がＲＩＤの半永久組織として設立される必要がある。

このＦＦＣの組織の構成と他の関係機関との関連は図７－17に示す如くである。

この組織でＦＦＣを管理する議長は洪水予報、洪水防御に造詣が深く、またＲＩＤ内の関係部署の活動を調整しうる立場の人間が担当する。またこの議長の下に洪水予報結果を評価し、適切な水防活動を即座に実行するために管理委員会を設定する。この委員会のメンバーにはＲＩＤ内の関係部署、事務所から選ぶ。表７－20にメンバーとその役割を示す。洪水予報の初期段階の作業を行うＦＦＣの中の洪水予測係は委員会の幹事役も行う。

議長からの指示と情報によって洪水予報の実際の運営はＦＦＣの総務係、洪水予測係、通信係、情報処理係等の各係によってサポーティングレポートに詳しく示す役割に従って行われる。

役割の分担

表７－12にＦＦＣの中での役割分担を示す。

テレメーター、レーダー、水文観測機器等電気通信機器の管理のためにＲＩＤ地方局（第１、２、３、７、８）に設置する集中局はＦＦＣの通信係で管理する。

7.8 プロジェクト評価

洪水防御計画で重要な役割を担う、洪水予報システムが確立されると、このシステム運用によって社会・経済的影響とともにかなりの洪水被害軽減が期待できる。さらに洪水防御計画が実施されれば、洪水被害軽減の目標は完全に達せられる。

(1) 洪水被害の軽減

第６章に述べたように、第１ステップ洪水予報システムがもたらす直接的な効果は(a)建物、道路、鉄道、河川構造物、農作物等の不動産、(b)家畜、家財等の動産、(c)人々や事務所の商業活動、(d)道路、鉄道の交通等に対する洪水被害の軽減である。

最新施設による第２ステップシステムでは、第１ステップに比べ洪水予測結果がより即座に関係機関に通報される。そのため洪水被害軽減効果は第１ステップよりはるかに大きいと考えられる。

(2) その他の影響

上記の直接効果の他、このシステムによって次のような影響が期待出来る。

(a) このシステムの電気通信網を使って非洪水期でＲＩＤ本局、地方局、他の関係機関と情報交換等のため交信することが出来る。このため通常業務の処理がかなり容易になる。

(b) 早急な情報伝達によって突然の洪水来襲に対する脅威がなくなり民生の安定がえられる。

(c) 施設の投入によって地域の経済発展に刺激的な効果を与える。

(d) 建設工事の実施によって雇用の機会が生まれる。

この他、第２ステップシステムの運営によって次のシステムや組織が生まれる。

(a) 広範囲、長期間に渡る水文、水理データの蓄積によってより長期の洪水予測システムが確立される。

(b) 専門家の入った洪水予測のための組織が確立される。

表7－1 (1/3) 対象雨量観測所変化による年最大流量、年間流出量計算値（第2ステップ）

Case of Observation and Simulation				Objective Basin: Upper Reaches from Bhumibol Dam (C.A. = 20,031 km^2) /1			
Year		Case No.	Density of Rainfall Gauging Network (km^2/station)	Number of Rainfall Stations	Annual Peak Discharge (m^3/s)	(Date)	Annual Discharge Volume (10^6m^3)
1978	(1)	Observation	-	-	1,267	Oct. 06	6,829
	(2)	Simulation 1	1000	20	1,327	Oct. 05	6,771
	(3)	simulation 2	1200	17	1,337	Oct. 05	6,797
	(4)	Simulation 3	1400	13	1,431	Oct. 05	6,967
	(5)	Simulation 4	1600	13	1,431	Oct. 05	6,967
	(6)	Simulation 5	more than 1800	11	1,368	Oct. 05	6,167
1980	(1)	Observation	-	-	1,662	Oct. 08	6,156
	(2)	Simulation 1	1000	19	1,547	Oct. 08	6,214
	(3)	Simulation 2	1200	17	1,587	Oct. 08	6,185
	(4)	Simulation 3	1400	13	1,627	Oct. 08	5,939
	(5)	Simulation 4	1600	12	1,635	Oct. 08	5,930
	(6)	Simulation 5	more than 1800	10	1,805	Oct. 08	5,499
1983	(1)	Observation	-	-	1,574	Oct. 19	4,939
	(2)	Simulation 1	1000	20	1,593	Oct. 19	5,041
	(3)	Simulation 2	1200	16	1,577	Oct. 20	5,013
	(4)	Simulation 3	1400	14	1,670	Oct. 20	5,551
	(5)	Simulation 4	1600	13	1,652	Oct. 20	5,547
	(6)	Simulation 5	more than 1800	11	1,709	Oct. 20	5,285

Note: /1 Covering the sub-basin of Code No. BS-1.

表7－1 (2/3) 対象雨量観測所変化による年最大流量、年間流出量計算値（第2ステップ）

Case of Observation and Simulation				Objective Basin: Upper Reaches from Nakhon Sawan (C.A. = 58,721 km^2) /1			
Year		Case No.	Density of Rainfall Gauging Network (km^2/station)	Number of Rainfall Stations	Annual Peak Discharge (m^3/s)	(Date)	Annual Discharge Volume (10^6m^3)
1978	(1)	Observation	-	-	3,540	Oct. 07	31,215
	(2)	Simulation 1	1000	59	3,579	Oct. 07	30,892
	(3)	simulation 2	1200	49	3,514	Oct. 08	30,139
	(4)	Simulation 3	1400	42	3,378	Oct. 08	28,477
	(5)	Simulation 4	1600	37	3,390	Oct. 08	29,453
	(6)	Simulation 5	more than 1800	33	3,268	Oct. 08	29,780
1980	(1)	Observation	-	-	4,320	Oct. 09	29,085
	(2)	Simulation 1	1000	57	4,360	Oct. 09	30,753
	(3)	Simulation 2	1200	49	4,373	Oct. 09	30,959
	(4)	Simulation 3	1400	40	4,434	Oct. 09	30,501
	(5)	Simulation 4	1600	38	4,514	Oct. 09	31,081
	(6)	Simulation 5	more than 1800	34	4,580	Oct. 09	31,663
1983	(1)	Observation	-	-	2,290	Oct. 23	23,945
	(2)	Simulation 1	1000	58	2,324	Oct. 24	24,831
	(3)	Simulation 2	1200	48	2,332	Oct. 24	25,081
	(4)	Simulation 3	1400	42	2,229	Oct. 24	24,962
	(5)	Simulation 4	1600	37	2,304	Oct. 24	25,612
	(6)	Simulation 5	more than 1800	32	2,372	Oct. 24	26,319

Note: /1 Covering the sub-basins of Code Nos. BS-2, 3, 4, 5 6, 7, 8, 9 and 10.

表7－1 (3/3) 対象雨量観測所変化による年最大流量、年間流出量計算値（第2ステップ）

Case of Observation and Simulation				Objective Basin: Pasak River Upper Reaches from Saraburi (S.9) (C.A. = 8,124 km^2) /1			
Year		Case No.	Density of Rainfall Gauging Network (km^2/station)	Number of Rainfall Stations	Annual Peak Discharge (m^3/s)	(Date)	Annual Discharge Volume (10^6m^3)
1978	(1)	Observation	-	-	3,206	Oct. 03	5,186
	(2)	Simulation 1	1000	-	-	-	-
	(3)	simulation 2	1200	7	3,272	Oct. 03	5,318
	(4)	Simulation 3	1400	-	-	-	-
	(5)	Simulation 4	1600	5	3,305	Oct. 03	6,023
	(6)	Simulation 5	more than 1800	3	3,309	Oct. 03	6,239
1980	(1)	Observation	-		No Notable Flood		
	(2)	Simulation 1	1000				
	(3)	Simulation 2	1200				
	(4)	Simulation 3	1400				
	(5)	Simulation 4	1600				
	(6)	Simulation 5	more than 1800				
1983	(1)	Observation	-		No Notable Flood		
	(2)	Simulation 1	1000				
	(3)	Simulation 2	1200				
	(4)	Simulation 3	1400				
	(5)	Simulation 4	1600				
	(6)	Simulation 5	more than 1800				

Note: /1 Covering the sub-basin of Code No. BS-14.

表7－2 (1/2) 雨量観測所一覧表（第2ステップ）

Installation Priority	Code No.	River Basin	Location	
			Latitude	Longitude
1	R-1.1	Sakae Krang	15°54'	99°28'
1	R-1.2	"	15°47'	99°41'
1	R-1.3	"	15°38'	99°32'
1	R-1.4	"	15°28'	99°34'
1	R-1.5	Chao Phraya	15°20'	100°32'
1	R-1.6	Pasak	15°28'	101°04'
1	R-1.7	"	15°13'	101°16'
1	R-1.8	"	15°04'	101°04'
1	R-1.9	"	14°51'	100°59'
1	R-1.10	"	14°37'	101°11'
2	R-2.1	Ping	16°52'	99°07'
2	R-2.2	"	16°46'	98°55'
2	R-2.3	"	16°20'	99°16'
2	R-2.4	"	16°12'	99°43'
2	R-2.5	"	16°03'	99°51'
2	R-2.6	"	15°56'	99°59'
2	R-2.7	Yom	16°49'	99°48'
2	R-2.8	"	16°39'	99°35'
2	R-2.9	"	16°27'	99°53'
2	R-2.10	Nan	16°52'	100°45'
2	R-2.11	"	16°50'	100°31'
2	R-2.12	"	16°42'	100°36'
2	R-2.13	"	16°25'	100°33'
2	R-2.14	"	16°12'	100°25'
2	R-2.15	Nan	16°10'	100°33'
2	R-2.16	"	16°11'	100°51'
2	R-2.17	"	15°51'	100°35'
2	R-2.18	"	15°38'	100°29'
2	R-2.19	"	15°35'	100°39'
2	R-2.20	Pasak	16°25'	101°09'
2	R-2.21	"	15°59'	101°03'
2	R-2.22	"	15°59'	101°14'

表７－２ (2/2) 雨量観測所一覧表（第２ステップ）

Installation Priority	Code No.	River Basin	Location	
			Latitude	Longitude
3	R-3.1	Wang	18°17'	99°30'
3	R-3.2	"	18°07'	99°31'
3	R-3.3	"	17°52'	99°20'
3	R-3.4	Yam	18°23'	100°22'
3	R-3.5	"	18°08'	100°08'
3	R-3.6	"	18°04'	99°50'
3	R-3.7	"	17°53'	99°36'
3	R-3.8	"	17°19'	99°33'
3	R-3.9	"	17°00'	99°34'
3	R-3.10	Nan	17°37'	100°05'
3	R-3.11	"	17°28'	100°07'
3	R-3.12	"	17°13'	100°21'
3	R-3.13	"	17°17'	100°33'
3	R-3.14	"	17°05'	100°50'
4	R-4.1	Ping	18°50'	98°58'
4	R-4.2	"	18°51'	99°17'
4	R-4.3	"	18°50'	98°44'
4	R-4.4	"	18°42'	99°02'
4	R-4.5	"	18°29'	98°21'
4	R-4.6	"	18°24'	98°40'
4	R-4.7	"	18°27'	99°08'
4	R-4.8	"	18°17'	98°19'
4	R-4.9	"	18°18'	98°49'
4	R-4.10	"	18°03'	98°38'
4	R-4.11	"	17°47'	98°21'
4	R-4.12	"	17°48'	98°57'
4	R-4.13	"	17°39'	98°46'
4	R-4.14	"	17°22'	98°29'
4	R-4.15	Nan	18°44'	101°01'
4	R-4.16	"	18°34'	100°45'
4	R-4.17	"	18°23'	100°51'
4	R-4.18	"	18°19'	100°43'
4	R-4.19	"	18°02'	101°01'

表7－3　雨量水位観測所一覧表（第2ステップ）

Installation Priority	Station Code No.	River System	Location		Existing /1 Gauging Station Located Nearby	Existing River Structure Located Nearby
			Latitude	Longitude		
1	W/R-1.1	Chao Phraya	15°40'	100°06'	C2 (RID)	-
1	W/R-1.2	Sakae Krang	15°29'	99°56'	-	-
1	W/R-1.3	Pasak	16°46'	101°14'	Wichian Buri (MD)	-
1	W/R-1.4	"	14°33'	100°45'	-	Upper Rama VI Dam Site
2	W/R-2.1	Ping	17°12'	99°06'	W4A (RID)	-
2	W/R-2.2	"	16°28'	99°31'	P7A (RID)	-
2	W/R-2.3	Yom	16°30'	100°12'	Y17 (RID)	-
2	W/R-2.4	Nan	16°49'	100°15'	N5A (RID)	-
2	W/R-2.5	"	16°12'	100°25'	N10A (RID)	-
2	W/R-2.6	Pasak	16°46'	101°14'	Lom Sak (MD)	-
3	W/R-3.1	Wang	18°31'	99°37'	W10A (RID)	Lower Kiu Lom Dam Site
3	W/R-3.2	"	17°38'	99°14'	W3A (RID)	-
3	W/R-3.3	Yom	18°35'	100°09'	Y20 (RID)	-
3	W/R-3.4	"	17°35'	99°43'	Y14 (RID)	-
3	W/R-3.5	"	17°00'	99°49'	Y4 (RID)	-
3	W/R-3.6	Nan	17°44'	100°32'	N12A (RID)	Lower Sirikit Dam Site
3	W/R-3.7	"	17°01'	100°11'	N27A (RID)	Upper Naresuan Dam Site
4	W/R-4.1	Ping	18°47'	99°00'	P1 (RID)	-
4	W/R-4.2	Nan	18°46'	100°46'	N1	-

Note: /1 The name in parenthesis means the office controlling the existing water level gauging station.

表7－4 (1/2) 流域流出予測モデル適用雨量観測所（第2ステップ）

Objective Basin		Applied Gauging Station		
Basin Code No.	River System	Station Code No. /Location	Station Code No. /Location	Station Code No. /Location
BS-1	Ping	W/R-4.1/Chiang Mai R-4.3/Mae Rim R-4.6/Chom Thong R-4.9/Hot R-4.12/Li	R-4.1/Samoeng R-4.4/Sarapi R-4.7/Mae Tha R-4.10/Ban Aen R-4.13/Ban Ko	R-4.2/Sam Kamphaeng R-4.5/Mae Chaem R-4.8/Huai Mae Ka R-4.11/Omkoi R-4.14/Ban San Mamuang
BS-2	Wang	W/R-3.1/Kiu Lom Dam R-3.3/Sop Prap	R-3.1/Lampang W/R-3.2/Thoen	R-3.2/Mae Tha
BS-3	Ping	W/R-2.1/Wang Khrai R-2.3/Khlong Lan	R-2.1/Tak W/R-2.2/Kamphaeng Phet	R-2.2/Doi Musae
BS-4	Ping	W/R-2.2/Kamphaeng Phet R-2.6/Banphot Phisai	R-2.4/Khlong Khlung W/R-1.1/Nakhon Sawan	R-2.5/Ban Pang Wai
BS-5	Yom	W/R-3.3/Ngao Sak R-3.6/Long	R-3.4/Rong Kwang R-3.7/Wang Chin	R-3.5/Phrae W/R-3.4/Si Satchanalai
BS-6	Yom	W/R-3.4/Si Satchanalai W/R-3.5/Sukhotai	R-3.8/Thung Saliam	R-3.9/Ban Dan Lan Hoi
BS-7	Nan	W/R-4.2/Nan R-4.17/Na Noi W-R-3.6/Tha Pla	R-4.15/Mae Charim R-4.18/Yan Sarang	R-4.16/Sa R-4.19/Nam Pat
BS-8	Nan	W/R-3.6/Tha Pla R-3.12/Ban Nong Bon W/R-3.7/Naresuan Dam	R-3.10/Uttaradit R-3.13/Chattrakan W/R-2.4/Phitsanulok	R-3.11/Thron R-3.14 Nakhon Thai
BS-9	Nan	W/R-2.4/Phitsanulok R-2.12/Nan Khek	R-2.10/Khao Krayang R-2.13/Wang Saiphum	R-2.11/Wang Nok Aen

表7－4 (2/2) 流域流出予測モデル適用雨量観測所（第2ステップ）

Objective Basin		Applied Gauging Station		
Basin Code No.	River System	Station Code No. /Location	Station Code No. /Location	Station Code No. /Location
BS-10	Nan/ Yom	R-2.7/Khirimat R-2.13/Wang Saiphum R-2.16/Chon Daen R-2.19/Phaisali	R-2.8/Phran Kratai R-2.14/Bang Mun Nak R-2.17/Nong Bua W/R-2.3/Sam Ngam	R-2.9/Sai Ngam R-2.15/Thap Khlo R-2.18/Thatako W/R-2.5/Taphan Hin
BS-11	Sakae Krang	R-1.1/Ban Pang Makha R-1.4/Lan Sak	R-1.2/Ban San Chao W/R-1.2/Uthai Thani	R-1.3/Khlong Pho
BS-12	Tha Pla Pi	R-1.5/Ban Mi		
BS-13	Pasak	W/R-2.6/Lom Sak R-2.22/Ban Wang Thadi	R-2.20/Phetchabun W/R-1.2/Wichian Buri	R-2.21/Nong Phai
BS-14	Pasak	W/R-1.3/Wichian Buri R-1.8/Chai Badam W/R-1.4/Rama VI Dam	R-1.6/Kok Saat R-1.9/Phatthana Nikhom	R-1.7/Ban Tha Ruak R-1.10/Kham Takhian

表7－5 (1/2) 水位観測所一覧表（第2ステップ）

Installation Priority	Station Code No.	River System	Location		Existing /1 Gauging Station Located Nearby	Existing River Structure Located Nearby
			Latitude	Longitude		
1	W-1.1	Chao Phraya	15°09'	100°11'	C13 (RID)	Chao Phraya Dam
1	W-1.2	"	14°53'	100°24'	C3 (RID)	-
1	W-1.3	Lop Buri	14°47'	100°36'	L2A (RID)	-
1	W-1.4	Chao Phraya	14°35'	100°27'	C7A (RID)	-
1	W-1.5	"	14°21'	100°35'	S5 (RID)	-
1	W-1.6	"	14°11'	100°30'	C29 (RID)	-
1	W-1.7	"	13°53'	100°29'	C22 (RID)	-
1	W-1.8	"	13°47'	100°30'	C12 (RID)	-
1	W-1.9	"	13°44'	100°29'	C4 (RID)	-
1	W-1.10	"	13°32'	100°34'	Phra Chul (PAT)	-
1	W-1.11	C-P Canal /2	15°20'	100°06'	-	Manorom Regulator
1	W-1.12	"	15°09'	100°25'	-	Chongkae Regulator
1	W-1.13	"	14°54'	100°36'	-	Kake Kathien Regulator
1	W-1.14	"	14°38'	100°45'	-	Reong Rang Regulator
1	W-1.15	C-A Canal /3	15°10'	100°10'	-	Maharaj Regulator
1	W-1.16	Noi	15°10'	100°09'	-	Borommathat Regulator
1	W-1.17	"	14°56'	100°17'	-	Chanasatr Regulator

Note: /1 The name in parenthesis means the office controlling the existing water level gauging station.

/2 Chai Nat - Pasak Canal.

/3 Chai ,Nat - Ayutthaya Canal.

表7－5 (2/2) 水位観測所一覧表 (第2ステップ)

Installation Priority	Station Code No.	River System	Location		Existing /1 Gauging Station Located Nearby	Existing River Structure Located Nearby
			Latitude	Longitude		
1	W-1.18	Noi	14°45'	100°25'	-	Yang Manee Regulator
1	W-1.19	"	14°26'	100°23'	-	Pakhar Regulator
1	W-1.20	Suphan	15°13'	100°04'	-	Phonlathep Regulator
1	W-1.21	"	15°03'	100°01'	-	Thabote Regulator
1	W-1.22	"	14°46'	100°06'	-	Samchook Regulator
1	W-1.23	"	14°32'	100°08'	-	Phophya Regulator
2	W-2.1	Ping	17°14'	99°00'	P12 (RID)	Lower Bhumibol Dam Site
4	W-4.1	"	17°15'	98°50'	-	Upper Bhumibol Dam Site
4	W-4.2	Nan	17°46'	100°33'	-	Upper Sirikit Dam Site

Note: /1 The name in parenthesis means the office controlling the existing water level gauging station.

表７－６　水位流量監視検証用水位観測所（第２ステップ）

River System	Monitor and Calibration Items	Station Code No.	Location
Ping	Discharge	W-4.1	Upper Bhumibol Dam
Ping	Discharge	W/R-2.2	Kamphaeng Phet (P7A)
Wang	Discharge	W/R-3.2	Thoen (W3A)
Wang	Discharge	W/R-2.1	Wang Khrai (W4A)
Yom	Discharge	W/R-3.4	Si Satchanalai (Y14)
Yom	Discharge	W/R-3.5	Sukhotai (Y4)
Yom	Discharge	W/R-2.3	Sam Ngan (Y17)
Nan	Discharge	W-4.2	Upper Sirikit Dam
Nan	Discharge	W/R-3.7	Lower Naresuan Dam (N27A)
Nan	Discharge	W/R-2.4	Phitsanulok (N5A)
Nan	Discharge	W/R-2.5	Thaphan Hin (N10A)
Sakae Krang	Discharge	W/R-1.2	Thap Than (Ct8)
Pasak	Discharge	W/R-1.3	Wichian Buri
Pasak	Discharge	W/R-1.4	Upper Rama VI Dam
Chao Phraya	Discharge/Water Level	W/R-1.1	Nakhon Sawan (C2)
Chao Phraya	Discharge/Water Level	W-1.1	Lower Chao Phraya Dam (C13)
Chao Phraya	Discharge/Water Level	W-1.2	Sing Buri (C3)
Lop Buri	Discharge/Water Level	W-1.3	Lop Buri (L2A)
Chao Phraya	Discharge/Water Level	W-1.4	Angthong (C7A)
Chao Phraya	Discharge/Water Level	W-1.5	Ayutthaya
Chao Phraya	Discharge/Water Level	W-1.6	Bang Sai (C29)
Chao Phraya	Water Level	W-1.7	Pakred (C22)
Chao Phraya	Water Level	W-1.8	RID Bangkok Office (C12)
Chao Phraya	Water Level	W-1.9	Memorial Bridge
Chao Phraya	Water Level	W-1.10 /1	Fort Phra Chul (Gulf)

Note: /1 The observed water level is also used to predict the tidal level in the Gulf of Thailand.

表7－7　既存流量調節ゲート地点監視用水位観測所（第2ステップ）

Name of Channel	Name of Regulator	Station Code No.
Chai Nat-Pasak Canal	Manorom	W-1.11
Chai Nat-Pasak Canal	Chongkae	W-1.12
Chai Nat-Pasak Canal	Kake Kathiom	W-1.13
Chai Nat-Pasak Canal	Reong Rang	W-1.14
Chai Nat-Ayutthaya Canal	Maharaj	W-1.15
Noi River	Borommathat	W-1.16
Noi River	Chanasatr	W-1.17
Noi River	Yang Manee	W-1.18
Noi River	Pakhai	W-1.19
Suphan River	Phonlathep	W-1.20
Suphan River	Thabote	W-1.21
Suphan River	Samchook	W-1.22
Suphan River	Phophya	W-1.23

表7－8　境界条件入力用水位観測所（第2ステップ）

Item of Prediction		Applied Gauging Station		
Prediction Time	Target Point	River System	Station Code No.	Location
Short	Bangkok Metropolis	(1) Chao Phraya	W-1.6	Bang Sai (C29)
Short	Ayutthaya	(1) Chao Phraya	W-1.1	Lower Chao Phraya Dam (C13)
		(2) Pasak	W/R-1.3	Wichian Buri
Short	Chai Nat, Sing Buri, Lop Buri and Angthong	(1) Chao Phraya	W/R-1.1	Nakhon Sawan (C2)
Short	Nakhon Sawan	(1) Ping	W/R-2.2	Kamphaeng Phet (P7A)
		(2) Yom	W/R-2.3	Sam Ngam (Y17)
		(3) Nan	W/R-2.4	Phitsanulok (N5A)
Long	All Target Points	(1) Ping	W-2.1	Lower Bhumibol Dam (P12)
		(2) Wang	W/R-3.1	Lower Kiu Lom Dam (W10A)
		(3) Yom	W/R-3.3	Ngao Sak (Y20)
		(4) Nan	W/R-3.6	Lower Sirikit Dam (N12A)
		(5) Pasak	W/R-2.6	Lom Sak
		(6) Ping	W/R-4.1	Chiang Mai (P1) /1
		(7) Nan	W/R-4.2	Nan (N.1) /1

Note: /1 Subject to flood prediction for upper reaches from Bhumibol and Sirikit dams.

表7－9　水文観測所設置優先順位（第2ステップ）

Priority	Gauging Purpose	Coverage of Gauging Network to be Expanded	Number of Gauging Station			
			Water Level Gauging Station	Water Level/ Rainfall Gauging Station	Rainfall Gauging Station	Radar Gauging Station
1.	(1) Short Term Prediction for target areas except Nakhon Sawan	(1) Chao Phraya River Basin upto Nakhon Sawan (Sta. C2) including Sake Krang River Basin (2) Pasak River Basin upto Wichian Buri	23	4	10	0
2.	(1) Long Term Prediction for target areas except Nakhon Sawan (2) Short Term Prediction for Nakhon Sawan	(1) Ping River Basin upto Bhumibol Dam (Stas. P12 and W4A) (2) Yom River Basin upto Sam Ngam (Sta. Y17) (3) Nan River Basin upto Phitsanulok (Sta. N5A) (4) Pasak River Basin upto Lop Buri	1	6	22	0
3.	(1) Long Term Prediction for all target areas	(1) Wang River Basin upto Chae Hom (Sta. W10A) (2) Yom River Basin upto Ngao Sak (Sta. Y20) (3) Nan River Basin upto Sirikit Dam (Sta. N12A)	0	7	14	0
4.	(1) Long Term Prediction for all target areas (2) Flood mitigation effect for respective target areas through effective use of potential flood control functions attached to Bhumibol and Sirikit Dam.	(1) Catchment area of Bhumibol Dam upto Chiang Mai (Sta. P1) (2) Catchment area of Sirikit Dam upto Nan (Sta. N1)	2	2	19	0
5.	(1) Facilitating the rainfall prediction measures (2) Improving the accuracy of areal average rainfall estimated from the point rainfall gauging data	(1) Most of Pasak and Sakae Krang River (2) Lower reaches of Ping, Yom and Nan River Basin	0	0	0	2

Note: "Short Term Prediction" is proposed to be done 3 days in advance, while "Long Term Prediction" is to be done 6 to 10 days in advance.

表7－10　幹線通信回線チャンネル数（第2ステップ）

Section	No. of Channels				
	Data /1 Transmission	Tel/FAX	Telephone	Radar	Total
FFC - R1	1	1	-	-	2
FFC - R2	1	1	-	-	2
FFC - R3	1	1	-	2	4
FFC - R7	1	1	1	-	3
FFC - R8	1	1	1	2	5

Note: /1 Sections R1, R2 and R3 are used for telemetering transmission to FFC only. Sections R7 and R8 are used for telemetering transmission to FFC and mutual data communication.

表7－11　電気通信網の費用比較（第2ステップ）

Cost Item	Amount (US$ 10^3)			
Construction Cost	TOT	RID	CAT	PTD
1. Trunk Line	1,645	10,980	1,781	3,013
- Sub-station	678	1,115	678	2,723
- Terminal Station (TOT, CAT, PTD)	813	-	949	136
- Repeater Station (UHF)	-	9,407	-	-
- Flood Forecasting Center	154	458	154	154
2. Branch Line	1,524	1,524	1,524	1,524
- Radar Ganging Station	171	171	171	171
- Repeater Station	1,182	1,182	1,182	1,182
- Sub-station	171	171	171	171
Sub Total	3,169	12,504	3,305	4,537
O&M Cost for 10 years				
1. Rental Fee for Line	309	-	5,619	818
2. Personnel for O&M	682	853	682	768
3. Maintenance Cost for Materials	540	2,133	564	774
Sub-Total	1,531	2,986	6,865	2,360
Grand Total	4,700	15,490	10,170	6,897

表7－12 (1/2) 情報管理施設仕様（第2ステップ）

(1) Engineering Work Station

(1.1) CPU

1. Quantity : 3

2. Technical Specifications : To be refered to Table 6-8.

(1.2) CRT color graphic display/keyboard

1. Quantity : 3

2. Technical Specifications : To be refered to Table 6-8.

(2) Data Storage Equipment

(2.1) Hard Disk Drive

1. Quantity : 3

2. Technical Specifications : To be refered to Table 6-8.

(2.2) Magnetic Tape Unit

1. Quantity : 1

2. Technical Specifications : To be refered to Table 6-8.

(3) Printer

1. Quantity : 1

2. Technical Specifications : To be refered to Table 6-8.

(4) Color Hard Copy

1. Quantity : 1

2. Technical Specifications : To be refered to Table 6-8.

(5) Video Projector

1. Quantity : 1

2. Technical Specifications : To be refered to Table 6-8.

Note: Above specifications should be modified in detailed design.

表7－12 (2/2) 情報管理施設仕様（第2ステップ）

(6) Mimic Board		
1. Quantity	:	1
- Type	:	Self-standing with basin map and display panel
- Display	:	Present date and time, observation time, rainfall data, water level data
(7) Electronic Filing System		
1. Quantity	:	1 set
2. Technical Specifications		
- Type	:	16 bit CPU, 17" display keyboard, mouse, image scanner, optical disk, laser printer
- Disk Capacity	:	800 MB
- Resolution	:	Scanner: 400 picture element/inch, Printer: 400 picture element/inch
- Print Speed	:	8 page/min
(8) Video Tape Recorder		
(8.1) Portable Video Cassette Recorder		
1. Quantity	:	1
2. Technical Specifications	:	Remote control, editing, picture search
(8.2) Portable Video Camera		
1. Quantity	:	1
2. Technical Specifications	:	Zoom, 525 lines 50 fields 2:1 interlaced scanning, 500(H)x582(V) picture elements.

Note: Above specifications should be modified in detailed design.

表7－13 洪水予測地点年最大流量（第2ステップ）

Target Point	Year	Observed		Predicted 3 Days Before		Predicted 6 Days Before	
		m^3/s	Date	m^3/s	Date	m^3/s	Date
Nakhon Sawan	1978	3,540	Oct. 07	3,527	Oct. 07	3,514	Oct. 08
Chai Nat	1978	3,741	Oct. 11	3,689	Oct. 11	3,709	Oct. 11
Angthong	1978	2,550	Oct. 10	2,966	Oct. 12	2,938	Oct. 12
Nakhon Sawan	1980	4,320	Oct. 09	4,356	Oct. 09	4,373	Oct. 09
Chai Nat	1980	3,795	Oct. 10	3,796	Oct. 10	3,796	Oct. 10
Angthong	1980	3,115	Oct. 15	3,024	Oct. 13	3,011	Oct. 11
Nakhon Sawan	1983	2,290	Oct. 23	- /1	- /1	2,332	Oct. 24
Chai Nat	1983	3,290	Oct. 25	3,097	Oct. 27	3,114	Oct. 27
Angthong	1983	2,482	Oct. 24	2,604	Oct. 26	2,425	Oct. 28

Note: /1 Prediction was not made because of the missing upstream observed discharge data at Y17.

表7－14　観測最大潮位と予測最大潮位の差（第2ステップ：6日前予測）

Subject Year	Season	Maximum Difference (m)	Average Difference (m)	Occurrence of Difference in Daily Maximum Tidal Leve in One Year					
				Less than 0.1 m (day)	Less than 0.2 m (day)	Less than 0.3 m (day)	Less than 0.4 m (day)	Less than 0.5 m (day)	More than 0.5 m (day)
1978	Rainy Season	0.45	0.11	105	157	175	182	184	
	Dry Season	0.38	0.10	115	168	177	181		
	Annual	0.45	0.11	120	325	352	363	365	
1980	Rainy Season	0.33	0.08	125	173	181	184		
	Dry Season	0.34	0.09	112	166	179	182		
	Annual	0.34	0.09	237	339	360	366		
1983	Rainy Season	0.62	0.11	95	162	180	182	182	184
	Dry Season	0.28	0.09	117	167	181			
	Annual	0.62	0.10	212	329	361	363	363	365

表7－15　感潮区間日最大予測水位（第2ステップ）

Observation/ Prediction Date /1	Objective Point		Observed		Predicted 3 Days Before		Predicted 6 Days Before	
	Location Name	Distance from River Mouth (km)	Water Level (m. MSL)	Time	Water Level (m. MSL)	Time	Water Level (m. MSL)	Time
Oct. 21 1978	Bangkok Port	27	1.73	10:00	1.70	11:00	1.67	11:00
	Satha Pradit	40	1.77	10:00	1.66	11:00	1.60	11:00
	Memorial Bridge	48	1.89	10:00	2.07	11:00	2.01	10:00
	RID Samsen	54	2.03	12:00	2.00	11:00	1.94	11:00
	Pakred	70	2.15	12:00	2.09	12:00	1.98	12:00
Oct. 27 1980	Bangkok Port	27	1.77	09:00	1.86	10:00	1.86	10:00
	Satha Pradit	40	Data Missing		1.76	10:00	1.75	10:00
	Memorial Bridge	48	1.92	10:00	2.04	10:00	2.02	10:00
	RID Samsen	54	2.01	10:00	2.05	10:00	2.07	10:00
	Pakred	70	2.21	11:00	2.24	12:00	2.27	11:00
Oct. 31 1983	Bangkok Port	27	1.97	15:00	1.93	17:00	1.89	17:00
	Satha Pradit	40	1.87	16:00	1.85	18:00	1.74	18:00
	Memorial Bridge	48	1.82	16:00	1.97	16:00	2.13	16:00
	RID Samsen	54	1.94	17:00	1.97	18:00	1.85	18:00
	Pakred	70	2.05	18:00	1.99	20:00	2.00	19:00

Note: /1 Date of observation of annual maximum discharge at Bang Sai.

表7－16　電気通信網段階施工計画（第2ステップ）

Phase	Trunk Line	Branch Line Data Collection	Data Dissemination
Phase 1	FFC - R/O 8 (3 ch)	R/O 8 - 11 Gauging Stations (1 ch)	FFC - BMA (2 ch)
	FFC - R/O 7 (3 ch)	R/O 7 - 21 Gauging Stations (1 ch)	FFC - LAD (2 ch)
		FFC - 5 Gauging Stations (1 ch)	FFC - EGAT (2 ch)
Phase 2	FFC - R/O 3 (2 ch)	R/O 7 - 2 Gauging Stations	-
		R/O 3 - 27 Gauging Stations (1 ch)	-
Phase 3	FFC - R/O 2 (2 ch)	R/O 3 - 10 Gauging Stations	-
		R/O 2 - 11 Gauging Stations (1 ch)	-
Phase 4	FFC - R/O 1 (2 ch)	R/O 3 - 2 Gauging Stations	-
		R/O 2 - 6 Gauging Stations	-
		R/O 1 - 15 Gauging Stations (1 ch)	-
Phase 5	FFC - R/O 8 (2 ch)	R/O 8 - 1 Radar Gauge (2 ch)	-
	FFC - R/O 3 (2 ch)	R/O 3 - 1 Radar Gauge (2 ch)	-

表7－17　システム全体事業費（第2ステップ）

Cost Item	Amount (US$)
1. Telecommunication Facilities	
Gauging Station	16,954,700
Substation	4,544,600
TOT Terminal Station	813,000
Flood Forecasting Center	5,291,700
Related Agencies	330,000
Sub-Total	27,934,000
2. Data Management and Dissemination Facilities	
Substation	101,000
Flood Forecasting Center	1,034,800
Related Agencies	123,900
Sub-Total	1,259,700
3. Engineering Services	
Detailed Design	3,134,800
Construction Supervision	5,634,500
Development of the System	1,422,000
Sub-Total	10,191,300
4. Training	600,000
Total of 1 to 4	39,985,000
5. Physical Contingency	3,998,500
Total of 1 to 5	43,983,500
6. Price Contingency	11,964,000
Grand Total	55,947,500

表7－18 段階別事業費（第2ステップ）

(Unit: US$)

Work Item	Total	Detailed Design	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
1. Telecommunication Facilities							
Gauging Station	16,954,700	-	2,495,600	1,693,400	1,553,500	1,451,600	9,760,600
Substation	4,544,600	-	1,136,700	511,700	511,700	511,700	1,872,800
TOT Terminal Station	813,000	-	406,500	135,500	135,500	135,500	-
Flood Forecasting Center	5,291,700	-	1,682,700	-	-	-	3,609,000
Related Agencies	330,000	-	330,000	-	-	-	-
Sub-Total	27,934,000	-	6,051,500	2,340,600	2,200,700	2,098,800	15,242,400
2. Data Management and Dissemination Facilities							
Substation	101,000	-	77,000	8,000	8,000	8,000	-
Flood Forecasting Center	1,034,800	-	1,034,800	-	-	-	-
Related Agencies	123,900	-	123,900	-	-	-	-
Sub-Total	1,259,700	-	1,235,700	8,000	8,000	8,000	-
3. Engineering Services							
Detailed Design	3,134,800	3,134,800	-	-	-	-	-
Construction Supervision	5,634,500	-	1,126,900	1,126,900	1,126,900	1,126,900	1,126,900
Development of the System	1,422,000	-	284,400	284,400	284,400	284,400	284,400
Sub-Total	10,191,300	3,134,800	1,411,300	1,411,300	1,411,300	1,411,300	1,411,300
4. Training	600,000	-	120,000	120,000	120,000	120,000	120,000
Total of 1 to 4	39,985,000	3,134,800	8,818,500	3,879,900	3,740,000	3,638,100	16,773,700
5. Physical Contingency	3,998,500	313,500	881,800	388,000	374,000	363,800	1,677,400
Total of 1 to 5	43,983,500	3,448,300	9,700,300	4,267,900	4,114,000	4,001,900	18,451,100
6. Price Contingency	11,964,000	434,500	1,881,700	981,600	1,098,400	1,220,600	6,347,200
Grand Total	55,947,500	3,882,800	11,582,000	5,249,500	5,212,400	5,222,500	24,798,300

表7－19 年間維持管理費（第2ステップ）

Cost Item	Amount (US$)
1. Rental Fee for TOT Line /1	
Line Charge	42,500
Power Charge	3,800
Sub-Total	46,300
2. Operation /2	
Personnel	180,000
Consumables /3	25,300
Power Charge	500,000
Miscellaneous	200,000
Sub-Total	905,300
3. Maintenance	
Materials, Spare Parts and Unit /4	
- Telecommunication	558,700
- Data Management	25,300
Vehicles	153,000
Sub-Total	737,000
Grand-Total	1,688,600

/1 Refer to Supporting Report

/2 Refer to Supporting Report

/3 Cost for consumable is assumed to be 2% of data management facility cost

/4 Cost for maintenance is assumed to be 2% of equipment cost

表7－20　ＲＩＤ洪水予報センター監理委員会

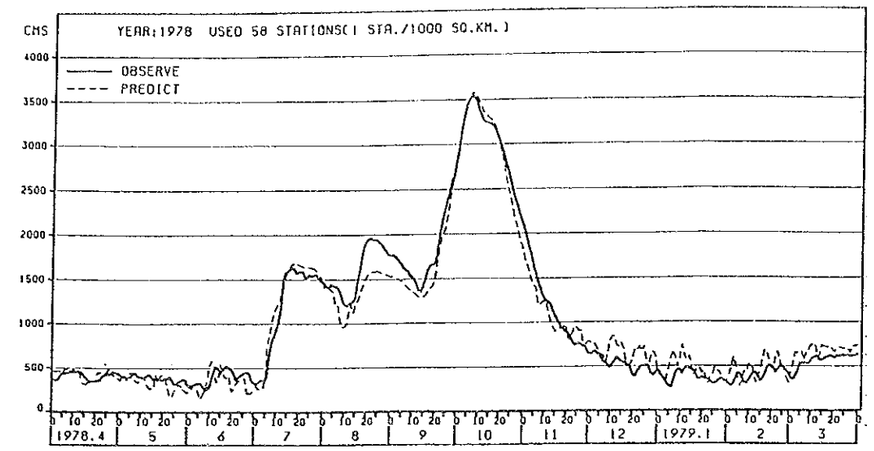
	Posision in RID	Position in Committee	Existing Related Activity
1.	Chairman of Flood Forecasting Center	Chairman	-
2.	Director of Hydrology Division	Member	Hydrological analysis
3.	Director of O&M Division	- do -	Management of water flow control
4.	Director of Communications Division	- do -	Telecommunication service
5.	Director of Data Processing Division	- do -	Data compilation by computer
6.	Director of Project Planning Division	- do -	Monitoring and evaluation of RID's projects for the purpose of adequate future planning
7.	Director of Design Division	- do -	Design of riparian structures for flood protection
8.	Director of Regional Office (Nos. 7 & 8) /1	- do -	Flood fighting for agricultural areas
9.	Chief of Flood Prediction Section	Secretary	-

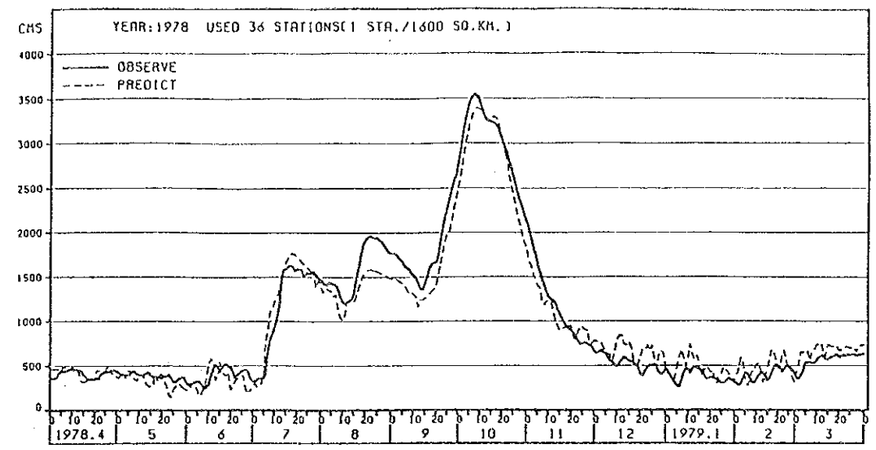
Note: /1 Directors of Regional Office shall serve as members upon instructions of the Chairman, in accordance with predicted flood area and scale.

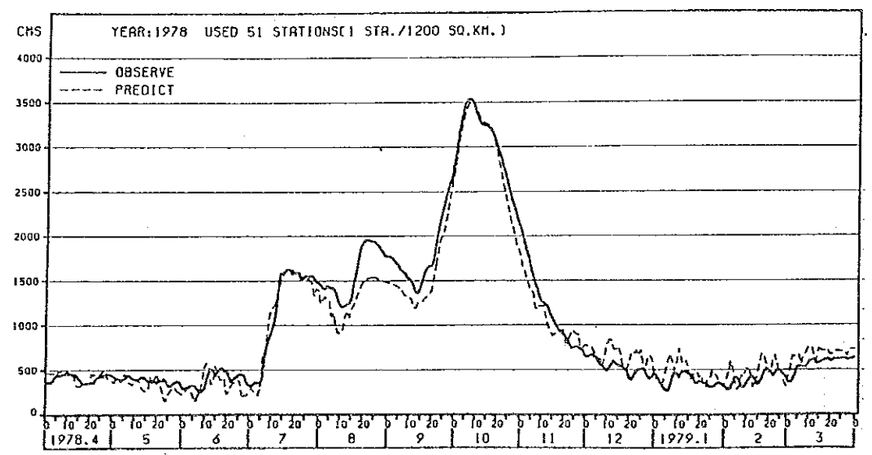
表7－21　ＲＩＤ洪水予報センター担当係の主要作業項目

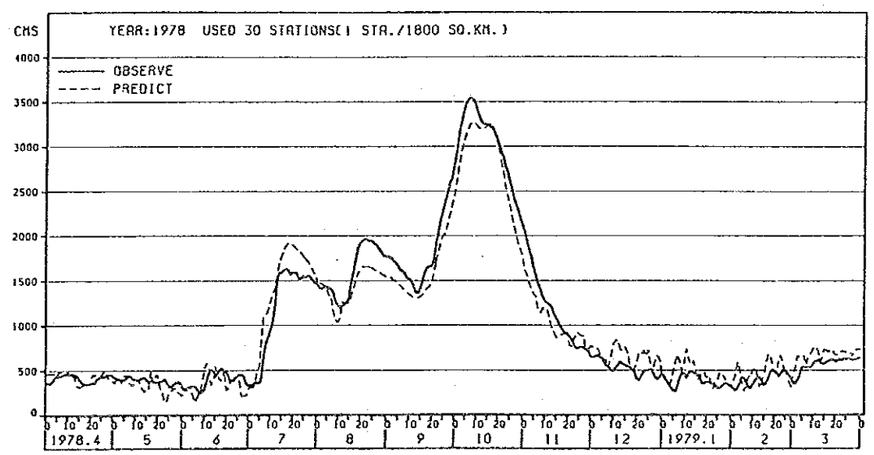
Office	Required Activity
Administrative Section	Administrative affairs
Flood Prediction Section	Collection of hydro-meteorological information; flood prediction; dissemination and public response.
Communications Section /1	Maintenance and study of telecommunication system and facilities such as telemetering, radar and gauging facilities in head office and substations.
Data Processing Section	Basic data collection, compilation and storage for formulation of flood control includig flood forecasting; maintenance of computers acilities and study of computer system.

Note: /1 Substations of the Communications Section will be installed in Regional Offices (Nos. 1, 2, 3, 7 and 8) for the inspection of related facilities in the region.









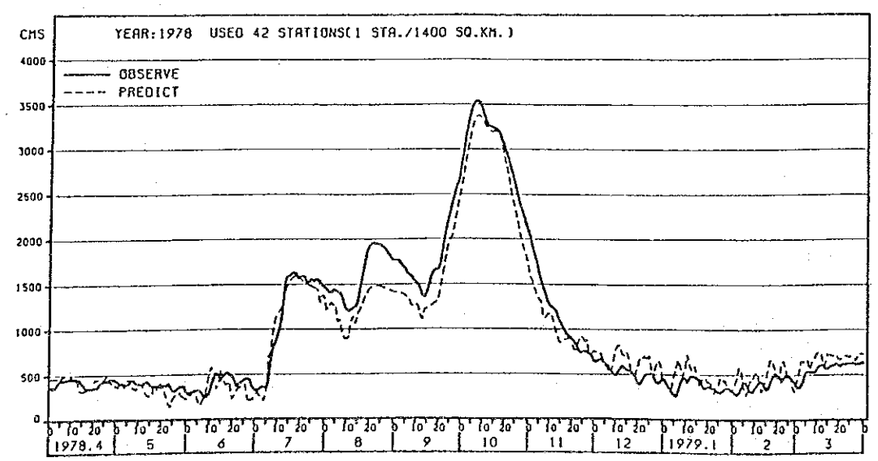
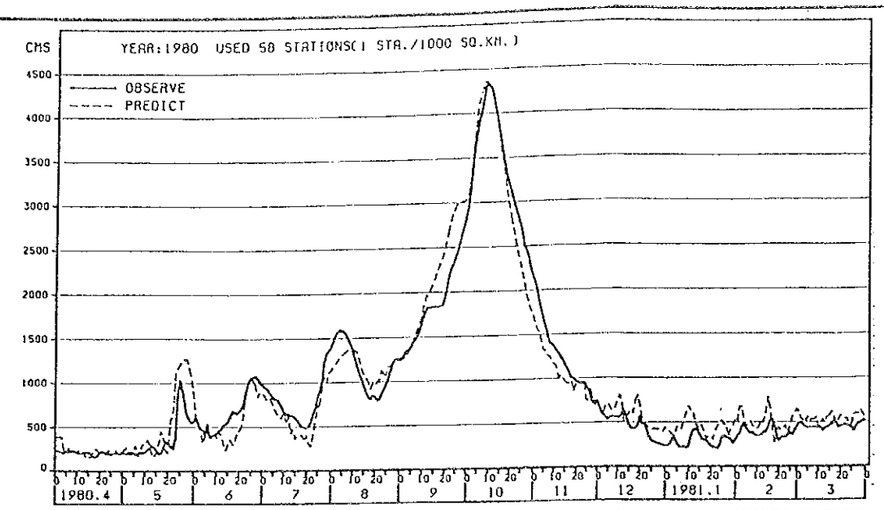
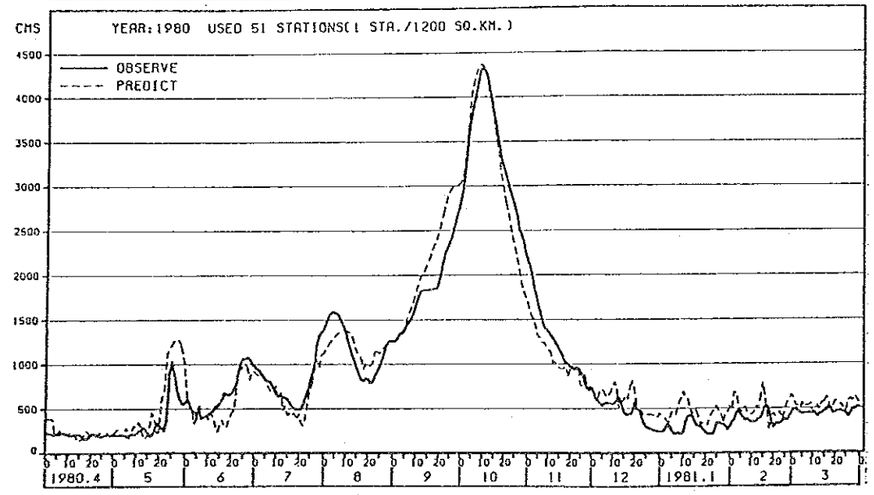
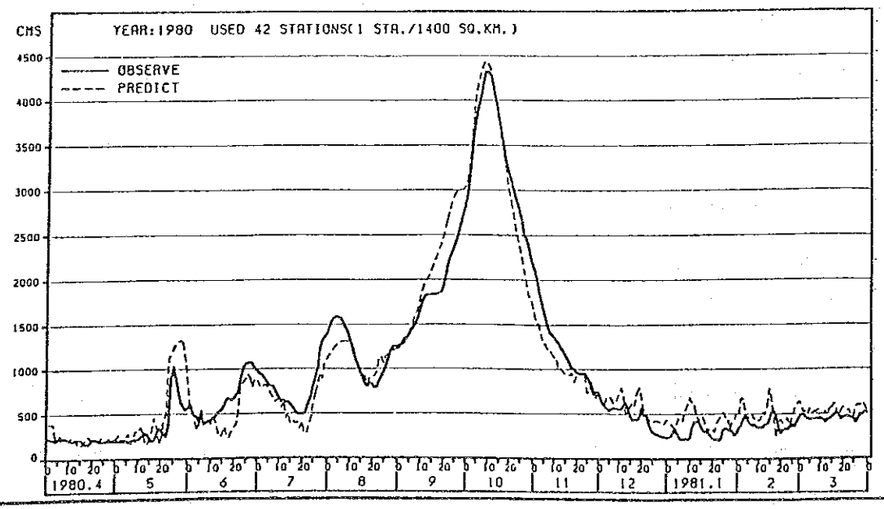


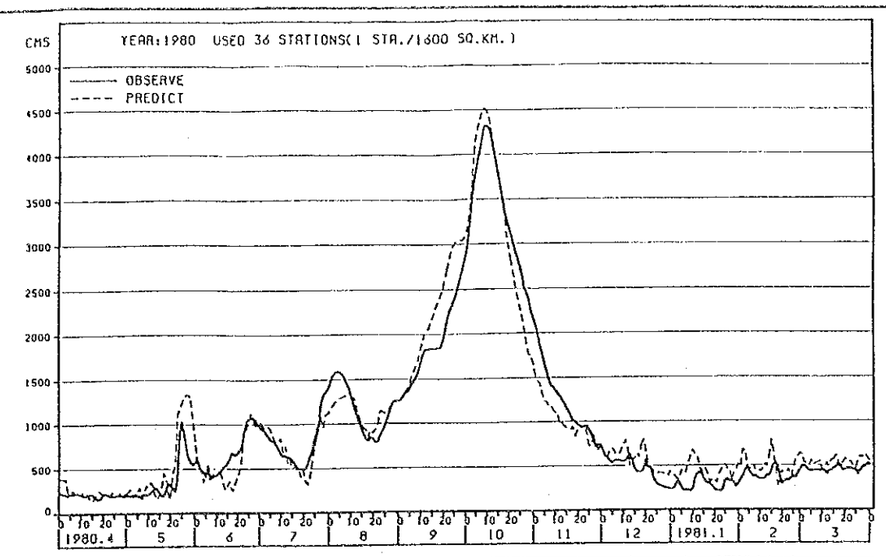
図7－1 (1/3) 雨量観測所組み合せ変化による計算流出ハイドログラフ

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY









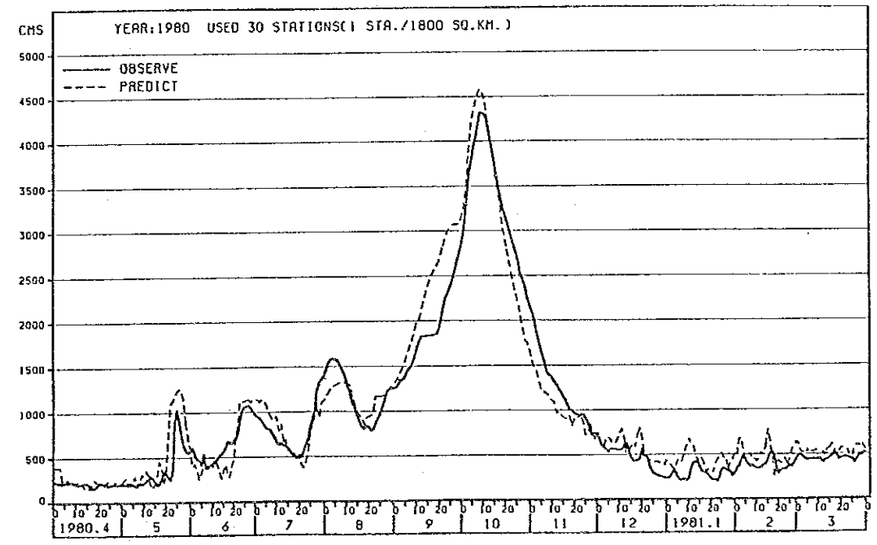
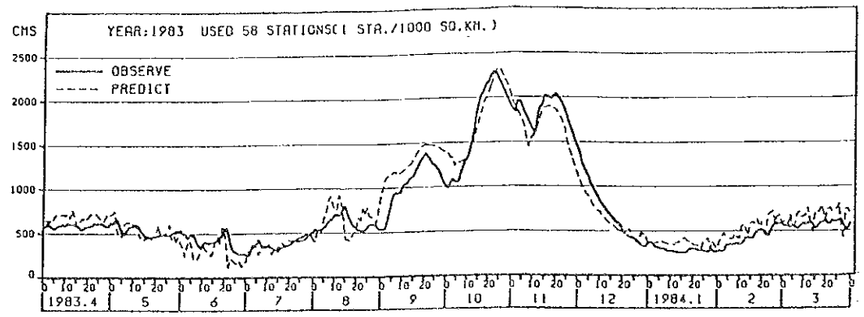
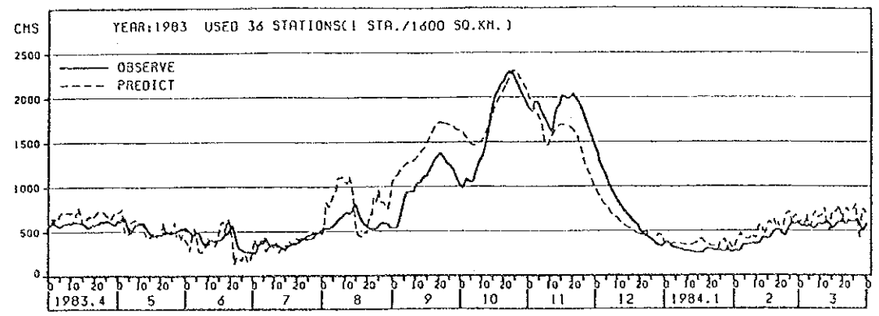
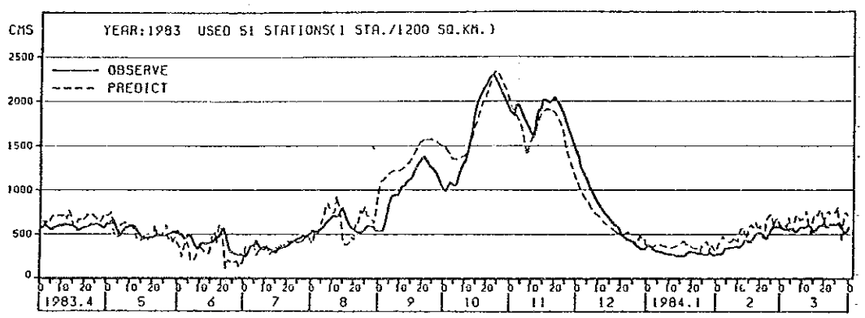


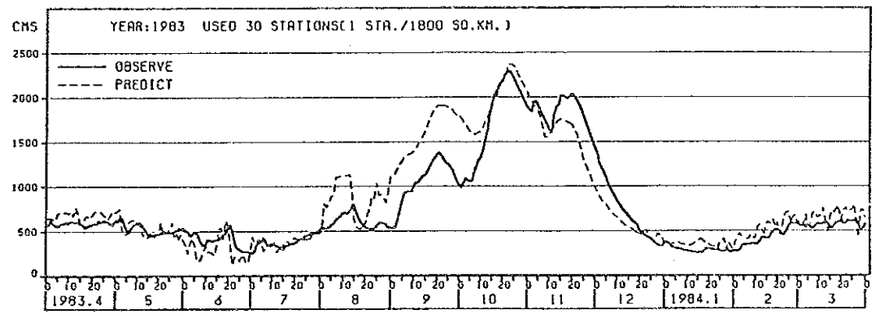
図7－1 (2/3) 雨量観測所組み合せ変化による計算流出ハイドログラフ

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY









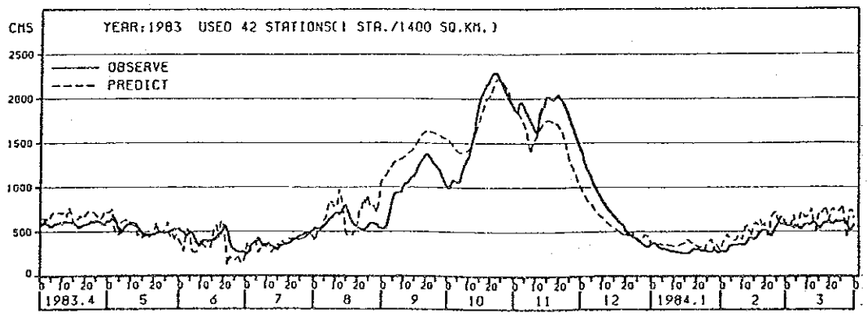


図7－1 (3/3) 雨量観測所組み合せ変化による計算流出ハイドログラフ

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

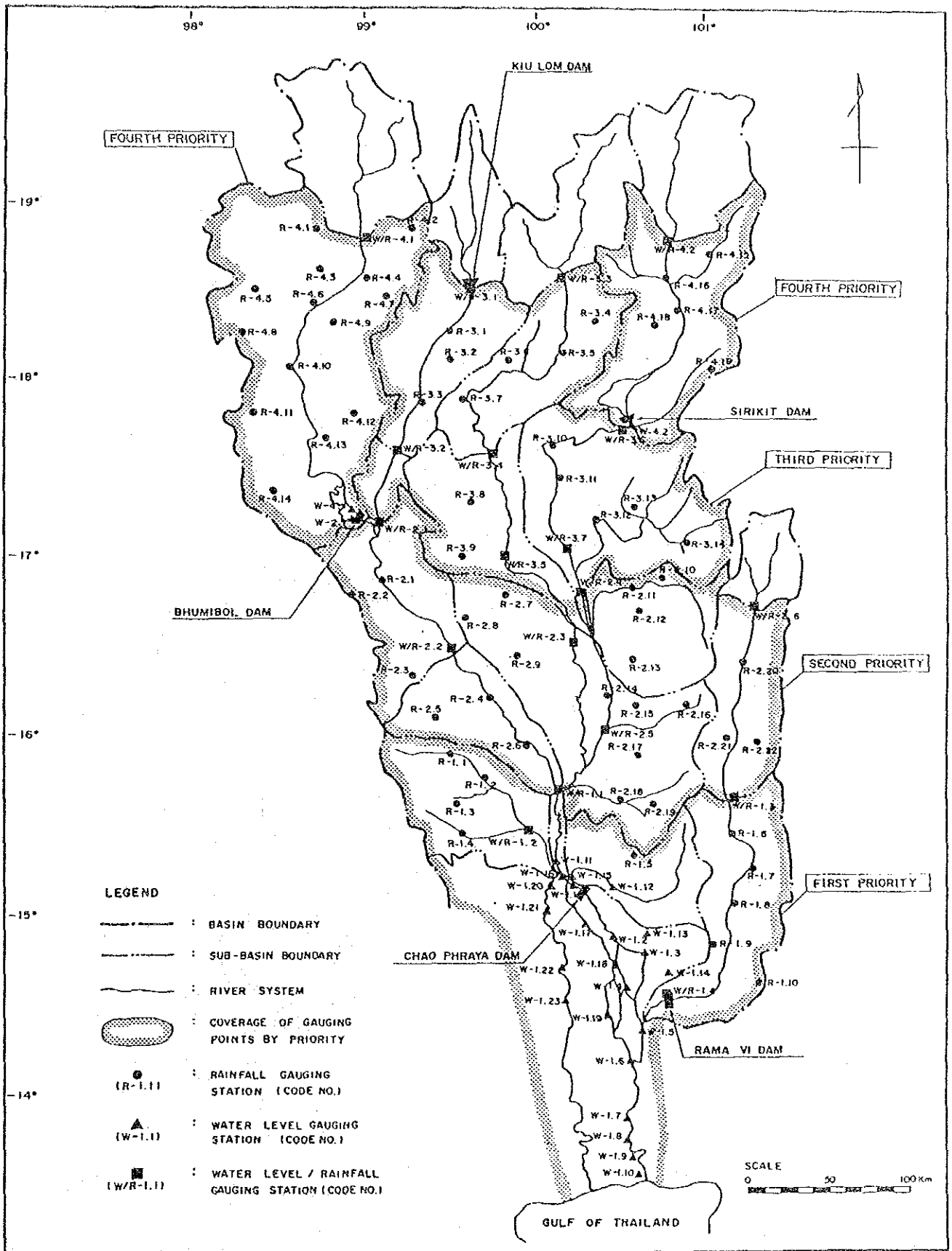


図7－2　水文観測所（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

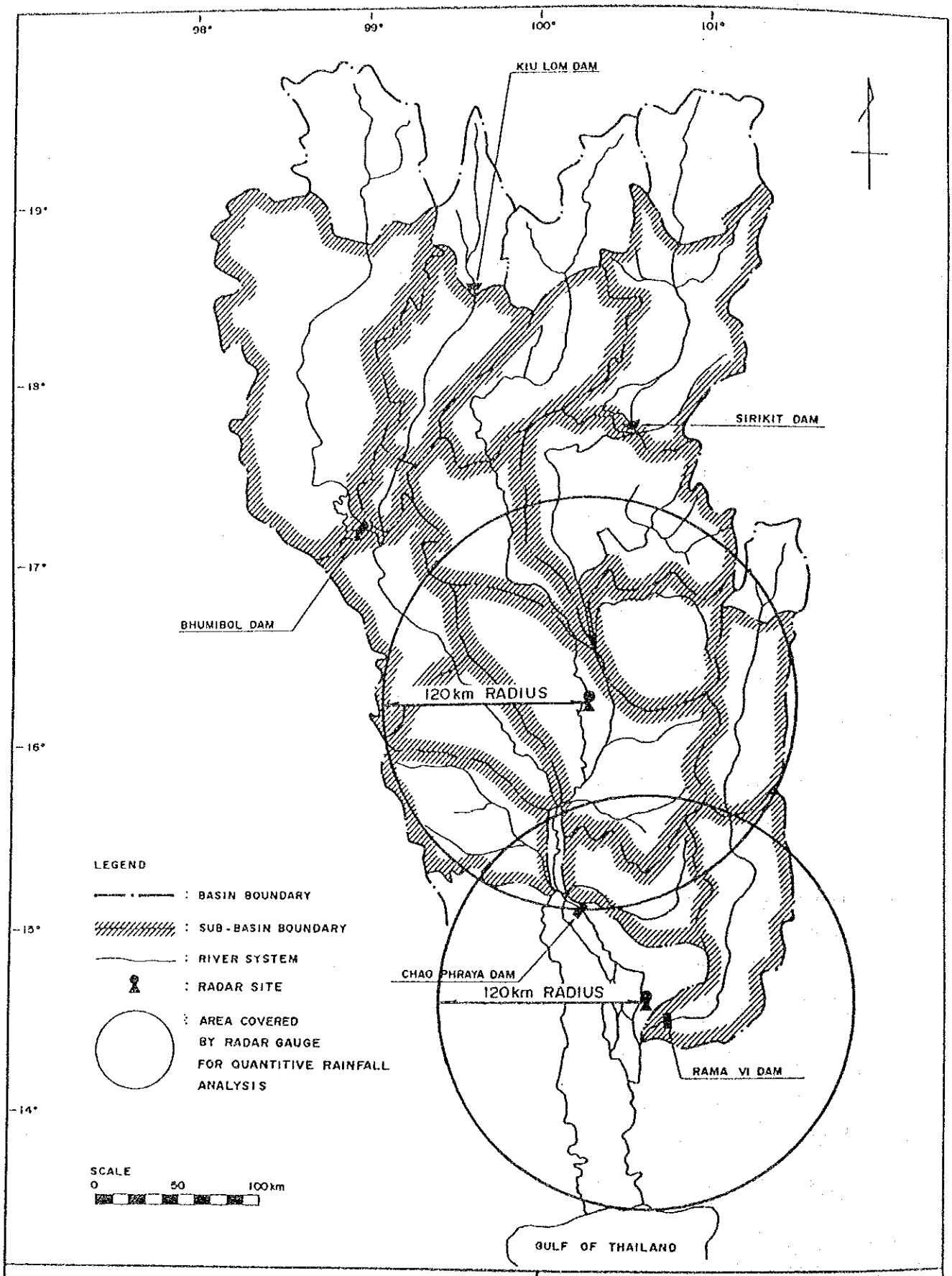


図7－3　レーダー雨量観測所の設置地点と観測領域（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

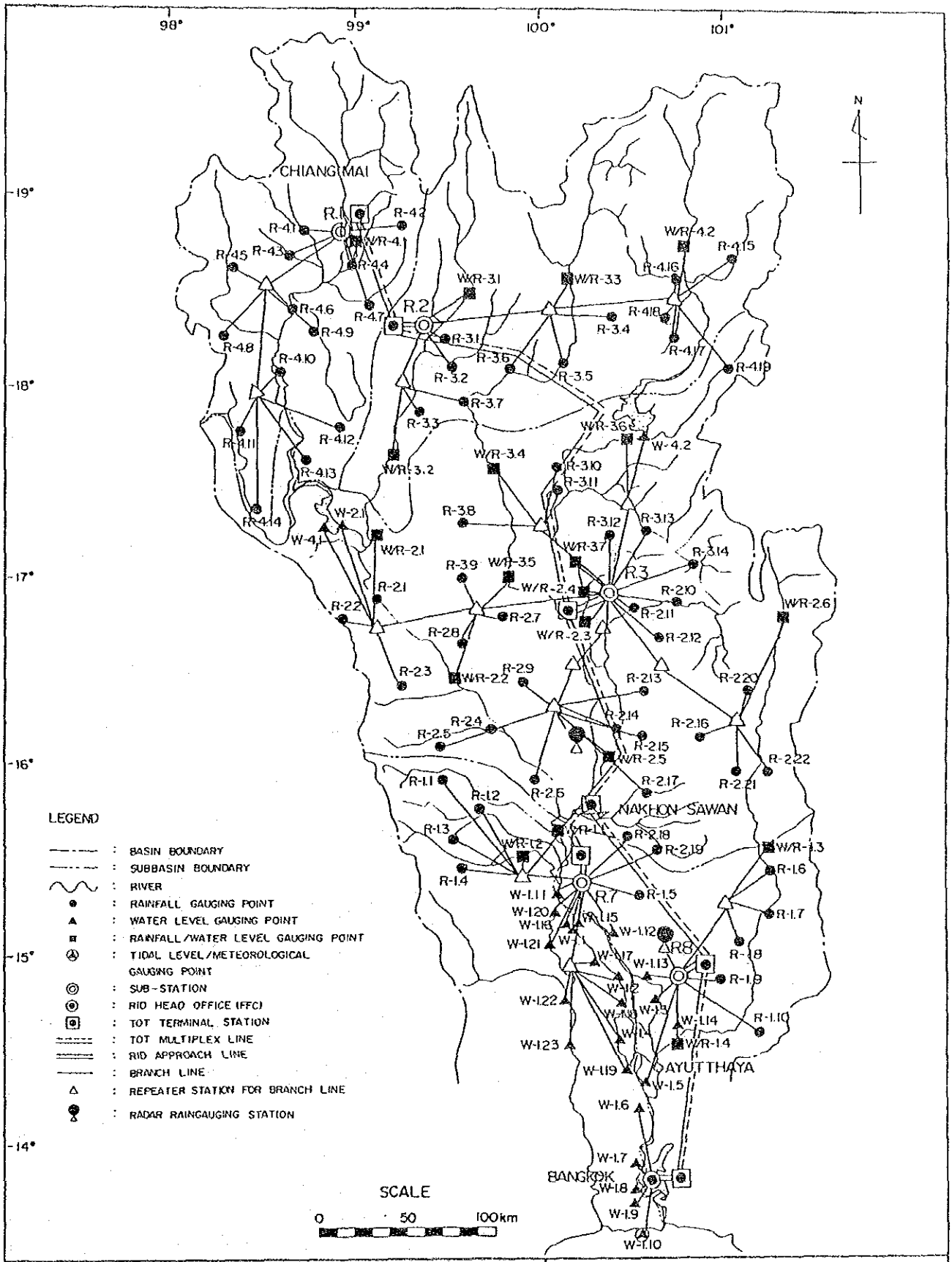


図7－4 (1/4) 電気通信網（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

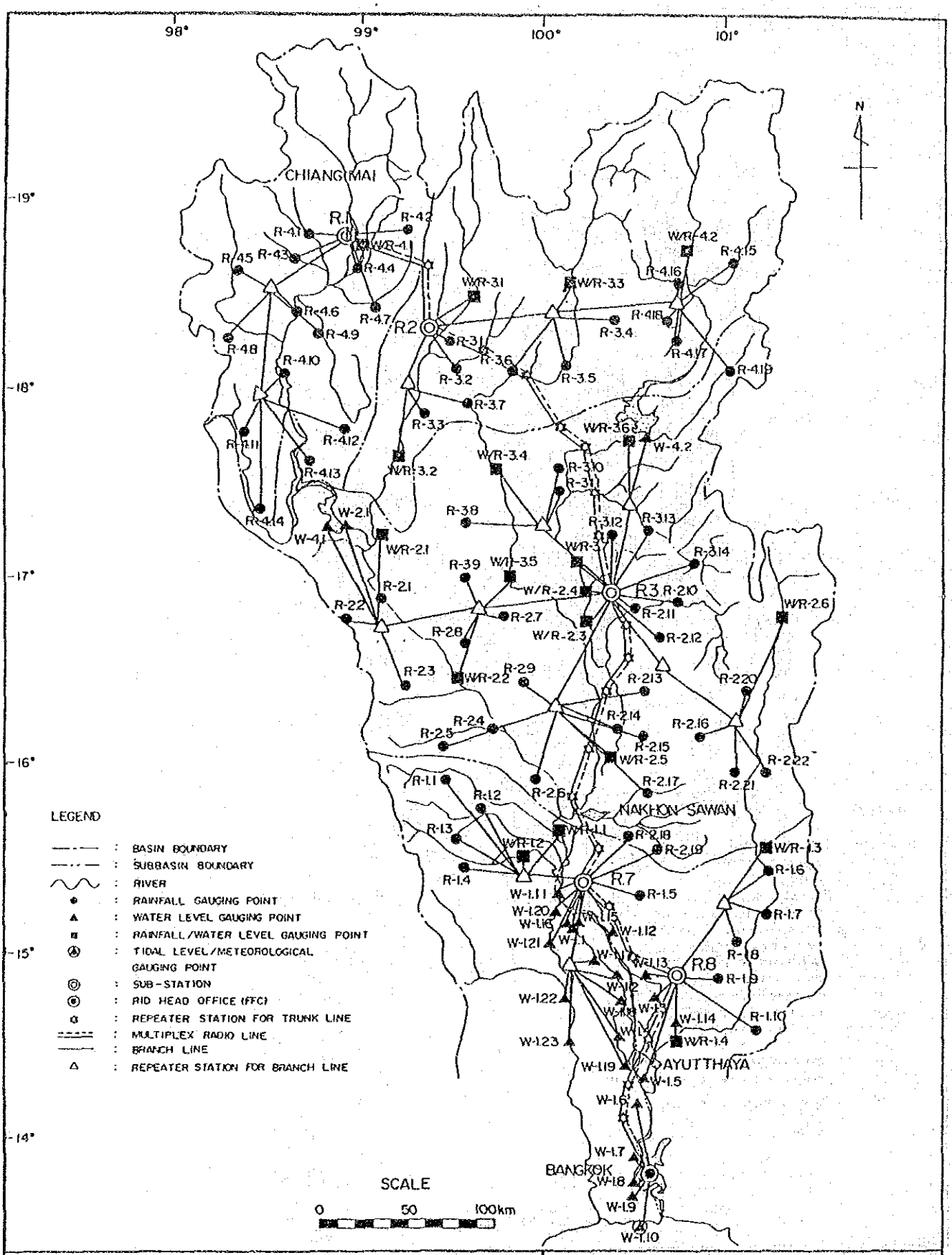


図7－4 (2/4) 電気通信網（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

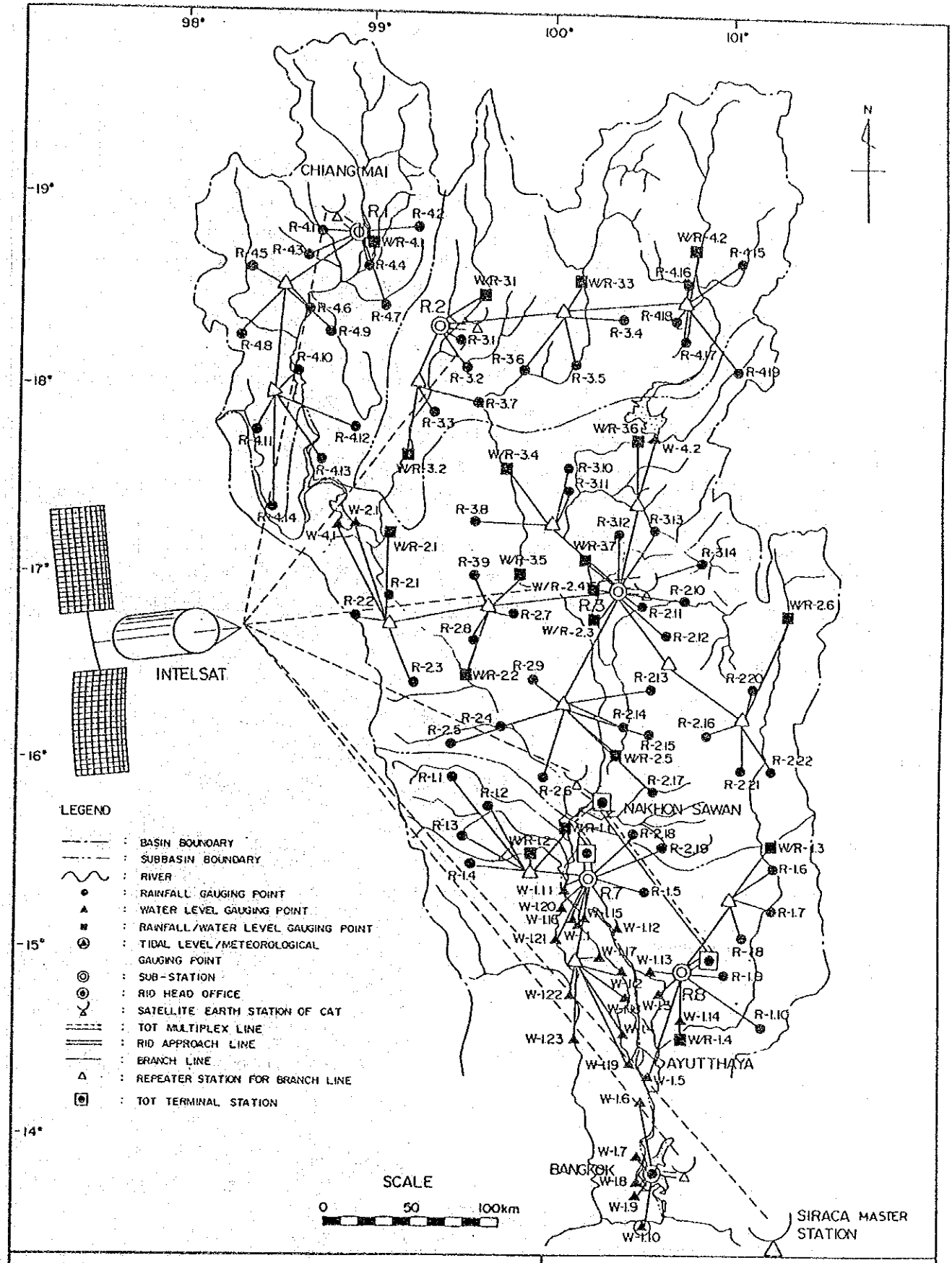


図7－4 (3/4) 電気通信網（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

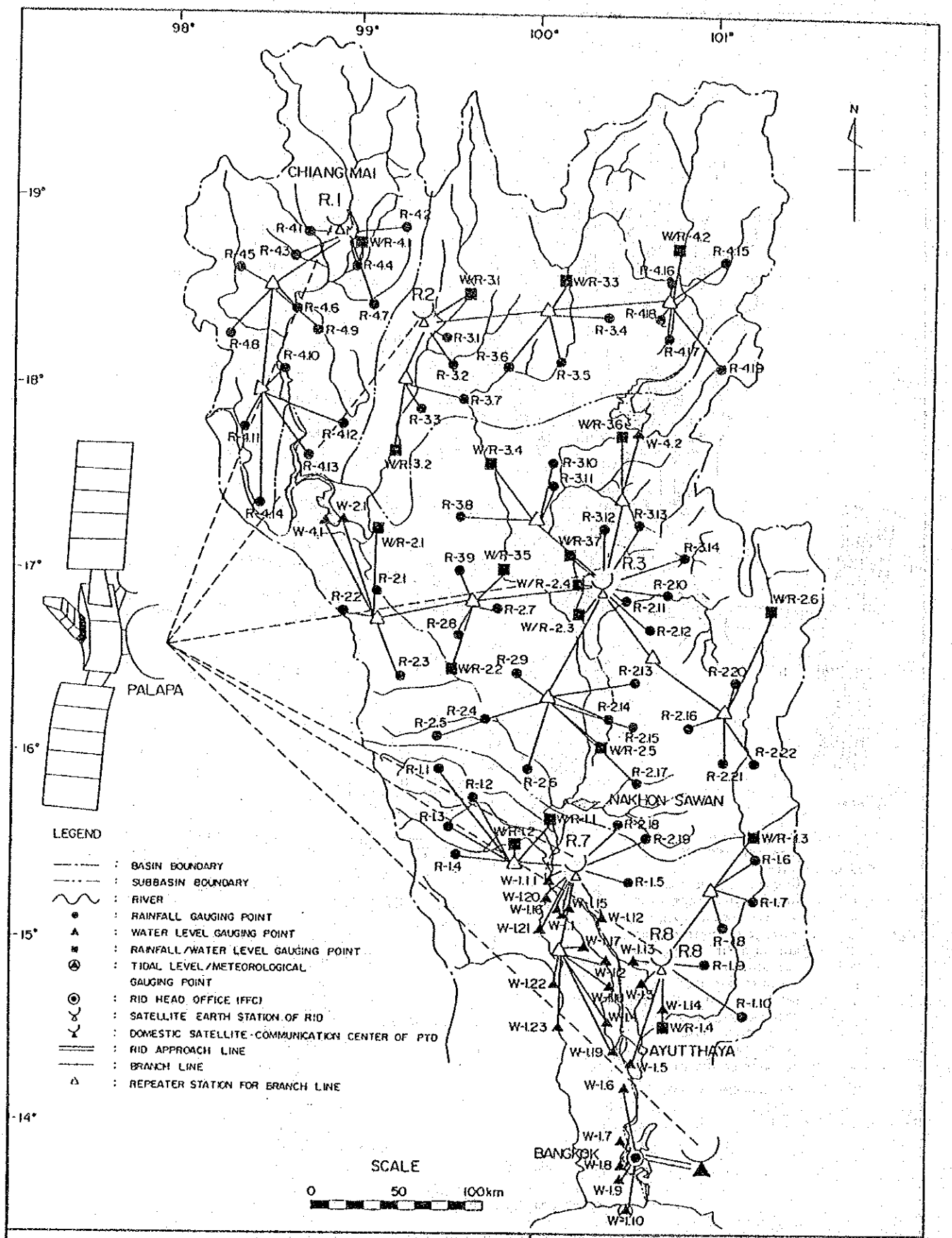


図7－4 (4/4) 電気通信網（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

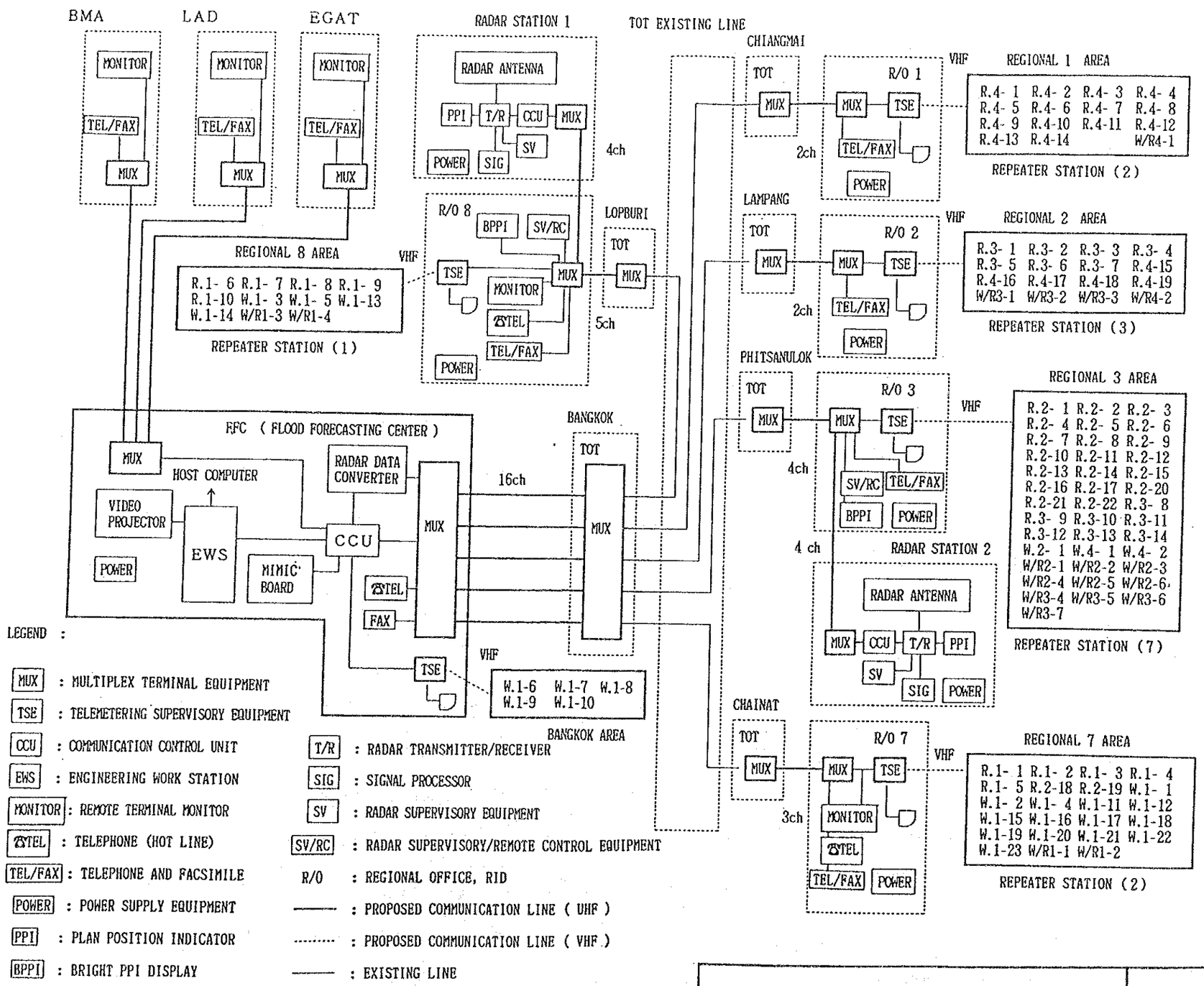


図7－5　電気通信網模式図（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

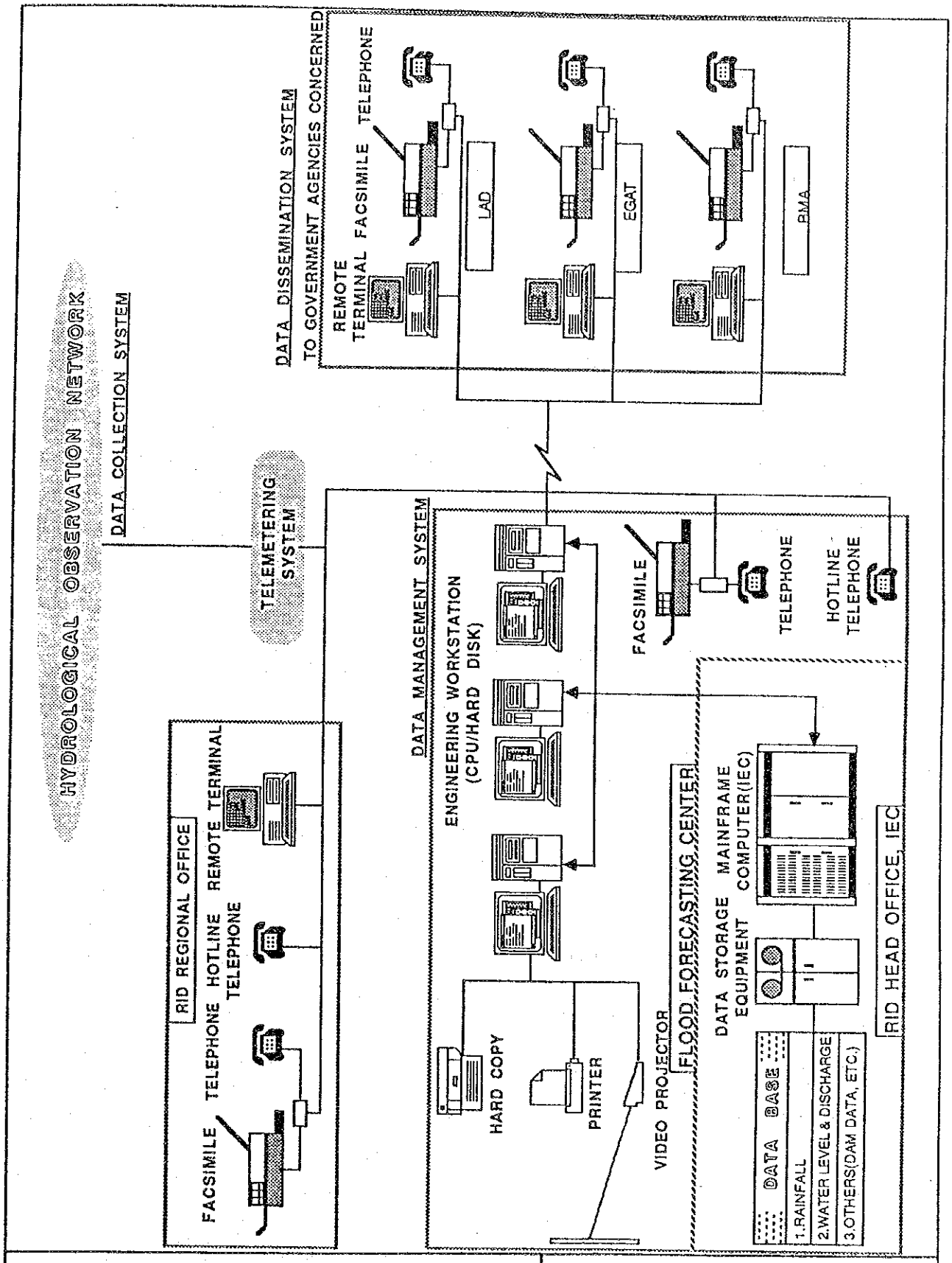
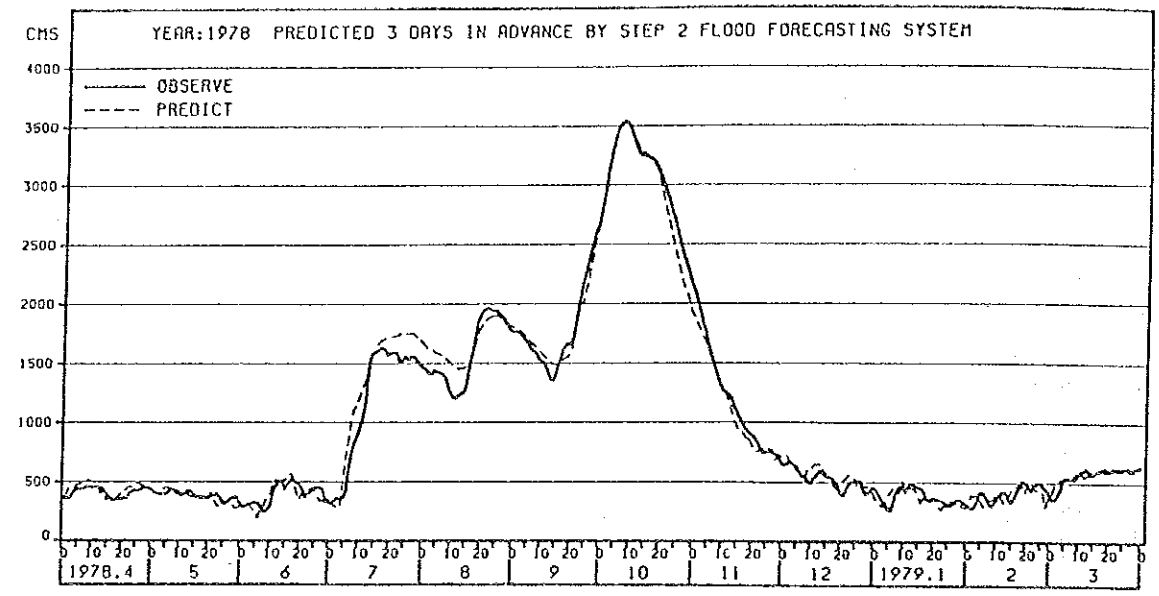


図7－6　情報管理システムの模式図
（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY



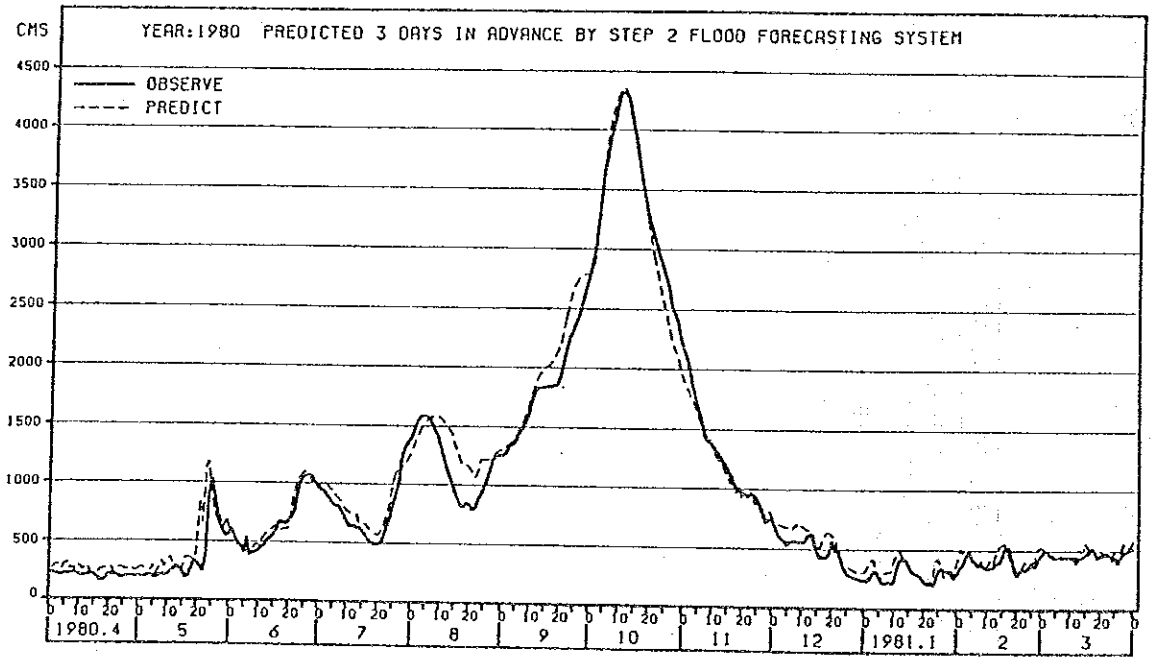
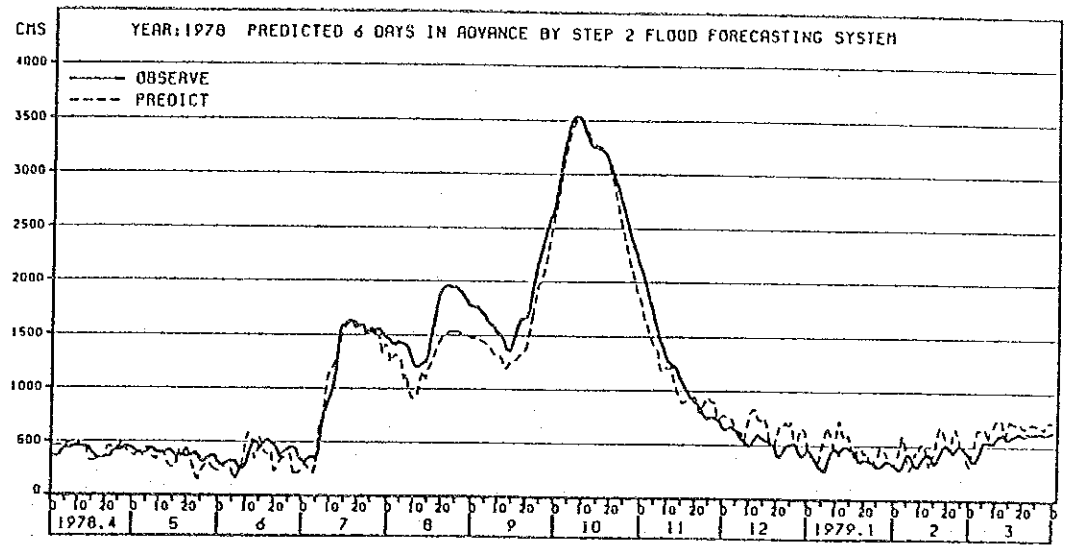
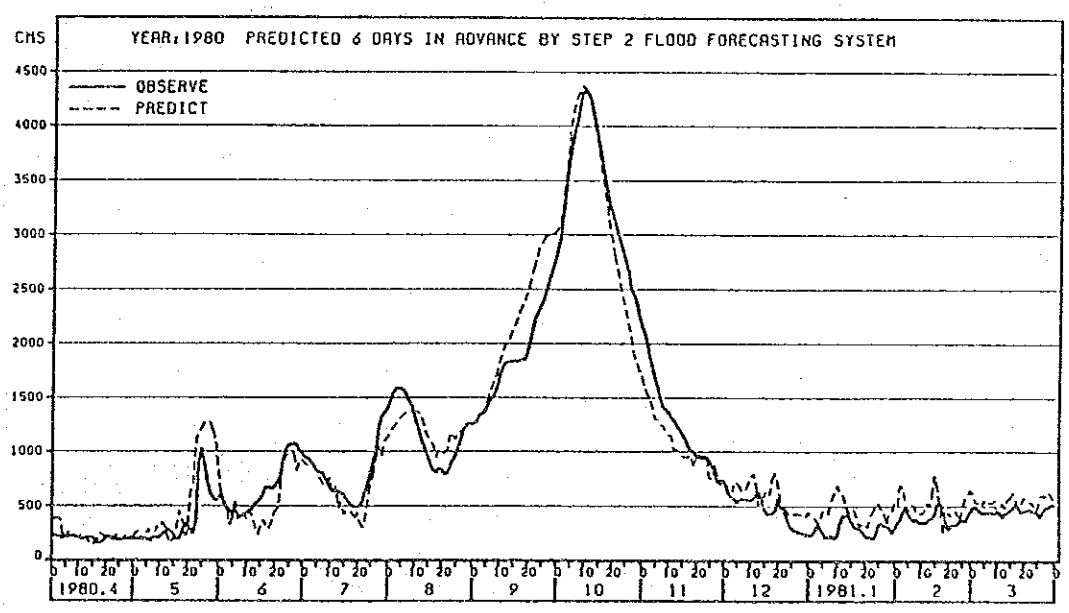


図7－7　ナコンサワン地点の3日前予測流出ハイドログラフ（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY





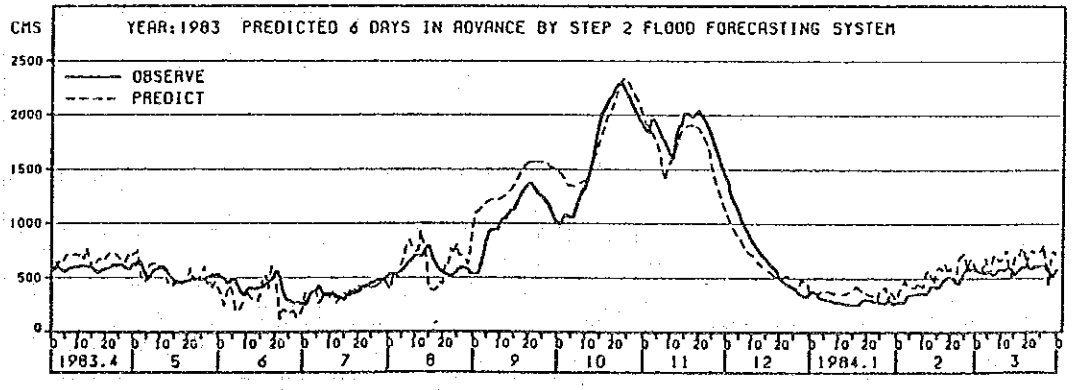
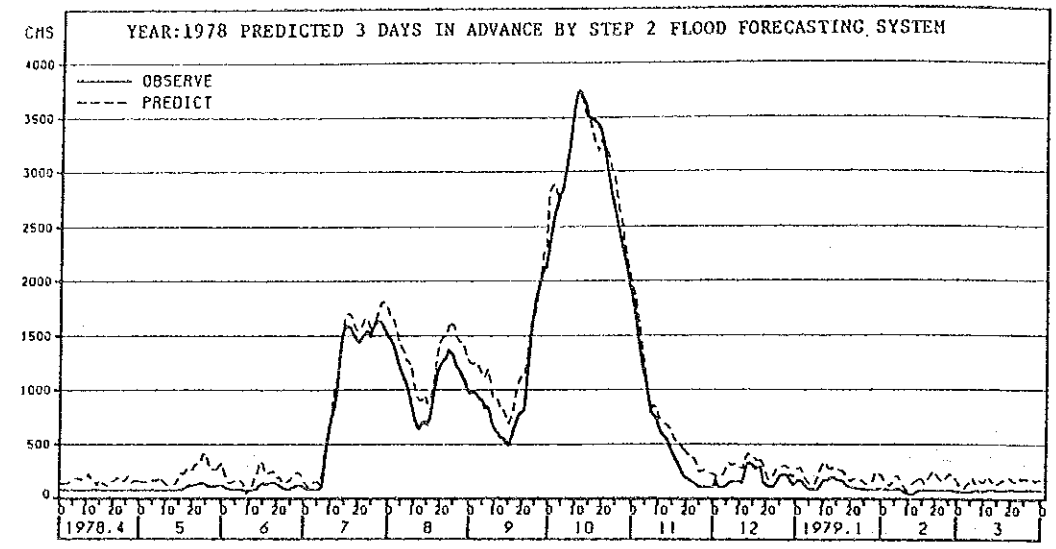
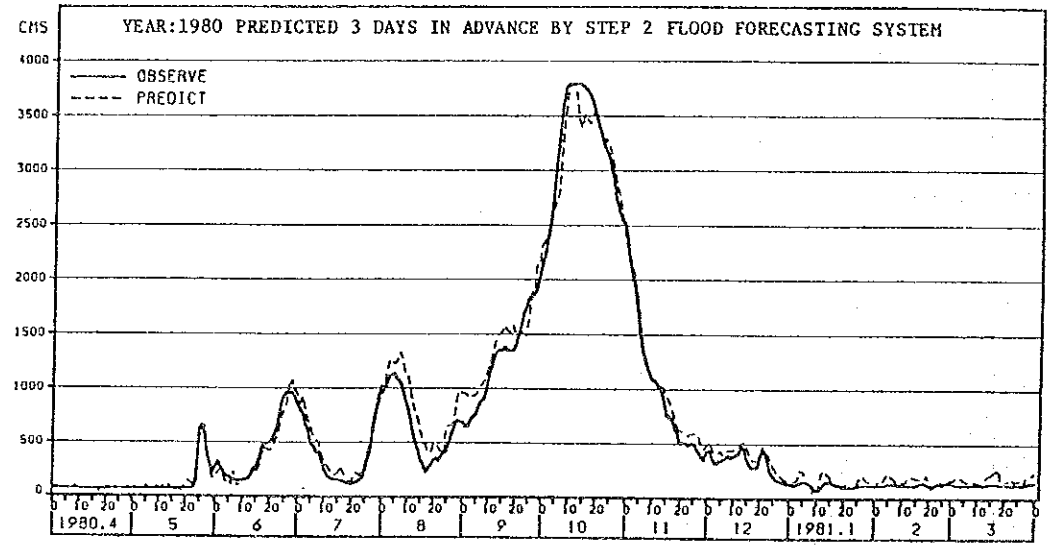


図7－8　ナコンサワン地点の6日前予測流出ハイドログラフ（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY





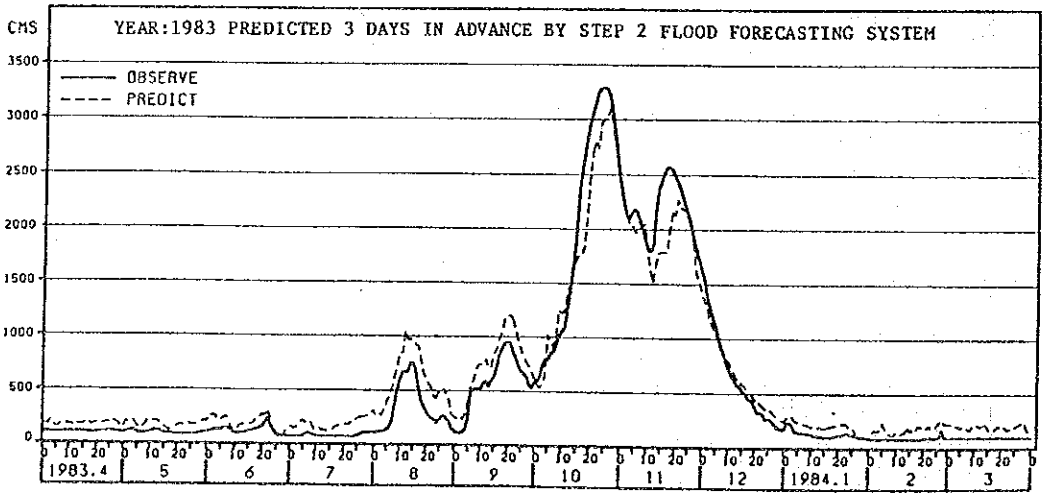
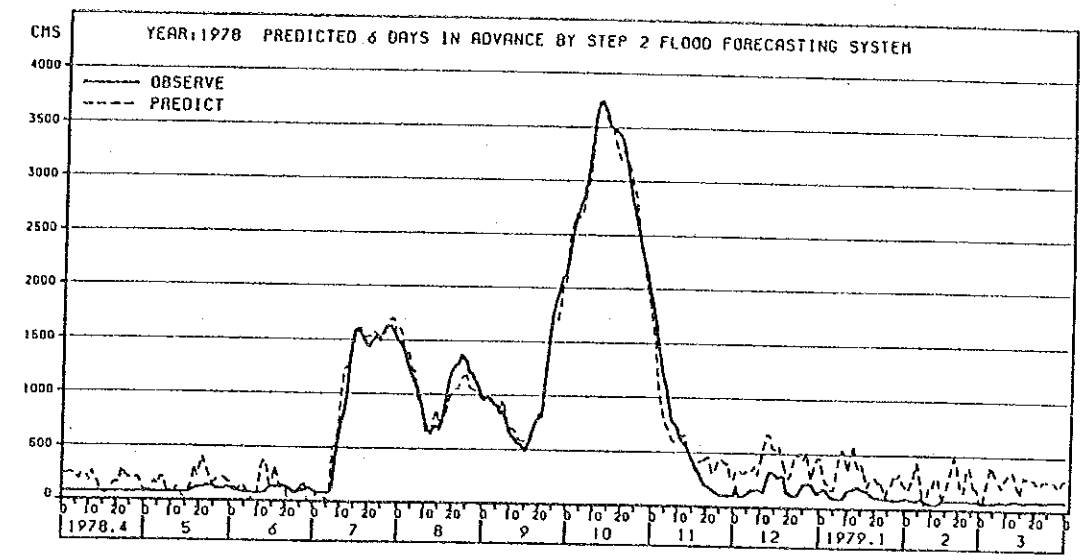
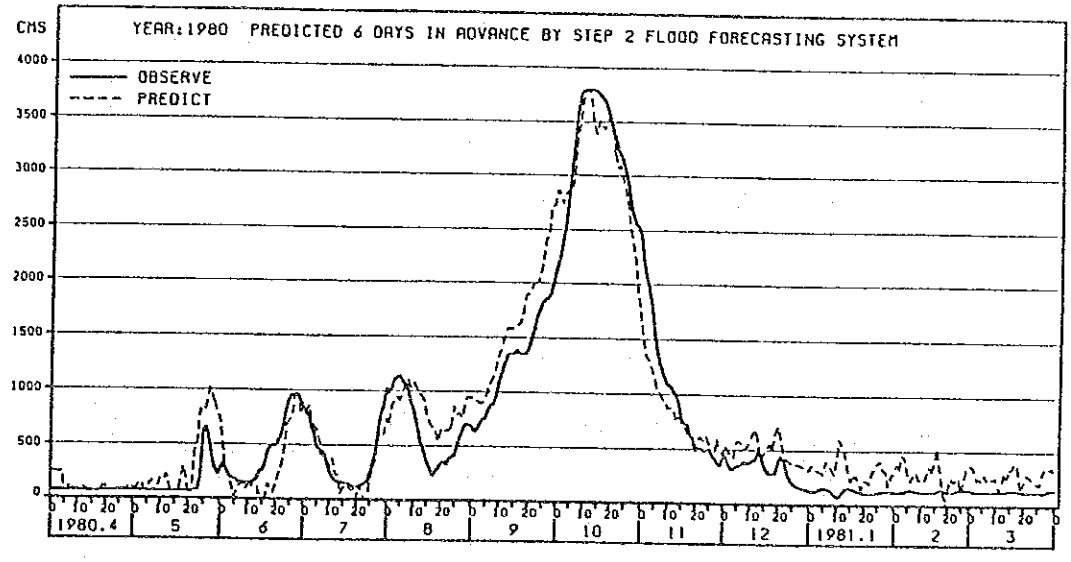


図7－9　チャイナート地点の3日前予測流出ハイドログラフ（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY





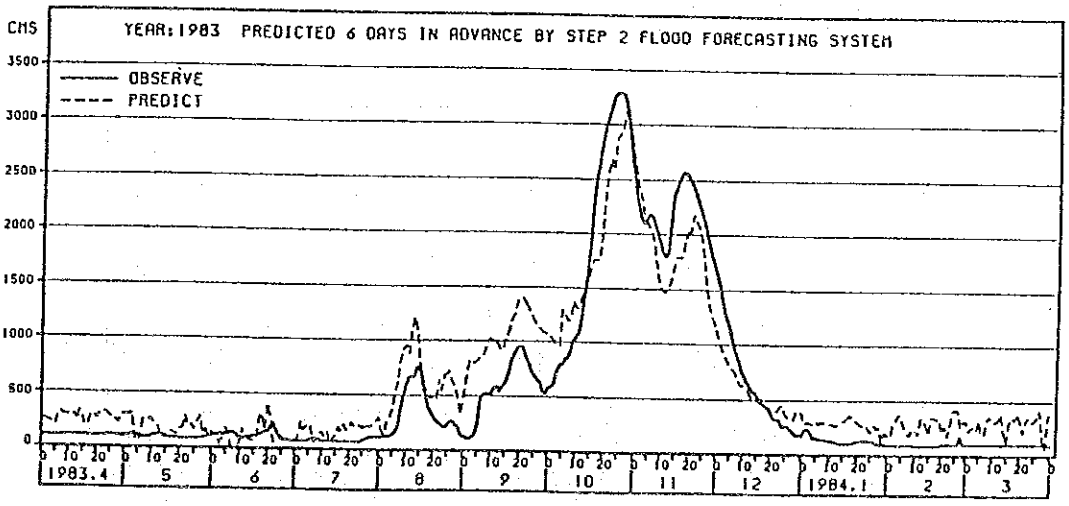
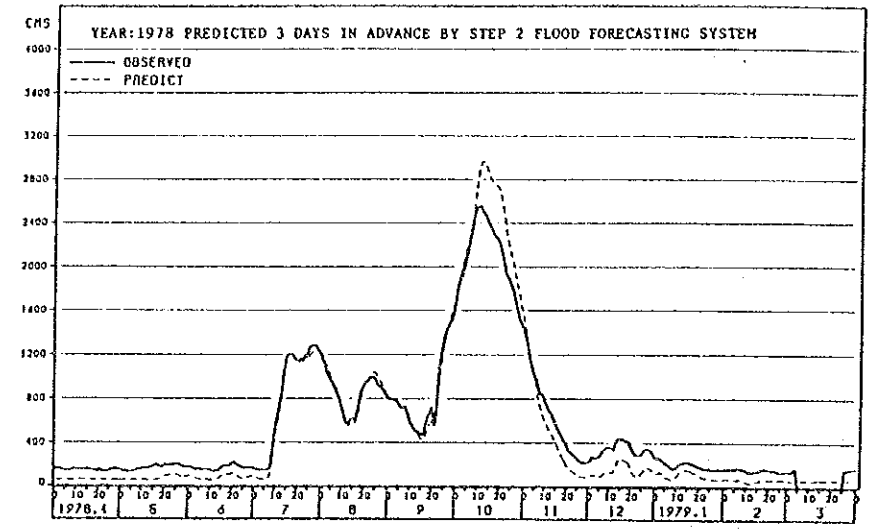
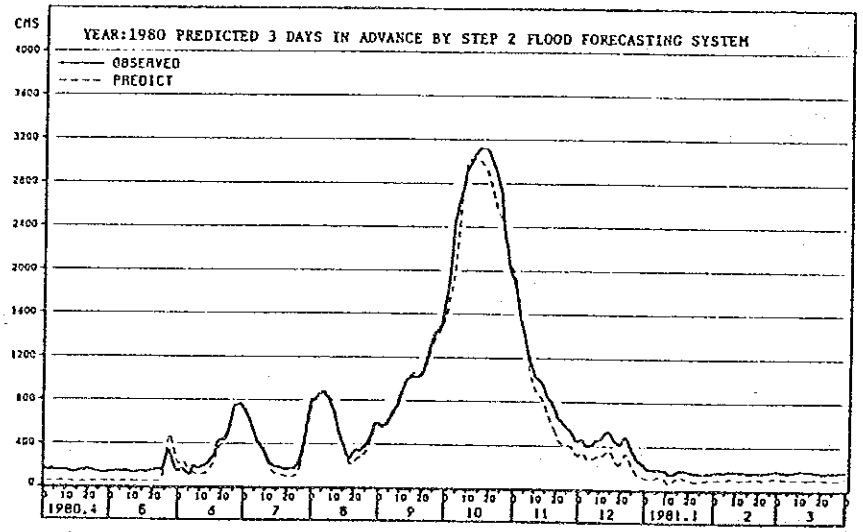


図7－10　チャイナート地点の6日前予測流出ハイドログラフ（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY





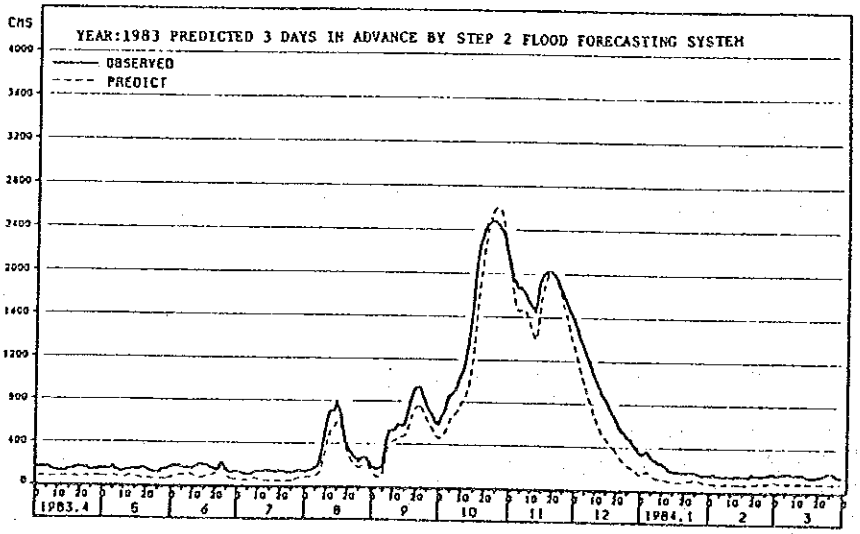
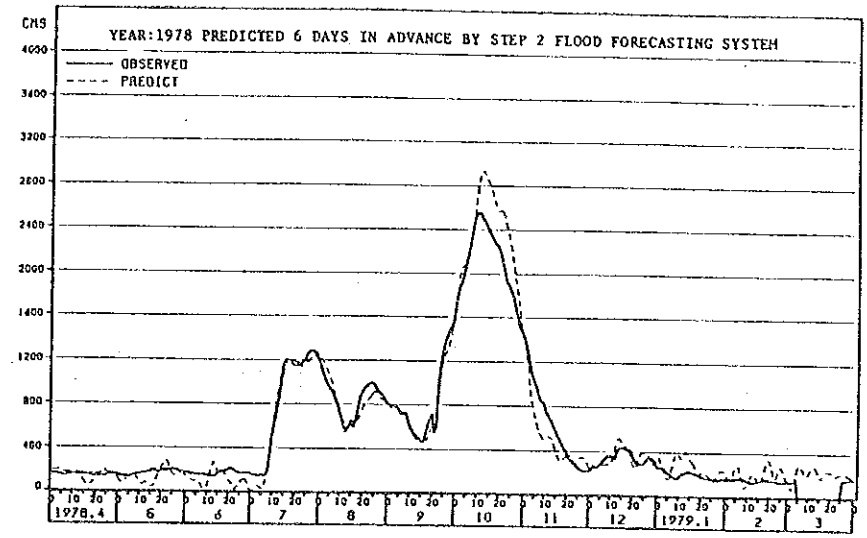
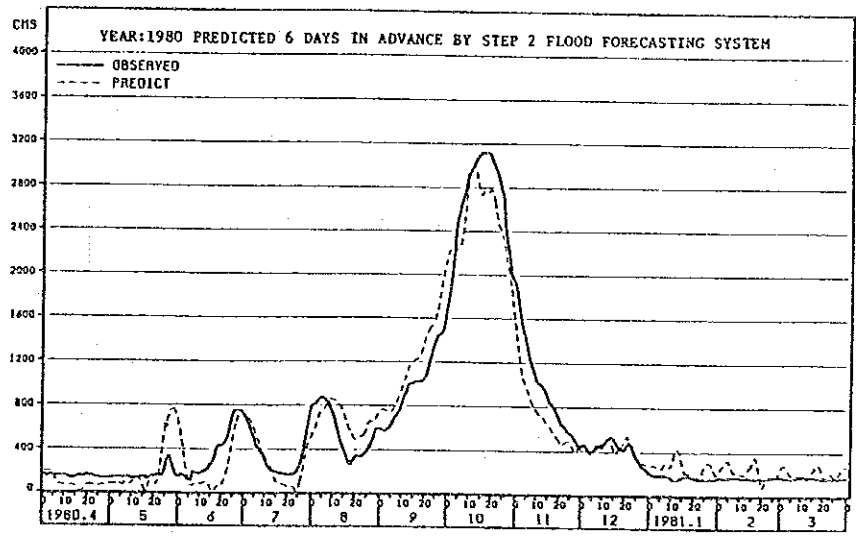


図7－11　アントン地点の3日前予測流出ハイドログラフ（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY





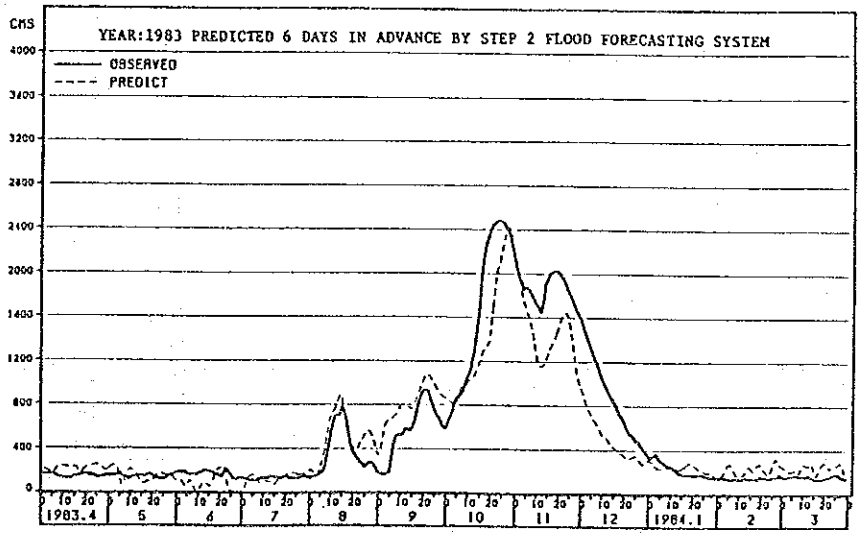
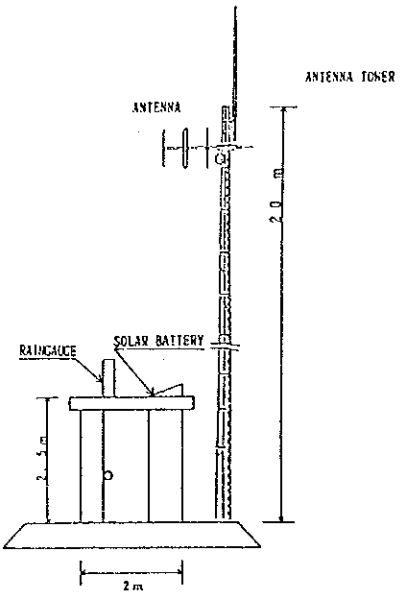


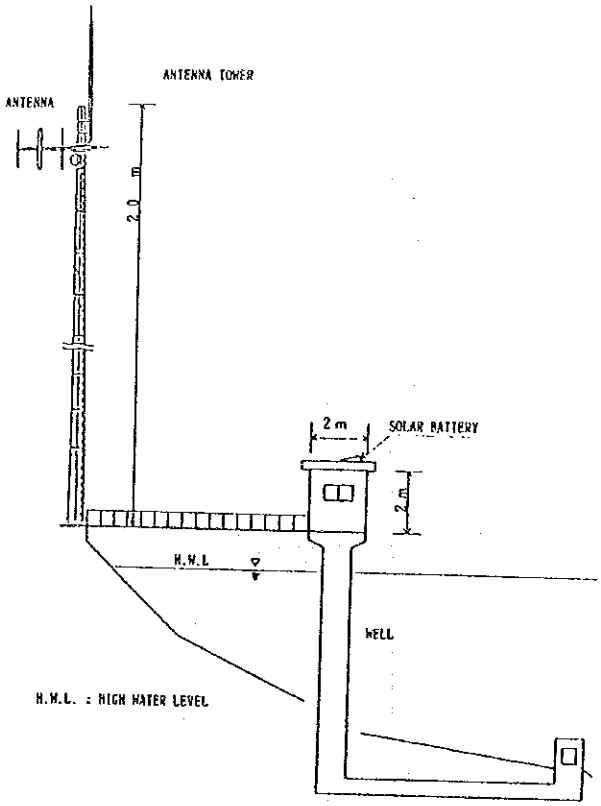
図7－12　アントン地点の6日前予測流出ハイドログラフ（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

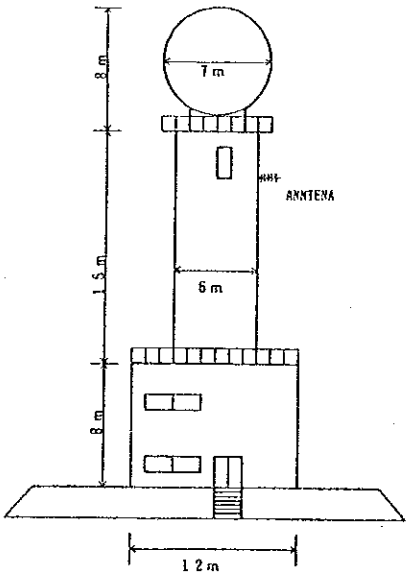
POINT RAINFALL GAUGING STATION



WATER LEVEL GAUGING STATION



RADAR RAINGAUGE STATION



REPEATER STATION

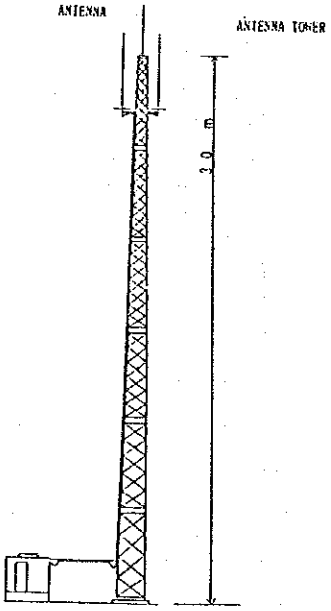
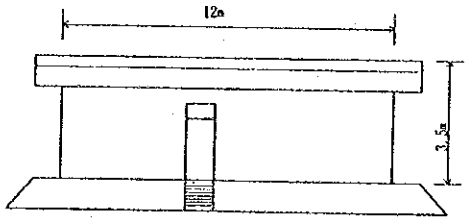


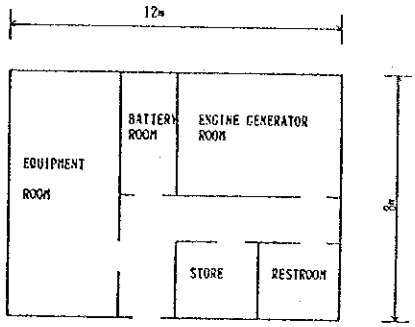
図７－13　水位、雨量観測施設及び中継局の標準図

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

SUBSTATION

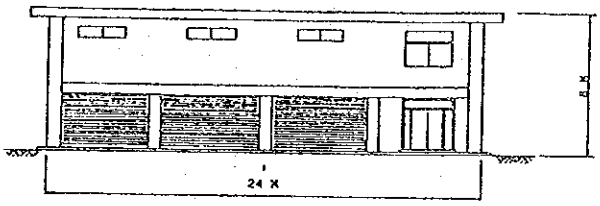


FRONT VIEW

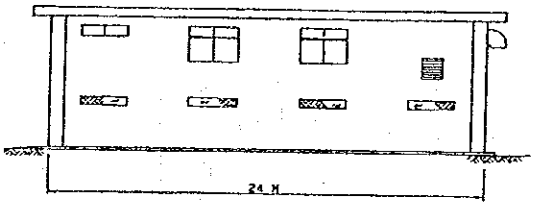


PLAN VIEW

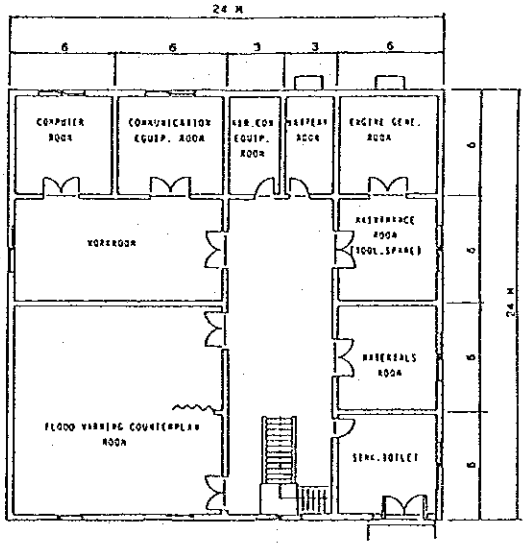
FLOOD FORECASTING CENTER



FRONT VIEW



RIGHT SIDE VIEW



PLAN VIEW

図7－14　洪水予報センターの建屋標準図

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

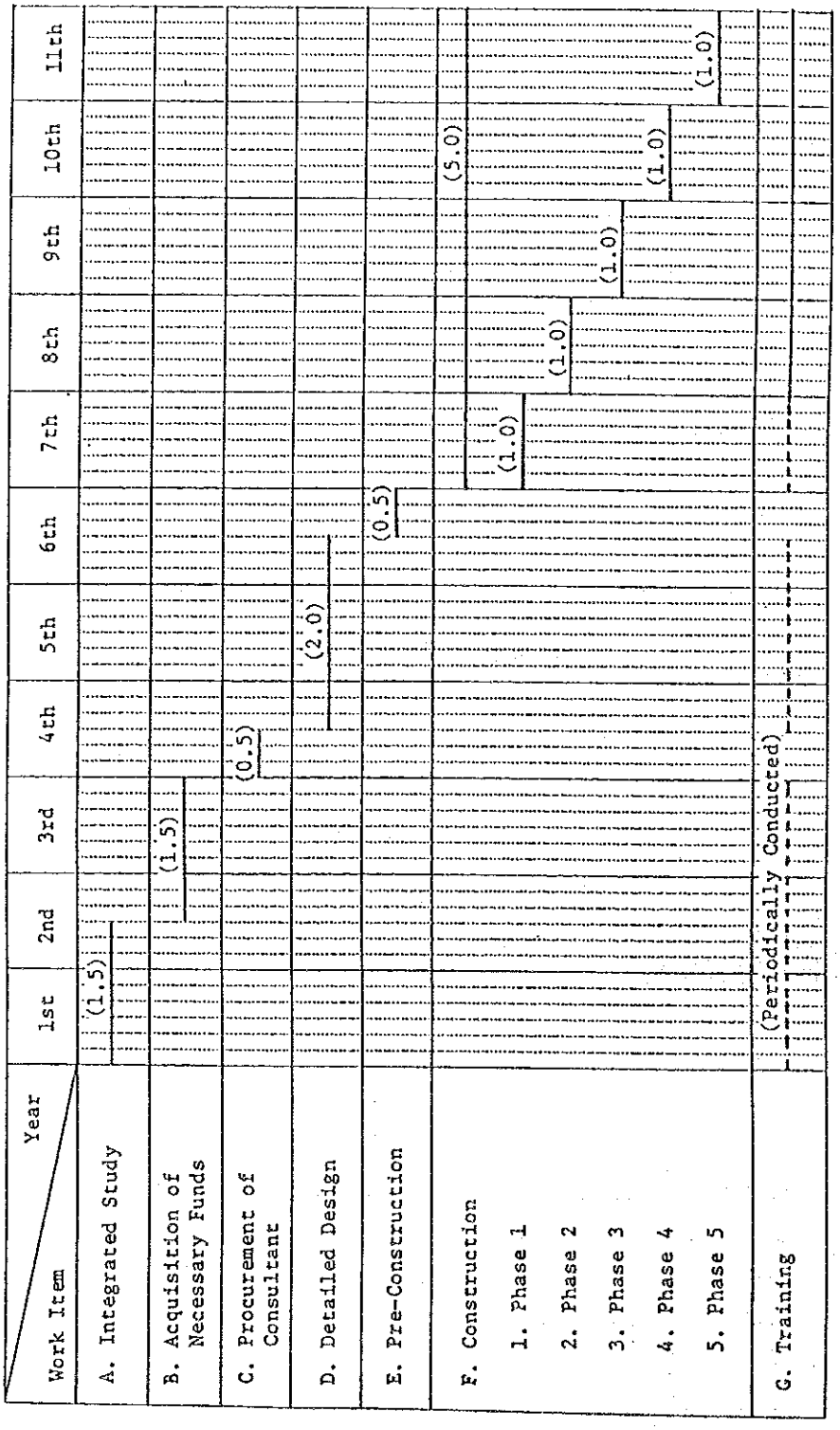


図7－15　実施計画（第2ステップ）

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

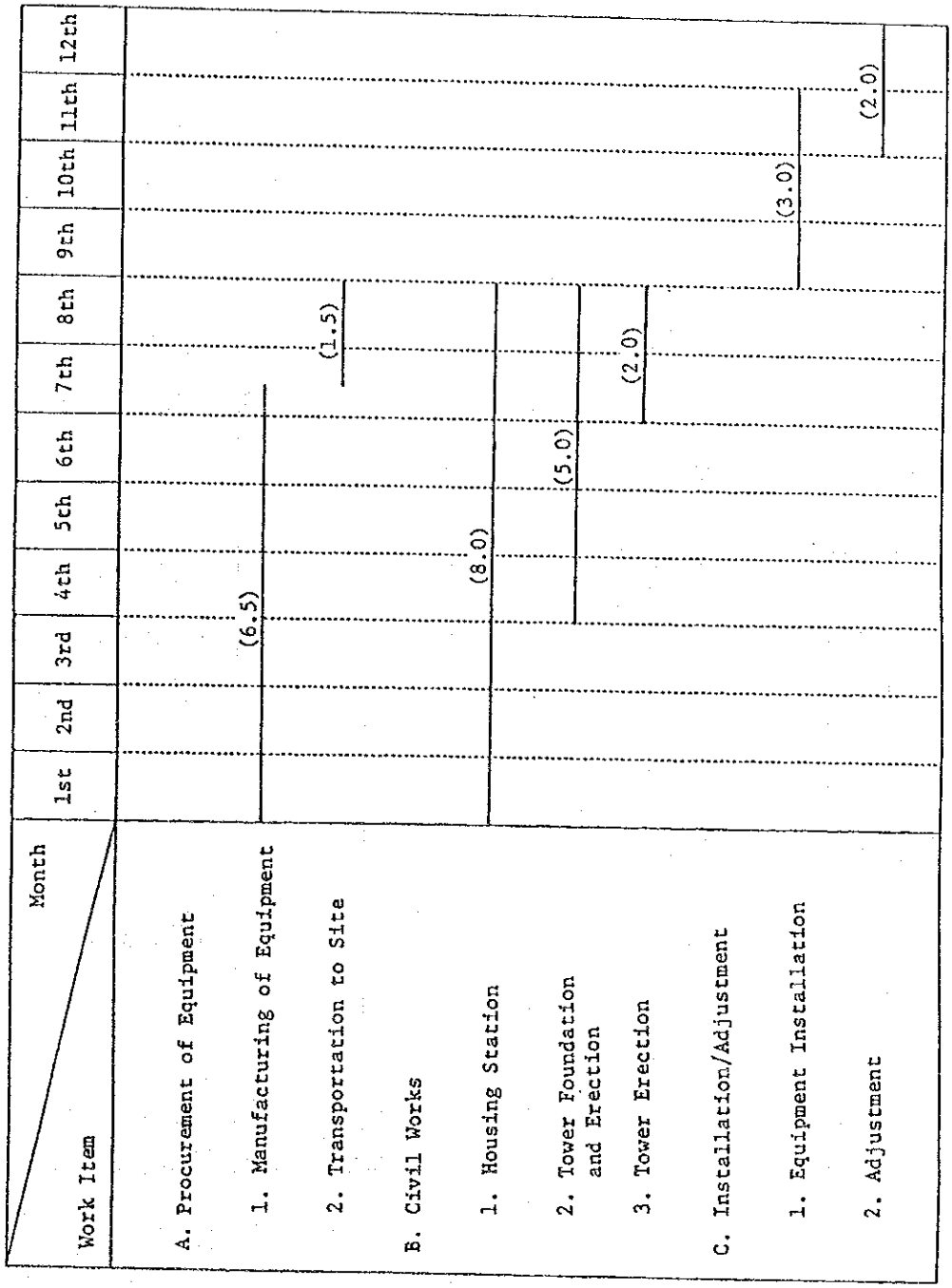


図7－16　各フェーズの施工計画

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

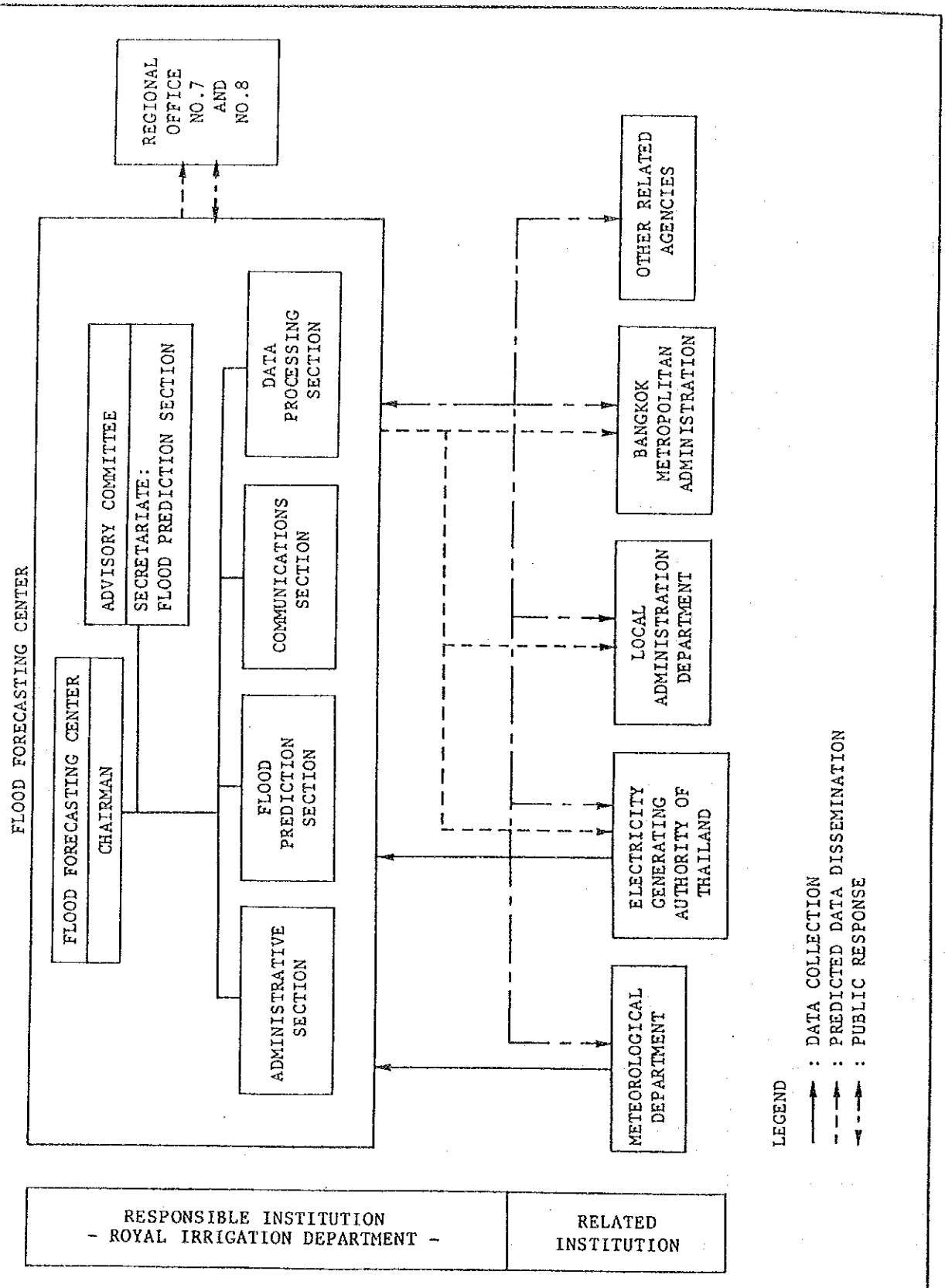


図7－17　洪水予報センターの組織計画

FLOOD FORECASTING SYSTEM
IN THE CHAO PHRAYA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

第8章　勧　　告

8.1　この調査で、最新施設による第2ステップ洪水予報システムがマスタープランレベルで計画、策定された。この調査と平行し、洪水予報システムと施設を共有する可能性の高い水管理システム調査が行われており、実施にむけて2つのプロジェクトの最終的な調整が必要と考えられる。

このことから、水管理システム調査の完成の後、出来るだけ早急に次の段階の調査を始めることを勧告する。

8.2　洪水被害問題に緊急に対処するため、既存の施設を使った第1ステップ洪水予報システムを策定した。このシステムは効果は第2ステップ程高くないものの、この調査結果にもとづきこのまま詳細設計、建設工事への段階へと進める状態にある。

ここで、第2ステップシステムの調査を促進するとともに、この第2ステップシステム完成までの期間洪水予報業務を実施するため、第1ステップを早急に実現することを勧告する。

8.3　この第1ステップシステムは早急な洪水予報の実施を目的としているが、信頼性を高めるためには第2ステップで用いているテレメーター施設の一部を予算の許す範囲で早い段階に導入することが望ましい。

8.4　第2ステップシステムの策定では、ＴＯＴ地上通信を衛星通信等との比較において経済的、技術的理由から最適なものとして選んだ。

しかし、この衛星通信の技術、経済的改善はすさまじく、将来において衛星通信システムが技術的、経済的に地上通信より有利になる可能性がある。この意味から次の段階での調査では、衛星通信の可能性を改めて検討する必要がある。

8.5　この調査で開発した4つの基本モデルからなる洪水予測モデルは比較的良好な結果を示している。しかし洪水予測モデルは限られた資料で策定しており、今後改善していく必要がある。

この改善に先だって、必要と考えられるデータとして、氾濫区域、氾濫水深、期間、

詳細な地形図、ナコンサワン上流域の洪水氾濫域付近の河川横断、縦断図があげられる。これらの資料は現時点では質・量ともに充分といえないところから早い段階で整備する必要がある。

8.6　洪水予報システムの整備によって洪水被害問題は緊急かつ効果的にある程度軽減される。しかし、根本的にこの問題を解決するには総合的洪水防御計画によって洪水防御施設を整備する必要がある。この観点から洪水予報システムの整備とともに洪水防御のマスタープラン策定を進めることが必要である。

8.7　この洪水防御計画、洪水予報システムのスムースな促進のためにはこの分野に関するＲＩＤの能力を強化することが肝要である。このことからＲＩＤにこの分野のアドバイスを与える外国人専門家を置くことが必要と考えられる。

添　付　資　料

MINUTES OF MEETING

OF

THE INCEPTION REPORT FOR THE STUDY

ON

FLOOD FORECASTING SYSTEM

IN

THE CHAO PHRAYA RIVER BASIN

IN

THE KINGDOM OF THAILAND

BANGKOK, FEBRUARY 19, 1987

Mr. Suha Thanomsingha
Director General
Royal Irrigation Department
Ministry of Agriculture
and Cooperatives
The Kingdom of Thailand

Mr. Katsuhisa Abe
Team Leader
JICA Study Team for
the Study on Flood
Forecasting System
in the Chao Phraya
River Basin

witnessed by

Mr. Sukehisa Aoki
Chairman
Advisory Committee for
The Study

Joint meeting between the Royal Irrigation Department (RID) and the JICA Study Team (the Team) in the presence of the Advisory Committee was held on February 16, to discuss on the contents of the Inception Report. The Team submitted thirty-five (35) copies of the Inception Report to RID.

After discussion, the contents of the Report were agreed by and between both parties with confirmation of the following items :

(1) Hydrological Observation Network

The flood forecasting system will be formulated in three (3) stages. Among these stages, the first stage flood forecasting system is provided to predict flood discharge at the reference points along the river for the area covering Bangkok Metropolis and the suburban area. For the purpose, the hydrological observation network will be provided downstream from Nakhon Sawan in main river basin and the other tributaries such as Pasak river, Sakaekrang river, etc.

(2) Data Management System

In this study, the facilities for the data management system is designed on the basis of the data volume necessary for the flood forecasting system.

(3) Dissemination system

RID will select the related agencies to which the flood information should be disseminated ; and will inform the selected agencies to the Team in early stage.

Besides, RID desired the Team to pay attention for the following points in this study :

- To make every endeavour for development of the suitable model so as to satisfy the necessary accuracy for the flood prediction.
- To select the suitable telecommunication network considering the capability of RID for operation and maintenance for telecommunication network.

And, in order to elaborate the flood prediction model, RID kindly offered cooperation in the cross sectional surveying works along the main river and tributaries within the possible extent of RID.

The list of attendants is attached hereto.

LIST OF ATTENDANCE

No	NAME	DESIGNATION
1	Mr. Vira Poomvises	Chief Civil Engineer
2	Dr. Boonyok Vadhanaphuti	Director, Project Planning Div.
3	Mr. Taweuchai Mackaman	Director, Hydrology Div.
4	Mr. Sompote Sukhumparnich	Director, Data Processing Div.
5	Mr. Sinserm Ketudat	Act. Director, Communications Div.
6	Mr. Suthi Songvoravit	Chief, Project Planning Div.
7	Mr. Prasert Milintangul	Chief, Research & Applied Hydrology Div.
8	Mr. Virat Khao-Uppatum	Hydraulic Engineer, O & M Div.
9	Mr. Prasong Jitsari	Hydrologist, Hydrology Div.
10	Mr. Narumi Yamada	JICA Expert, Project Planning Div.
11	Mr. Toshiharu Kai	JICA Thailand Office
12	Mr. Sukehisa Aoki	Chairman, JICA Advisory Committee
13	Mr. Seiko Fukuda	JICA Advisory Committee
14	Mr. Fumio Kikuchi	JICA Advisory Committee
15	Mr. Katsuhisa Abe	Leader, JICA Study Team
16	Mr. Yoshiharu Matsumoto	JICA Study Team
17	Mr. Makihiko Otogawa	JICA Study Team
18	Mr. Yutaro Hoshi	JICA Study Team

MINUTES OF MEETING

OF

THE PROGRESS REPORT FOR THE STUDY

ON

FLOOD FORECASTING SYSTEM

IN

THE CHAO PHRAYA RIVER BASIN

IN

THE KINGDOM OF THAILAND

BANGKOK, JUNE 29, 1987

Mr. Vira Poomvises
Chief Civil Engineer
Royal Irrigation Department
Ministry of Agriculture
and Cooperatives
The Kingdom of Thailand

Mr. Katsuhisa Ito
Team Leader
JICA Study Team for
the Study on Flood
Forecasting System
in the Chao Phraya
River Basin

Witnessed by

Mr. Tokehisa Aoki
Chairman
Advisory Committee for
the Study

Joint meeting between the Royal Irrigation Department(RID) and the JICA Study Team (the Team) in the presence of the Advisory Committee was held on June 25, to discuss on the contents of the Progress Report. The Team submitted thirty-five (35) copies of the Progress Report to RID.

After discussion, the contents of the Report were agreed by and between both parties. In the meeting, the followings are specifically discussed:

- The target area shall include urban areas along the Chao Phraya river course such as Sing Buri, Lop Buri and Ang Thong in addition to the areas stipulated in the Progress Report.

- The necessity of hydrological observation stations between Bang Sai and Bangkok Memorial Bridge will be studied to predict the flood discharge precisely.

The list of attendants is attached hereto.

LIST OF ATTENDANCE

NO.	NAME	DESIGNATION
1	Mr. Vira Poomvises	Chief Civil Engineer
2	Mr. Taweechai Mackaman	Director, Hydrology Div.
3	Mr. Sompote Sukhumparnich	Director, Data Processing Div.
4	Mr. Prasert Milintangul	Chief, Reserch & Applied Hydrology
5	Mr. Prasong Jitseri	Hydrology Div.
6	Mr. Virat Khao-Uppatum	O & M Div.
7	Mr. Theerawat Tangpanich	Project Planning Div.
8	Mr. Putchai Nitakorn	Communication Div.
9	Mr. Hideo Matsuda	Embassy of Japan
10	Mr. Toshiharu Kai	JICA Thailand Office
11	Mr. Sukehisa Aoki	Chairman, JICA Advisory Committee
12	Mr. Fumio Kikuchi	JICA Advisory Committee
13	Mr. Katsuhisa Abe	Team Leader, JICA Study Team
14	Mr. Yoshiharu Matsumoto	JICA Study Team
15	Mr. Yutaro Hoshi	JICA Study Team
16	Mr. Masashi Furutaguchi	JICA Study Team
17	Mr. Yoshinori Ohyama	JICA Study Team
18	Mr. Junji Kamata	JICA Study Team
19	Mr. Yuzo Mizota	JICA Study Team
20	Mr. Kinichi Ohno	JICA Study Team

MINUTES OF MEETING

OF

THE INTERIM REPORT FOR THE STUDY

ON

FLOOD FORECASTING SYSTEM

IN

THE CHAO PHRAYA RIVER BASIN

IN

THE KINGDOM OF THAILAND

BANGKOK, NOVEMBER 30, 1987

Suha Thanomsingha

Mr. Suha Thanomsingha
Director General
Royal Irrigation Department
Ministry of Agriculture
and Cooperatives
the Kingdom of Thailand

Mr. Katsuhisa Abe
Team Leader
JICA Study Team for
the Study on Flood
Forecasting System
in the Chao Phraya
River Basin

witnessed by

Sukehisa Aoki

Mr. Sukehisa Aoki
Chairman
Advisory committee for
the Study

Joint meeting between the Royal Irrigation Department (the RID) and the JICA Study Team (the Team) was held on November 26 in the presence of the Advisory Committee to discuss on the contents of the Interim Report. The JICA Study Team submitted 35 copies of the Interim Report to the RID in accordance with the scope of works.

Through discussion, the contents of the Report were agreed by and between both parties. The major items discussed are enumerated as below:

- The RID revealed his intention to carry the plan of Step 1 Flood Forecasting System into the implementation on the premises of eligible external assistance.

- The RID had a quotation about the possibility for the Team to provide the development works on the detailed computer programming for the Flood Prediction Model within this study period. In this connection, the Team made an explanation that such computer programming works are not within the scope of work but will be performed during the implementation stage.

- In accordance with a request from the RID, a certain modification might be made to the implementation schedule for Step 1 Flood Forecasting System specified in the Interim Report. Details of the modification will be clarified by the RID and discussed with the Team before the Team leaves to Japan.

- In addition to the Interim Report which principally describes the plan of Step 1 Flood Forecasting System, the Team will prepare the material to present the outline of Step 2 Flood Forecasting System and discuss its contents with the RID before the Team leaves to Japan.

The list of attendance is attached hereto:

LIST OF ATTENDANCE

No	NAME	DESIGNATION
1	Mr. Chareuk Nonthathum	Chief Civil Engineer
2	Mr. Prasert Milintangul	Chief, Research & Applied Hydrology Div.
3	Mr. Sinserm Ketudat	Director, Communications Div.
4	Mr. Sompote Sukhumparnich	Director, Data Processing Div.
5	Mr. Kitla Thepalagleka	Project Planning Div.
6	Mr. Prasong Jitseri	Hydrologist, Hydrology Div.
7	Mr. Virat Khao-Uppatum	Hydraulic Engineer, O & M div.
8	Mr. Lek Prapasajchavet	O & M Div.
9	Mr. Narumi Yamada	JICA Expert, Project Planning Div.
10	Mr. Sukehisa Aoki	Chairman, JICA Advisory Committee
11	Mr. Tadahiko Nakao	JICA Advisory Committee
12	Mr. Seiko Fukuda	JICA Advisory Committee
13	Mr. Fumio Kikuchi	JICA Advisory Committee
14	Mr. Katsuhisa Abe	Leader, JICA Study Team
15	Mr. Yoshiharu Matsumoto	JICA Study Team
16	Mr. Makihiko Otogawa	JICA Study Team
17	Mr. Yutaro Hoshi	JICA Study Team
18	Mr. Yoshinori Oyama	JICA Study Team
19	Mr. Hideki Oguchi	JICA Study Team
20	Mr. Kinichi Ohno	JICA Study Team
21	Mr. Yuzo Mizota	JICA Study Team

MINUTES OF MEETING

OF

THE DRAFT FINAL REPORT FOR THE STUDY

ON

FLOOD FORECASTING SYSTEM

IN

THE CHAO PHRAYA RIVER BASIN

IN

THE KINGDOM OF THAILAND

BANGKOK, MARCH 22, 1988.

J. Tejasen

Mr. Jumsak Tejasen
Director of Research and
Laboratory Division
Acting for chief Civil
Engineer

Mr. Katsuhisa Abe
Team Leader
JICA Study Team for
the Study on Flood Forecasting
System in the Chao
Phraya River Basin

Witnessed by

Sukehisa Aoki

Mr. Sukehisa Aoki
Chairman
Advisory committee for
the study

Joint meeting between the Royal Irrigation Department (RID) and the JICA Study Team (the Team) was held on March 21 in the presence of the Advisory Committee to discuss on the contents of the Draft Final Report. The Team submitted the Draft Final Report consisting of 35 copies of main report and executive summary report and 10 copies of supporting report.

Through discussion, the contents of the Report were agreed by and between both parties. The major items discussed are enumerated as below :

- In response to the question on the long term flood prediction in the step-2 flood forecasting System, the Team explained that the system can be used for longer flood prediction than that described in the Report by the model developed in this Study, though the accuracy of the flood prediction results tends to lower.

- RID revealed the intention to promote the step-1 flood forecasting system including facilities for data collection, data transmission and data management in the manner of the grant aid by Japanese Government.

The list of attendants is attached hereto.

J. Tejasu.

S. a.

LIST OF ATTENDANCE

NO	NAME	DESIGNATION
1.	Mr. Chareuk Nonthathum	Chief Civil Engineer
2.	Mr. Taweechai Mackaman	Director, Hydrology Div.
3.	Mr. Sompote Sukhumparnich	Director, Data Processing Div.
4.	Mr. Sinserm Ketudat	Director, Communications Div.
5.	Mr. Prasert Milintangul	Chief, Research & Applied Hydrology Branch
6.	Mr. Kitla Thepalagleka	Project Planning Div.
7.	Mr. Prasong Jitseri	Hydrologist, Hydrology Div.
8.	Mr. Virat Khao-Uppatum	O & M Div.
9.	Mr. Chatchawan Panyawatinondha	O & M Div.
10.	Mr. Chairat Kua-Arun	Data Processing Div.
11.	Mr. Narumi Yamada	JICA Expert, Project Planning Div.
12.	Mr. Sukehisa Aoki	Chairman, JICA Advisory Committee
13.	Mr. Seiko Fukuda	JICA Advisory Committee
14.	Mr. Fumio Kikuchi	JICA
15.	Mr. Katsuhisa Abe	Leader, JICA Study Team
16.	Mr. Yoshiharu Matsumoto	JICA Study Team
17.	Mr. Makihiko Otogawa	JICA Study Team
18.	Mr. Yutaro Hoshi	JICA Study Team

JICA