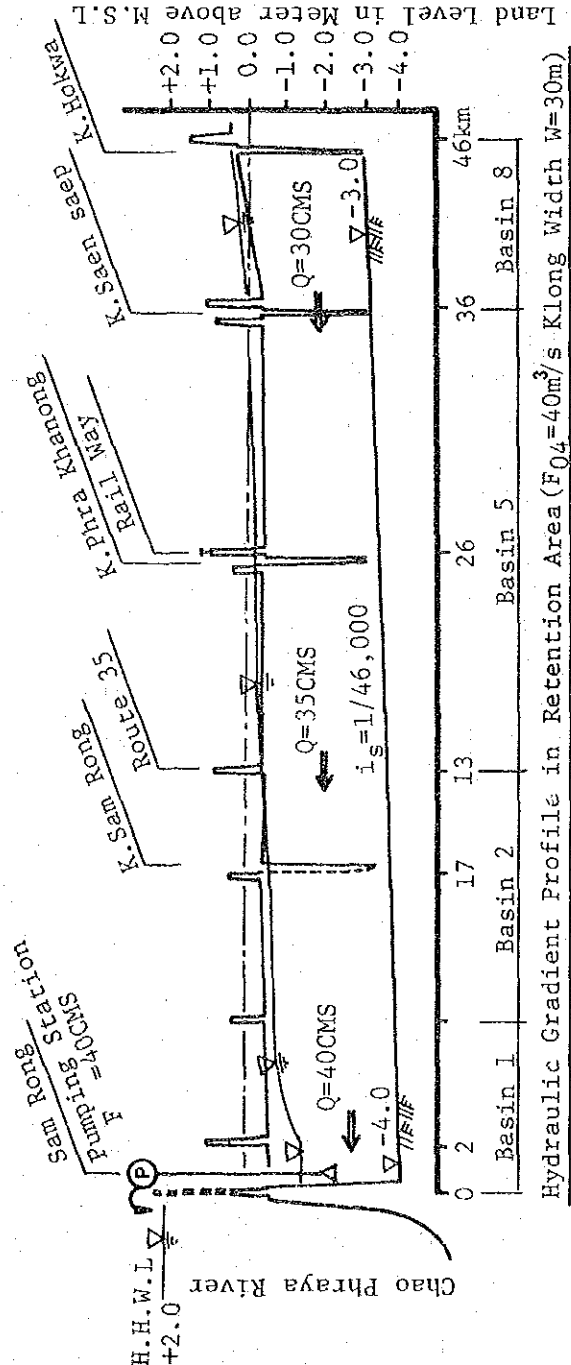
4. Basin Size

NO. of basins	Area (Km ²)	A P L (+MSL)
①	19	-0.6
②	35	-0.5
⑤	105	-0.6
⑧	160	-0.2

APL : Average Paddy Field Land Level



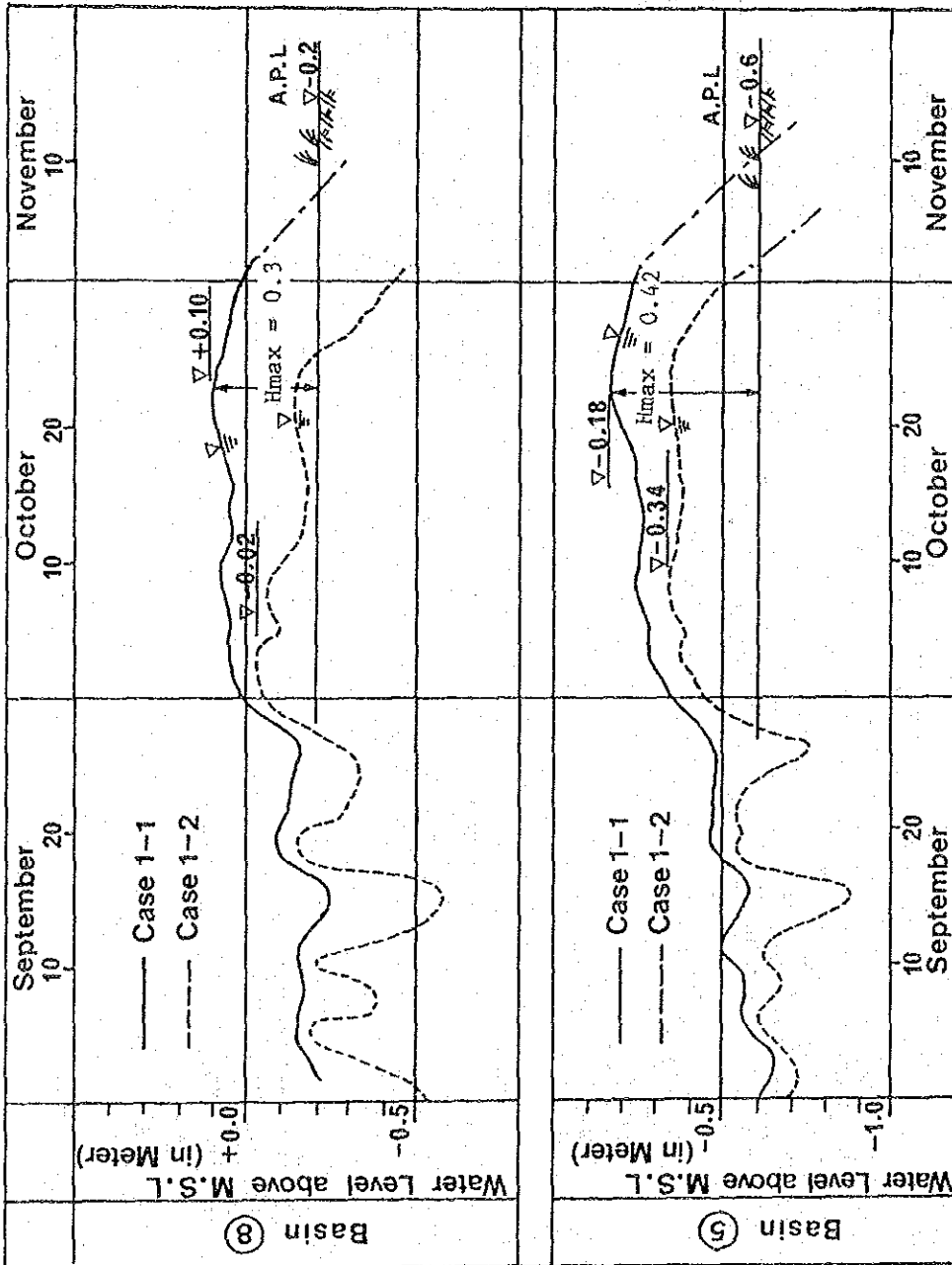
Inundation Condition in Retarding Area due to (F04)



Hydraulic Gradient Profile in Retention Area (F04=40m³/s Klong Width W=30m)

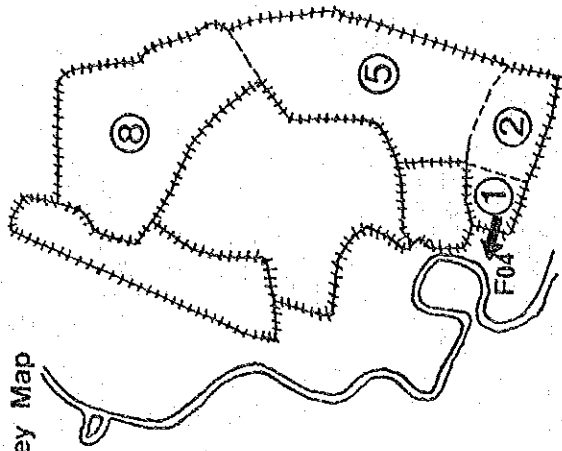
Fig. H.33 INUNDATION STATUS VS. SCALE OF TRUNK DRAINAGE FACILITY (1) (RESULT OF STEP I ANALYSIS FOR THE RETARDING AREA)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



— A.P.L. Average Paddy Field Land Level

1. Key Map



2. Calculation Case

Case	Pump Capac (F04) m ³ /s	Klong Width (m)	
		②~⑤	⑤~⑧
Case1-1	30	15	15
Case1-2	40	30	30

3. Conditions of Analysis

- 1) Model : Storage Basin Model
- 2) Topography : AD2000
- 3) Land Use : AD2000 (Paddy Field)
- 4) Rainfall : 5years Freq. AD1980 Pattern

Fig. H.34 INUNDATION STATUS VS. SCALE OF TRUNK DRAINAGE FACILITY (2)
(RESULT OF STEP I ANALYSIS FOR THE RETARDING AREA)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

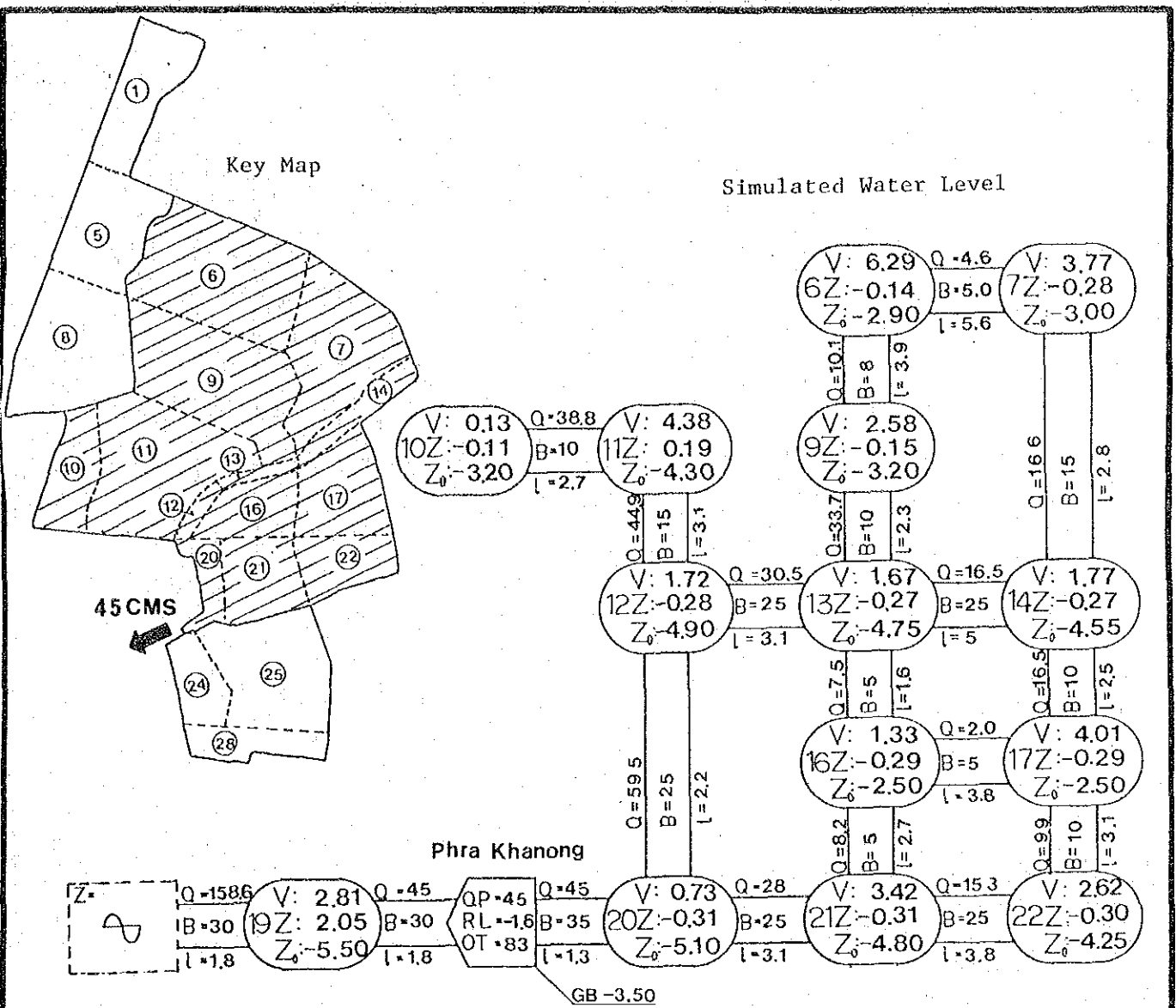
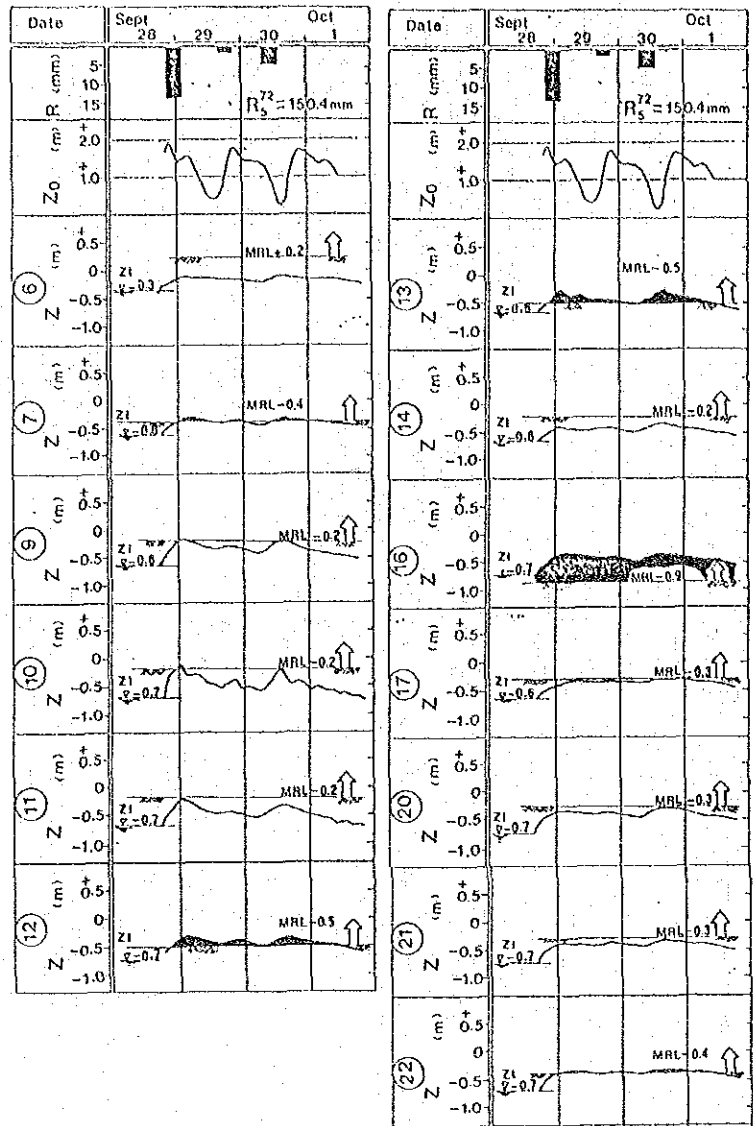
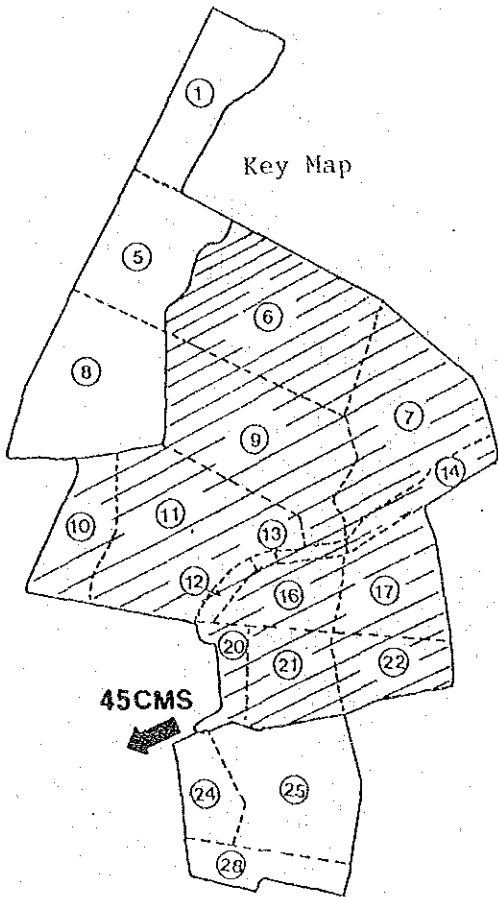


Fig. H. 35

RESULT OF STEP II ANALYSIS FOR THE PHRA KHANONG POLDER-(1)
(FLOW AND STORAGE CONDITION WITH 45 CMS PUMP CAPACITY)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Simulated Water Level



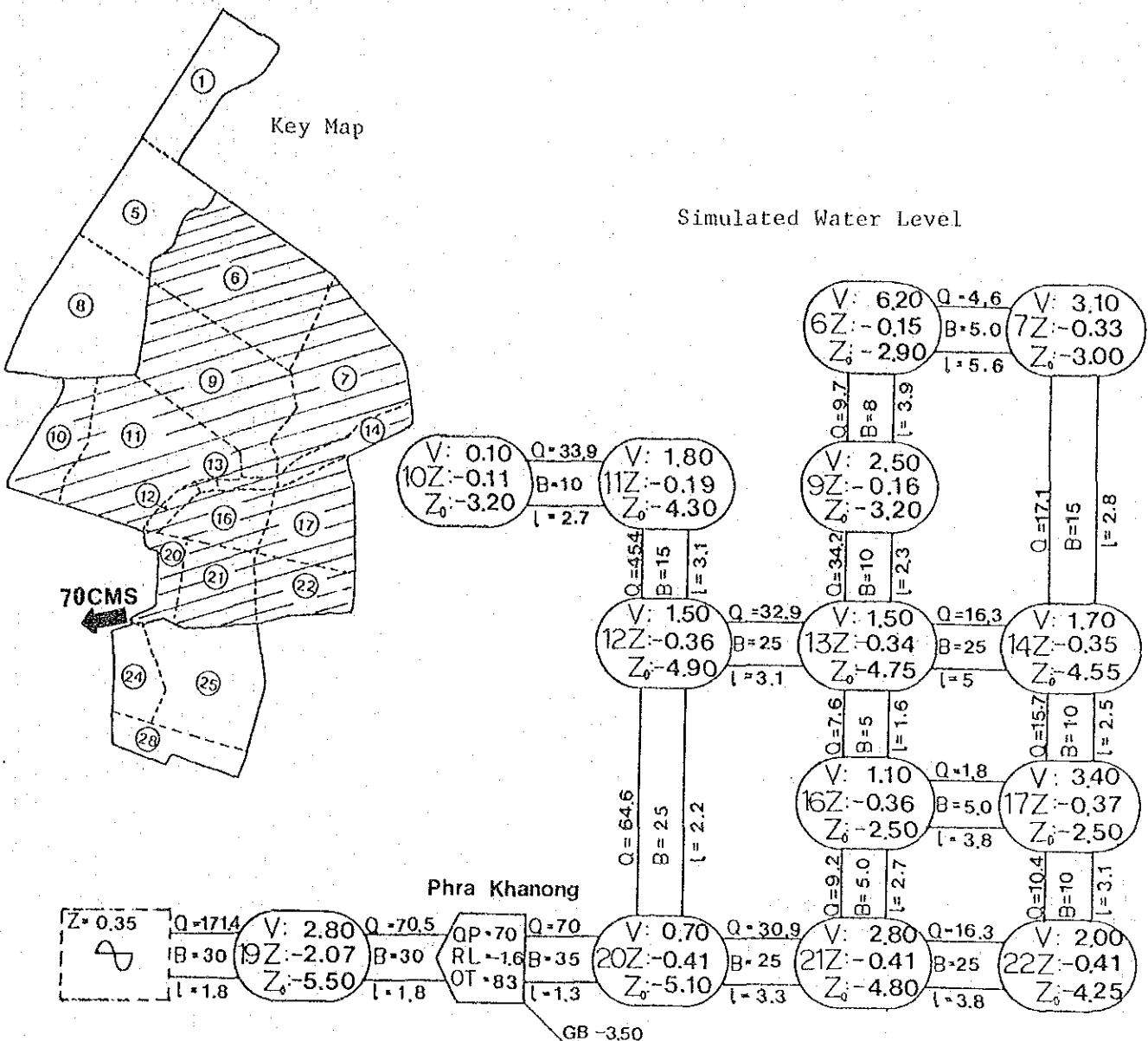
Legend

- R : Design Rainfall in millimeter
- Z₀: Water Level in Chao Phraya River in meter above M.S.L.
- Z : Simulated Maximum Water Level in meter above M.S.L.
- Q_p: Pump Capacity in C M S
- RL: Pump Running Level in meter above M.S.L.
- OT: Pump Operation Time in Hours
- Q : Maximum Flow Discharge in C M S
- V : Maximum Basin Storage Volume in million cubic meter
- Z₀: Bottom Elevation of Basin in meter above M.S.L.
- B : Width of Klong in meter
- l : Length between each Basin in kilometer
- MRL: Minimum Residential Land Level in meter above M.S.L.
- Z_i: Initial Water Level in meter above M.S.L.
- GB: Bottom Elevation of Sluice Gate in meter above M.S.L.

Fig. H. 36

RESULT OF STEP II ANALYSIS FOR THE PHRA KHANONG POLDER-(2)
(INUNDATION STATUS WITH 45 CMS PUMP CAPACITY)

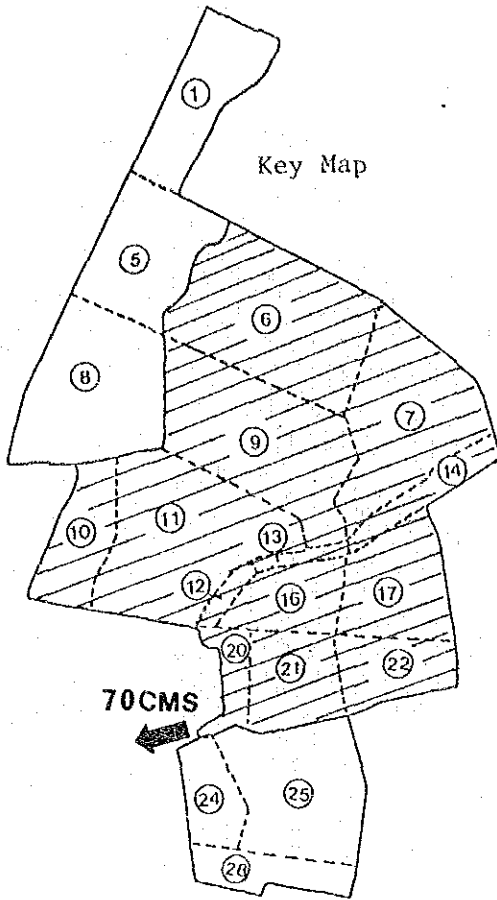
MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



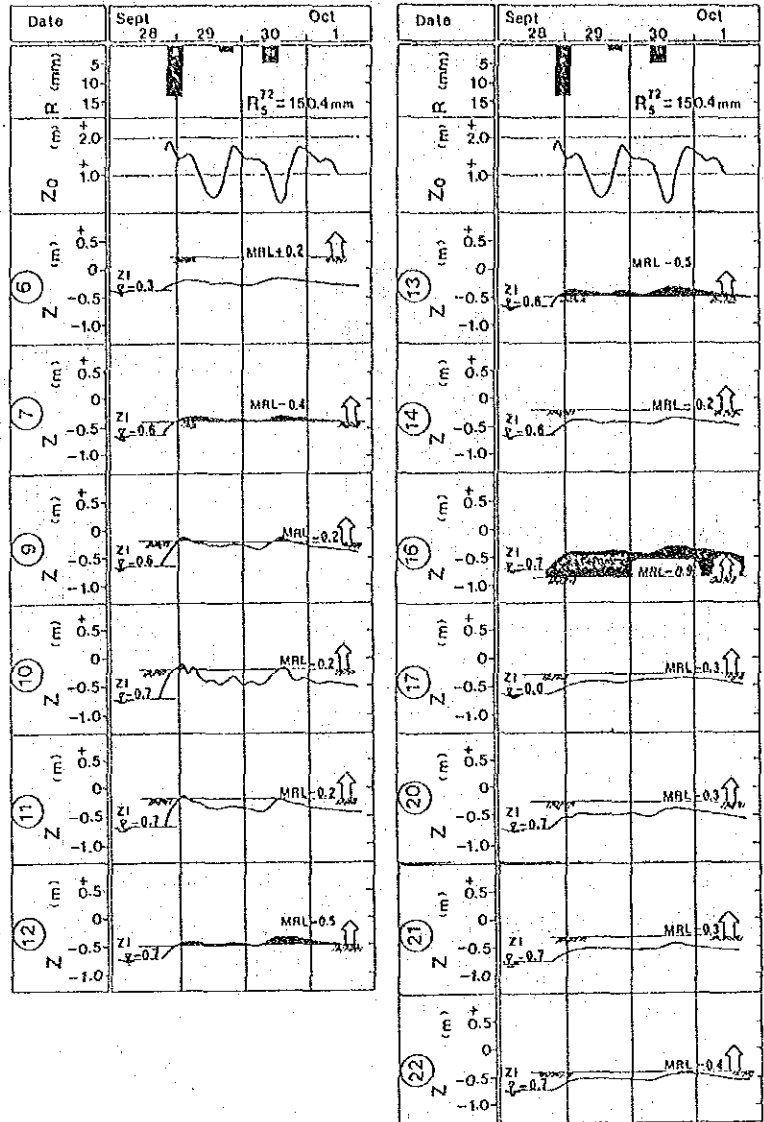
- Legend**
- R : Design Rainfall in millimeter
 - Z₀ : Water Level in Chao Phraya River in meter above M.S.L.
 - Z : Simulated Maximum Water Level in meter above M.S.L.
 - Q_P : Pump Capacity in C M S
 - RL: Pump Running Level in meter above M.S.L.
 - OT: Pump Operation Time in Hours
 - Q : Maximum Flow Discharge in C M S
 - V : Maximum Basin Storage Volume in million cubic meter
 - Z₀ : Bottom Elevation of Basin in meter above M.S.L.
 - B : Width of Klong in meter
 - l : Length between each Basin in kilometer
 - MRL: Minimum Residential Land Level in meter above M.S.L.
 - Z_i : Initial Water Level in meter above M.S.L.
 - GB: Bottom Elevation of Sluice Gate in meter above M.S.L.

Fig. H.37 RESULT OF STEP II ANALYSIS FOR THE PHRA KHANONG POLDER-(3) (FLOW AND STORAGE CONDITION WITH 70 CMS PUMP CAPACITY)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Simulated Water Level



Legend

- R : Design Rainfall in millimeter
- Z₀: Water Level in Chao Phraya River in meter above M.S.L.
- Z : Simulated Maximum Water Level in meter above M.S.L.
- Q_p: Pump Capacity in C M S
- RL: Pump Running Level in meter above M.S.L.
- OT: Pump Operation Time in Hours
- Q : Maximum Flow Discharge in C M S
- V : Maximum Basin Storage Volume in million cubic meter
- Z₀: Bottom Elevation of Basin in meter above M.S.L.
- B : Width of Klong in meter
- l : Length between each Basin in kilometer
- MRL: Minimum Residential Land Level in meter above M.S.L.
- Z_i: Initial Water Level in meter above M.S.L.
- GB: Bottom Elevation of Sluice Gate in meter above M.S.L.

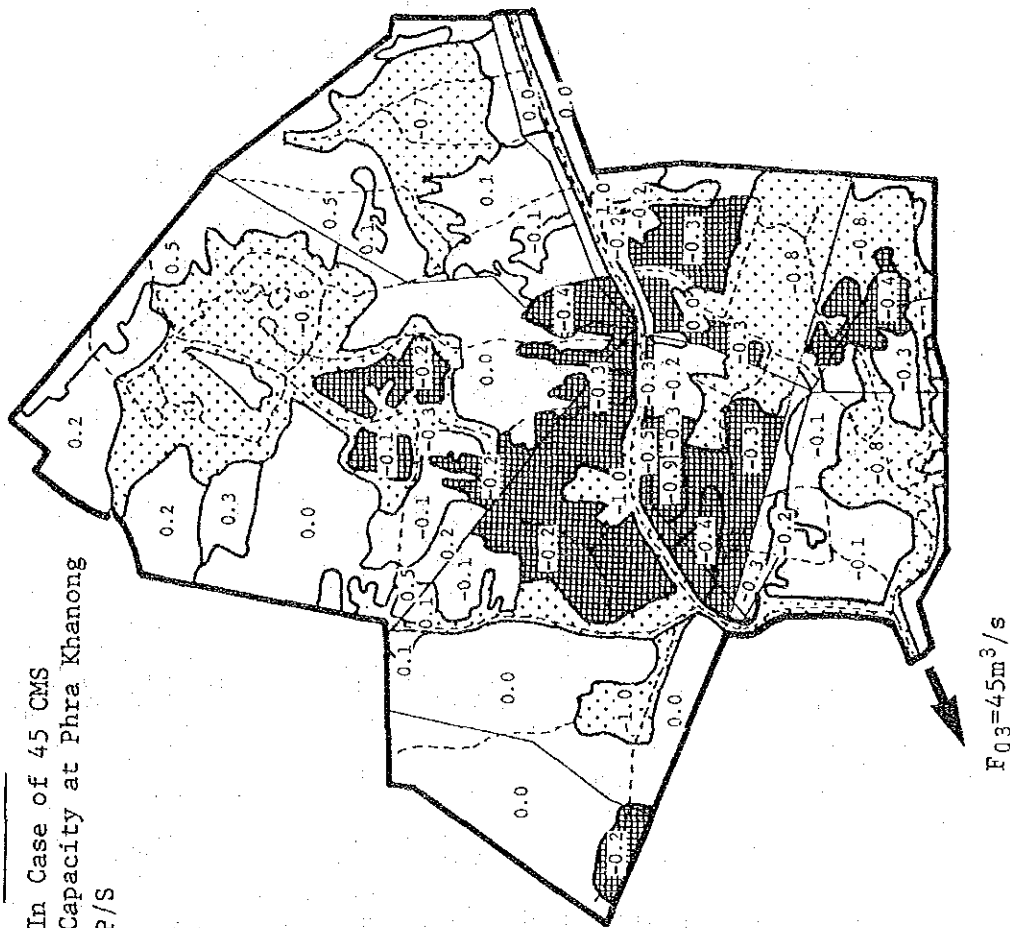
Fig. H. 38

RESULT OF STEP II ANALYSIS FOR THE PHRA KHANONG POLDER-(4)
(INUNDATION STATUS WITH 70 CMS PUMP CAPACITY)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Case A

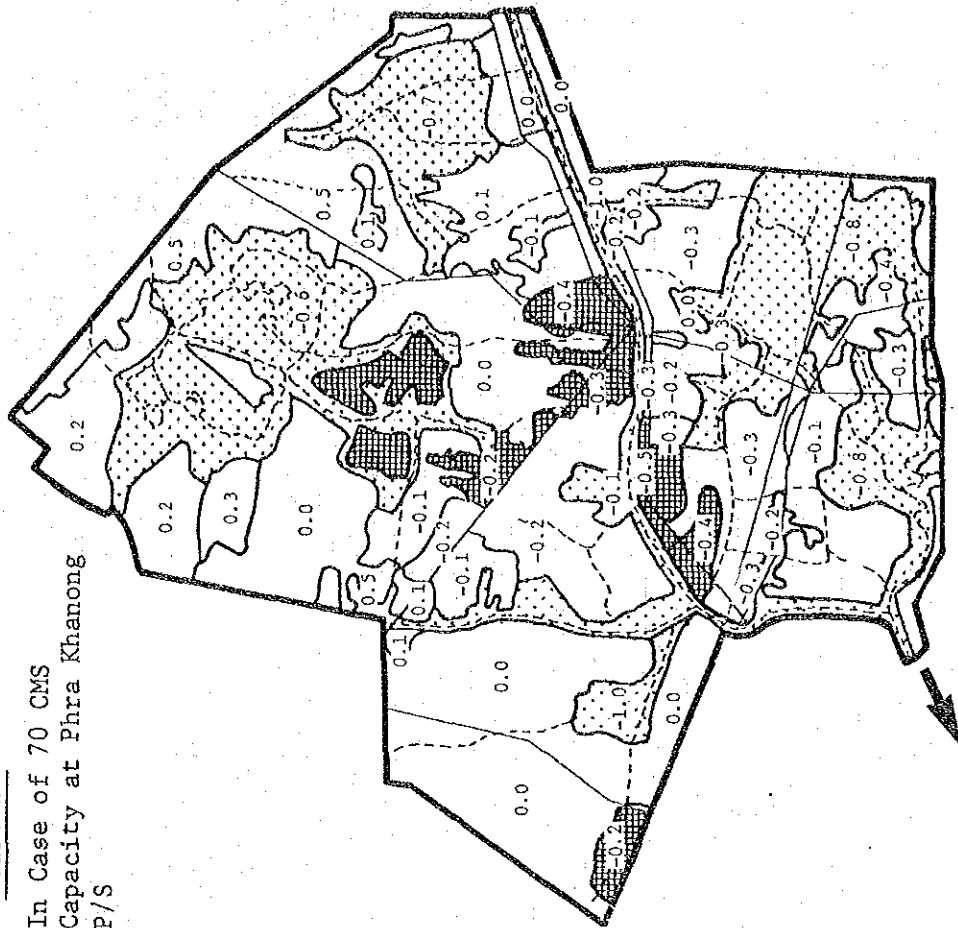
In Case of 45 CMS
Capacity at Phra Khanong
P/S



$F_{03}=45m^3/s$


Case B

In Case of 70 CMS
Capacity at Phra Khanong
P/S



$F_{03}=70m^3/s$

Legend

 : Retention Area


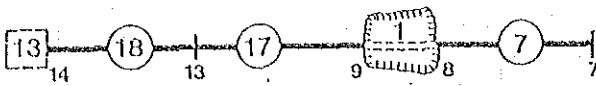
 : Poor Drainage Area Influenced
by the water level in Main Klongs

Fig. H.39 RESULT OF STEP II ANALYSIS FOR THE PHRA KHANONG POLDER-(5)
(COMPARISON OF INUNDATION AREA WITH 45 AND 70 CMS. PUMP
CAPACITY)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Legend



13 : Dummy Block NO.13 for Boundary Water Level

18 : Block NO.18 for Klong

13 : Section NO.13 for Klong

Retention Area

Bang Khen Bang Sue Polder

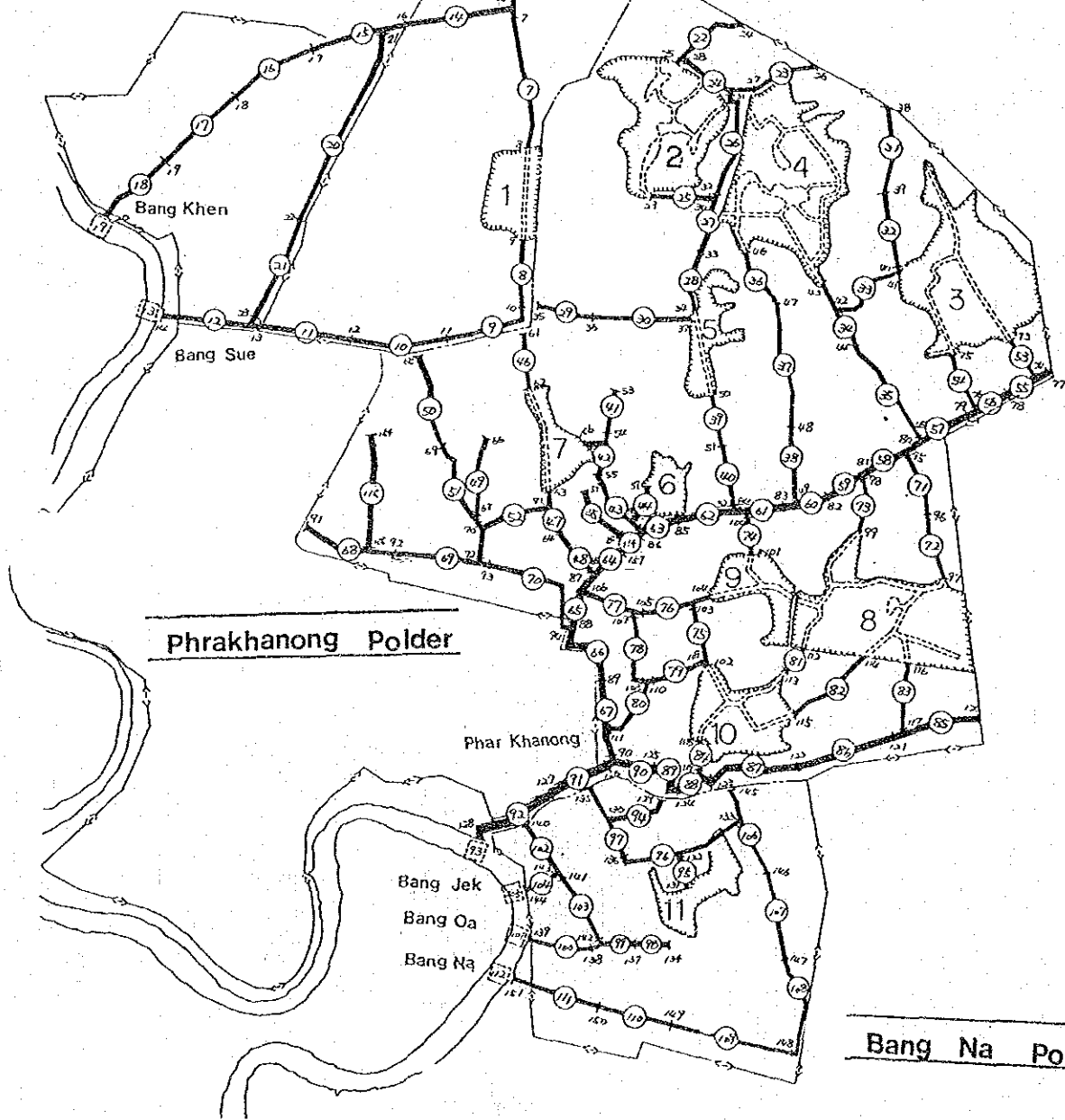


Fig. H.40

PROPOSED KLONG NETWORK IN THE MASTER PLAN AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Legend



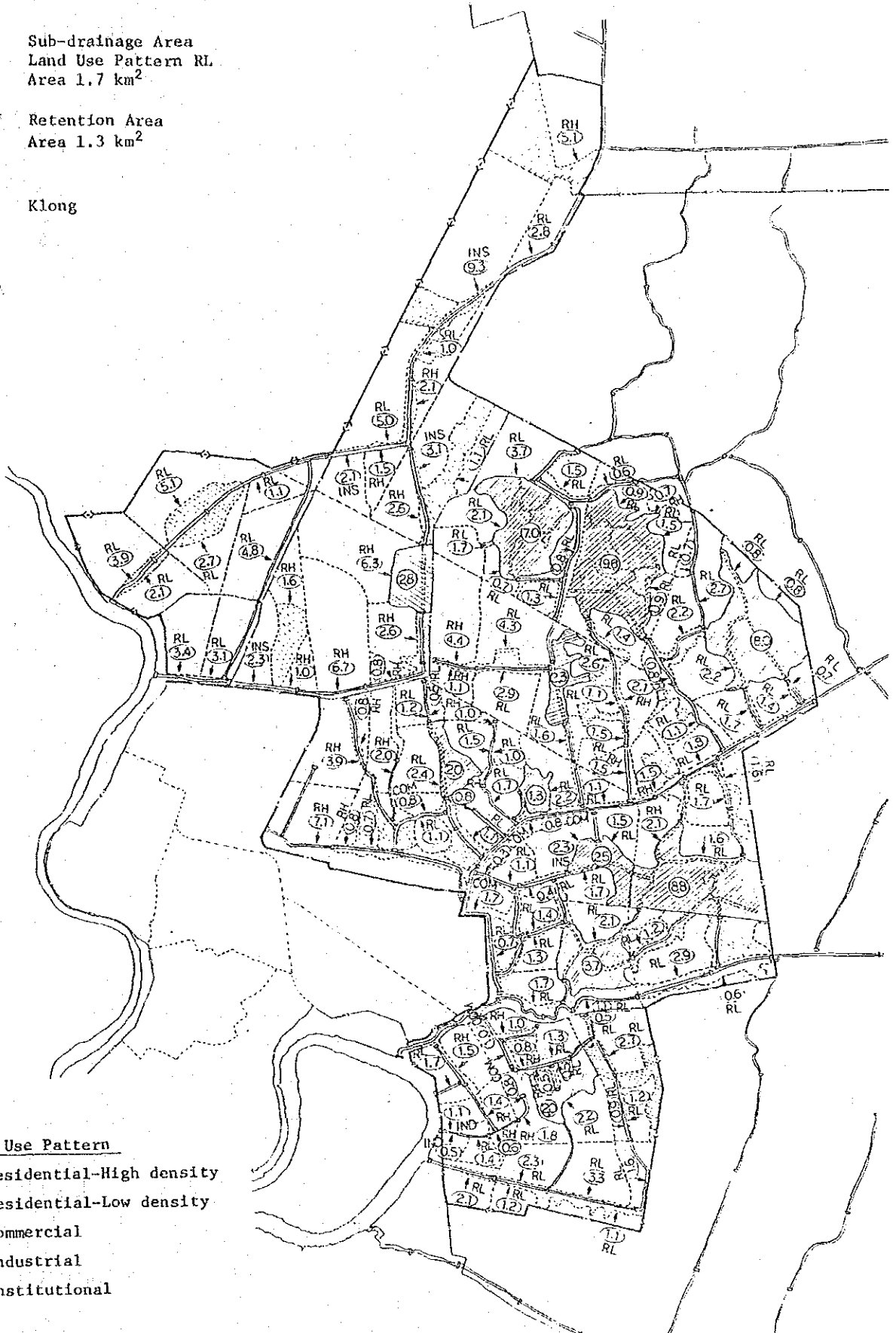
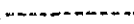
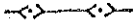
Sub-drainage Area
Land Use Pattern RL
Area 1.7 km²



Retention Area
Area 1.3 km²



Klong



Land Use Pattern

- RH : Residential-High density
- RL : Residential-Low density
- COM : Commercial
- IND : Industrial
- INS : Institutional

Fig. H.41

SUB-DRAINAGE AREA IN THE MASTER PLAN AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

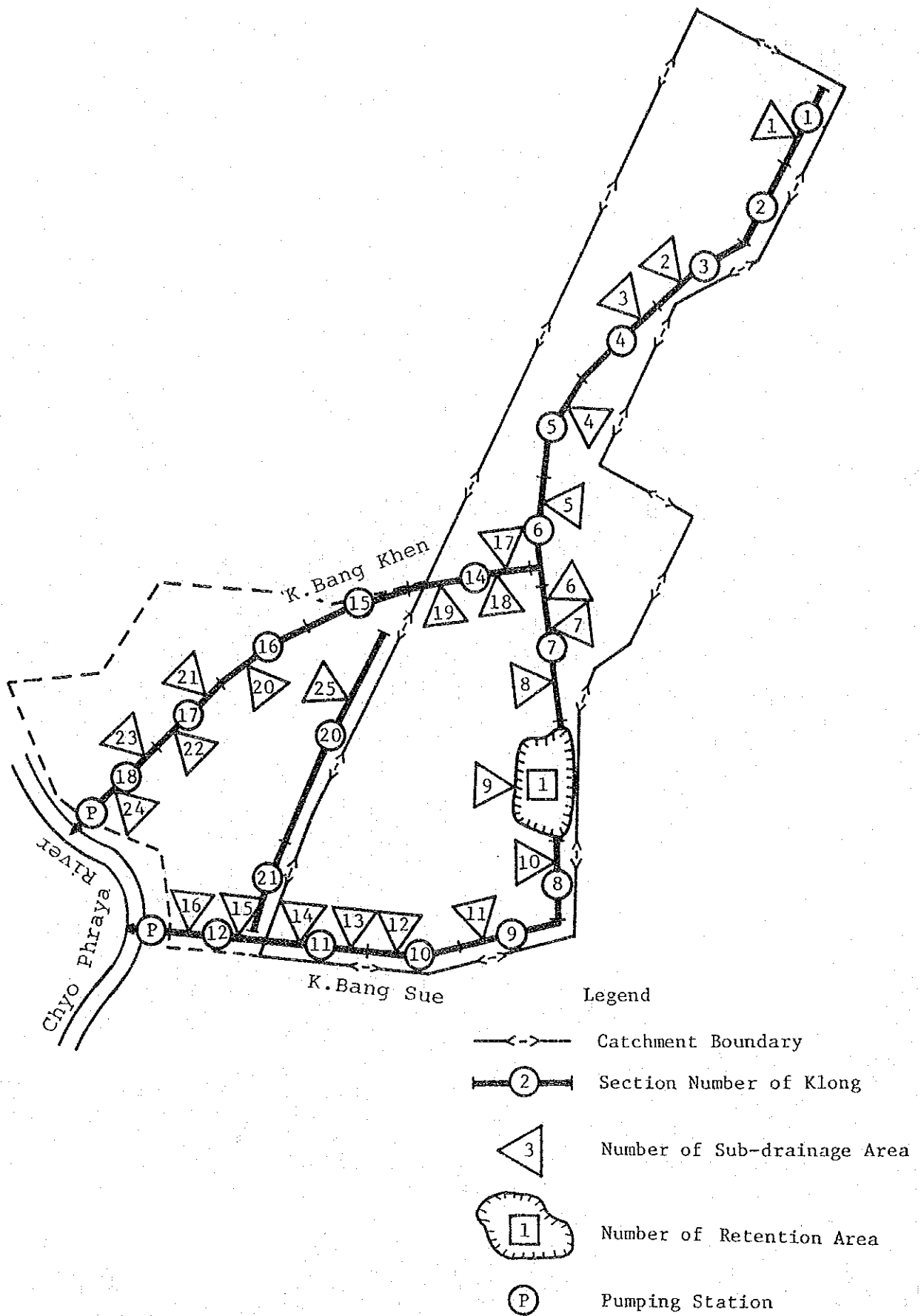


Fig. H.42 LAYOUT OF KLONGS IN BANG KHEN AND BANG SUE DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

--- K. Bang Khen (15m³/s), K. Bang Sue (30m³/s) One Polder
 - - - " (15m³/s) " (30m³/s) Two Polders
 ——— " (15m³/s) " (50m³/s) One Polder

Bang Khen, Bang Sue, D.A.

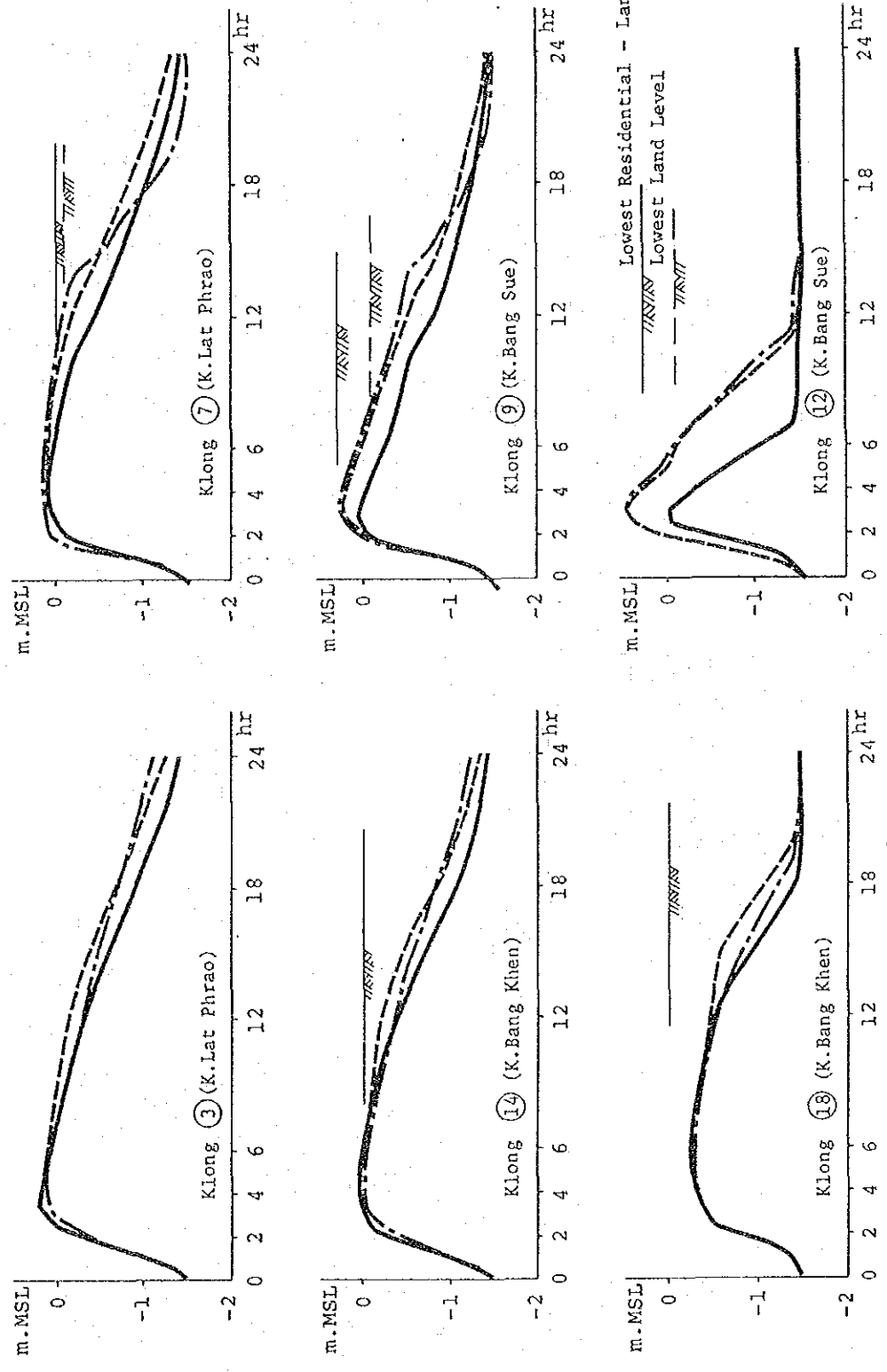
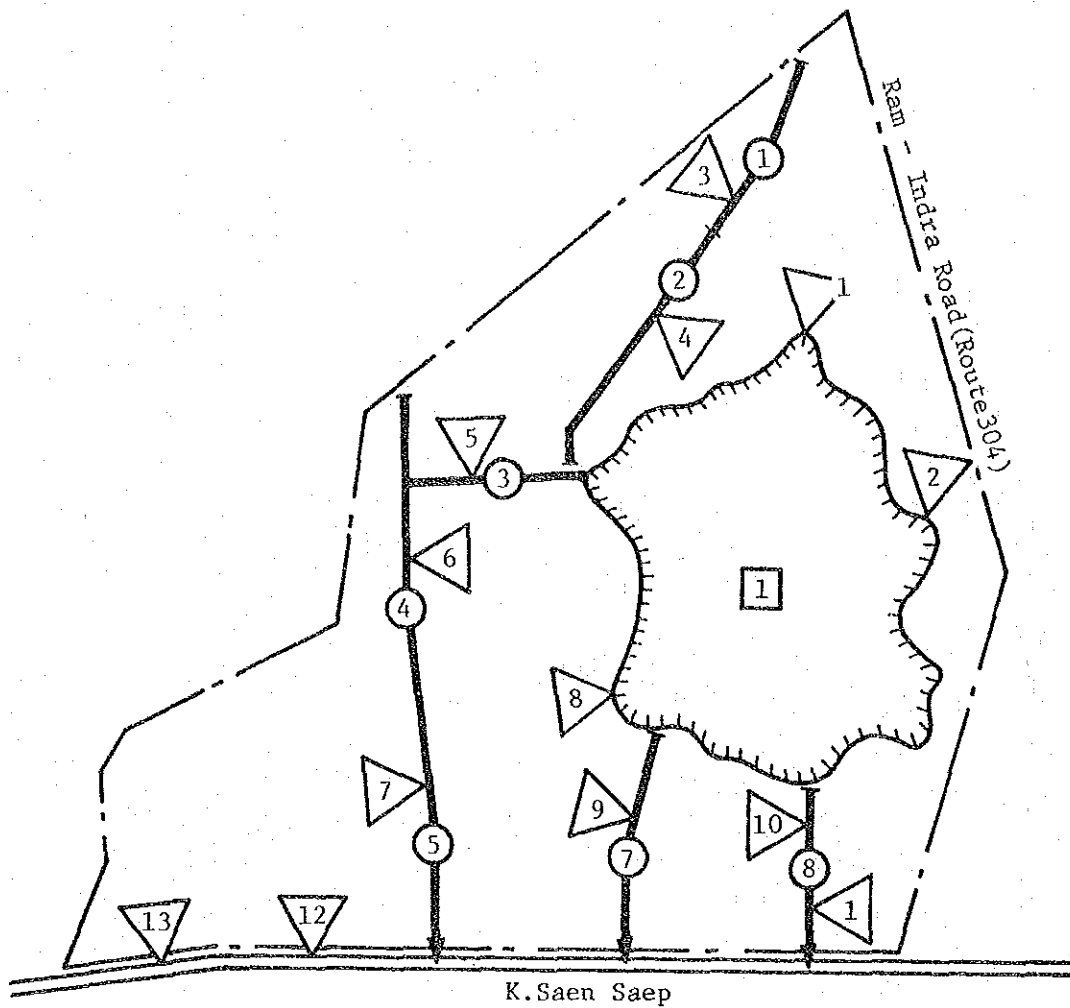


Fig. H.43

WATER LEVEL IN BANG KHEN AND BANG SUE DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Legend

- Catchment Boundary
- Section Number of Klong
- Number of Sub-drainage Area
- Number of Retention Area
- Pumping Station

Fig. H.44

LAYOUT OF KLONGS IN KLONG CHAN DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

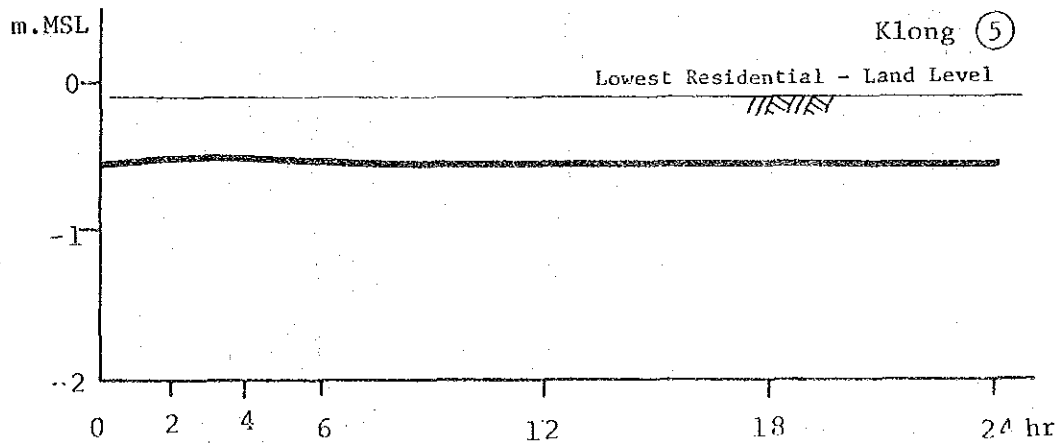
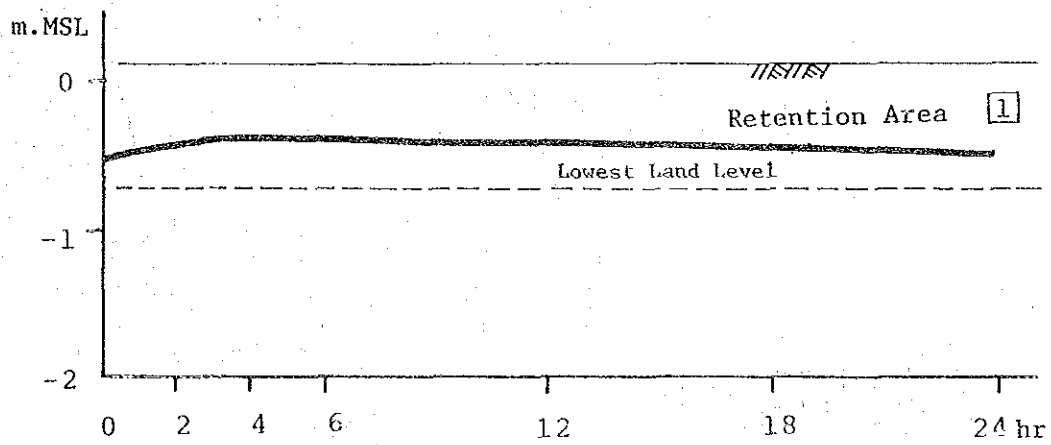
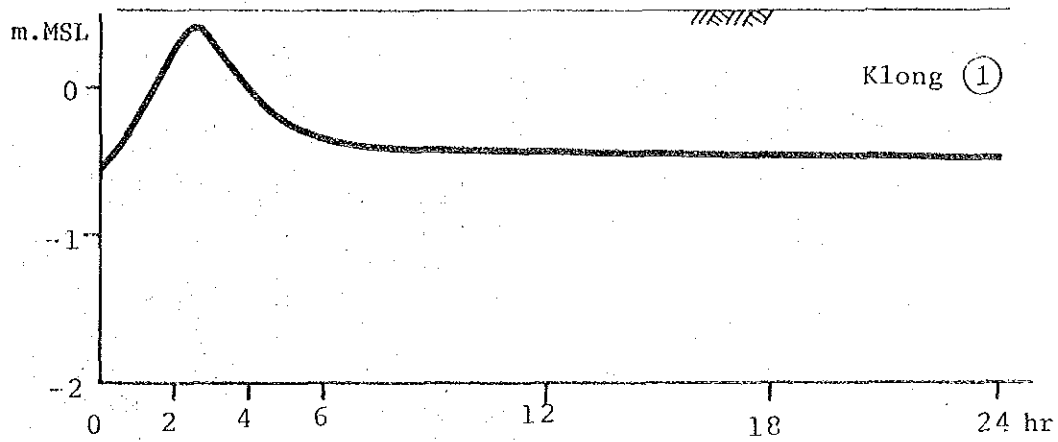


Fig. H.45

WATER LEVEL IN KLONG CHAN DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

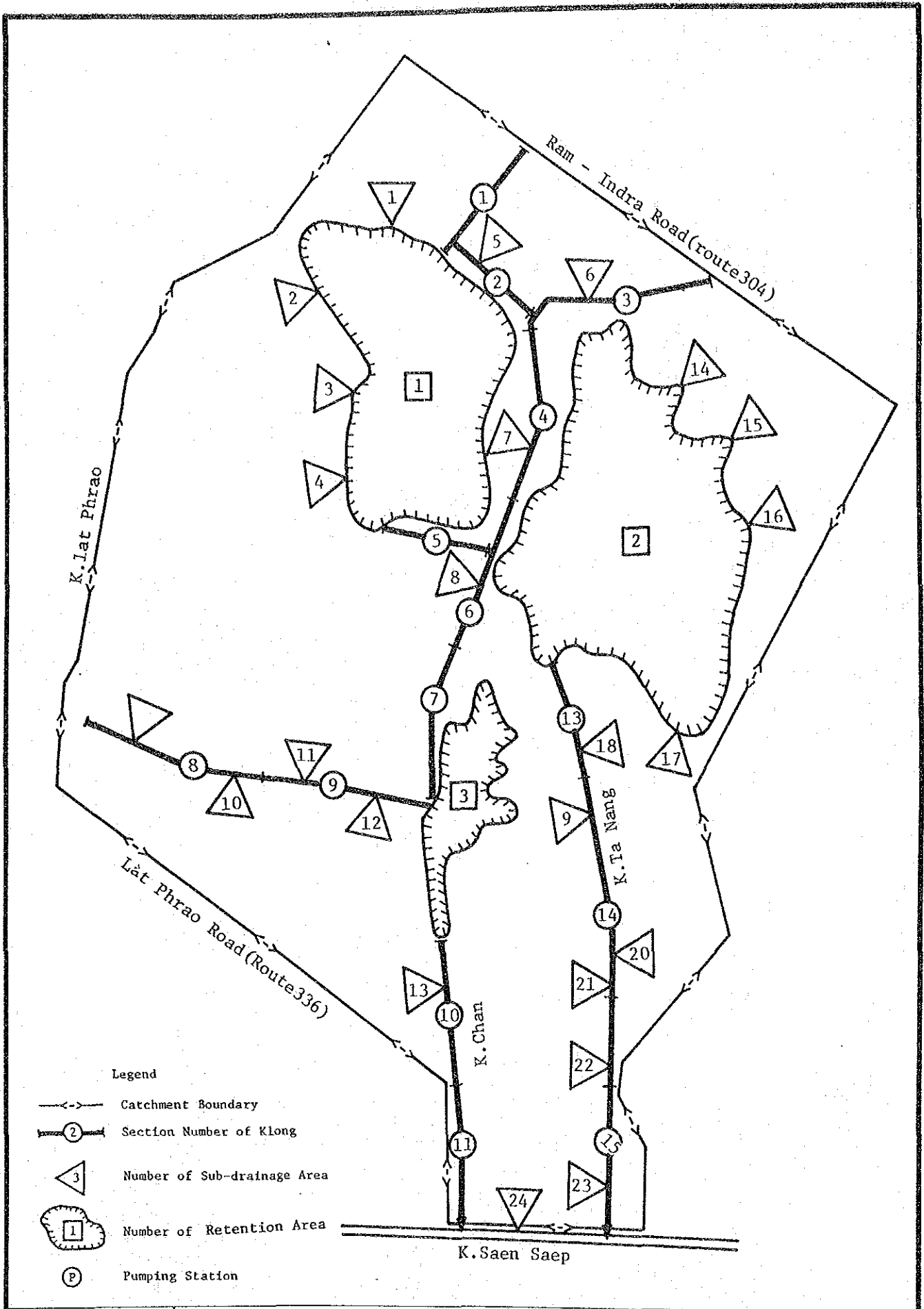


Fig. H.46

LAYOUT OF KLONGS IN LAT PHRAO DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

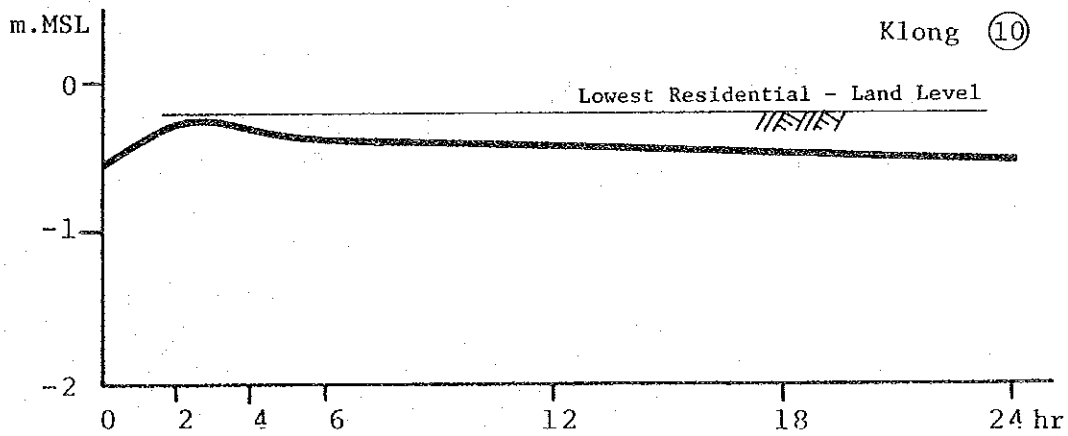
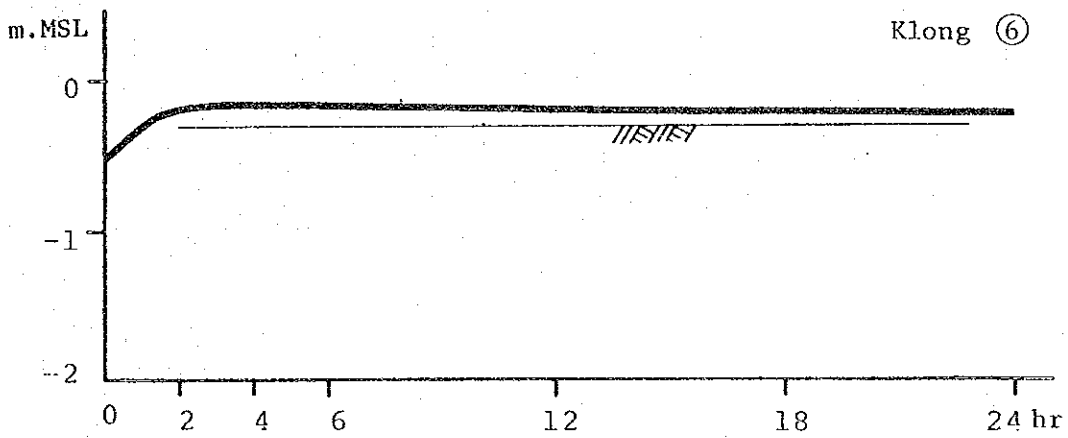
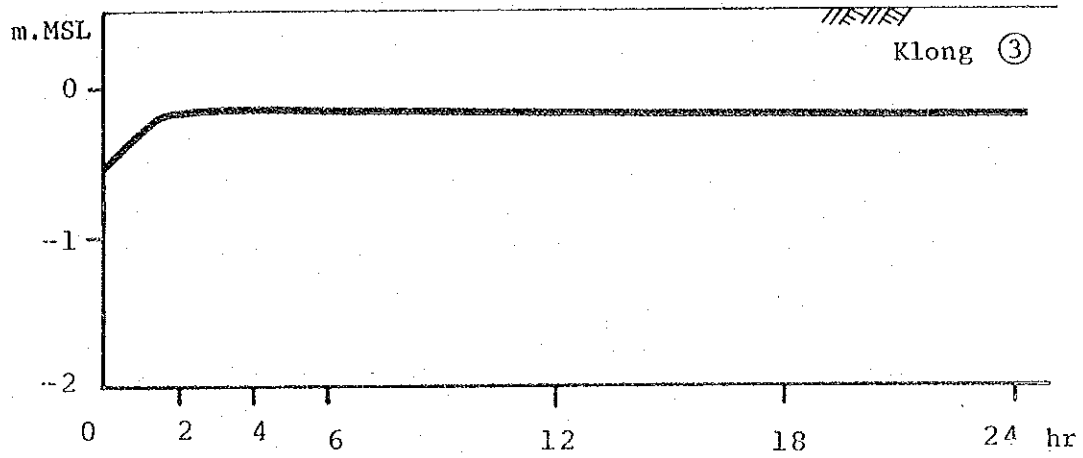


Fig. H.47

WATER LEVEL IN LAT PHRAO DRAINAGE AREA-(1)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

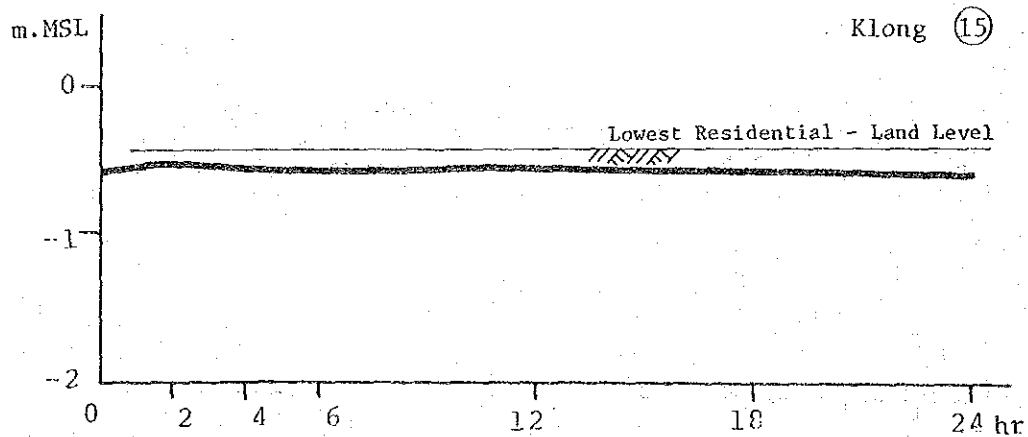
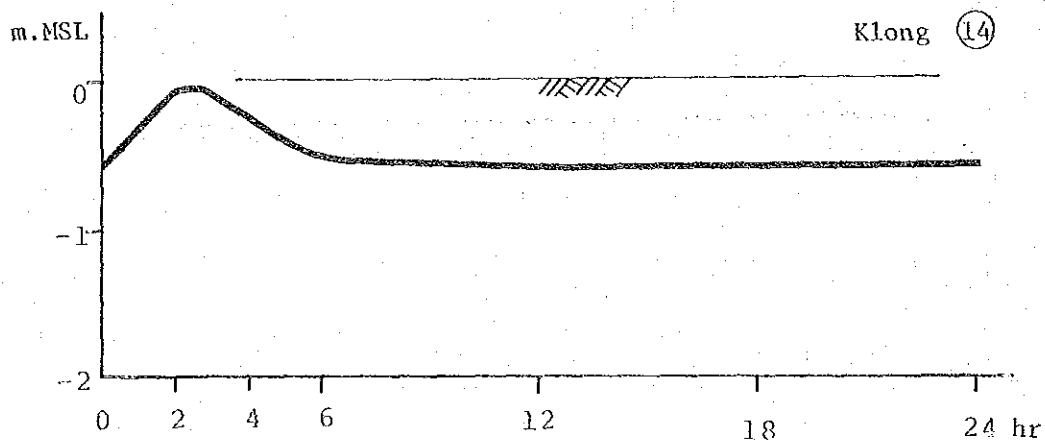
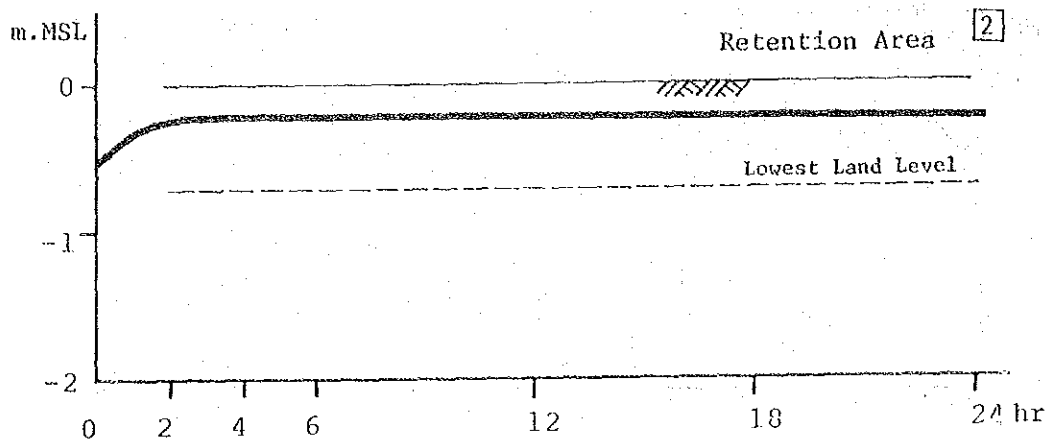
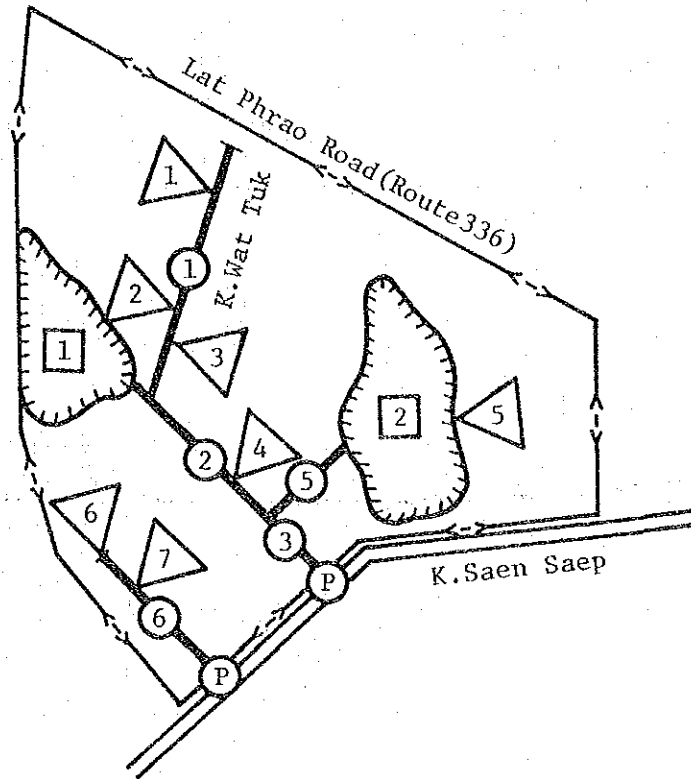


Fig. H.48

WATER LEVEL IN LAT PHRAO DRAINAGE AREA-(2)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Legend

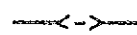
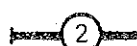



-  Catchment Boundary
-  Section Number of Klong
-  Number of Sub-drainage Area
-  Number of Retention Area
-  Pumping Station

Fig. H.49

LAYOUT OF KLONGS IN EAST HUAY KWANG DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

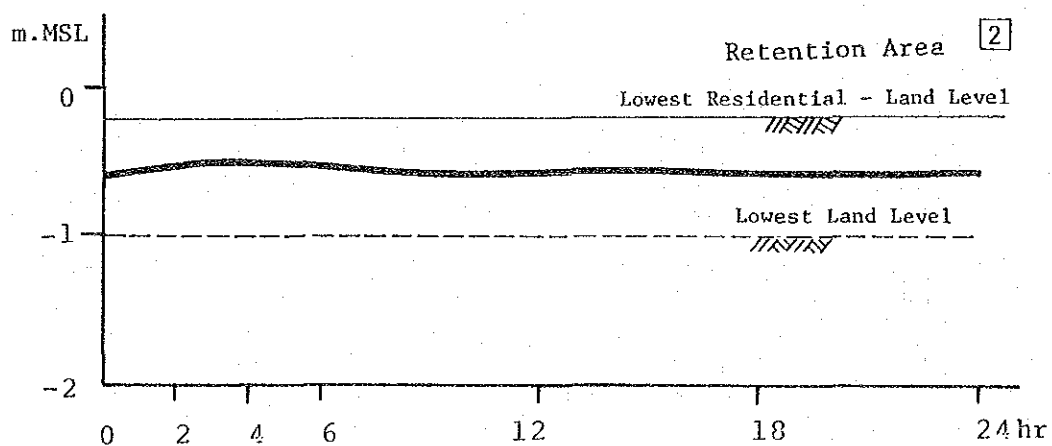
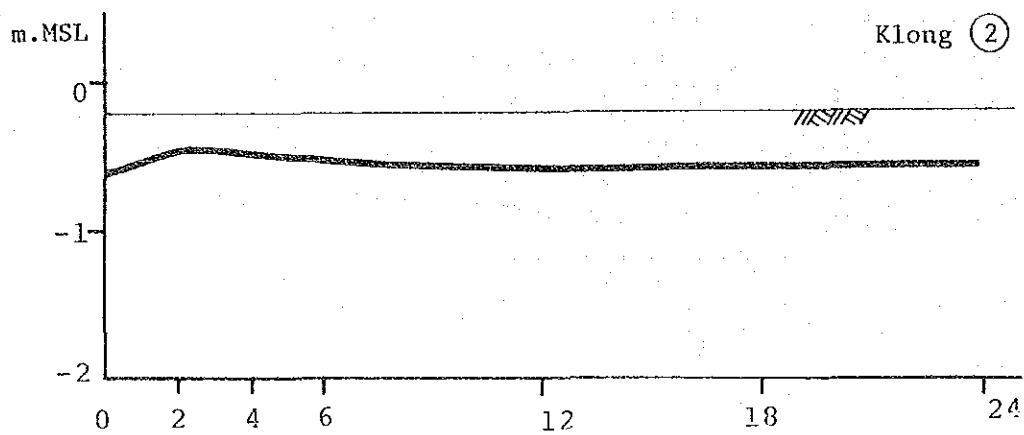
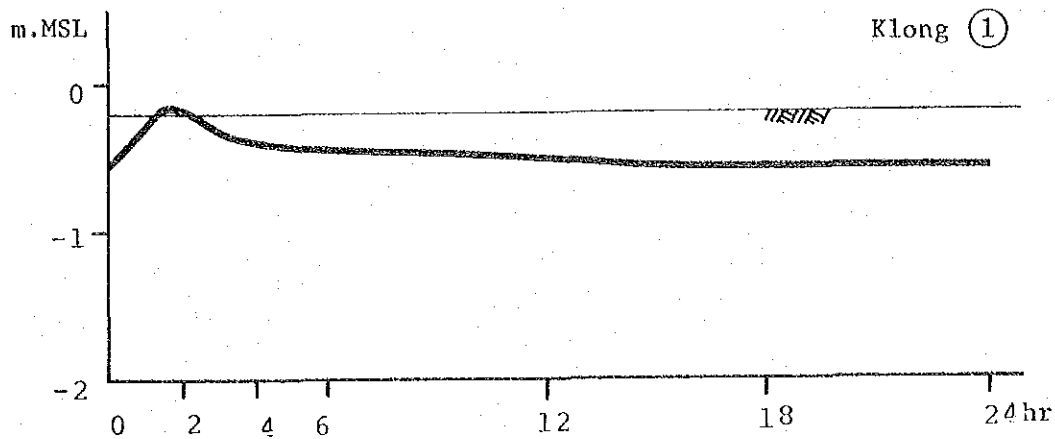
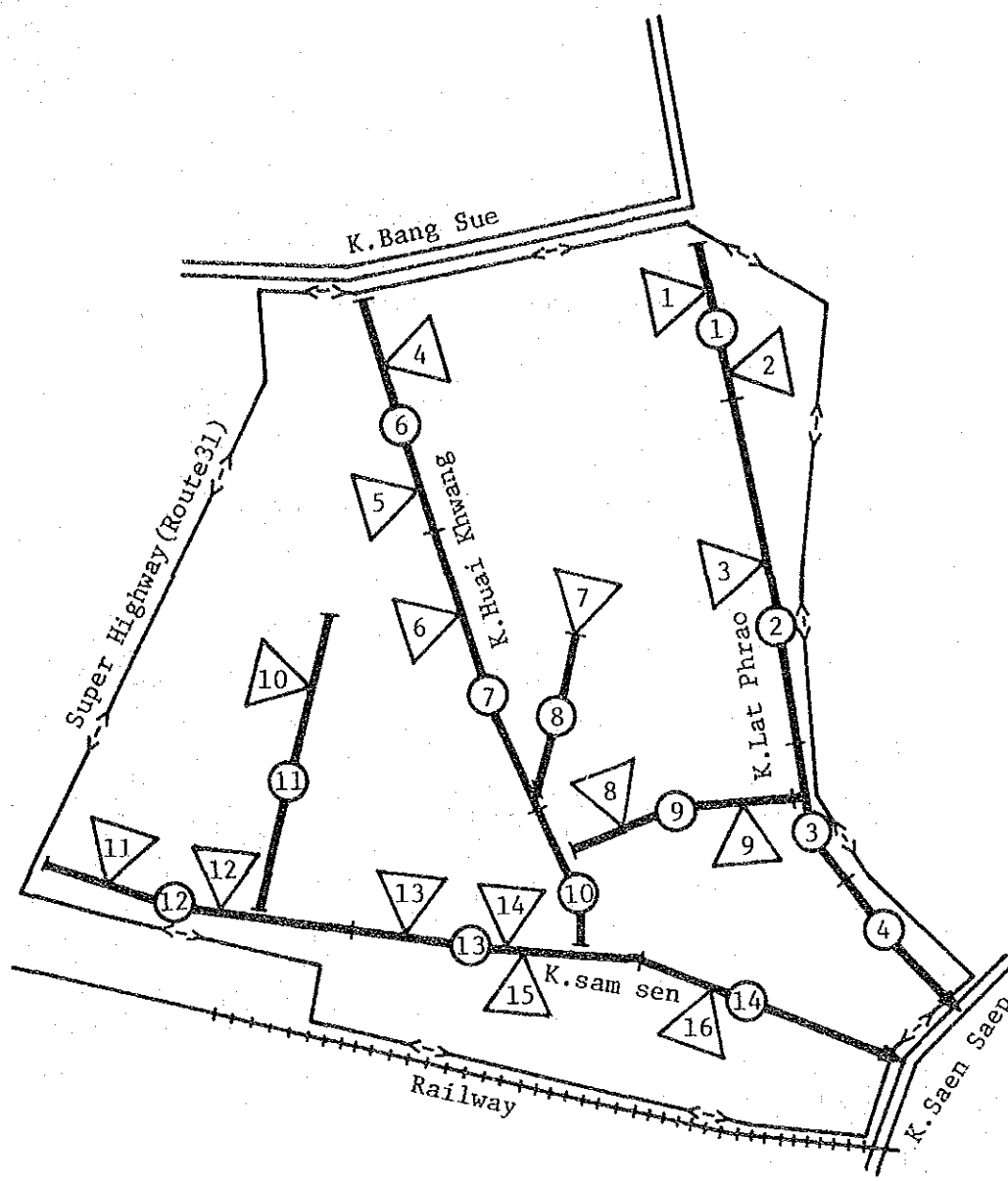


Fig. H.50

WATER LEVEL IN EAST HUAY KWANG DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Legend






-  Catchment Boundary
-  Section Number of Klong
-  Number of Sub-drainage Area
-  Number of Retention Area
-  Pumping Station

Fig. H.51

LAYOUT OF KLONGS IN WEST HUAY KWANG DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

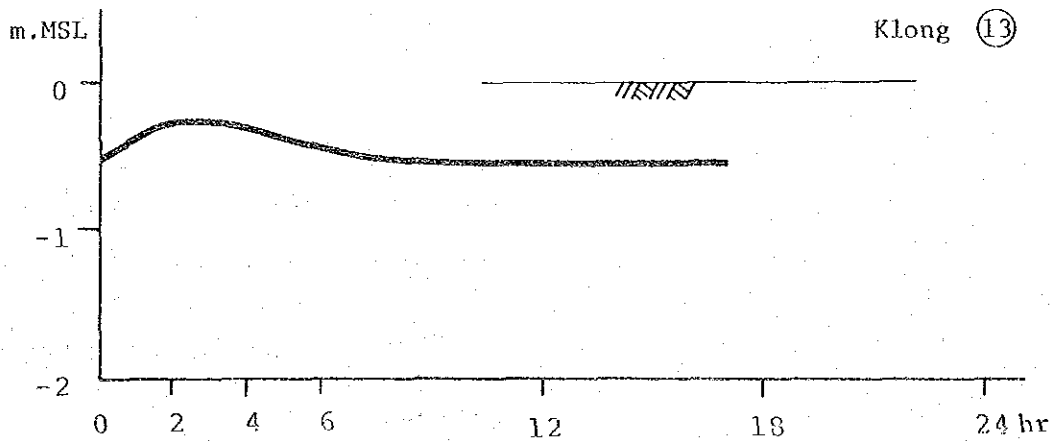
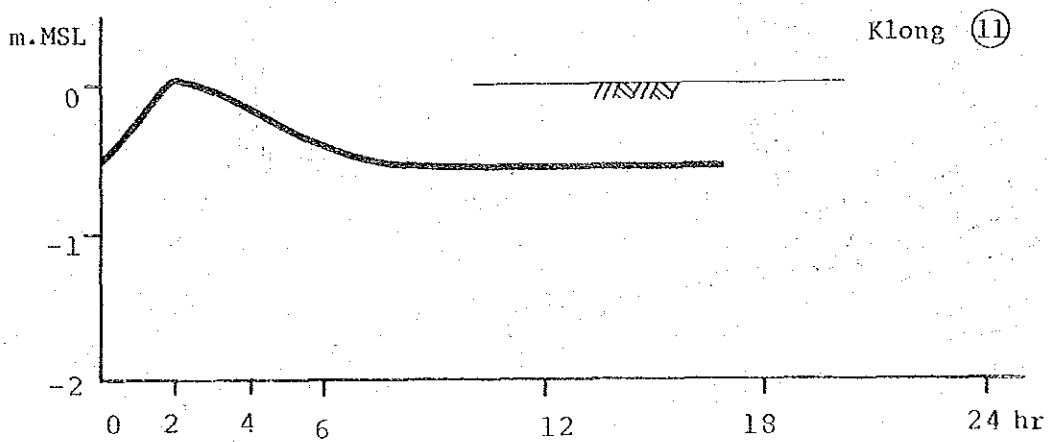
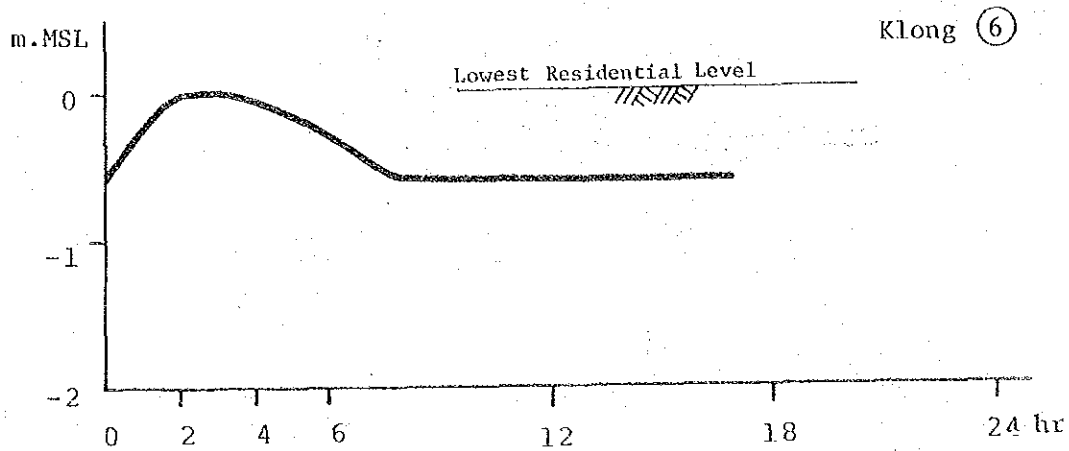


Fig. H.52

WATER LEVEL IN WEST HUAY KWANG DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

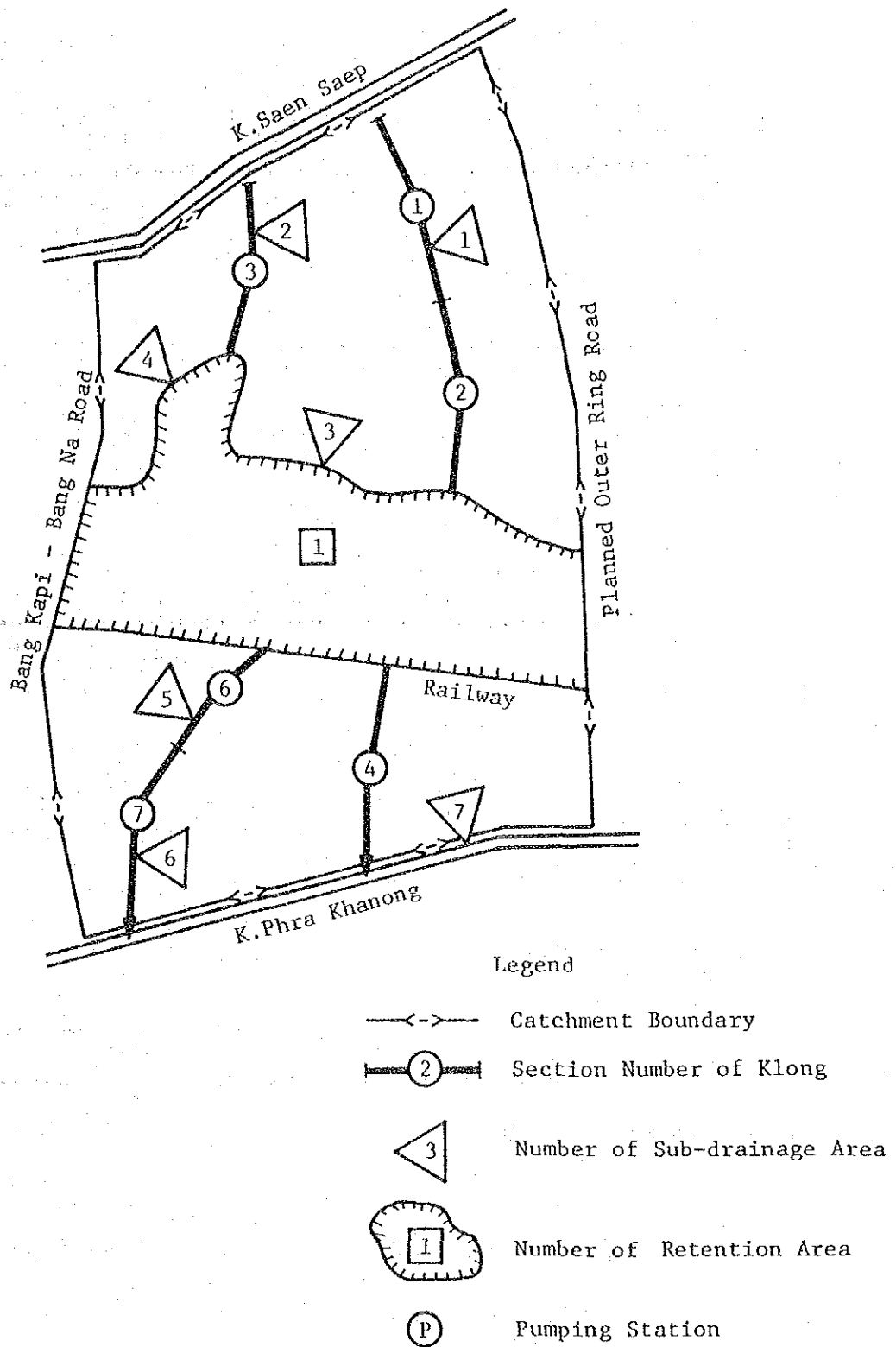


Fig. H.53

LAYOUT OF KLONGS IN PATERNA KARN DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

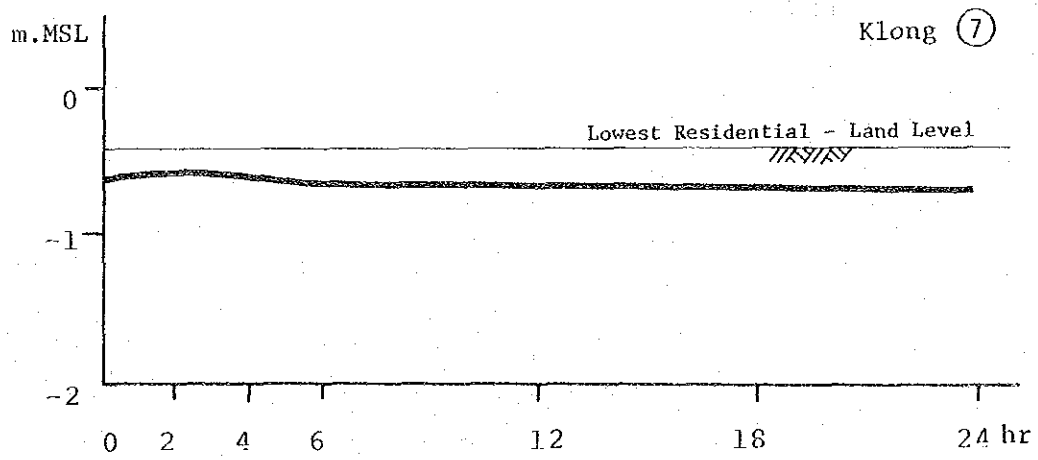
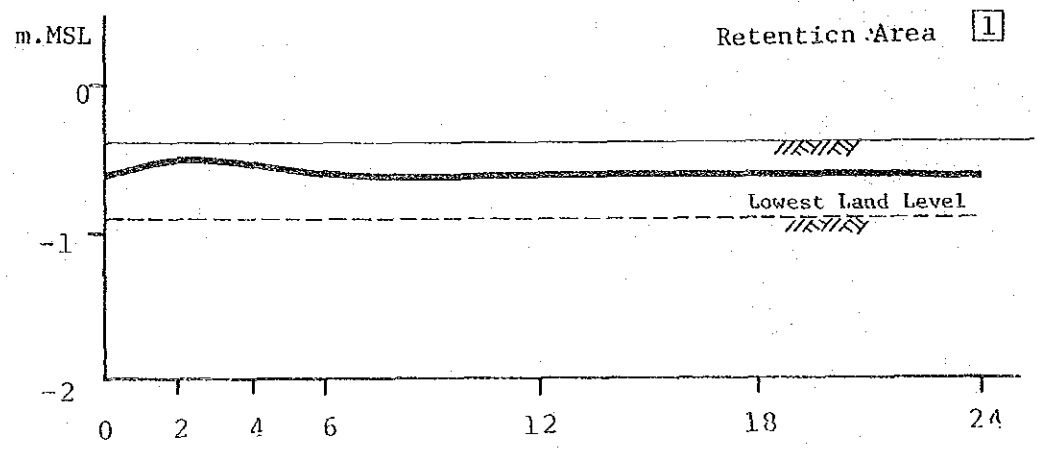
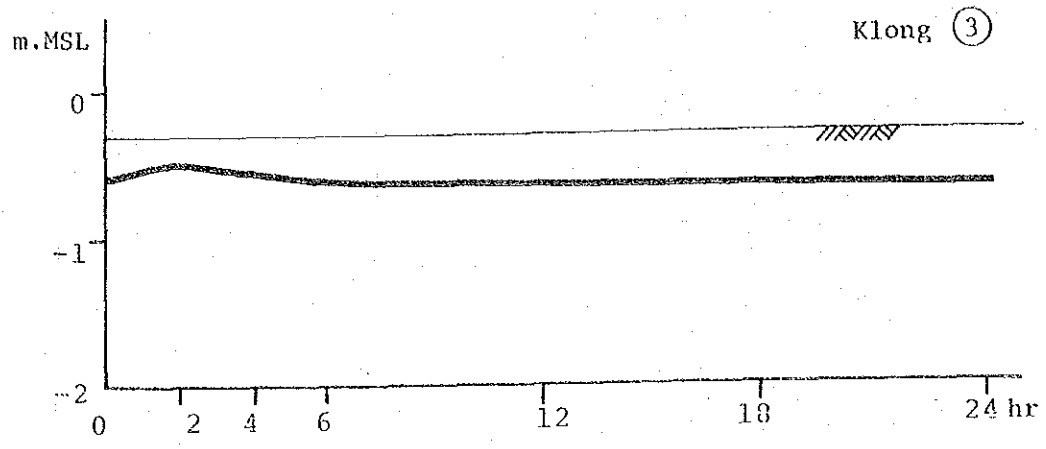
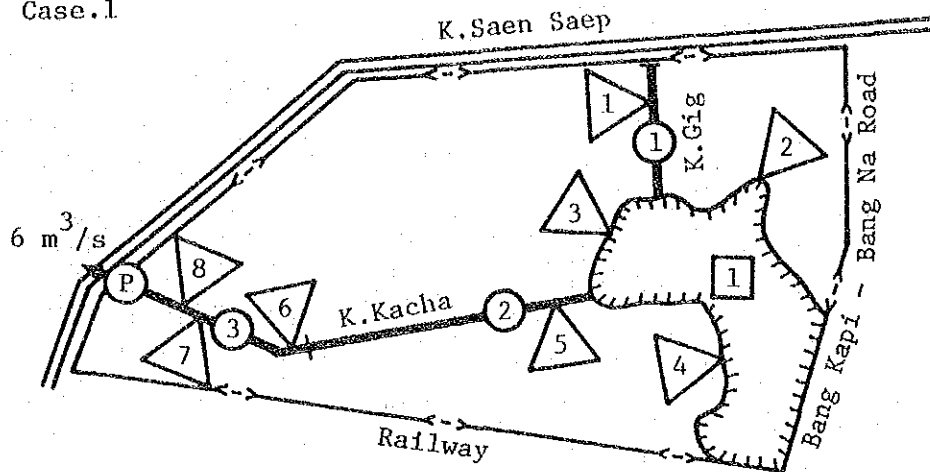


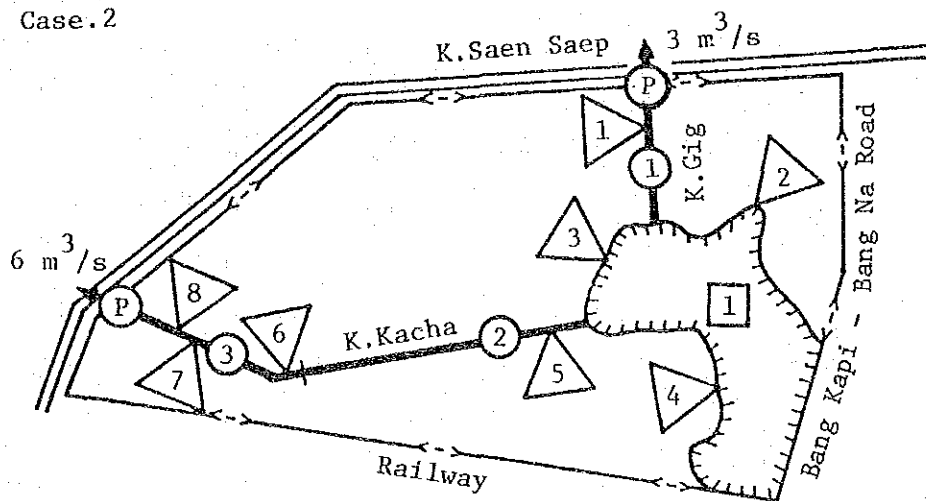
Fig. H.54 WATER LEVEL IN PATERNA KARN DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

(1) Case.1



(2) Case.2



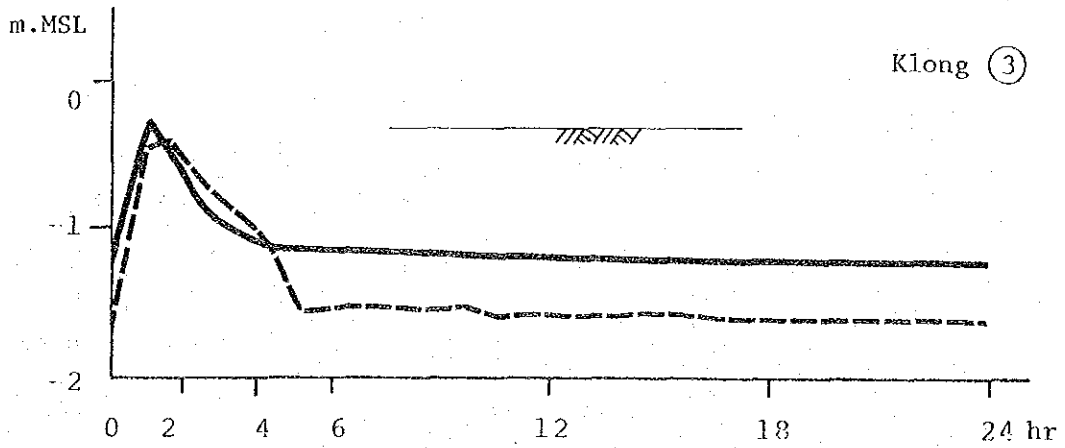
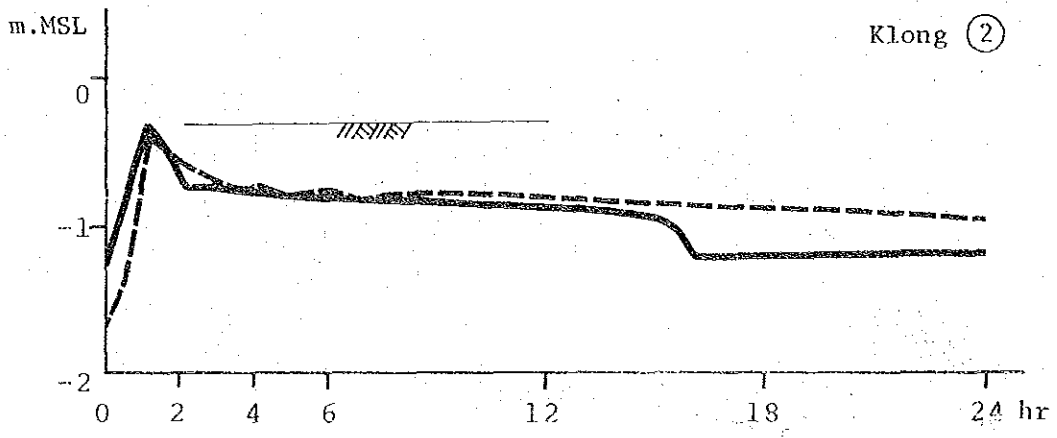
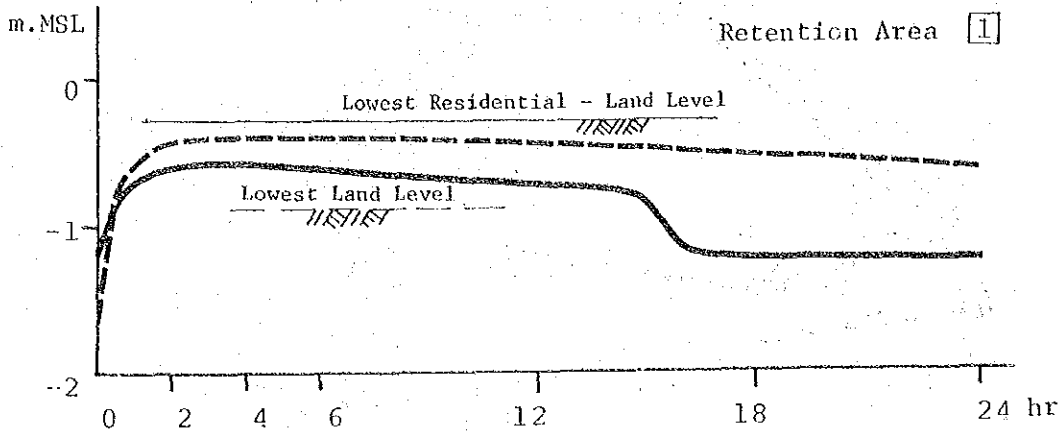
Legend

- Catchment Boundary
- Section Number of Klong
- Number of Sub-drainage Area
- Number of Retention Area
- Pumping Station

Fig. H.55

LAYOUT OF KLONGS IN NORTH HUA MARK DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

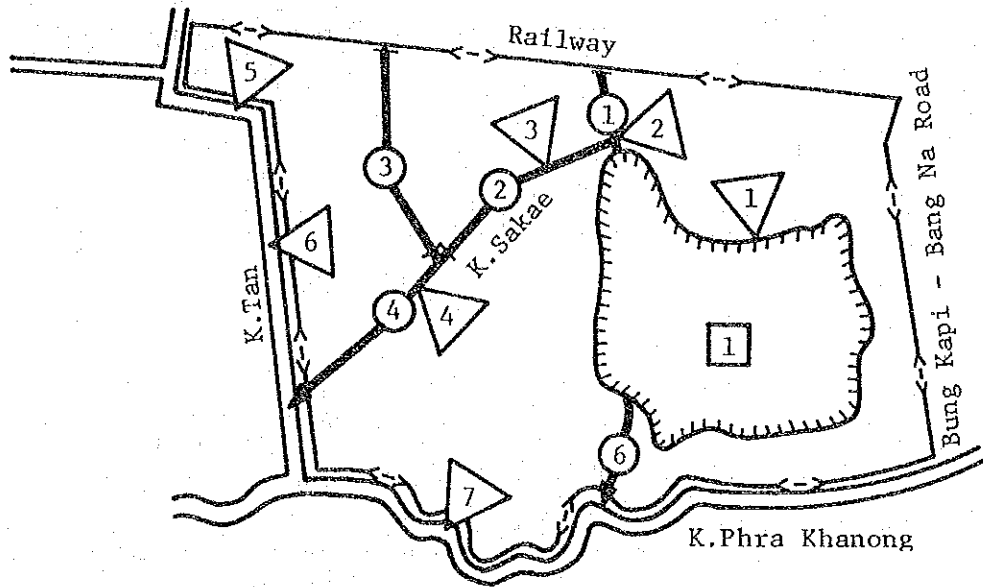


--- Case 1 — Case 2

Fig. H.56

WATER LEVEL IN NORTH HUA MARK DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Legend

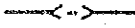




-  Catchment Boundary
-  Section Number of Klong
-  Number of Sub-drainage Area
-  Number of Retention Area
-  Pumping Station

Fig. H.57

LAYOUT OF KLONGS IN SOUTH HUA MARK DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

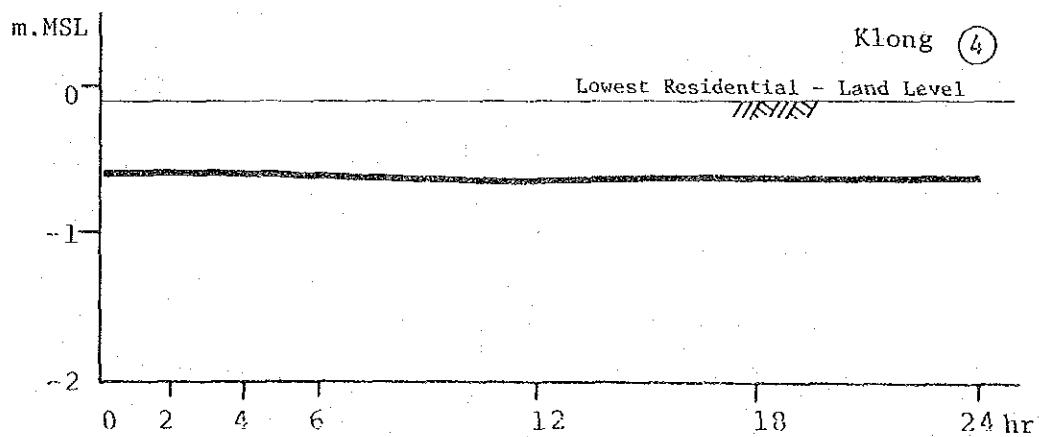
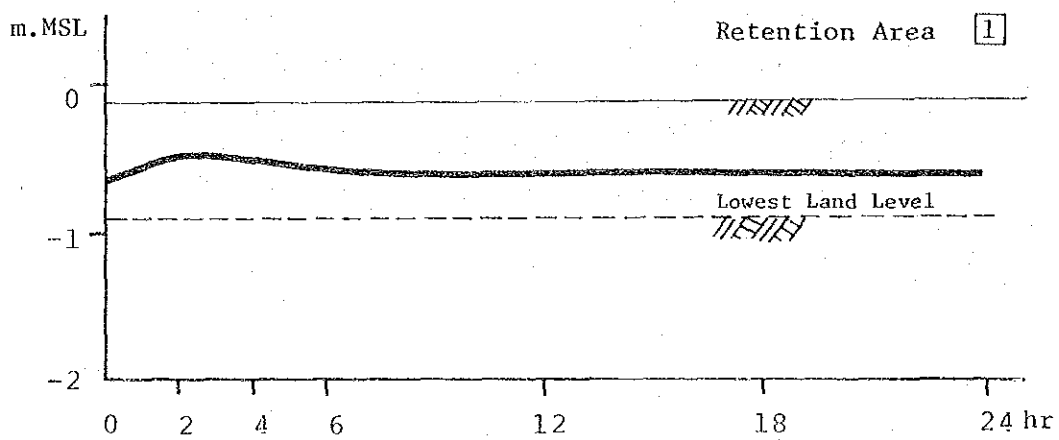
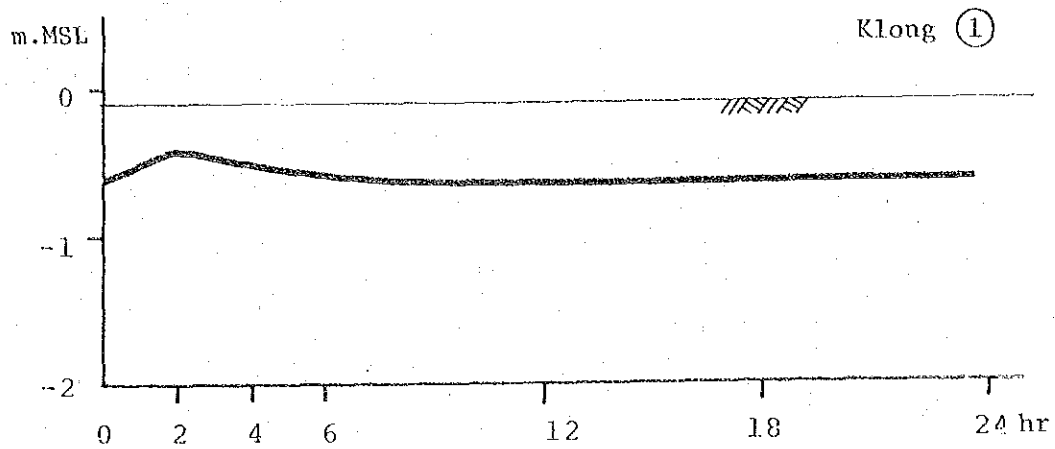
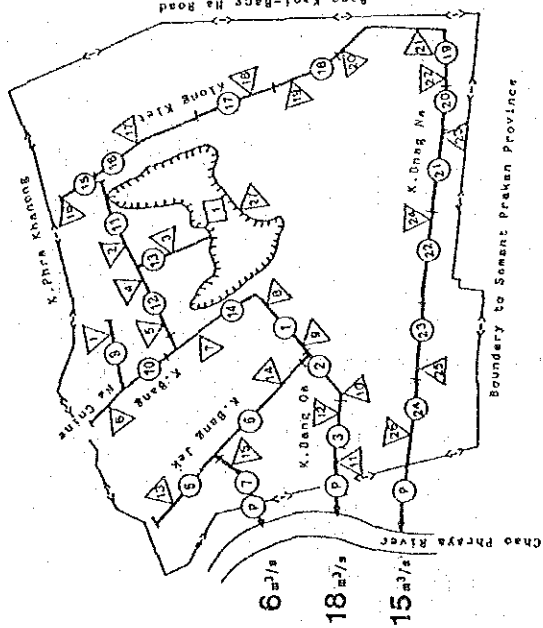


Fig. H.58

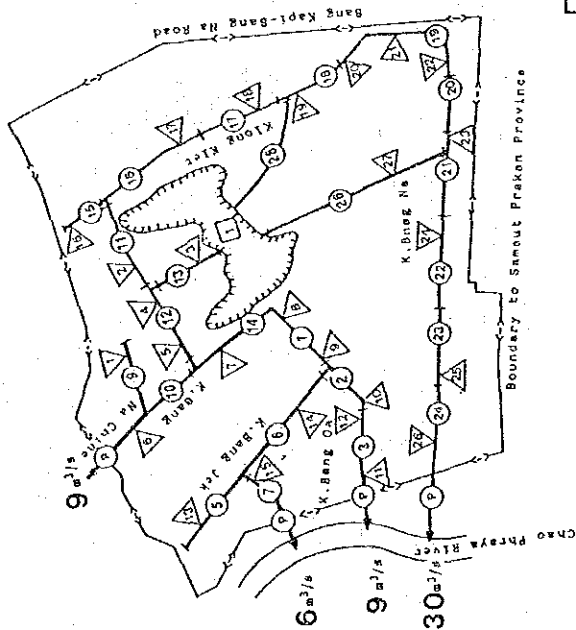
WATER LEVEL IN SOUTH HUA MARK DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

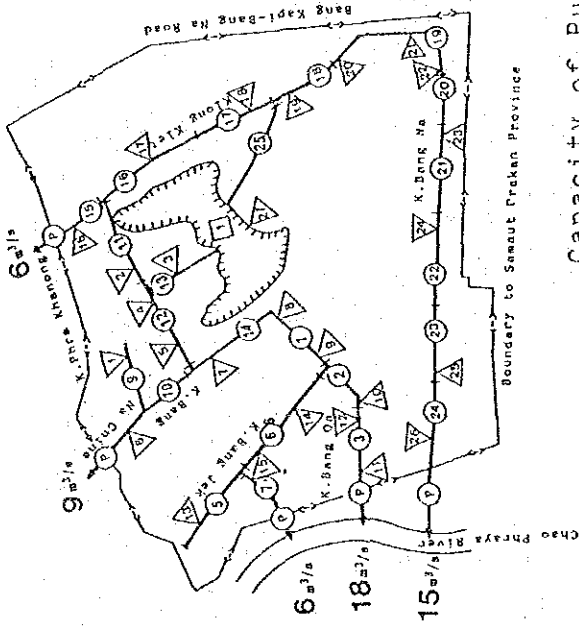
ALTERNATIVE 1



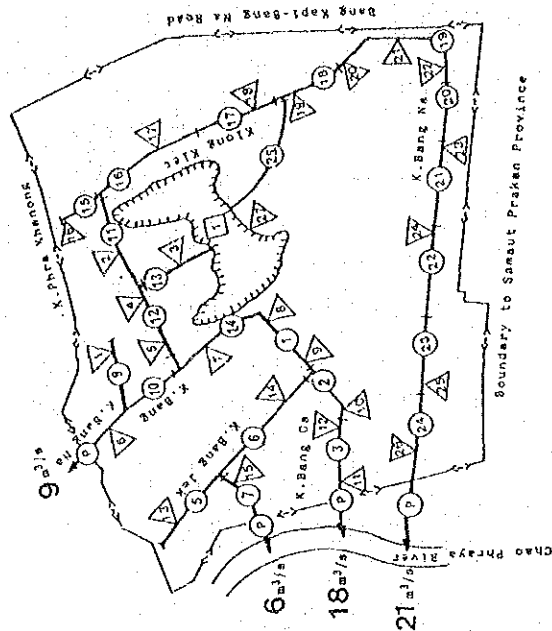
ALTERNATIVE 4



ALTERNATIVE 2



ALTERNATIVE 3



Capacity of Pumping Stations

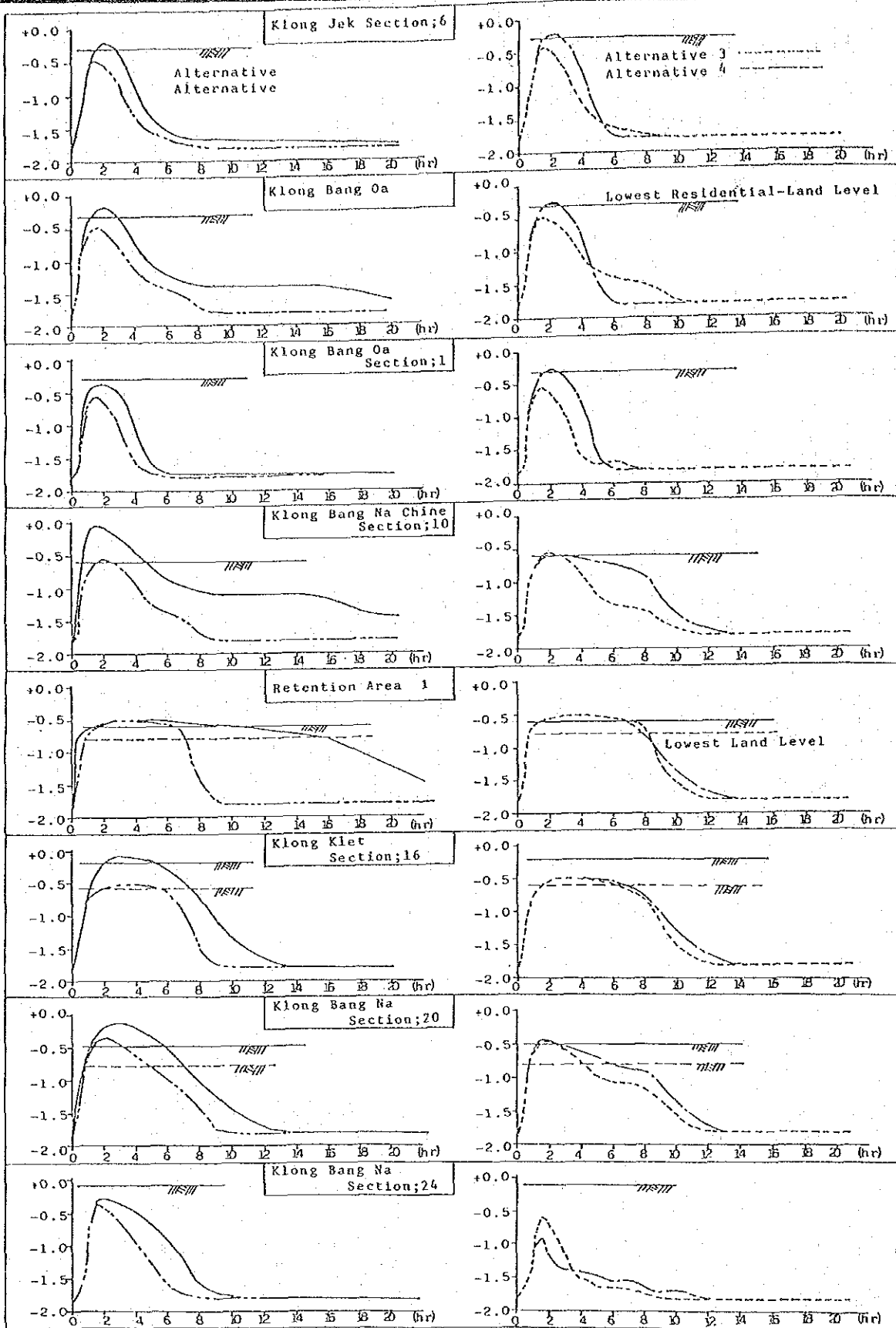
ALTER-NATIVE	Capacity of Pump (m ³ /sec)				Kiet Total
	Jek	Bang Oa	Bang Na	Bang Na Chine	
1	6	18	15	—	39
2	6	18	15	9	54
3	6	18	21	9	54
4	6	9	30	9	54

Legend

- Catchment Boundary
- Section Number of Klong
- Number of Sub-drainage Area
- Number of Retention Area
- Pumping Station

Notes: Alternative 3 was proposed for Master Plan

Fig. H.59 ALTERNATIVES OF LAYOUT OF DRAINAGE SYSTEM IN BANG NA DRAINAGE AREA
MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Legend

- | | | | |
|-------|---------------|---------|-------------------------------|
| — | Alternative 1 | —— | Lowest Residential Land Level |
| - - - | " 2 | - . - . | Lowest Land Level |
| · · · | " 3 | | |
| · · · | " 4 | | |

Fig. H.60

WATER LEVEL IN BANG NA DRAINAGE AREA

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Bang Khen, Bang Sue D.A.

- Legend**
- Area Mark : Name of Drainage Area
 - (P) : Main Pump
 - (P) : Boundary Pump
 - : Klong
 - 6 : Peak Discharge ($6 \text{ m}^3/\text{sec}$) and Flow Direction
 - ⊖ : Retention Area

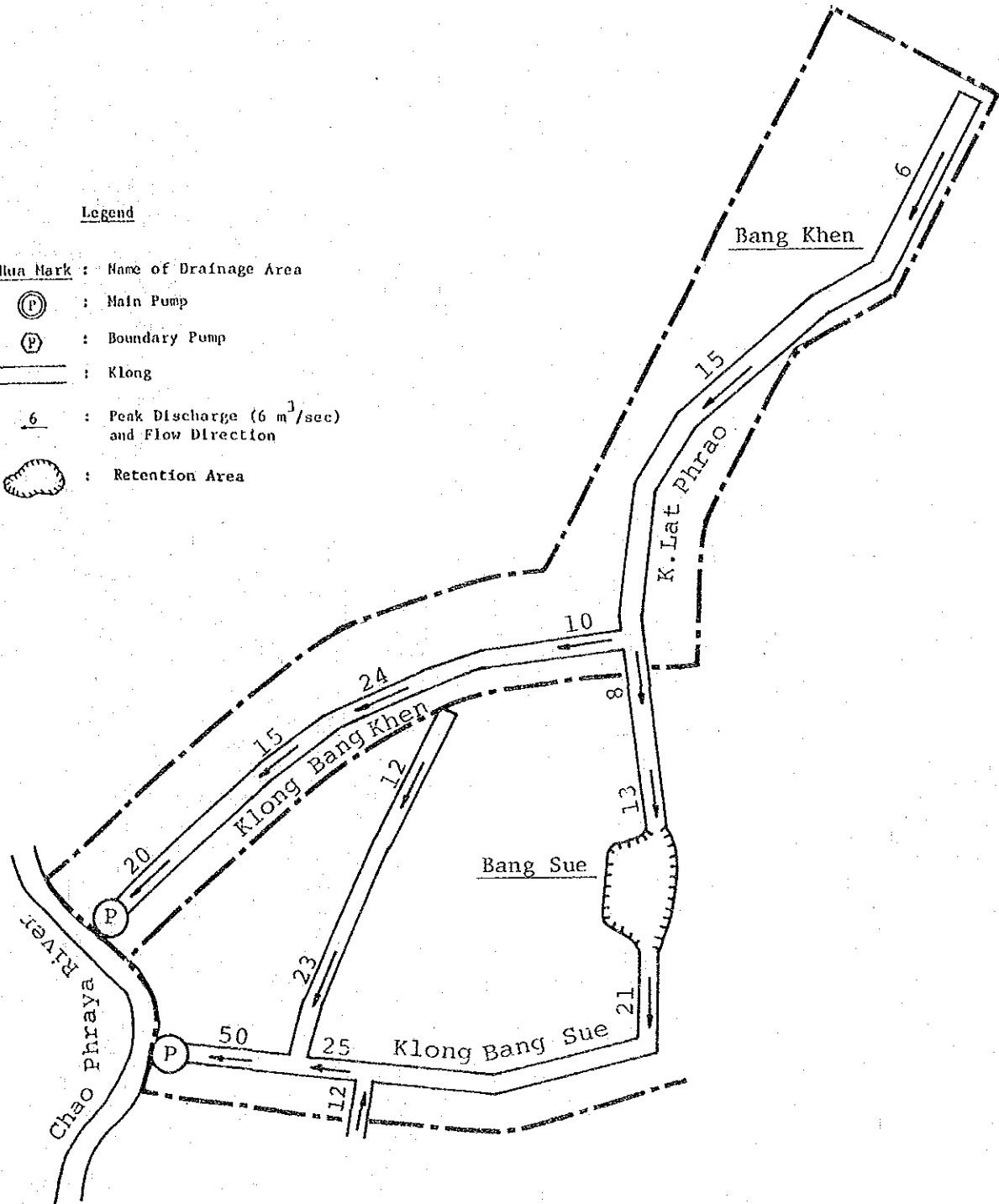


Fig. H.61

DESIGN DISCHARGE OF SUB-KLONGS--(1)
(BANG KHEN-BANG SUE POLDER)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

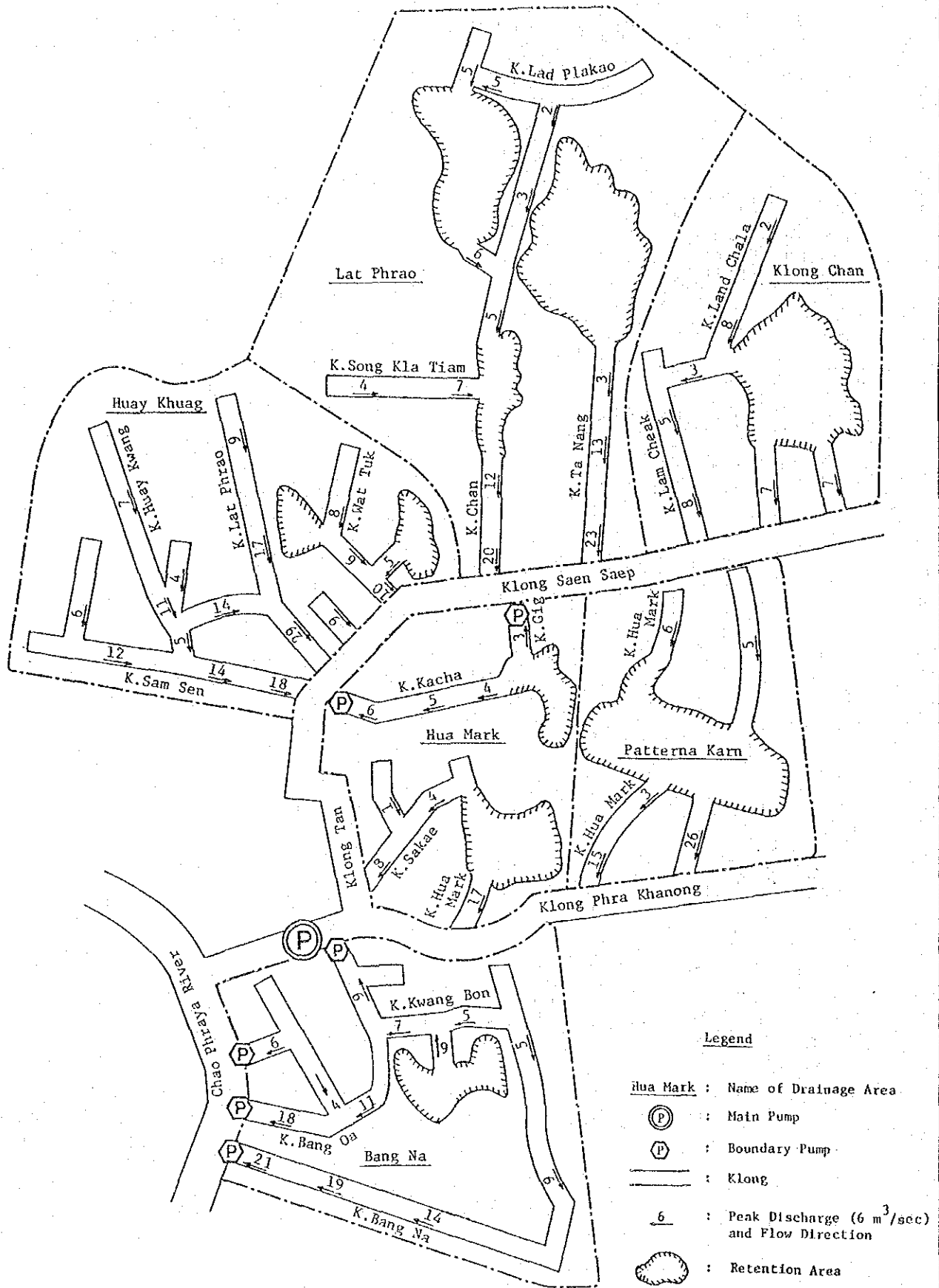


Fig. H.62

DESIGN DISCHARGE OF SUB-KLONGS--(2)
(PHRA KHANONG AND BANG NA POLDER)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

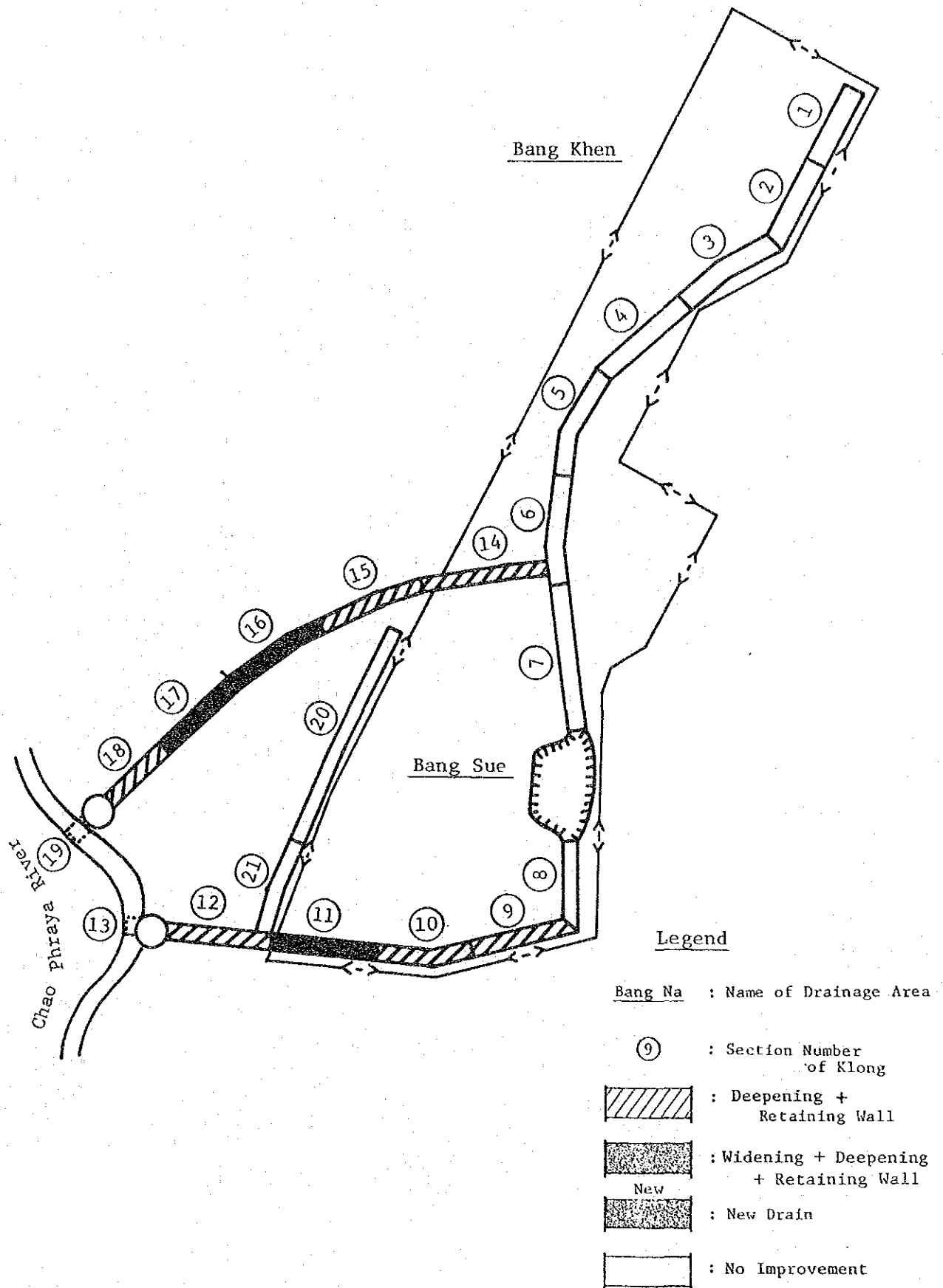


Fig. H.63

KLONG IMPROVEMENT WORKS--(1)
(BANG KHEN-BANG SUE POLDER)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

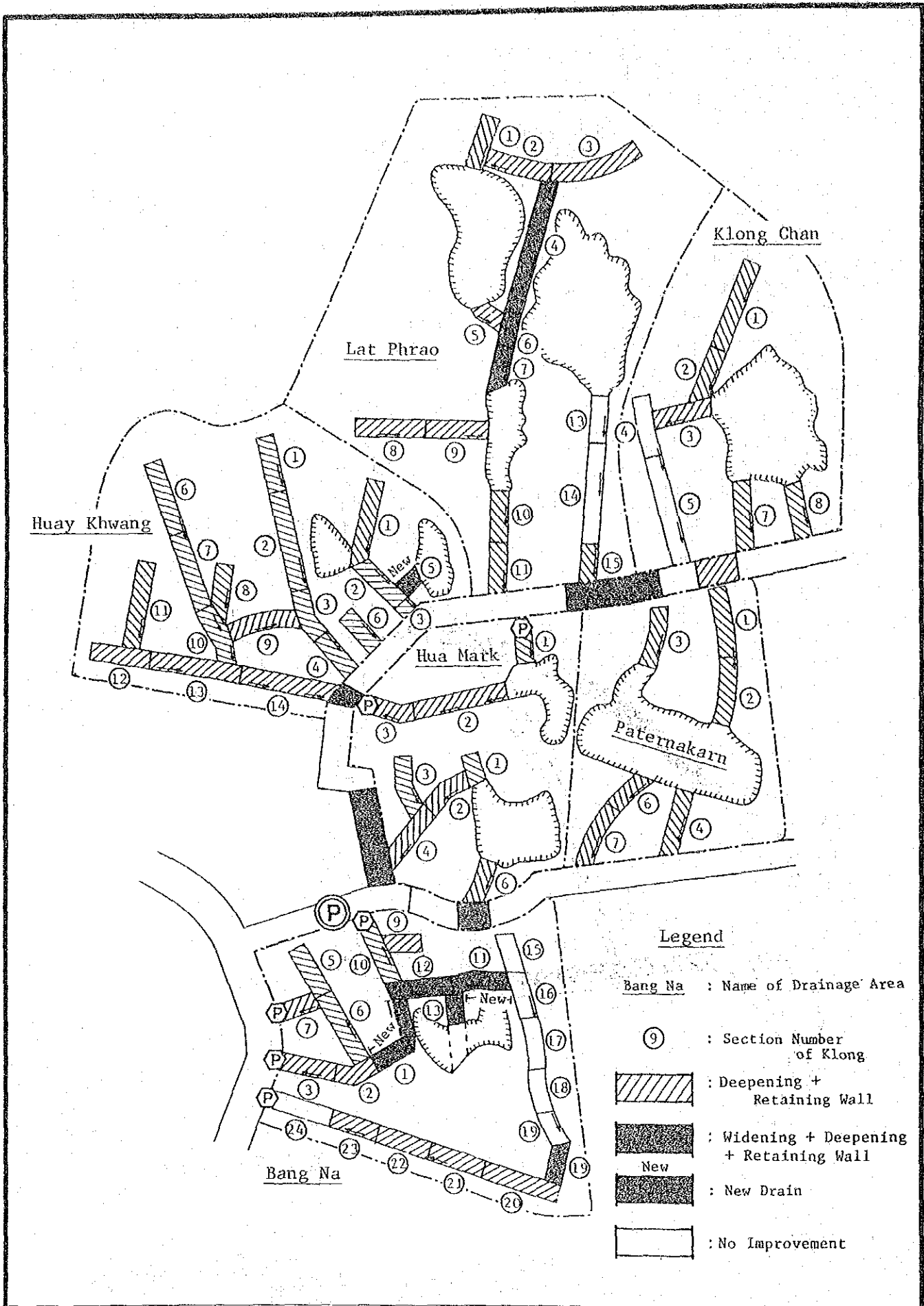


Fig. H.64

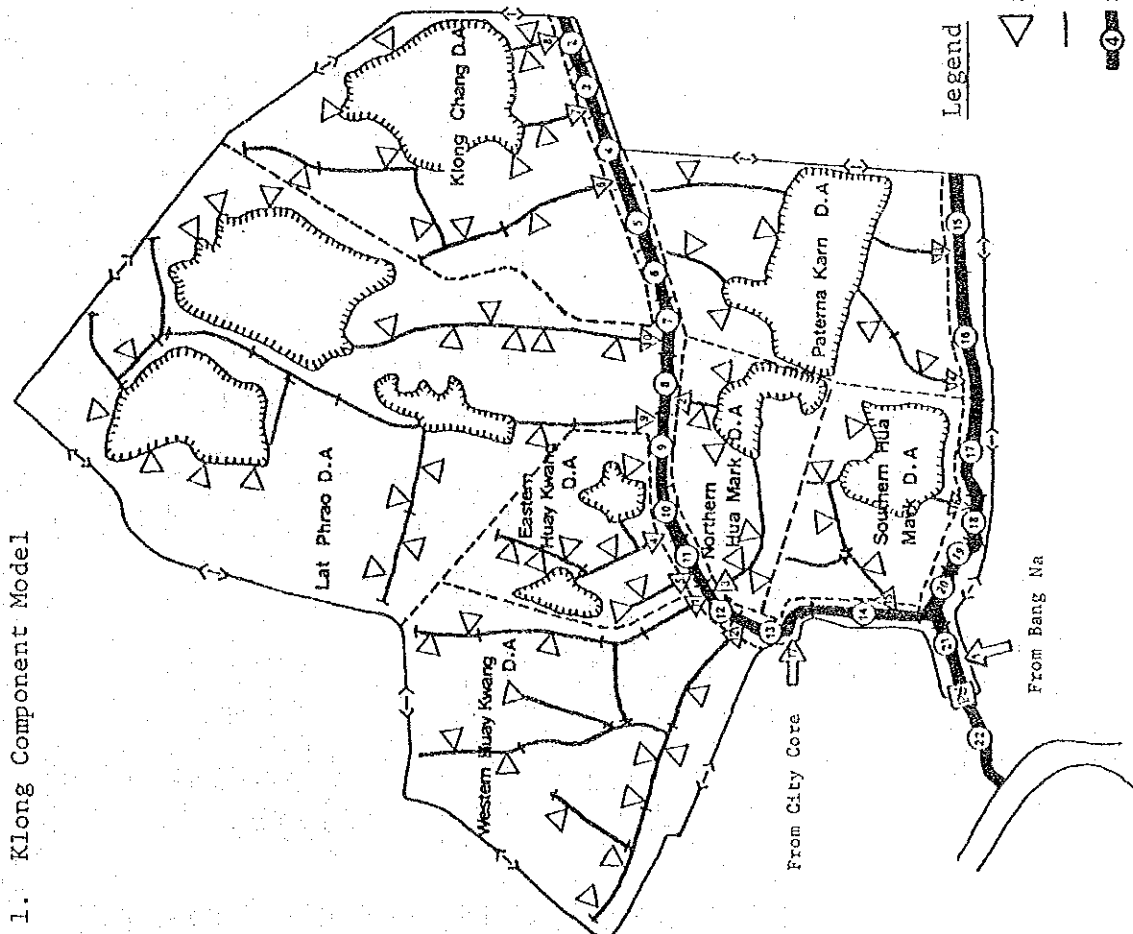
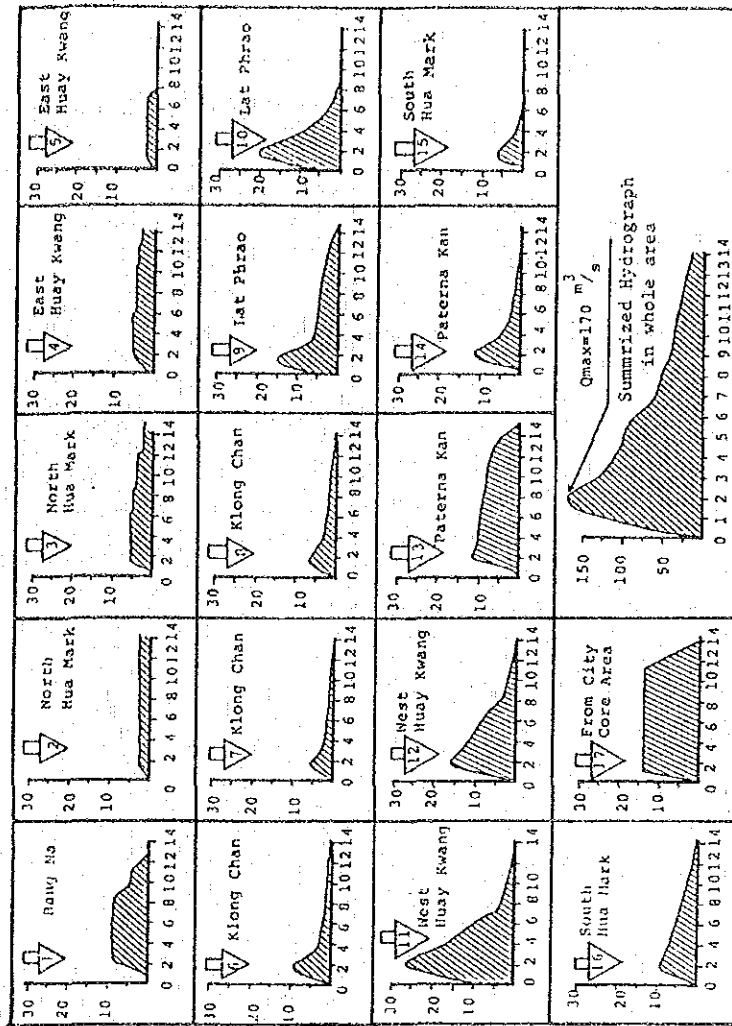
KLONG IMPROVEMENT WORKS--(2)
(PHRA KHANONG AND BANG NA POLDER)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

1. Klong Component Model

2. Inflow Hydrograph into K. Saen Saep and Phra Khanong

Vertical scale : m^3/s
Horizontal scale : Hour

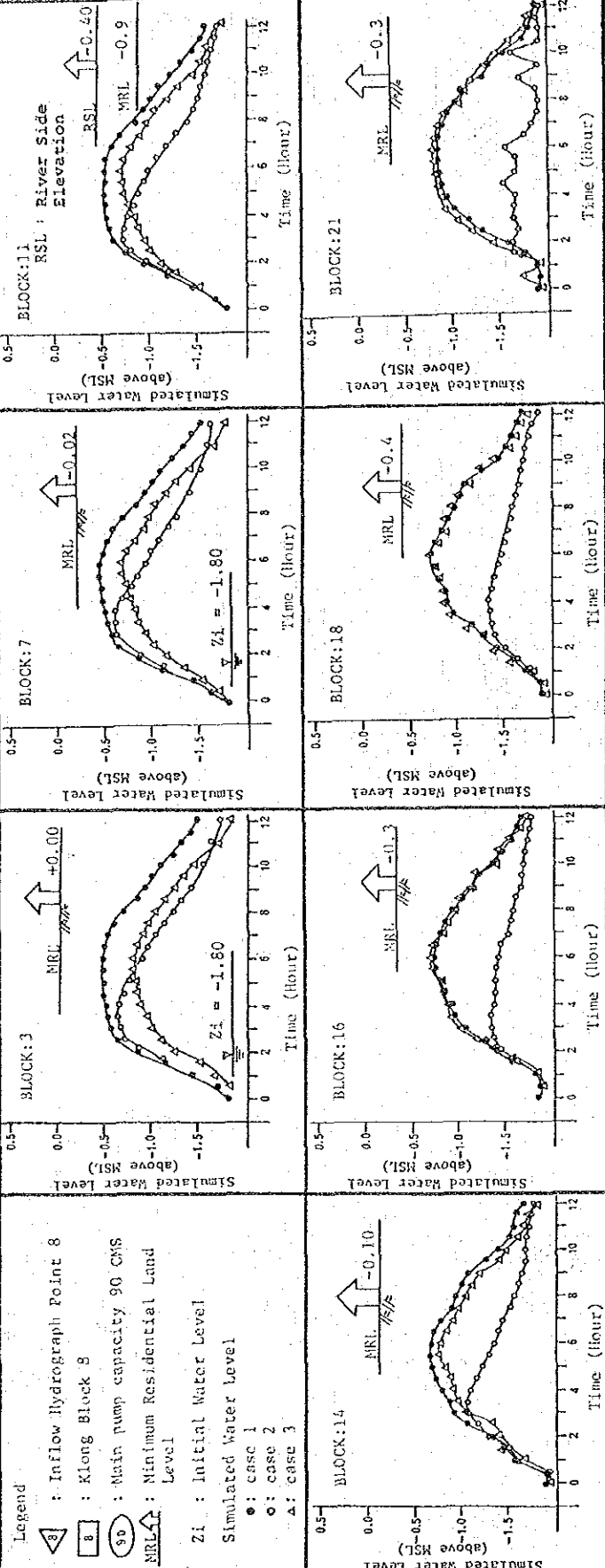
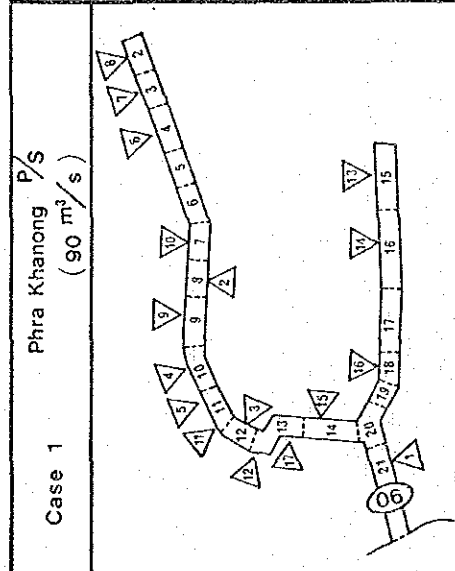
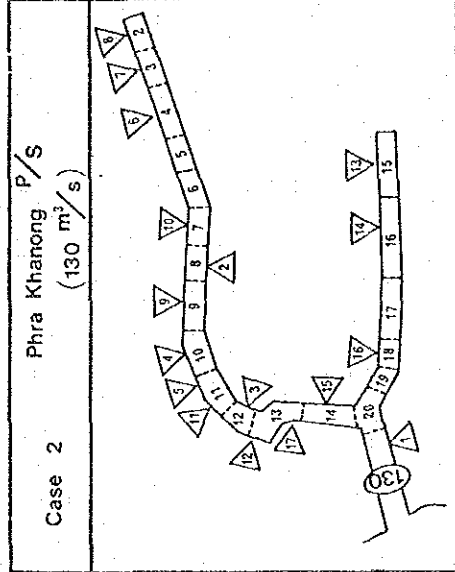
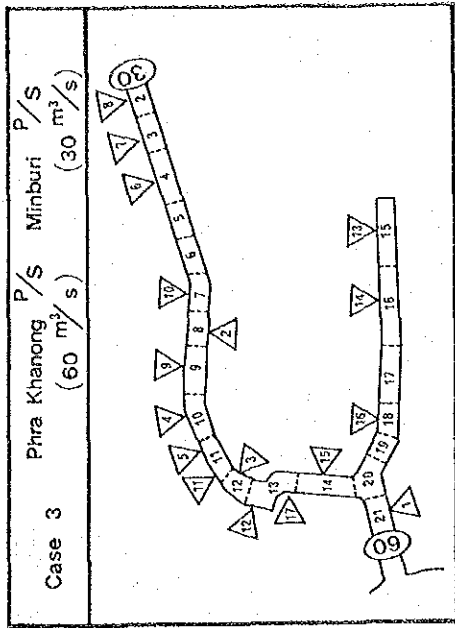


Legend

- : Subdrainage Area
- : Sub Klong
- : Main Klong (Block No.4)
- : Storm Water Retention Area
- : Main Pumping Station
- : Inflow Point from Drainage Area

Fig. H.65 LAYOUT OF DRAINAGE AREA AND INFLOW HYDROGRAPH FOR TRUNK KLONGS IN PHRA KHANONG FOLDER

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

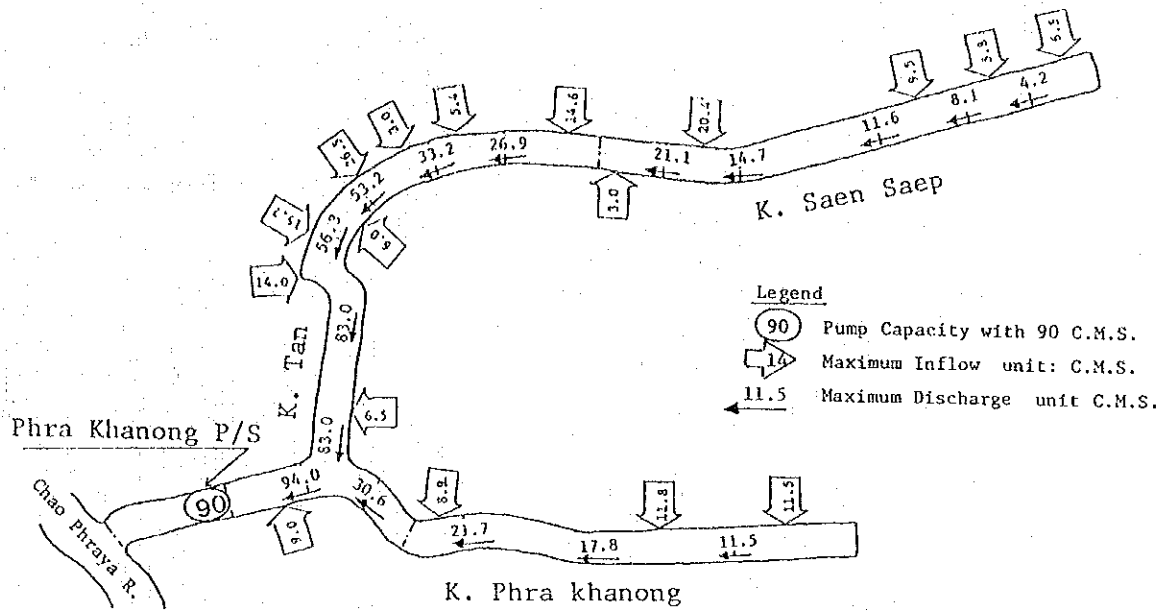


MRL : Lowest Residential - Land Level

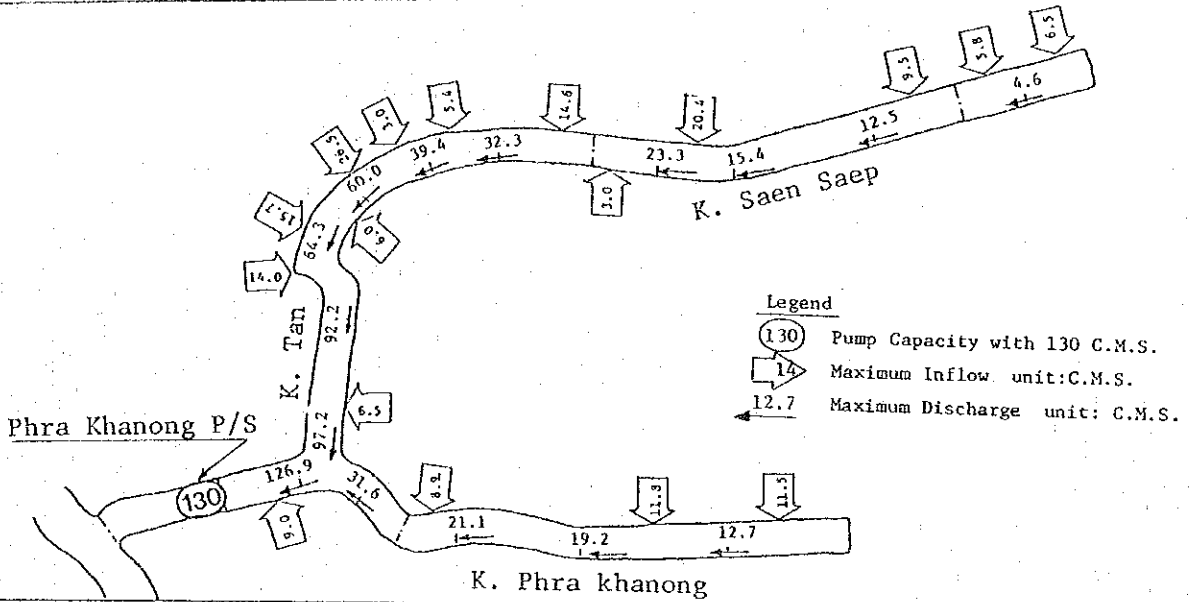
Fig. H.66 WATER LEVEL IN TRUNK KLONGS IN PHRA KHANONG POLDER

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Case 1



Case 2



Case 3

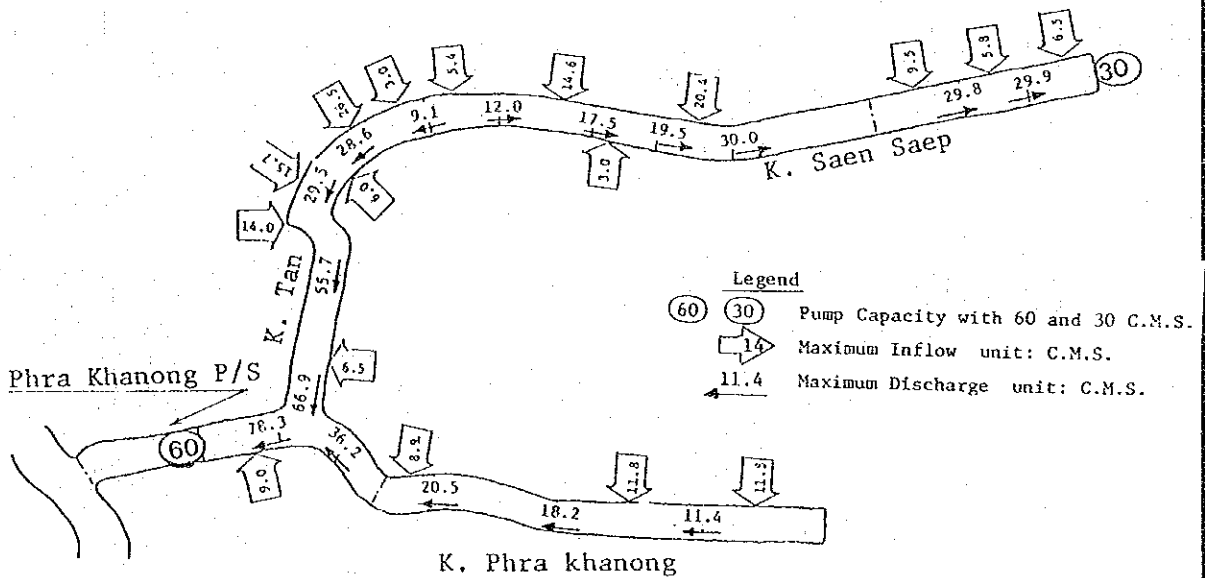


Fig. H.67

PEAK DISCHARGE IN TRUNK DRAINAGE KLONGS
IN PHRA KHANONG POLDER

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

KLONG PHRA KHANONG

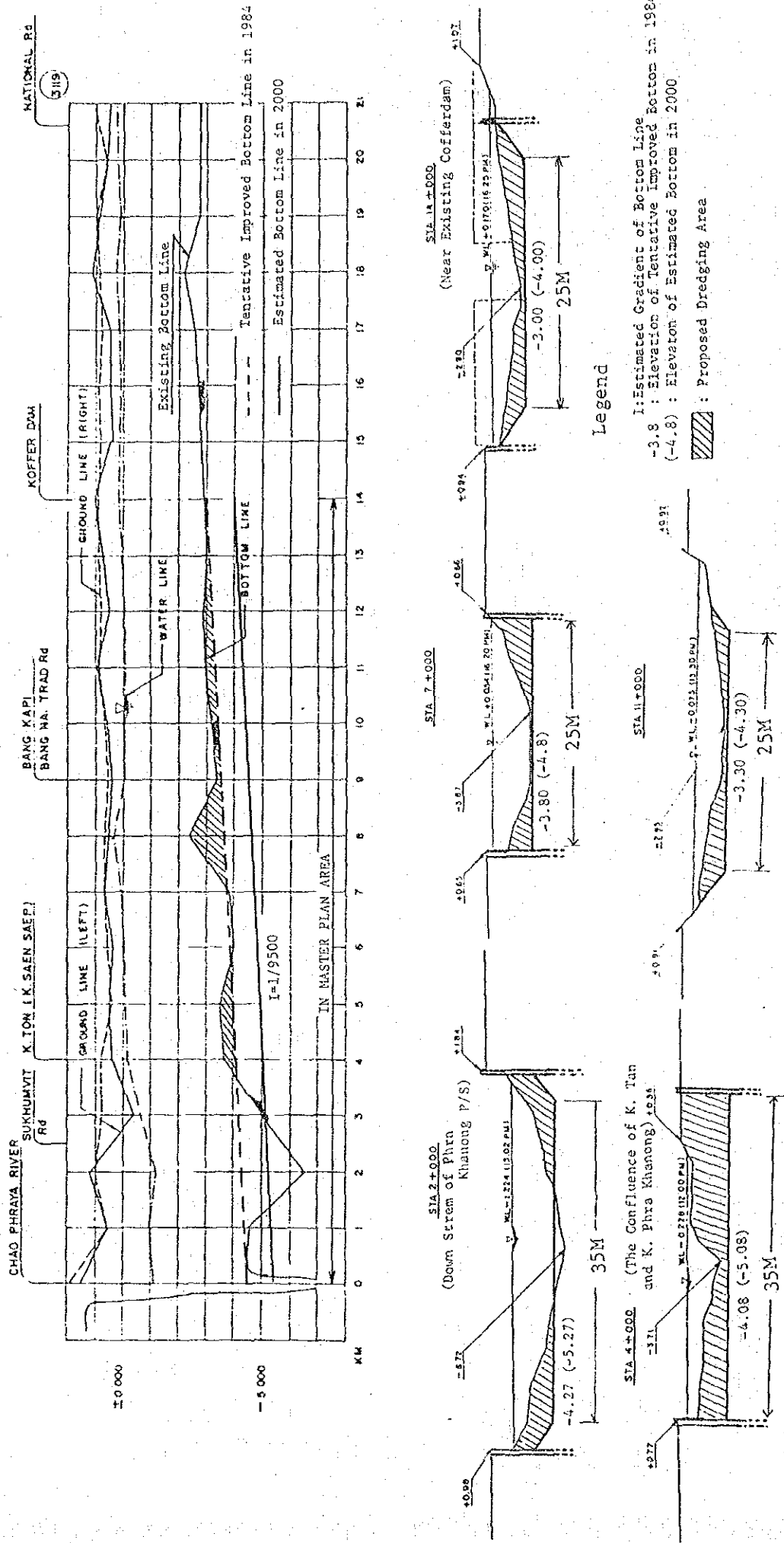


Fig. H.68

KLONG PHRA KHANONG IMPROVEMENT WORKS

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN - BANGKOK

KLONG SAEN SAEF

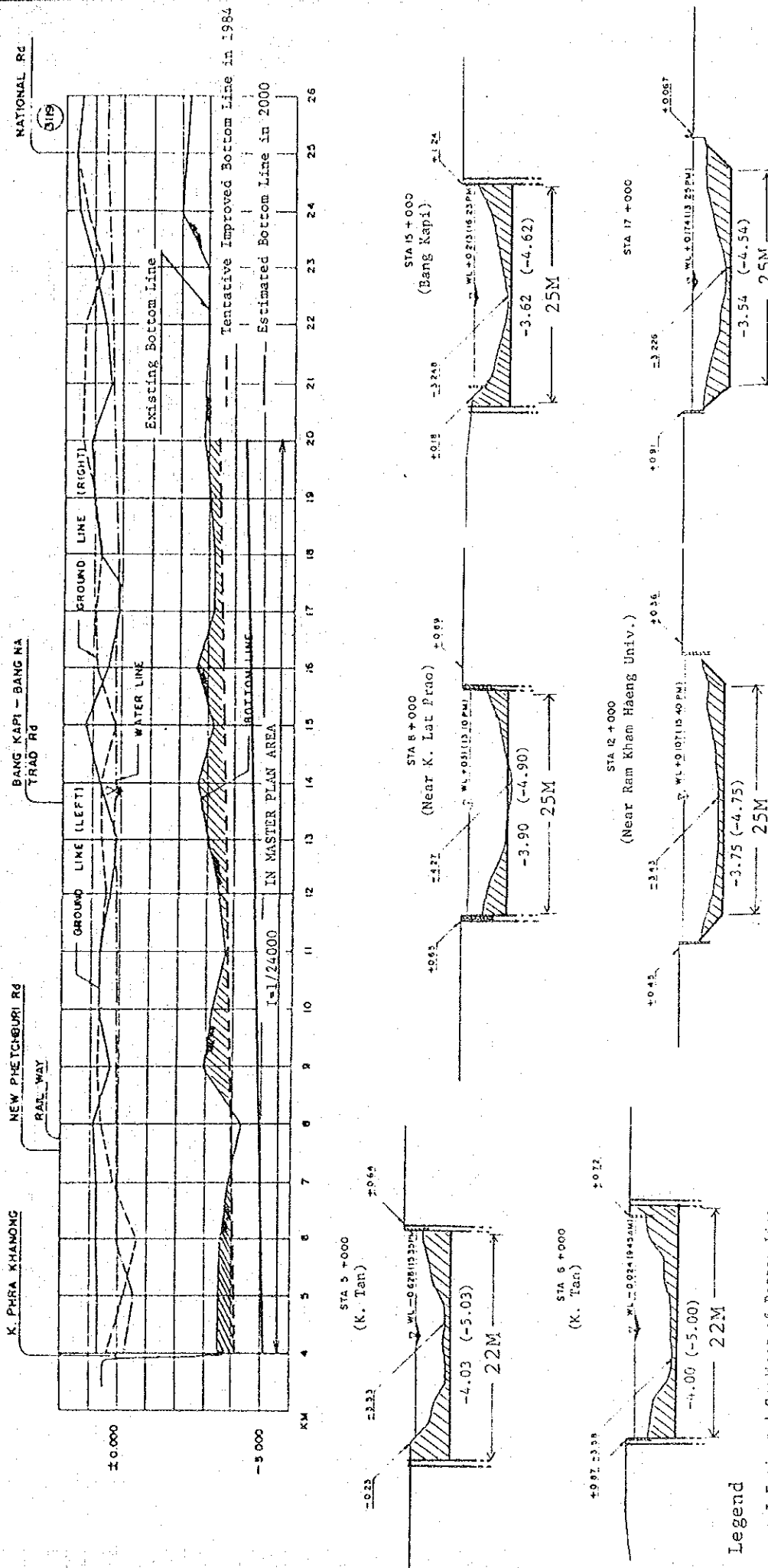


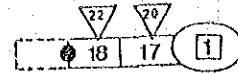
Fig. H.69

KLONG SAEN SAEF IMPROVEMENT WORKS

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN - BANGKOK

- Legend
- 1: Estimated Gradient of Bottom Line
 - 3.8 : Elevation of Tentative Improved Bottom in 1984
 - (-4.8) : Elevation of Estimated Bottom in 2000
 - [Hatched Area] : Proposed Dredging Area

Legend



--- : Dummy Block for Boundary Water Level

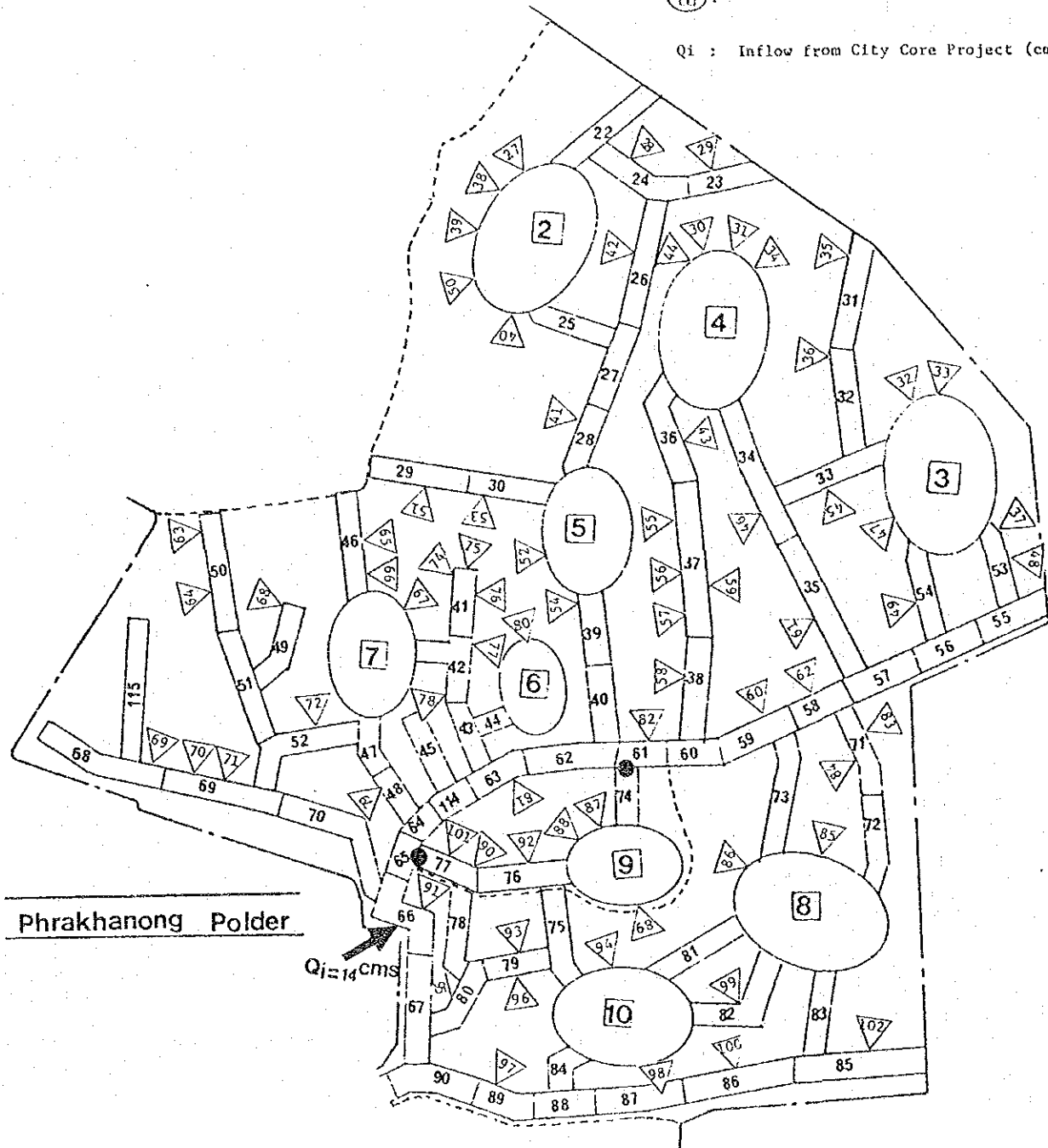
18 : Block No. 18 of Klong

● : Pump/Gate

22 : Connected Subwatershed

1 : Retention Area

Q_i : Inflow from City Core Project (cms)



Phrakhanong Polder

$Q_i = 14 \text{ cms}$

Fig. H.70

PROPOSED KLONG NETWORK IN PHRA KHANONG POLDER
(STEP IV ANALYSIS)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

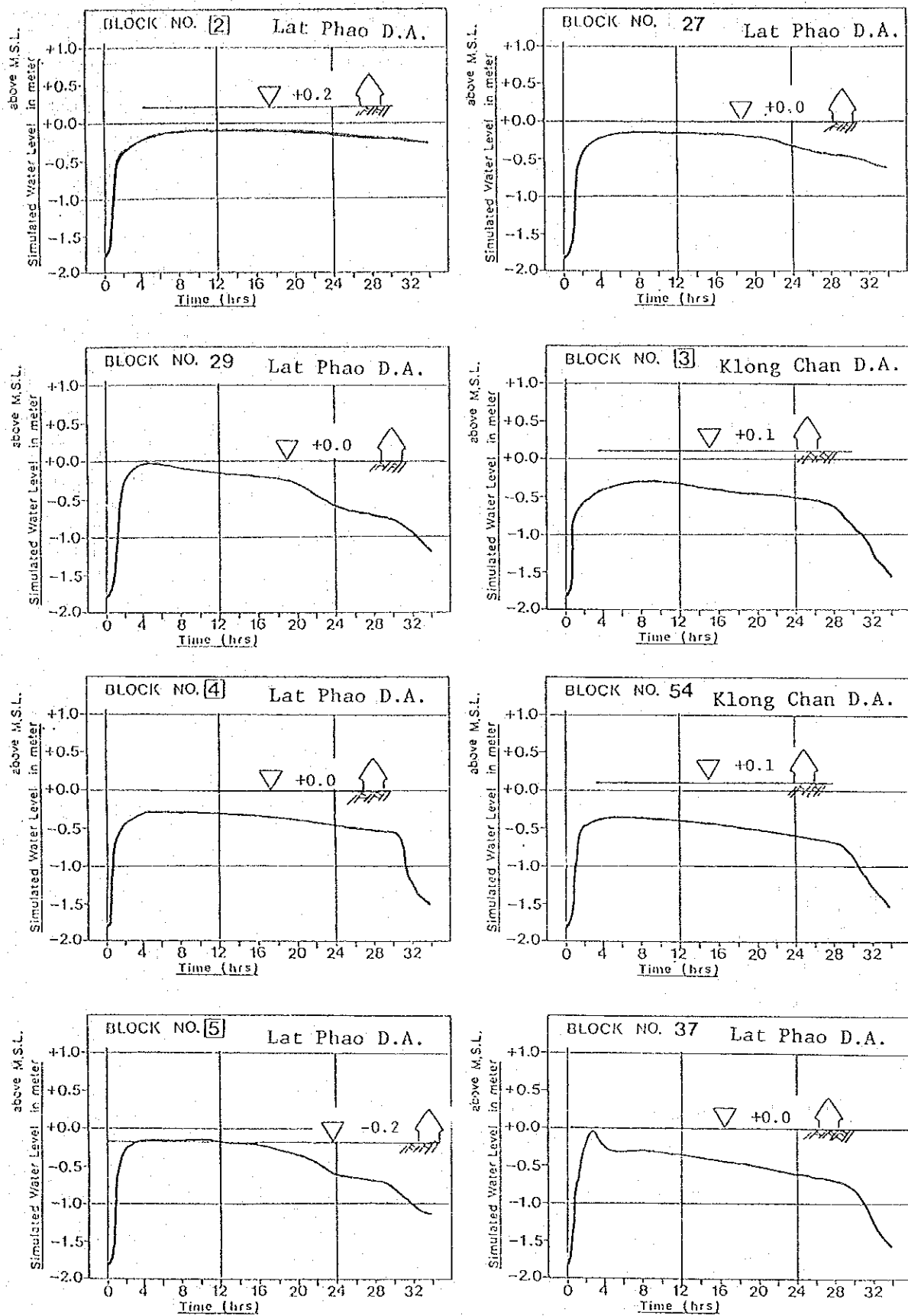


Fig. H. 71

VARIATION OF WATER LEVEL IN PHRA KHANONG POLDER--(1)
(RESULT OF STEP IV ANALYSIS)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

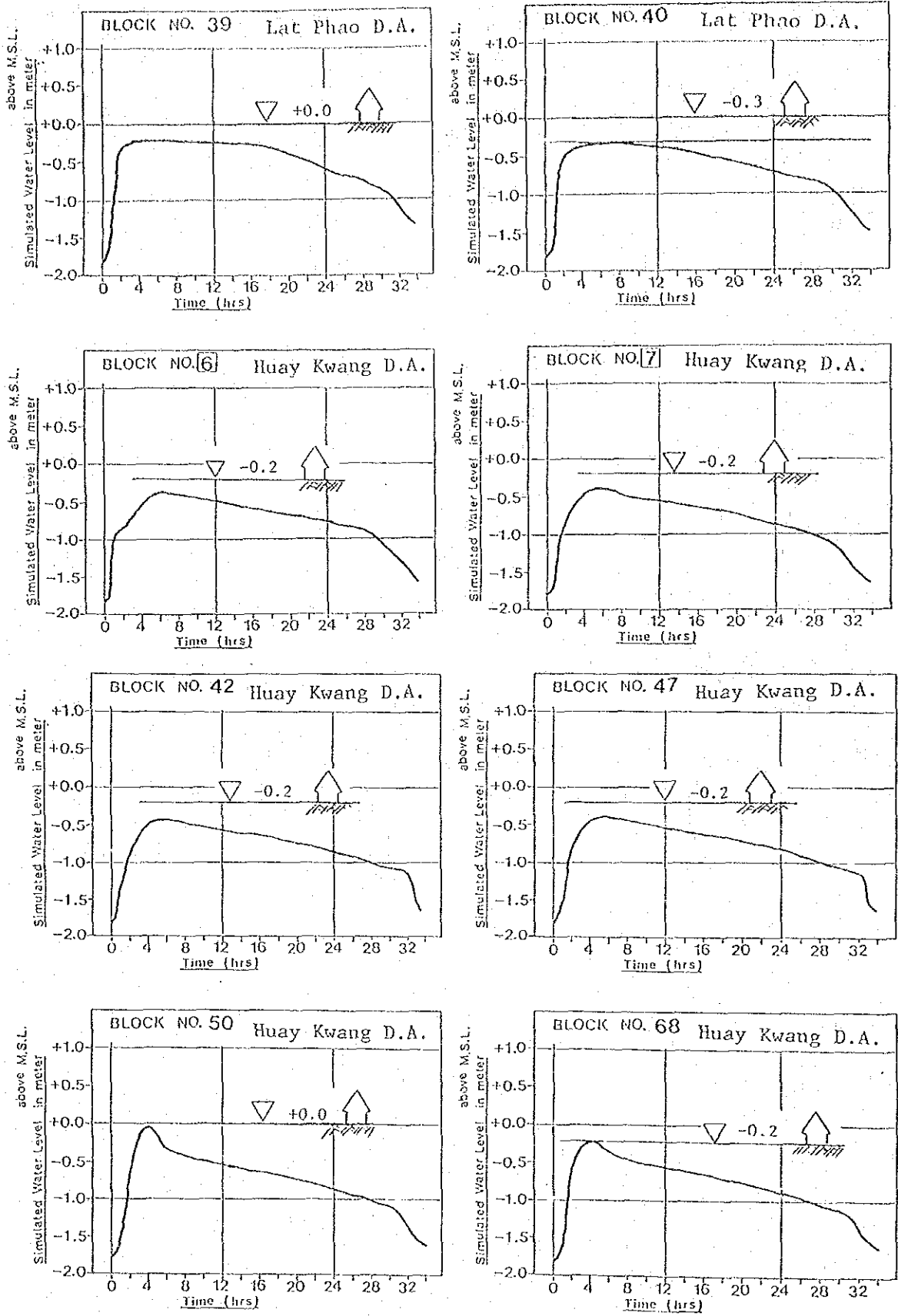


Fig. H.72

VARIATION OF WATER LEVEL IN PHRA KHANONG POLDER--(2)
(RESULT OF STEP IV ANALYSIS)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

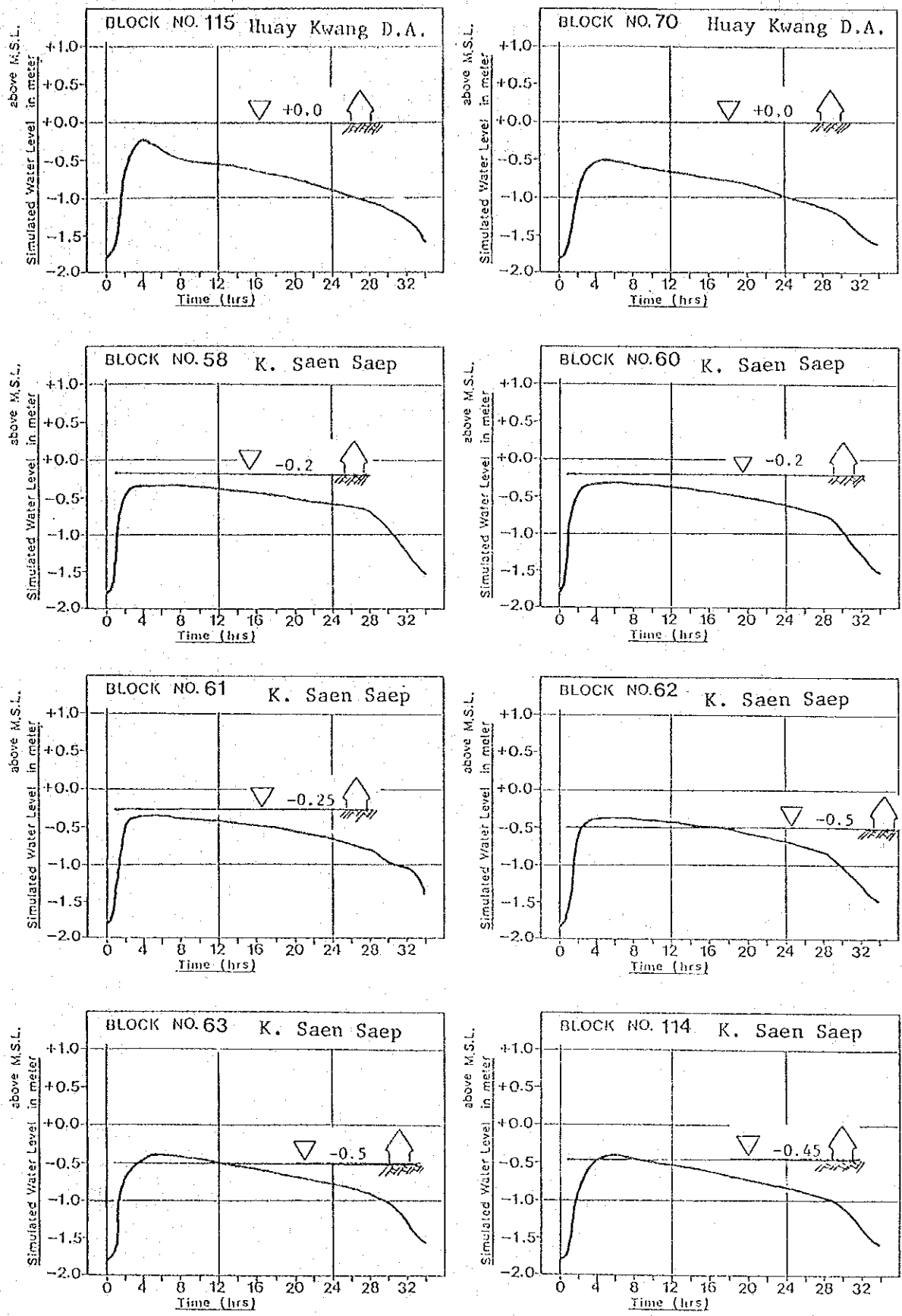


Fig. H. 73

VARIATION OF WATER LEVEL IN PHRA KHANONG POLDER--(3)
(RESULT OF STEP IV ANALYSIS)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

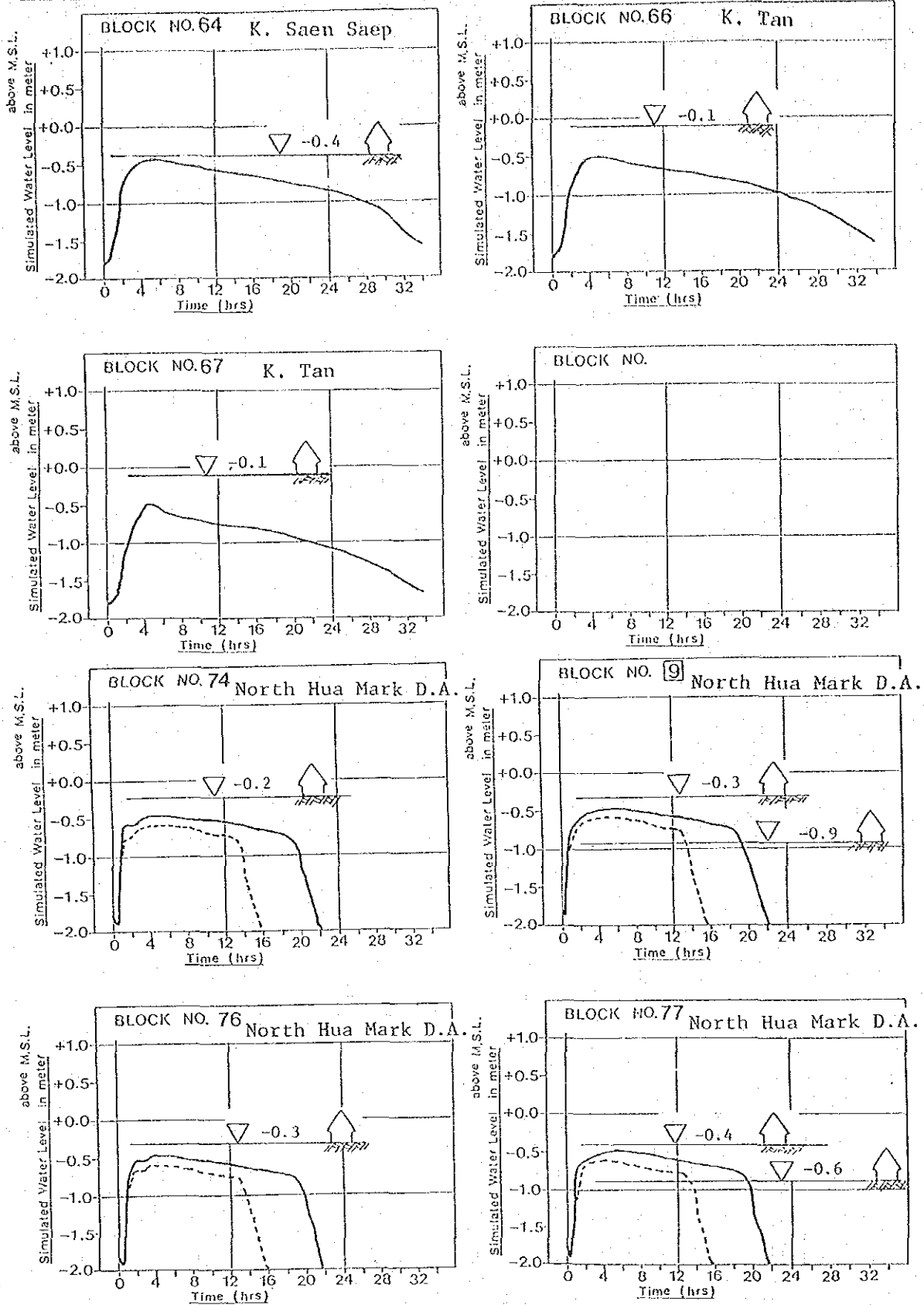


Fig. H.74

VARIATION OF WATER LEVEL IN PHRA KHANONG POLDER--(4)
(RESULT OF STEP IV ANALYSIS)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

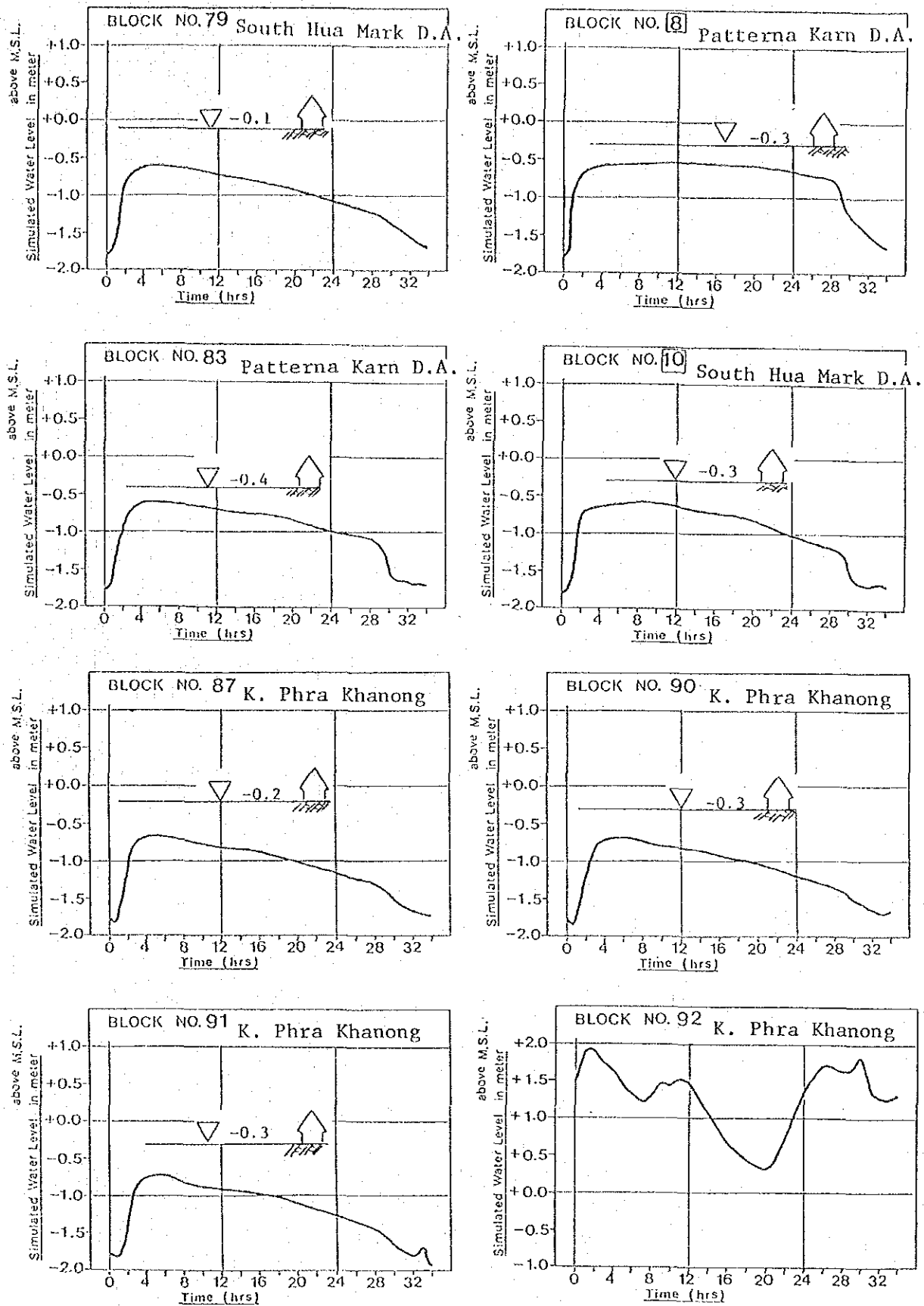


Fig. H.75

VARIATION OF WATER LEVEL IN PHRA KHANONG POLDER--(5)
(RESULT OF STEP IV ANALYSIS)

MASTER PLAN ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK