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THE KINGDOM OF THAILAND

BANGKOK METROPOLITAN ADMINISTRATION

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

FINAL REPORT

VOLUME Ⅱ : APPENDIX

MARCH, 1984

JAPAN INTERNATIONAL COOPERATION AGENCY

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Appendices

APPENDIX A

Topographical Survey

Appendix A Topographical Survey

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Appendix A Topographical Survey

1. Introduction

1.1 General

The topographical survey was carried out in order to obtain the necessary data for planning the flood protection/drainage system, especially for the implementation of the hydraulic analysis.

The location of the surveys are shown in Fig. A.1.

Datum line for the levelling was delivered from the BM 31 of Royal Thai Survey Department (RTSD), established in July 1982.

15 millimeters are usually allowed for accuracy of closure on the control leveling of 5 kilometers. But in the Study Area, the accuracy of closure was allowed at 20 millimeters considering the soft and weak ground condition.

1.2 Objective of the topographical survey.

The objective of the survey is as follows:

1) To survey the level of 11 water gauges which were newly installed for the Study.

2) To survey the longitudinal and lateral cross sections of main klongs.

3) To survey spot ground elevations in the Study Area.

1.3 Scope of work of the topographical survey

The following main items were surveyed;

1)	Levelling of Water Gauges	:	11 stations
2)	Longitudinal levelling of main klongs	:	74 kilometers
3)	Cross levelling of main klongs	:	62 sections
4)	Spot levelling	:	780 points
5)	Elevation of existing roads	:	60 kilometers

2. Bench mark survey

The investigation of 11 existing bench marks was executed in order to use these bench marks as temporary bench marks for our survey. According to the survey, all these bench marks have been affected by land subsidence. Following table shows the results.

Table A.1 Elevation of BMA Bench Marks Surveyed in July 1983

Number	Surveyed Elevation (m) in July 1983	Past Surveyed Elevation *1	
		Date	Elevation (m)
BM. 018	4.003	Aug., 1978	4.445
BM. 024	1.829	Aug., 1978	2.210
		May., 1981	2.028
BM. 026	2.042	Aug., 1978	2.432
BM. 084	1.407	Aug., 1978	1.968
BM. 085	1.393	Aug., 1978	1.923
BM. 086	1.359	Aug., 1978	1.881
		April.,1981	1.607
BM. 087	2.025	Aug., 1978	2.361
BM. 088	5.237	Aug., 1978	5.817
BM. 100	1.023	Aug., 1978	1.587
BM. 101	0.908	Aug., 1978	1.394
		May., 1981	1.173
(BM.16)*2	2.001	Aug., 1978	2.347

Note; *1 These figures were surveyed by the Royal Thai Survey Department (RTSD)

*2 AIT Bench Mark

* Elevation of based BM. 31 is 2.425 m. above MSL.

3 Survey of water gauge stations

After the installation of 11 water gauges, their elevations were delivered/obtained from BM 31 of RTSD.

4. Survey of main klongs

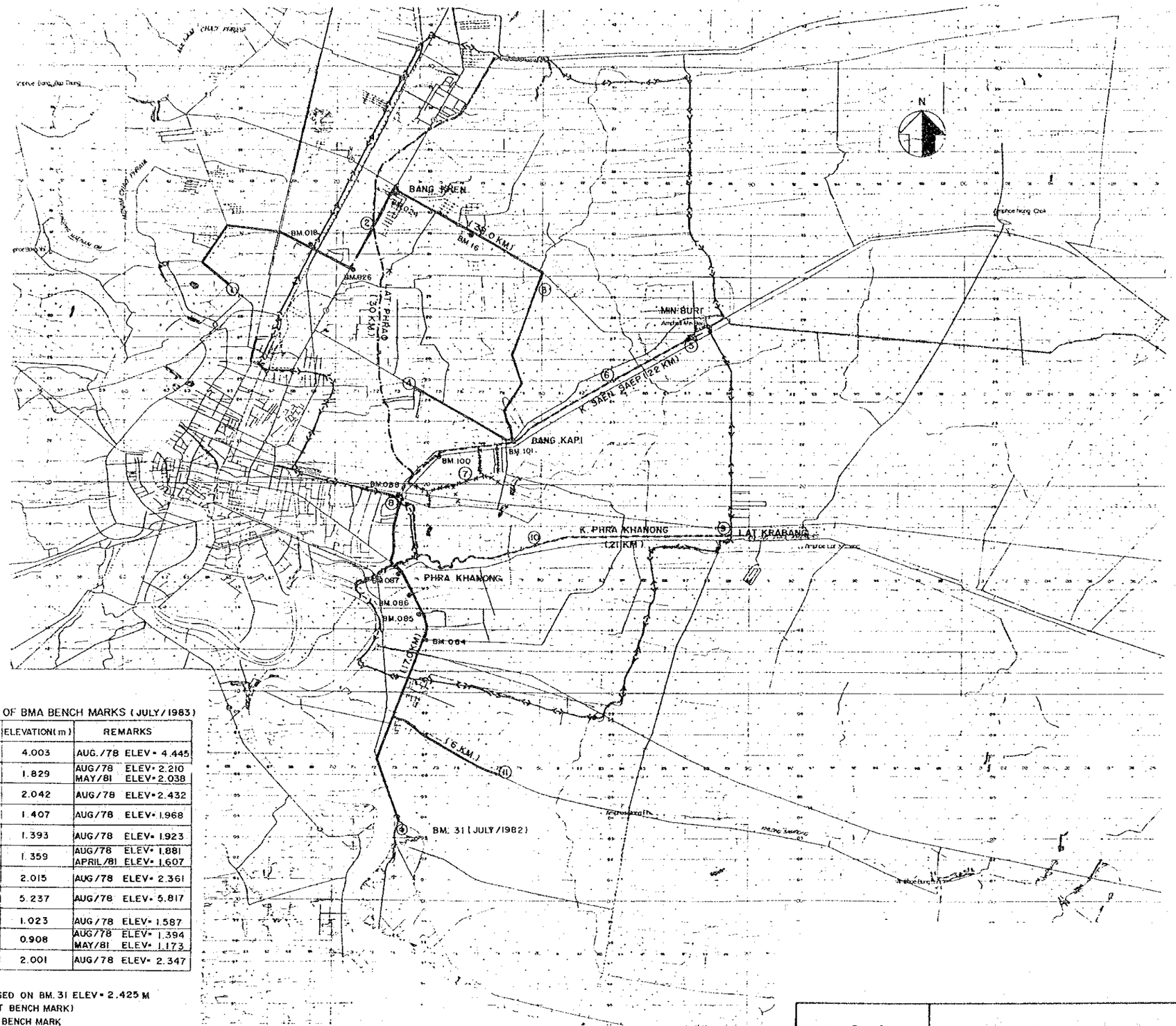
Longitudinal and cross-sectional survey for the existing main klongs, namely, Klong Phra Khanong, Klong Tan, Klong Saen Saep, Klong Lat Phrao were executed at 1 kilometer intervals. The results are shown in Figs. A.2 to A.20.

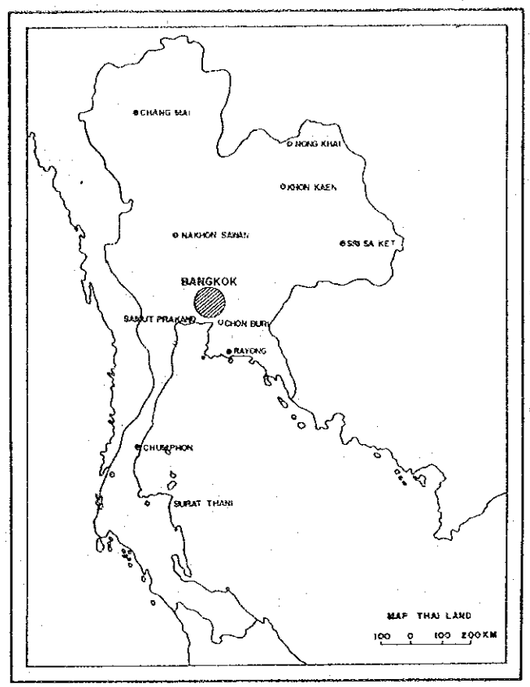
5. Survey of spot levelling

Longitudinal profiles of the existing roads were drawn when surveys of water gauge stations and main klongs were made.

Survey of spot levels was conducted to obtain the general features of ground elevations in the Study Area necessary for the preliminary study, and also for the model area necessary for the rainfall-discharge analysis.

Figs. A.21 to 27 show the elevations of existing roads.





LEGEND

- LEVELLING SURVEY OF WATER LEVEL GAGE (61KM LENGTH)
- KLONG OF ROYAL IRRIGATION DEPARTMENT (RID) (43KM. LENGTH)
- KLONG OF DEPARTMENT OF DRAINAGE AND SEWERAGE (DDS) (30KM. LENGTH)
- KLONG IN MODEL STUDY AREA
- (1) NUMBER OF NEW WATER GAGE (JULY / 1982)
- BM.31 NUMBER OF BENCH MARK IS 31 AND ESTABLISHED IN JULY 1982

ELEVATION OF BMA BENCH MARKS (JULY/1983)

NUMBER	ELEVATION(m)	REMARKS
BM.018	4.003	AUG./78 ELEV = 4.445
BM.024	1.829	AUG/78 ELEV= 2.210 MAY/81 ELEV= 2.038
BM.026	2.042	AUG/78 ELEV=2.432
BM.084	1.407	AUG/78 ELEV= 1.968
BM.085	1.393	AUG/78 ELEV= 1.923
BM.086	1.359	AUG/78 ELEV= 1.881 APRIL/81 ELEV= 1.607
BM.087	2.015	AUG/78 ELEV= 2.361
BM.088	5.237	AUG/78 ELEV= 5.817
BM.100	1.023	AUG/78 ELEV= 1.587
BM.101	0.908	AUG/78 ELEV= 1.394 MAY/81 ELEV= 1.173
(BM. 16) *	2.001	AUG/78 ELEV= 2.347

NOTE
1 BASED ON BM. 31 ELEV = 2.425 M (AIT BENCH MARK)
2 * AIT BENCH MARK

FIG. A.1 **Surveyed Routes & Klongs**

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

PLAN OF KHLONG

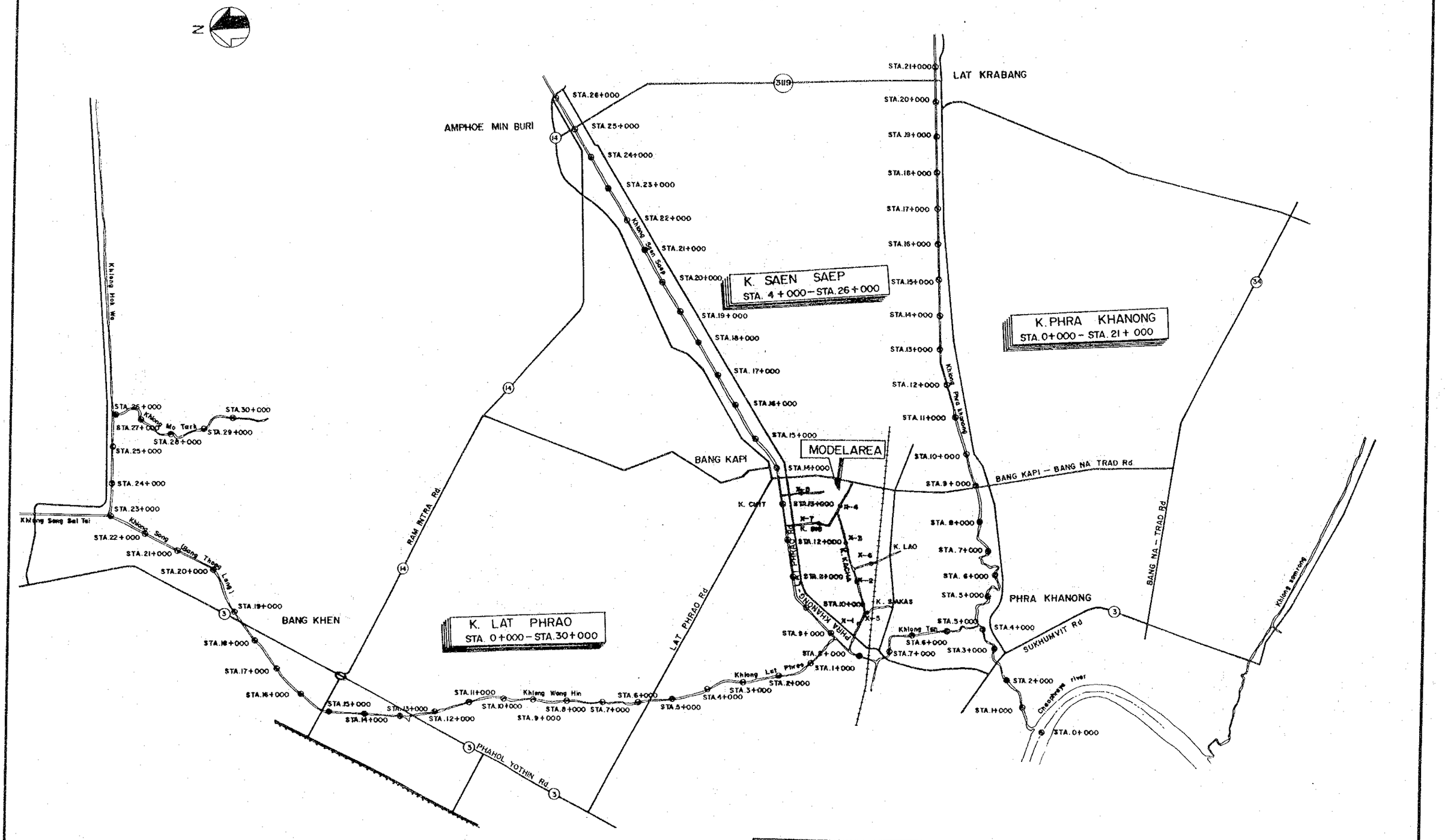
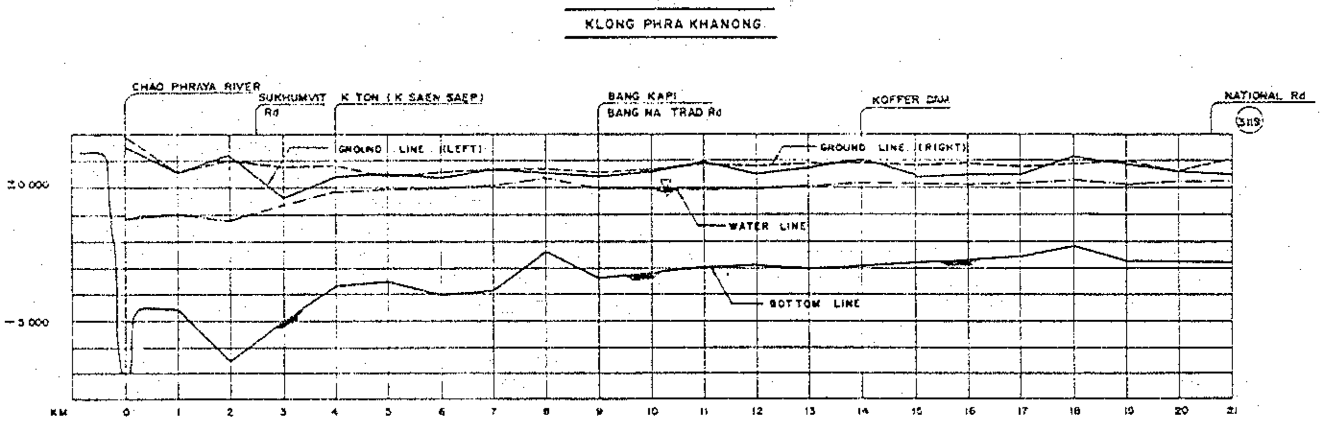


FIG. A.2	Plan of Klong

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



GROUND ELEV RIGHT	GROUND ELEV LEFT	BOTTOM ELEV	WATER LEVEL DATA ELEV, TIME, DATE
1.92			1.169, 11.17 8/6
0.30	0.70	−4.00	−1.019, 14.10, 8/28
0.87	1.16	−3.90	−1.224, 13.02, 8/28
0.78	−0.42	−3.02	−0.700, 12.40, 8/28
0.77	0.38	−2.71	−0.228, 17.00, 8/20
0.39	0.44	−2.85	−0.111, 14.20, 8/20
0.83	0.35	−3.04	−0.059, 16.00, 8/20
0.56	0.46	−3.07	0.034, 16.30, 8/20
0.71	0.53	−2.38	0.060, 17.35, 8/20
0.82	0.45	−3.38	−0.016, 11.10, 8/21
0.88	0.61	−3.15	−0.036, 17.05, 8/21
0.91	0.32	−2.99	−0.070, 13.30, 8/21
0.82	0.50	−2.88	−0.010, 14.35, 8/21
0.30	0.75	−2.87	0.017, 13.20, 8/21
0.84	1.07	−2.90	0.170, 18.39, 8/21
0.84	0.38	−2.78	0.159, 10.40, 8/22
0.92	0.50	−2.66	0.131, 11.30, 8/22
0.93	0.45	−2.57	0.124, 13.50, 8/22
0.86	1.14	−2.14	0.289, 14.58, 8/22
1.03	0.87	−2.70	0.085, 15.40, 8/22
0.64	0.82	−2.72	0.178, 10.10, 8/22
1.08	0.49	−2.72	0.170, 11.00, 8/22

FIG. A. 3 Profile of Klong Phra Khanong

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

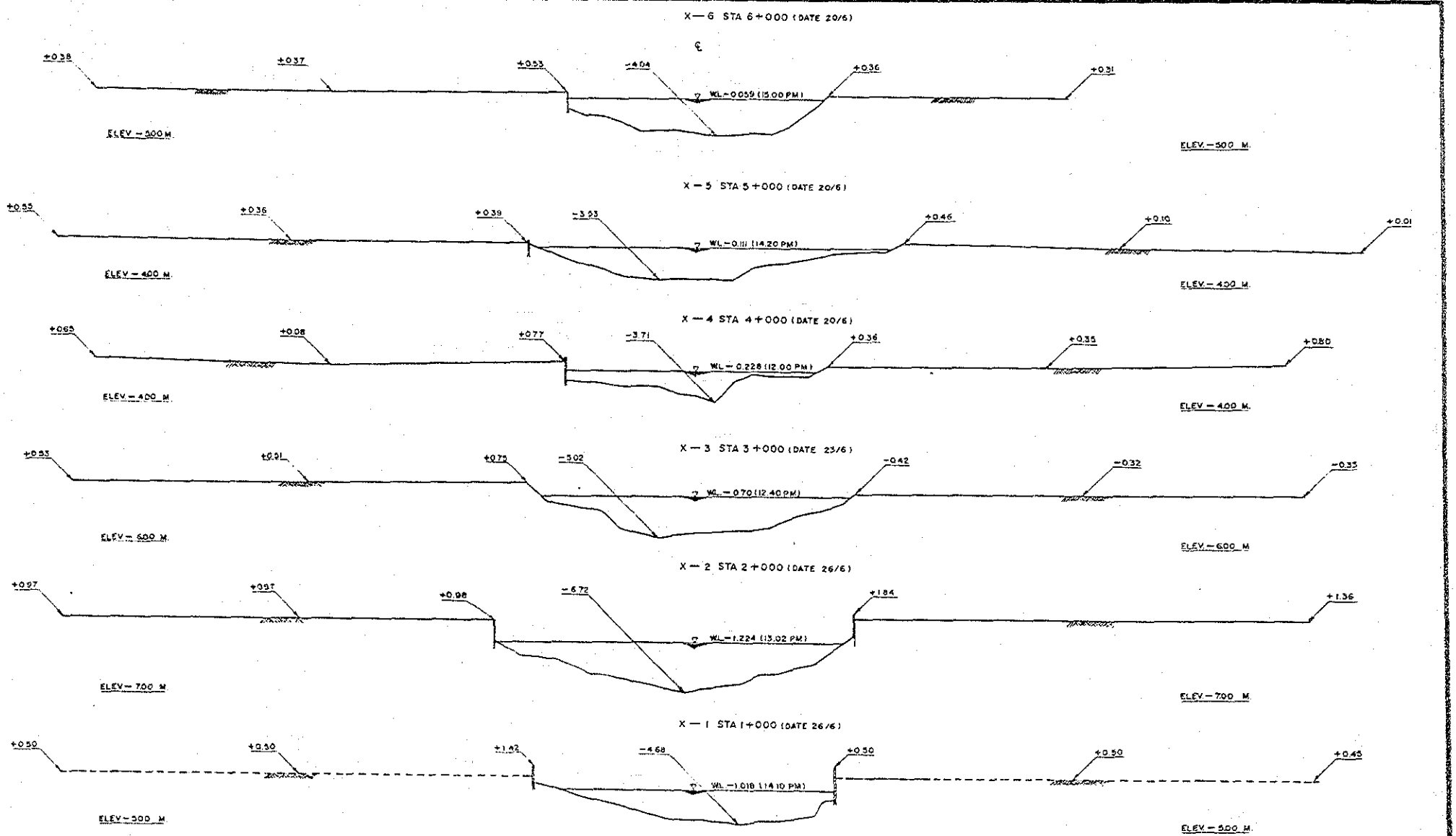


FIG. A. 4 | Cross Section of Klong Phra Khanong (1)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

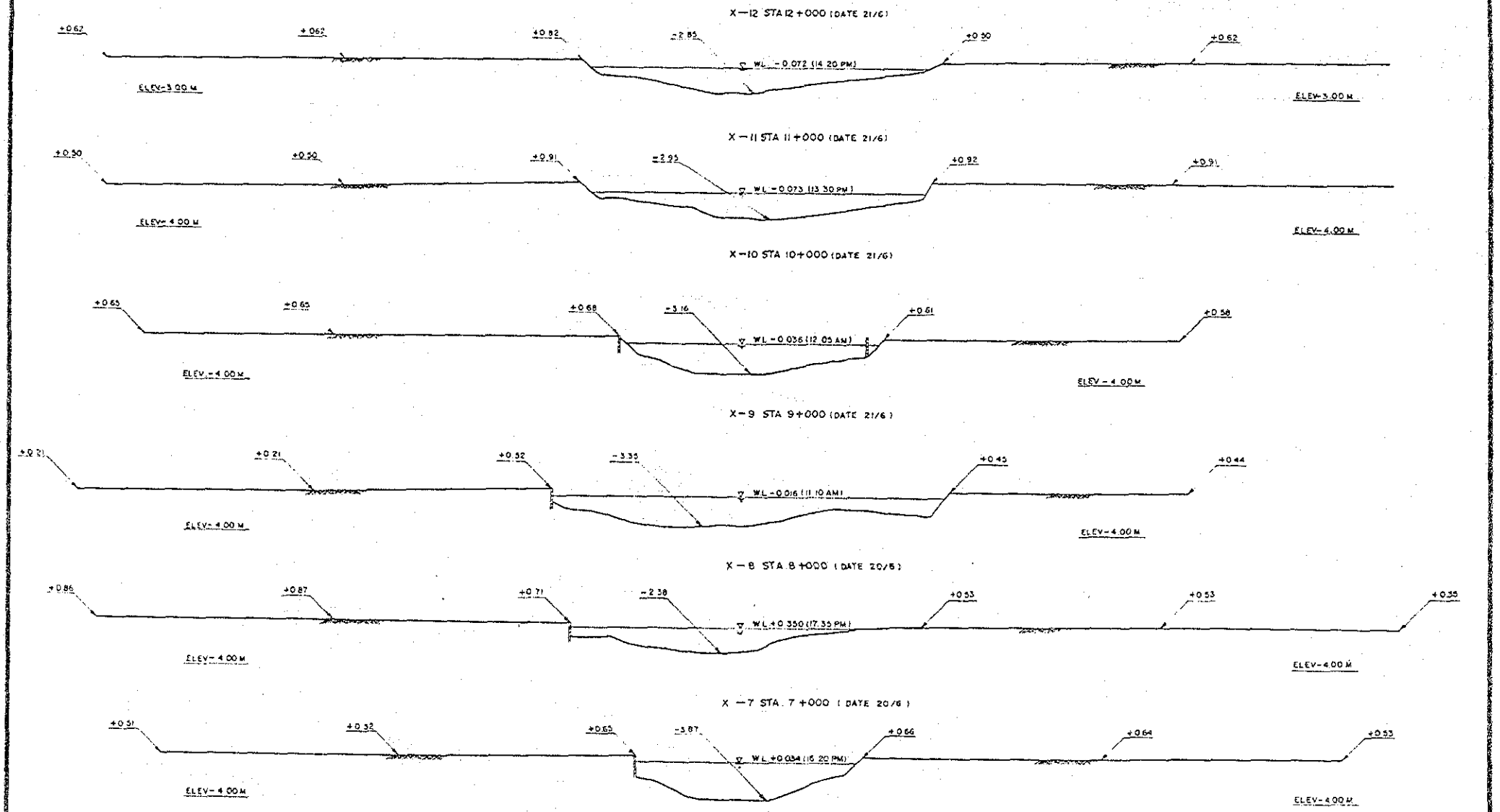


FIG. A.5 Cross Section of Klong Phra Khanong (2)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

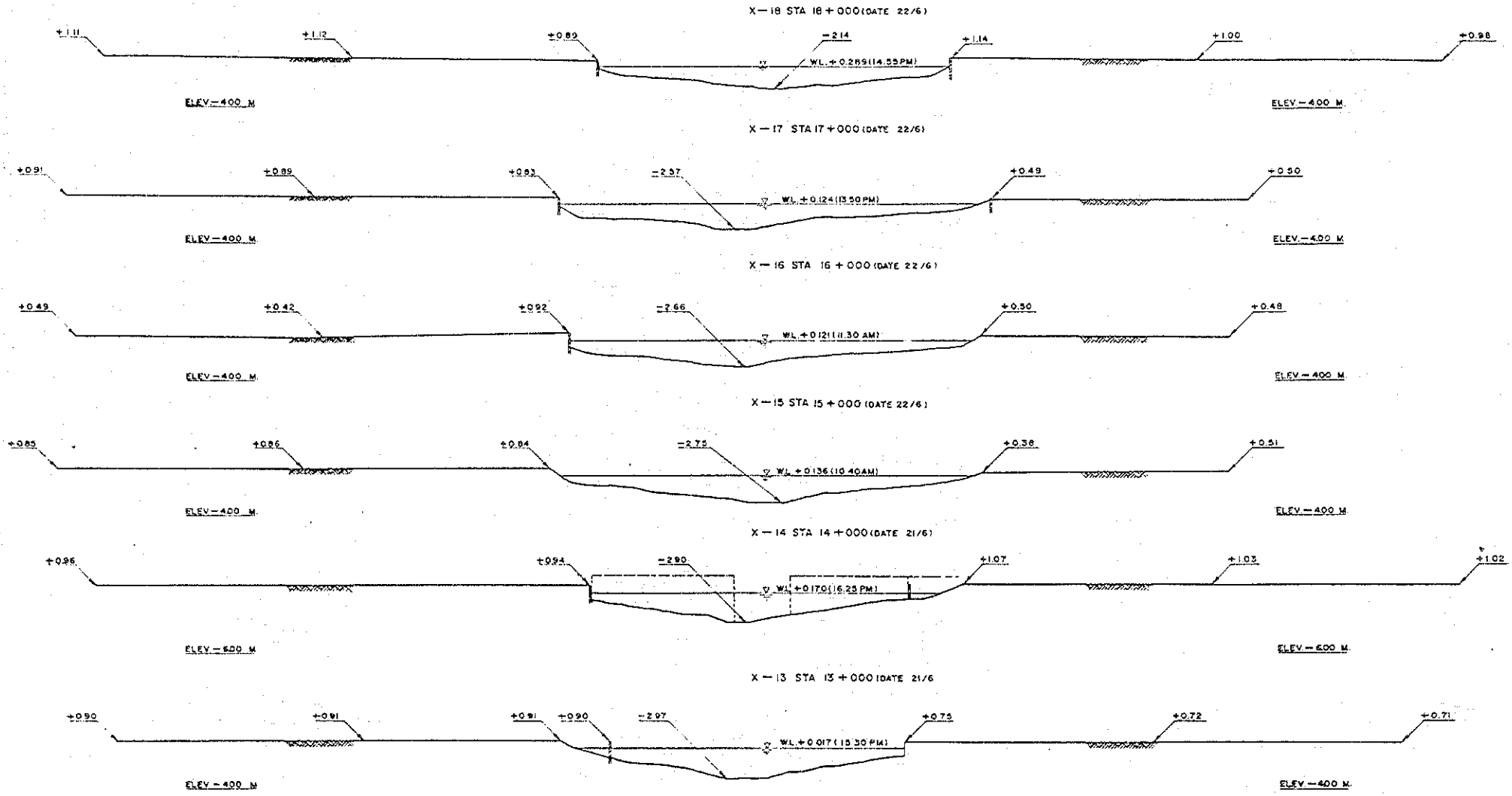


FIG. A.6	Cross Section of Klong Phra Khanong (3)
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	

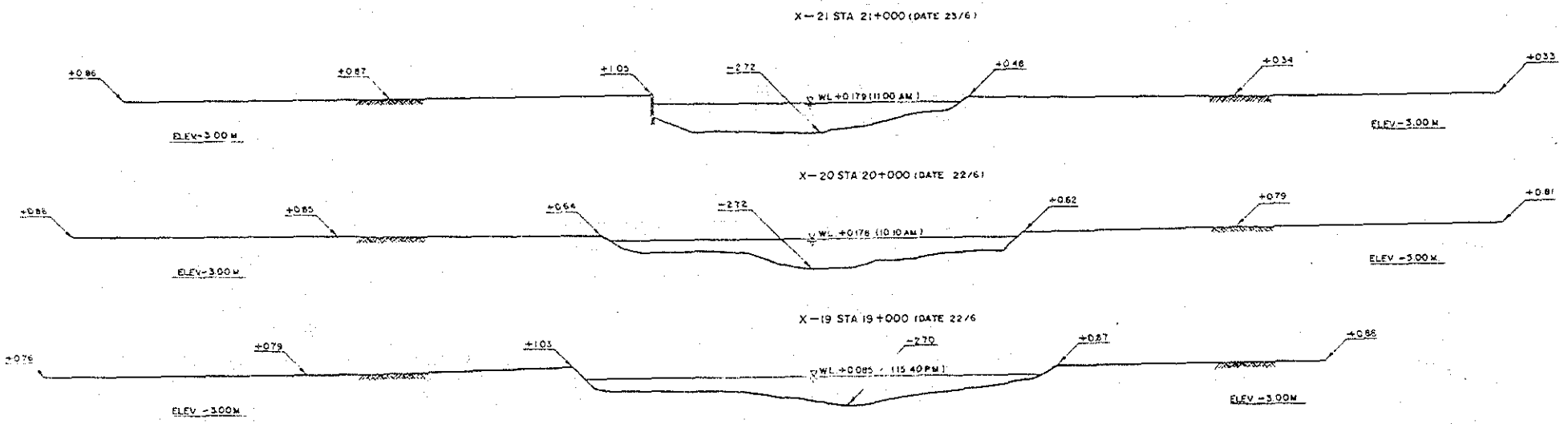


FIG. A.7 Cross Section of Klong Phra Khanong (4)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

KLONG SAEN SAEP

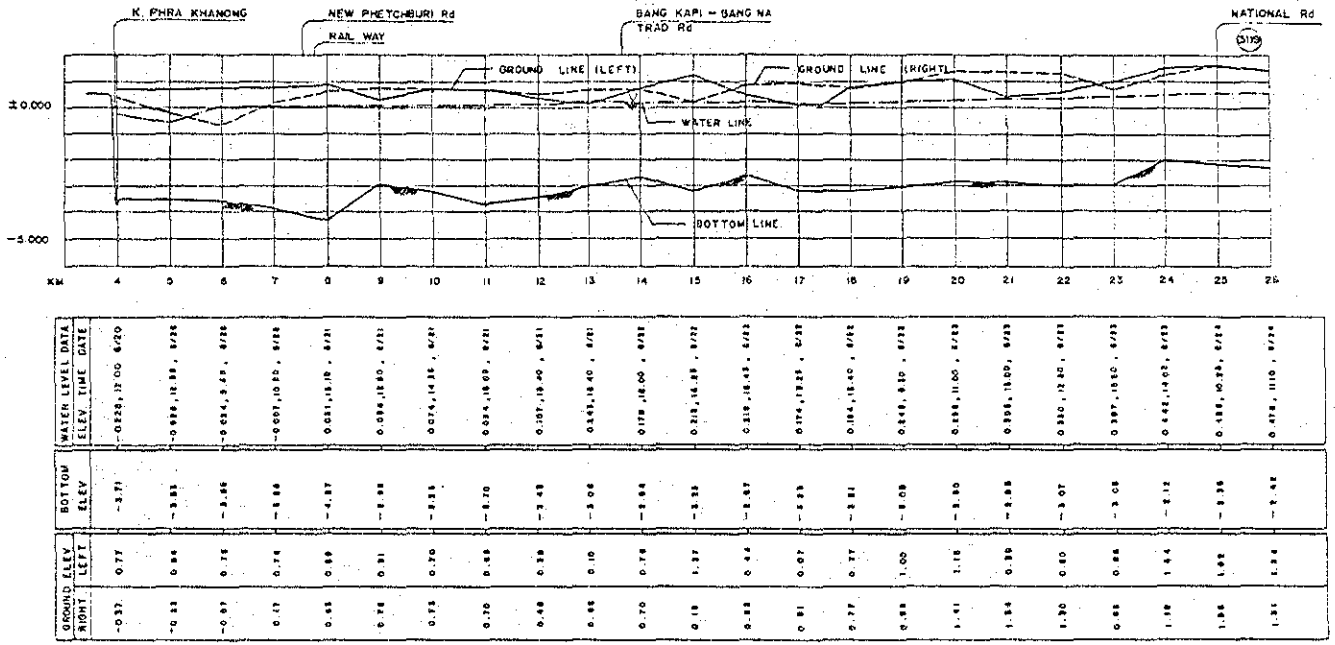


FIG. A. 8	Profile of Klong Saen Saep
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	

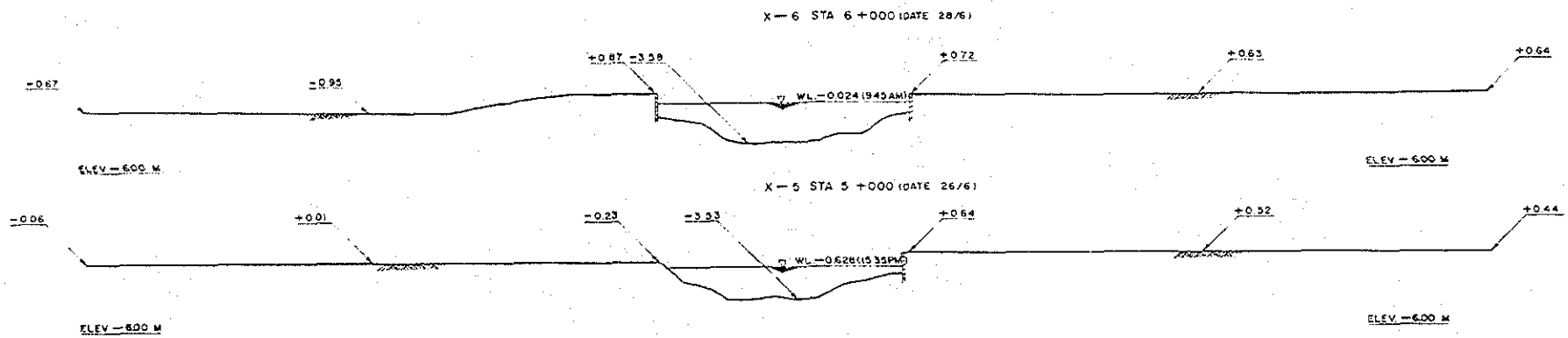


FIG. A.9 Cross Section of Klong Saen Saep (1)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

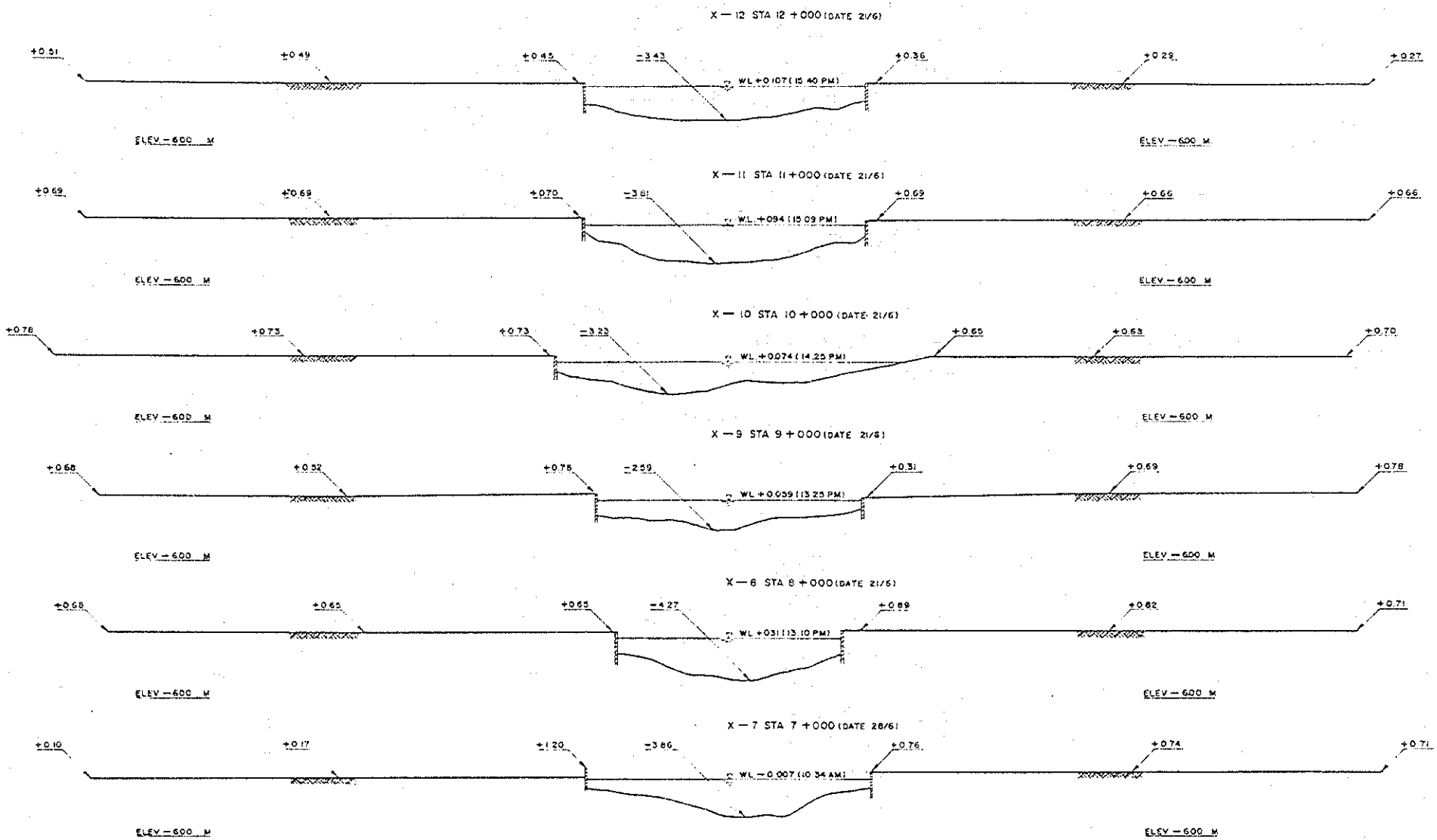


FIG. A. 10	Cross Section of Klong Saen Saep (2)
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	

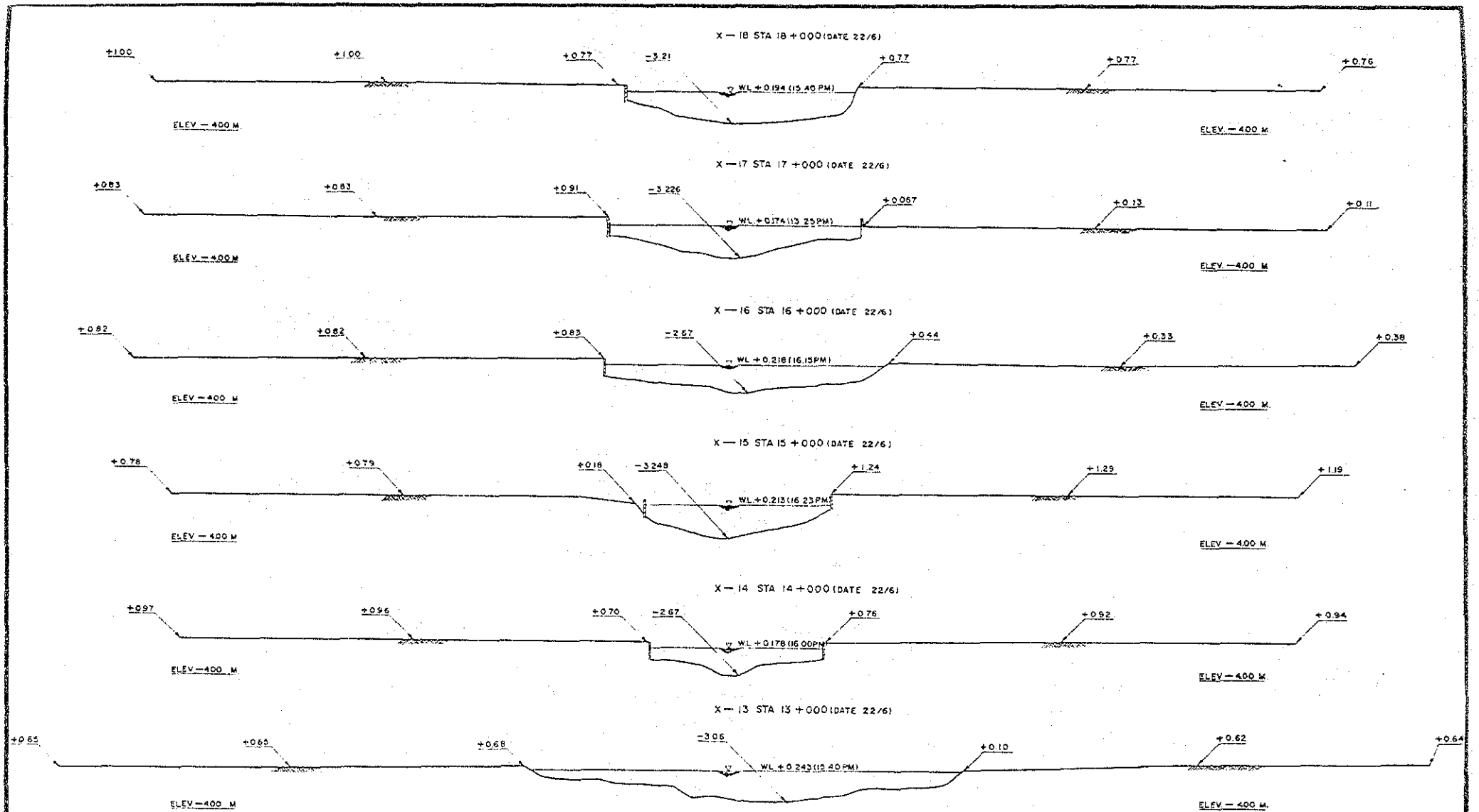


FIG. A.11 Cross Section of Klong Saen Saep (3)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

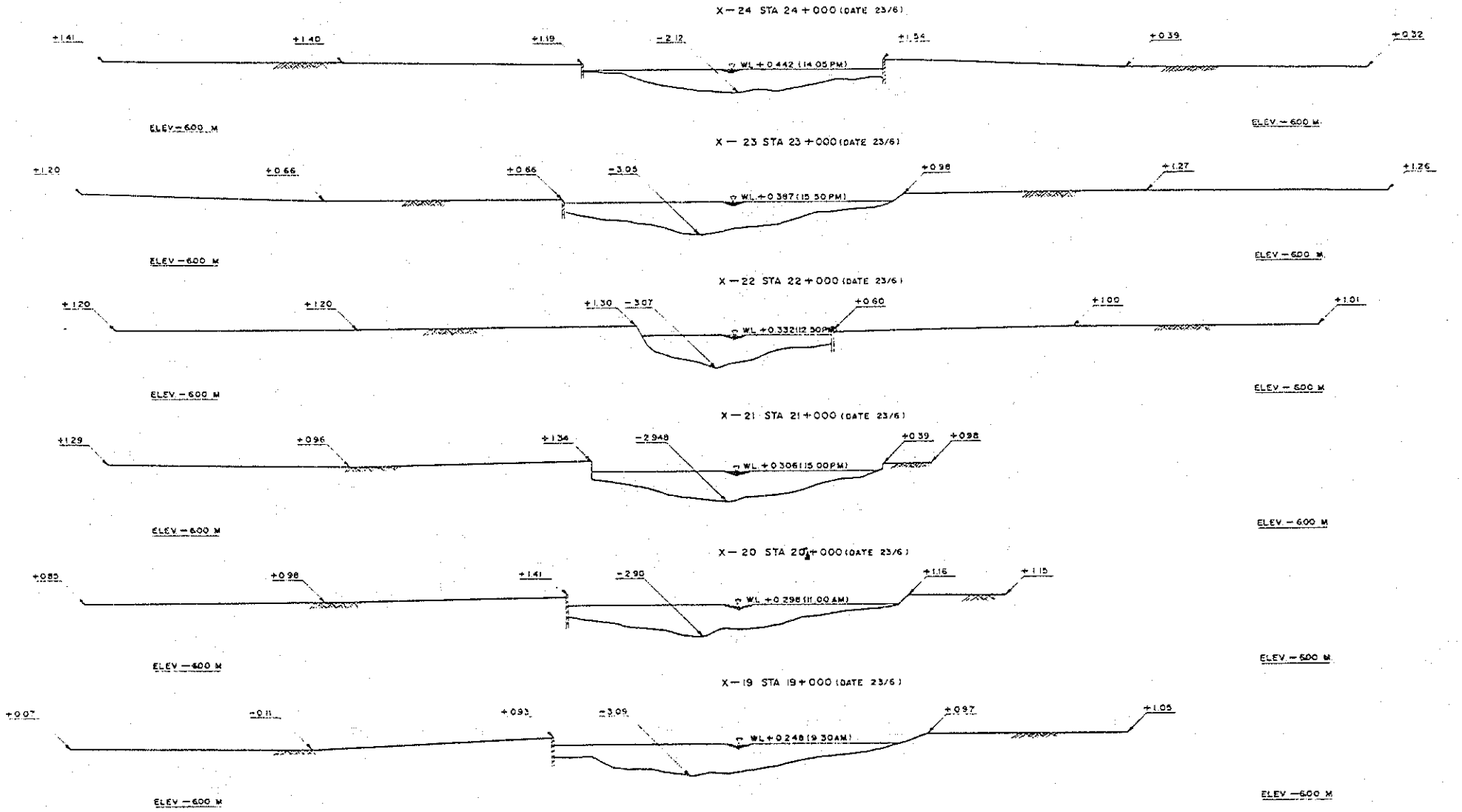


FIG. A.12	Cross Section of Klong Saen Saep (4)
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	

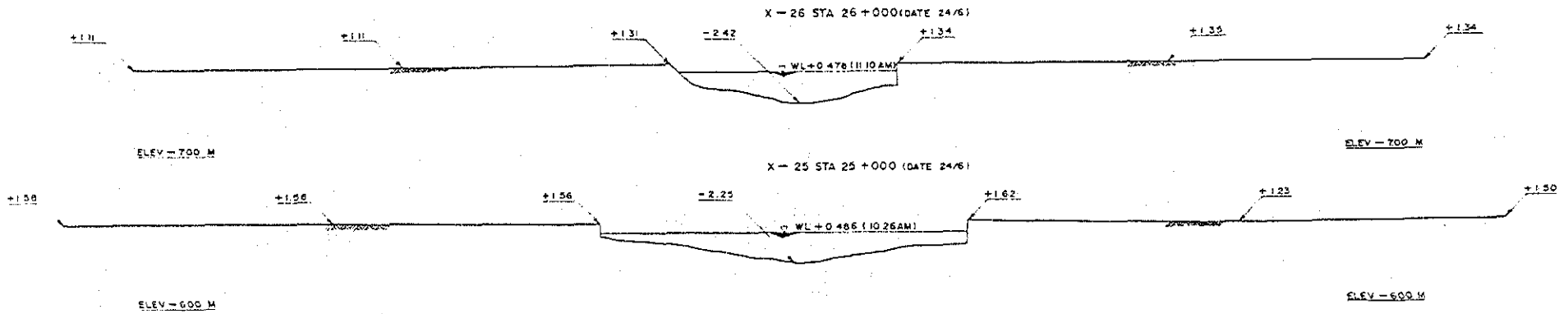


FIG. A.13	Cross Section of Klong Saen Saep (5)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

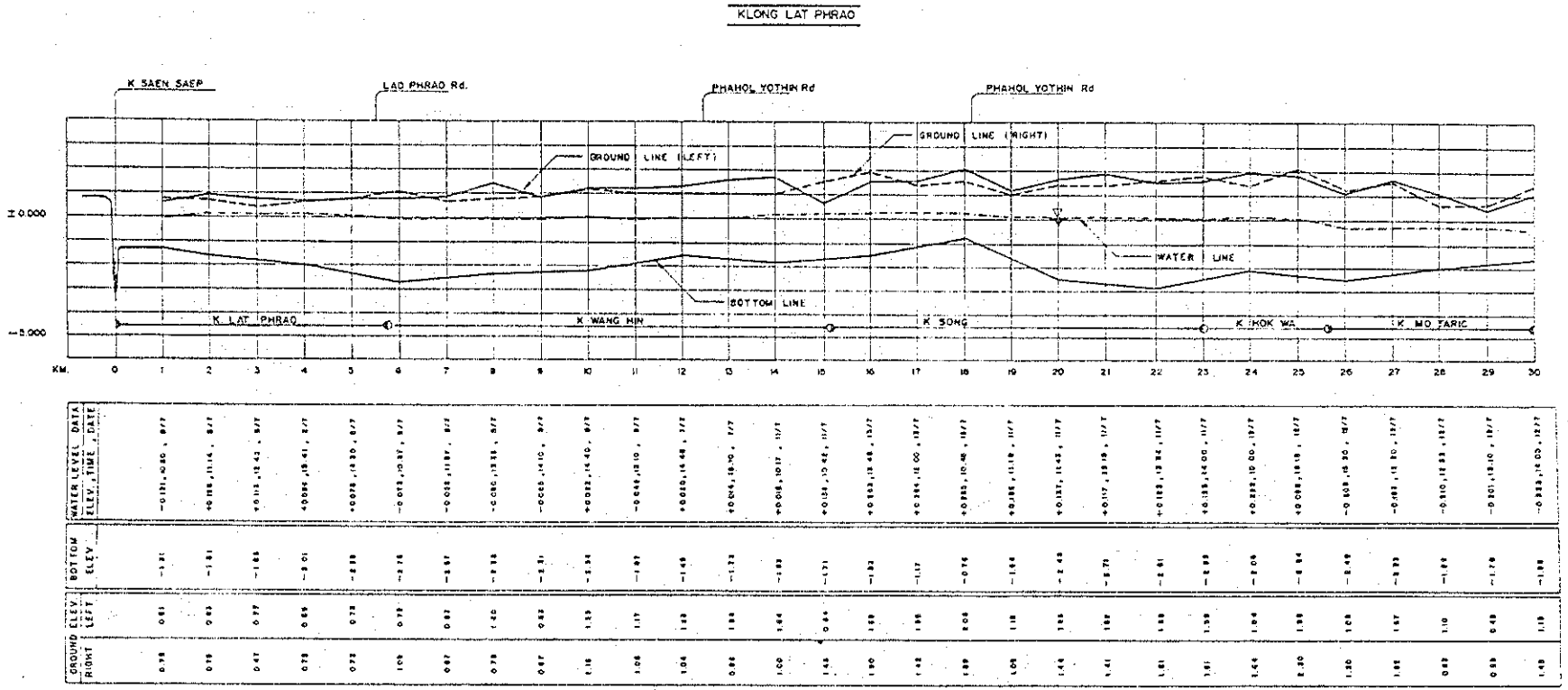


FIG. A.14	Profile of Klong Lat Phrao
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	

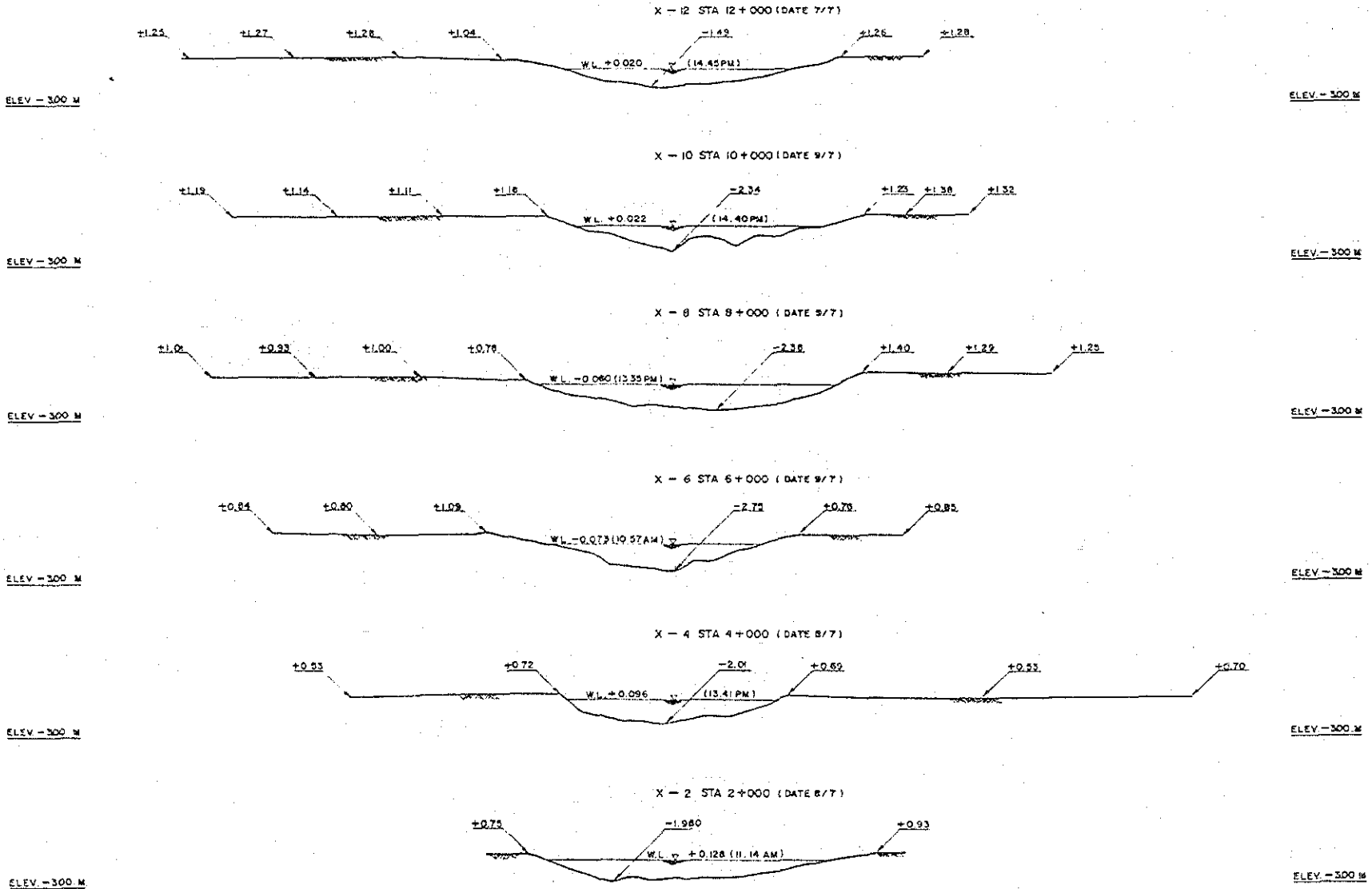


FIG. A.15 Cross Section of Klong Lat Phrao (1)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

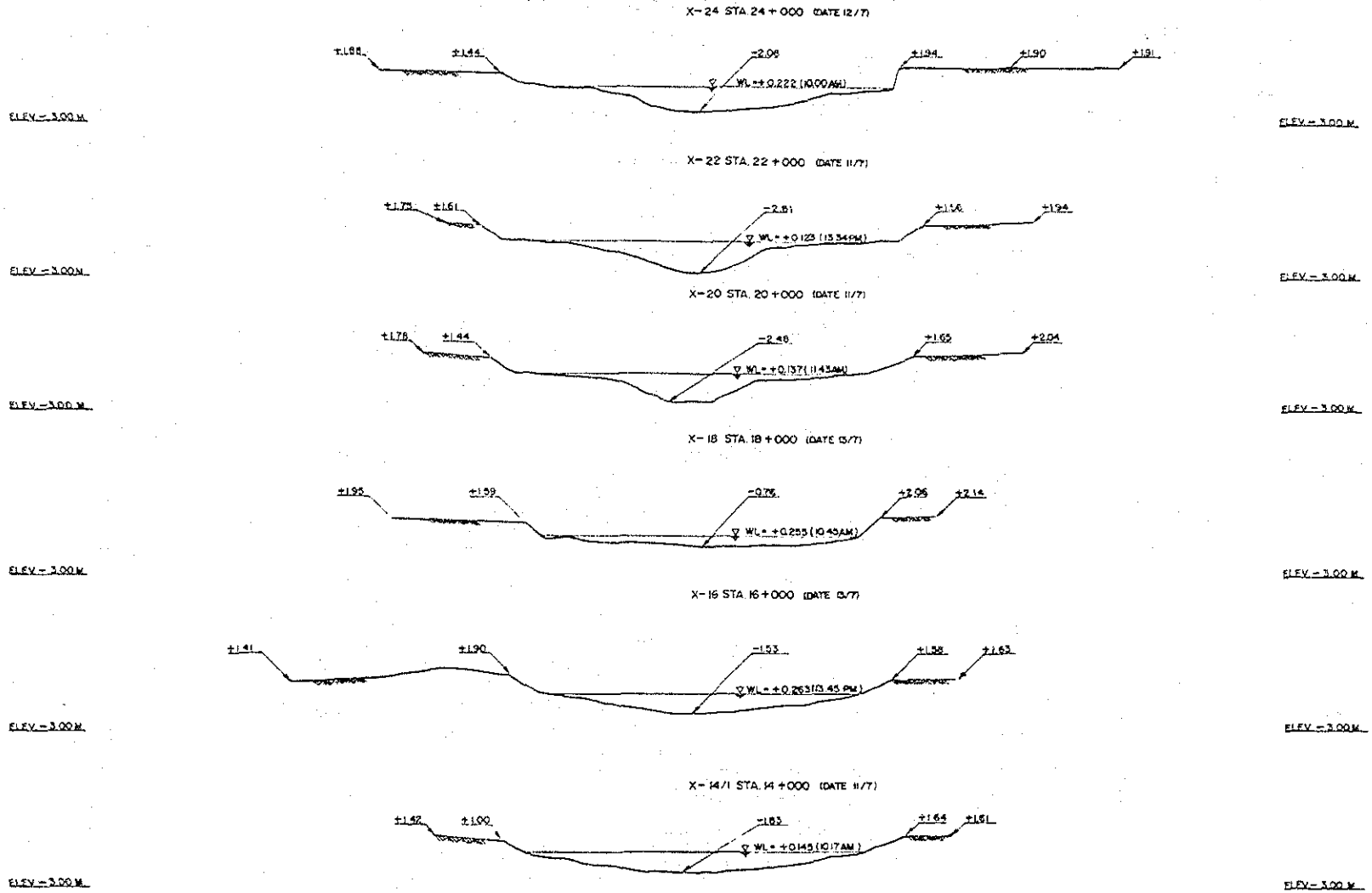


FIG. A.16 Cross Section of Klong Lat Phrao (2)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

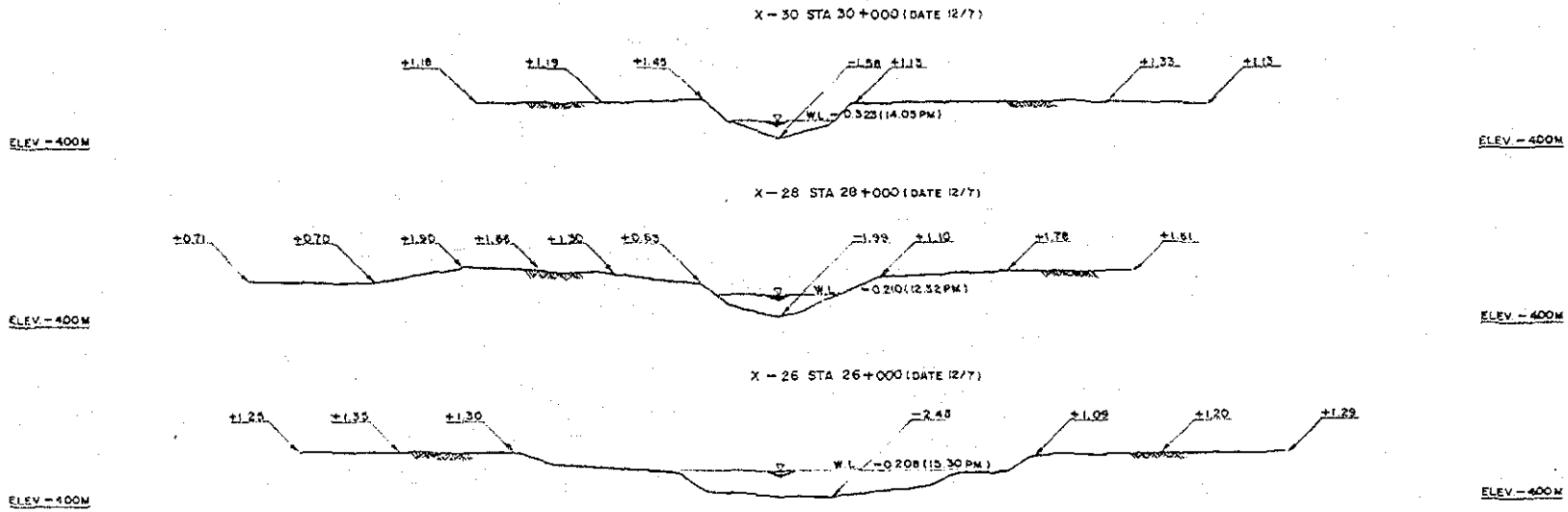
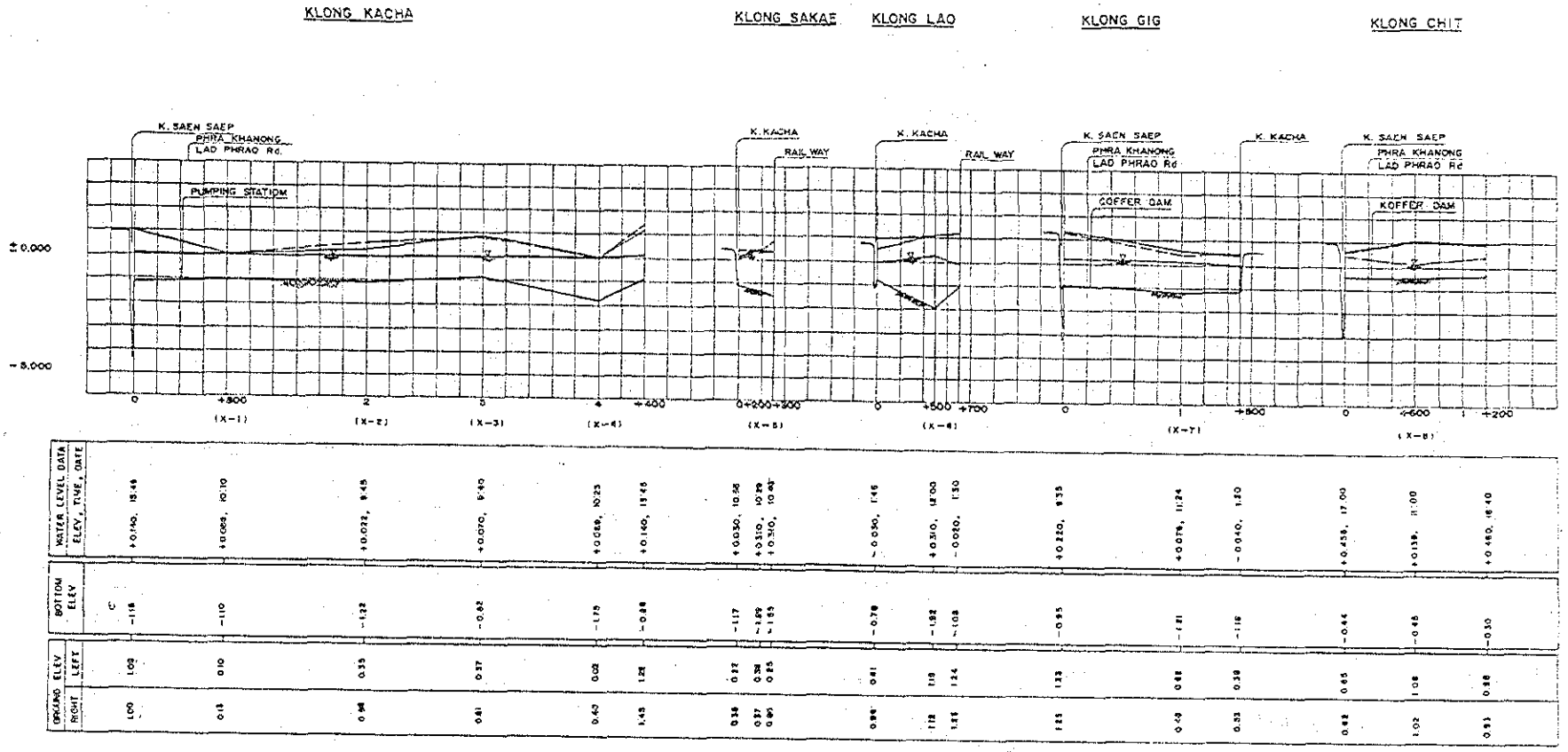


FIG. A .17	Cross Section of Klong Lat Phrao (3)
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	



(Refer to Appendix G)

FIG. A.18 Profile of Klong in Model Area

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

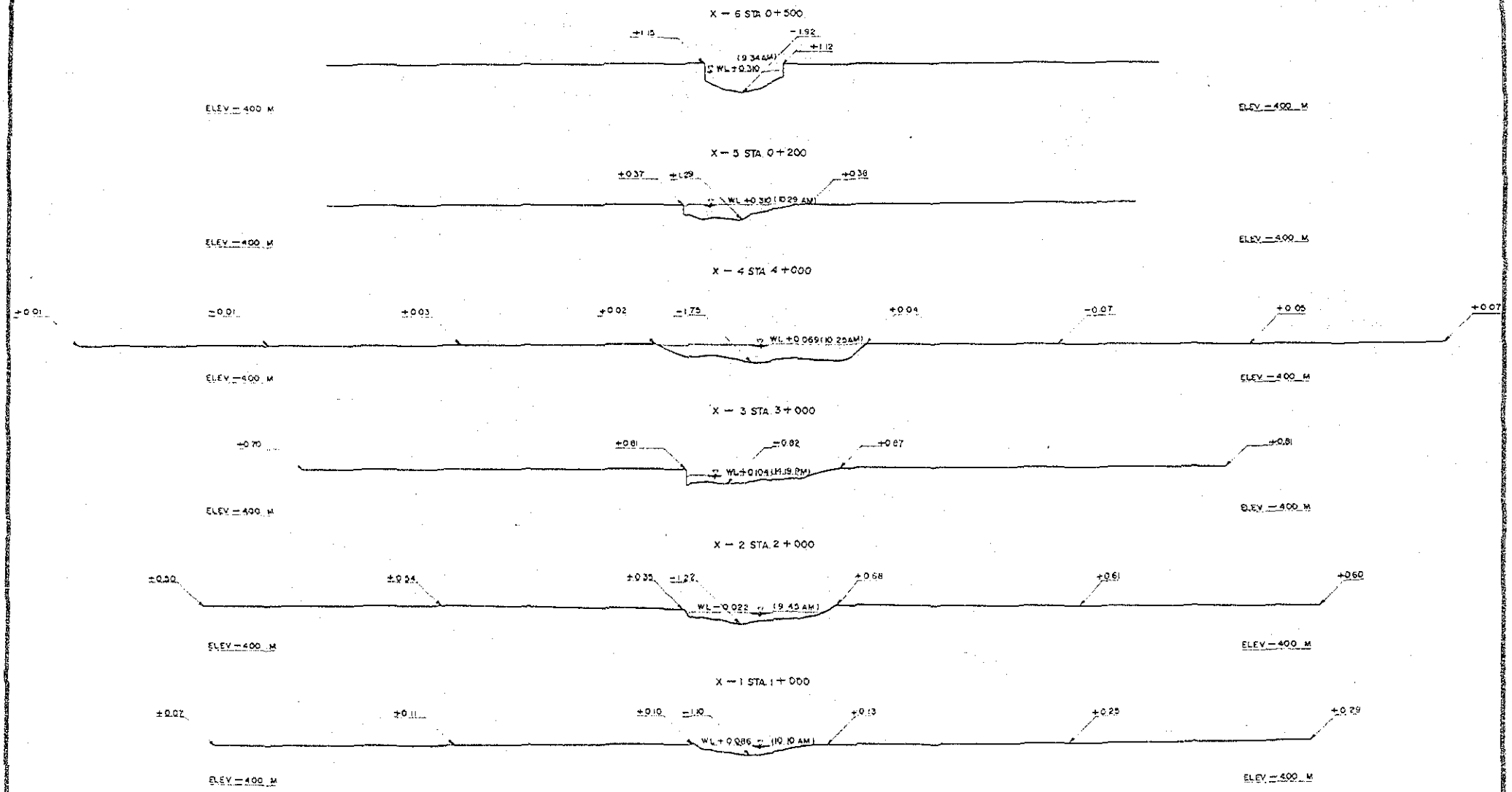


FIG. A.19 Cross Section of Klong in Model Area (1)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

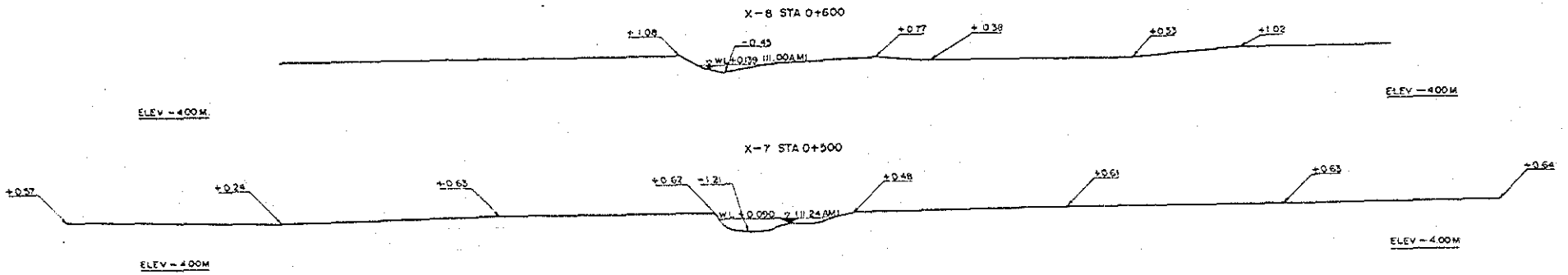
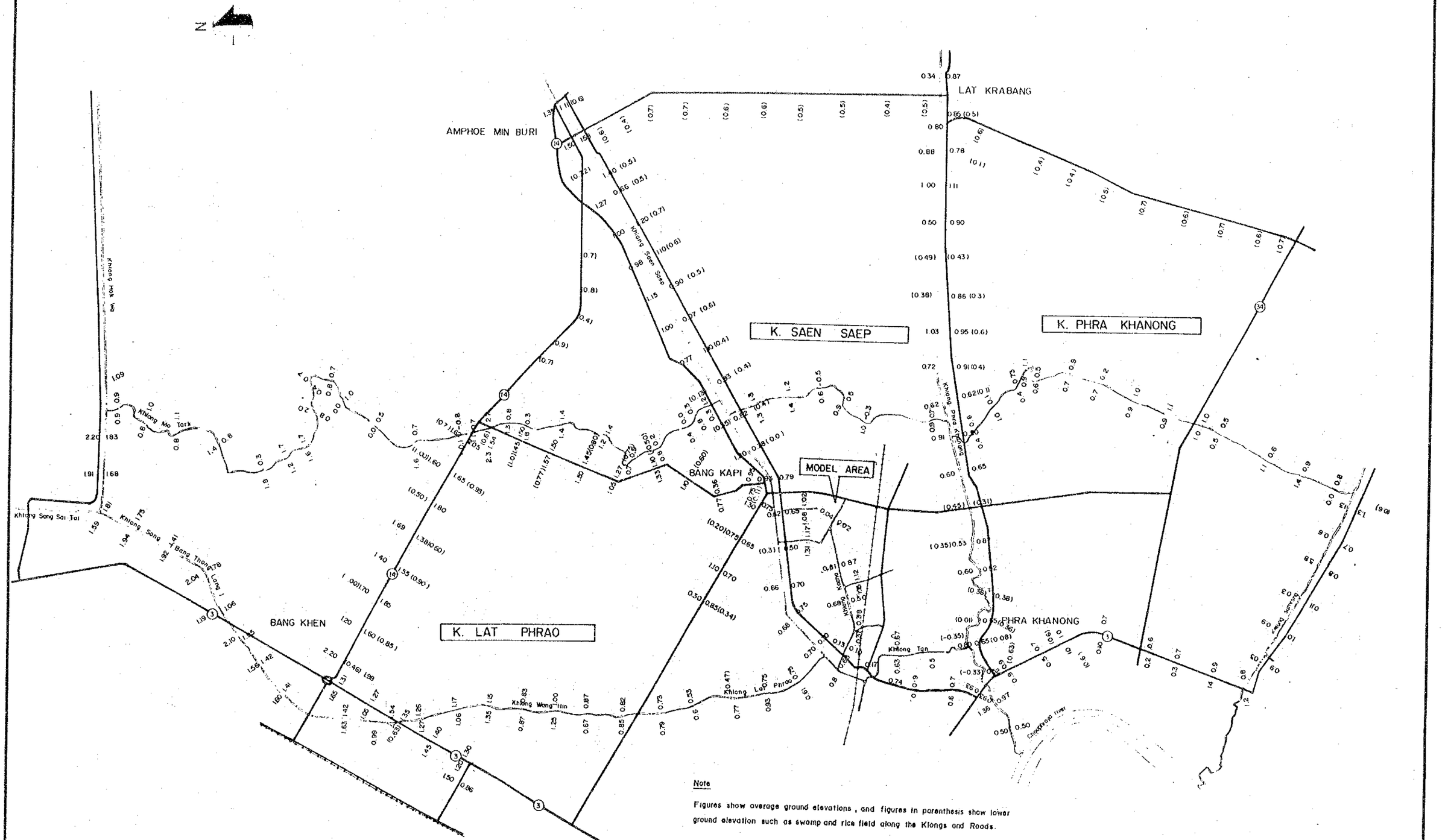


FIG. A.20 Cross Section of Klong in Model Area (2)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



Note

Figures show average ground elevations , and figures in parenthesis show lower ground elevation such as swamp and rice field along the Klongs and Roads.

FIG. A.21 Spot Elevation

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

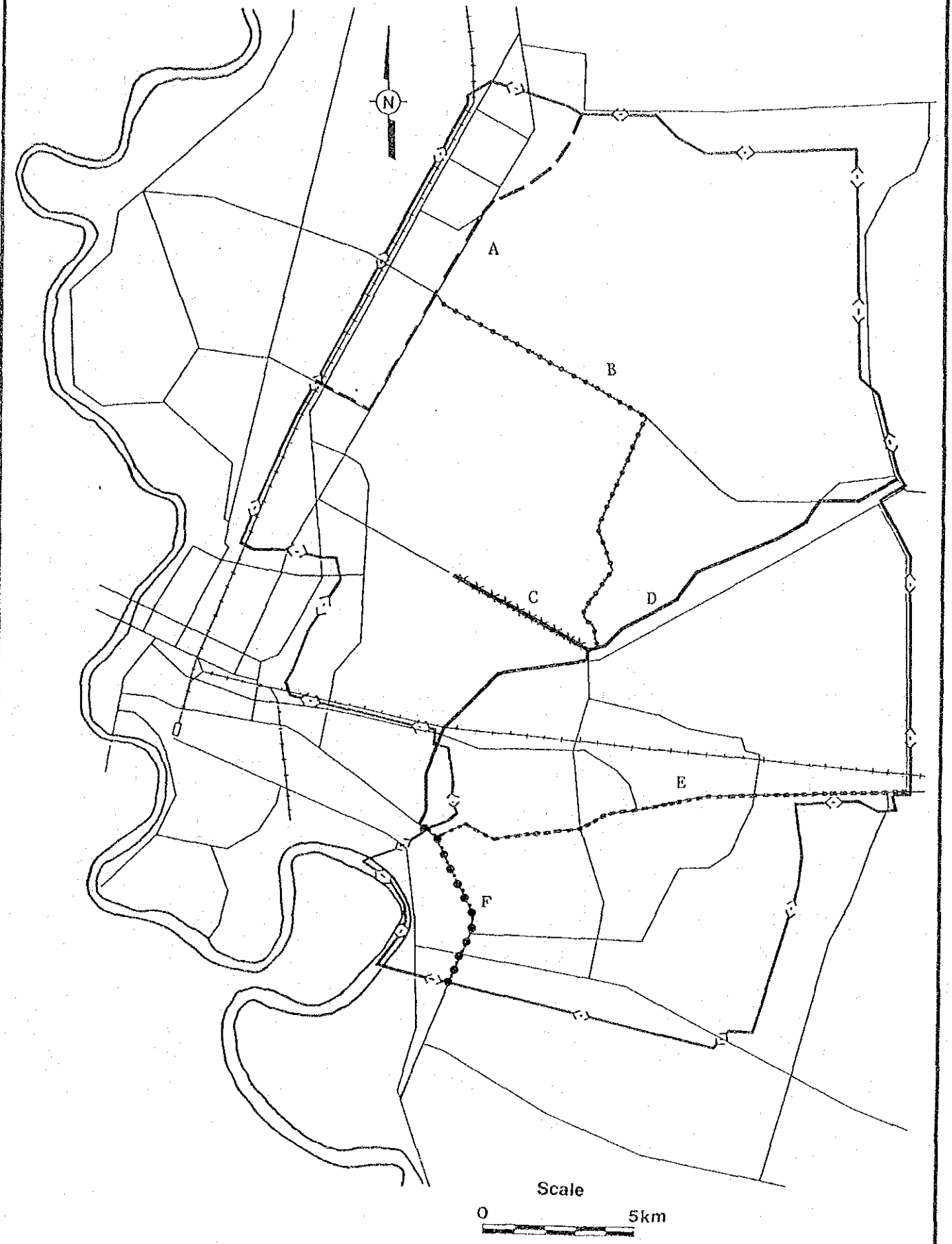


FIG. A.22 **Survey Routes for The Longitudinal Profile of Road**

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Route A

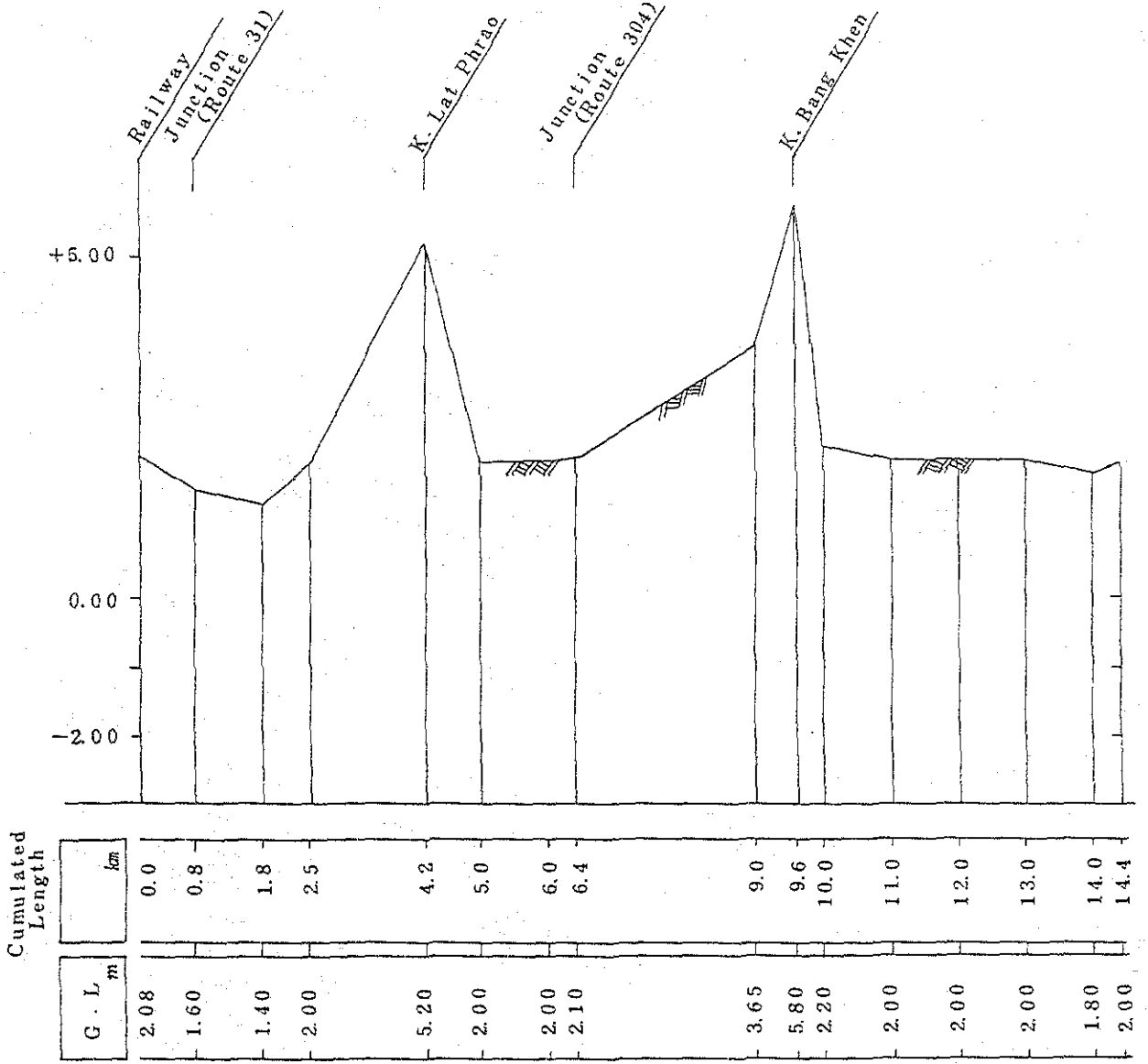


FIG. A.23 Longitudinal Profile of Road (1)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

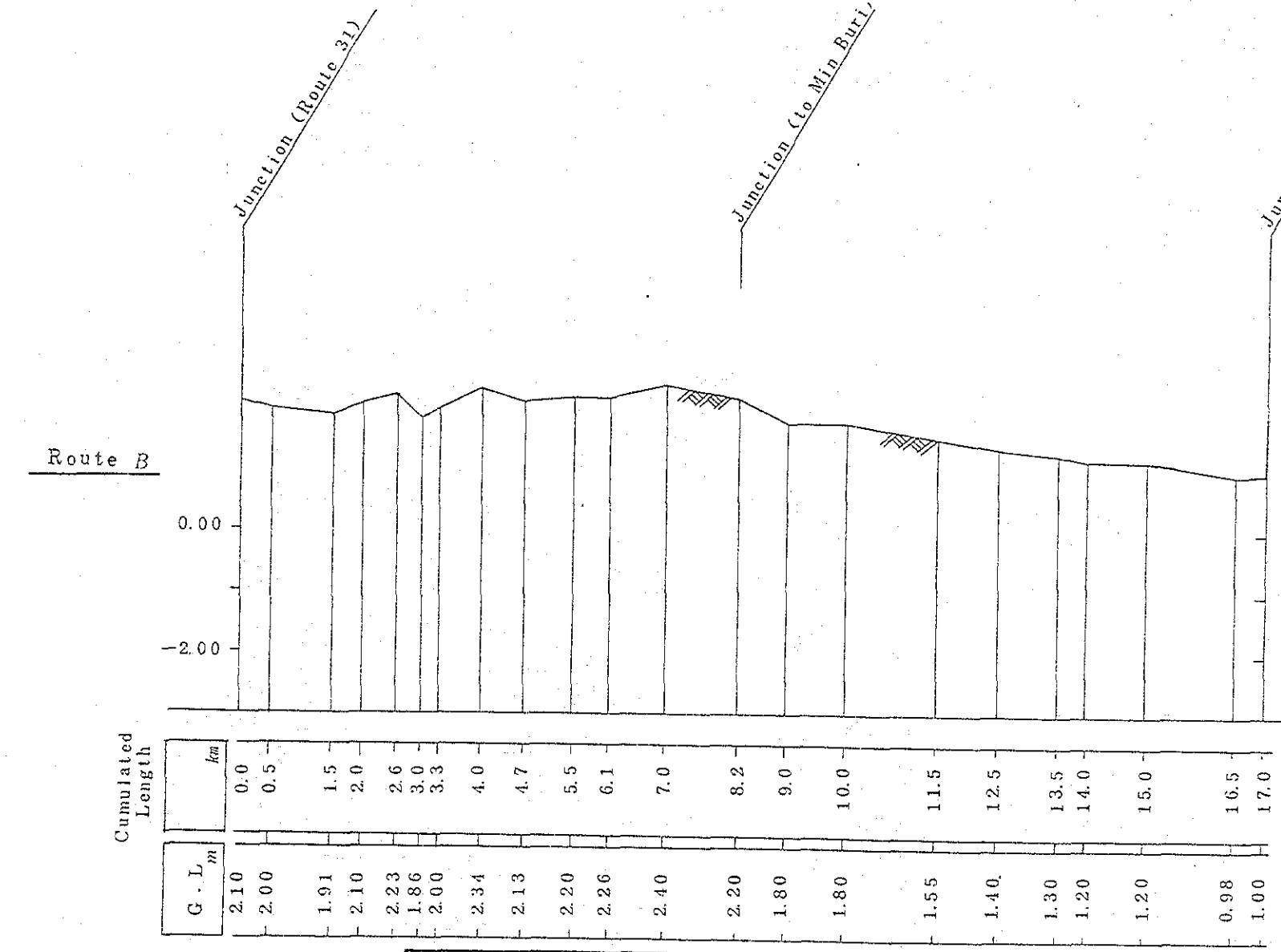


FIG. A.24 Longitudinal Profile of Road (2)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

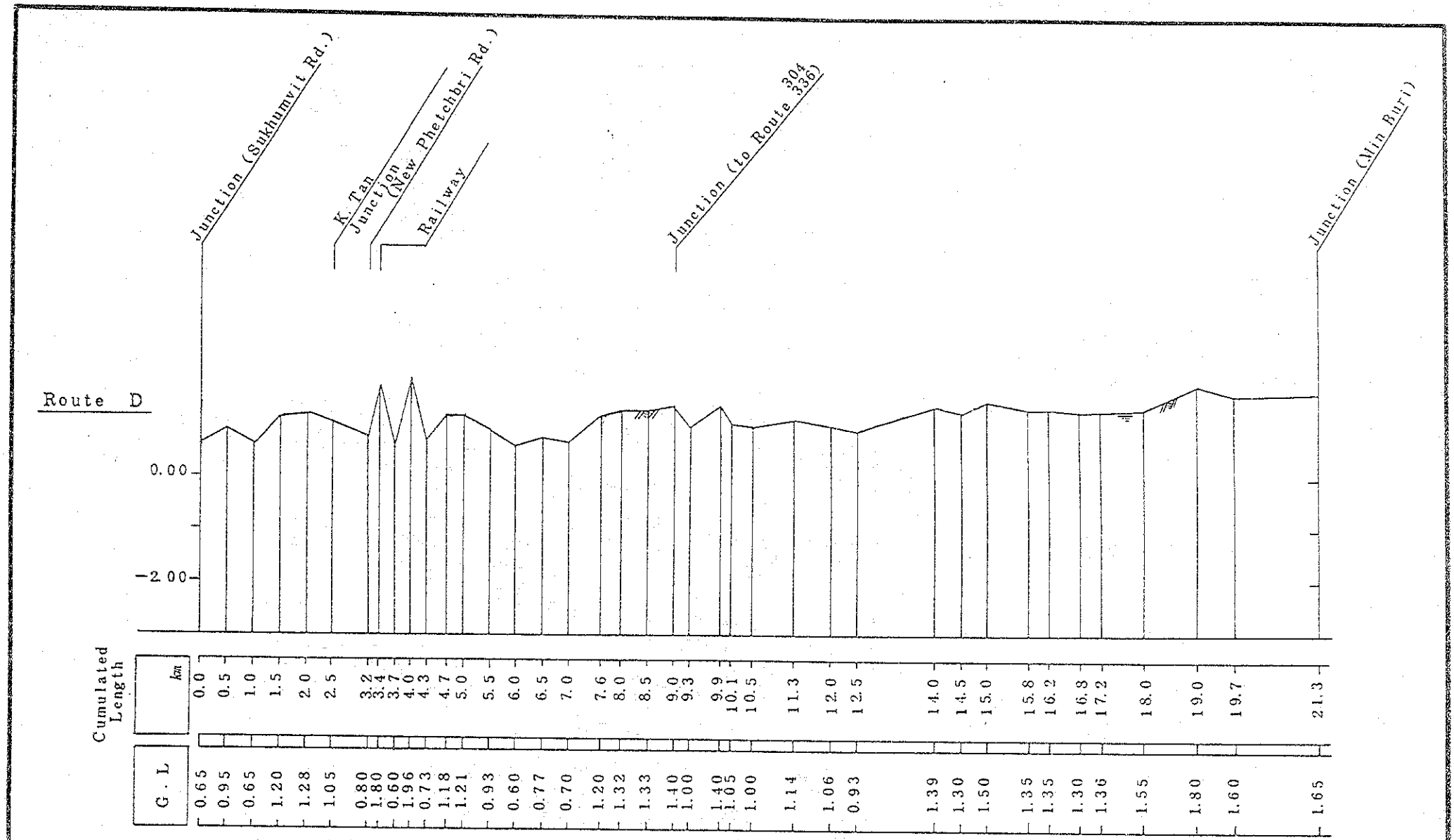


FIG. A . 25 Longitudinal Profile of Road (3)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

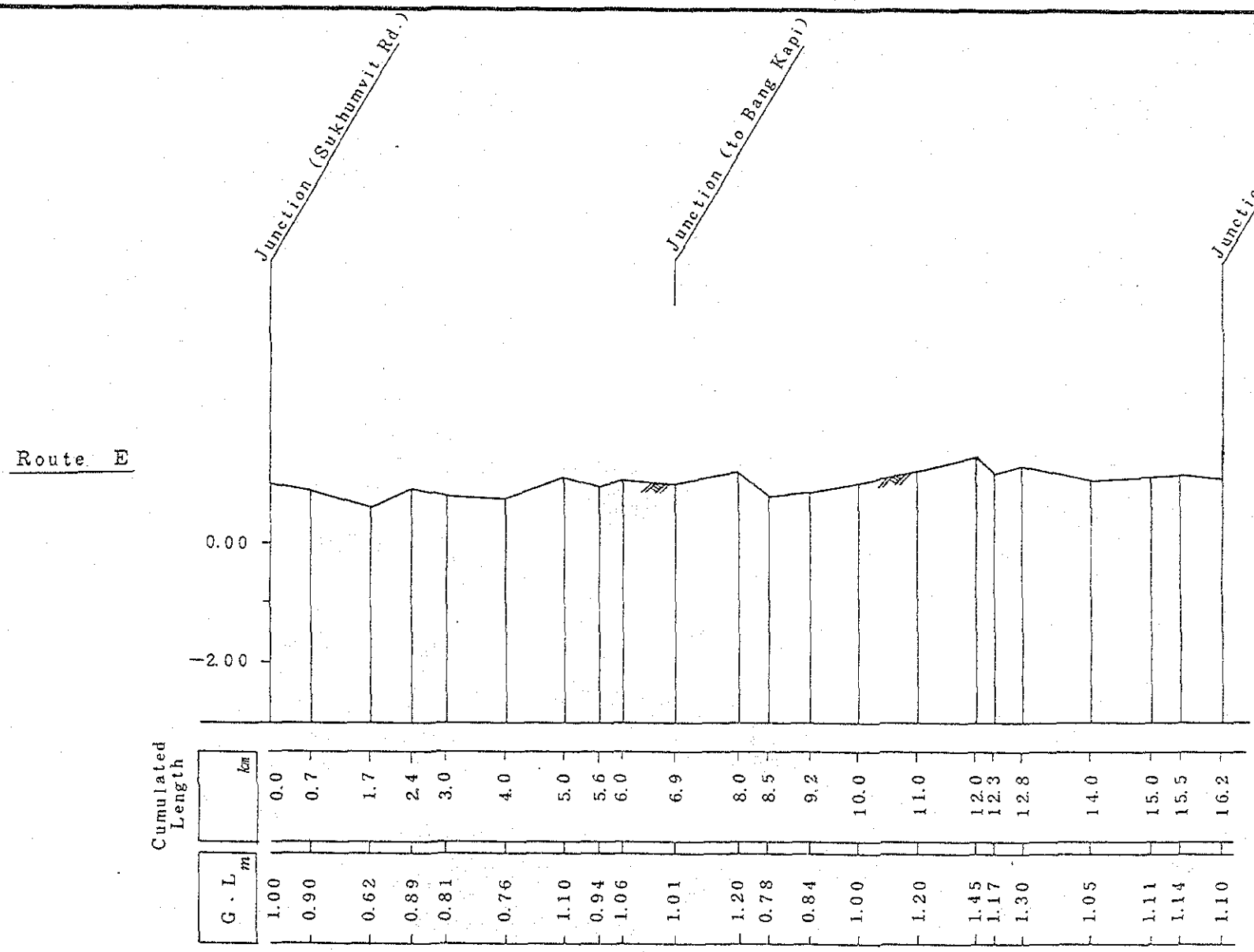


FIG. A.26 Longitudinal Profile of Road (4)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

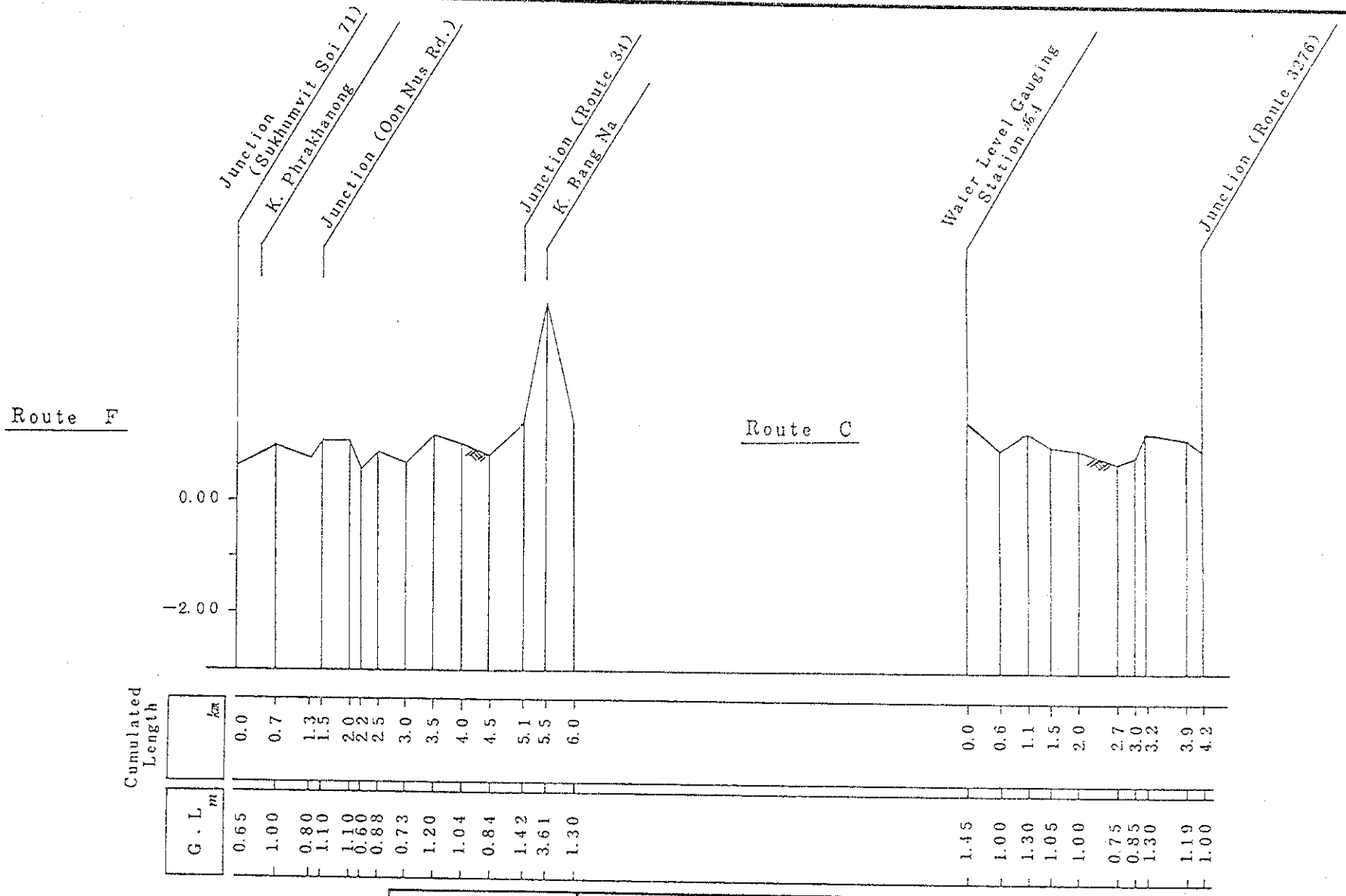


FIG. A . 27 Longitudinal Profile of Road (5)

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

APPENDIX B

Flood Damage Survey on 1982 Flood

Appendix B Flood Damage Survey on 1982 Flood

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Appendix B Flood Damage Survey on 1982 Flood

1. General

A flood damage survey is usually designed to collect data on flood damage relating to households, firms and organizations. The survey data will provide the basis for a benefit/cost analysis of the project, the determination of feasibility of the project, the estimation of the future social, economic and financial benefits to be derived from flood control and drainage works. Although these will be analyzed in the feasibility study, the Study Team has surveyed and analyzed flood damage by the 1982 flood.

2. Survey Method

The damage survey on the 1982 flood in the entire Study Area was conducted from June 29, 1983 to July 13, 1983 with the assistance of 11 staff from the DDS, some of whom took part in the field survey which had been conducted in Sukhmvit area by Burkhard in 1982. The survey was conducted with questionnaires in the form of direct interviews.

The surveyed points were initially selected from flood-prone areas as informed by the DDS in the western parts of the Study Area, which is shown in Fig. 3.2, main report. However, these survey points were expanded to cover the entire Study Area, as it was found that flood area is not limited only to the above-mentioned flood-prone area as the survey started.

Fig. B.1 shows existing urban and rural area.

3. Questionnaires

Two forms of questionnaires, namely; a dwelling house survey form and a trade survey form which are applied correspondingly to Burkhard Survey Form, were used in the interview, as shown in Appendix B.4.

Contents of the questionnaires for both dwelling house and trade are as follows:

(1) General Question

Type of dwelling house, dimensions of estate, number of inhabitants etc.

(2) Question on Investment for Flood Prevention

Whether flood prevention measures such as raising floor level, raising estate level and constructing walls and pumps were executed or not was first inquired. If these measures were provided then the costs were then requested.

This investment cost falls in "Uncertain Damage" as classified in section 3.4, main report.

(3) Question on Characteristics of Flood

Characteristics of flood such as flood depth, duration and frequency were inquired.

(4) Question on Flood Damage

Any loss (direct property damage, time loss, decrease of turnover etc.) was investigated. These were classified into direct damage and indirect damage.

4. Analysis of Damage by 1982 Flood

4.1 General

Survey samples were 401 places, dwelling houses 287 and 114 trade properries. As many as 90 percent of the surveyed houses and shops suffered from the flood, and as many as 70 percent have carried out flood prevention measures. (Survey results are shown in Appendix B.1)

Flood damage to a dwelling house amounted to 204 Baht per person (*1) per annum, and 1,374 Baht per house. Flood damage in urban area (which is defined in Fig. B.1 based on existing land use) was eight times as great as that in the remaining rural area.

Flood Damage in trade was nine Baht per m^2 (*2) per annum, and 4,859 Baht per shop. (Table B.1)

Unit damage was classified and analyzed according to the following three categories:

1) Direct Damage
2) Indirect Damage (as time loss of inhabitants due to traffic delay)
3) Uncertain Damage (as flood prevention cost)

The three damage categories were analyzed for whether or not individual flood prevention measures were executed and whether or not they had cars. Their damages are shown in Table B.1, while their depth and duration are shown in Tables B.2 and B.3 respectively.

Note : *1, 1,374 (Baht/house) ÷ 6.84 (person/house) = 204 Baht/person
*2, 4,859 (Baht/shop) ÷ 515 (m^2/shop) = 9 Baht/m^2

Table B.1 Average Damage on 1982 Flood

			Flood							No Flood	Total
			Prevention Measures			No Prevention Measures			Sub Total		
			Car	No Car	Sub Total	Car	No Car	Sub Total			
Dwelling House	Urban Area	Direct Damage	5,216	1,899	3,430	5	2	3	2,411	0	2,258
		Indirect Damage	17	29	23	27	48	37	27	0	26
		Prevention Cost	1,779	1,285	1,513	0	0	0	1,063	482	1,026
		Total	7,012	3,213	4,966	32	50	40	3,501	482	3,310
	Rural Area	Direct Damage	690	336	466	29	33	31	330	0	307
		Indirect Damage	45	15	26	57	56	56	36	0	33
		Prevention Cost	549	324	407	0	0	0	279	574	299
		Total	1,284	675	899	86	89	87	645	574	639
	Sub Total	Direct Damage	2,178	727	1,299	20	27	24	904	0	844
		Indirect Damage	36	19	25	46	54	51	33	0	31
		Prevention Cost	954	565	718	0	0	0	496	550	499
		Total	3,168	1,311	2,042	66	81	75	1,433	550	1,374
Trade		Direct Damage	5,423	-	5,423	5,009	-	5,009	5,275	8	4,675
		Indirect Damage	110	-	110	84	-	84	100	258	118
		Prevention Cost	110	-	110	0	-	0	71	31	66
		Total	5,643	-	5,643	5,093	-	5,093	5,446	297	4,859

Note : 1. Prevention cost is calculated as past investment cost divided by durable year (10 years).

2. 6.72 persons per house in dwelling house in total area
6.39 persons per house in dwelling house in urban area (Ref. to Fig. B.1)
6.84 persons per house in dwelling house in rural area (Ref. to Fig. B.1)

3. Size of Estate is 515 m^2 per shop

Table B.2 Flood Depth on 1982 Flood

[Unit : cm]

			Flood							No Flood	Total
			Prevention Measure			No Prevention Measure			Total		
			Car	No Car	Total	Car	No Car	Total			
Dwelling House	Urban Area	No	24	28	52	12	10	22	74	5	79
		Maximum									
		Average	26	22	24	16	20	18	22	0	20
		Minimum									
	Rural Area	No	49	84	133	19	42	61	194	14	208
		Maximum									
		Average	36	37	37	19	24	22	32	0	30
		Minimum									
	Sub Total	No	73	112	185	31	52	83	268	19	287
		Maximum									
		Average	33	33	33	18	23	21	29	0	27
		Minimum									
Trade		No	65	0	65	36	0	36	101	13	114
		Maximum		-			-				
		Average	19	-	19	17	-	17	19	0	16
		Minimum		-			-				
Total		No.	138	112	250	67	52	119	369	32	401

Table B.3 Flood Duration on 1982 Flood

[Unit : day]

			Flood							No Flood	Total
			Prevention Measure			No Prevention Measure			Total		
			Car	No Car	Total	Car	No Car	Total			
Dwelling House	Urban Area	No.	24	28	52	12	10	22	74	5	79
		Maximum									
		Average	49	34	41	43	18	31	38	0	36
		Minimum									
	Rural Area	No.	49	84	133	19	42	61	194	14	208
		Maximum									
		Average	44	43	43	35	34	34	40	2	38
		Minimum									
	Sub Total	No.	73	112	185	31	52	83	268	19	287
		Maximum									
		Average	45	40	42	38	31	33	40	1	37
		Minimum									
Trade		No.	65	0	65	36	0	36	101	13	114
		Maximum									
		Average	36	-	36	18	-	18	29	2	26
		Minimum									
Total No.			138	112	250	67	52	119	=369	32	401

4.2 Direct Damage

4.2.1 Dwelling House

Flood damage was found to increase in an urban area dwelling house at the rate of 307 Baht per cm per house as the flood deepens. (Fig. B.2) It was found that flood damage in a rural area was little influenced with flood depth and that flood damage was also little influenced by flood duration.

Flood damage to dwelling houses in the urban area with prevention measures was found to be affected strongly by flood depth.

4.2.2 Trade

Fig. B.4 shows the flood damage relating to flood depth in case of trade.

4.3 Indirect Damage

4.3.1 Dwelling House

Indirect damage was calculated as time loss value. This damage becomes larger, as the flood deepens and lasts longer. (Figs. B.5 and B.6)

4.3.2 Trade

Fig. B.7 shows relationship between flood damage and duration.

4.4 Unit Uncertain Damage (Flood Prevention Cost)

Raising houses and installing pumps took a large amount of prevention cost. Pumps generally work efficiently for about 10 years. Raised housing is usually suitable for avoiding flood water for semi-permanent works. However, ground surface will subside in the Study Area resulting in floods again sooner or later.

Taking into account of these situation, durable year of flood prevention measures may be assumed to be 10 years. Hence, flood prevention cost was calculated as the surveyed cost divided by 10 years to obtain an annual cost.

4.4.1 Dwelling House

Dwelling Houses in the deeper flood areas invested for flood prevention measures more than in shallower area. (Figs. B.8 and B.9)

4.4.2 Trade

Fig. B.10 shows relationship between flood damage and depth, duration.

5. Flood Damage on 1982 Flood

5.1 Flood Condition

Flood condition was surveyed by the Study Team. The result is shown in Table B.4 according to Meshes (Fig. B.1). Population and commercial area are also included in Table B.4. The number of shops were assumed to be 2,600 per km^2 obtained by a survey of aerophotographs.

5.2 Unit Damage

The following unit damages were adopted based on the above-mentioned analysis:

A. Direct Damage

1) Dwelling House in Urban Area

(307.4·X (Flood Depth, cm) - 3,999) ÷ 6.39 (฿/Person)

2) Dwelling House in Rural Area

307.4 ÷ 6.84 (฿/person)

3) Trade

(96.0·X (Flood Depth, cm) + 3,016) ÷ 515 (฿/m^2)

B. Indirect Damage

1) Dwelling House in Urban Area

(0.2·X (Flood Duration, day) + 18.4) ÷ 6.39 (฿/person)

2) Dwelling House in Rural Area

(0.1·X (Flood Duration, day) + 29.4) ÷ 6.84 (฿/person)

3) Trade

(0.4·X (Flood Duration, day) + 108.8) ÷ 515 (฿/m^2)

C. Prevention Cost (Uncertain Damage)

1) Dwelling House in Urban Area

10,264 ÷ 6.39 = 1,606 (฿/person)

2) Dwelling House in Rural Area

2,990 ÷ 6.84 = 437 (฿/person)

3) Trade

664 ÷ 515 = 1.3 (฿/m^2)

Table B.4 Flood Depth, Duration, Population and Size of Commercial Area in 1982

Mesh No	A	B	C	D	E
000010	2				
000020	2			20000	
000030	2	100	60	3000	
000040	2	100	90	4000	
000050	2	80	30	3000	
000060	2	50	60	2000	
000070	2	50	60	4000	
000080	2				
000090	2	20	90	7000	
000100	2	50	90	3000	
000110	2	100	90	8000	
000120	2	20	30	7000	
000130	2	50	30	3000	
000140	1			14000	3
000150	2	20	30	17000	
000160	1	50	90	12000	1
000170	2	20	5	12000	
000180	2				
000190	2	30	30	2000	
000200	1	10		16000	1
000210	2	10	5	4000	
000220	2	10	5	2000	
000230	2	15	30	7000	
000240	2	10	30	1000	
000250	1	10		17000	1
000260	2	10	5	11000	
000270	2	15	30	9000	
000280	2	15	5	5000	
000290	2	20	30	1000	
000300	2				
000310	2	20	90	2000	
000320	1	10	5	16000	
000330	1	10	5	21000	
000340	2	15	20	14000	
000350	2	15	5	6000	
000360	2	20	90	15000	
000370	1	20	90	3000	1
000380	1	10		21000	2
000390	1	10	5	31000	1
000400	2	20	20	11000	
000410	1	15	5	30000	1
000420	1	15	10	16000	2
000430	1	20	10	13000	
000440	1	20	10	34000	1
000450	1	15	20	38000	4
000460	1	15	20	37000	
000470	1	15	10	15000	1
000480	1	10		32000	4
000490	1	15	5	37000	6
000500	1	15	5	15000	1
000510	1	15	90	28000	2
000520	1	25	90	13000	2
000530	1	15	5	34000	1
000540	2	15	5	23000	
000550	2	30	30	16000	
000560	1	30	5	12000	2
000570	1	30	90	11000	

Mesh No.	A	B	C	D	E
000580	1	30	90	9000	1
000590	1	30	90	9000	1
000600	2	5	5	4000	
000610	1	20	5	31000	7
000620	1	20	30	8000	1
000630	2	30	90	8000	
000640	2	50	60	13000	
000650	2	20	30	1000	
000660	2	30	90	3000	
000670	2	50	60	6000	
000680	1	20	5	26000	1
000690	2	20	30	6000	
000700	2	20	90	6000	
000710	2	50	60	6000	
000720	1	20	40	19000	4
000730	1	20	40	13000	1
000740	1	20	40	20000	2
000750	2	50	40	15000	
000760	2	25	40	11000	
000770	2	25	20	20000	
000780	2	25	20	2000	
000790	2	25	20	4000	
000800	1	10	5	17000	2
000810	1	5	5	31000	5
000820	2	5	5	15000	
000830	2	40	30	4000	
000840	2	30	30		
000850	2	50	60		
000860	2	10	5	9000	
000870	1	10	5	18000	3
000880	2	5	5	2000	
000890	2	40	30		
000900	2	30	30		
000910	2	30	30		
000920	2	50	60		
000930	2	15	5	13000	
000940	2	15	5	4000	
000950	2	15	5	6000	
000960	2	15	5	6000	
000970	2	30	5	2000	
000980	2	50	60	1000	
000990	2	10	5	12000	
001000	2	15	5		
001010	2	30	5	3000	
001020	2	30	5	2000	
001030	2	15	5	1000	
001040	2	50	30	3000	
001050	2	50	30	2000	
001060	2	50	30	3000	
001070	2	50	30	4000	
001080	2	20	50	9000	
001090	2	20	90	4000	
001100	1	10	5	4000	
Total				1,160,000	65

Note : A : Type of Area (1. Urban Area)
(2. Rural Area)

B : depth (cm)

C : duration (day)

D : population

E : Area of trade ($10^{-1}km^2$)

5.3 Flood Damage on 1982 Flood

Flood damage was estimated as 384 million Baht as shown on Table B.5.

Flood damage was also calculated according to the size of area based mainly on future land use (Refer to section 15.2 and Fig. 15.2, main report) as shown on Table B.6.

Table B.5 Flood Damage on 1982 Flood in the Study Area

[Unit : million Baht]

	Dwelling House		Trade	Total
	Urban Area	Rural Area		
Direct Damage	142	20	79	241
Indirect Damage	3	2	2	6
Prevention Cost	116	19	1	136
Total	260	41	82	384

[Refer to Table B3.1]

Table B.6 Flood Damage on 1982 Flood According to Area

[Unit : million Baht]

	Damage
1. Entire Study Area (501 Km^2)	384
2. Area Covered by DDS Flood Protection Activities (370 km^2)	377
3. Area of Low & Medium Density Area in the Year 2000 (260 km^2)	343
4. Area of Medium Density & Part of Low Density Area in 2000 (200 km^2)	305
5. Area of Medium Density Area (170 km^2)	284

[Refer to Table B3.1]

Table B.7 Flood Damage on 2000 Flood According to Area

[Unit : million Baht]

	Damage
1. Entire Study Area (501 km^2)	6,544
2. Area Covered by DDS Flood Protection Activities (370 km^2)	6,532
3. Area of Low & Medium Density Area in the Year 2000 (260 km^2)	6,332
4. Area of Medium Density & Part of Low Density Area in 2000 (200 km^2)	5,804
5. Area of Medium Density Area (170 km^2)	5,564

[Refer to Table B3.2]

Table B.8 Flood Depth, Duration, Population and Size of Commercial Area in 2000

Mesh No	A	B	C	D	E
000010	2				
000020	2			27000	
000030	2	90	60	3000	
000040	2	90	60		
000050	2	90	60		
000060	2	90	60		
000070	2	90	60		
000080	2				1
000090	2	90	90	12000	
000100	2	90	90		
000110	2	120	90	4000	
000120	2	120	90	1000	
000130	2	90	90		
000140	2	10	5	16000	3
000150	2	10	5	29000	5
000160	2	40	80	18000	1
000170	2	120	90	24000	
000180	2	120	90	3000	
000190	2	120	90		
000200	2	10	5	35000	
000210	2	20	10	11000	
000220	2	110	90	18000	
000230	2	20	10	24000	
000240	2	20	10	2000	
000250	2			57000	
000260	2	110	90	28000	
000270	2	110	90	24000	
000280	2	110	90	1000	
000290	2	20	10	3000	
000300	2	100	80	19000	
000310	2	10	5	11000	
000320	2			30000	
000330	2			55000	
000340	2	50	30	45000	
000350	2	110	90	14000	
000360	2	20	10	20000	
000370	2	100	90	14000	
000380	1			56000	2
000390	1			74000	2
000400	1	70	50	46000	
000410	1	70	50	37000	2
000420	1	70	50	13000	2
000430	1	130	100	19000	
000440	1			57000	24
000450	1	70	50	88000	10
000460	1	70	50	92000	7
000470	1	70	50	31000	4
000480	1			34000	13
000490	1	50	20	60000	9
000500	1	50	20	36000	
000510	1	70	50	72000	2
000520	1	100	90	20000	4
000530	1	50	20	88000	
000540	1	120	100	92000	
000550	1	120	100	56000	
000560	1	100	90	28000	4
000570	1	130	100	37000	3
000580	1	70	50	17000	3
000590	2	70	50	18000	

Mesh No.	A	B	C	D	E
000600	2	10	5	16000	5
000610	1	140	30	33000	8
000620	1	130	100	44000	6
000630	2	140	100	13000	
000640	2	110	90	16000	
000650	1	130	100		
000660	2	140	100	4000	
000670	2	110	100		
000680	1	90	30	89000	
000690	1	120	100	8000	
000700	2	120	100	7000	
000710	2	110	90		
000720	1	100	90	30000	5
000730	1	100	90	87000	
000740	1	140	100	54000	3
000750	1	140	100	57000	
000760	1	70	40	14000	
000770	1	70	40	38000	
000780	2	120	100		
000790	2	120	100		
000800	1	70	40	40000	2
000810	1	90	60	56000	5
000820	1	130	100	32000	
000830	1	150	100	11000	
000840	1	120	100	8000	
000850	2	120	100		
000860	2	110	100		
000870	1	70	40	60000	
000880	1	90	60	40000	3
000890	1	130	100		
000900	1	130	100		
000910	1	90	60		
000920	2	90	60		
000930	2	120	90		
000940	1	70	40	18000	
000950	1	70	40	9000	
000960	1	70	40	13000	
000970	1	90	60	7000	
000980	2	120	100		
000990	2	120	100		
001000	1	70	40	36000	
001010	1	120	100		
001020	1	120	100	1000	
001030	1	120	100		
001040	2	120	100		
001050	2	90	90		
001060	2	90	90		
001070	2	90	90		
001080	2	10	5		
001090	2	70	30	14000	
001100	2	10	5	16000	
001110	1	70	40	10000	2
Total				2,500,000	190

Note : A : Type of Area (1. Urban Area)
(2. Rural Area)
B : depth (cm)
C : duration (day)
D : population
E : Area of trade (10^{-1} km^2)

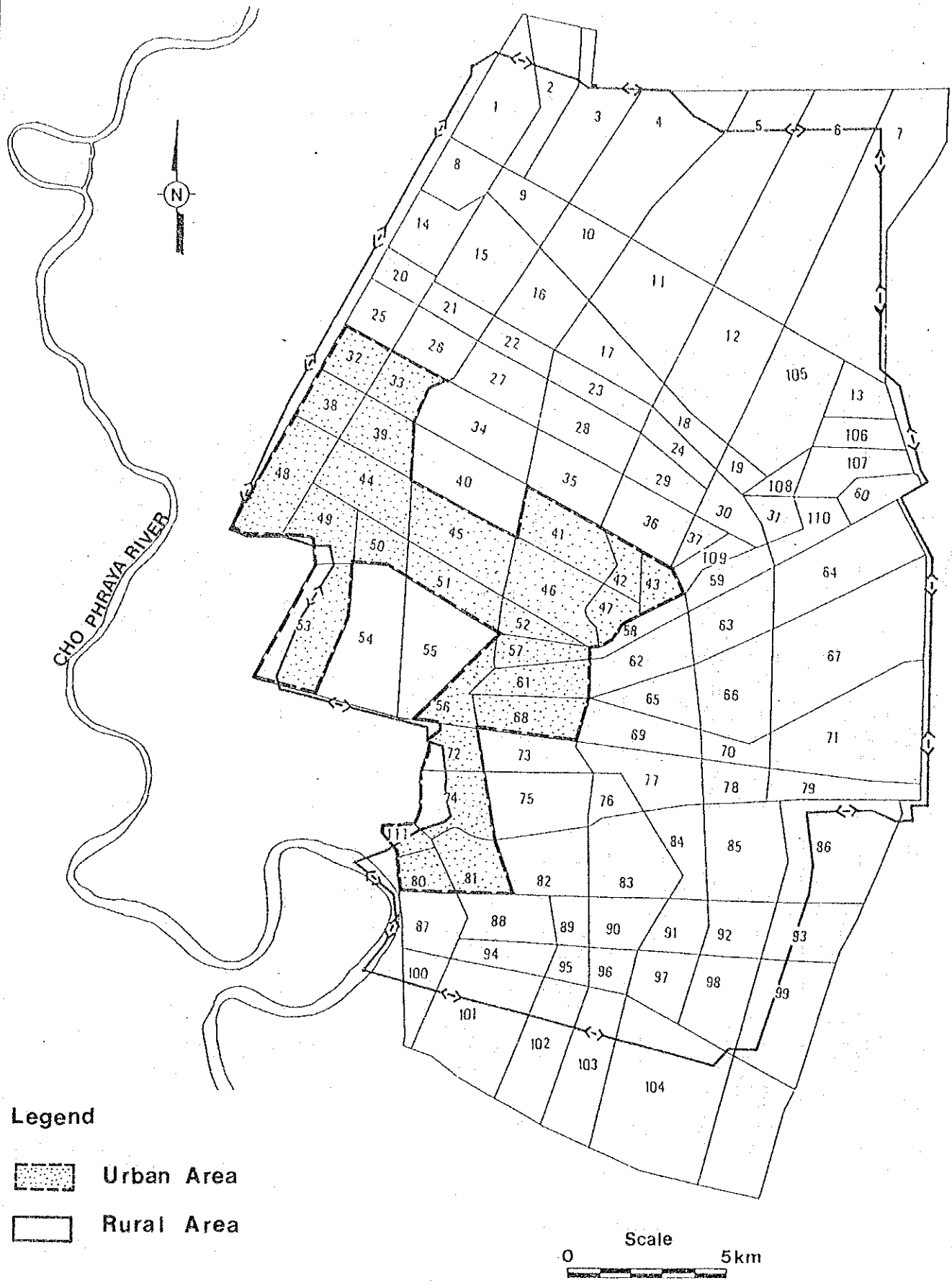
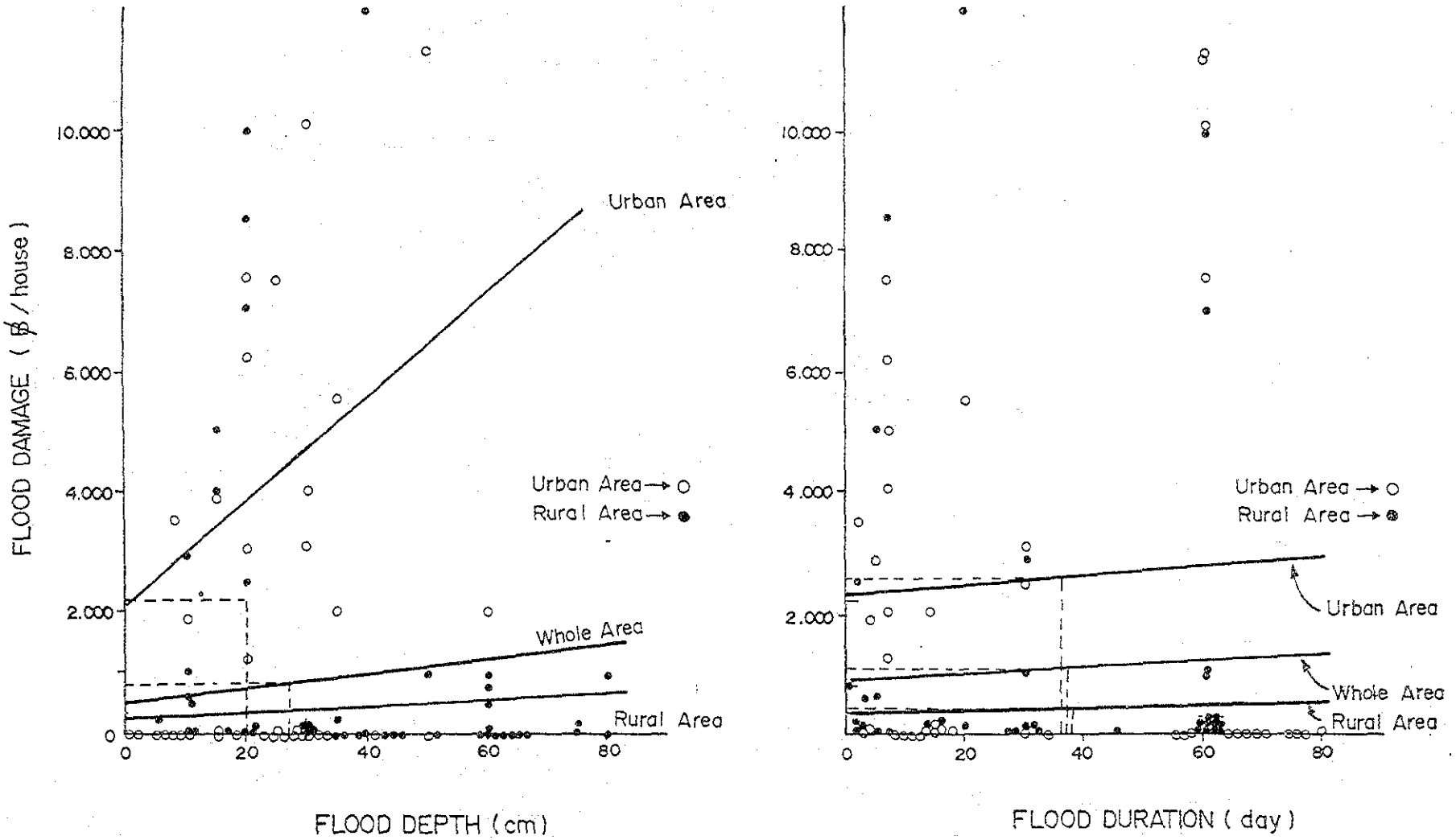


FIG. **B. 1** **Existing Urban and Rural Area According to Mesh**

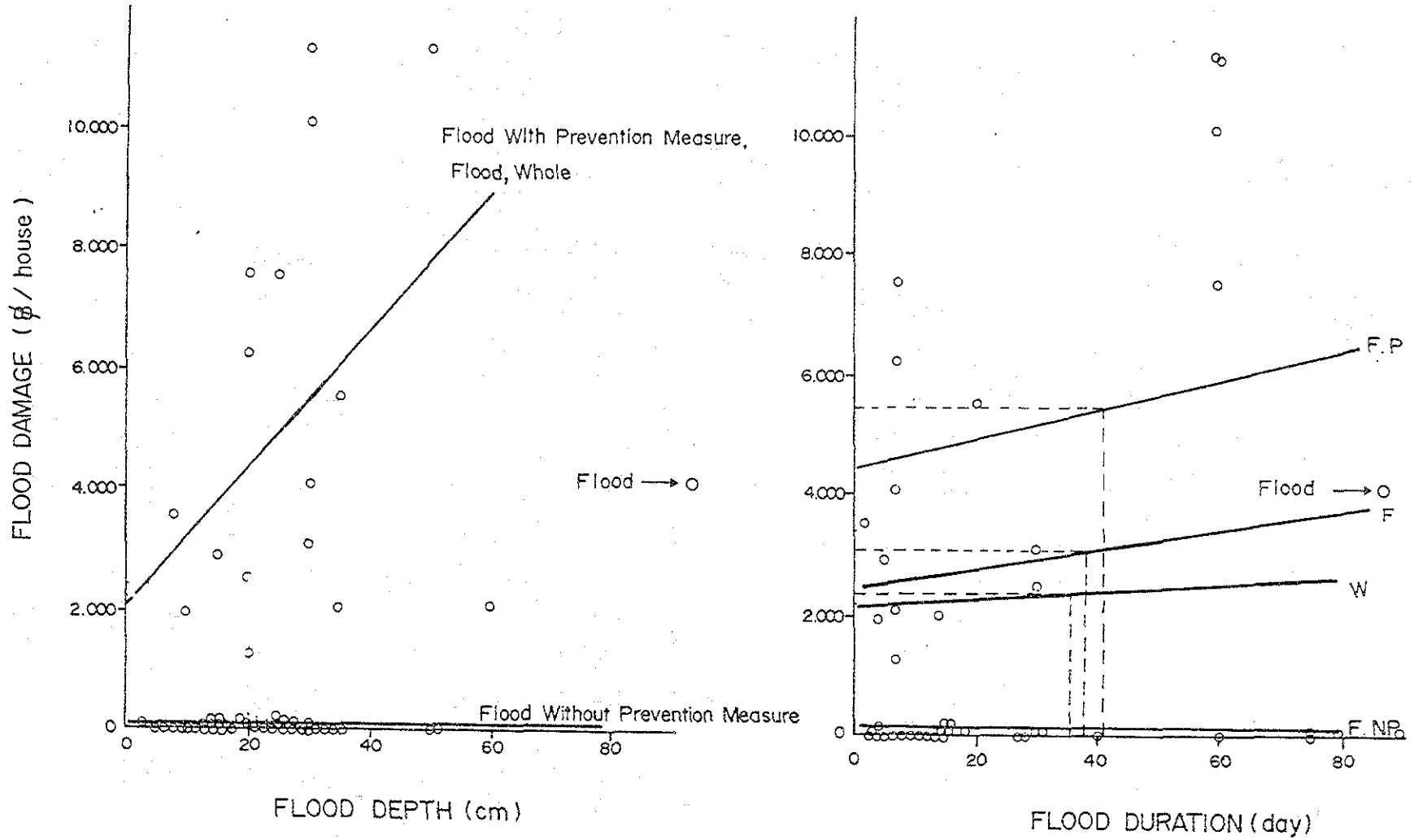
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



(Refer to Tables B 2.1 & B 2.2)

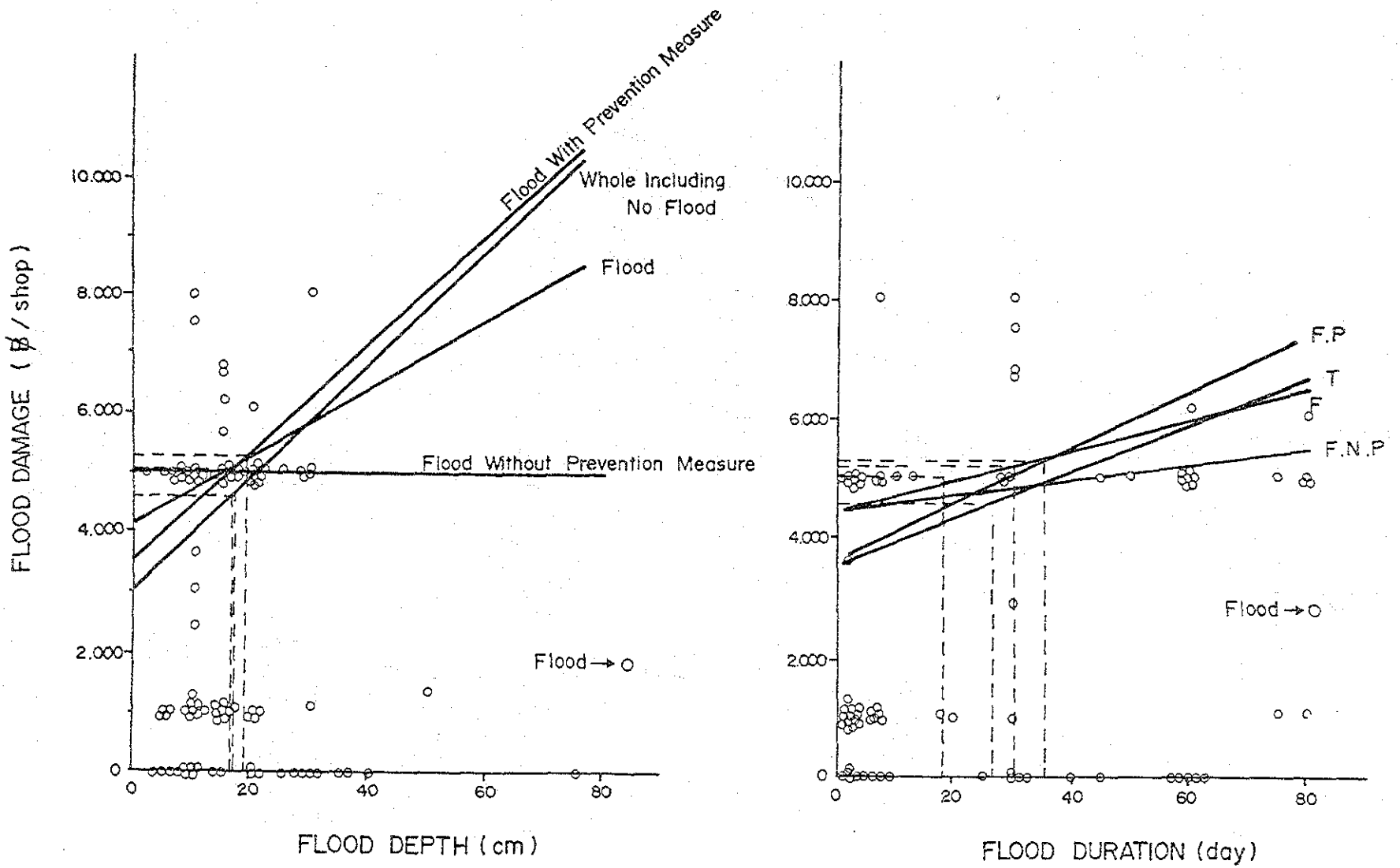
FIG. B.2 Unit Direct Damage of Dwelling House Vs. Flood Depth & Duration

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK



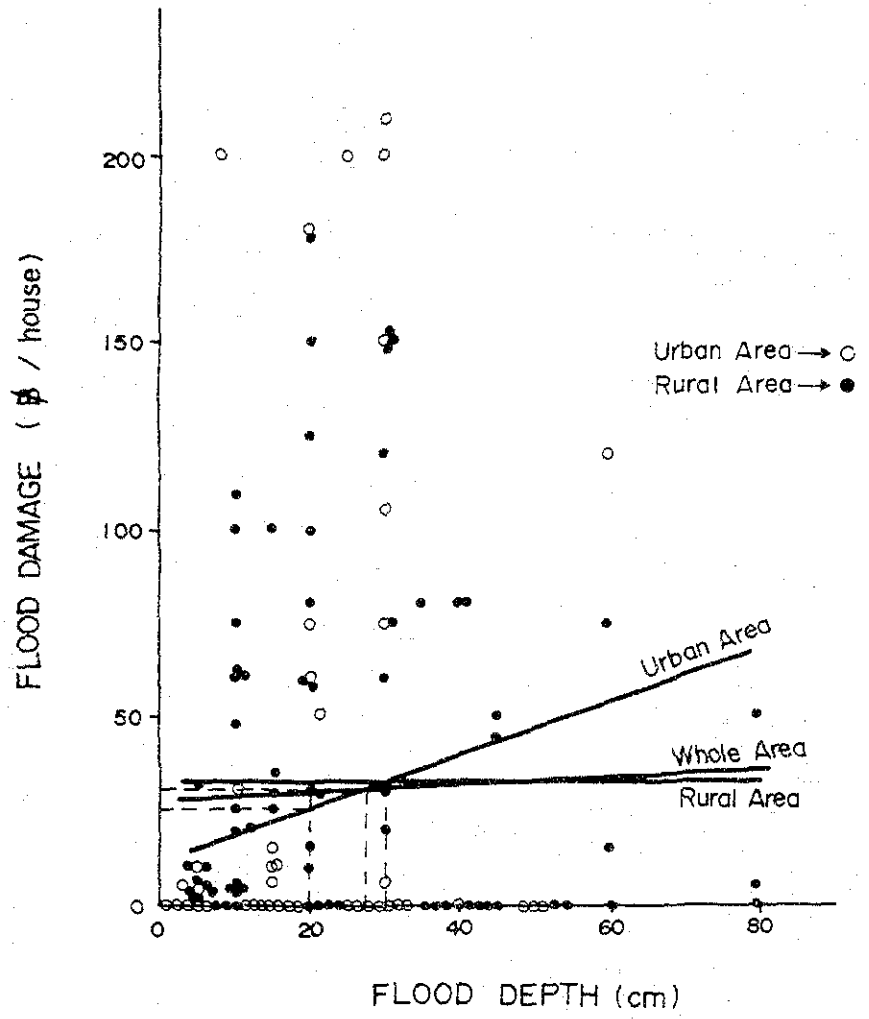
(Refer to Tables B 2.1 & B 2.2)

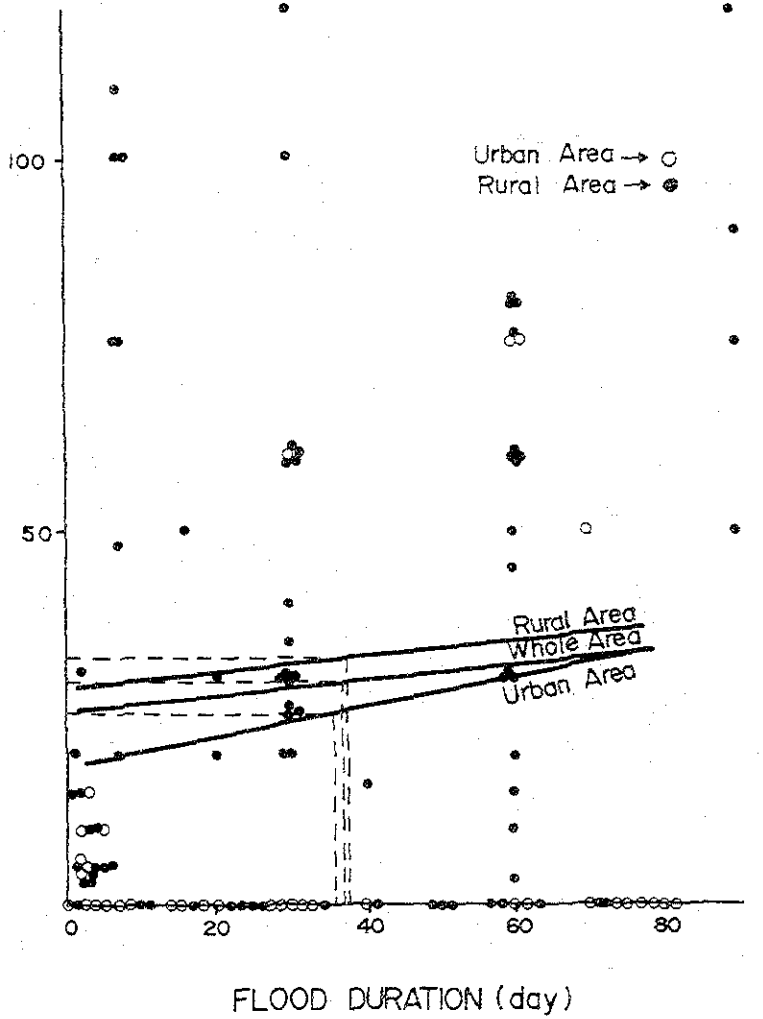
FIG. B. 3	Unit Direct Damage of Dwelling House in Urban Area Vs. Flood Depth & Duration
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	



(Refer to Tables B 2.1 & B 2.2)

FIG. B.4	Unit Direct Damage of Trade Vs. Flood Depth & Duration
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	

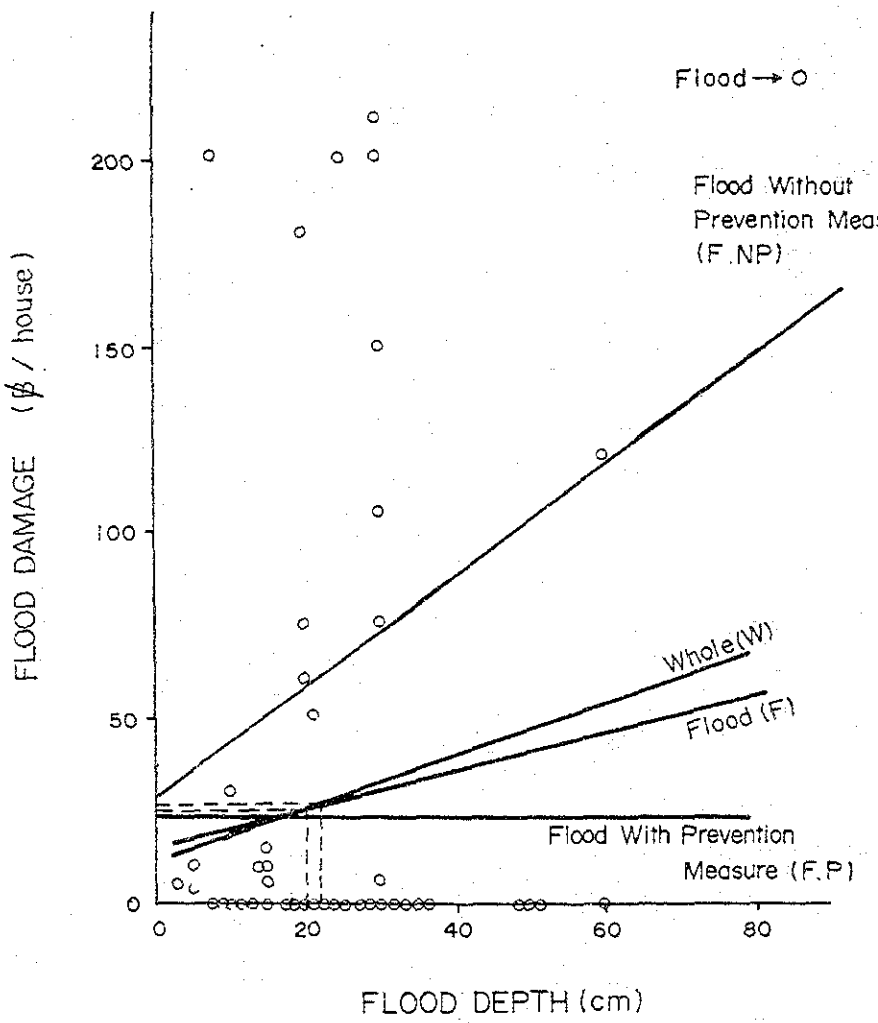


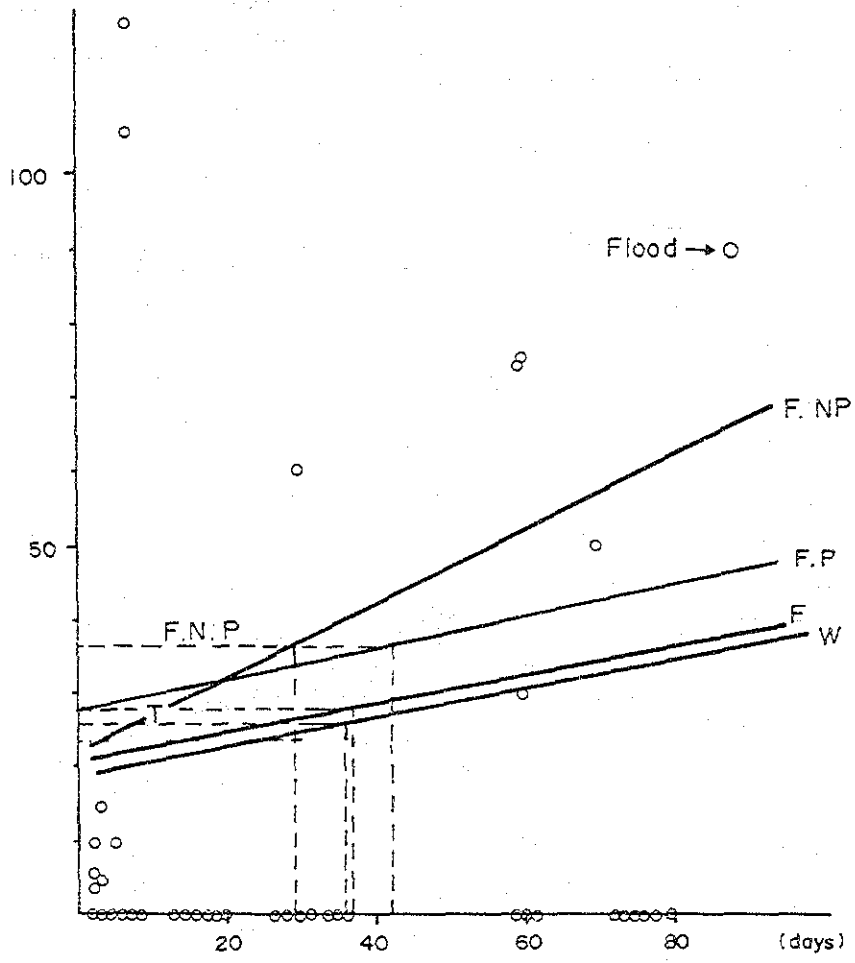


(Refer to Tables B 2.3 & B 2.4)

FIG. B.5 **Unit Indirect Damage of Dwelling House Vs. Flood Depth & Duration**

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

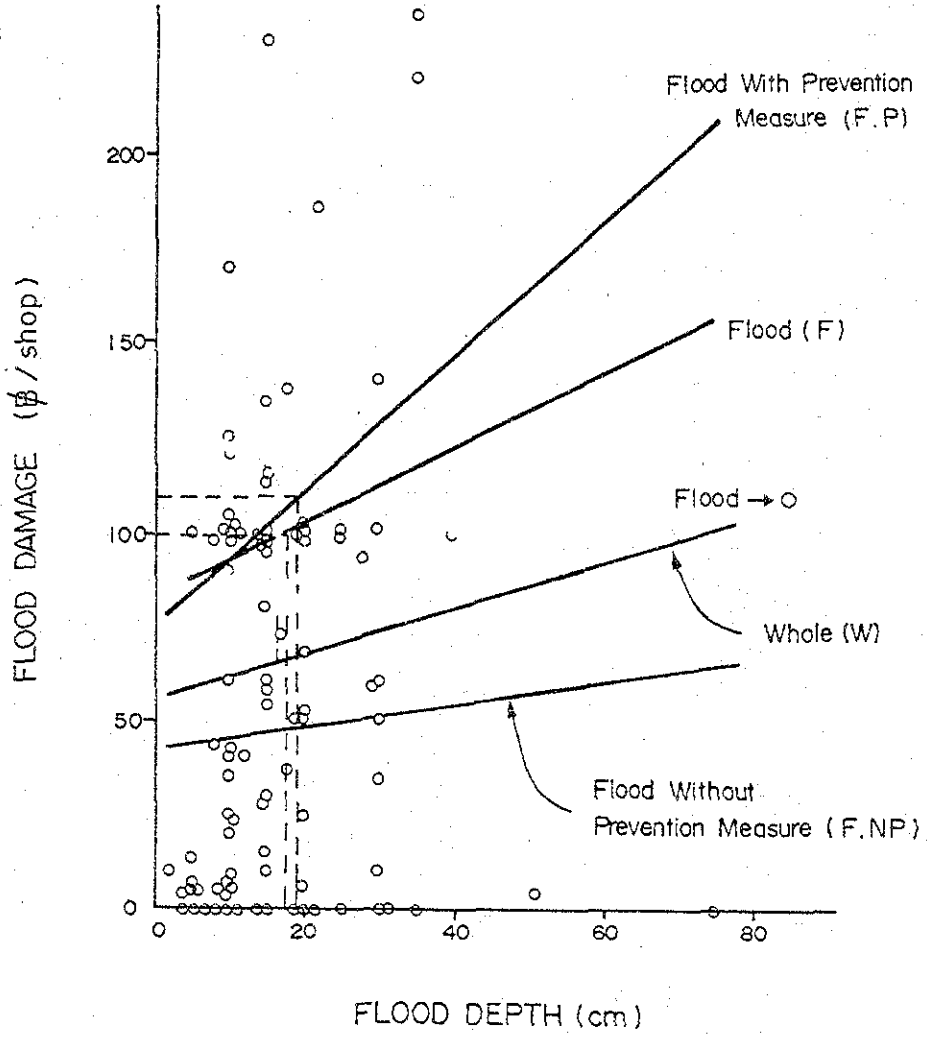


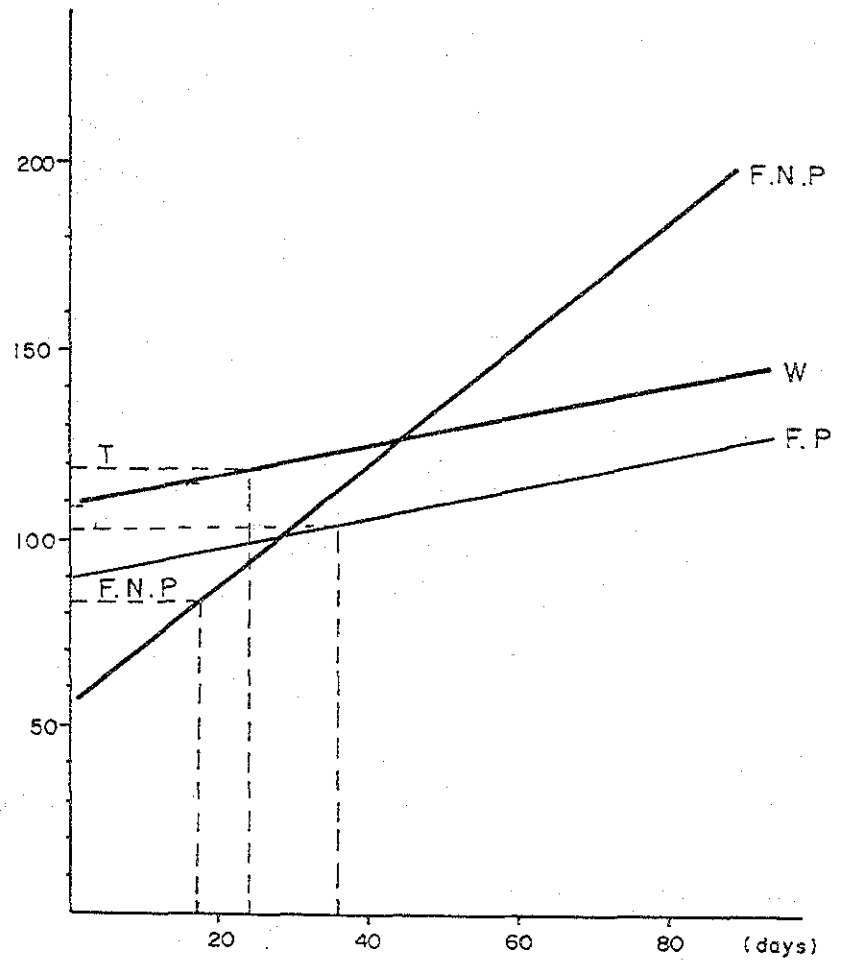


(Refer to Tables B 2.3 & B 2.4)

FIG. B.6 Unit Indirect Damage of Dwelling House in Urban Area Vs. Flood Depth & Duration

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

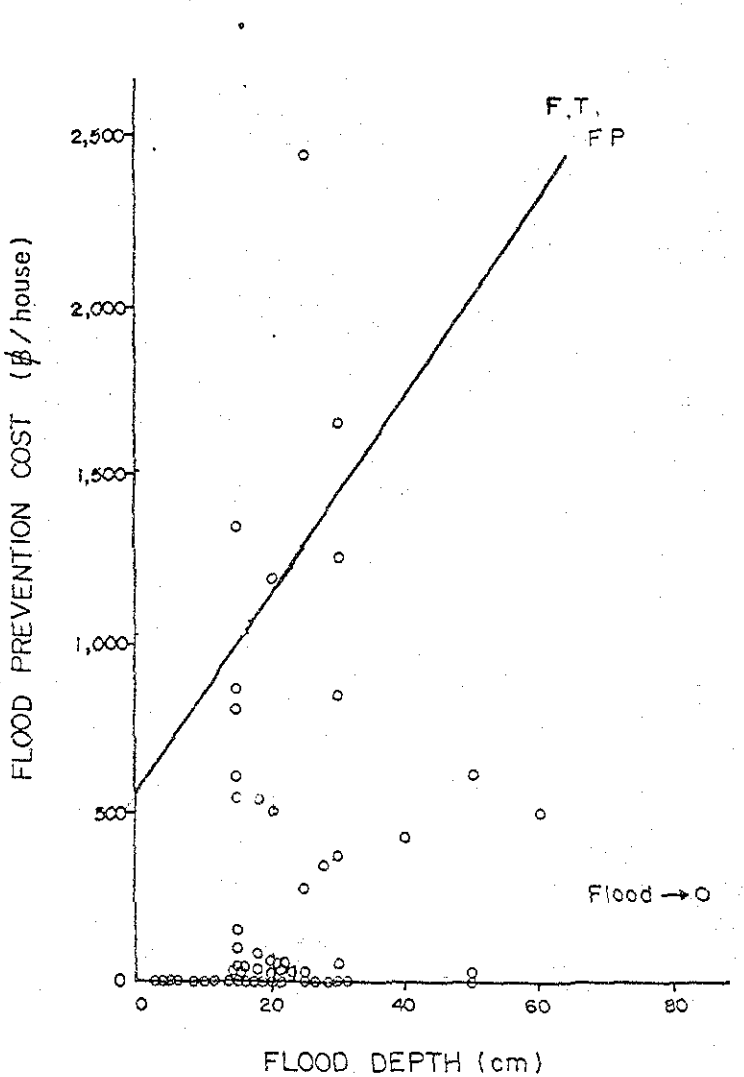


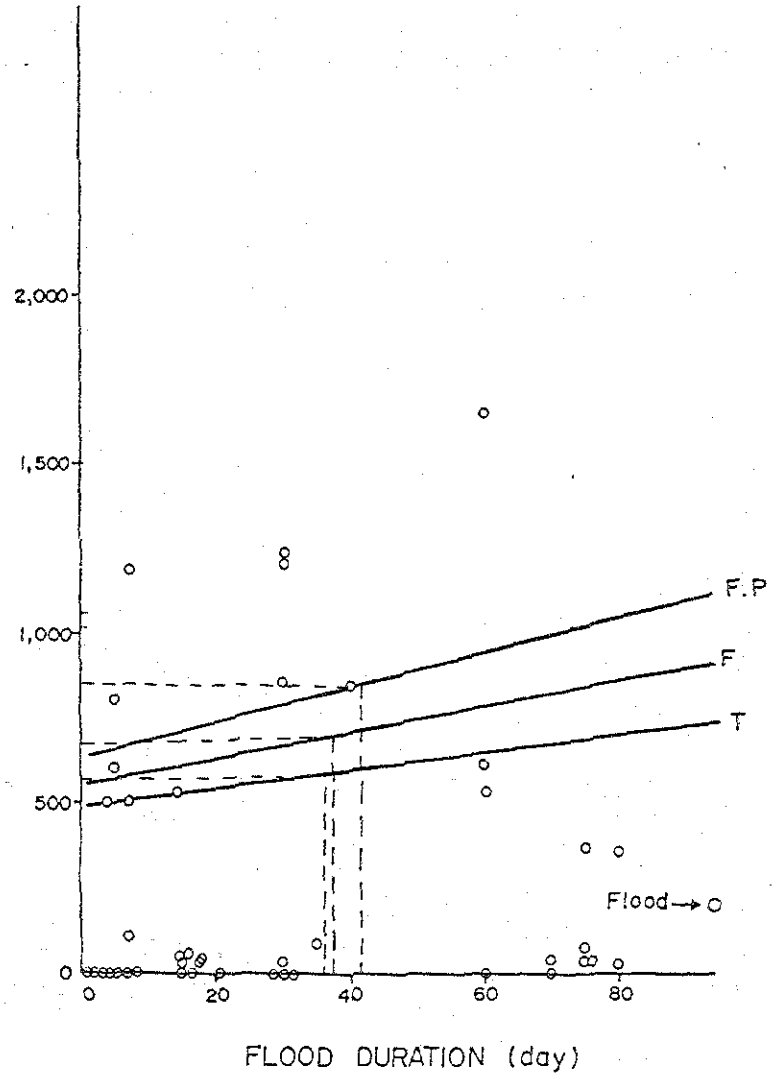


(Refer to Tables B 2.3 & B 2.4)

FIG. B.7	Unit Indirect Damage of Trade Vs. Flood Depth & Duration

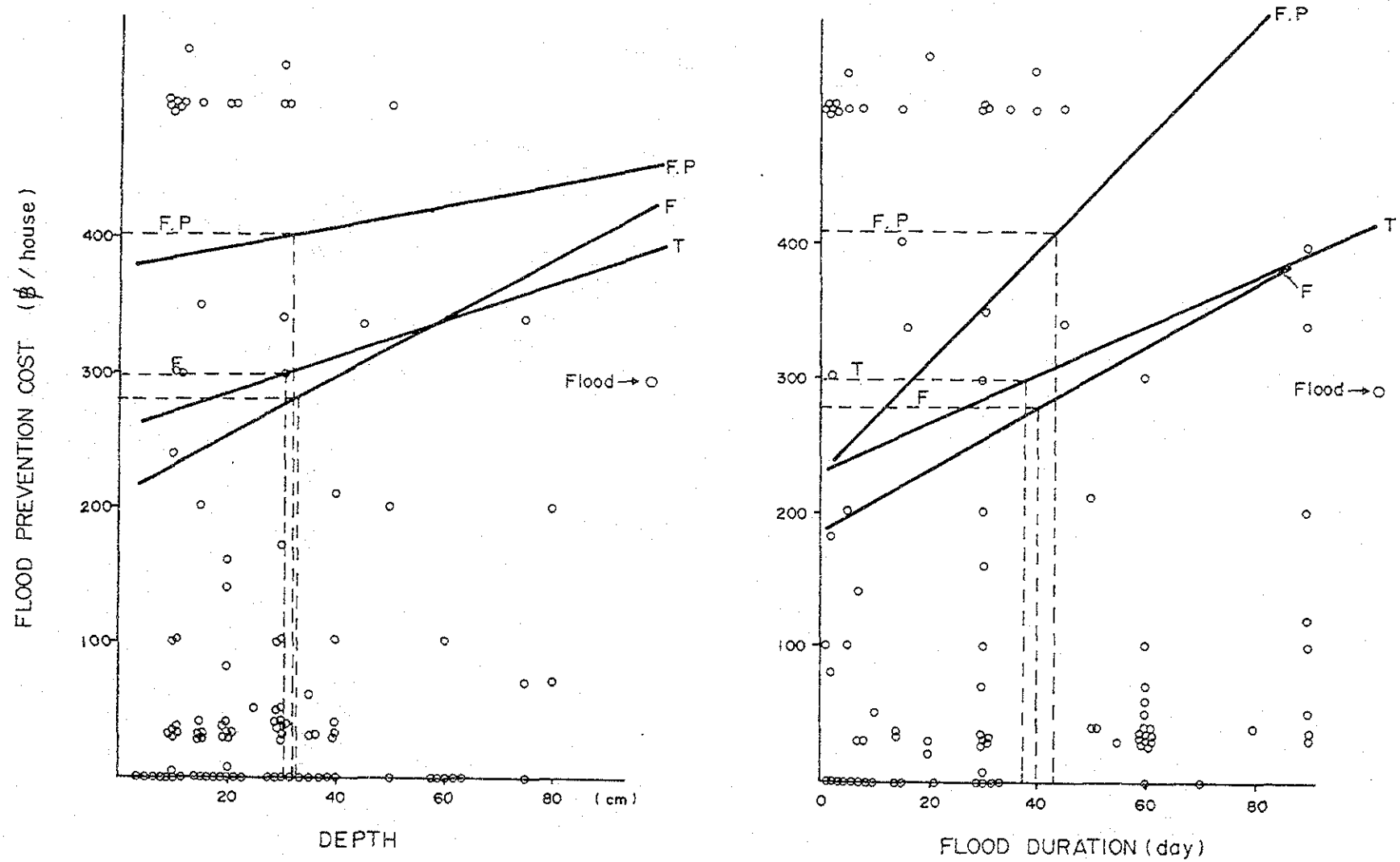
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK





(Refer to Tables B 2.5 & B 2.6)

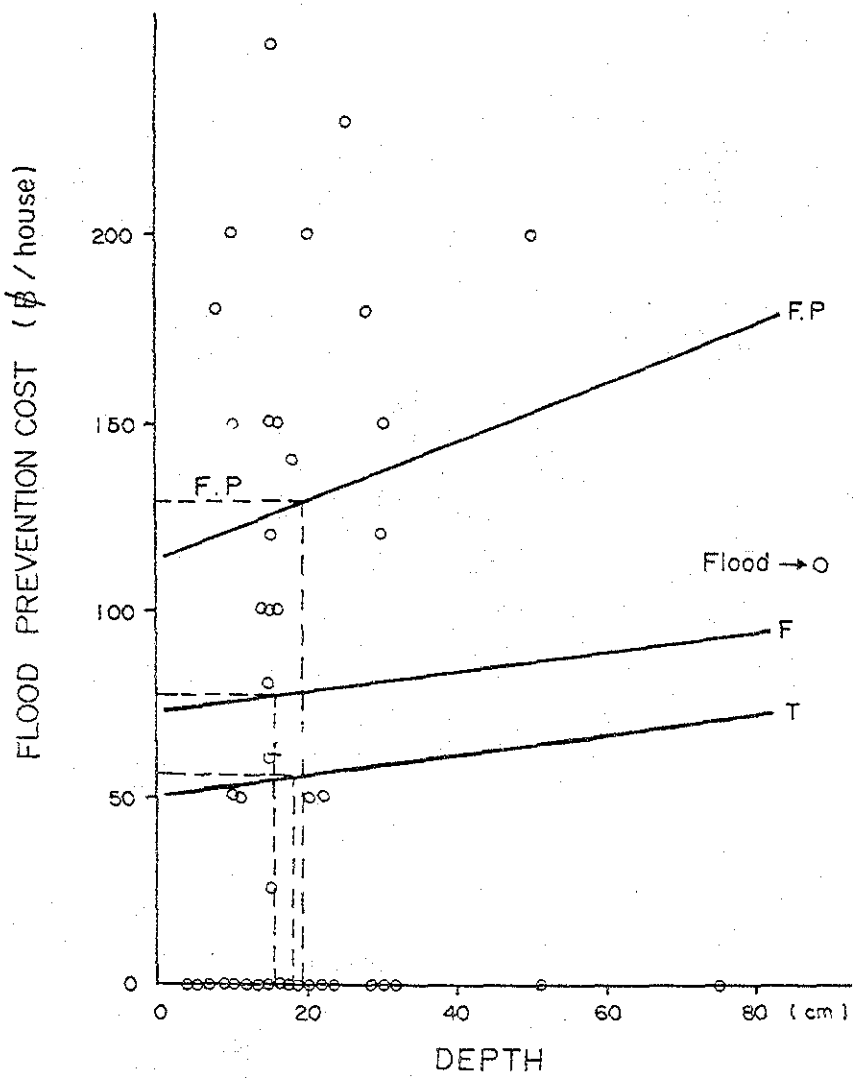
FIG. B.8	Flood Prevention Cost of Dwelling House in Urban Area Vs. Flood Depth & Duration
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	

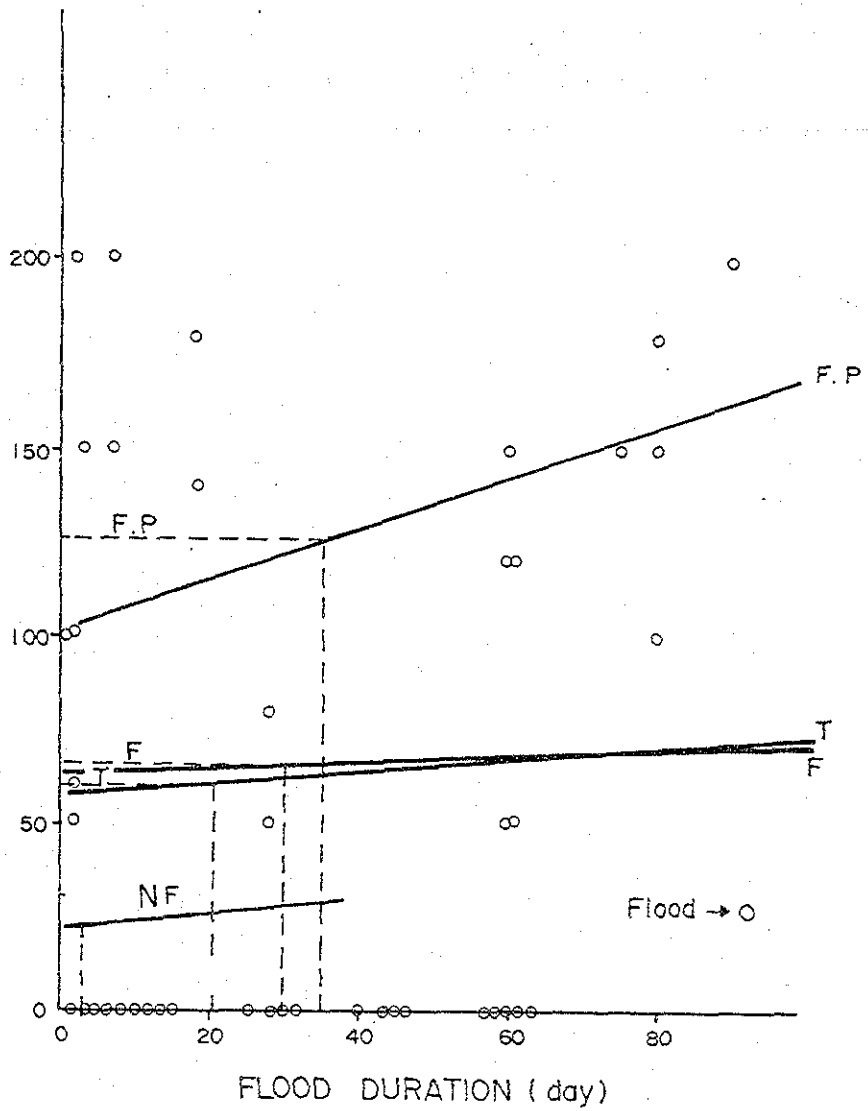


(Refer to Tables B 2.5 & B 2.6)

FIG. B.9 Flood Prevention Cost of Dwelling House in Rural Area Vs. Flood Depth & Duration

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK





(Refer to Tables B 2.5 & B 2.6)

FIG. B.10 Flood Prevention Cost of Trade Vs. Flood Depth & Duration

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

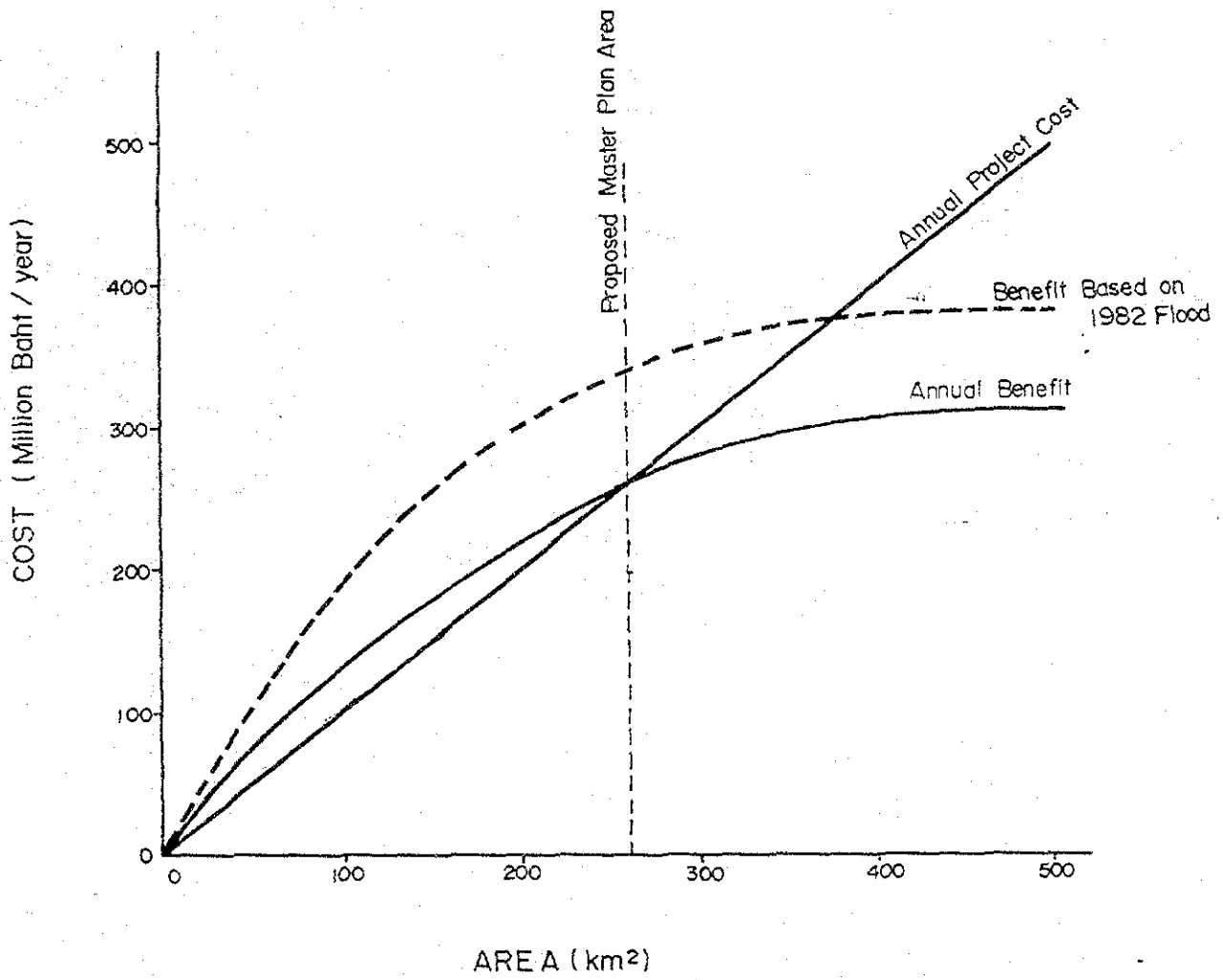


FIG. B.11	Benefit & Cost According to Area
FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK	

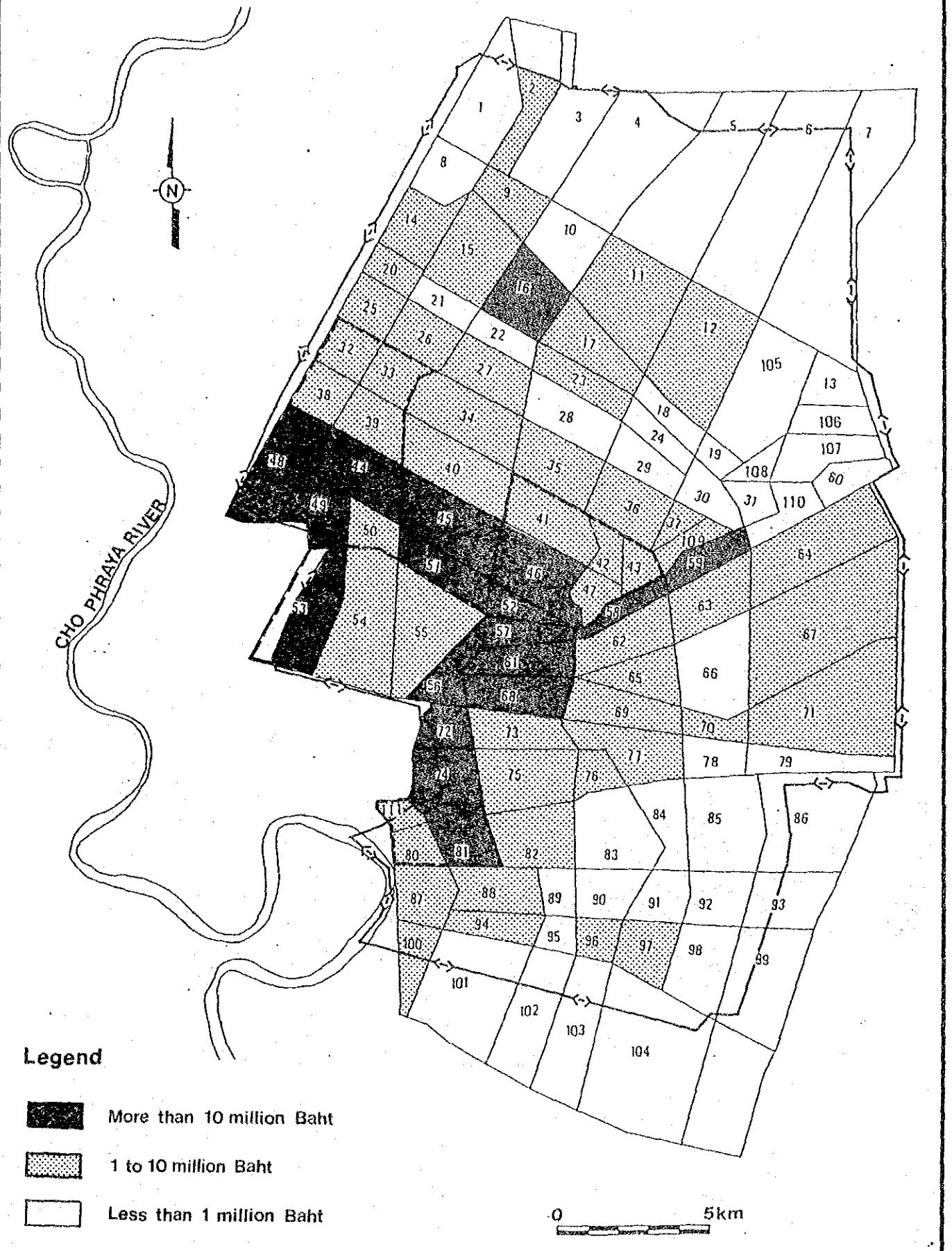


FIG. **B.12** | **Flood Damage on 1982 Flood**

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

Appendix B.1 Data

Remarks

A : 1, Trade; 2, Dwelling House in Urban Area; 3, Dwelling House in Rural Area

B : Flood Depth (cm)

C : Flood Duration (day)

D : In case of 1 in column A, Area of Estate (m^2)

In case of 2 and 3 in column A, 1 indicates that they have car.
0 indicates that they do not have car.

E : Number of Inhabitants

F : Prevention Cost as raising estate (Baht)

G : Prevention Cost as raising house (Baht)

H : Prevention Cost as constructing wall (Baht)

I : Prevention Cost as Installing Pump (Baht)

J : Direct Damage to House (Baht)

K : Direct Damage to Goods (Baht)

L : Indirect Damage as loss of time and turnover (Baht)

M : Indirect Damage as others (Baht)

Data No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N
000010	3	80	90	1	5	0	0	150	50	0	0	50	0	0
000020	3	10	60	0	6	1200	800	0	25	2	0	0	0	0
000030	3	80	60	0	14	0	50	0	20	0	0	10	0	0
000040	3	20	60	1	5	5020	0	0	140	7010	0	0	0	0
000050	3	60	80	0	6	12100	80	0	30	0	0	15	0	0
000060	3	90	60	1	6	700	10	0	0	1500	0	0	0	0
000070	3	120	90	1	6	7900	1000	325	8800	0	1000	75	10	10
000080	3	110	30	0	5	7100	1000	0	20	43	5000	30	20	20
000090	1	100	30	150			300	0	0	0		100	0	0
000100	3	10	60	35	7	12300	50	0	150	0	0	0		
000110	3	80	30	1	4	0	100	0	0	0		0	0	0
000120	3	0	0	0	4	0	200	0	0	0	0	0		
000130	3	0	30	0	11	0	100	0	0	0		0	0	0
000140	3	30	30	0	5	0	0	0	0	0	0	0		
000150	3	50	30	0	7	0	200	0	0	0		0	0	0
000160	3	30	30	0	4	0	100	0	0	0	0	0		
000170	3	0	0	0		0	500	0	0	0		0	0	0
000180	1	80	90	150	8	7100	200	0	0	1000	0	0		
000190	3	30	25	0	7	5400	200	0	0	0		0	0	0
000200	3	75	15	1	11	0	300	0	0	200	0	0		
000210	3	50	90	0	10	5600	0	0	0	0		0	0	0
000220	3	0	0	1	6	70	2500	56000	0	0	0	0		
000230	3	50	120	1	4	35080	500	0	0	0		0	0	0
000240	3	45	60	1	4	14700	300	0	0	0	0	0		
000250	3	50	50	1	10	36400	800	0	0	0		0	0	0
000260	3	110	15	0	7	3600	0	0	0	0	0	0		
000270	3	110	90	1	5	2250	200	0	0	0		0	0	0
000280	3	120	90	0	6	0	100	0	0	0	0	0		
000290	3	120	90	0	7	2040	1100	0	0	0		0	0	0
000300	3	140	120	0	7	2540	300	0	0	0	0	0		
000310	3	90	90	0	7	0	0	0	0	0		0	0	0
000320	3	100	150	0	5	60	50	0	0	0	0	0		
000330	1	15	90	1			300	0	0	0		0	0	0
000340	3	50	90	60			1000	0	0	0	0	0		
000350	1	0	90	45			200	0	0	0		0	0	0
000360	3	20	40	1	6	0	300	0	0	0	0	0		
000370	3	10	30	0	4	0	500	0	0	0		0	0	0
000380	3	40	50	1	4	0	500	0	0	0	0	0		
000390	3	0	0	1	5	0	0	0	0	0		0	0	0
000400	3	0	0	1	8	0	800	0	0	0	0	0		
000410	3	0	0	1	4	0	85	0	0	0		0	0	0
000420	3	50	30	0	6	0	800	0	0	0	0	0		
000430	3	130	15	0	6	3055	100	0	0	0		0	0	0
000440	3	20	40	0	8	0	500	0	0	0	0	0		
000450	3	50	90	0	3	0	500	0	0	0		0	0	0
000460	3	10	30	0	4	0	300	0	0	0	0	0		
000470	3	40	60	0	7	0	0	0	0	0		0	0	0
000480	1	20	40	120	7	0	0	0	0	0	0	0		
000490	3	5	3	0	6	0	0	0	0	0		0	0	0
000500	3	5	2	0	7	0	0	0	0	0	0	0		
000510	3	5	2	1	7	0	400	0	0	0		0	0	0
000520	3	100	90	0	5	2200	200	0	0	0	0	0		
000530	3	90	60	1	3	2100	80	0	0	0		0	0	0
000540	3	140	90	0	3	0	100	0	0	0	0	0		
000550	1	15	1	150			0	0	0	0		0	0	0
000560	1	51	13	74	7	0	80	0	0	0	0	0		
000570	3	20	2	0	7	0	0	0	0	0		0	0	0
000580	3	30	10	1	5	0	800	0	0	0	0	0		
000590	3	10	2	0	10	5300	0	0	50	0	1000	10	5	5
000600	3	20	30	0	5	8	0	0	0	0	5000	0	5	5

Data No.	A	B	C	D	E	F	G	H	I	J	K	L	M
000610	3	10	3	0	6	750	0	0	0	600		0	
000620	3	30	3	0	5	500	300	0	0	50		0	
000630	2	30	30	0	5	965	200	0	50	3102		0	
000640	3	10	2	0	8	0	300	0	0	0		5	
000650	3	10	2	1	6	0	0	0	0	20		15	
000660	3	5	1	0	5	0	0	0	0	0		10	
000670	3	10	0	0	6	0	0	0	0	0		5	
000680	3	10	1	0	4	0	0	0	0	6		5	
000690	3	15	5	1	5	3910	300	0	30	5040		0	
000700	3	15	5	1	7	0	200	0	0	2		4	
000710	3	10	5	0	6	0	100	0	0	0		5	
000720	2	3	3	0	6	0	0	0	0	5		5	
000730	2	5	2	1	6	0	0	0	0	0		10	
000740	2	5	2	0	4	0	0	0	0	0		4	
000750	3	10	5	0	5	0	0	0	0	20		0	
000760	3	10	5	1	9	670	0	0	50	605		5	
000770	3	5	3	0	6	0	0	0	0	0		4	
000780	3	5	2	0	5	0	0	0	0	5		3	
000790	3	10	2	1	6	0	0	0	5	0		6	
000800	3	10	3	0	7	0	0	0	0	0		5	
000810	1	15	2	200			100	0	0	0	5000	0	0
000820	1	0	0	192			0	0	0	0	0	0	0
000830	1	5	2	200			0	0	0	0	1000	300	5
000840	1	5	2	64			0	0	0	0	1000	0	5
000850	1	10	2	192			0	0	50	0	5000	10	30
000860	1	5	2	250			0	0	0	0	1000	4	10
000870	1	5	2	200			0	0	0	0	0	0	6
000880	1	5	2	120			0	0	0	0	1000	0	5
000890	1	10	3	64			500	0	50	30	5000	0	4
000900	3	40	60	0	8	0	0	0	30	15		80	
000910	3	20	30	1	5	0	0	0	35	10		30	
000920	3	30	60	0	6	0	0	0	30	0		60	
000930	3	35	60	0	7	0	0	0	32	15		60	
000940	3	40	60	0	5	0	0	0	40	15		0	
000950	3	20	60	0	5	0	0	0	35	15		30	
000960	3	15	15	1	5	0	0	0	0	30		253	
000970	3	15	20	1	6	0	0	0	30	10		30	
000980	3	15	15	1	5	0	0	0	0	17		0	
000990	3	20	60	0	6	0	0	0	35	10		60	
001000	3	10	60	0	8	0	0	0	30	10		60	
001010	2	20	7	0	5	2940	800	0	0	1250		0	
001020	3	20	2	0	5	5600	100	0	0	2510		0	
001030	3	10	30	1	6	0	0	0	0	8		60	
001040	3	30	90	0	10	0	0	0	32	20		120	
001050	3	40	60	1	7	0	0	0	32	15		80	
001060	3	35	60	0	6	0	0	0	0	8		0	
001070	3	35	60	0	8	0	0	0	0	12		0	
001080	3	35	60	0	6	0	0	0	30	12		80	
001090	3	15	7	1	8	0	0	0	0	0		100	
001100	3	15	7	1	7	0	0	0	0	0		75	
001110	3	10	7	1	6	0	0	0	0	0		48	
001120	3	10	7	0	6	0	0	0	0	0		100	
001130	3	10	7	1	5	0	0	0	0	0		75	
001140	3	12	30	1	5	0	0	800	0	0		40	
001150	3	10	30	1	6	0	0	0	30	18		25	
001160	3	10	7	1	7	0	0	0	35	4		109	
001170	3	20	40	0	8	0	0	1000	0	0		16	
001180	1	10	5	0			2200	0	0	0	0	0	0
001190	1	30	90	600			2500	0	50	100	1000	0	0
001200	1	0	0	400			50	0	0	0	0	0	0

Data No.	A	B	C	D	E	F	G	H	I	J	K	L	M
001210	1	10	60	51			150	0	0	0	0	0	5
001220	1	0	0	50			200	0	0	0	0	0	0
001230	1	15	60	1200			0	1520	35	1265	5000	20	75
001240	1	10	2	800			400	0	50	10	1000	0	125
001250	1	35	60	1000			0	3050	0	1215	50000	1	220
001260	1	35	60	1500			0	1250	34	1220	50000	8	230
001270	3	15	30	0	7	0	0	0	350	9		25	
001280	3	15	30	0	5	0	0	0	30	10		30	
001290	3	12	30	0	5	0	0	0	0	6		20	
001300	3	15	30	1	8	0	0	0	35	9		35	
001310	3	15	30	0	8	0	0	0	32	10		30	
001320	3	15	30	0	8	0	0	0	0	8		25	
001330	3	10	30	1	6	12600	0	0	35	2896		330	
001340	3	10	30	0	8	4080	0	0	0	1072		60	
001350	3	10	30	0	9	0	0	0	0	5		60	
001360	3	10	30	1	6	0	0	0	0	8		20	
001370	1	10	30	1400			0	3620	70	2510	5000	10	30
001380	1	10	30	800			0	3025	30	1449	1000	10	25
001390	1	15	30	1500			0	3315	40	1810	5000	20	40
001400	1	15	30	1200			0	1700	0	1770	5000	9	20
001410	3	5	2	0	6	0	0	0	0	0		31	
001420	3	7	2	0	5	0	0	0	0	0		3	
001430	3	60	60	0	12	0	0	0	0	0		0	
001440	3	50	60	0	6	0	0	0	0	0		0	
001450	3	30	60	0	4	0	0	0	0	0		0	
001460	3	30	60	0	9	800	0	0	50	0		75	
001470	3	40	60	0	5	800	800	0	0	0		0	
001480	3	30	60	0	5	0	0	0	50	0		150	
001490	2	10	7	1	4	0	0	0	0	0		0	
001500	2	30	365	1	6	0	0	0	0	0		200	
001510	3	0	18	1	12	0	0	0	40	8		0	
001520	3	20	14	1	4	0	0	0	38	27		0	
001530	2	21	16	1	7	0	0	0	52	14		0	
001540	2	21	18	0	9	0	0	0	35	0		0	
001550	3	10	14	0	10	0	0	0	38	0		0	
001560	2	15	18	1	7	0	0	0	40	8		0	
001570	2	15	14	1	5	0	500	0	38	13		0	
001580	2	22	15	0	9	0	0	0	35	0		0	
001590	3	25	100	0	9	0	0	0	50	0		0	
001600	2	21	70	0	8	0	0	0	40	0		50	
001610	3	12	20	1	5	0	500	0	40	0		0	
001620	3	19	90	0	7	0	500	0	35	0		0	
001630	2	15	5	1	5	300	300	0	0	2888		10	
001640	2	10	4	0	7	5400	0	0	0	1925		0	
001650	2	15	3	0	5	0	0	0	0	0		15	
001660	3	30	90	1	9	0	0	0	38	20		0	
001670	3	15	80	1	5	0	0	0	40	28		0	
001680	3	20	90	0	9	100	0	0	20	0		0	
001690	3	30	90	1	7	300	0	0	40	27		0	
001700	2	15	5	1	5	0	0	0	0	0		0	
001710	2	35	20	0	6	32700	0	16050	25	5535		0	
001720	3	15	7	1	6	0	0	0	0	0		0	
001730	2	10	4	1	4	0	0	0	0	0		0	
001740	2	20	80	1	9	0	0	0	28	0		0	
001750	2	18	75	0	7	0	0	0	40	0		0	
001760	2	28	80	1	9	300	0	0	50	28		0	
001770	2	15	15	0	5	12150	0	0	0	0		0	
001780	2	15	14	0	8	0	0	0	0	0		0	
001790	2	20	14	0	7	25200	0	0	0	0		0	
001800	2	15	15	0	5	0	0	25	0	30		0	

Data No.	A	B	C	D	E	F	G	H	I	J	K	L	M
001810	2	15	15	1	6	0	0	0	0	50		0	
001820	2	15	90	1	8	0	0	0	32	15		0	
001830	2	35	14	1	10	10500	500	0	0	2010		0	
001840	2	20	70	1	6	0	0	0	0	0		0	
001850	2	20	4	1	8	500	0	0	0	100		0	
001860	2	5	5	1	4	0	0	0	0	0		0	
001870	2	30	75	1	7	350	0	0	27	0		0	
001880	2	18	60	1	5	0	500	0	32	0		0	
001890	2	25	90	1	4	0	0	0	25	20		0	
001900	2	40	120	0	7	400	0	0	28	0		0	
001910	2	25	120	1	5	250	0	0	30	63		0	
001920	2	10	7	1	8	0	0	0	0	0		0	
001930	2	25	21	1	5	0	0	0	0	0		0	
001940	1	15	20	500			0	380	130	0	1000	0	116
001950	1	18	18	400			0	0	140	13	1000	0	37
001960	1	15	80	360			0	0	100	100	1000	0	80
001970	1	18	80	400			0	350	110	22	5000	0	72
001980	1	18	30	500			0	450	18	0	50000	0	138
001990	1	15	75	350			0	0	250	36	5000	0	30
002000	1	15	75	400			0	0	150	0	1000	0	230
002010	1	15	90	300			0	1008	35	0	5000	0	98
002020	1	28	80	350			0	0	180	19	5000	0	94
002030	1	15	7	320			0	25	0	15	1000	0	60
002040	1	10	4	80			0	0	0	0	50000	0	120
002050	1	30	90	500			0	200	180	23	5000	0	140
002060	1	15	80	450			0	0	150	30	5000	0	115
002070	3	20	30	1	4	100	60	0	0	30		60	
002080	3	0	0	1	10	1000	0	0	20	0		0	
002090	3	60	0	1	2	0	0	0	100	800		0	
002100	3	30	60	1	8	0	0	0	0	0		320	
002110	3	30	60	1	10	0	0	0	0	0		0	
002120	3	20	365	1	4	0	0	0	0	0		80	
002130	2	20	60	1	5	5100	0	25050	50	0		0	
002140	2	20	30	0	8	0	0	0	0	0		60	
002150	3	30	30	0	5	0	0	0	0	0		150	
002160	3	20	30	0	6	0	0	0	0	0		120	
002170	3	20	60	0	5	0	0	0	0	0		0	
002180	3	20	7	0	10	0	0	0	0	81		950	
002190	3	30	30	0	6	0	0	0	0	0		240	
002200	3	15	7	1	7	50050	100	0	0	5000		300	
002210	3	25	30	0	5	0	0	0	0	0		250	
002220	3	20	20	0	4	0	0	0	0	0		180	
002230	3	20	30	0	5	0	0	0	0	0		100	
002240	2	20	7	0	5	0	0	0	0	0		180	
002250	2	8	2	0	9	35000	0	0	0	3500		200	
002260	2	30	30	0	6	0	0	0	0	0		210	
002270	2	15	7	0	4	100	0	0	0	0		300	
002280	1	25	10	400			0	0	0	0	50000	0	100
002290	1	10	7	160			0	0	0	0	1000	0	100
002300	1	20	10	140			0	0	0	0	5000	0	50
002310	1	5	2	160			0	0	0	0	5000	0	100
002320	1	10	3	140			0	0	0	0	1000	0	100
002330	1	10	2	140			0	0	0	0	5000	0	100
002340	1	10	2	500			0	0	0	0	5000	0	90
002350	1	20	7	140			0	0	0	0	1000	0	0
002360	1	15	7	180			0	10050	0	0	1000	0	100
002370	1	10	2	120			0	0	0	0	5000	0	100
002380	1	10	7	200			0	10550	0	7000	1000	0	60
002390	1	20	7	300			0	0	0	0	5000	0	100
002400	1	15	45	400			0	0	0	0	0	0	100

Data No.	A	B	C	D	E	F	G	H	I	J	K	L	M
002410	1	20	7	150			0	0	0	0	1000	0	0
002420	1	30	30	200			0	0	0	0	0	0	110
002430	1	30	25	120			0	0	0	0	0	0	60
002440	1	2	0	1200			0	0	0	0	5000	0	10
002450	2	15	75	1	5	0	0	0	34	0		0	
002460	2	15	90	0	9	0	100	0	50	0		0	
002470	1	15	100	500			0	450	180	715	5000	0	134
002480	1	8	100	500			0	2400	130	19	5000	0	43
002490	1	20	80	350			150	0	130	1100	5000	0	68
002500	2	20	7	0	6	20000	100	12500	0	6260		0	
002510	2	60	30	1	4	250800	800	50050	0	75070		0	
002520	2	50	30	0	9	0	0	10	20	0		0	
002530	3	20	7	1	6	20900	800	0	50	8550		0	
002540	3	20	60	0	10	37600	0	0	0	0		0	
002550	3	60	90	1	6	18400	800	2550	50	500		75	
002560	3	20	60	1	8	12000	800	0	55	0		125	
002570	3	60	60	0	7	0	0	0	0	100		50	
002580	2	20	30	1	5	50900	800	10050	50	20060		0	
002590	3	60	60	0	30	0	0	0	0	1000		0	
002600	2	15	30	0	3	860	0	0	0	60		0	
002610	2	25	30	0	8	0	0	0	0	10		0	
002620	2	20	30	0	4	50080	800	0	0	2510		0	
002630	3	60	60	0	8	0	0	0	0	0		0	
002640	2	50	50	0	5	0	0	0	0	0		0	
002650	2	30	60	0	5	75100	0	0	60	10100		150	
002660	3	30	60	1	6	0	800	0	26	120		150	
002670	1	30	60	144			300	0	350	100	5000	0	50
002680	1	10	2	135			0	0	0	10	0	0	25
002690	1	10	60	40			500	0	50	70	5000	0	25
002700	1	20	2	60			0	0	0	10	1000	10	15
002710	1	30	30	48			0	1005	50	3030	5000	10	25
002720	1	20	60	1600			0	0	0	100	5000	50	0
002730	1	30	60	1600			0	0	0	0	5000	50	10
002740	1	20	60	524			0	0	50	0	5000	50	50
002750	1	0	0	224			0	0	0	0	0	0	0
002760	1	0	0	3200			0	0	0	0	0	0	0
002770	1	0	0	256			0	0	0	0	0	0	0
002780	3	0	0	1	4	0	0	0	0	0		0	
002790	3	0	0	1	12	0	0	0	0	0		0	
002800	3	30	30	1	7	0	0	0	0	0		0	
002810	3	20	50	0	11	0	0	0	40	0		0	
002820	3	30	50	1	7	0	0	0	40	17		0	
002830	3	20	55	0	11	0	0	0	30	0		0	
002840	2	30	40	0	11	0	800	0	43	0		0	
002850	3	30	60	0	8	0	0	0	40	0		0	
002860	2	20	75	1	8	0	0	30	38	3		0	
002870	1	25	50	500			0	180	50	13	5000	0	102
002880	3	30	60	0	7	300	0	0	0	0		0	
002890	3	10	15	0	6	400	0	0	0	0		0	
002900	3	20	2	0	6	0	0	0	0	0		0	
002910	3	30	90	0	12	12300	300	0	14	0		0	
002920	3	100	15	0	12	0	500	0	0	200		0	
002930	3	60	90	0	5	0	0	0	0	0		0	
002940	1	0	30	2400			0	0	0	100	0	3300	50
002950	1	10	30	360			0	0	0	60	0	0	170
002960	1	30	60	600			120	0	0	0	0	10	0
002970	1	25	7	64			0	0	0	0	0	0	0
002980	3	35	60	0	11	60	0	0	0	200		0	
002990	3	60	60	1	5	1100	0	0	0	0		0	
003000	3	0	8	1	5	19235	0	0	2	0		0	

Data No.	A	B	C	D	E	F	G	H	I	J	K	L	M
003010	3	75	30	0	18	70	0	0	0	0		0	
003020	3	30	30	0	3	0	0	0	0	0		0	
003030	3	40	90	0	8	100	0	0	0	0		0	
003040	3	10	7	0	9	30	0	0	0	0		0	
003050	3	75	45	0	6	340	0	0	0	60		0	
003060	3	50	120	1	6	0	0	35	1400	60		0	
003070	1	6	45	180			0	0	0	0	5000	5	0
003080	1	7	60	5000			0	0	0	0	0	0	0
003090	1	75	60	4000			0	0	0	0	0	0	0
003100	3	5	2	0	7	0	0	0	0	0		3	
003110	3	5	60	0	4	0	0	0	0	0		3	
003120	3	5	2	1	6	0	0	0	0	0		3	
003130	3	20	60	0	8	75600	100	40050	50	10000		0	
003140	3	30	60	0	2	0	100	0	0	100		30	
003150	3	20	60	0	12	1300	0	1200	0	0		150	
003160	2	10	60	0	7	12640	500	0	0	0		30	
003170	3	20	180	0	6	0	0	0	0	110		0	
003180	2	20	60	0	6	40800	0	0	20	7560		75	
003190	2	30	60	1	9	1400	250	0	0	11310		75	
003200	1	20	60	300			0	0	0	50	5000	820	25
003210	2	50	60	0	5	615	0	0	0	11330		0	
003220	2	10	2	0	10	10250	0	0	40	0		0	
003230	2	60	7	1	7	400	100	0	0	2050		120	
003240	2	0	0	1	4	700	800	0	0	0		0	
003250	2	0	0	1	5	1200	0	180	40	0		0	
003260	1	10	2	60			0	808	0	2618	1000	0	100
003270	3	40	20	0	4	14580	0	0	0	12100		0	
003280	3	45	16	1	6	300	0	0	38	0		50	
003290	3	10	0	0	9	220	0	0	0	21		0	
003300	3	20	7	1	5	0	0	0	0	38		20	
003310	3	20	30	0	7	0	800	0	0	0		0	
003320	3	10	1	1	7	0	500	0	0	0		0	
003330	3	0	0	0	3	0	500	0	0	0		0	
003340	3	30	2	0	4	180	0	0	0	120		0	
003350	3	5	1	1	6	0	800	0	50	20		0	
003360	3	30	20	1	12	0	0	0	20	153		20	
003370	3	20	1	0	3	0	500	0	0	0		0	
003380	3	30	30	0	7	0	500	0	0	0		0	
003390	3	15	5	0	8	0	500	0	0	0		0	
003400	3	10	1	0	6	0	500	0	0	0		0	
003410	3	30	35	1	4	0	500	0	0	0		0	
003420	3	10	1	0	7	0	500	0	0	0		0	
003430	3	30	45	0	9	0	500	0	0	0		0	
003440	3	10	7	1	12	0	500	0	0	0		0	
003450	3	20	2	0	5	0	500	0	0	0		0	
003460	3	30	30	0	5	0	500	0	0	0		0	
003470	2	15	5	0	5	0	800	0	0	0		0	
003480	3	25	45	0	7	400	500	0	0	0		0	
003490	2	0	0	0	8	0	800	0	0	0		0	
003500	3	30	30	1	6	100	800	0	0	20		0	
003510	2	20	7	1	3	300	800	50	40	0		0	
003520	3	30	7	0	5	170	0	0	0	30		0	
003530	3	10	1	0	6	0	100	0	0	0		0	
003540	2	25	7	1	7	2440	0	0	0	7500		200	
003550	2	30	7	1	6	12200	800	0	0	4025		0	
003560	3	10	2	0	11	0	500	0	0	0		0	
003570	3	30	5	0	8	0	500	0	27	0		0	
003580	3	0	0	1	17	0	0	0	0	0		0	
003590	3	0	0	1	16	750	500	0	0	0		0	
003600	2	0	0	0	8	20300	0	0	0	0		0	

Data No.	A	B	C	D	E	F	G	H	I	J	K	L	M
003610	2	0	0	1	5	0	100	0	0	0		0	
003620	1	20	2	1600			500	0	0	20	5000	0	110
003630	1	0	0	408			250	0	0	0	0	0	0
003640	1	15	60	128			120	0	0	0	0	0	0
003650	1	30	7	136			0	150	0	0	0	0	0
003660	1	0	0	48			100	0	0	0	0	0	0
003670	1	35	30	400			800	0	0	0	0	300	0
003680	1	40	30	100			300	0	0	0	0	100	0
003690	1	0	0	538			450	0	0	0	0	0	0
003700	1	12	2	1200			400	0	0	0	1000	0	40
003710	1	20	2	6000			4000	0	0	0	0	0	2150
003720	1	15	2	100			60	0	0	60	5000	4	50
003730	1	8	2	0			1200	0	0	50	5000	0	0
003740	1	10	2	0			0	0	50	50	5000	0	0
003750	1	20	1	0			2000	0	0	50	0	0	0
003760	1	15	2	400			500	0	0	20	5000	300	355
003770	1	8	7	90			2400	0	0	0	5000	0	0
003780	1	35	2	96			600	0	0	0	0	0	0
003790	1	10	1	48			700	0	0	0	0	0	0
003800	1	0	0	48			2500	0	0	0	0	0	0
003810	1	20	30	200			0	0	0	20	5000	12	40
003820	1	20	7	54			0	0	0	60	5000	0	100
003830	1	10	2	70			0	0	0	0	1000	0	105
003840	1	10	3	48			150	0	0	0	1000	0	0
003850	2	30	150	1	7	0	0	0	50	0		6	
003860	1	10	2	64			200	0	0	200	1000	5	4
003870	1	10	2	64			300	0	0	300	1000	3	4
003880	3	40	60	0	3	0	0	0	0	0		0	
003890	3	2	2	0	10	600	0	0	0	0		0	
003900	3	30	60	0	7	0	0	0	0	0		0	
003910	1	22	28	800			0	0	50	19	5000	0	186
003920	2	15	30	0	11	0	1300	0	41	0		0	
003930	1	15	28	500			0	0	80	0	5000	0	93
003940	1	8	18	500			0	0	180	0	5000	0	98
003950	2	18	35	0	9	0	0	40	48	0		0	
003960	3	15	2	0	4	0	0	0	0	2		10	
003970	3	20	4	1	6	0	0	0	0	22		10	
003980	2	15	2	1	5	0	0	0	0	0		6	
003990	2	15	0	0	6	0	0	0	0	0		10	
004000	2	30	7	1	6	0	0	0	0	5		105	
004010	1	20	7	64			200	0	0	20	1000	0	6

/EOF

ｼｭﾂﾘｮｸ ﾚｺｰﾄﾞ ｽｳ = 401

Appendix B.2 Analysis of Flood Damage

Remarks

T : Total

F : Flood experienced

NF : Flood not experienced

P : With flood Prevention measures

NP : Without flood Prevention measures

C : With Car

NC : Without Car

Urban area and Rural area are shown in Fig. B.1.

Table B2.1 Direct Damage Vs. Flood Depth

(1) Average Flood Depth (cm)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	15.4	19.2	0.0	19.2	17.1	0.0	17.1	18.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.Dwelling House															
(Urban)	20.4	25.5	21.7	23.5	15.8	19.8	17.6	21.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	30.1	36.1	37.3	36.9	18.9	23.7	22.2	32.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Sub-Total)	27.4	32.6	33.4	33.1	17.7	22.9	21.0	29.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(2 Average Direct Damage (Baht/House)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	4674.6	5423.0	0.0	5423.0	5008.6	0.0	5008.6	5275.3	0.0	0.0	0.0	20.0	0.0	20.0	1.7
.Dwelling House															
(Urban)	2258.3	5215.7	1898.6	3429.6	4.6	1.5	3.2	2410.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	307.4	690.0	335.8	466.3	28.8	32.5	31.3	329.5	1.1	0.0	0.7	0.0	0.0	0.0	0.6
(Sub-Total)	844.4	2177.9	726.5	1299.2	19.5	26.5	23.9	904.2	0.8	0.0	0.5	0.0	0.0	0.0	0.4

(3) Correlation Coefficient of Regression Curve

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	0.13	0.12	0.00	0.12	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.Dwelling House															
(Urban)	0.43	0.60	0.41	0.49	0.02	-0.08	-0.03	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Rural)	-0.01	-0.15	-0.04	-0.08	0.45	0.34	0.34	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Sub-Total)	0.07	0.09	-0.04	0.03	0.42	0.33	0.33	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(4) Regression Curve (Y = a + bx, Y (Direct Damage, Baht/House), x (Flood Depth, cm))

		T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	a	3015.8	3545.7	0.0	3526.8	5008.1	0.0	5008.1	4101.4	0.0	0.0	0.0	0.0	0.0	0.0	566.0
	b	96.0	91.7	0.0	91.1	0.0	0.0	0.0	58.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.Dwelling House																
(Urban)	a	-3999.0	*4495.0	-766.9	-7453.6	4.0	1.9	3.7	-5223.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	b	307.4	773.0	122.8	463.9	0.0	-0.0	-0.0	351.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	a	327.9	1030.0	406.0	622.6	-5.4	-38.8	-28.0	381.0	0.0	0.0	566.0	0.0	0.0	0.0	566.0
	b	-0.7	-9.4	-1.9	-4.2	1.8	3.0	2.7	-1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Sub-Total)	a	486.6	1141.8	820.1	1051.9	-9.0	-35.8	-26.4	566.0	566.0	0.0	566.0	0.0	0.0	0.0	566.0
	b	13.1	31.8	-2.8	7.5	1.8	2.7	2.4	11.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table B2.2 Direct Damage Vs. Flood Duration

(1) Average Flood Duration (day)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	26.3	35.6	0.0	35.6	18.1	0.0	18.1	29.4	0.0	0.0	0.0	6.0	0.0	6.0	2.3
.Dwelling House															
(Urban)	35.6	48.9	34.0	40.9	42.5	17.9	31.3	38.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	37.6	43.6	42.5	42.9	35.4	33.7	34.2	40.2	3.7	0.0	2.4	0.0	0.0	0.0	1.9
(Sub-Total)	37.0	45.4	40.4	42.3	38.1	30.6	33.4	39.6	2.6	0.0	1.6	0.0	0.0	0.0	1.4

(2) Average Direct Damage (Baht/House)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	4674.6	5423.0	0.0	5423.0	5008.6	0.0	5008.6	5275.3	0.0	0.0	0.0	20.0	0.0	20.0	7.7
.Dwelling House															
(Urban)	2258.3	5215.7	1898.6	3429.6	4.6	1.5	3.2	2410.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	307.4	690.0	335.8	466.3	28.8	32.5	31.3	329.5	1.1	0.0	0.7	0.0	0.0	0.0	0.6
(Sub-Total)	844.4	2177.9	726.5	1299.2	19.5	26.5	23.9	904.2	0.8	0.0	0.5	0.0	0.0	0.0	0.4

(3) Correlation Coefficient of Regression Curve

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	0.12	0.15	0.00	0.15	-0.12	0.00	-0.12	0.08	0.00	0.00	0.00	0.00	0.00	0.00	1.00
.Dwelling House															
(Urban)	-0.02	-0.16	0.11	-0.08	-0.10	0.08	-0.06	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Rural)	-0.03	-0.17	-0.04	-0.09	-0.16	0.19	0.07	-0.05	0.00	0.00	0.91	0.00	0.00	0.00	0.91
(Sub-Total)	-0.02	-0.10	-0.02	-0.07	-0.13	0.20	0.05	-0.03	0.91	0.00	0.91	0.00	0.00	0.00	0.91

(4) Regression Curve (Y = a + bx, Y (Direct Damage, Baht/House), x (Flood Duration, day))

		T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	a	3541.4	3645.2	0.0	3581.6	6157.6	0.0	6157.6	4398.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	b	39.7	46.6	0.0	47.6	-63.5	0.0	-63.5	26.5	0.0	0.0	0.0	0.0	0.0	0.0	3.3
.Dwelling House																
(Urban)	a	2362.7	8262.7	1503.0	4364.0	5.1	1.3	3.5	2611.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	b	-2.9	-62.3	11.6	-22.9	-0.0	0.0	-0.0	-5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	a	349.6	1069.4	434.7	680.1	33.1	3.5	25.7	398.1	0.0	0.0	-0.2	0.0	0.0	0.0	-0.1
	b	-1.1	-8.7	-2.3	-5.0	-0.1	0.9	0.2	-1.7	0.0	0.0	0.4	0.0	0.0	0.0	0.4
(Sub-	a	925.8	3328.0	797.4	1790.0	22.2	0.5	20.7	1043.1	-0.2	0.0	-0.1	0.0	0.0	0.0	-0.1
Total)	b	-2.2	-25.3	-1.8	-11.6	-0.1	0.8	0.1	-3.5	0.4	0.0	0.4	0.0	0.0	0.0	0.4

Table B2.3 Indirect Damage Vs. Flood Depth

(1) Average Flood Depth (cm)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	16.4	19.2	0.0	19.2	17.1	0.0	17.1	18.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.Dwelling House (Urban)	20.4	25.5	21.7	23.5	15.8	19.8	17.6	21.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	30.1	36.1	37.3	36.9	18.9	23.7	22.2	32.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Sub-Total)	27.4	32.6	33.4	33.1	17.7	22.9	21.0	29.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(2) Average Indirect Damage (Baht/House)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	118.3	109.6	0.0	109.6	83.8	0.0	83.8	100.4	0.0	0.0	0.0	670.0	0.0	670.0	257.7
.Dwelling House (Urban)	25.6	17.1	28.8	23.4	26.8	48.4	36.6	27.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	33.1	44.7	15.2	26.1	57.3	55.6	56.1	35.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Sub-Total)	31.0	35.6	18.6	25.3	45.5	54.2	51.0	33.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(3) Correlation Coefficient of Regression Curve

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	-0.02	0.09	0.00	0.09	-0.07	0.00	-0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.Dwelling House (Urban)	0.13	0.32	-0.19	-0.01	0.70	0.20	0.41	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Rural)	0.01	0.19	-0.10	0.05	-0.01	-0.04	-0.03	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Sub-Total)	0.03	0.23	-0.11	0.05	0.15	-0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(4) Regression Curve (Y=a + bx, Y (Indirect Damage, Baht/House), x (Flood Depth, cm)

		T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	a	129.1	74.8	0.0	74.8	95.3	0.0	95.3	82.8	0.0	0.0	0.0	0.0	0.0	0.0	33.1
	b	-0.7	1.8	0.0	1.8	-0.7	0.0	-0.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.Dwelling House (Urban)	a	12.3	-15.4	55.5	24.4	-52.4	24.8	-9.2	16.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	b	0.7	1.3	-1.2	-0.0	5.0	1.2	2.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	a	32.1	23.2	18.7	22.2	58.0	63.8	62.1	37.3	0.0	0.0	33.1	0.0	0.0	0.0	33.1
	b	0.0	0.6	-0.1	0.1	-0.0	-0.3	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Sub-Total)	a	28.5	11.9	24.2	21.9	29.6	57.8	47.6	33.1	33.1	0.0	33.1	0.0	0.0	0.0	33.1
	b	0.1	0.7	-0.2	0.1	0.9	-0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table B2.4 Indirect Damage Vs. Flood Duration

(1) Average Flood Duration (day)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	26.3	35.6	0.0	35.6	18.1	0.0	18.1	29.4	0.0	0.0	0.0	6.0	0.0	6.0	2.3
.Dwelling House (Urban)	35.6	48.9	34.0	40.9	42.5	17.9	31.3	38.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	37.6	43.6	42.5	42.9	35.4	33.7	34.2	40.2	3.7	0.0	2.4	0.0	0.0	0.0	1.9
(Sub-Total)	37.0	45.4	40.4	42.3	38.1	30.6	33.4	39.6	2.6	0.0	1.6	0.0	0.0	0.0	1.4

(2) Average Indirect Damage (Baht/House)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	118.3	109.6	0.0	109.6	83.8	0.0	83.8	100.4	0.0	0.0	0.0	670.0	0.0	670.0	257.7
.Dwelling House (Urban)	25.6	17.1	28.8	23.4	26.8	48.4	36.6	27.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	33.1	44.7	15.2	26.1	57.3	55.6	56.1	35.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Sub-Total)	31.0	35.6	18.6	25.3	45.5	54.2	51.0	33.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(3) Correlation Coefficient of Regression Curve

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	0.03	-0.07	0.00	-0.07	0.23	0.00	0.23	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.00
.Dwelling House (Urban)	0.16	-0.27	-0.10	-0.18	0.85	0.06	0.52	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Rural)	0.04	0.13	0.26	0.16	0.14	-0.16	-0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Sub-Total)	0.07	0.02	0.09	0.06	0.36	-0.14	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(4) Regression Curve (Y = A + bx, Y (Indirect Damage, Baht/House), x (Flood Duration, day))

		T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	a	108.8	130.7	0.0	130.7	55.3	0.0	55.3	102.5	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
	b	0.4	-0.6	0.0	-0.6	1.6	0.0	1.6	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	111.7
.Dwelling House (Urban)	a	18.4	32.6	37.2	36.1	5.0	44.3	21.9	20.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	b	0.2	-0.3	-0.2	-0.3	0.5	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	a	29.4	31.0	3.7	13.4	51.9	79.8	59.5	33.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	b	0.1	0.3	0.3	0.3	0.2	-0.7	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Sub-Total)	a	25.9	33.4	13.3	20.7	33.2	73.1	46.2	29.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	b	0.1	0.0	0.1	0.1	0.3	-0.6	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table B2.5 Flood Prevention Cost Vs. Flood Depth

(1) Average Flood Depth (cm)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	16.4	19.2	0.0	19.2	17.1	0.0	17.1	18.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.Dwelling House															
(Urban)	20.4	25.5	21.7	23.5	15.8	19.8	17.6	21.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	30.1	36.1	37.3	36.9	18.9	23.7	22.2	32.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Sub-Total)	27.4	32.6	33.4	33.1	17.7	22.9	21.0	29.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

(2) Average Flood Prevention Cost (Baht/House)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	664.4	1102.9	0.0	1102.9	0.0	0.0	0.0	709.8	506.2	0.0	506.2	0.0	0.0	0.0	311.5
.Dwelling House															
(Urban)	10264.0	17789.0	12850.0	15129.5	0.0	0.0	0.0	10631.6	1006.7	10550.0	4824.0	0.0	0.0	0.0	4824.0
(Rural)	2990.3	5493.3	3244.1	4072.8	0.0	0.0	0.0	2792.2	3233.1	14417.5	7300.2	0.0	0.0	0.0	5735.9
(Sub-Total)	4992.5	9535.7	5645.6	7180.6	0.0	0.0	0.0	4956.8	2565.2	13128.3	6526.4	0.0	0.0	0.0	5495.9

(3) Correlation Coefficient of Regression Curve

	T	F.P.C	F.P.NC	F.P	F.NP.NC	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	-0.01	-0.02	0.00	-0.13	0.00	0.00	0.00	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.Dwelling House															
(Urban)	0.35	0.58	0.02	0.40	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Rural)	0.03	0.12	-0.02	0.02	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Sub-Total)	0.07	0.15	-0.07	0.04	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(4) Regression Curve (Y = a + bx, Y (Flood Prevention Cost, Baht/House), x (Flood Depth, cm))

		T	F.P.C	F.P.NC	F.P	F.NP.NC	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	a	643.1	2022.5	0.0	1675.5	0.0	0.0	0.0	762.7	0.0	0.0	0.0	0.0	0.0	0.0	3153.4
	b	-1.6	-10.8	0.0	-23.2	0.0	0.0	0.0	-5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.Dwelling House																
(Urban)	a	*0563.5	*8393.9	11992.4	*0717.5	0.0	0.0	0.0	*5274.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	b	1023.2	2987.8	39.5	1527.9	0.0	0.0	0.0	1192.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	a	2597.9	3840.5	3537.9	3793.2	0.0	0.0	0.0	2088.4	0.0	0.0	3153.4	0.0	0.0	0.0	3153.4
	b	13.0	45.8	-7.9	7.6	0.0	0.0	0.0	21.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Sub-Total)	a	3482.0	2519.7	6869.1	5863.0	0.0	0.0	0.0	3153.4	3153.4	0.0	3153.4	0.0	0.0	0.0	3153.4
	b	55.1	215.1	-36.6	39.8	0.0	0.0	0.0	61.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table B2.6 Flood Prevention Cost Vs. Flood Duration

(1) Average Flood Duration (day)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	26.3	35.6	0.0	35.6	18.1	0.0	18.1	29.4	0.0	0.0	0.0	6.0	0.0	6.0	2.3
.Dwelling House															
(Urban)	38.6	48.9	34.0	40.9	42.5	17.9	31.3	38.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	37.6	43.6	42.5	42.9	35.4	33.7	34.2	40.2	3.7	0.0	2.4	0.0	0.0	0.0	1.9
(Sub-Total)	37.0	45.4	40.4	42.3	38.1	30.6	33.4	39.6	2.6	0.0	1.6	0.0	0.0	0.0	1.4

(2) Average Flood Prevention Cost (Baht/House)

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	884.4	1102.9	0.0	1102.9	0.0	0.0	0.0	709.8	506.2	0.0	506.2	0.0	0.0	0.0	311.5
.Dwelling House															
(Urban)	10264.0	17789.0	12850.0	15129.5	0.0	0.0	0.0	10631.6	1006.7	10550.0	4824.0	0.0	0.0	0.0	4824.0
(Rural)	2990.3	5493.3	3244.1	4072.8	0.0	0.0	0.0	2792.2	3233.1	14417.5	7300.2	0.0	0.0	0.0	5735.9
(Sub-Total)	4992.5	9535.7	5645.6	7180.6	0.0	0.0	0.0	4956.8	2565.2	13128.3	6526.4	0.0	0.0	0.0	5495.9

(3) Correlation Coefficient of Regression Curve

	T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	0.03	-0.16	0.00	-0.15	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.14
.Dwelling House															
(Urban)	-0.03	-0.13	-0.05	-0.09	0.00	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Rural)	0.07	0.14	0.10	0.11	0.00	0.00	0.00	0.09	0.00	0.00	-0.04	0.00	0.00	0.00	0.01
(Sub-Total)	0.00	-0.04	0.02	-0.01	0.00	0.00	0.00	0.01	0.28	0.00	-0.01	0.00	0.00	0.00	0.01

(4) Regression Curve (Y = a + bx, Y (Flood Prevention Cost, Baht/House), x (Flood Duration, day))

		T	F.P.C	F.P.NC	F.P	F.NP.C	F.NP.NC	F.NP	F	NF.P.C	NF.P.NC	NF.P	NF.NP.C	NF.NP.NC	NF.NP	NF
.Trade	a	573.9	2890.4	0.0	1617.4	0.0	0.0	0.0	634.1	0.0	0.0	0.0	0.0	0.0	0.0	337.5
	b	1.6	-30.2	0.0	-10.9	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	-11.3
.Dwelling House																
(Urban)	a	1023.4	27330.4	13992.8	19752.6	0.0	0.0	0.0	11676.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	b	-21.3	-195.1	-33.6	-113.1	0.0	0.0	0.0	-27.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Rural)	a	2308.6	3668.3	1510.2	2280.4	0.0	0.0	0.0	1834.9	0.0	0.0	7554.9	0.0	0.0	0.0	5705.9
	b	18.1	41.8	40.8	41.8	0.0	0.0	0.0	23.8	0.0	0.0	-107.8	0.0	0.0	0.0	16.1
(Sub-Total)	a	4916.5	11275.6	5321.1	7617.8	0.0	0.0	0.0	4844.1	1851.7	0.0	6597.2	0.0	0.0	0.0	5450.4
	b	2.0	-38.4	8.0	-10.3	0.0	0.0	0.0	2.8	274.4	0.0	-43.6	0.0	0.0	0.0	33.3

Appendix B.3 Estimated Flood Damage in 1982 and 2000

Table B3.1 Estimated Flood Damage in 1982 According to Mesh
(Mesh No. is shown in Fig. B.1) (Unit : million Bhat)

Mesh NO	DIRECT DAMAGE				INDIRECT DAMAGE				PREVENTION COST				TOTAL			
	URBAN	RURAL	TRADE	TOTAL	URBAN	RURAL	TRADE	TOTAL	URBAN	RURAL	TRADE	TOTAL	URBAN	RURAL	TRADE	TOTAL
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
13	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	0.	0.	4.	4.	0.	0.	0.	0.	2.	0.	0.	2.	2.	0.	4.	6.
16	21.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
17	0.	1.	0.	23.	0.	0.	0.	0.	2.	0.	0.	2.	23.	0.	1.	25.
18	0.	0.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
19	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	0.	0.	1.	1.	0.	0.	0.	0.	3.	0.	0.	3.	3.	0.	1.	4.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	0.	0.	1.	1.	0.	0.	0.	0.	3.	0.	0.	3.	3.	0.	1.	4.
26	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
27	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
32	0.	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.	3.	3.	0.	0.	3.
33	0.	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.	3.	3.	0.	0.	3.
34	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
35	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
36	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
37	1.	0.	1.	2.	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	1.	3.
38	0.	0.	2.	2.	0.	0.	0.	0.	3.	0.	0.	3.	3.	0.	3.	6.
39	0.	0.	1.	1.	0.	0.	0.	0.	5.	0.	0.	5.	5.	0.	1.	6.
40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
41	3.	0.	1.	4.	0.	0.	0.	0.	5.	0.	0.	5.	8.	0.	1.	9.
42	2.	0.	2.	4.	0.	0.	0.	0.	3.	0.	0.	3.	4.	0.	3.	7.
43	4.	0.	0.	4.	0.	0.	0.	0.	2.	0.	0.	2.	6.	0.	0.	6.
44	11.	0.	1.	13.	0.	0.	0.	0.	5.	0.	0.	5.	17.	0.	1.	18.
45	4.	0.	5.	9.	0.	0.	0.	0.	6.	0.	0.	6.	10.	0.	5.	15.
46	4.	0.	0.	4.	0.	0.	0.	0.	6.	0.	0.	6.	10.	0.	0.	10.
47	1.	0.	1.	3.	0.	0.	0.	0.	2.	0.	0.	2.	4.	0.	1.	5.
48	0.	0.	5.	5.	0.	0.	0.	0.	5.	0.	0.	5.	5.	0.	5.	10.
49	4.	0.	7.	11.	0.	0.	0.	0.	6.	0.	0.	6.	10.	0.	8.	17.
50	1.	0.	1.	3.	0.	0.	0.	0.	2.	0.	0.	2.	4.	0.	1.	5.
51	3.	0.	2.	5.	0.	0.	0.	0.	4.	0.	0.	5.	7.	0.	3.	10.
52	7.	0.	2.	10.	0.	0.	0.	0.	2.	0.	0.	2.	10.	0.	3.	12.
53	3.	0.	1.	4.	0.	0.	0.	0.	5.	0.	0.	5.	9.	0.	1.	10.
54	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
55	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
56	10.	0.	2.	12.	0.	0.	0.	0.	2.	0.	0.	2.	12.	0.	3.	14.
57	9.	0.	0.	9.	0.	0.	0.	0.	2.	0.	0.	2.	11.	0.	0.	11.
58	7.	0.	1.	9.	0.	0.	0.	0.	1.	0.	0.	1.	9.	0.	1.	10.
59	7.	0.	1.	8.	0.	0.	0.	0.	1.	0.	0.	1.	8.	0.	1.	10.
60	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Table B3.1 (Continue)

Mesh NO	DIRECT DAMAGE URBAN	DIRECT DAMAGE RURAL	DIRECT DAMAGE TRADE	DIRECT DAMAGE TOTAL	INDIRECT DAMAGE URBAN	INDIRECT DAMAGE RURAL	INDIRECT DAMAGE TRADE	INDIRECT DAMAGE TOTAL	PREVENTION COST URBAN	PREVENTION COST RURAL	PREVENTION COST TRADE	PREVENTION COST TOTAL	TOTAL URBAN	TOTAL RURAL	TOTAL TRADE	TOTAL TOTAL
61	10.	0.	9.	19.	0.	0.	0.	0.	5.	0.	0.	5.	15.	0.	9.	24.
62	3.	0.	1.	4.	0.	0.	0.	0.	1.	0.	0.	1.	4.	0.	1.	5.
63	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
64	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
65	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
66	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
67	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
68	9.	0.	1.	10.	0.	0.	0.	0.	4.	0.	0.	4.	13.	0.	1.	14.
69	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
70	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
72	6.	0.	5.	11.	0.	0.	0.	0.	3.	0.	0.	3.	10.	0.	5.	15.
73	4.	0.	1.	6.	0.	0.	0.	0.	2.	0.	0.	2.	7.	0.	1.	8.
74	7.	0.	2.	9.	0.	0.	0.	0.	3.	0.	0.	3.	10.	0.	3.	13.
75	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
76	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
77	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
78	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80	0.	0.	2.	2.	0.	0.	0.	0.	3.	0.	0.	3.	3.	0.	3.	5.
81	0.	0.	6.	6.	0.	0.	0.	0.	5.	0.	0.	5.	5.	0.	6.	11.
82	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
83	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
84	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
85	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
86	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
87	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
88	0.	0.	4.	4.	0.	0.	0.	0.	3.	0.	0.	3.	3.	0.	4.	7.
89	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
91	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
92	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
93	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
94	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
95	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
96	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
97	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
98	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
101	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
102	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
103	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
104	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
105	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
106	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
107	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
108	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
109	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
110	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
111	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	1.	1.	0.	0.	1.
CASE-1	142.	20.	79.	241.	3.	2.	2.	6.	116.	19.	1.	136.	260.	41.	82.	384.
CASE-2	142.	16.	79.	238.	3.	2.	2.	6.	116.	16.	1.	133.	260.	34.	82.	377.
CASE-3	121.	12.	78.	211.	2.	1.	2.	5.	114.	12.	1.	127.	237.	25.	81.	343.
CASE-4	95.	9.	66.	170.	2.	1.	1.	4.	100.	9.	1.	110.	197.	19.	68.	284.
CASE-5	103.	7.	73.	183.	2.	1.	2.	5.	109.	7.	1.	117.	214.	15.	76.	305.

Table B3.2 Estimated Flood Damage in 2000 According to Mesh
(Mesh No. is shown in Fig. B.1) (Unit : million Baht)

Mesh NO	DIRECT DAMAGE URBAN	DIRECT DAMAGE RURAL	DIRECT DAMAGE TRADE	DIRECT DAMAGE TOTAL	INDIRECT DAMAGE URBAN	INDIRECT DAMAGE RURAL	INDIRECT DAMAGE TRADE	INDIRECT DAMAGE TOTAL	PREVENTION COST URBAN	PREVENTION COST RURAL	PREVENTION COST TRADE	PREVENTION COST TOTAL	TOTAL URBAN	TOTAL RURAL	TOTAL TRADE	TOTAL TOTAL
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	3.	0.	3.
3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
9	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
10	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	0.	1.	4.	4.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	4.	5.
15	0.	1.	6.	7.	0.	0.	0.	0.	0.	1.	0.	1.	0.	3.	6.	9.
16	0.	1.	1.	2.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	1.	3.
17	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
18	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
19	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	0.	2.	0.	2.	0.	0.	0.	0.	0.	2.	0.	2.	0.	3.	0.	3.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
22	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
23	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	0.	3.	0.	3.	0.	0.	0.	0.	0.	3.	0.	3.	0.	5.	0.	5.
26	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	3.	0.	3.
27	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
32	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	3.	0.	3.
33	0.	2.	0.	2.	0.	0.	0.	0.	0.	2.	0.	2.	0.	5.	0.	5.
34	0.	2.	0.	2.	0.	0.	0.	0.	0.	2.	0.	2.	0.	4.	0.	4.
35	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
36	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
37	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
38	0.	0.	2.	2.	0.	0.	0.	0.	9.	0.	0.	9.	9.	0.	3.	12.
39	0.	0.	2.	2.	0.	0.	0.	0.	12.	0.	0.	12.	12.	0.	3.	15.
40	126.	0.	0.	126.	0.	0.	0.	0.	7.	0.	0.	7.	133.	0.	0.	133.
41	101.	0.	2.	104.	0.	0.	0.	0.	6.	0.	0.	6.	107.	0.	3.	110.
42	36.	0.	2.	38.	0.	0.	0.	0.	2.	0.	0.	2.	38.	0.	3.	40.
43	107.	0.	0.	107.	0.	0.	0.	0.	3.	0.	0.	3.	110.	0.	0.	110.
44	0.	0.	29.	29.	0.	0.	1.	1.	9.	0.	0.	10.	9.	0.	30.	40.
45	241.	0.	12.	253.	0.	0.	0.	1.	14.	0.	0.	14.	255.	0.	13.	268.
46	252.	0.	9.	260.	0.	0.	0.	1.	15.	0.	0.	15.	267.	0.	9.	276.
47	85.	0.	5.	90.	0.	0.	0.	0.	5.	0.	0.	5.	90.	0.	5.	95.
48	0.	0.	16.	16.	0.	0.	0.	0.	5.	0.	0.	6.	6.	0.	16.	22.
49	107.	0.	11.	118.	0.	0.	0.	0.	10.	0.	0.	10.	116.	0.	11.	128.
50	64.	0.	0.	64.	0.	0.	0.	0.	6.	0.	0.	6.	70.	0.	0.	70.
51	197.	0.	2.	200.	0.	0.	0.	0.	12.	0.	0.	12.	209.	0.	3.	211.
52	84.	0.	5.	88.	0.	0.	0.	0.	3.	0.	0.	3.	87.	0.	5.	92.
53	156.	0.	0.	156.	0.	0.	0.	0.	14.	0.	0.	14.	171.	0.	0.	171.
54	473.	0.	0.	473.	1.	0.	0.	1.	15.	0.	0.	15.	488.	0.	0.	488.
55	288.	0.	0.	288.	0.	0.	0.	0.	9.	0.	0.	9.	297.	0.	0.	297.
56	117.	0.	5.	122.	0.	0.	0.	0.	4.	0.	0.	5.	122.	0.	5.	127.
57	209.	0.	4.	212.	0.	0.	0.	0.	6.	0.	0.	6.	214.	0.	4.	218.
58	47.	0.	4.	50.	0.	0.	0.	0.	3.	0.	0.	3.	49.	0.	4.	53.
59	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
60	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.

Table B3.2 (Continue)

Mesh NO	DIRECT DAMAGE				INDIRECT DAMAGE				PREVENTION COST				TOTAL			
	URBAN	RURAL	TRADE	TOTAL	URBAN	RURAL	TRADE	TOTAL	URBAN	RURAL	TRADE	TOTAL	URBAN	RURAL	TRADE	TOTAL
61	201.	0.	10.	211.	0.	0.	0.	0.	5.	0.	0.	5.	207.	0.	10.	217.
62	247.	0.	7.	255.	0.	0.	0.	0.	7.	0.	0.	7.	255.	0.	8.	262.
63	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
64	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	2.	0.	2.
65	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
66	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
67	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
68	329.	0.	0.	329.	0.	0.	0.	0.	14.	0.	0.	14.	344.	0.	0.	344.
69	41.	0.	0.	41.	0.	0.	0.	0.	1.	0.	0.	1.	42.	0.	0.	42.
70	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
72	125.	0.	6.	131.	0.	0.	0.	0.	5.	0.	0.	5.	130.	0.	6.	137.
73	364.	0.	0.	364.	0.	0.	0.	0.	14.	0.	0.	14.	378.	0.	0.	378.
74	329.	0.	4.	333.	0.	0.	0.	0.	9.	0.	0.	9.	338.	0.	4.	342.
75	348.	0.	0.	348.	0.	0.	0.	0.	9.	0.	0.	9.	357.	0.	0.	357.
76	38.	0.	0.	38.	0.	0.	0.	0.	2.	0.	0.	2.	41.	0.	0.	41.
77	104.	0.	0.	104.	0.	0.	0.	0.	6.	0.	0.	6.	110.	0.	0.	110.
78	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
79	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80	108.	0.	2.	112.	0.	0.	0.	0.	6.	0.	0.	6.	116.	0.	3.	119.
81	207.	0.	6.	213.	0.	0.	0.	0.	9.	0.	0.	9.	216.	0.	6.	223.
82	180.	0.	0.	180.	0.	0.	0.	0.	5.	0.	0.	5.	185.	0.	0.	185.
83	72.	0.	0.	72.	0.	0.	0.	0.	2.	0.	0.	2.	74.	0.	0.	74.
84	41.	0.	0.	41.	0.	0.	0.	0.	1.	0.	0.	1.	42.	0.	0.	42.
85	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
86	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
87	164.	0.	0.	164.	0.	0.	0.	0.	10.	0.	0.	10.	174.	0.	0.	174.
88	148.	0.	4.	152.	0.	0.	0.	0.	6.	0.	0.	6.	155.	0.	4.	158.
89	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
91	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
92	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
93	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
94	49.	0.	0.	49.	0.	0.	0.	0.	3.	0.	0.	3.	52.	0.	0.	52.
95	25.	0.	0.	25.	0.	0.	0.	0.	1.	0.	0.	1.	26.	0.	0.	26.
96	36.	0.	0.	36.	0.	0.	0.	0.	2.	0.	0.	2.	38.	0.	0.	38.
97	26.	0.	0.	26.	0.	0.	0.	0.	1.	0.	0.	1.	27.	0.	0.	27.
98	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
99	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100	99.	0.	0.	99.	0.	0.	0.	0.	6.	0.	0.	6.	104.	0.	0.	104.
101	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
102	5.	0.	0.	5.	0.	0.	0.	0.	0.	0.	0.	0.	5.	0.	0.	5.
103	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
104	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
105	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
106	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
107	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
108	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
109	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.
111	27.	0.	2.	30.	0.	0.	0.	0.	2.	0.	0.	2.	29.	0.	3.	32.
CASE-1	6002.	29.	171.	6202.	8.	3.	4.	15.	296.	28.	2.	327.	6307.	60.	177.	6544.
CASE-2	6002.	26.	164.	6193.	8.	3.	4.	15.	296.	25.	2.	324.	6307.	54.	170.	6532.
CASE-3	5827.	21.	157.	6005.	8.	2.	3.	14.	290.	20.	2.	313.	6125.	43.	163.	6332.
CASE-4	5123.	17.	134.	5273.	7.	2.	3.	12.	261.	16.	2.	279.	5391.	35.	139.	5564.
CASE-5	5350.	12.	146.	5508.	8.	1.	3.	12.	271.	11.	2.	284.	5628.	24.	152.	5804.

Appendix B.4 Questionnaire

Questionnaire for dwelling-houses

คำถามสำหรับบ้านพักอาศัย
Questionnaire for dwelling-houses.

ชื่อ เจ้าหน้าที่สอบถาม
English
คำถามหมายเลข
Questionnaire Nr. Interviewer

หน้าที่ 1

1. ชนิดของบ้านพักอาศัย
Type of the dwelling-house

a. บ้านราคาไม่แพง (ไม่มีแอร์)
small dwelling-house (without airconditioner) ☐

บ้านราคาแพง (มีแอร์)
large dwelling-house (with airconditioner) ☐

บ้านทาวน์เฮ้าส์
Terrace-house ☐

บ้านแฟลตรวม
block of flats ☐

b. ที่บ้านมีรถยนตร์เก๋งหรือเปล่า
Is there a car in the house hold? ☐ Yes ☐ No

2. ชนิดที่ดิน กว้าง ยาว ม.^{2}
Dimensions of the estate: about ☐ sqm (m^2)

3. จำนวนแฟลตในบ้าน
Number of flats. ☐

4. จำนวนผู้อยู่อาศัย
Number of occupants ☐

คำถามหมายเลข

Questionnaire Nr.

4.1 อาชีพผู้ให้สัมภาษณ์

Profession of interviewed person:

5. พื้นบ้านอยู่สูงกว่าพื้นดินรอบ ๆ หรือเปล่า

Is the floor of the house higher than the average level around?

Yes = go to 5.1 No = go to 6

5.1 ถ้าใช่สูงเท่าไหร่ < 10 cm 10-20 cm

In case of "yes" how much: 20-30 cm >30 cm

รู้จริงไหมว่าสูงกว่า exact cm

5.2 ที่พื้นบ้านสูงนี้เพราะยกพื้นขึ้นหรือเปล่า

Did this elevation cause additional costs?

ใช่ Yes = go to 5.2.1 ตอบ 5.2.1 ไม่ใช่ No= go to 6 ตอบ 6

5.2.1 ค่ายกพื้น

If "Yes" how much money was spent:

<10,000 ฿. 10,000 – 50,000 ฿ >50,000 ฿.

exact: ฿

5.2.2 ยกพื้นขึ้นเมื่อ พ.ศ. ค.ศ.

when had this been?

6. เคยมีการถมที่ให้สูงขึ้นหรือเปล่า ใช่ ตอบ 6.1 เปล่า ตอบ 7

Had the estate been elevated at any time? Yes = go to 6.1 No = go to 7

(ถ้าเผื่อเคยมีการถมหลายครั้งใช้กระดาษข้อ 6 หลาย ๆ แผ่น โดยเขียนเติมเป็น 6.1, 6.2 และ อื่น ๆ)

(in case of several elevations use additional sheet and put the numbers 6.1, 6.2 etc. on it)

คำถามหมายเลข

Questionnaire Nr.

6.1 ถมที่ดินสูงขึ้นเท่าใด

How much had the estate been elevated?

10 ซม	10-20 ซม	20-30 ซม	กว่า 30 ซม
< 10 cm	10-20 cm.	20-30 cm.	> 30 cm.

จริง ๆ เลย ซม.exact cm.

6.2 ถมเมื่อปีไหน

When had this elevation taken place? _ _ _ _ _ พ.ศ. AD

6.3.ก. การถมที่นี้เจ้าของบ้านทำเองหรือเปล่า ใช่ ตอบ 6.3.1

Had the elevation been done by the owners themselves

a. go to 6.3.1

ข. การถมที่นี้คนจัดขายที่ดินเป็นคนถมหรือเปล่า ใช่ ตอบ 6.3.4

or had it been done by a building enterprise b. go to 6.3.4

6.3.1 ใช้เวลาทำการถมเท่าไร

How many hours of labour had been spent?

น้อยกว่า 100 ซม.	100-500 ซม.	500-1,000 ซม.	กว่า 1,000 ซม.
< 100 h	100-500 h	500-1,000 h	> 1,000 h

จริง ๆ ซม. exact h

6.3.2 คุณคิดว่าทำให้คุณเสียค่าแรงชั่วโมงละเท่าใด

Which price do you estimate for your own hour of labour?

ไม่ถึง 25 บาท	25-50 บาท	50-100 บาท	กว่า 100 บาท
< 25 ฿.	25-50 ฿.	50-100 ฿.	>100 ฿.

จริง ๆ บาท exact ฿.

6.3.3 ค่าวัสดุ (ดิน) ค่ารถบรรทุกที่เสียไปเท่าใด

How much money did you spend on material, trucks etc.,?

ไม่ถึง 1,000 บาท < 1,000 ฿. 1,000-5,000 บาท 1-5,000 ฿.

กว่า 5,000 บาท > 5,000 ฿.

จริง ๆ บาท exact ฿.

คำถามหมายเลข
Questionnaire Nr.

6.3.4 ตาม 6.3 ข. คุณต้องจ่ายให้เขาถมดินเท่าใด
In case of 6.3 b. how much did you pay for this elevation?

ไม่ถึง 10,000 บาท < 10,000 ฿. 10,000-50,000 1-50,000 ฿.

กว่า 50,000 บาท >50,000 ฿.

จริง ๆ บาท exact ฿.

7. คุณใช้วิธีสร้างคันดินกำแพงรอบบ้านกันน้ำท่วมหรือเปล่า
Did you build walls or dams around your estate or house?

ใช่ Yes = go to 7.1 เปล่า No = go to 8

7.1 คันดินถมกระทำชั่วคราว ก. ตอบ 7.1.1
If "yes" were they temporary ones a. go to 7.1.1

การทำถาวร or permanent ones ข. ตอบ 7.1.2 b. go to 7.1.2

7.1.1 ต้องถมคันดินใหม่บ่อยไหม
How often did you build them? go to 7.2

ปีละครั้ง 2 ปี ครั้ง เมื่อ 5 ปีที่แล้วทำกี่ครั้ง
once a year twice a year How often during the last 5years

7.1.2 ตามคำของข้อ 7.1 ข. คันกำแพงนั้นสร้างเมื่อ พ.ศ.
In case of 7.1 b. when were these walls or dams build?

AD_ _ _ _ _

7.2 คันกำแพงกันน้ำท่วมสูงเท่าใด
Which height do these walls or dams have?

ไม่ถึง 10 ซม. 10-20 ซม. 20-30 ซม. กว่า 30 ซม.
< 10 cm 10-20 cm. 20-30 cm. >30 cm.

จริง ๆ เลย ซม. exact cm.

7.3 คุณทำคันกันน้ำท่วมเองหรือเปล่า ใช่ ตอบ 7.3.1
Did you build these walls or dams yourselves a. go to 7.3.1

คนก่อสร้างบ้านเป็นผู้ลงทุน ใช่ ตอบ 7.3.3
or were they built by a building enterprise. b. go to 7.3.3

คำถามหมายเลข

Questionnaire Nr.

7.3.1 ระยะเวลาที่ใช้ทำคันกันน้ำท่วม

How many hours of labour had been spent?

ไม่ถึง 100 ชม.	100-500 ชม.	กว่า500 ชม.	จริง ๆ เลย	ชม.
< 100 h.	100-500 h.	> 500 h.	exact	h.

7.3.2 คุณต้องจ่ายเงินค่าดิน, ค่ารถ เองหรือเปล่า

How much money did you spend on material, trucks etc., ?

ไม่ถึง 1,000 บาท	1,000-5,000 บาท	กว่า 5,000 บาท
< 1,000 ฿.	1,000-5,000 ฿	>5,000 ฿

จริง ๆ เลย บาท exact ฿

go to 8 (เสร็จแล้วไปตอบ 8)

7.3.3 คุณจ่ายเงินให้ผู้ก่อสร้างเท่าใด

How much money had you to pay to the building entry?

ไม่ถึง 1,000 บาท	1,000-5,000 บาท	กว่า 50,000 บาท
< 10,000 ฿.	10,000-50,000 ฿	>50,000 ฿.

จริง ๆ เลย บาท exact ฿.

8. คุณซื้อเครื่องสูบน้ำหรือเปล่า ใช่ ไปตอบ 8.1 เปล่า ไปตอบ 9

Did you buy a pump? Yes = go to 8.1 No = go to 9

8.1 ซื้อเมื่อ พ.ศ.

When had this been _ _ _ _ _ _ _ _AD

8.2 ราคาเท่าใด How much did it cost?

ไม่ถึง 2,000 บาท	2,000-5,000 บาท	เกิน 5,000 บาท	จริง ๆ	บาท
< 2,000 ฿	2,000-5,000 ฿	>5,000 ฿	exact	฿

8.3 เคยใช้สูบน้ำหรือยัง

	เคย	ยัง
Had this pump been used at any time?	Yes	No

8.4 กี่ชั่วโมง กี่วัน

How many hours? How many day?

คำถามหมายเลข
Questionnaire Nr.

9. ของอื่นที่ต้องใช้เพื่อแก้ปัญหาน้ำท่วม
Other investments (e.g. check valves special doors)

ไทย	วัน เดือน ปี	บาท
1. ท่อดูดน้ำ		
2. ท่อส่งน้ำ		
3. สายไฟฟ้า		
4. น้ำมัน		

English	Date (Year)	Costs ฿
1. Suction tube		
2. Outlet pipe		
3. Electric cable		
4. Petrol		

สำหรับน้ำท่วมแต่ละครั้งให้ใช้แบบสอบถามนี้ 1 ชุด เพราะข้อมูล ควรจะต่างกัน
For each flooding there is a separate questionnaire part 2 to fill in, in case of getting different data.

10. สำหรับกรณีน้ำท่วม เมื่อ เดือน ปี
Afflicted by which flooding? Month Year

11. ความสูงสุดของระดับน้ำ เหนือพื้นดิน
Which height did the flooding reach (average above the estate)

0-10 ซม.	10-20 ซม.	20-30 ซม.	เกิน 30 ซม.	จริง ๆ	ซม
0-10 cm.	10-20 cm.	20-30 cm.	>30 cm.	exact	cm

12. น้ำท่วมกินเวลานานเท่าใด How long did the flooding last?

1-2 วัน	3-7 วัน	8-30 วัน	มากกว่า 1 เดือน	จริง ๆ
1-2 days	3-7 days	8-30 days	>1 month	exact

13. ความเสียหายต่างๆ ที่เกิดขึ้นฉับพลันหรือเปล่า
Did a damages occur at once a.

คำถามหมายเลข

Questionnaire Nr.

เสียหาย เพราะความนานของน้ำท่วม

or after a longer time of flooding b.

บอกไม่ถูก or cannot be said c.

14. ส่วนไหนของที่ดินที่เกิดน้ำท่วม

Which parts of the estate had been afflicted?

ก. ทั้งบ้านและที่ดิน

a. Whole premises (house and estate)

ข. ท่วม สนามและสวน ท่วมทางเดิน-ทางรถ

b. the garden the drive and footways

ท่วมพื้นบ้านชั้นล่าง ท่วมชั้นล่างบางห้อง

the ground-floor of the house. separate rooms of the ground

ท่วมส่วนอื่นของบ้านที่ต่อเติมไว้

adjoining buildings or less important rooms.

15. ข้าวของที่เก็บไว้ในบ้านเสียหาย ชำรุดหรือเปล่า

Were goods in the house or on the estate damaged or destroy

ใช่ ไปตอบ 15.1 เปล่า ไปตอบ 16

Yes = go to 15.1 No = go to 16

15.1 ข้าวของอะไรบ้างที่เสียหายและคิดเป็นเงินเท่าใด

Which goods were demolished and what were the resulting costs?

ของที่เสียหาย damaged goods	เสียหายสิ้นเชิง total loss	มูลค่า (บาท) replacing costs (฿)	เสียหายบางส่วน partly damaged	ค่าซ่อมหรือค่าเสื่อมราคา (บาท repairing costs reduction of value
รถยนต์ car				
เฟอร์นิเจอร์ furniture				
อาหาร foods				
อื่น ๆ 1. 2.				
Others 1. 2.				

แบบสอบถามที่ Questionnaire Nr.

เป็นครั้งที่ Nr. of flooding

แบบสอบถาม ที่
Questionnaire Nr.

16. มีความเสียหายกับพื้นที่ดินหรือเปล่า มี ไปตอบ 16.1 ไม่มี ไปตอบ 17
Had their been any damages at the estate? Yes = 16.1 No = go to 17

ค่าเสียหาย Kind of damage	ขนาดไหน of which intensity: เล็ก small	กลาง medium	ใหญ่ large	ซ่อมเอง repairing by own labour	ใช้เวลาซ่อมกี่ชั่วโมง Amount of labouring hours of owners: 10-50 h.	50-100 h.	>100 h.	1 คน exact h.	ค่าวัสดุและรถบรรทุก material costs and trucks etc.: <1,000 ฿.	1-5,000 ฿.	>5,000 ฿.	1 คน exact ฿	ซ่อมโดยบริษัท repaired by enterprise	ค่าจ้างซ่อม repairing costs: <1,000 ฿.	1-5,000 ฿.	>5,000 ฿.	1 คน exact ฿
ทางเดินหักพังหรือเสีย hollowed or destroyed drive or footway																	
รั้วกำแพงพัง destroyed fences or walls																	
ขยะโคลนตกค้าง waste-sediment																	
อื่น ๆ Others																	

แบบสอบถาม ที่
Questionnaire Nr.

น้ำท่วมครั้งที่
Nr. of flooding — — — —

17 มีความเสียหายกับตัวอาคารหรือเปล่า ใช่ ตอบ 17.1 เปล่า ตอบ 18
Did any damages arise at the house? Yes = go to 17.1 No = go to 18

While damages happened to the house and what were the repairing costs?

ชนิดความเสียหาย Kind of damage	ความรุนแรง of which intensity			เจ้าของซ่อมเอง Repaired by owners	เจ้าของเสียเวลา ชม. Amount of labouring hours of the owners				ค่าวัสดุและค่าขนส่ง material costs and trucks etc.				จ้างเขาซ่อม Repaired by enterprise	ค่าจ้างซ่อม rapairing costs			
	เล็ก small	กลาง medium	มาก large		10-50 h.	50-100 h.	> 100 h.	exact hours	500-1,000 ฿	1,-5,000 ฿	>5,000 ฿	exact ฿		< 1,000 ฿	1,-5,000 ฿	>5,000 ฿	exact ฿
ดินหลุด hollowing of the foundation																	
กำแพงร้าว cracking of the walls																	
อาคารชื้น humility or would at walls																	
ความเสียหายเกี่ยวกับความมั่นคงของอาคาร statical damages																	
พื้นชำรุด damage of the floor																	
อื่น ๆ																	
Others																	

คำถามหมายเลข
Questionnaire Nr.

น้ำท่วมครั้งที่
Nr. of flooding

18. ค่าใช้จ่ายอื่นที่เพิ่มเพราะน้ำท่วม ใช่ ไปตอบ 18.1 เปล่า ไปตอบ 19
Other costs, caused by flooding Yes = go to 18.1 No = go to 19

18.1 ค่าสูบน้ำ Pumping costs

18.1.1 ปั๊มซื้อมา
pump of own property

ปั๊มเช่ามา
commercial pump

ปั๊มยืมเขามา
another private pump

สูบจากเทศบาล
municipal pump

18.1.2 ค่าใช้จ่าย costs

500 บาท	500-1,000 บาท	เกิน 1,000 บาท	จริง ๆ
< 500 ฿	500 - 1,000 ฿	>1,000 ฿	exact

18.2 อื่น ๆ Others

ความเสียหาย	คิดเป็นเงิน
damages	costs

คำถามหมายเลข
Questionnaire Nr.

น้ำท่วมครั้งที่
Nr. of flooding

คำถามเพิ่มเติม Additional questions:

19. คุณเสียเวลาเดินทางไป-มาจากบ้านเพิ่มขึ้นหรือเปล่า
How much time was lost in the traffic per day during the flooding period?

คนที่ 1	1.	working person	วันละ	ชม.
คนที่ 2	2.	working person	วันละ	ชม.
คนอื่น ๆ	3.	Others	วันละ	ชม.
ทุกคน	4.	Together	วันละ	ชม.

19.1 คุณประมาณค่าเสียเวลาเพราะน้ำท่วม เพราะรถติดไปทำงานยาก เป็นเงินเท่าใดต่อชั่วโมง
Of which value do you estimate an hour of cost time in the traffic?

ไม่ถึง 10 บาท	10-25 บาท	25-50 บาท	50-100 บาท	100 บาท
< 10 ฿	10-25 ฿	25-50 ฿	50-100 ฿	>100 ฿

จริง ๆ บาท exact ฿

20. ถ้าจะลงทุนทำการป้องกันไม่ให้น้ำท่วมอีกเลย คุณคิดว่าจะเกิดผลประโยชน์ปีละกี่บาท
On which value do you estimate the advantage of having no floodings again ? ฿ / year

ไม่ถึง 100 บาท	100-1,000 บาท	1,000 - 5,000 บาท
< 100 ฿	100-1,000 ฿	1,000 - 5,000 ฿

5,000 - 10,000 บาท	เกิน 10,000 บาท
5,000 - 10,000 ฿	>10,000 ฿

ประมาณตัวเลขเลย บาท
exact ฿

Questionnaire for Trade

แบบสอบถามสำหรับร้านค้าพาณิชย์

Questionnaire for trade

แบบสอบถาม ที่

Questionnaire Nr.

ชื่อผู้ถาม
Interviewer

1. ชนิด
Classification

ร้านริมถนน, ไม่มีประตูใหญ่กั้นร้านกับถนน
street-shop, without a door between street and sale-room

ร้านพาณิชย์, มีประตูใหญ่รั้วกั้นร้านกับถนน
shop, with a door in front

ซุปเปอร์มาเกต, ห้างสรรพสินค้า
supermarket, department store

2. ขนาดเนื้อที่ดิน
Dimensions of the estate ≃ ☐ ตารางเมตร sqm(m^2)

3. ขนาดพื้นที่ทำการค้า
Size of sale-room ≃ ☐ ตารางเมตร sqm(m^2)

4. ยอดขายประจำปี (ประมาณ)
Turnover ≃ ☐ บาท / ปี ฿ / Year

5. ลักษณะอาคาร
Description of the site. ตั้งเดี่ยว Single ☐ อยู่ในแถว within a row ☐ อยู่ปลายแถว end of a row ☐

5.1 ความยาวของอาคาร / ความยาวถนน
Length of the shop paralled to the road ☐ ตารางเมตร sqm(m^2)

6. น้ำท่วมเข้าร้านทางด้านไหน
From which side might the water come in?

ด้านหน้า from the front side ☐ ด้านหลัง from the backside ☐ หน้าและหลัง both ☐

อื่นๆ
Others

แบบสอบถาม ที่

Questionnaire Nr.

7. พื้นที่ทำการค้าสูงกว่าพื้นที่ดินรอบ ๆ หรือเปล่า

Is the floor of the shop higher than the level of the surrounding?

ใช่ ตอบ 7.1 Yes ☐ = go to 7.1 ไม่ใช่ ตอบ 8 No ☐ = go to 8

7.1 ถ้าใช่สูงกว่าเท่าไหร่ In case of "yes" how much.

0-10 ซม 0-10 cm ☐ 10-20 ซม 10-20 cm ☐ 20-30 ซม 20-30 cm ☐ 30 ซม > 30 cm ☐

จริง ๆ ☐ ซม exact ☐ cm.

7.2 ที่สูงเท่านี้เพราะลงทุนถมหรือยกพื้นใช่ไหม

ใช่ ไปตอบ 7.2.1 ไม่ใช่ ไปตอบ 8

Did this higher level cause additional costs?

Yes ☐ = go to 7.2.1 No ☐ = go to 8

7.2.1 ต้องจ่ายเงินไปเท่าใด How much money had been spent additionally.

10,000 บาท < 10,000 ฿ ☐ 10,000-50,000 บาท 10,000-50,000 ฿ ☐ มากกว่า 50,000 บาท > 50,000 ฿ ☐

จริง ๆ ☐ บาท exact ☐ ฿

7.2.2 จ่ายไปเมื่อ พ.ศ. ☐

When had this been? _ _ _ _ _ _ AD

8. คุณสร้างกำแพงหรือคันกั้นน้ำท่วมร้านหรือเปล่า

Did you build walls or dams in front or beside your shop.

ใช่ ตอบ 8.1 Yes ☐ = go to 8.1 ไม่ใช่ ตอบ 9 No ☐ = go to 9

8.1 ถ้าใช่ทำชั่วคราว ก. ตอบ 8.1.1

If "yes" were they temporary ones. a. ☐ go to 8.1.1

หรือถาวร ข. ตอบ 8.1.2

or permanent ones. b. ☐ go to 8.1.2

แบบสอบถาม ที่
Questionnaire Nr.

8.1.1 คุณทำที่กั้นน้ำบ่อยแค่ไหน
How often did you build these walls or dams?

ทุกปี each year ☐ ทำเฉพาะปี only in ☐☐☐☐ พ.ศ.

หรือ or ☐ ครั้ง times in the last five years

go to 8.2

8.1.2 คุณสร้างคันกั้นน้ำ เมื่อ พ.ศ. ☐☐☐☐
When did you build this dam or wall .....

8.2 คันกั้นน้ำของคุณสูงเท่าไหร่
Which height do these dams or walls have?

ไม่ถึง 10 ซม < 10 cm ☐ 10-20 ซม 10-20 cm ☐ 20-30 ซม 20-30 cm ☐ เกิน 30 ซม > 30 cm ☐

จริง ๆ ☐☐ ซม exact ☐☐ cm.

8.3 คุณสร้างคันกั้นน้ำด้วยตนเองหรือเปล่า (คุมงานก็นับ)
Did you build these dams or walls yourself

ใช่ ตอบ 8.3.1 Yes ☐ = go to 8.3.1

ไม่ใช่ ตอบ 8.3.4 No ☐ = go to 8.3.4

8.3.1 คุณเสียเวลาทำงานกี่ชั่วโมง
How much hours of labour had been spent?

น้อยกว่า 100 ชม. < 100 h. ☐ 100-500 ชม. 100-500 h. ☐ กว่า 500 ชม. > 500 h. ☐ จริง ๆ exact ☐☐☐ ชม. hours.

8.3.2 คุณตีราคาค่าเสียเวลาชั่วโมงละเท่าไหร่
Which price do you estimate for an hour of your own or

ค่าแรงคนที่ทำคันกั้นน้ำ
your employees work for building a wall or dam?

น้อยกว่า 25 บาท < 25 ฿ ☐ 25-50 บาท 25-50 ฿ ☐ 50-100 บาท 50-100 ฿ ☐ กว่า 100 บาท >100 ฿ ☐

จริง ๆ ☐☐☐ บาท Exact ☐☐☐ ฿

แบบสอบถาม ที่

Questionnaire Nr.

8.3.3 ค่าของทำคันกั้นน้ำ

How much money did you spend on material, trucks etc.?

น้อยกว่า 1,000 บาท < 1,000 ฿ ☐ 1,000-5,000 บาท 1,000-5,000 ฿ ☐ กว่า 5,000 บาท > 5,000 ฿ ☐ จริง ๆ ☐ บาท exact ☐ ฿

8.3.4 คุณต้องเสียเงินให้บริษัททำคันกั้นน้ำเท่าไหร่

How much money had you to pay to the building enterprise?

น้อยกว่า 10,000 บาท < 10,000 ฿ ☐ 10,000-50,000 บาท 10,000-50,000 ฿ ☐ กว่า 50,000 บาท > 50,000 ฿ ☐

จริง ๆ ☐ บาท exact ☐ ฿

9. คุณซื้อปั๊มน้ำหรือเปล่า ซื้อ ตอบ 9.1 เปล่า ตอบ 10

Did you buy a pump. Yes ☐ = go to 9.1 No ☐ = go to 10

9.1 ซื้อเมื่อ พ.ศ. ☐

When had this been? _ _ _ _ _ _ _ AD

9.2 ราคา

How much did it cost?

น้อยกว่า 20,000 บาท < 20,000 ฿ ☐ 20,000-50,000 ฿ ☐ มากกว่า 50,000 บาท > 50,000 ฿ ☐

จริง ๆ ☐ บาท exact ☐ ฿

9.3 ใช้ปั๊มบ้างหรือยัง แล้ว ยัง

Had this pump been used it any time? Yes ☐ No ☐

10. อุปกรณ์ที่ใช้ประกอบ เช่น วาวล์ ท่อ ฯลฯ

Other investment (eg. check valves, special doors)

ของที่ใช้	วัน เดือน ปี	ราคา
Investment	Date(year)	Costs(฿)

แบบสอบถาม ที่
Questionnaire Nr.

สำหรับน้ำท่วมแต่ละครั้งจะต้องมีการสัมภาษณ์ตอนที่ 2 ถ้าความเสียหายจากการท่วมแต่ละครั้งไม่เหมือนกัน

For each flooding there is a separate questionnaire part 2 to fill in the effect of each flood was different.

แบบสอบถาม ที่	ตอน 2	น้ำท่วมครั้งที่
Questionnaire Nr.	Part 2	Nr. of flooding

11. ความเสียหายจากน้ำท่วม เดือน ☐ พ.ศ.
Afflicted by which flooding? _ _ _ _ _ _ _ _ AD

12. น้ำท่วมสูงเท่าใดเหนือพื้นร้าน (ประมาณ)
Which height did the flooding reach (average in the shop)?

10 ซม < 10 cm ☐ | 10-20 ซม 10-20 cm ☐ | 20-30 ซม 20-30 cm ☐ | มากกว่า 30 ซม >30 cm ☐ | จริง ๆ exact ☐ ซม cm

13. ท่วมนานเท่าใด
How long did the flooding last?

1-2 วัน 1-2 days ☐ | 3-7 วัน 3-7 days ☐ | 8-30 วัน 8-30 days ☐ | กว่า 1 เดือน >1 month ☐ | จริง ๆ exact ☐

14. ความเสียหายเกิดทันที ปี ก. a. ☐
Did the damages occur at once ?

บอกไม่ถูก ค. c. ☐
or cannot be said

ความเห็นอื่น ๆ
Place for comments.

ไทย

English:

แบบสอบถาม ที่

Questionnaire Nr.

15. ความเสียหายเกิดที่ร้านส่วนไหน

Which parts of the shop had been afflicted?

ท่วมทั้งที่ดิน	all the estate around	☐
ท่วมที่ดินบางส่วน	partly of it	☐
ท่วมร้านทั้งหมด	the whole shop	☐
ท่วมเฉพาะห้องโชว์	the shop-window	☐
ท่วมที่ห้องเก็บสินค้า	the store-room	☐
ท่วมที่ทำงาน	office	☐
ท่วมที่อื่น ๆ		
Others which?		☐

ไทย

English:

16. ข้าวของเสียหายกี่บาท ความชำรุดเป็นมูลค่าเท่าใด

Goods of which value were spoilt or low great was the reduction of value of goods?

1,000 บาท	1,000-10,000 บาท	10,000-100,000 บาท	กว่า 100,000 บาท
< 1,000 ฿ ☐	1,000-10,000 ฿ ☐	10,000-100,000 ฿ ☐	> 100,000 ฿ ☐

17. รายได้ประจำปีลดลงเพราะน้ำท่วมสินค้าเสียหายหรือเปล่า

Did turnover decrease because of flooding? Spoilt goods

รายได้ประจำปีลดเพราะคนซื้อน้อยลง ใช่ ตอบ 17.1 เปล่า ตอบ 19

must not be put in here. Demand decreased because of worst conditions etc.

Yes ☐ = 17.1 No ☐ = 19

แบบสอบถาม ที่
Questionnaire Nr.

17.1 รายได้ลดลง

In case of "yes" how much did it decrease? ☐ ฿

18. รายได้ลดลงจนทำให้ขาดทุนหรือเปล่า ถ้าขาดทุน ๆ เท่าใด

How many Baht did you loose because of this decrease of fund?

ไม่ถึง 1,000 บาท < 1,000 ฿ ☐ | 1,000-5,000 บาท 1,000-5,000 ฿ ☐ | 5,000-10,000 บาท 5,000-10,000 ฿ ☐ | กว่า 10,000 บาท > 10,000 ฿ ☐

จริง ๆ ☐ บาท exact ☐ ฿

19. ความเสียหายอื่นๆ ☐ บาท ฿ ค่าซ่อมโทรศัพท์ ☐ บาท ฿
Other costs: repairing of Tel.

ค่าซ่อมรถ ☐ บาท repairing of cars ☐ ฿

อื่น ๆ
Others

ไทย

English

20. คุณต้องเสียเวลาเดินทางทำธุรกิจเพิ่มขึ้นอีกวันละกี่ชั่วโมง

How much time did you or your employees loose on business drives per day?

น้อยกว่า 0.5 ชม. < 0.5 h. ☐ | 0.5-1 ชม. 0.5-1 h. ☐ | 1-2 ชม. 1-2 h. ☐ | 2-4 ชม. 2-4 h. ☐ | มากกว่า 4 ชม. > 4 h. ☐

จริง ๆ ☐ ชม. exact ☐ hours.

แบบสอบถาม ที่

Questionnaire Nr.

21. คุณตีราคาค่าเสียเวลาเท่าใด เสียเวลาแล้วทำให้ธุรกิจเสียไปด้วยก็มัย

On which price do you estimate that time, that you loose on these drives (loss of profit)?

ไม่ถึง 10 บาท/ชม. < 10 ฿ / h. ☐ 10-15 บาท/ชม. 10-25 ฿ / h. ☐ 25-50 บาท/ชม. 25-50 ฿ / h. ☐ 50-100 บาท/ชม. 50-100 ฿ / h. ☐

มากกว่า 100 บาท/ชม. >100 ฿ / h. ☐ จริง ๆ exact ☐ บาท/ชม. ฿ / h.

22. ถ้าเกิดน้ำท่วมแบบนี้อีกในปีหน้าคุณคิดว่าค่าเสียหายจะขึ้นเป็นเท่าใด บาท/ปี

On which value do you estimate the advantage of having no floodings again?

฿ / Year = ☐

ไม่ถึง 100 บาท < 100 ฿ ☐ 100-1,000 บาท 100-1,000 ฿ ☐ 1,000-5,000 บาท 1,000-5,000 ฿ ☐ 5,000-10,000 บาท 5,000-10,000 ฿ ☐

มากกว่า 10,000 > 10,000 ฿ ☐ จริง ๆ ☐ บาท exact ☐ ฿

ต่อไปนี้ถามเฉพาะเจ้าของร้านที่เป็นเจ้าของอาคารหรือที่ดินด้วย

The rest is only to be filled in, when the owner of the shop is responsible of the house or estate.

แบบสอบถาม ที่

Questionnaire Nr.

น้ำท่วมครั้งที่

Nr. of flooding

23. ถามแบบเดียวกับข้อ 16 สำหรับบ้านพักอาศัย

Is question 16 from dwelling houses . Table

24. ถามแบบเดียวกับข้อ 17 สำหรับบ้านพักอาศัย

Is question 17 from dwelling house

25. ค่าเดินเครื่องสูบน้ำ Pumping costs.

น้อยกว่า 500 บาท < 500 ฿ ☐ 500-1,000 บาท 500-1,000 ฿ ☐ มากกว่า 1,000 บาท > 1,000 ฿ ☐ จริง ๆ exact ☐ บาท

ใช้ไฟฟ้า Electricity ☐ วัตต์ watt ☐ ชั่วโมง hour

แบบสอบถาม ที่
Questionnaire Nr.

16. มีความเสียหายกับพื้นที่ดินหรือเปล่า
Had their been any damages at the estate?

มี ไปตอบ 16.1 = Yes = 16,1
ไม่มี ไปตอบ 17 = No = go to 17

ความเสียหาย Kind of damage	ขนาดไหน of which intensity			ใช้เวลาซ่อมกี่ชั่วโมง Amount of labouring hours of owners				ค่าวัสดุและขนส่ง material costs and trucks etc.					ซ่อมโดยผู้ประกอบการ repairing by enterprise	ค่าจ้างซ่อม repairing costs				
	เล็ก small	กลาง medium	ใหญ่ large	10-50 ชม. 10-50 h.	50-100 ชม. 50-100 h.	> 100 ชม. > 100 h.	ประมาณ ? ชม. approx. ? h.	< 1,000 บาท < 1,000 ฿	1-5,000 บาท 1-5,000 ฿	> 5,000 บาท > 5,000 ฿	ประมาณ ? บาท approx. ? ฿		repairing by enterprise	< 1,000 บาท < 1,000 ฿	1-5,000 บาท 1-5,000 ฿	> 5,000 บาท > 5,000 ฿	ประมาณ ? บาท approx. ? ฿	
ทางเดินหักหลุดหรือเสีย hollowed or destroyed drive or footway													☐					
รั้วกำแพงพัง destroyed fences or walls													☐					
ขยะโคลนตกค้าง waste-sediment													☐					
ดินถล่มหลุด soil-erosion													☐					
อื่น ๆ																		
Others																		

แบบสอบถาม ที่
Questionnaire Nr.

น้ำท่วมครั้งที่
Nr. of flooding

17. มีความเสียหายกับตัวอาคารหรือเปล่า ใช่ ตอบ 17.1 ไม่ใช่ ตอบ 18

Did any damages arise at the house? Yes = go to 17.1 No = go to 18

Kind of damage	of which intensity: small	medium	large	Repairing by owners: Amount of labouring hours of the owners: 10-50 h.	50-100 h.	> 100 h.	exact hours	Material costs and trucks etc.: 500-1,000 ฿	1,-5,000 ฿	> 5,000 ฿	exact ฿	Repaired by enterprise: repairing costs: < 1,000 ฿	1-5,000 ฿	> 5,000 ฿	exact ฿
☐ คินทรุด hollowing of the foundation															
☐ ก้าแพงร้าว cracking of the walls															
☐ อาคารชื้น humility or would at walls															
☐ statical damages															
☐ พื้นชำรุด damage of the floor															
อื่น ๆ															
Others															

APPENDIX C

Future Urbanized Area

Appendix C Future Urbanized Area

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1. Existing Development Plan

1.1 Development Plan

There are two development plans; "The Fifth 5-year National Economic and Social Development Plan" and "The Structural Plan for Bangkok Metropolis and its Vicinity".

1) The Fifth 5-year Plan

The Fifth national economic and social development plan (1982-1986) deals with the development of various sectors of the Kingdom. Associated with the urban development, this plan emphasizes a strategy to stimulate economic activities and population in other regions outside the capital.

2) The Structural Plan for Bangkok Metropolis and its vicinity

The Cabinet gave an assent to the Department of Town and Country Planning (DTCP) to draw up a Structural Plan of the Bangkok Metropolis under the City Planning Act in 1976.

The DTCP made the Structural Plan and had public hearings from 1976 several times, aiming at the enforcement of the Structural Plan under the City Planning Act but without success. According to the latest Plan (1982) as shown in Fig. C.1, while the DTCP is now revising this Plan, aiming at public hearings in 1984, the whole region (Bangkok Metropolis and its vicinity) is divided into 3 parts, as follows:

(Inner Area)

The inner area is the center of the Bangkok Metropolis and its vicinity, having a radius of 20 to 25 kilometers from the core.

(Green Belt Area)

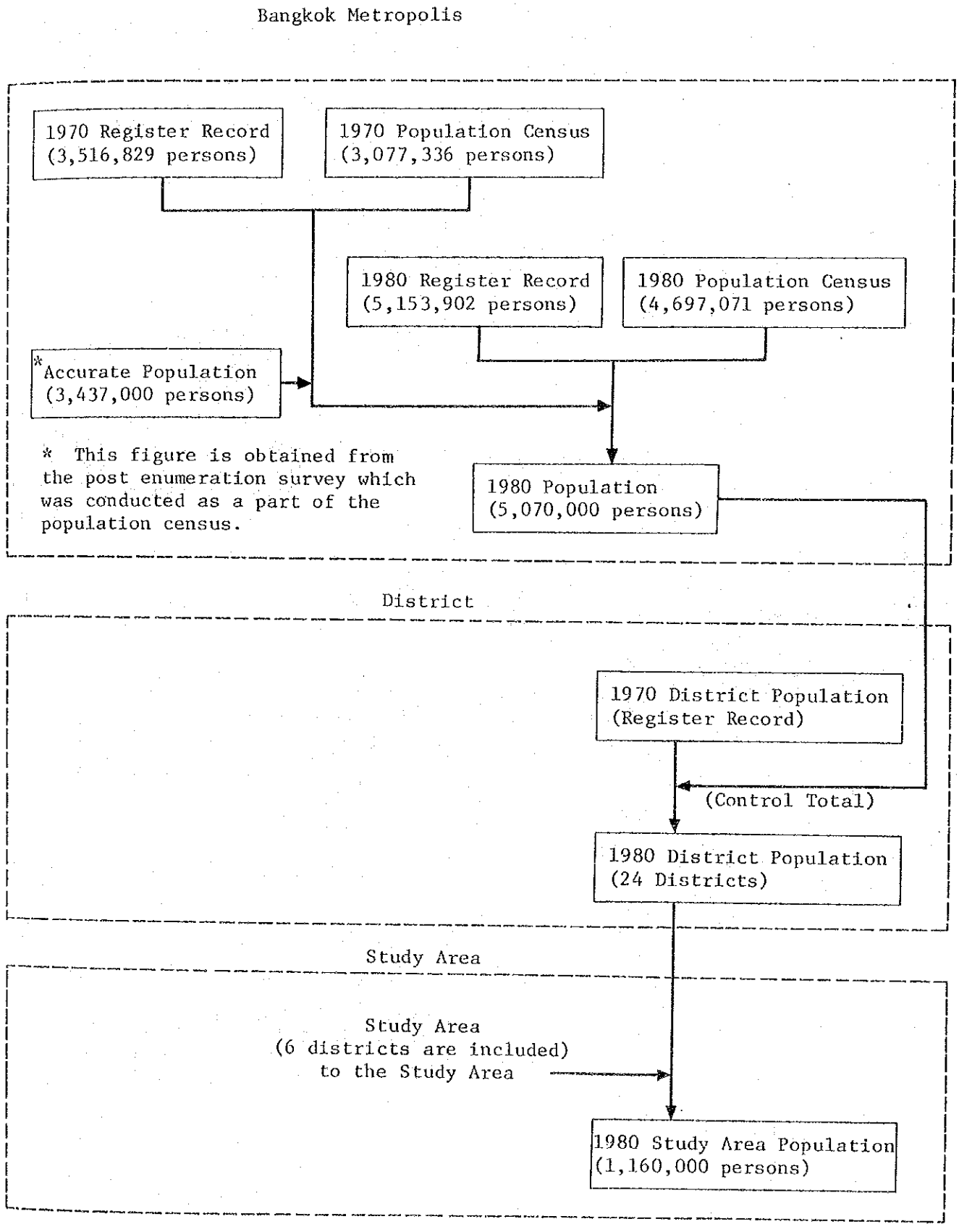
The green belt area is the zone between the inner area and the outer area, and is proposed to stop uncontrolled urbanization from the inner area.

(Outer Area)

The outer area is the zone outside the green belt.

The use for agriculture and the construction of residential and industrial complexes is encouraged.

2. Estimated Population of the Study Area in the year 1980



3. Population Projection of the Bangkok Metropolis and the Study Area

3.1 Population Projection for the Bangkok Metropolis for the year 2000

a. Projection based on regression curve

Year	Population
1960	2,253,000
1970	3,437,000
1980	5,070,000
1990	(6,390,000)
2000	(7,780,000)

1) Future population is estimated based on the past population using a logarithmic regression curve.

b. Projection based on "Population Projections for Thailand Whole Kingdom and Regions".
The National Statistical Office estimated the 1990 population based on 1970 population.

Year	Population
1970	3,437,000 Persons
1975	4,347,000
1980	5,152,000
1985	6,108,000
1990	6,996,000
2000	(8,780,000)*

Note : Future population in the year of 2000 is estimated based on the population from 1970 to 1990, using the regression curve.

c. Estimated figures from "The General Plan of Bangkok Metropolis and its Vicinity 2000".

Future population estimated by DTCP is as follows:

Year	Population	Growth Rate
	Persons	Percent
1980	5,154,000	2.3
1990	6,458,000	1.6
1995	6,991,000	1.05
2000	7,365,000	

d. Estimated figures of "The Research Centre of Chulalongkorn University"

The Research Centre estimated future population as follows:

Year	Population	Growth Rate
	Persons	Percent
1980	4,981,631	
1990	6,264,965	2.3
2000	7,503,712	1.8

These four estimated figures were adjusted by the Study Team based on the 1980 population of 50,700,000 persons as follows:

Year	Method			
	a	b	c	d
1980	5,070,000	5,070,000	5,070,000	5,070,000
1990	6,390,000	6,890,000	6,360,000	6,380,000
2000	7,780,000	8,640,000	7,260,000	7,640,000

3.2 Population Projection for the Study Area

3.2.1 Employment Projection related to industrial land use.

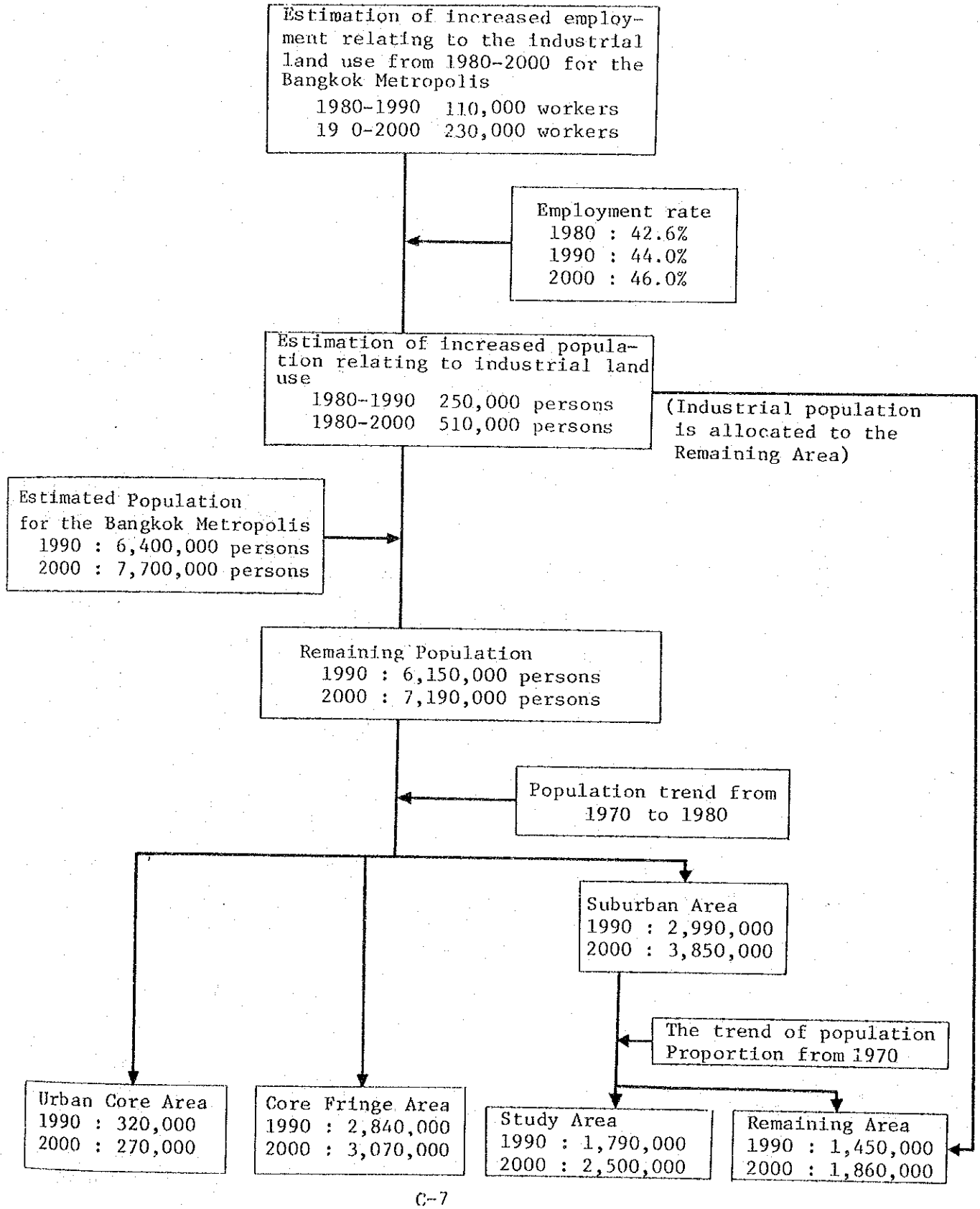
Future employment related to industrial land use was estimated based on the Population Census from 1960 to 1980.
The results are summarized in Table C.1.

Table C.1. Employment Projection Relating to Land Use

	1980	1990	2000
Industrial	330,000	440,000	560,000
(Commercial)	1,240,000	1,630,000	2,060,000
(Agricultural)	130,000	110,000	90,000
(Government)	460,000	640,000	830,000
Total:	2,160,000	2,820,000	3,540,000

3.2.2 Population Projection for the Study Area

The future population for the Study Area is estimated as follows :



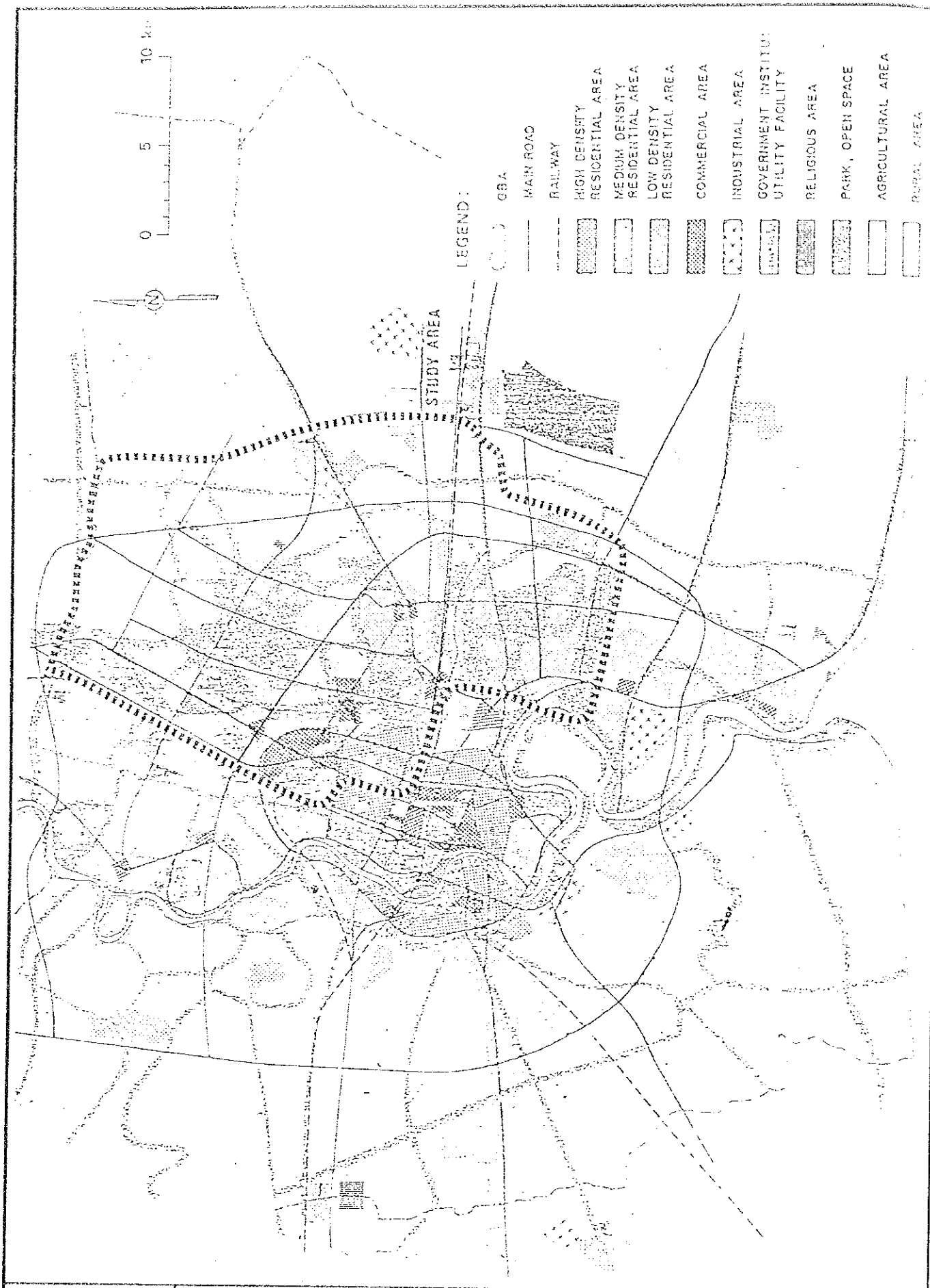


FIG. C . 1 **Structural Plan of Bangkok Metropolis and its Vicinity under DTCP**

FLOOD PROTECTION/DRAINAGE PROJECT IN EASTERN SUBURBAN-BANGKOK

APPENDIX D

Land Subsidence

Appendix D Land Subsidence

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