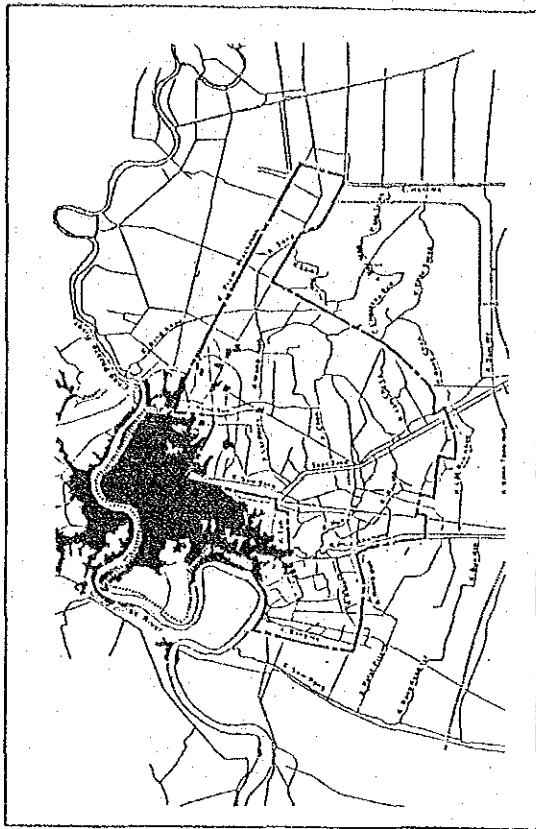


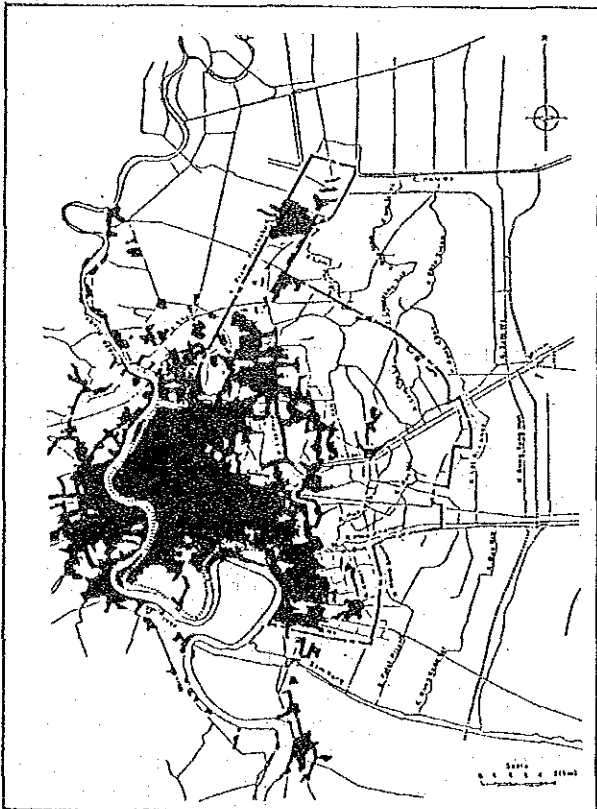
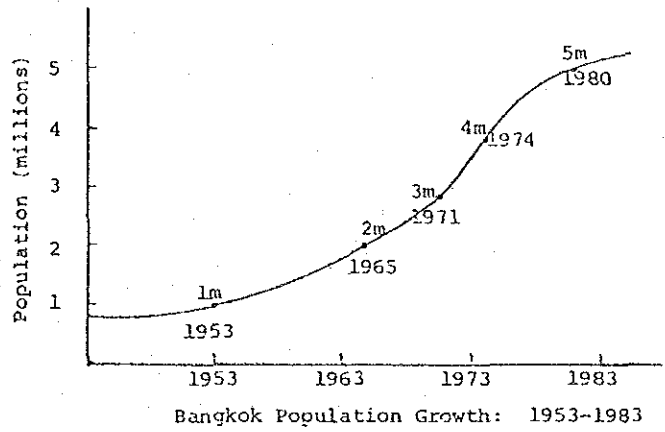
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図 2.5	流域平均及び月間降雨量	5
図 2.6	チャオプラヤ川の水位	6

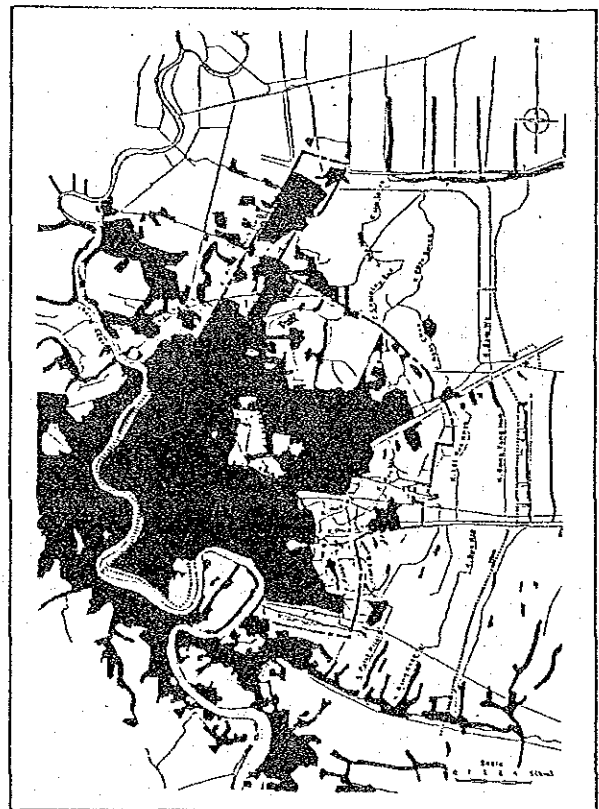




Urbanized Area 1958



1971



1984

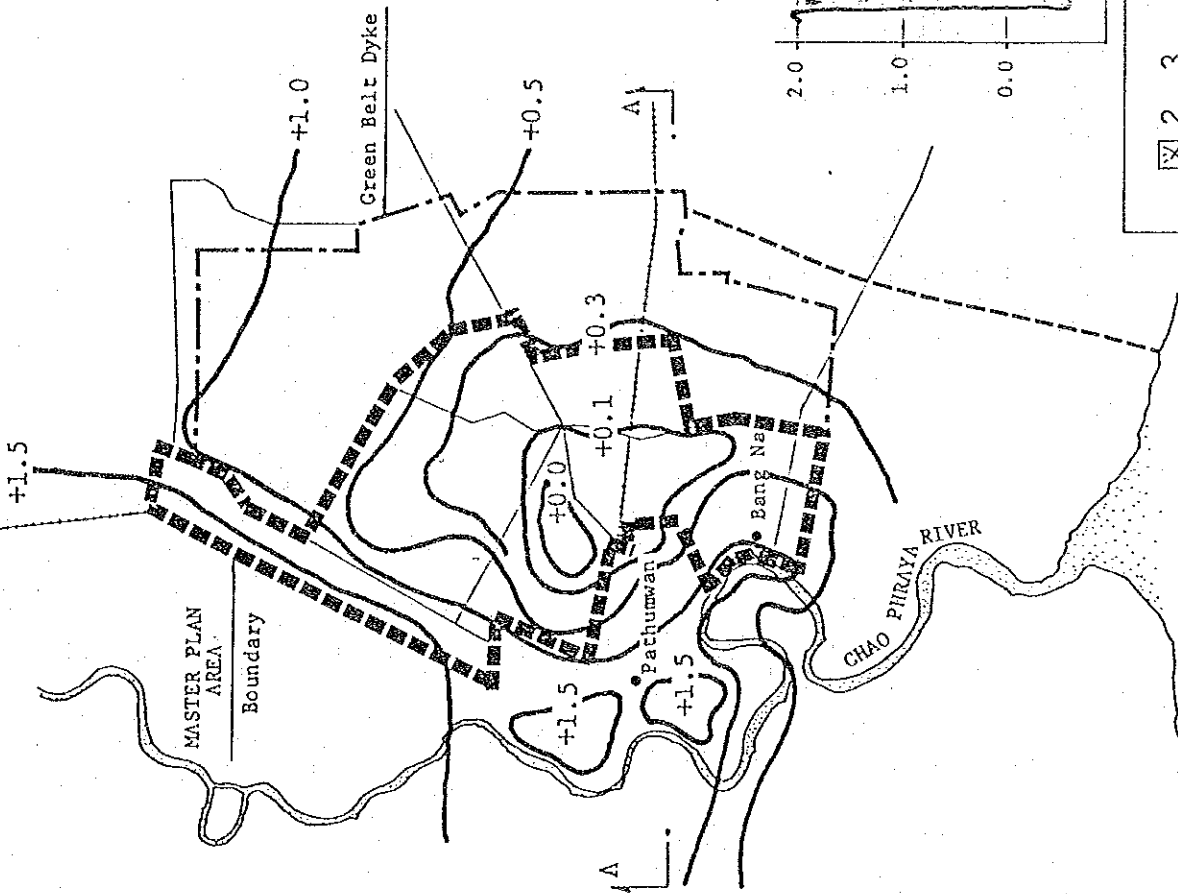
図 2.1

市街化区域の拡大

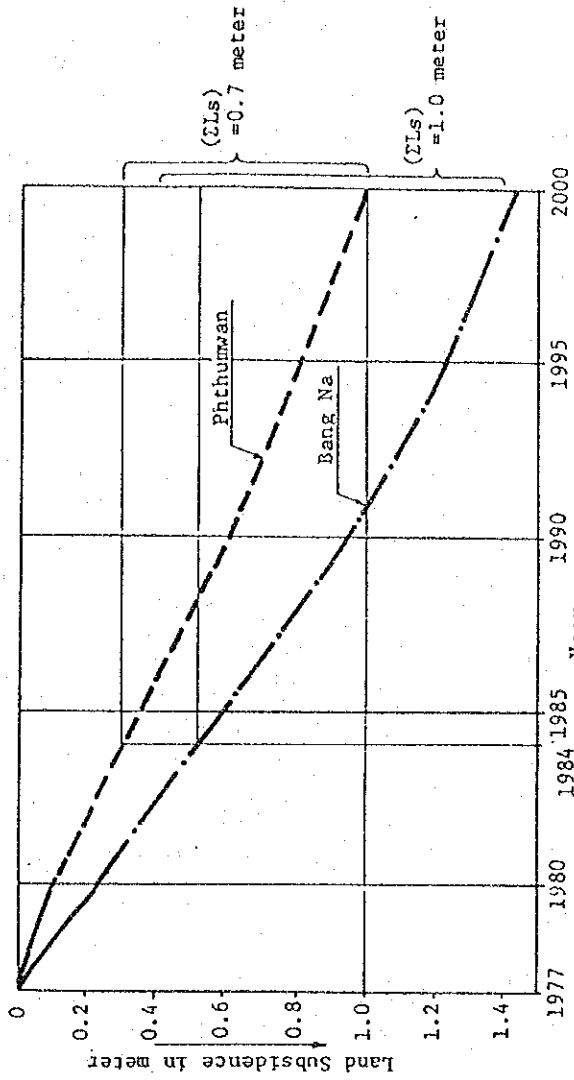
FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



GROUND ELEVATION IN 1984



PROGRESSION OF LAND SUBSIDENCE



LAND PROFILE (A - A section)

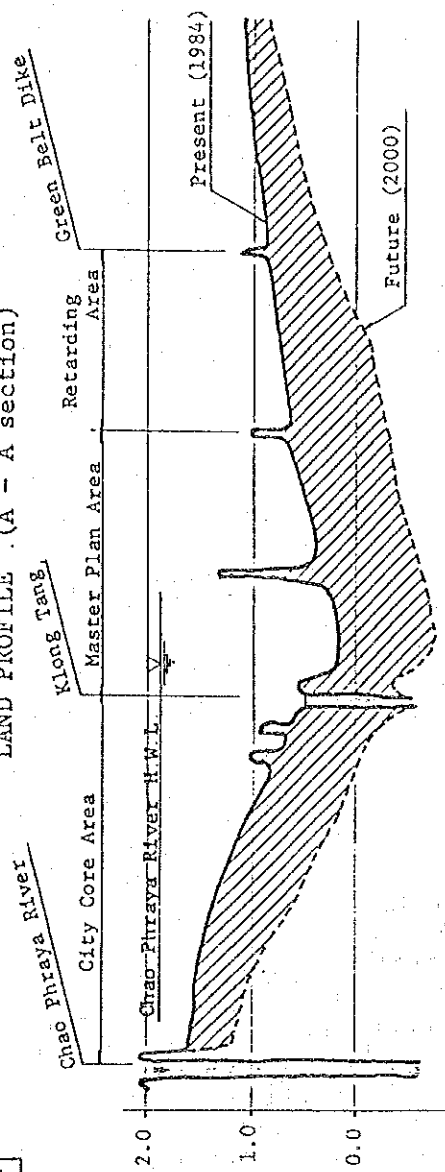
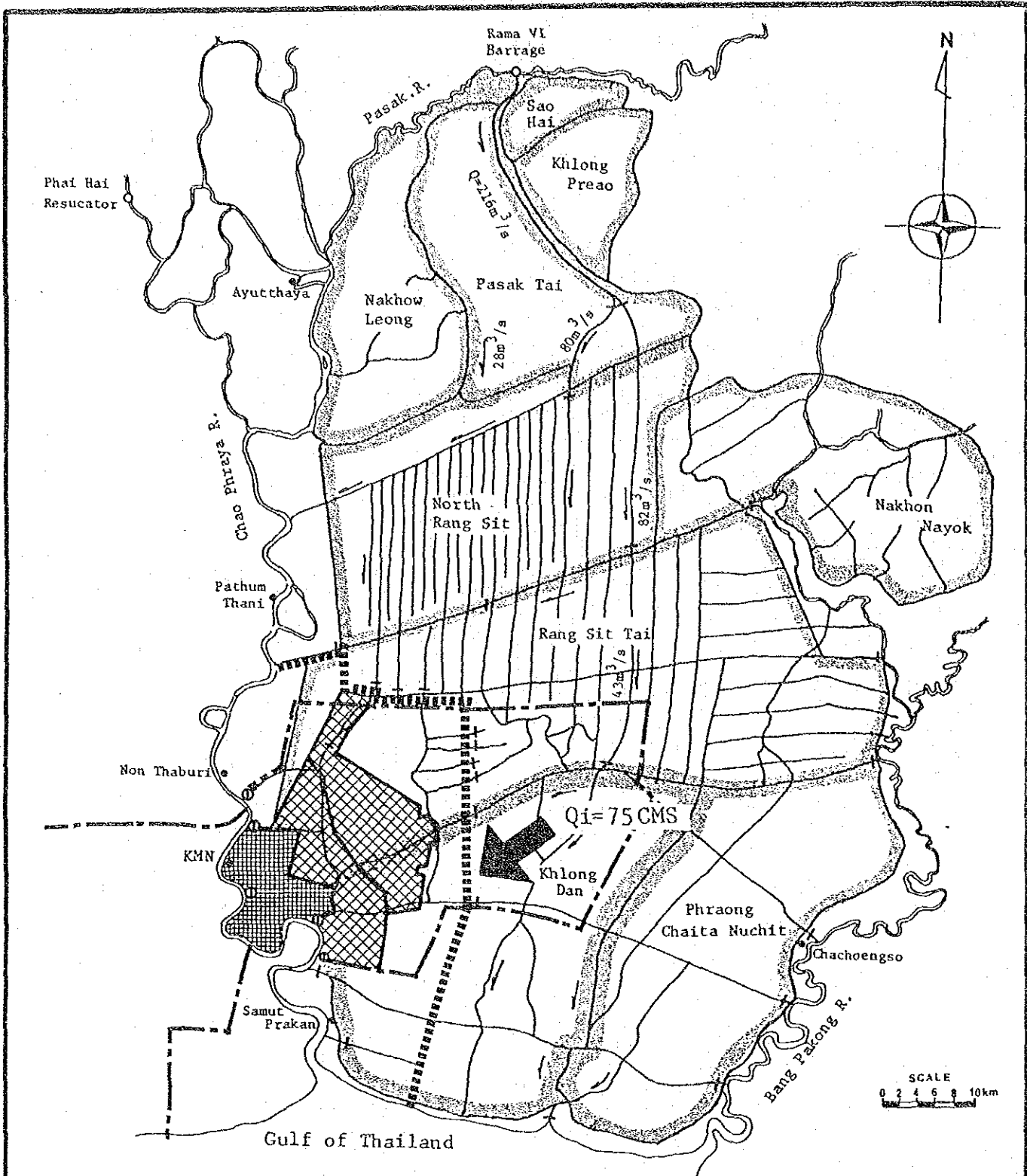


図 2.3

地盤沈下の進行

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

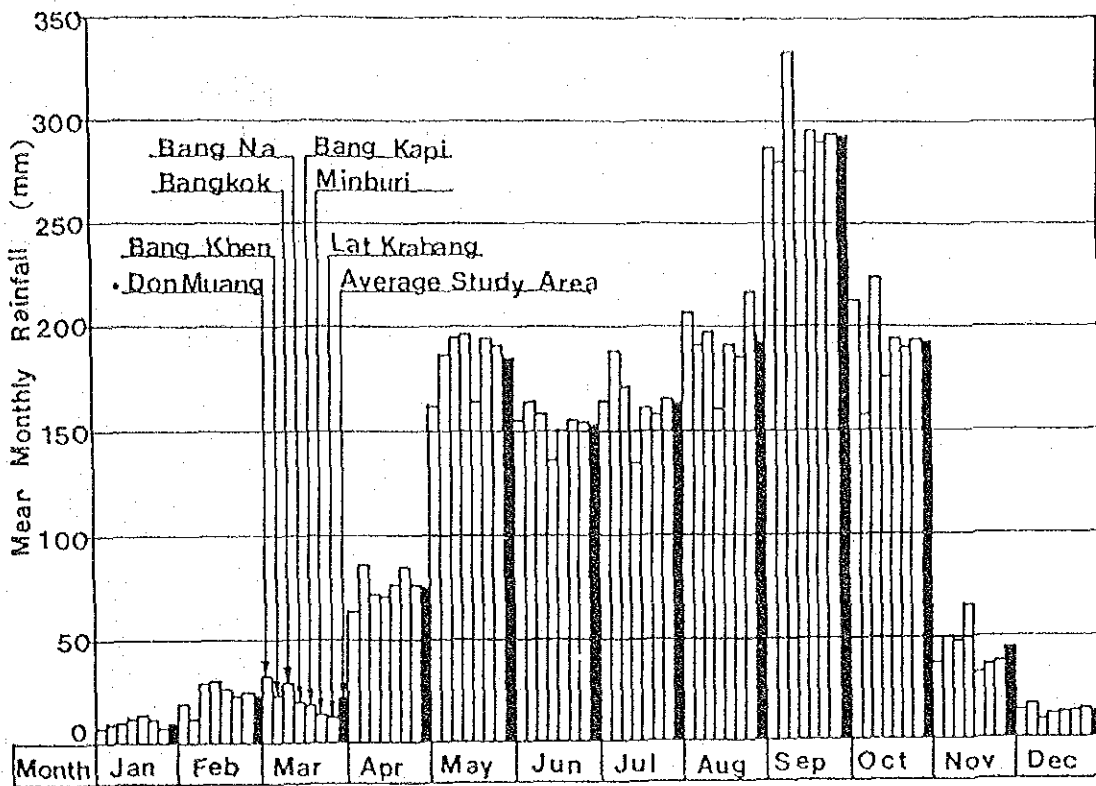


- : Irrigation Zone of RID
- : Green Belt Dyke
- : Qi: Inflow from Outer Area observed in 1983 by JICA Study Team
- : Master Plan Area and Feasibility Study Area (JICA)
- : Regulator Gate
- : Main Pumping Station (Existing and Planned)
- : BMA Boundary
- : City Core Area
- $80m^3/s$  : Discharge of Irrigation

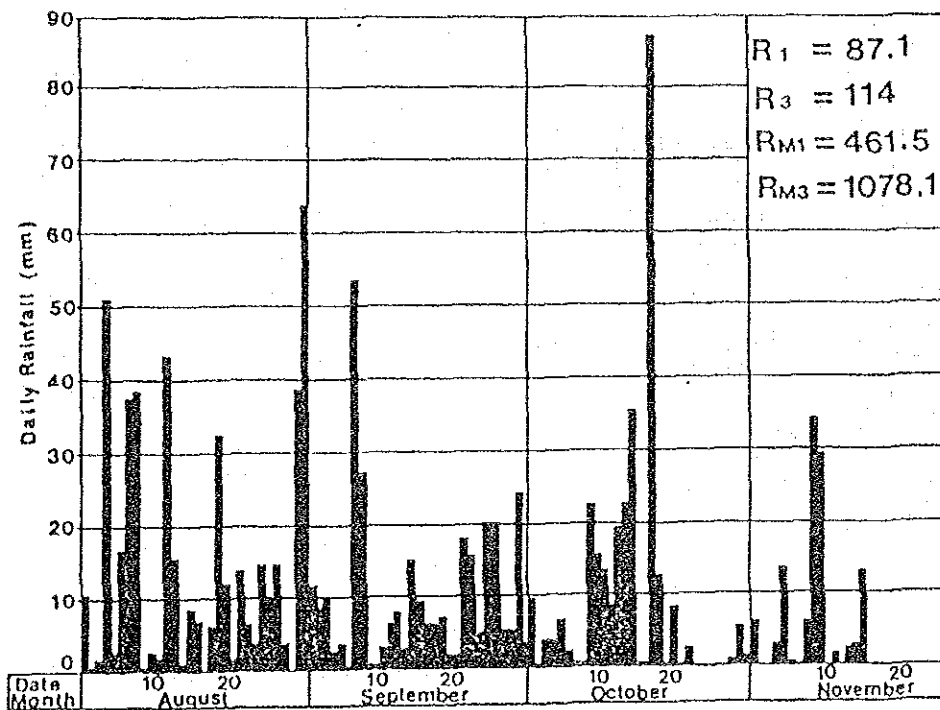
図 2.4

チャオプラヤ川東岸地域のクローン網

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



AVERAGE POINT AND AREAL MONTHLY RAINFALL DURING PAST 30 YEARS



AVERAGE AREAL DAILY RAINFALL IN FLOOD SEASON IN 1983

Legend

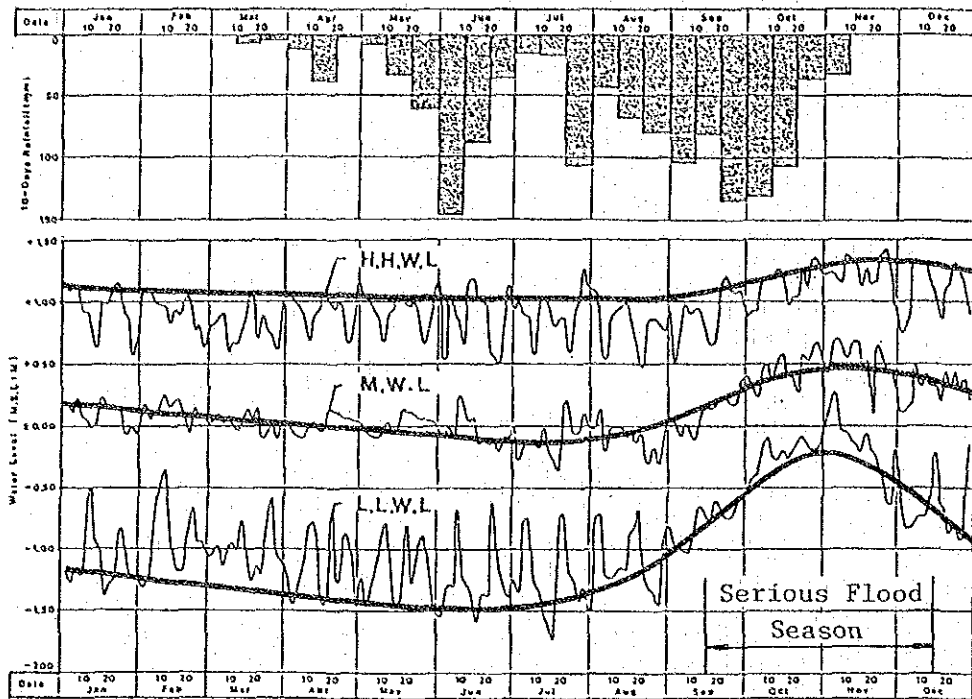
- $R_1$  : Maximum Daily Rainfall (mm)
- $R_3$  : Maximum 3-Day Rainfall (mm)
- $R_{m1}$  : Maximum Monthly Rainfall (mm)
- $R_{m3}$  : Maximum 3-Month Rainfall (mm)

Source : Meteorological Department

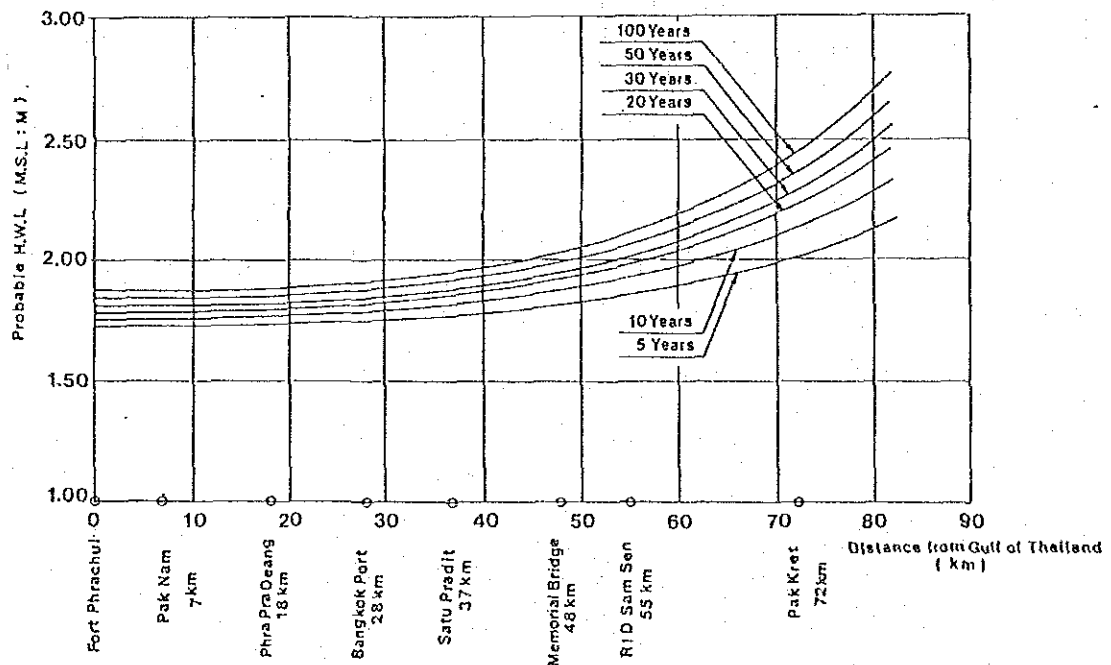
図 2.5

流域平均及び月間降雨量

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



SEASONAL CHANGES OF RAINFALL IN THE MASTER PLAN AREA AND WATER LEVEL AT BANGKOK PORT IN 1980



PROBABLE FLOOD WATER LEVEL OF CHAO PHRAYA RIVER

Source : Meteorological Department and Port Authority of Thailand

図 2.6

チャオプラヤ川の水位



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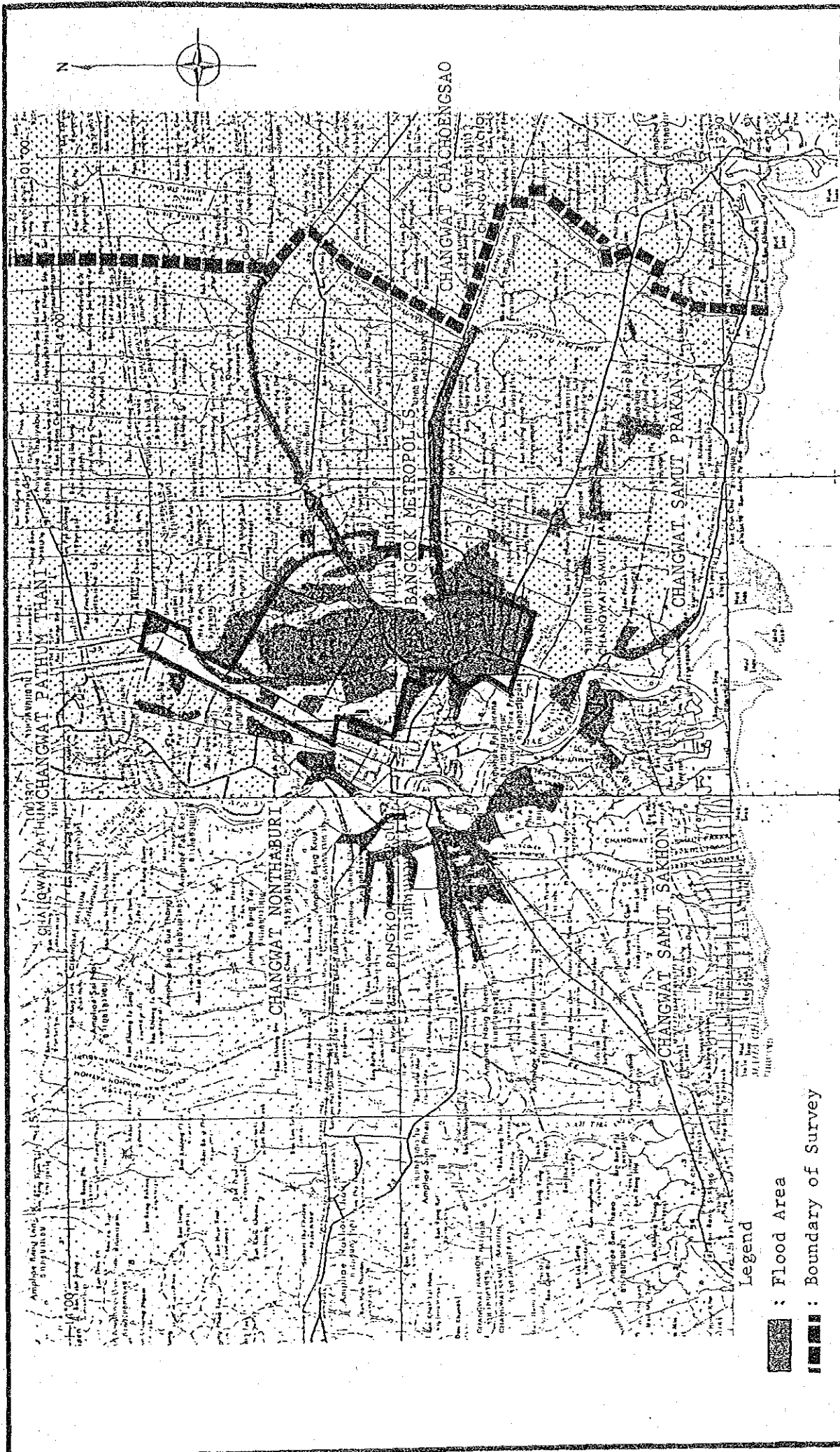
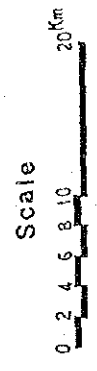
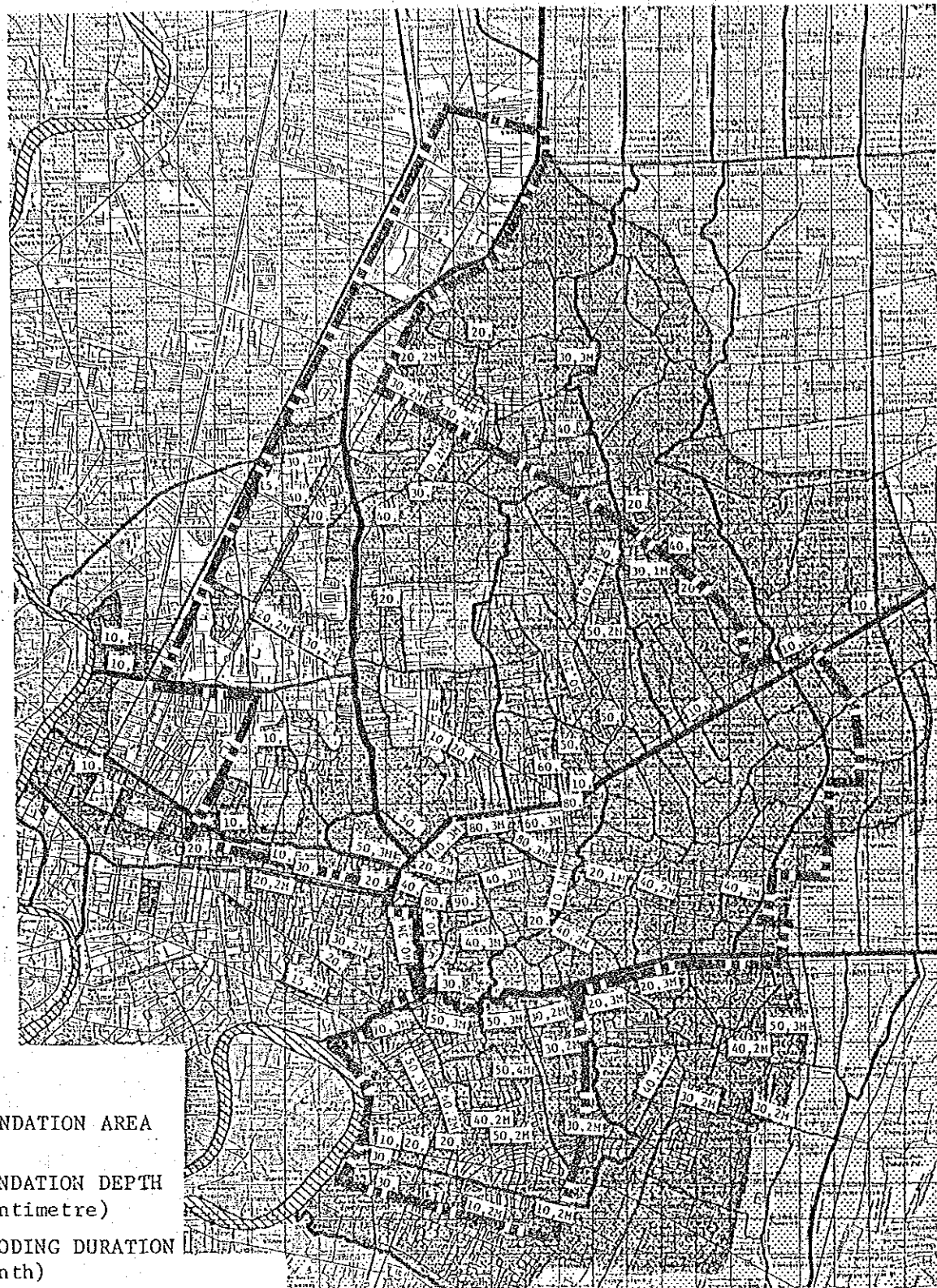
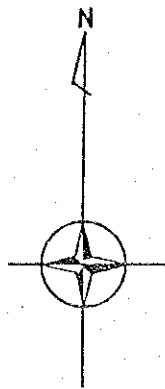


図 3.1 浸水実績図 (バンコク首都圏、1983年)

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

[Source: Flood Damage Survey by NSO]





**LEGEND**



: INUNDATION AREA

50: INUNDATION DEPTH  
(Centimetre)

3M: FLOODING DURATION  
(Month)

**Note:**

This map was prepared based on the ① hearing from residents in the flood damaged area and ② estimation from definite flood marks.

図 3.2

浸水実績図 (フィージビリティ調査地域、1983年)



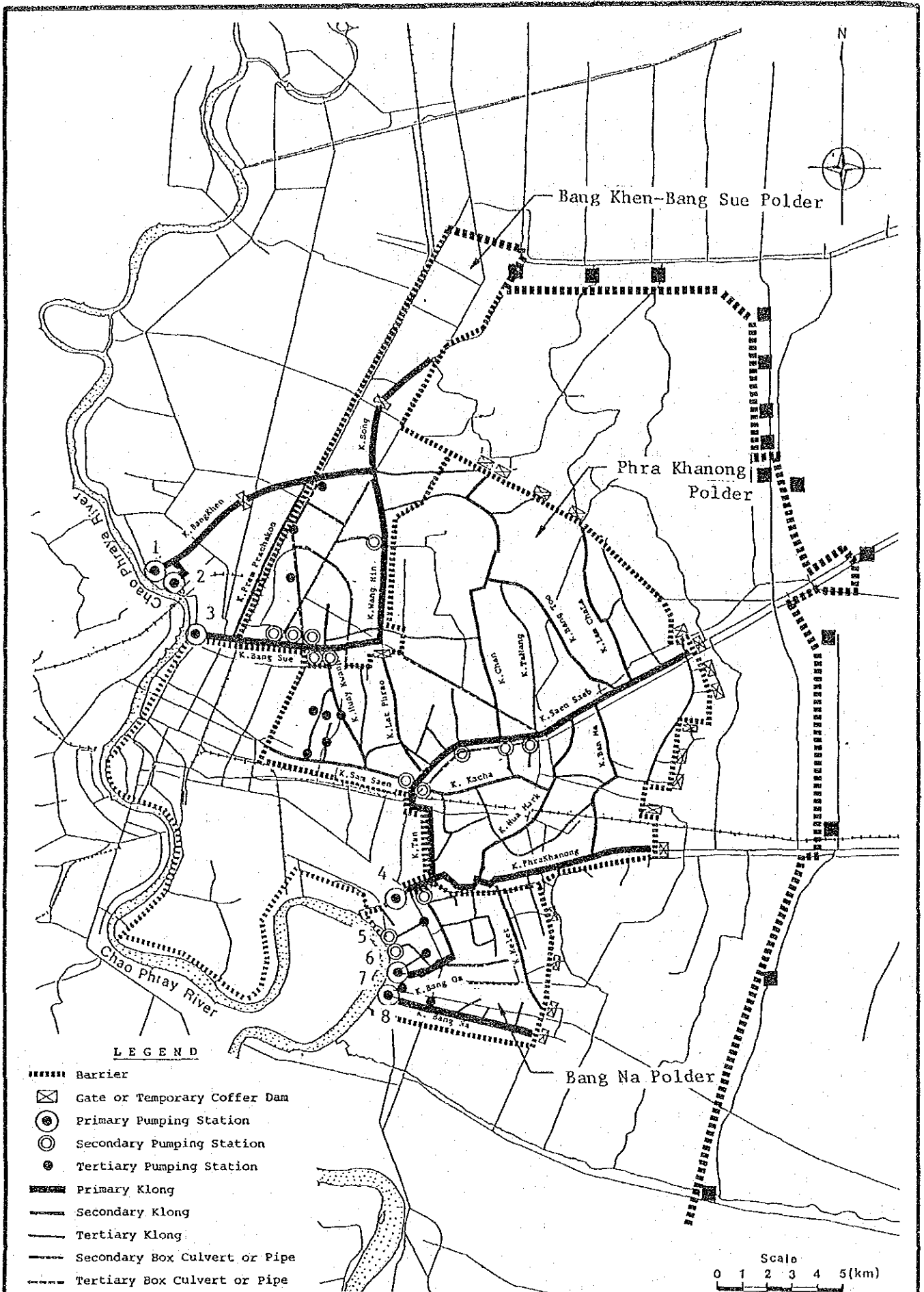
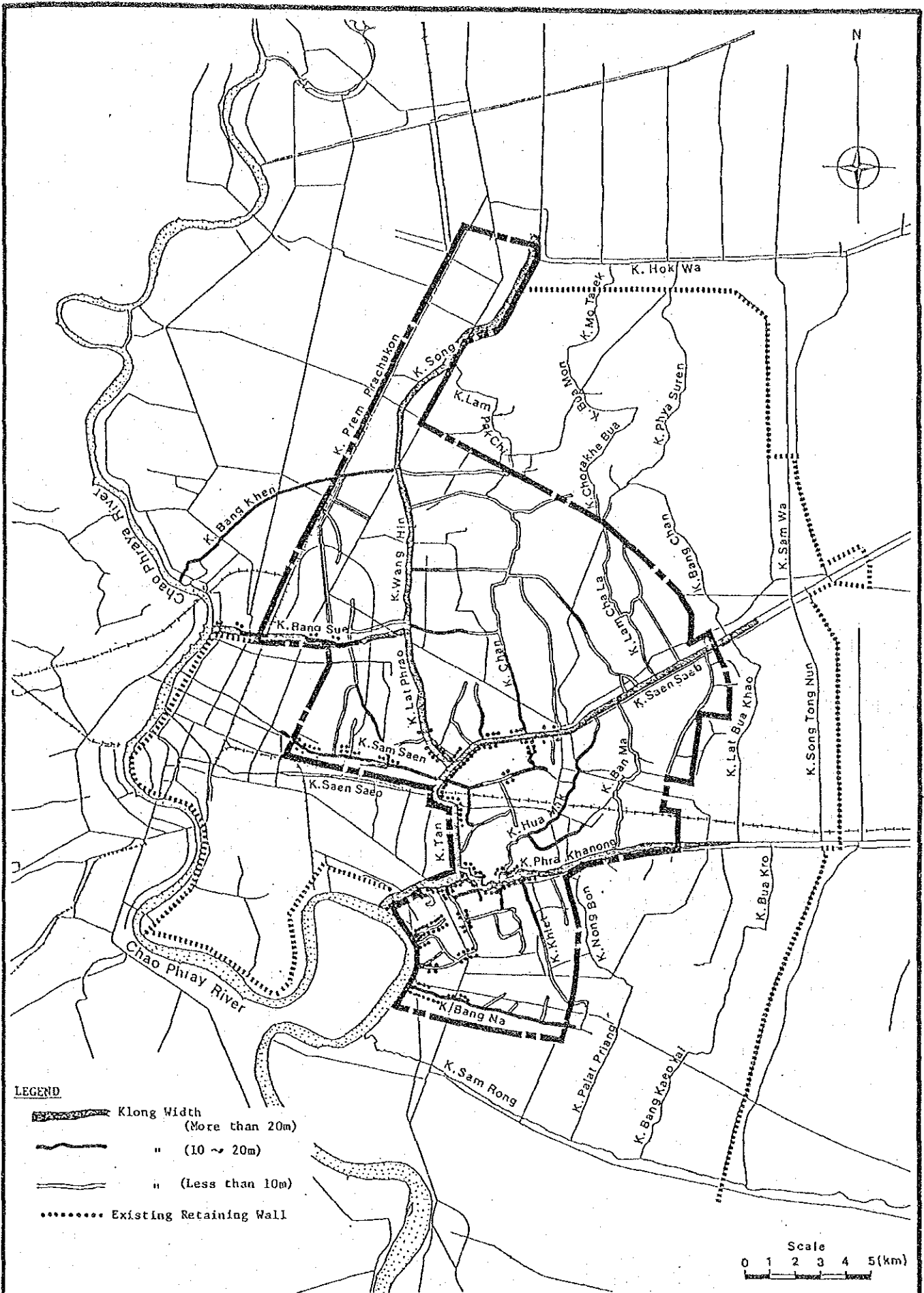


図 3.4

既存洪水対策施設

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



LEGEND

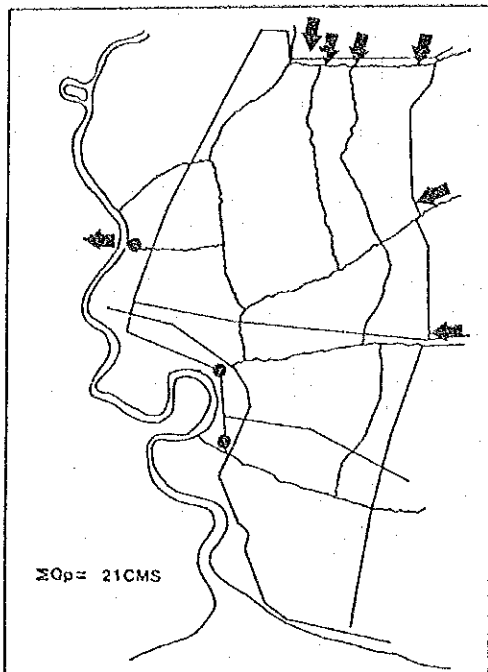
- Klong Width (More than 20m)
- " (10 ~ 20m)
- " (Less than 10m)
- Existing Retaining Wall

Scale  
0 1 2 3 4 5(km)

図 3.5

クローンの現況幅と既存護岸

1. Before Urgent Measures



2. After Urgent Measures

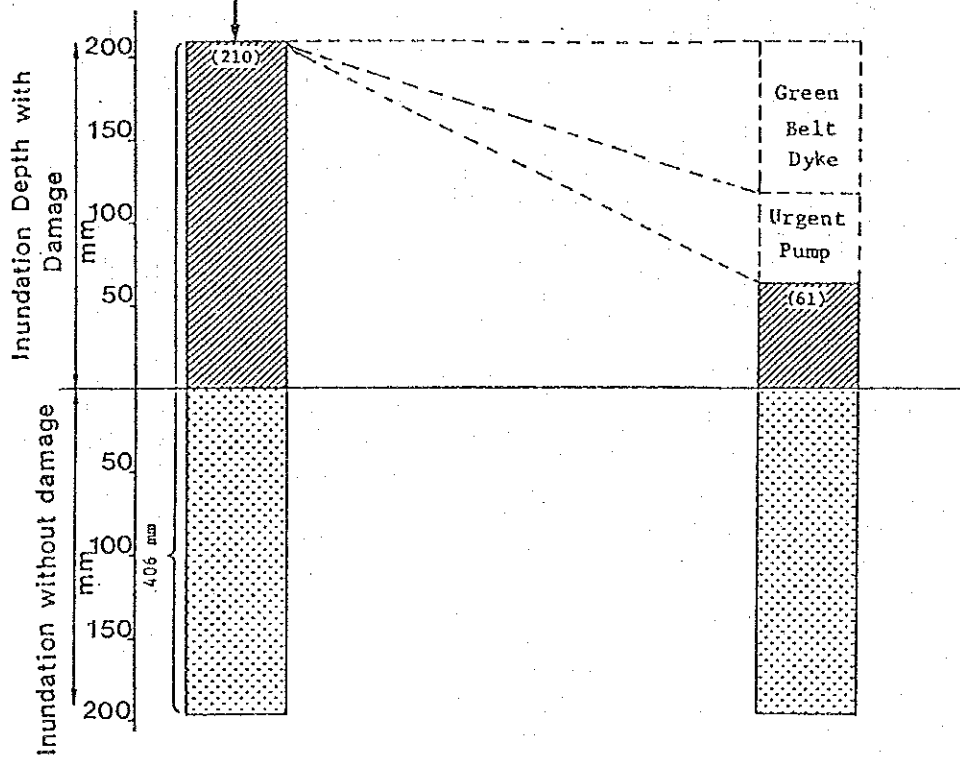
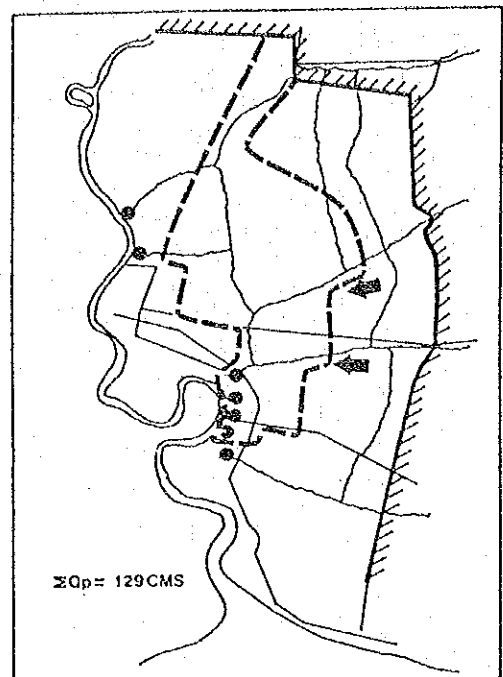


図 3.6

緊急洪水対策施設の水利的効果



**LEGEND**

- ① Bangkok Flood Control and Drainage Project (City Core) : NEDECO
- ② Preliminary Study and Master Plan on Flood Protection/Drainage Project in Eastern Suburban Bangkok : JICA
- ③ Samut Prakan Project : TISTR
- ④ Green Belt Project ( King,s Project )
- ⑤ Flood Routing and Control Alternatives of Chao Phraya River of Bangkok : AIT
- ⑥ Improvement of Canals Connecting Klong Tawe Wattana and Klong Khoon Ratpinlajai Project : AIT
- ⑦ Integrated Flood Relief Plan of the West Bank : Austria
- ⑧ Master Plan for Flood Protection and Drainage of Thonburi and Samut Prakan West Project : NEDECO

**OVERALL PROJECT**

- Bangkok Flood Control Management Project : ADB
- Bangkok Flood Alleviation Study of Model Feasibility : CIDA
- Flood Control Management Planning : USA



図 3.7 関連洪水対策計画

FEASIBILITY STUDY ON FLOOD PROTECTION/ DRAINAGE PROJECT IN EASTERN SUBURBAN BANGKOK

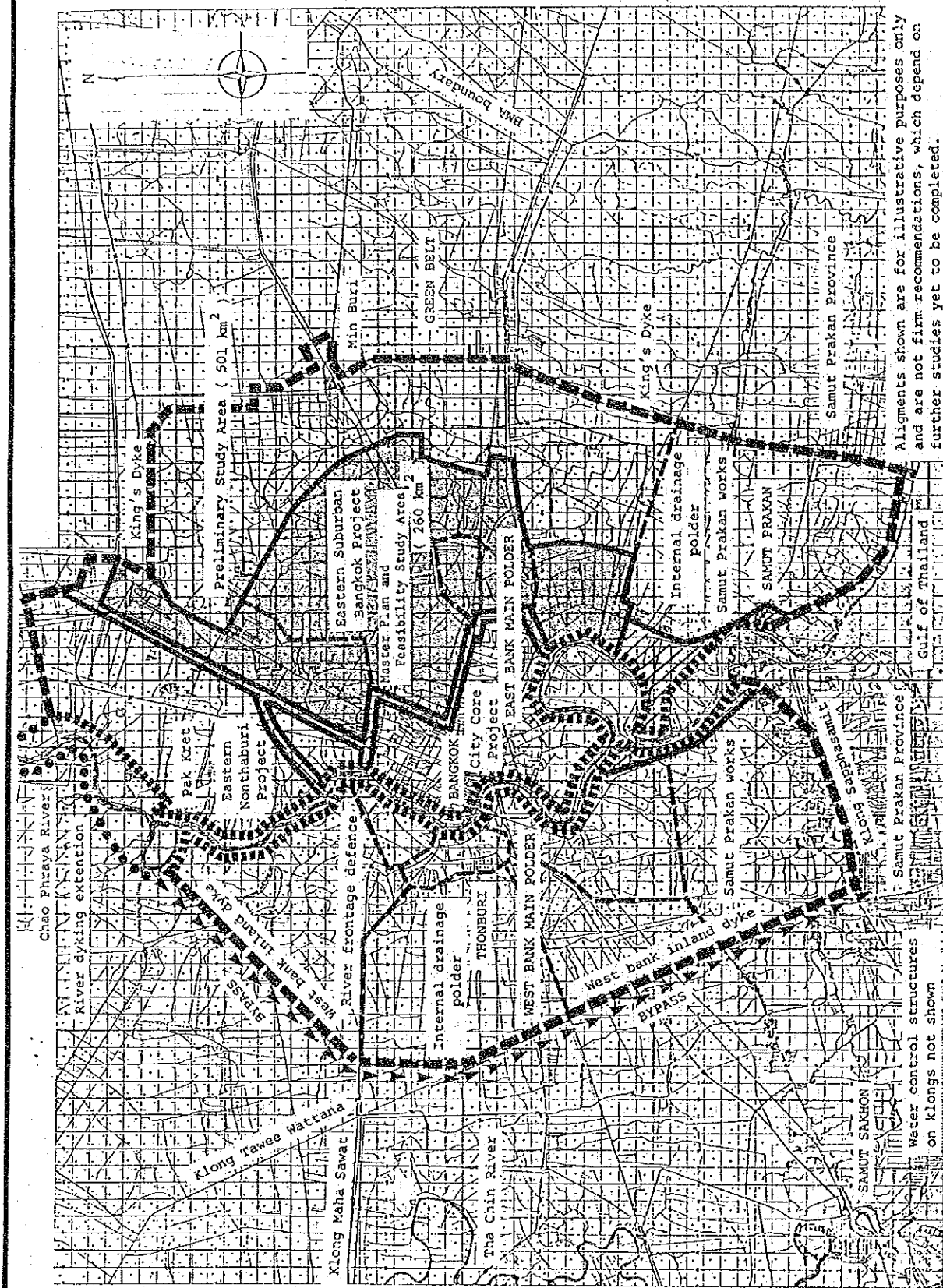
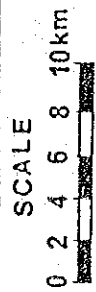


図 3.8 洪水対策計画の概念図 (バンコク首都圏、ADBレポート)

図 3.8



SCALE

Source : ADB Report

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

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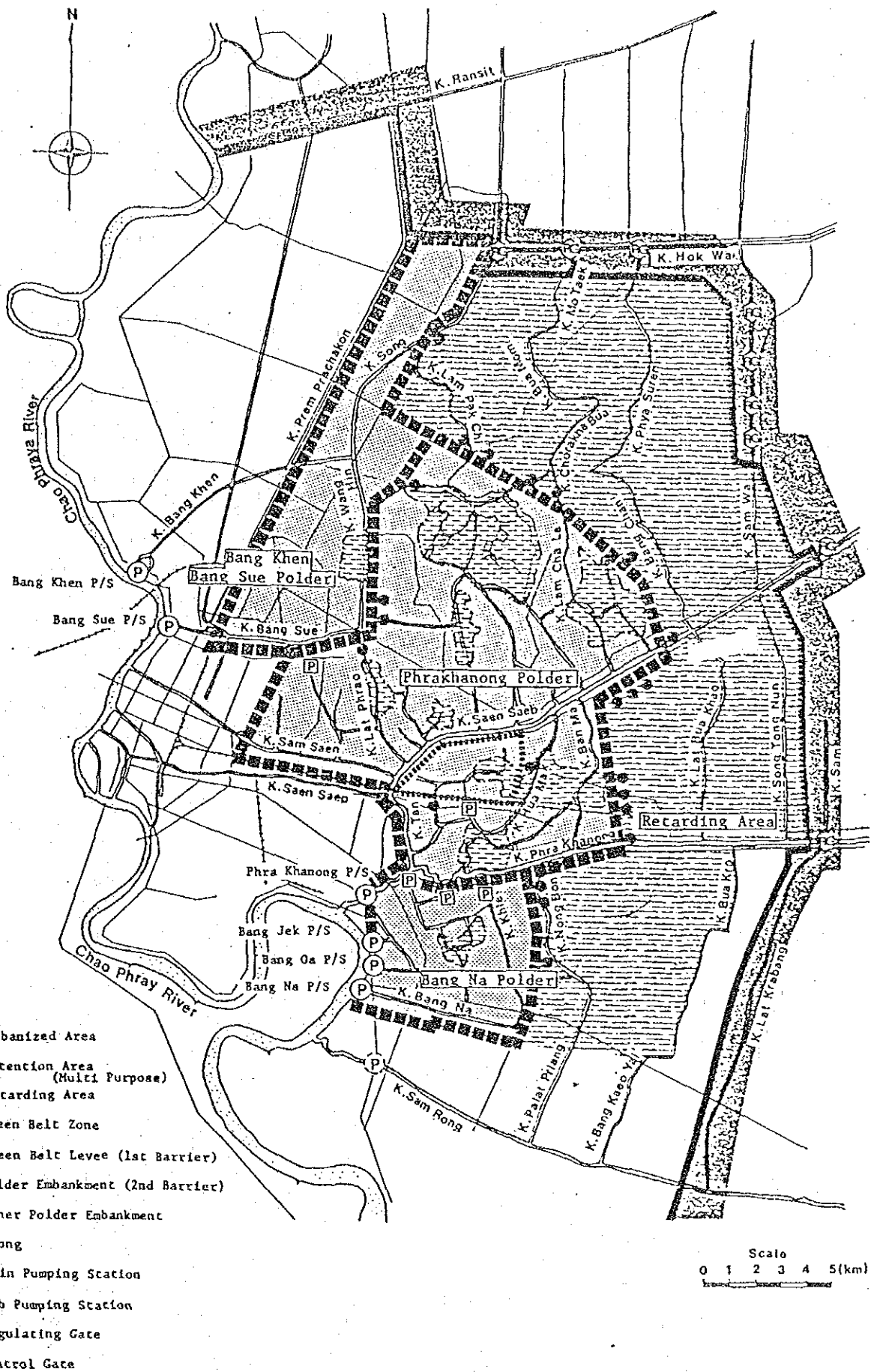


图 4.1

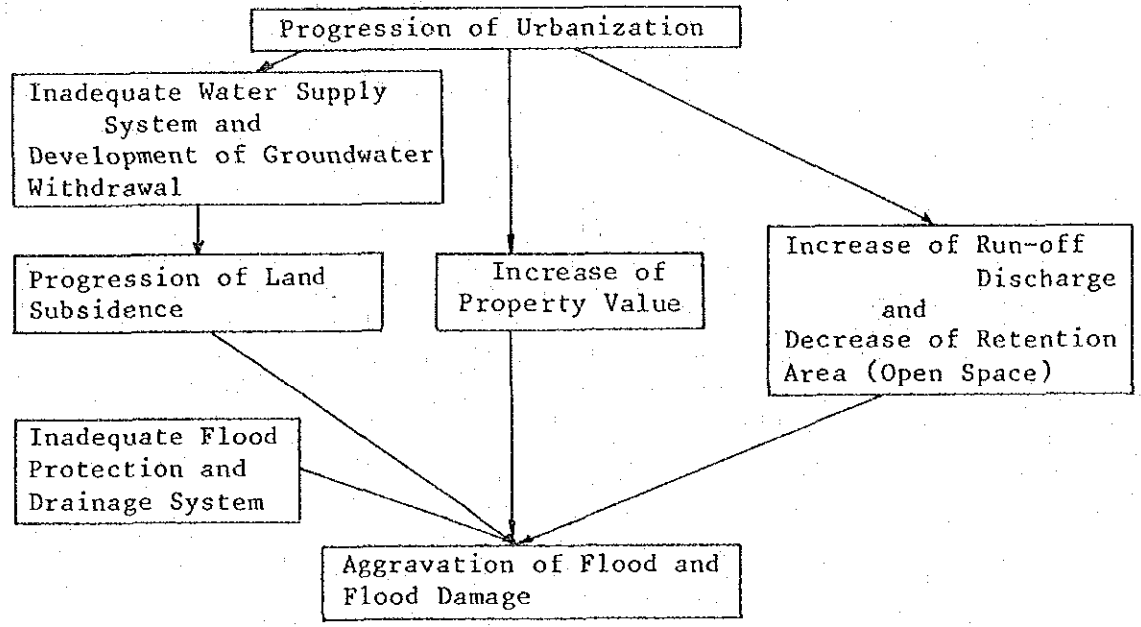
洪水防御・排水計画概念図

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Flood Damage Increase

**TOPOGRAPHY AND HYDROLOGY**

- . Flat and Low-lying Area
- . High Tide
- . High Water Level due to Flood Discharge from the North



Comprehensive Flood Damage Mitigation Plan

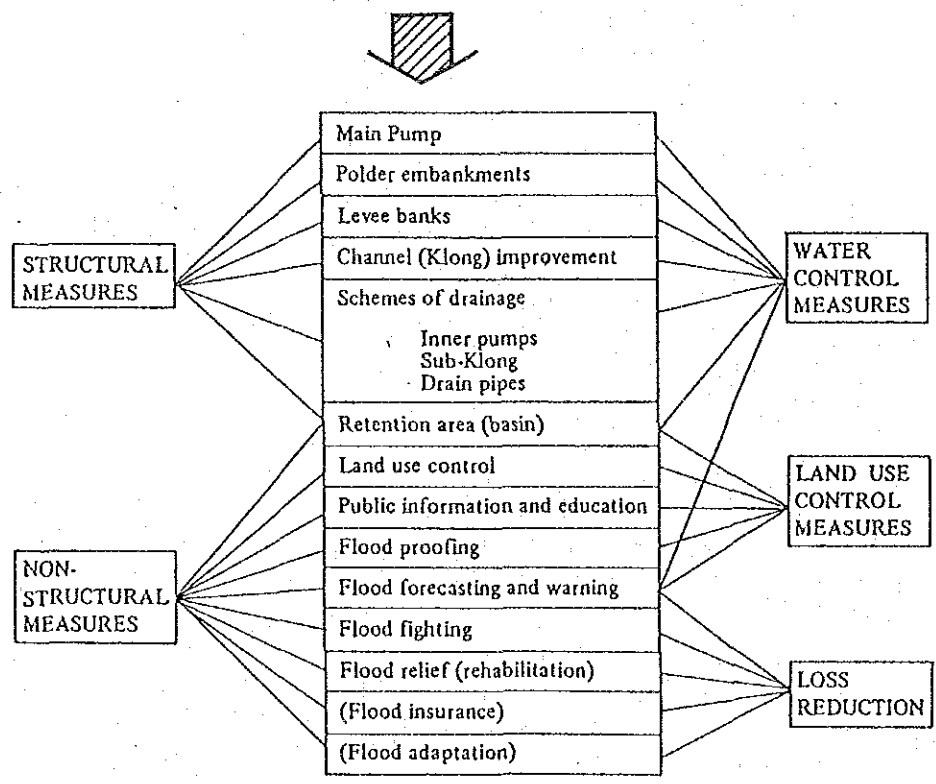


図 4.2

総合治水対策

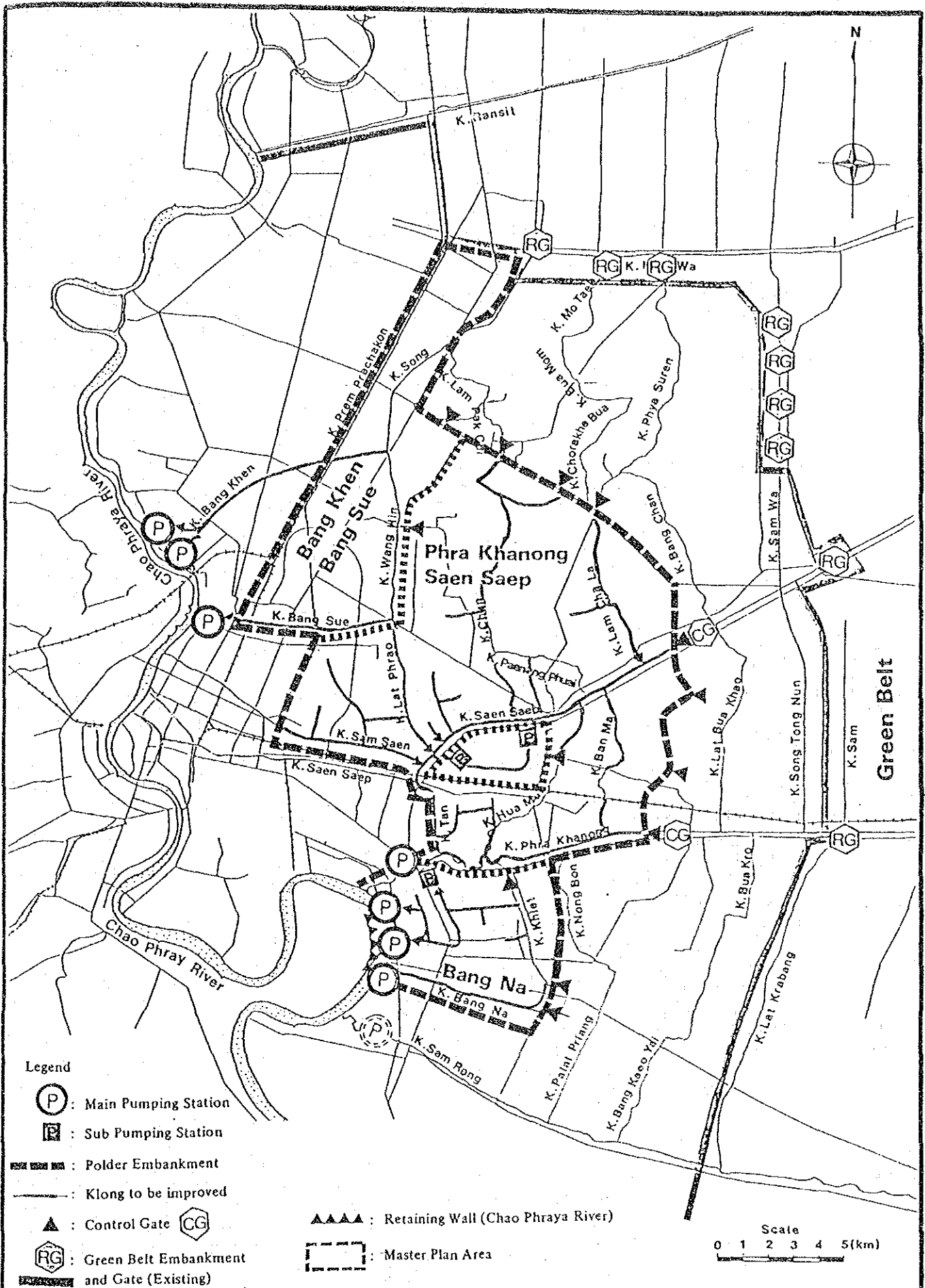


図 4.3

全体事業計画施設一般図 (マスタープラン)

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

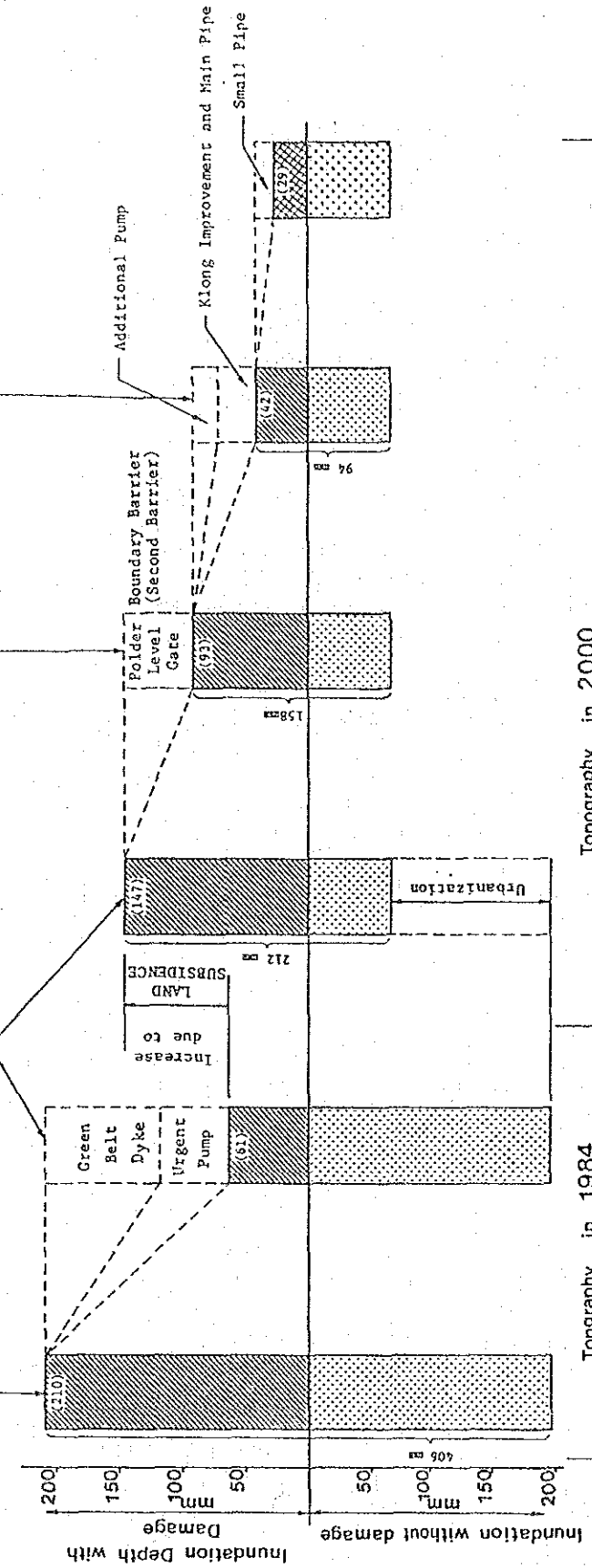
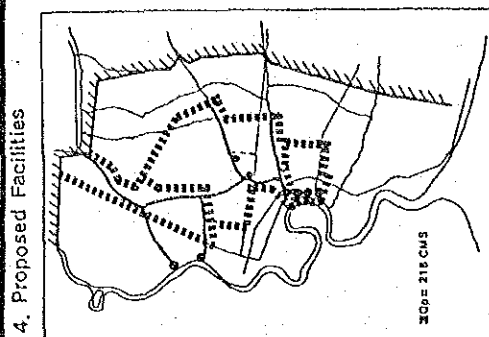
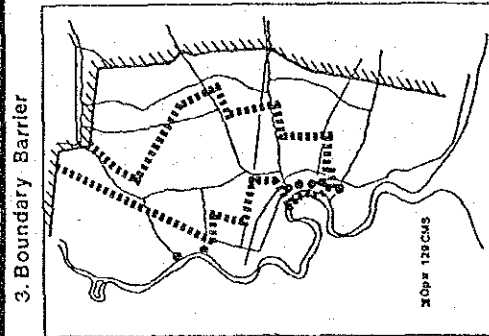
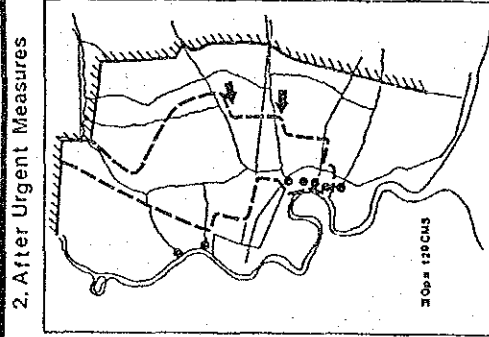
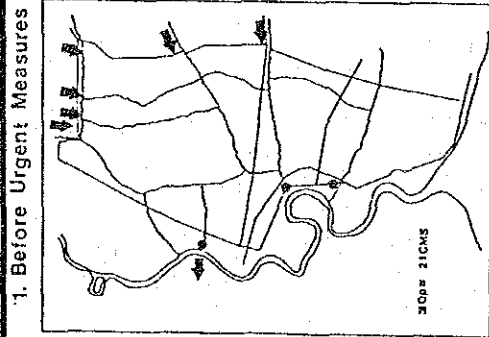
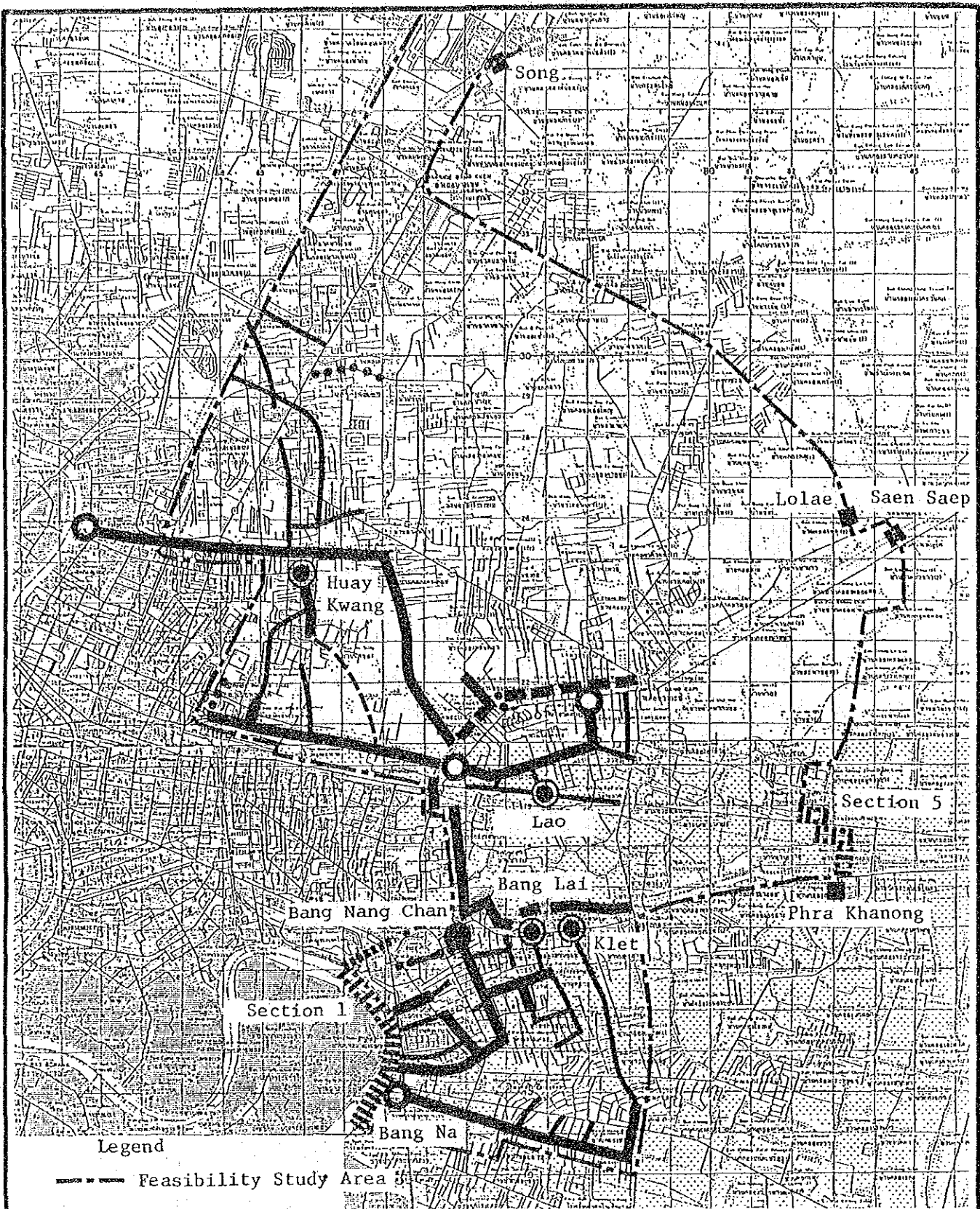


図 4.4 全体事業計画施設による水理的效果

Note: Hydraulic effect is calculated for 5-year frequency rainfall.







Legend

--- Feasibility Study Area

Dyke	Gate	Pumping Station	Klong	Drain Pipe	
					Same as proposed by Master Plan
	-			-	Revised / Added
	-			-	Revised / Excluded

図 4.6

第 1 期事業の計画施設修正一般図

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

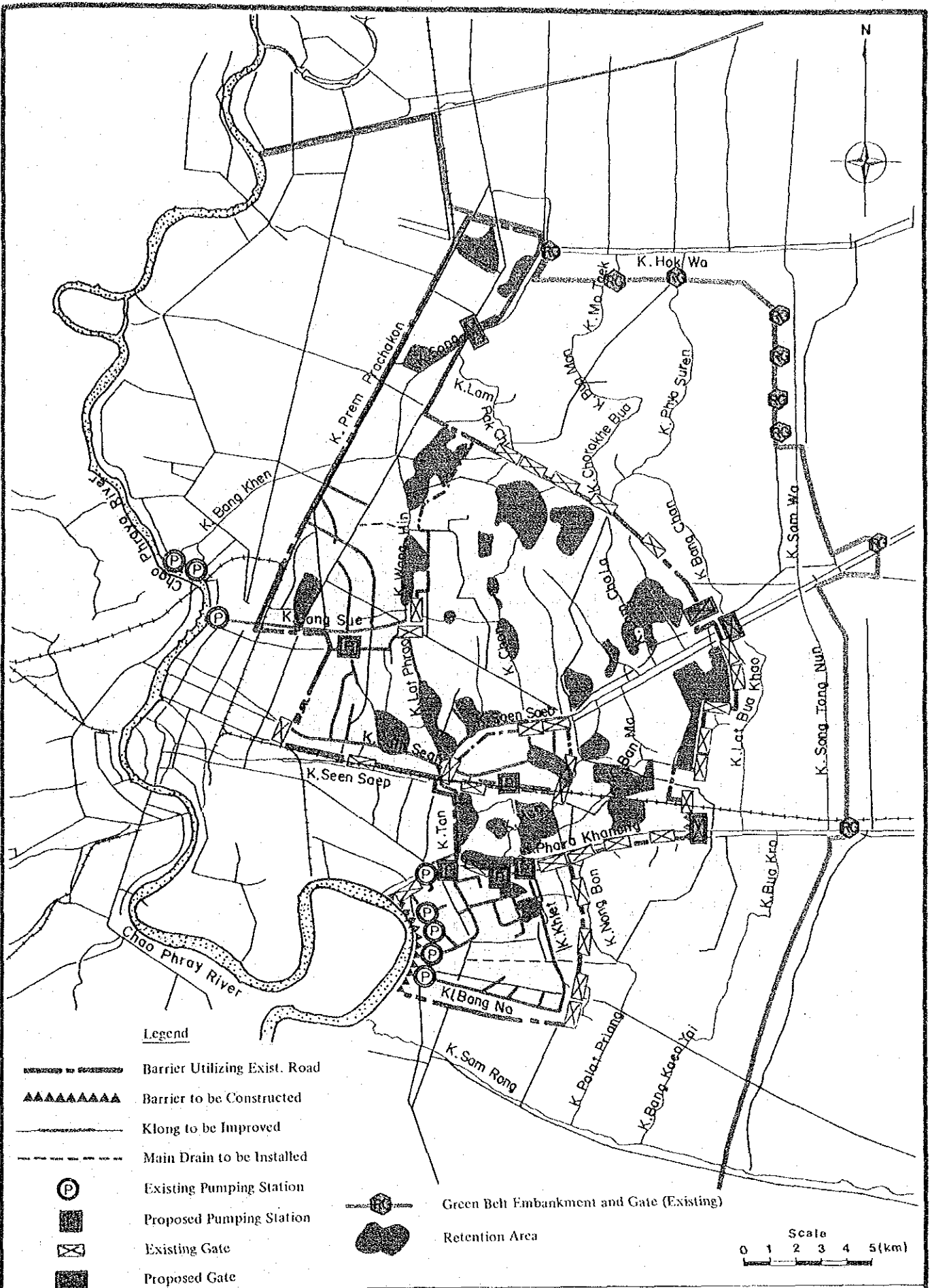


Fig. 4-7

フィージビリティ調査結果の対象施設

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



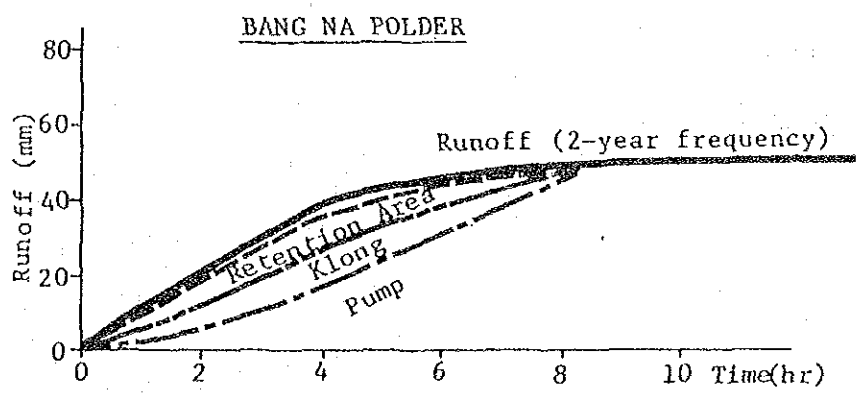
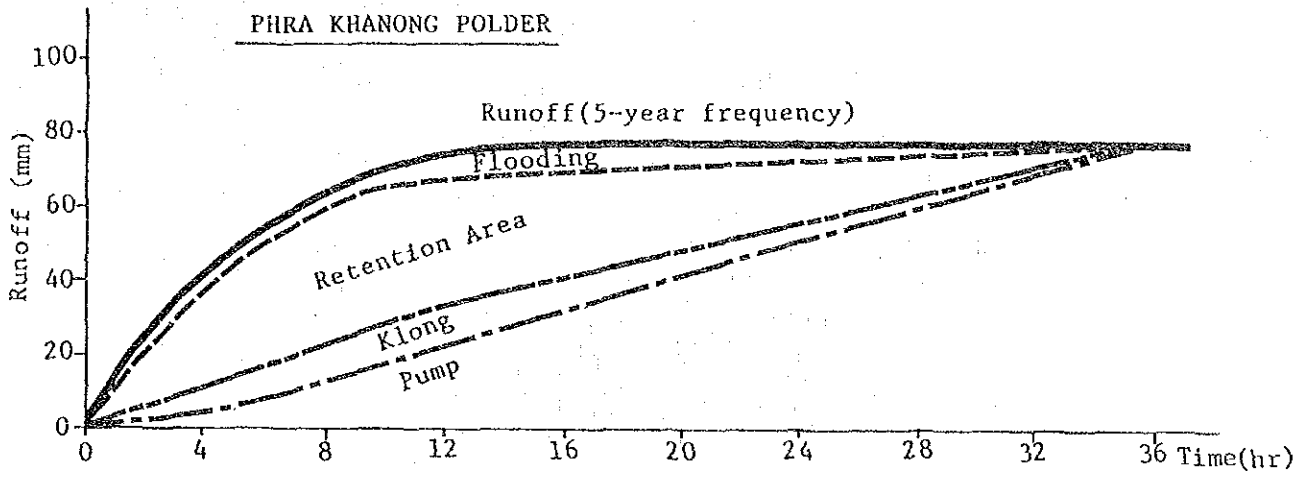
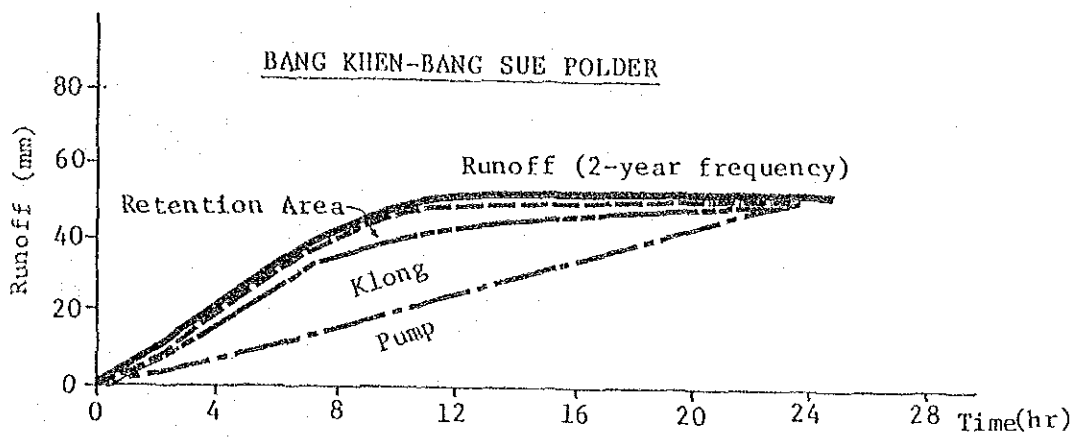


図 4.8

遊水池及びクローンの雨水貯留量とポンプ排水量の関係

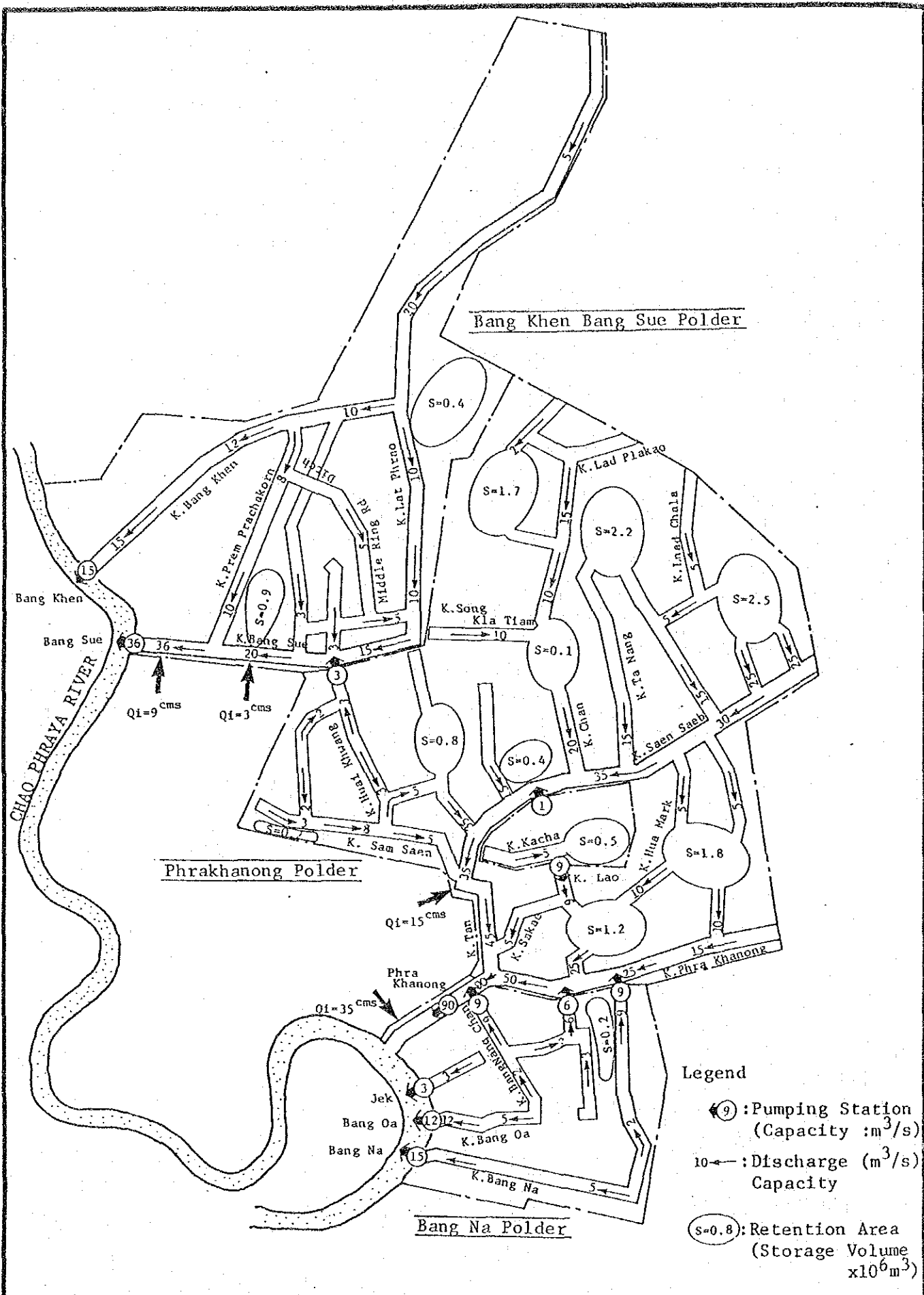
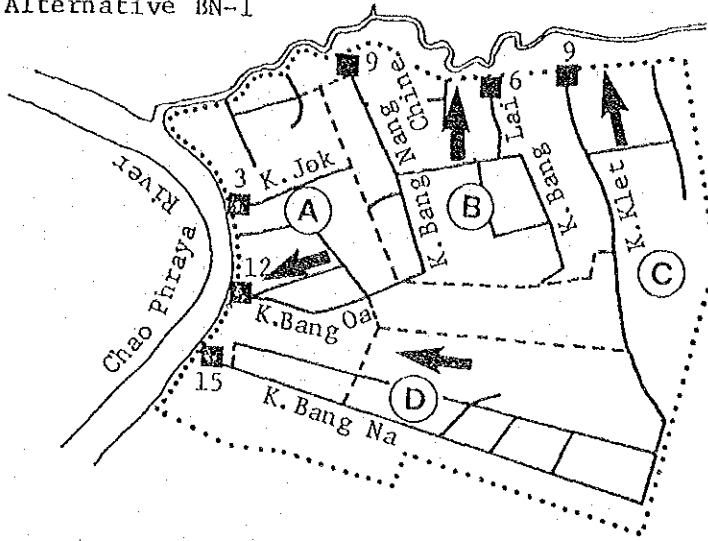


図 4.9

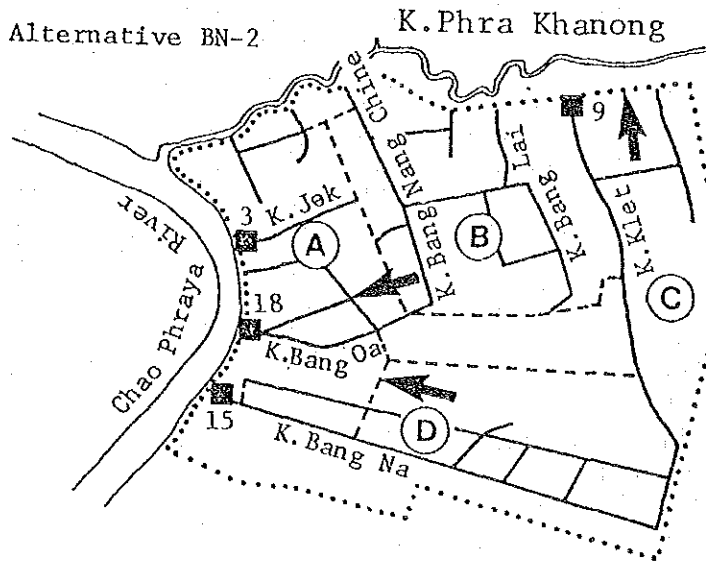
計画流量配分図

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

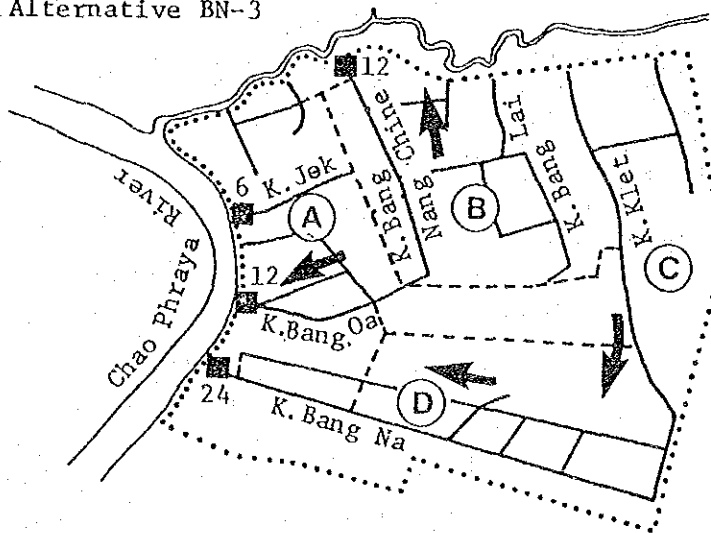
Alternative BN-1



Alternative BN-2



Alternative BN-3

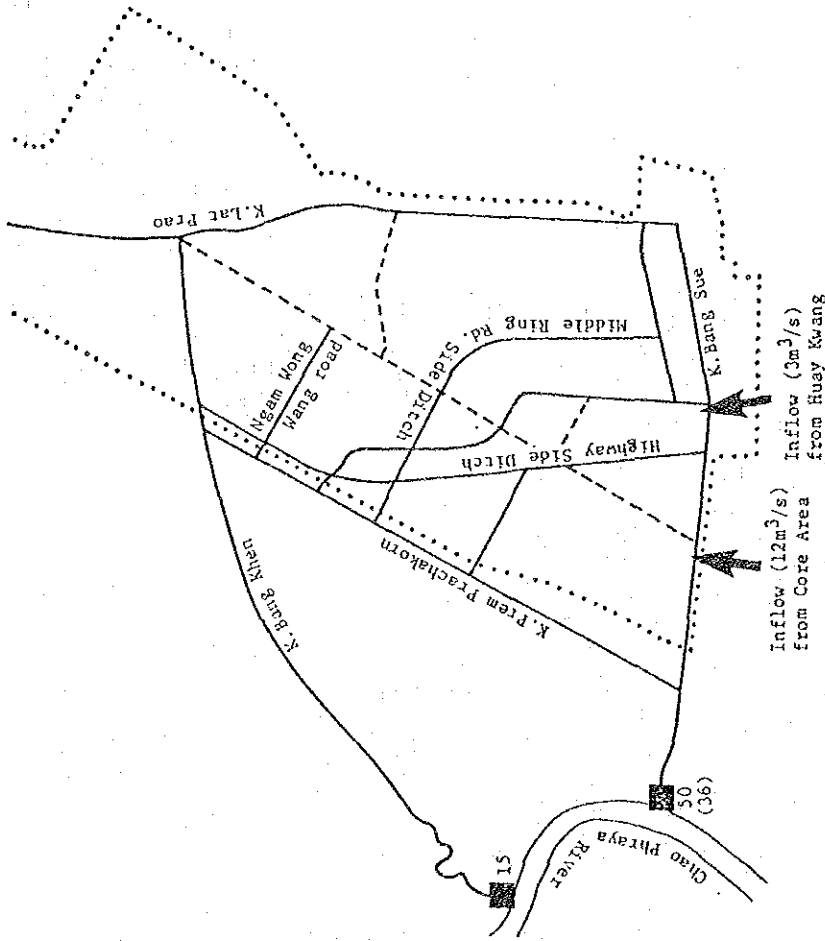


Legend

- ..... Boundary of Polder
- ~ Klong
- - - Pipe, Box Culvert
- Pumping Station with Future Capacity (m<sup>3</sup>/s)

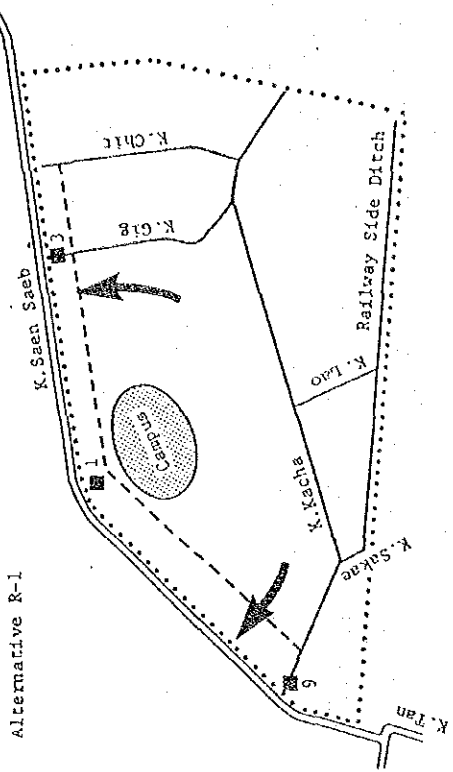
图 4.10

排水計画代替案 (Bang Na地区)

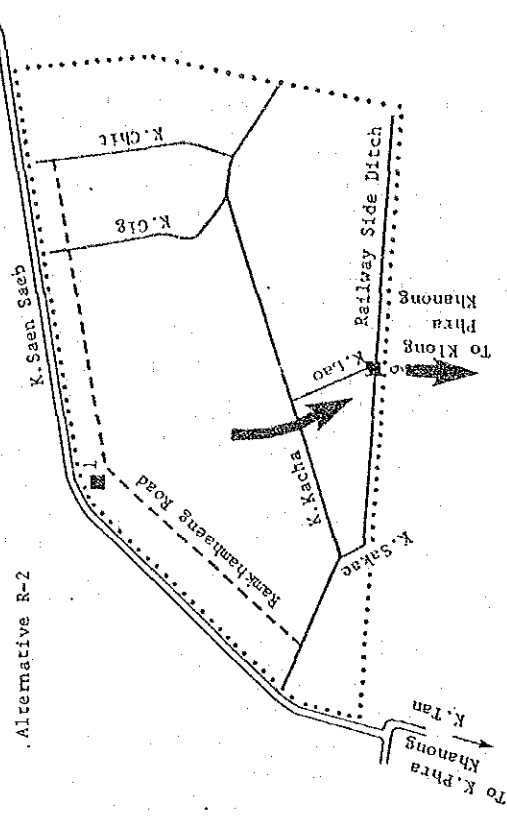


Bang Sue Area

- Legend
- ..... Boundary of Polder
  - ~ Klong
  - Pipe, Box Culvert
  - 5 Pumping Station with Future Capacity. (m<sup>3</sup>/s)



Alternative R-1



Alternative R-2

Ram khamhaeng Polder

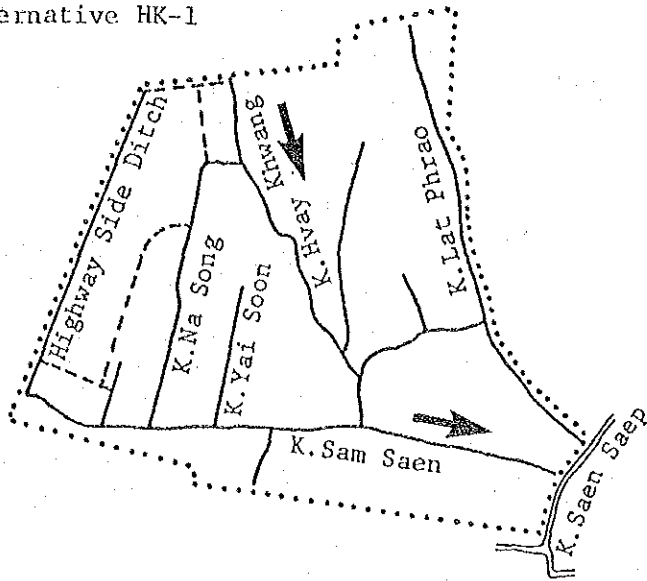
图 4.11

排水計画代替案 (Ramkhamhaeng 及び Bang Sue 地区)

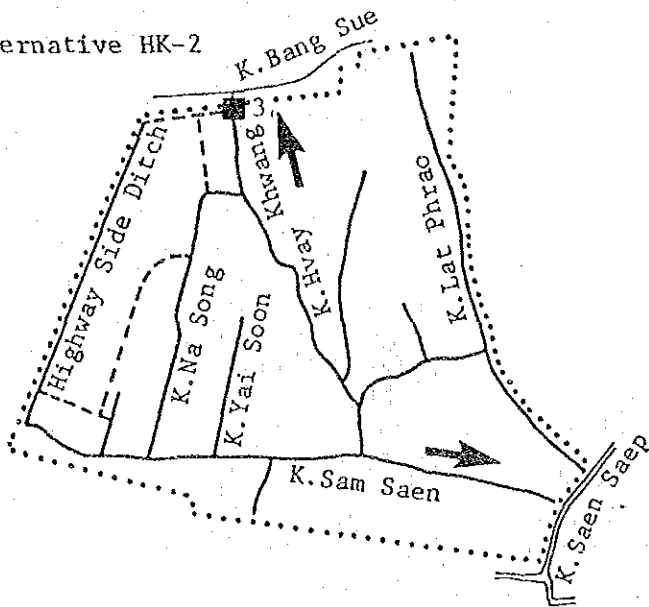
FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN BANGKOK



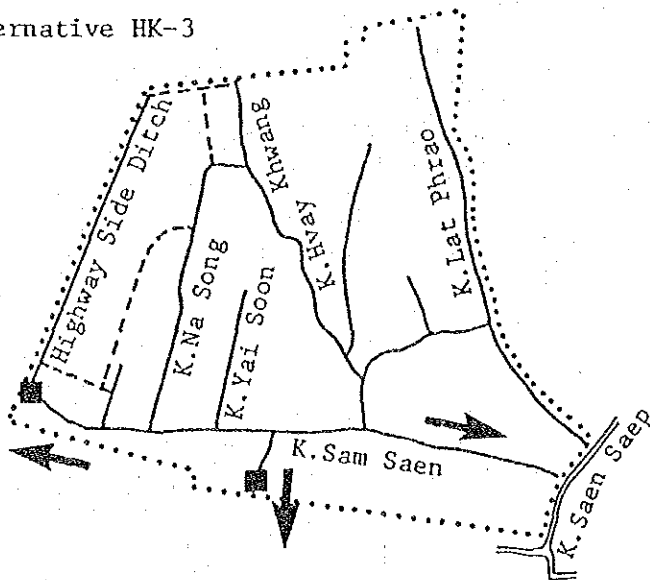
Alternative HK-1



Alternative HK-2



Alternative HK-3

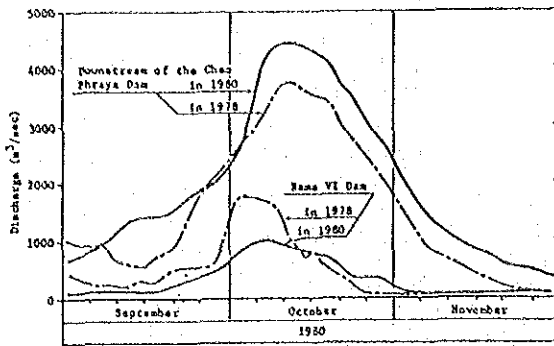


Legend

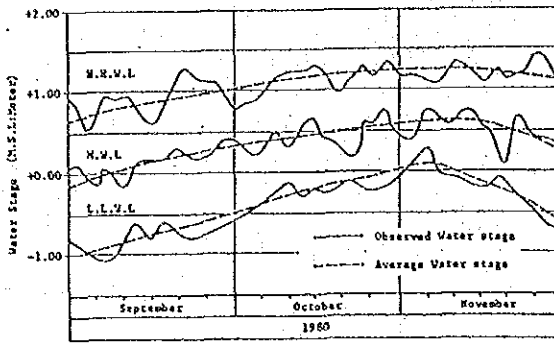
- ..... Boundary of Drainage Area
- ~ Klong
- Pipe, Box Culvert
- Pumping Station with 5 Future Capacity ( $m^3/s$ )

图 4.12

排水計画代替案 (West Huay Kwang 地区)



Observed Discharge Source: [ Flood Routing And Control Alternatives of Chao Phraya River for Bangkok. AIT March 1985 ]



Water stage at Bangkok Port Source: [ Master Plan on Flood Protection Drainage Project in Eastern Suburban-Bangkok JICA March 1985 ]

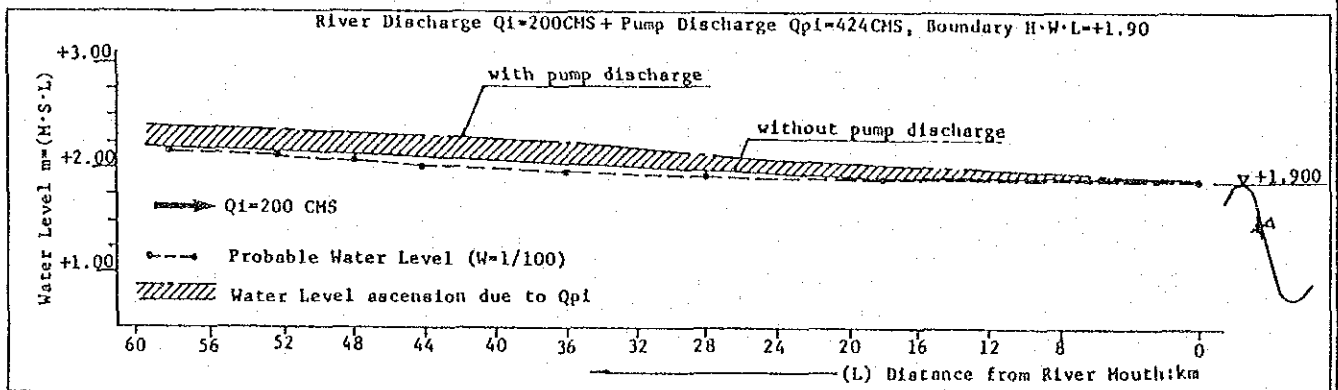
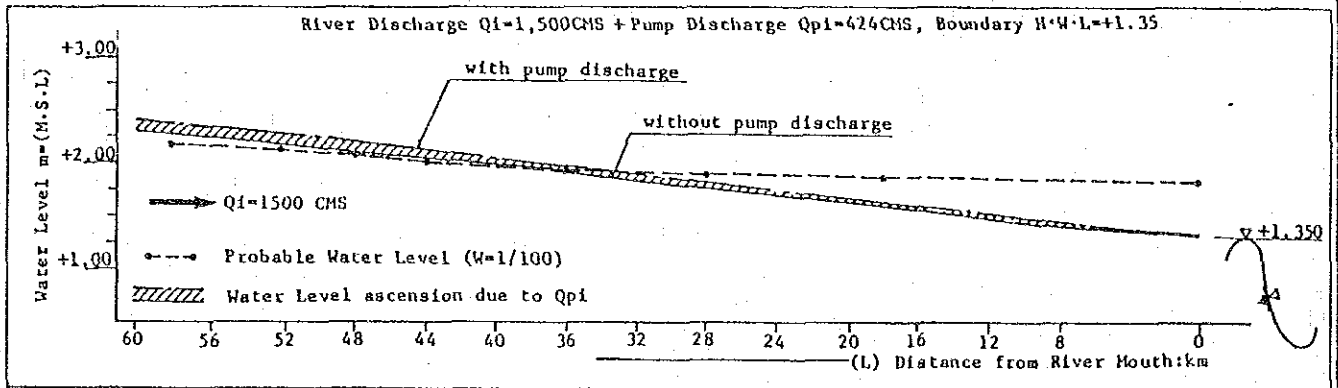
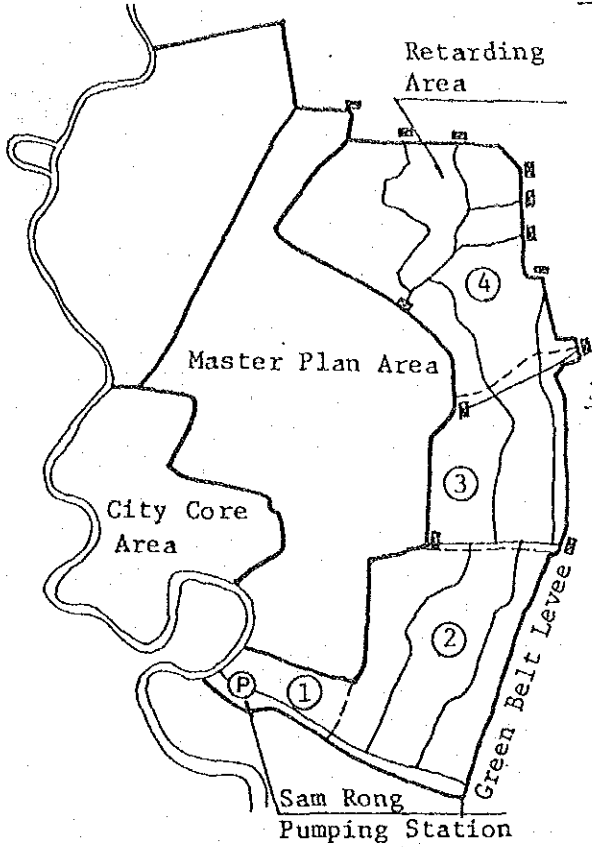


図 4.13

ポンプ排水に因るチャオプラヤ川水位の上昇

1) Key Map



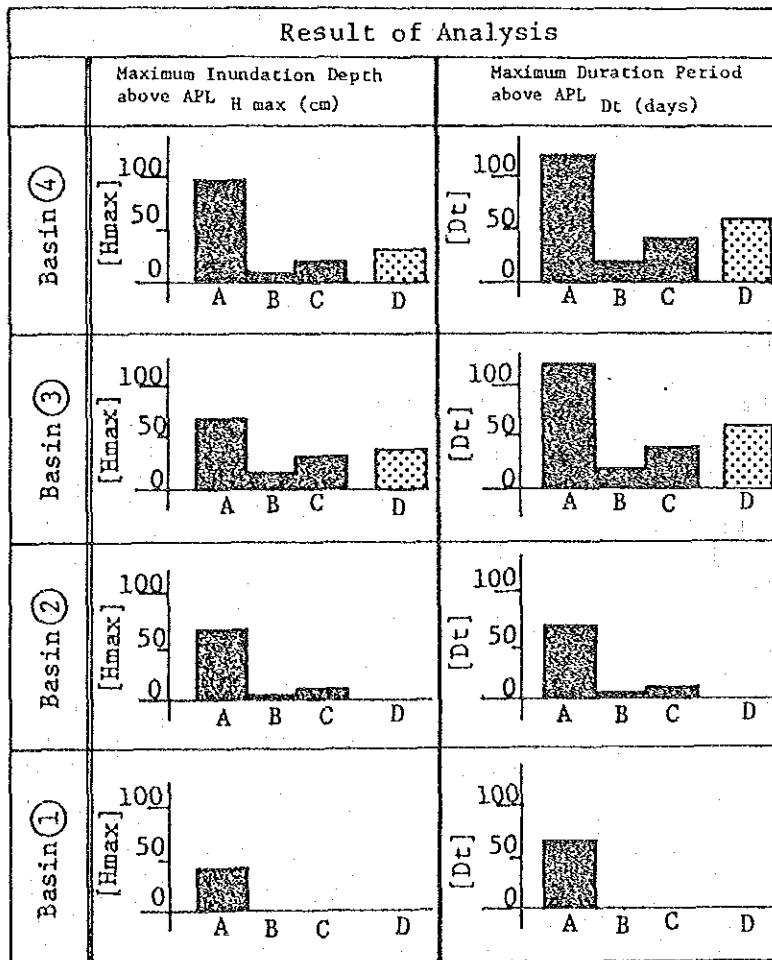
2. Calculation Cases

CASE	Topo- graphy	Pump Capacity	Green Belt	2nd Barrier (Gate)	Klong Section
A	Present (1984)	3 CMS	Nothing	Nothing	Same as present
B	"	75 CMS	Existing	"	"
C	"	75 CMS	"	Existing	"
D	Future (2000)	75 CMS	"	"	"

3. Conditions of Analysis

- 1) Model : Storage Basin Model
- 2) Rainfall : 5 years Freq. Scale. AD1980 Pattern
- 3) Boundary Water Level : 100 years Freq. Scal.  
in Chao Phraya R. AD1980 Pattern at Bangkok Port
- 4) Boundary Inflow : Same as result of verification  
for flooding in 1980

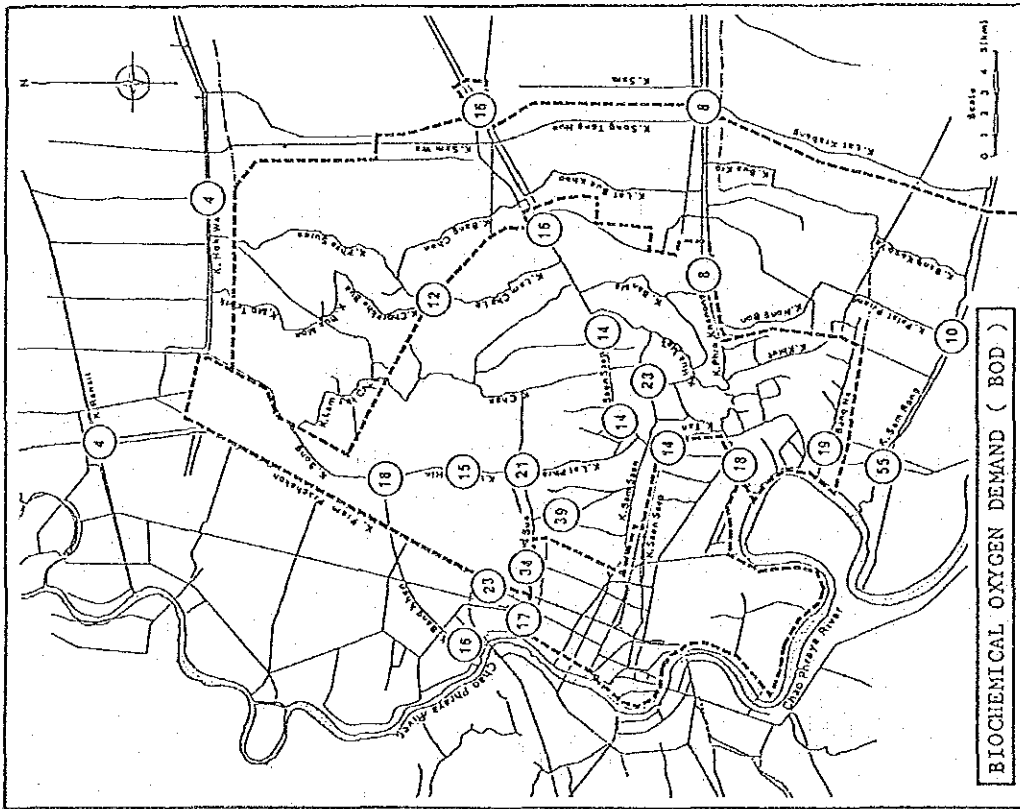
Result of Analysis



Legend  
 : Present  
 : Future  
 APL : Average  
 Paddy Field  
 Land Level

図 4.14

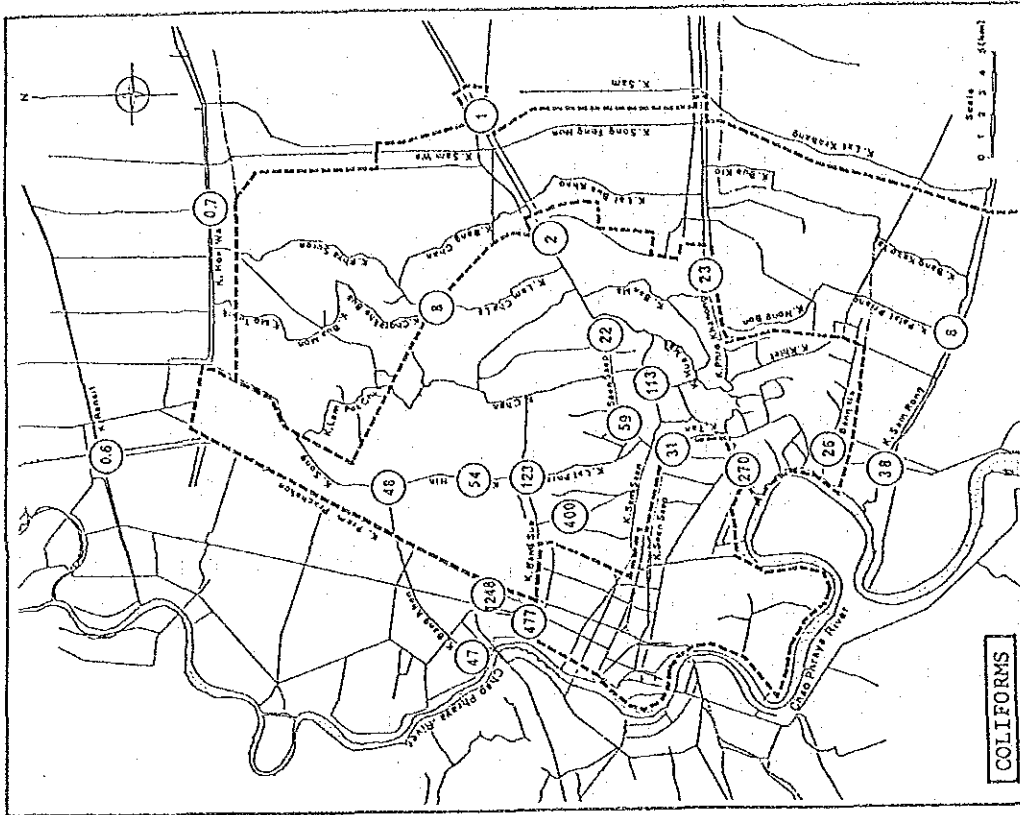
保水地区に対する洪水対策事業の水理的効果



BIOCHEMICAL OXYGEN DEMAND ( BOD )

Note 1. Unit of BOD and Coliforms are mg/l and  $\times 10^4$  MPN/ml respectively.

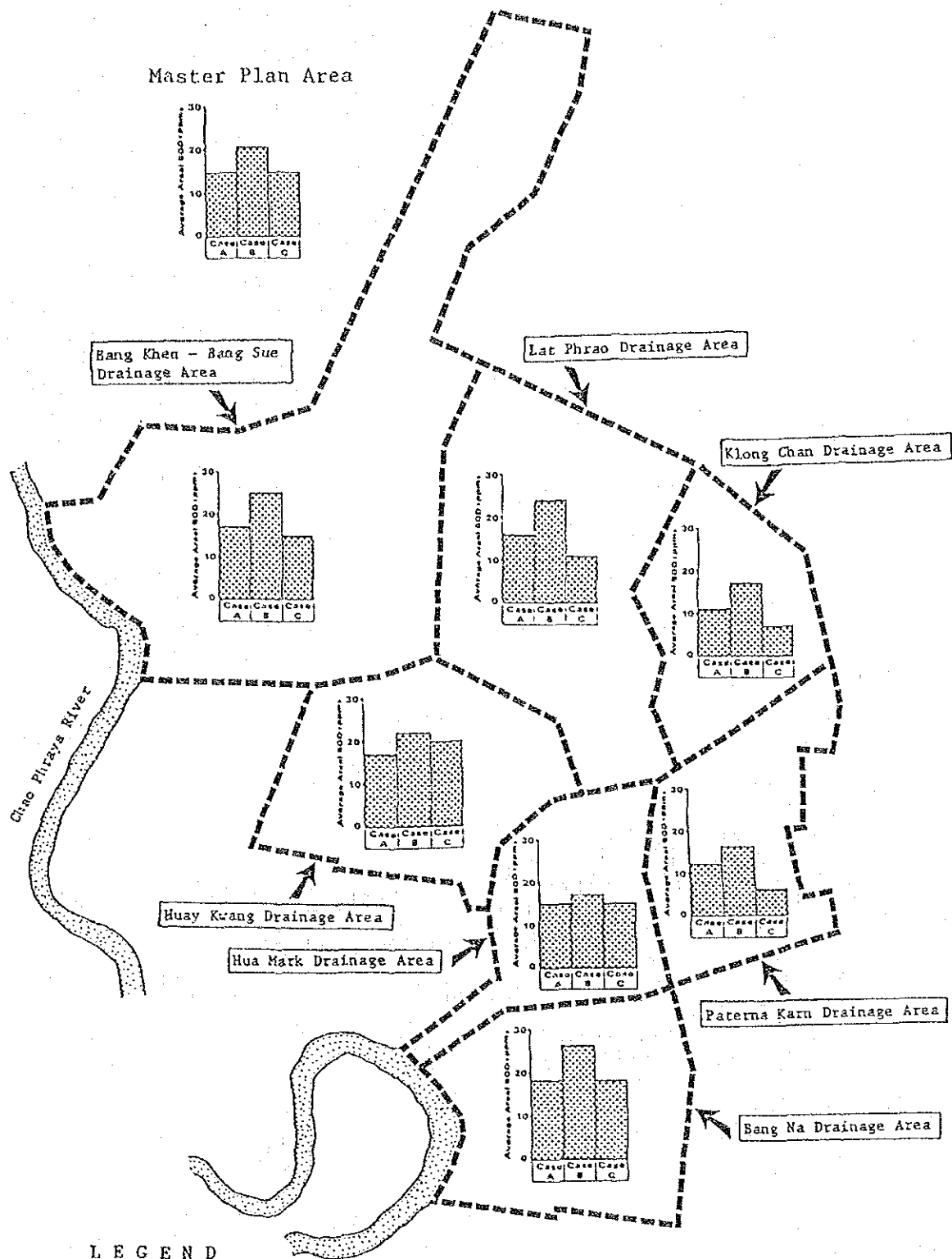
2. These data are based on survey by DDS between 1980 and 1985.



COLIFORMS

図 4.15 BOD 及び大腸菌の観測値

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



**LEGEND**

Case A : BOD value observed before the Project

Case B : BOD value estimated after the Project without flushing measure

Case C : BOD value estimated after the Project with flushing measure

Note : 1. Unit of BOD value is mg/l. ( ppm )

2. Observed BOD value is based on the DDS data.

3. Estimated BOD value is based on the calculation by complete mixed flow model.

図 4.16

事業実施に因る水質悪化とフラッシング効果

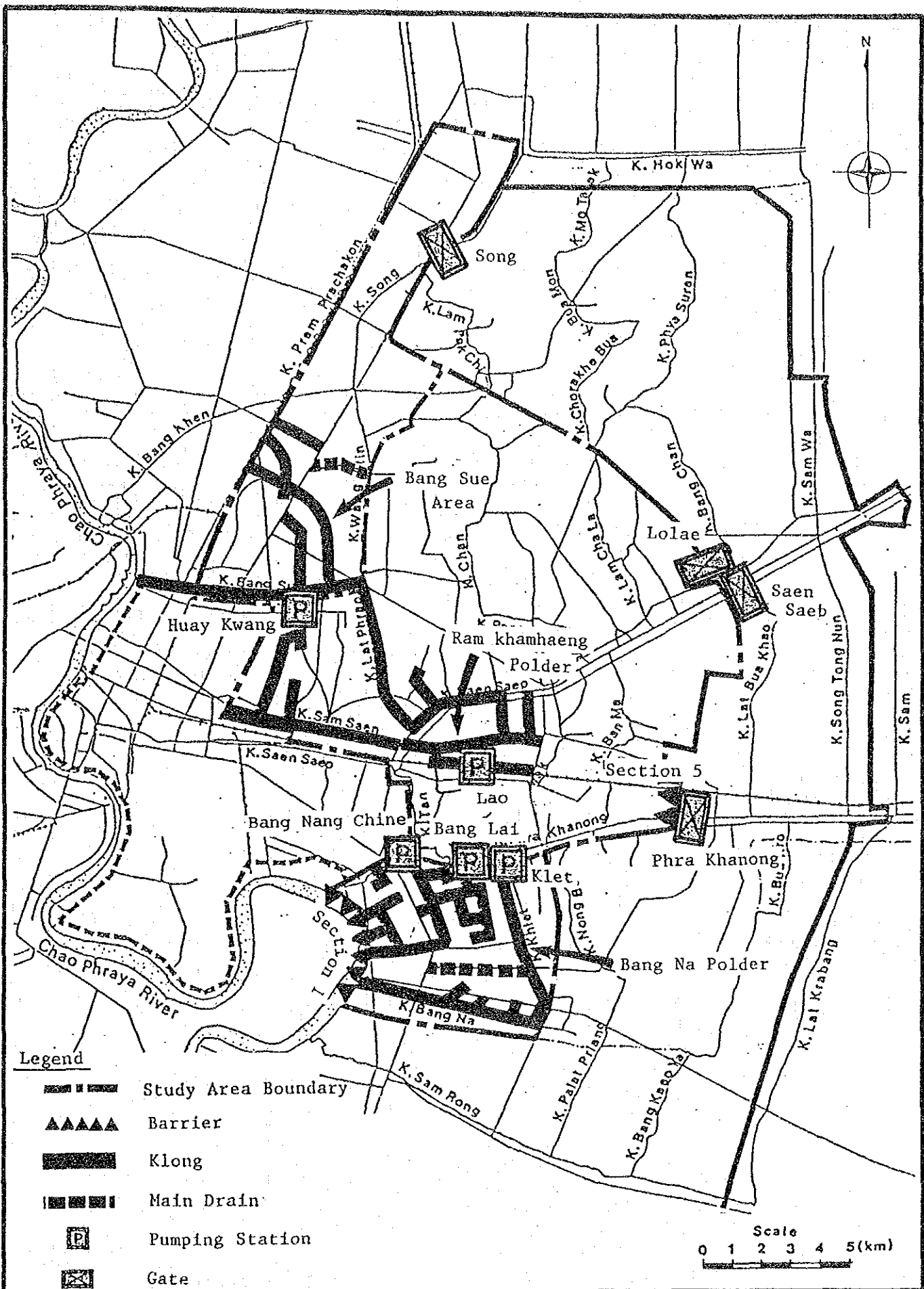


## 第5章







図 5.1	計画施設の位置図	31
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Legend

-  Study Area Boundary
-  Barrier
-  Klong
-  Main Drain
-  Pumping Station
-  Gate

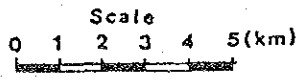
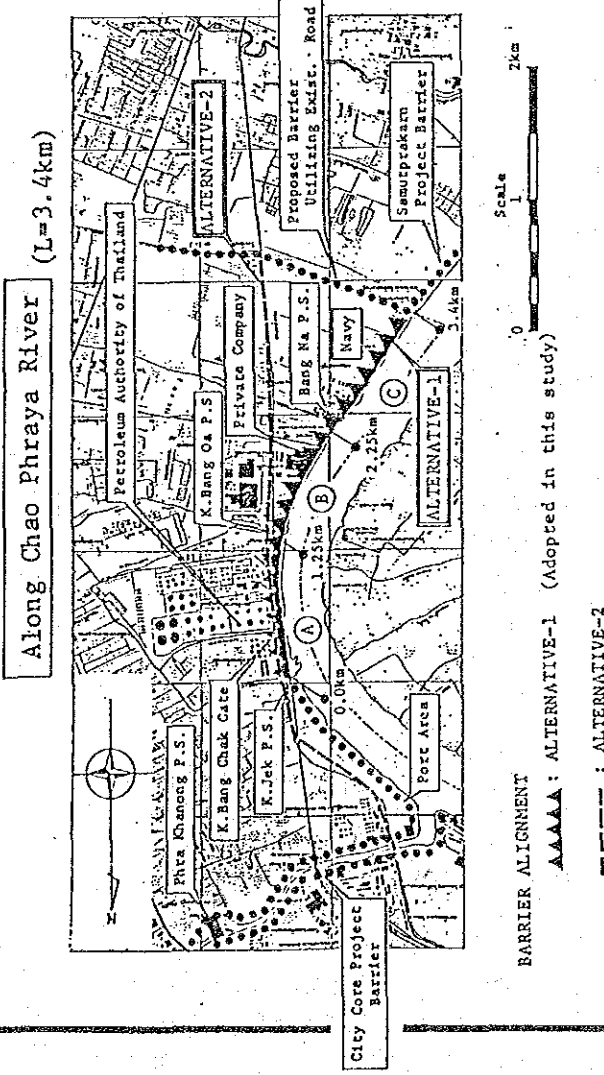


図 5.1

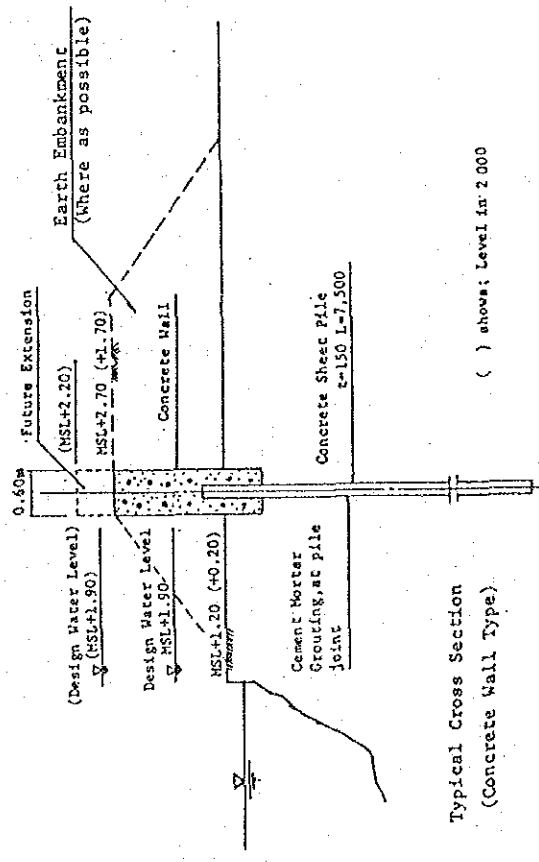
計画施設の位置図

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Along Chao Phraya River (L=3.4km)

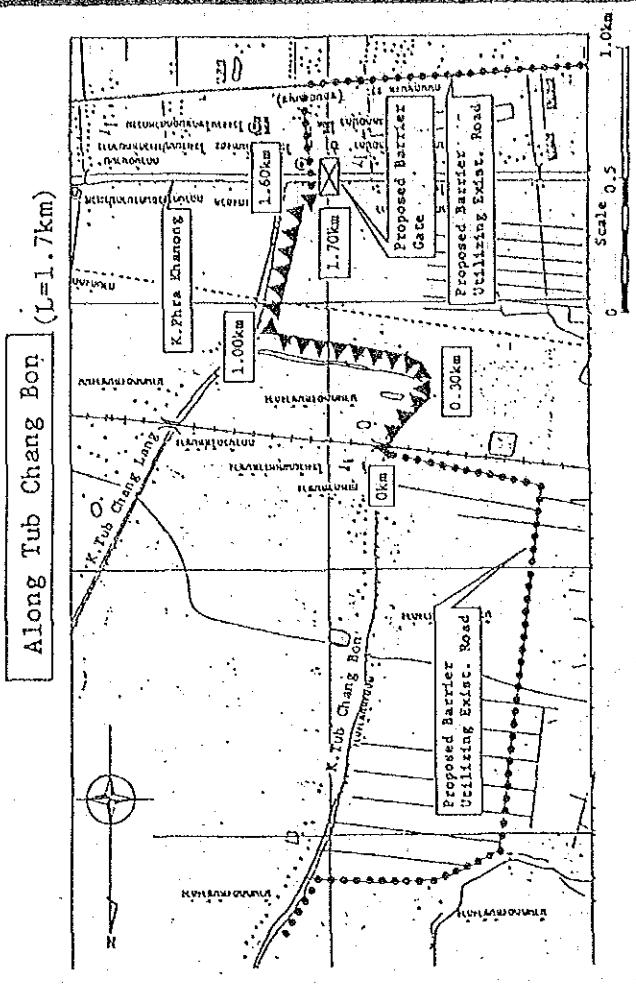
BARRIER ALIGNMENT  
 ----- ALTERNATIVE-1 (Adopted in this study)  
 ..... ALTERNATIVE-2



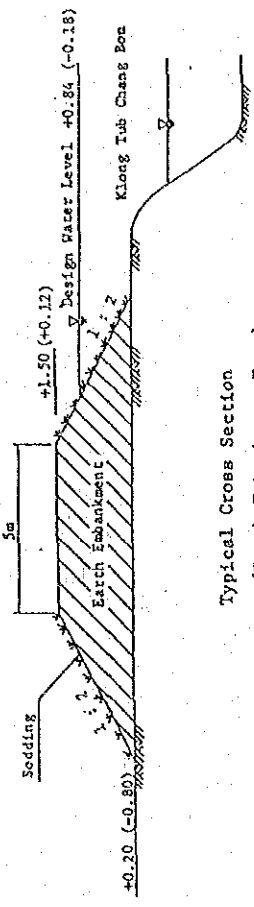
Typical Cross Section  
 (Concrete Wall Type)

Legend  
 AAAAA : Barrier to be Newly Constructed  
 ..... : Barrier Utilizing Existing Roads.

Note : Figure in Parenthesis shows future elevation considering land subsidence and settlement



Along Tub Chang Bon (L=1.7km)



Typical Cross Section  
 (Earth Embankment Type)

図 5.2 計画施設の標準構造図 (堤防)

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

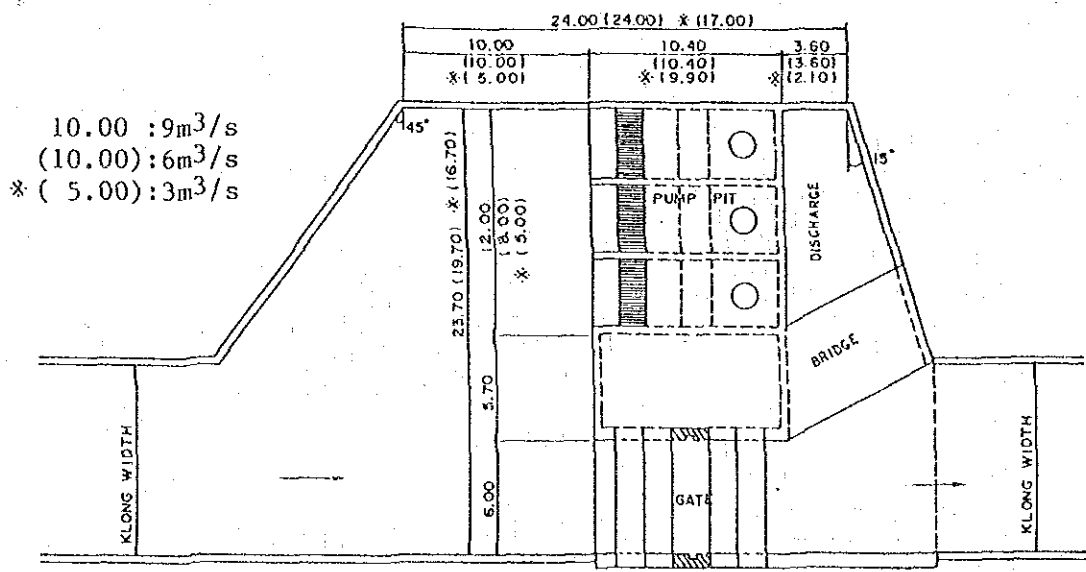
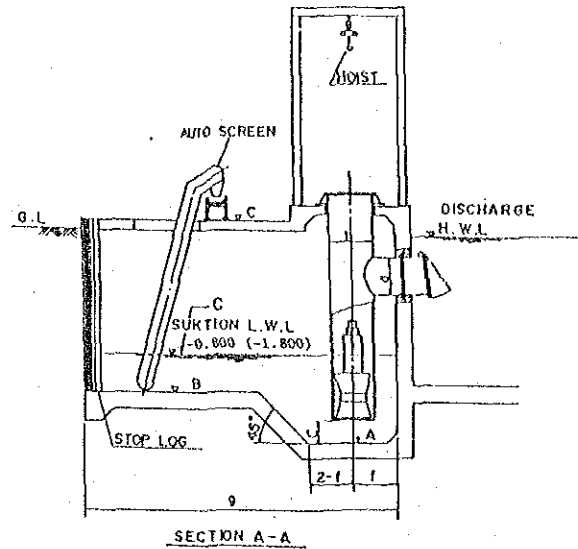
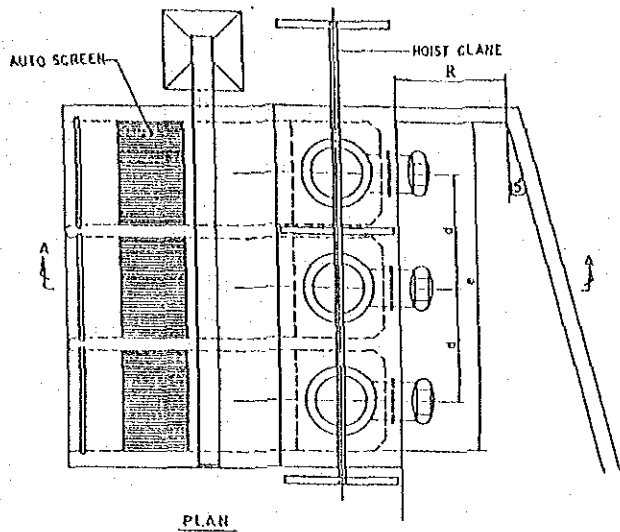


Table of Elevation and Dimension

[Unit:m MSL]

NAME OF PUMPING STATION	NO. S OF PUMP	TOTAL CAPACITY	ELEVATION				DIMENSION							DISCHARGE HWL
			G. L.	A	B	C	a	b	c	d	e	f	g	
K. BANG NANG CHINE	3	9 m <sup>3</sup> /S	10.600 (-0.400)	-4.800 (-5.800)	-3.430 (-4.430)	+1.100 (+0.100)	1.200	1.400	0.700	3.600	2.000	1.400	10.000	-0.180 (-1.180)
K. KLET	3	9	10.800 (-0.200)	-4.800 (-5.800)	-3.600 (-4.600)	+1.300 (+0.300)	*	*	*	*	*	*	*	-0.150 (-1.160)
K. LAO	3	9	10.600 (-0.400)	-4.800 (-5.800)	-3.500 (-4.500)	+1.100 (+0.100)	*	*	*	*	*	*	*	+0.200 (-0.800)
K. BANG LAI	2	6 m <sup>3</sup> /S	10.700 (-0.300)	-4.800 (-5.800)	-3.500 (-4.500)	+1.200 (+0.200)	*	*	*	*	8.000	*	*	-0.165 (-1.165)
K. HUAY KWANG	2	3 m <sup>3</sup> /S	10.700 (0.000)	-3.600 (-4.300)	-2.000 (-2.700)	+1.500 (+0.800)	0.700	0.900	0.450	2.100	5.000	1200	9.500	10.900 (+0.200)

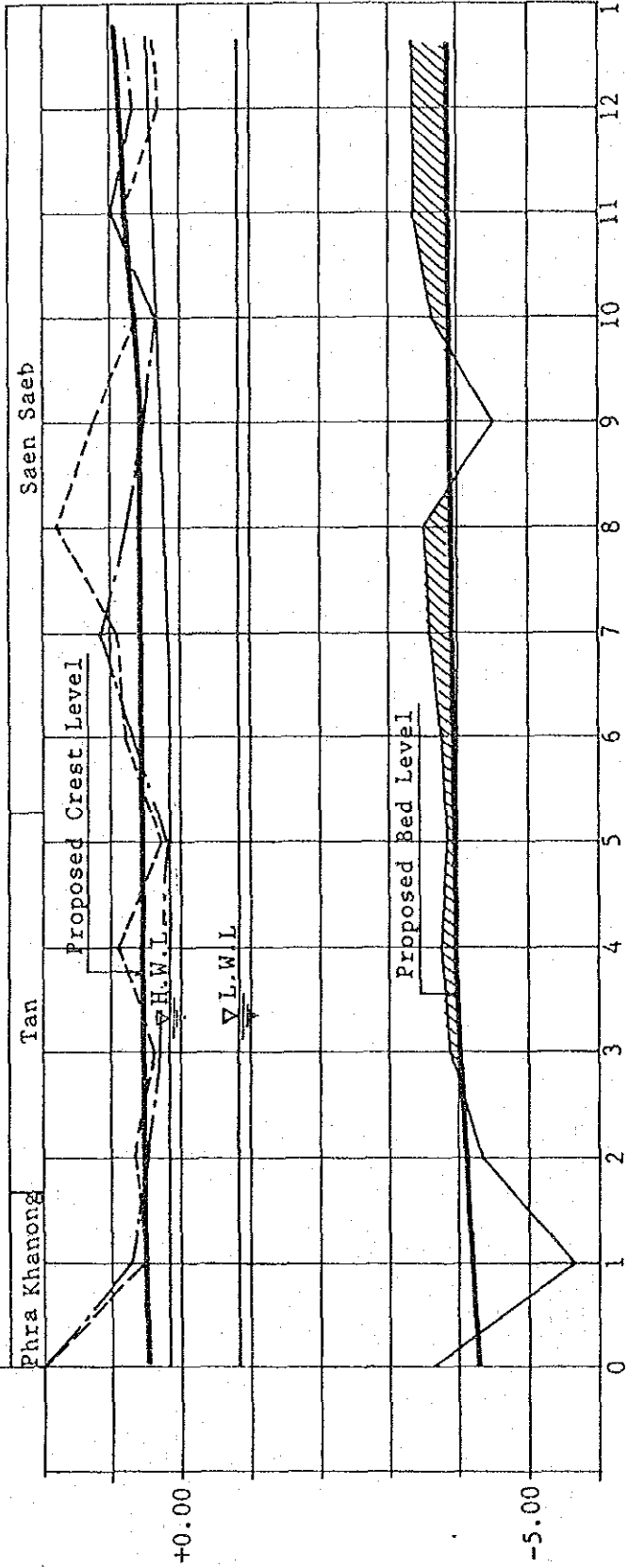
0.700:Elevation at present (m MSL)

(-0.300):Elevation in 2000 (m MSL)

図 5.3

計画施設の標準構造図 (ポンプ場)

Phra Khanong F.S



--- Left Bank Elev.  
 --- Right Bank Elev.

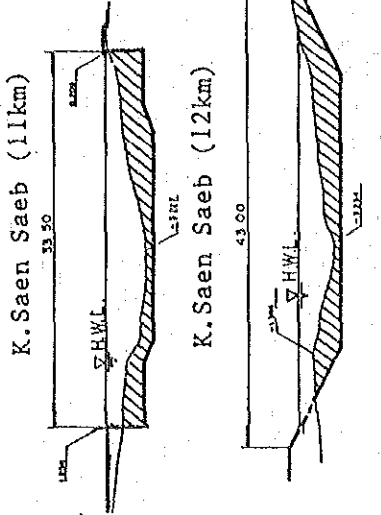
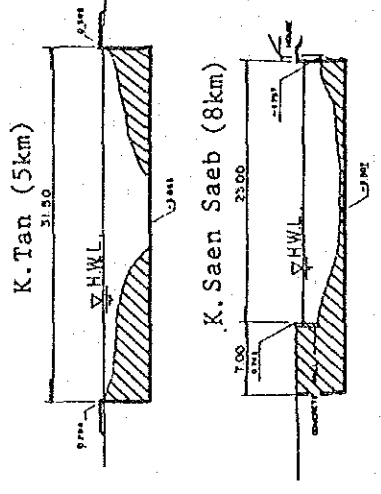
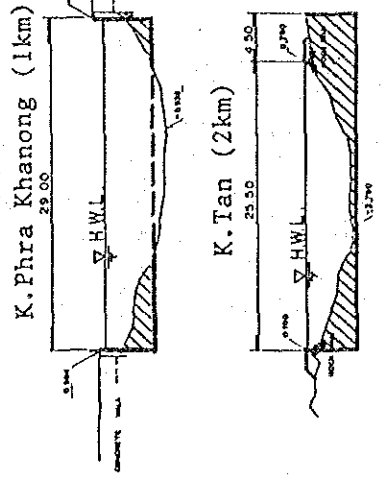
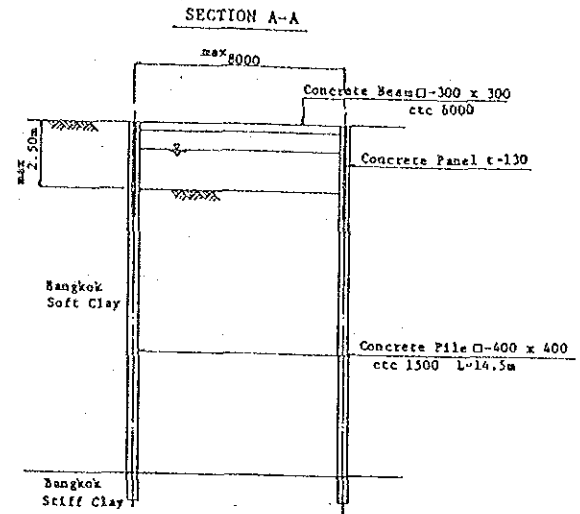
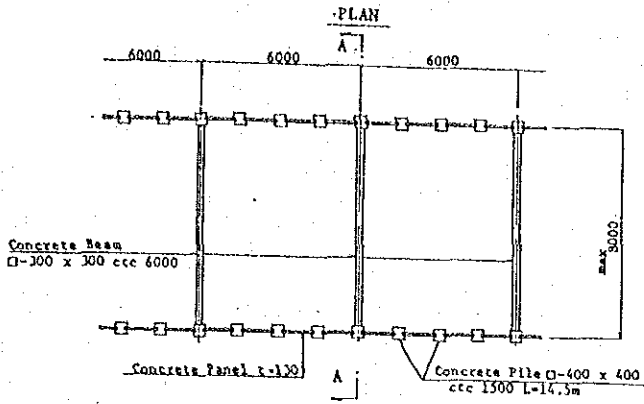


図 5.4 主クローンの改修計画  
 (Phra Khanong, Tan, Saen Saeb クローン)

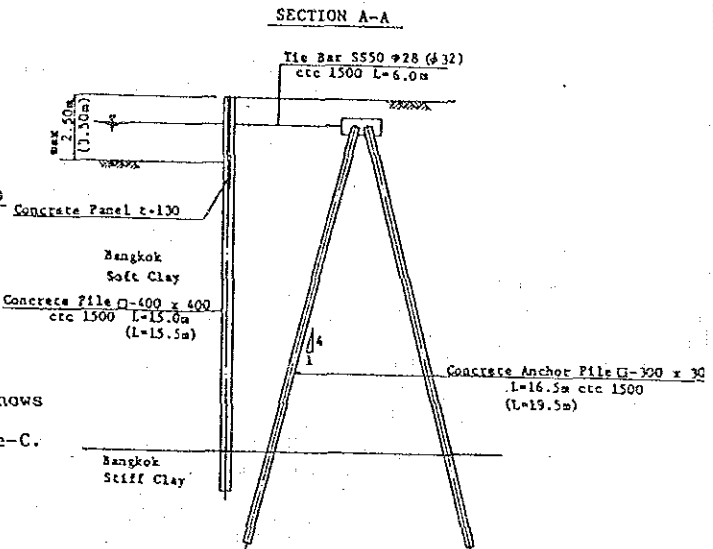
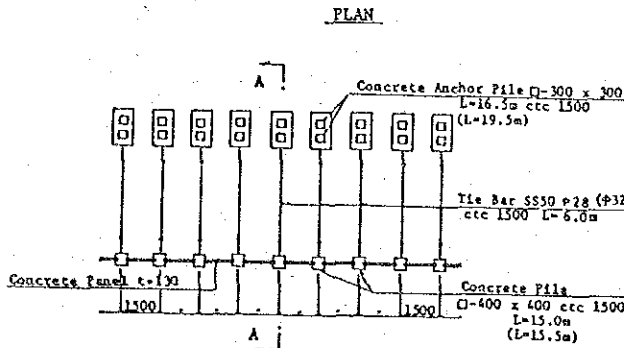
FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Type-A (Hmax=2.50m)



Type-B (Hmax=2.50m)

Type-C (Hmax=3.50m)



\* Figure in parenthesis shows dimension of Type-C.

Type-D (Hmax=4.50m)

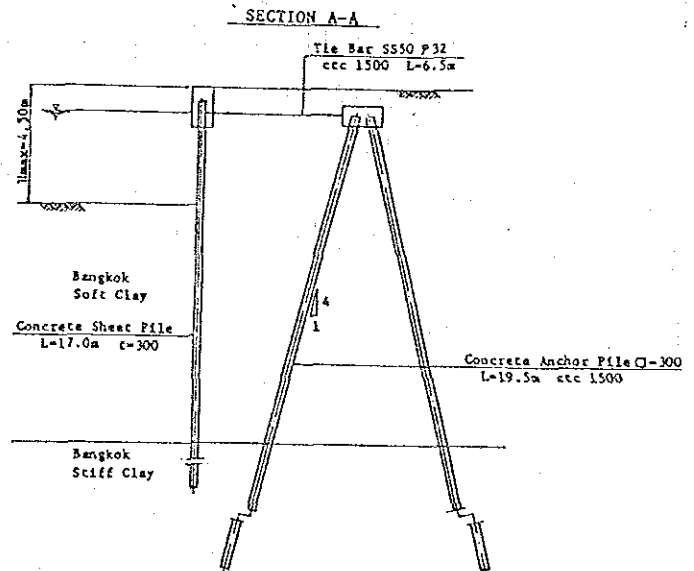
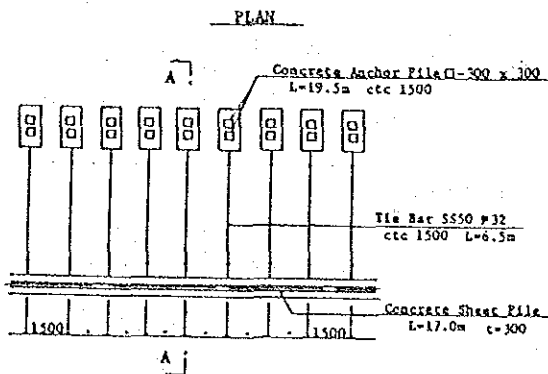


図 5.5

計画施設の標準構造図 (護岸)



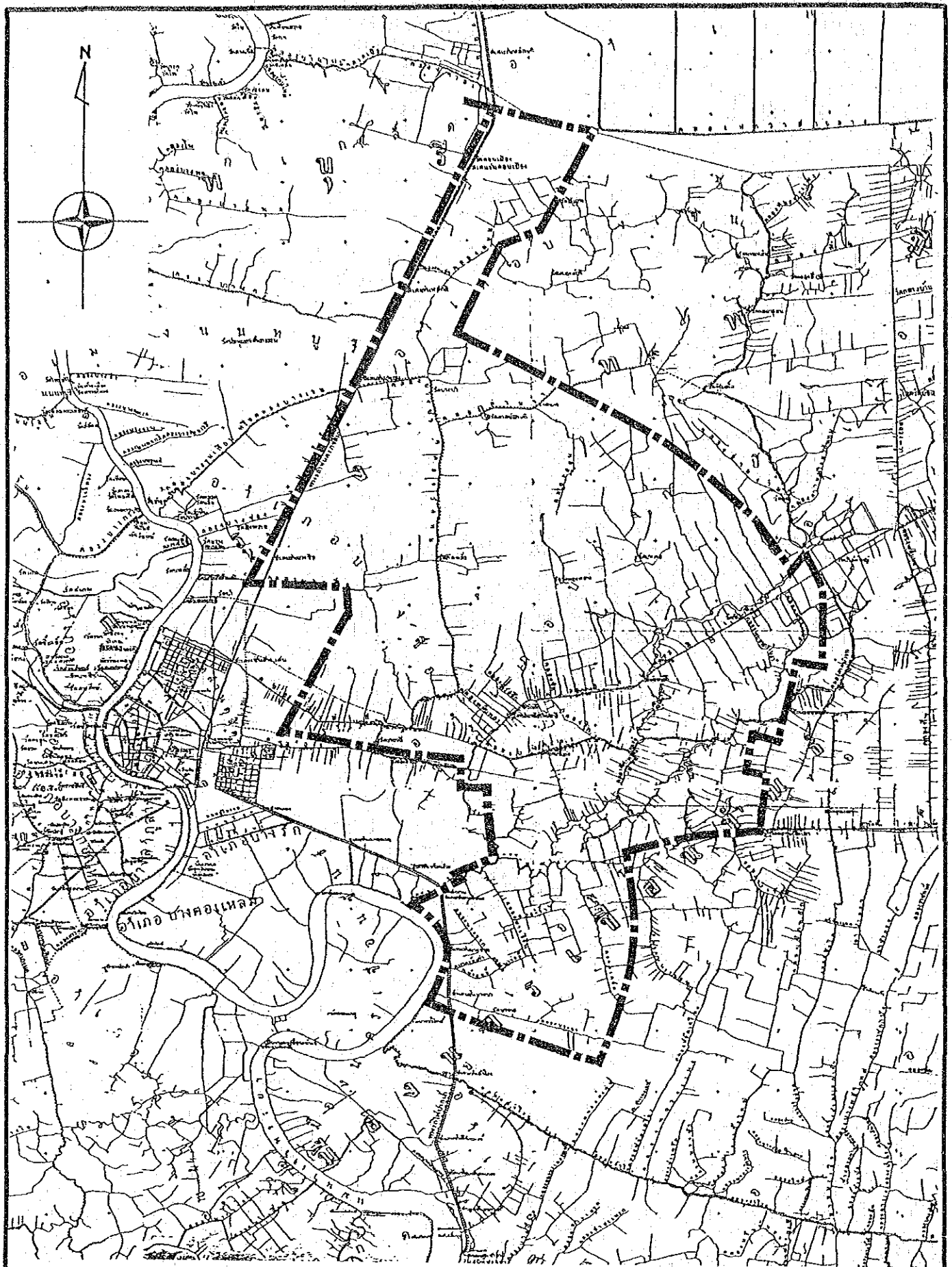
## 第6章

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(Source: 1910 Map of RTSD)

図 6.2

クローン網 (1910年)

FEASIBILITY STUDY ON FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK