

图5-3 降雨强度曲线

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

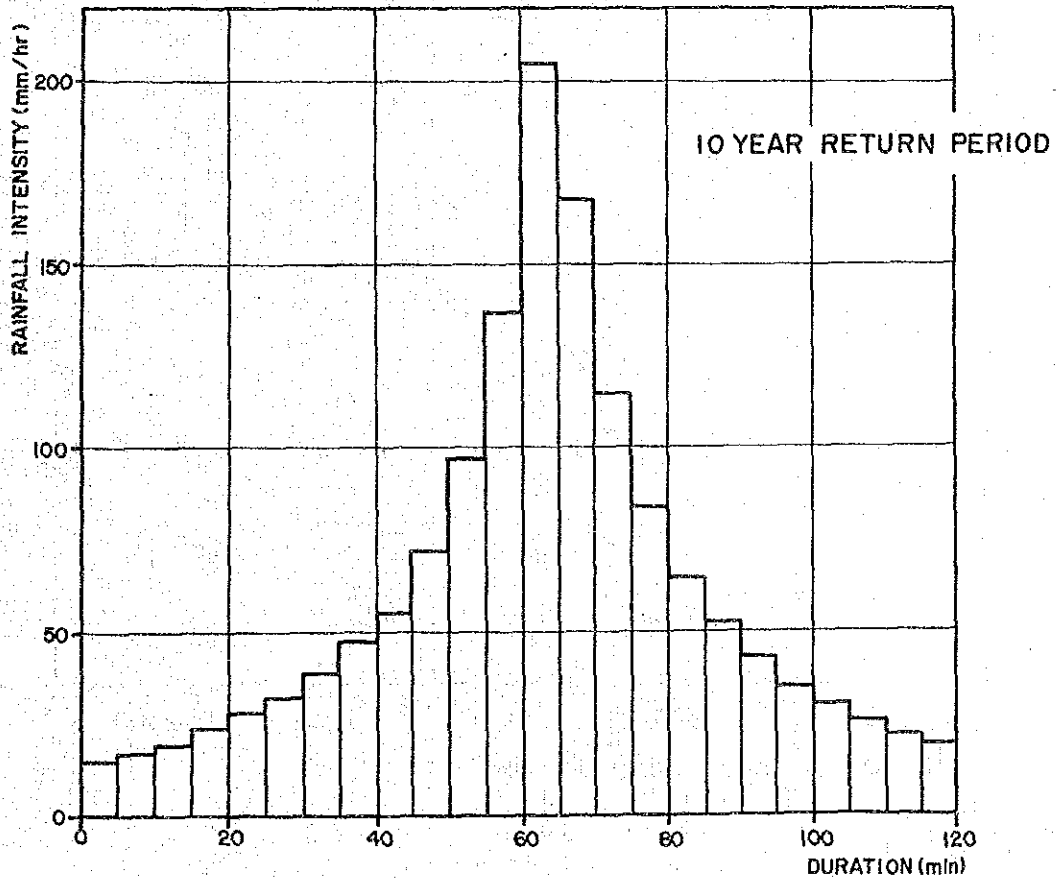
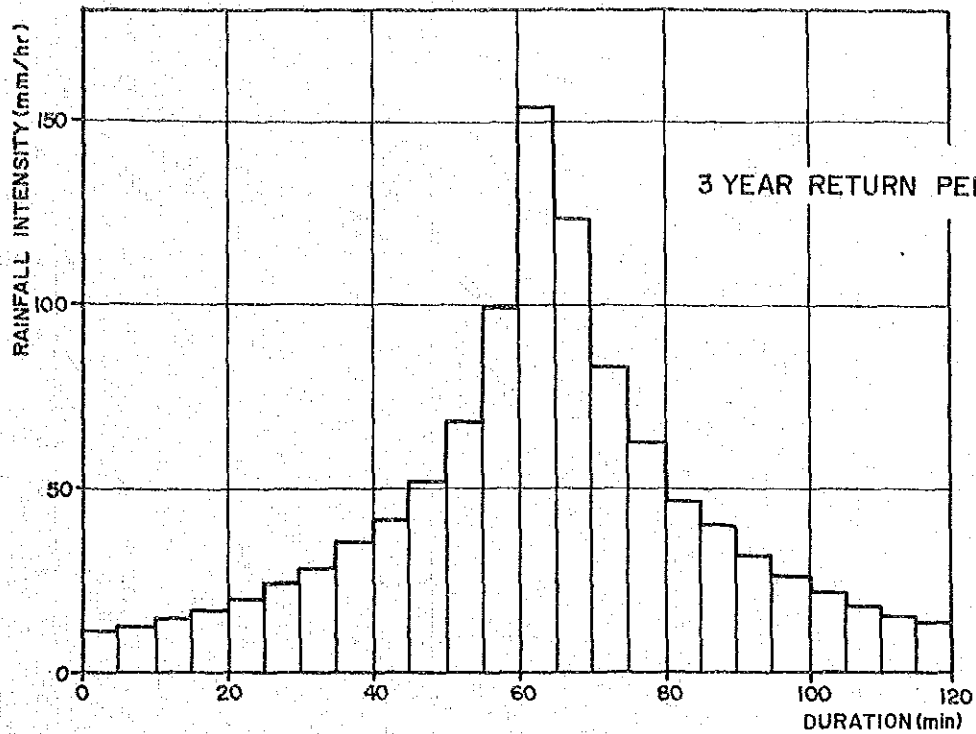


図5-4 ハイエットグラフ

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
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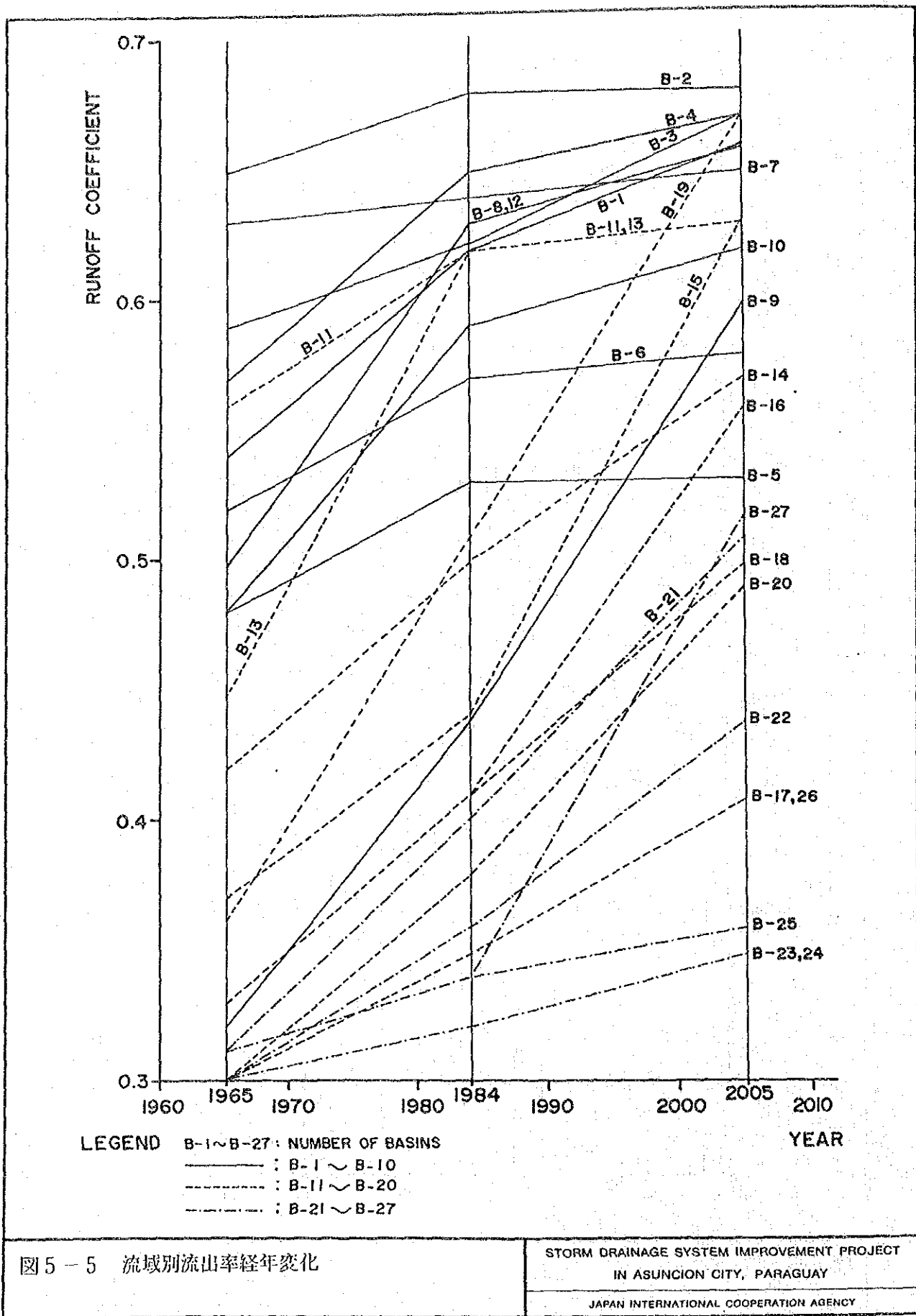


図5-5 流域別流出率経年変化

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
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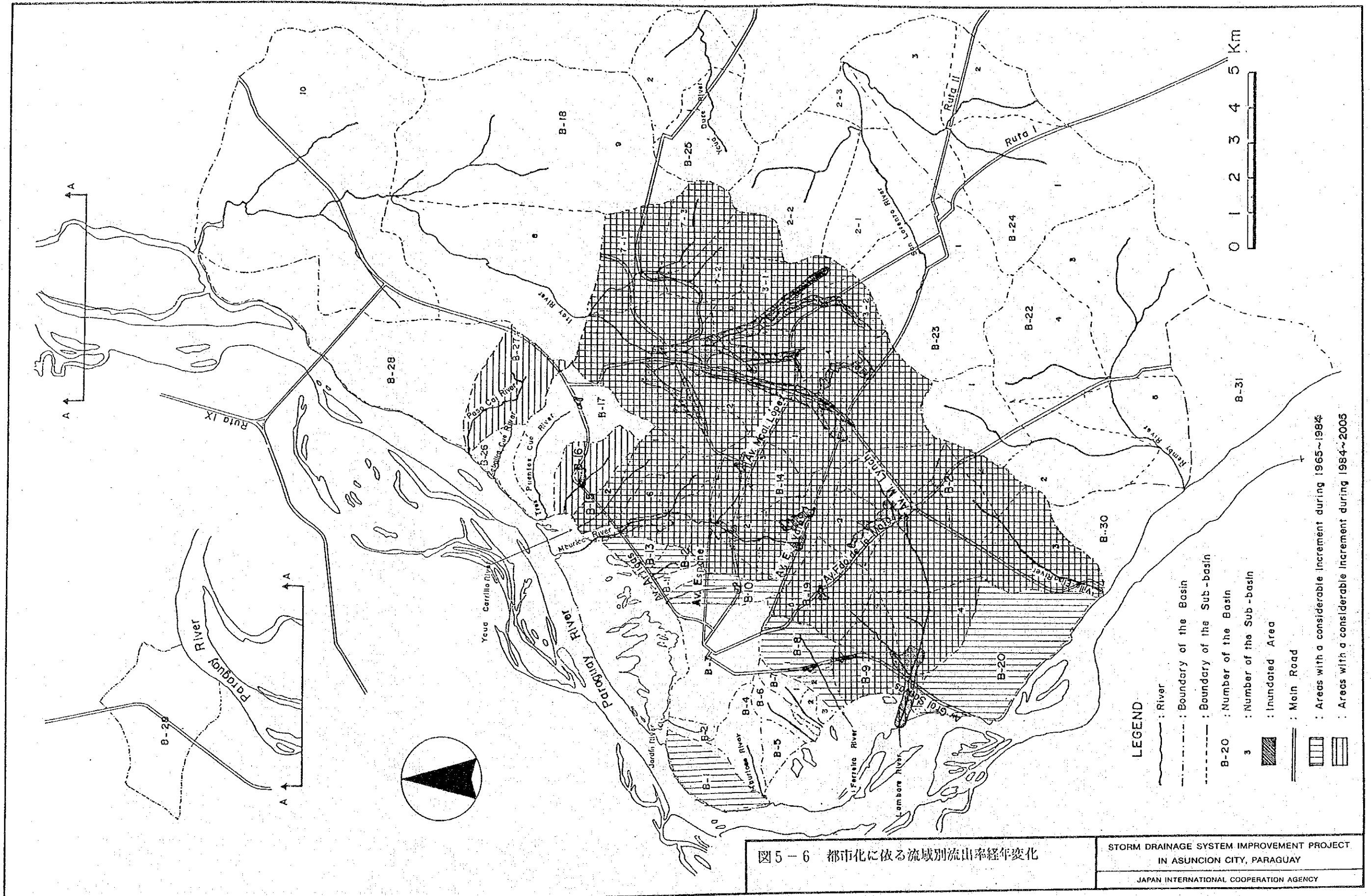
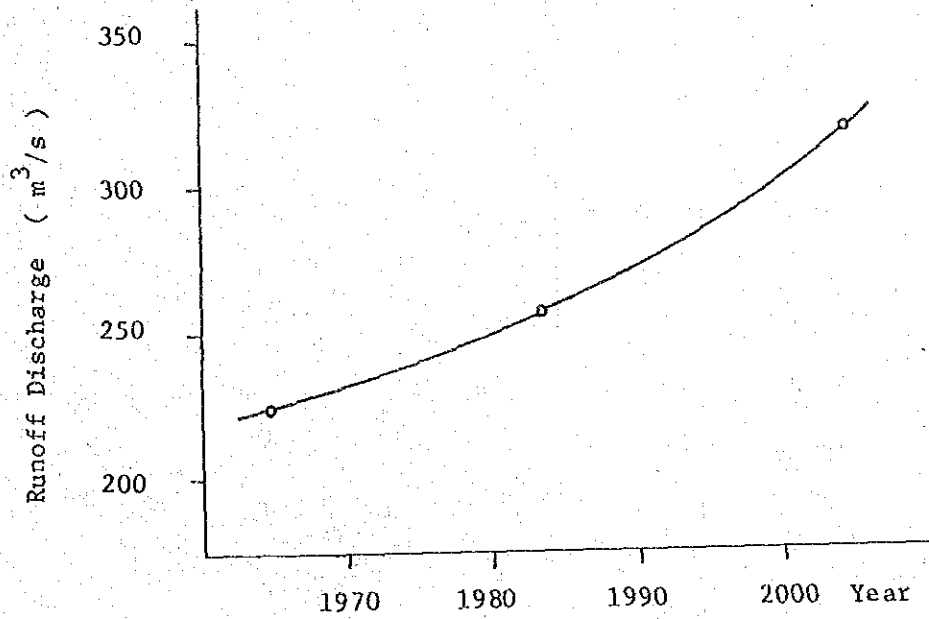


図5-6 都市化に依る流域別流出率経年変化



Variation of Runoff Discharge  
at River Mouth

(30-Year Return Period)



Variation of Assets in  
Inundated Area

(30-Year Return Period)

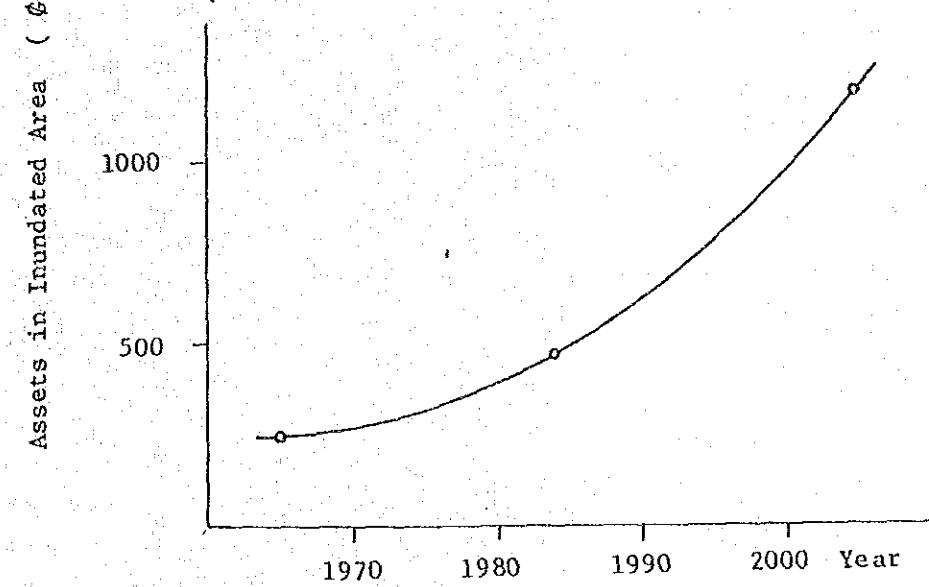


図5-7 流出量及び資産の経年変化

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
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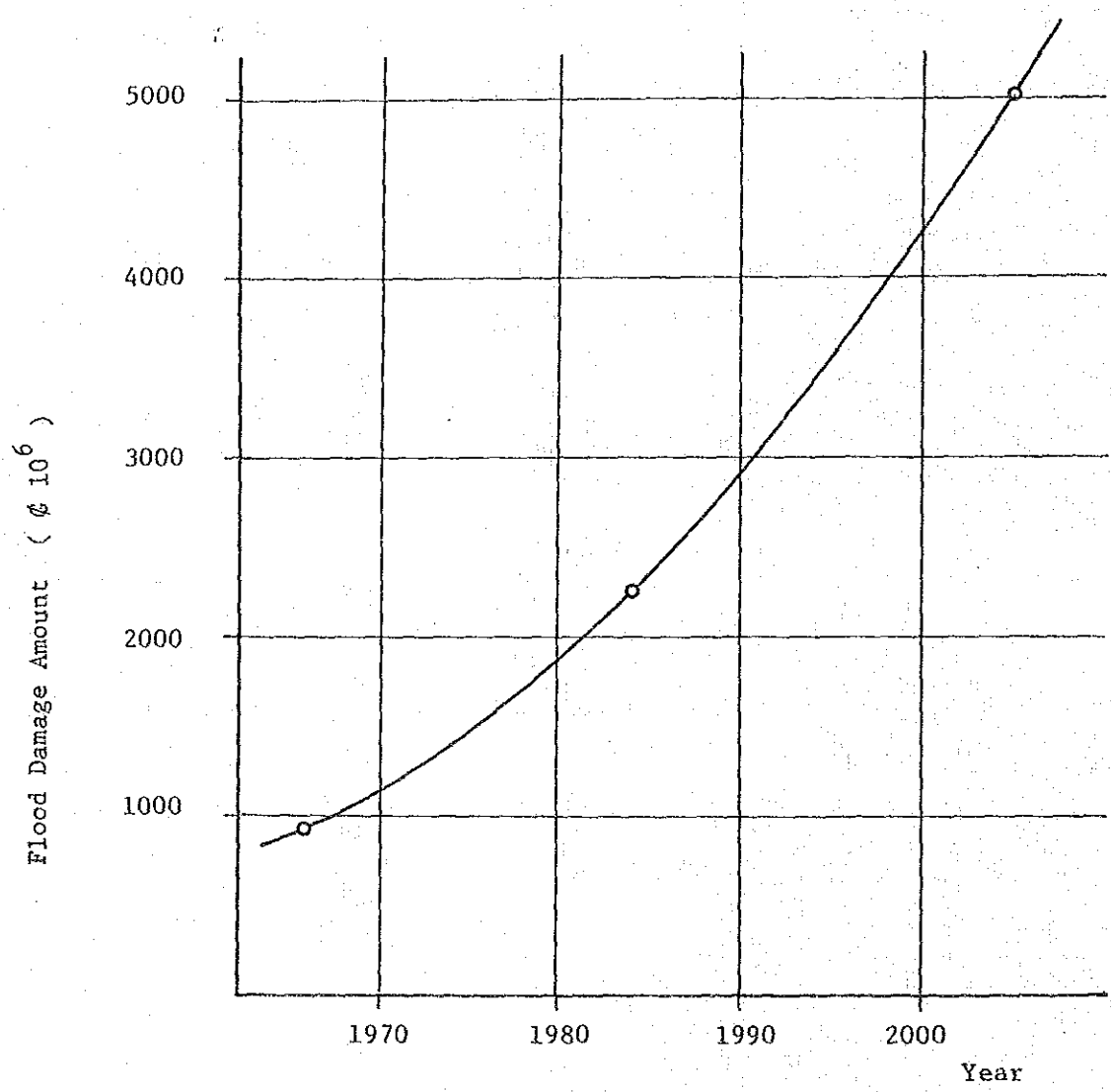


図 5 - 8 計画対象域内洪水被害額変化

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
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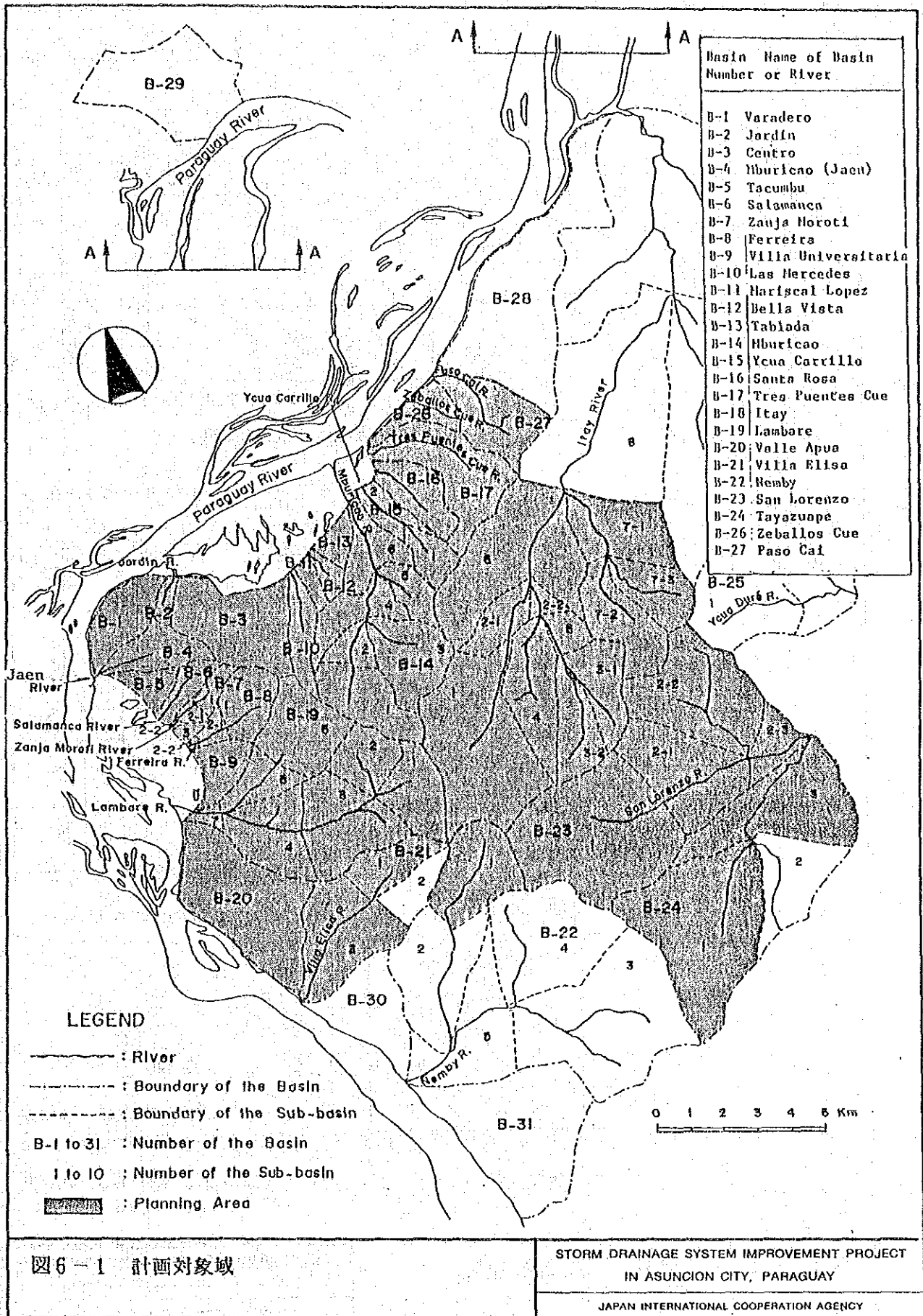


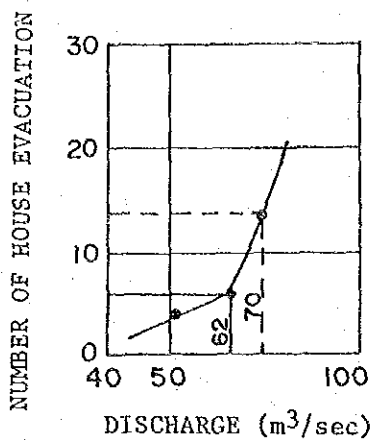
図6-1 計画対象域

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

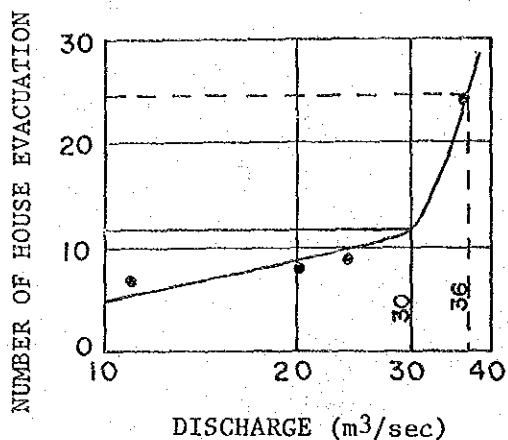
JAPAN INTERNATIONAL COOPERATION AGENCY



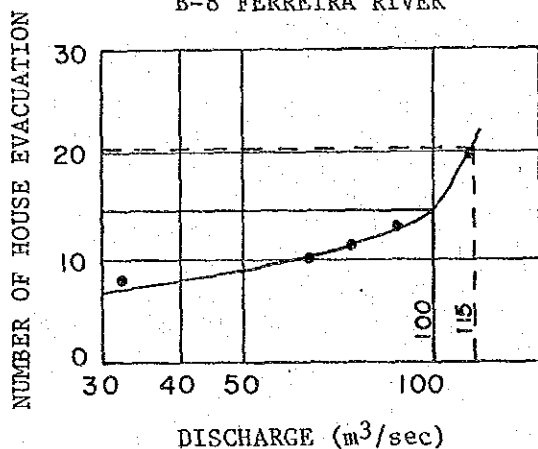
B-4 JAEN RIVER



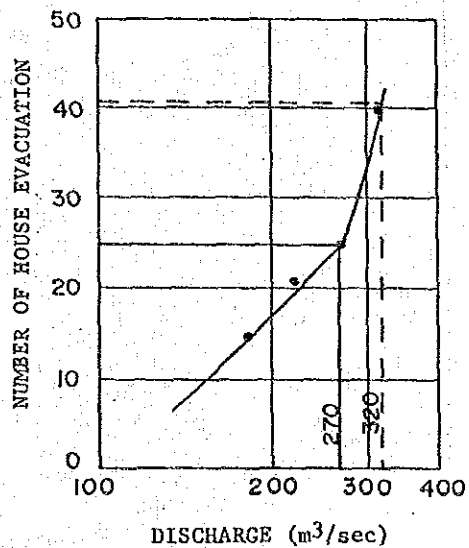
B-7 ZANJA MOROTI RIVER



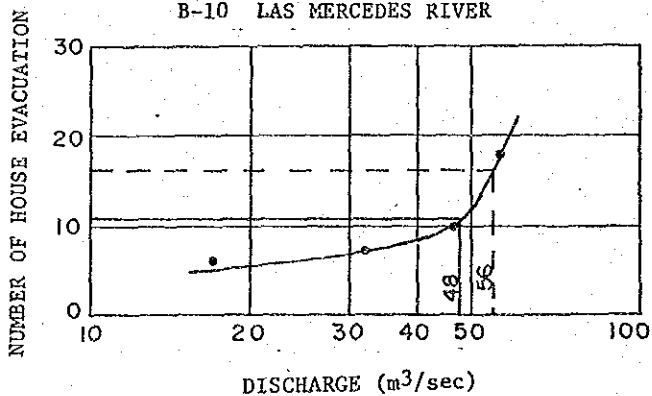
B-8 FERREIRA RIVER



B-14 MBURICAO RIVER



B-10 LAS MERCEDES RIVER



LEGEND

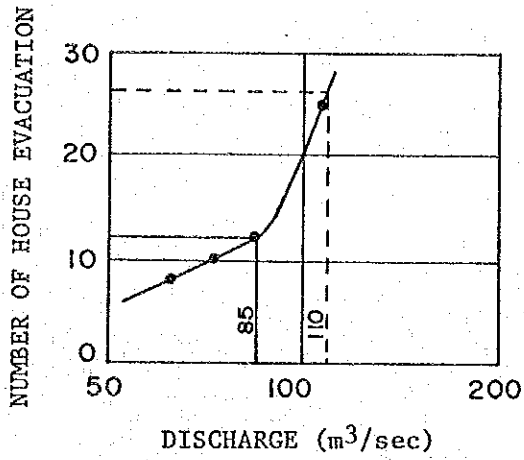
- : DESIGN DISCHARGE FOR OPTIMUM PLAN
- - - : DESIGN DISCHARGE FOR CASE I

図6-2 (1/2) 流出量～移転家屋数

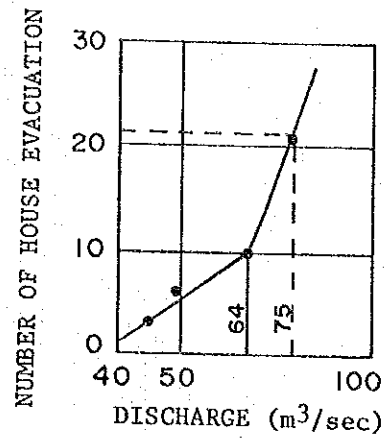
STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

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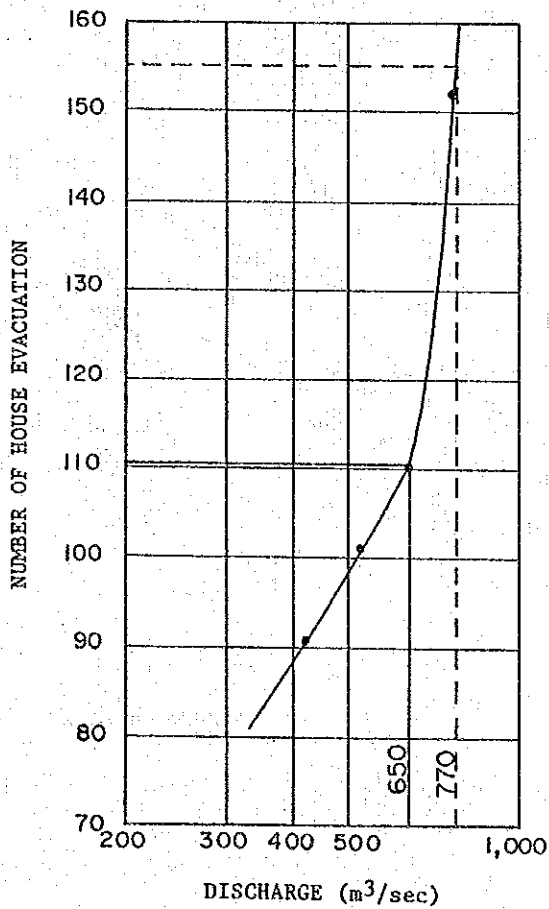
B-15 YCUÁ CARRILLO RIVER



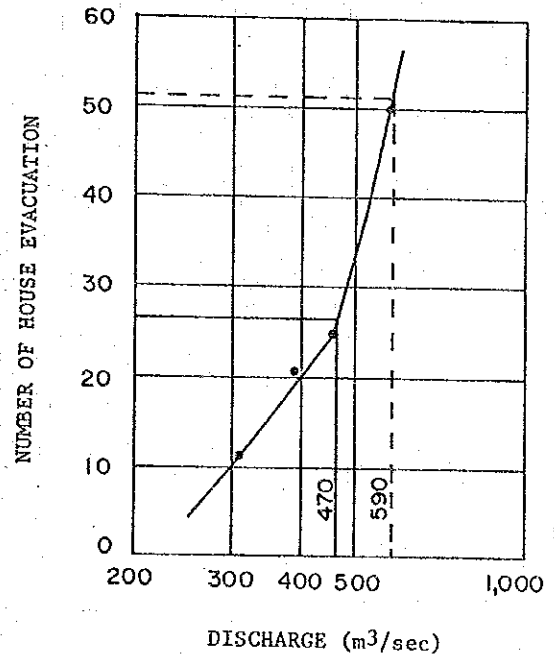
B-16 SANTA ROSA RIVER



B-18 ITAY RIVER



B-19 LANBARE RIVER



LEGEND

- : DESIGN DISCHARGE FOR OPTIMUM PLAN
- - - : DESIGN DISCHARGE FOR CASE I

図6-2 (2/2) 流出量~移転家屋数

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IN ASUNCION CITY, PARAGUAY

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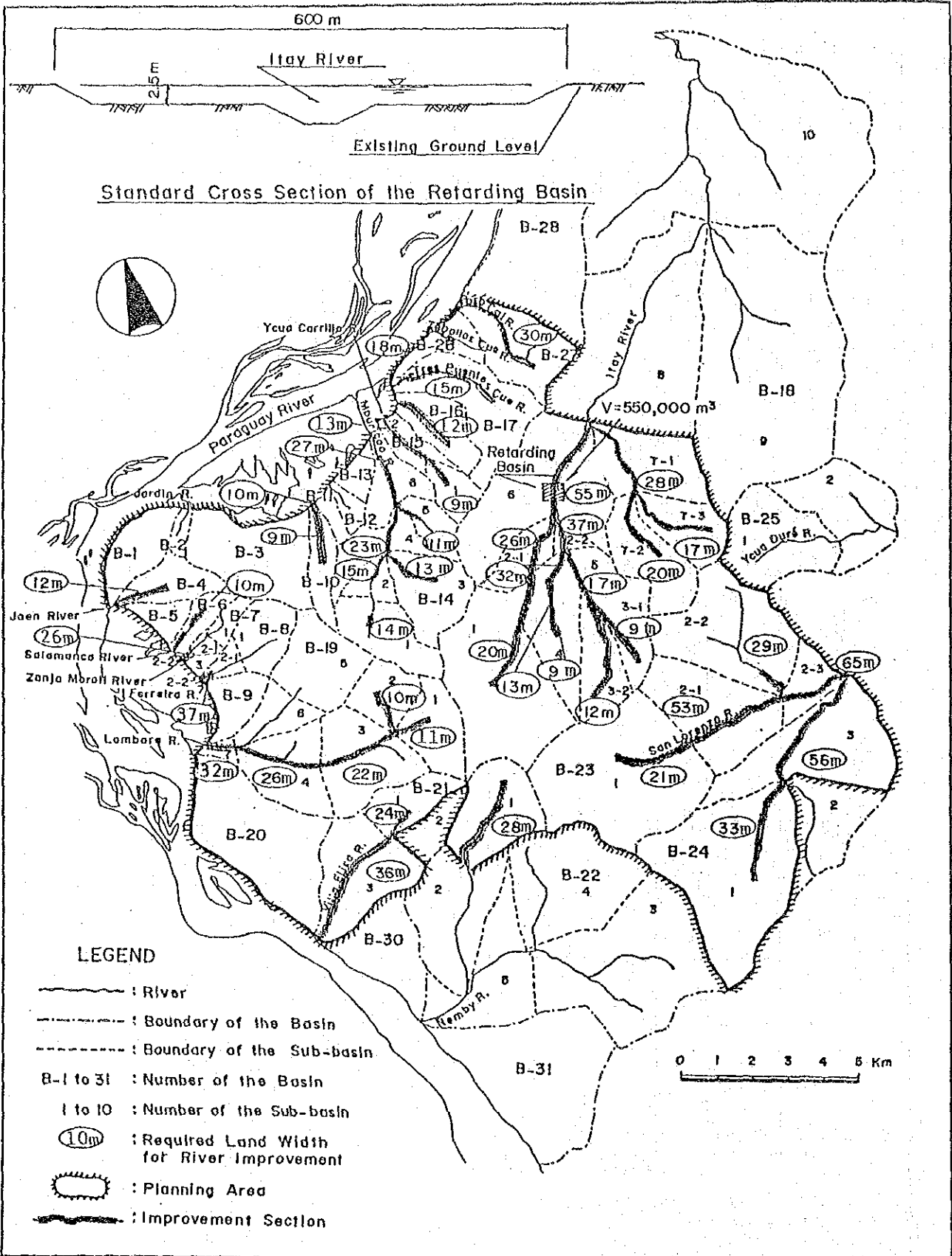
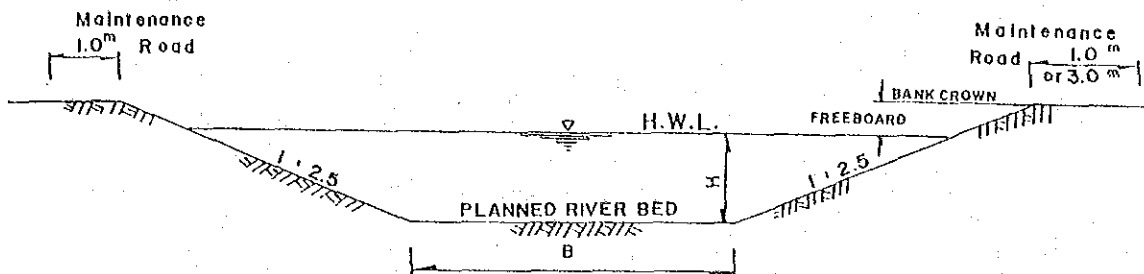


図6-3 必要河川幅 (ベシック・プラン)

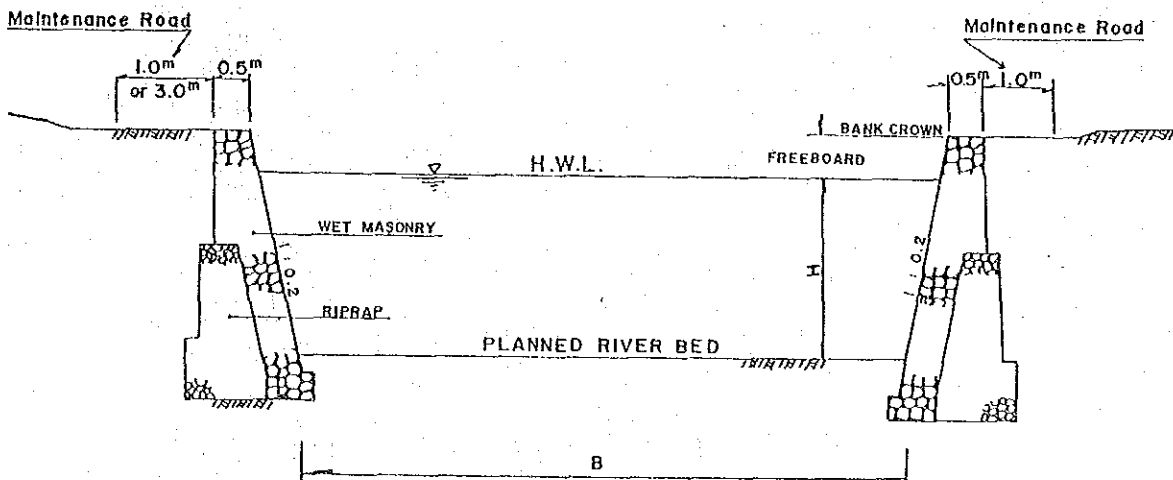
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### Channel without Revetment (TYPE A)



### Channel with Revetment and without Invert (TYPE B)



### Channel with Revetment and Invert (TYPE C)

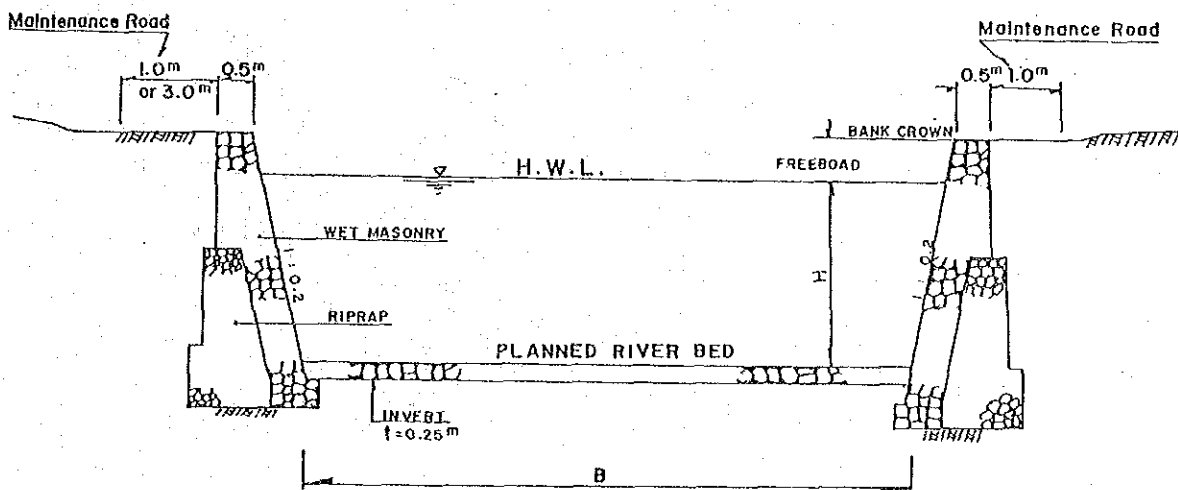
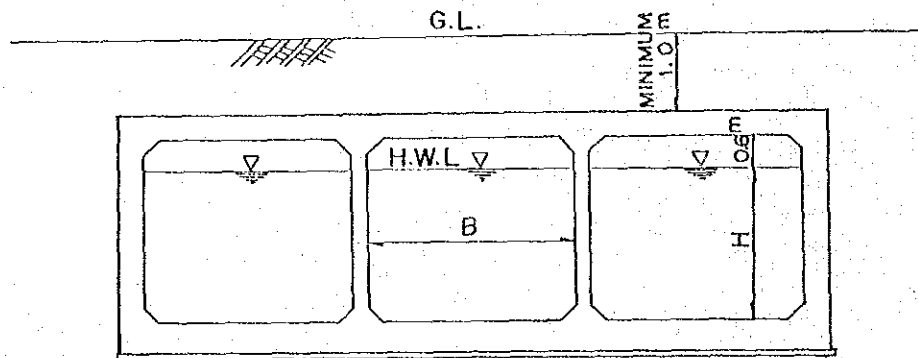


図6-4 (1/2) 標準河川横断面図

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Box Culvert (TYPE D)



Channel with Embankment (TYPE E)

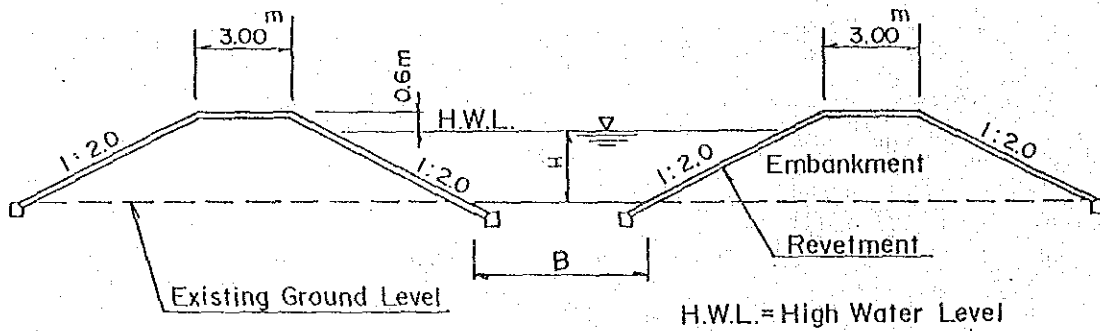
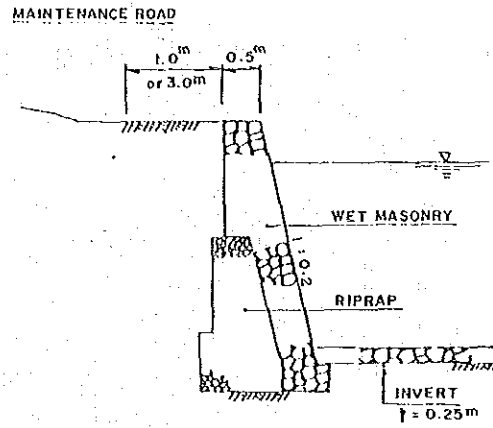


図6-4 (2/2) 標準河川横断面図

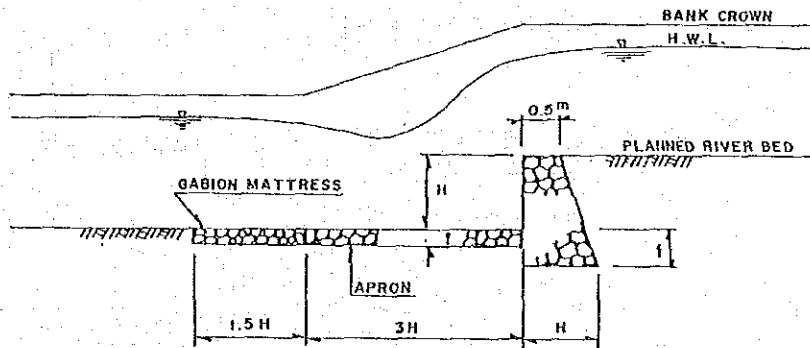
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## REVEMENT



## GROUNDSILL WITH HEAD



## BRIDGE

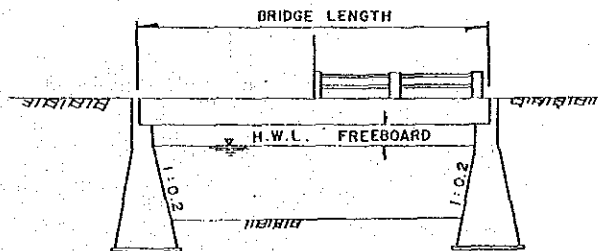


图 6 - 5 標準構造図

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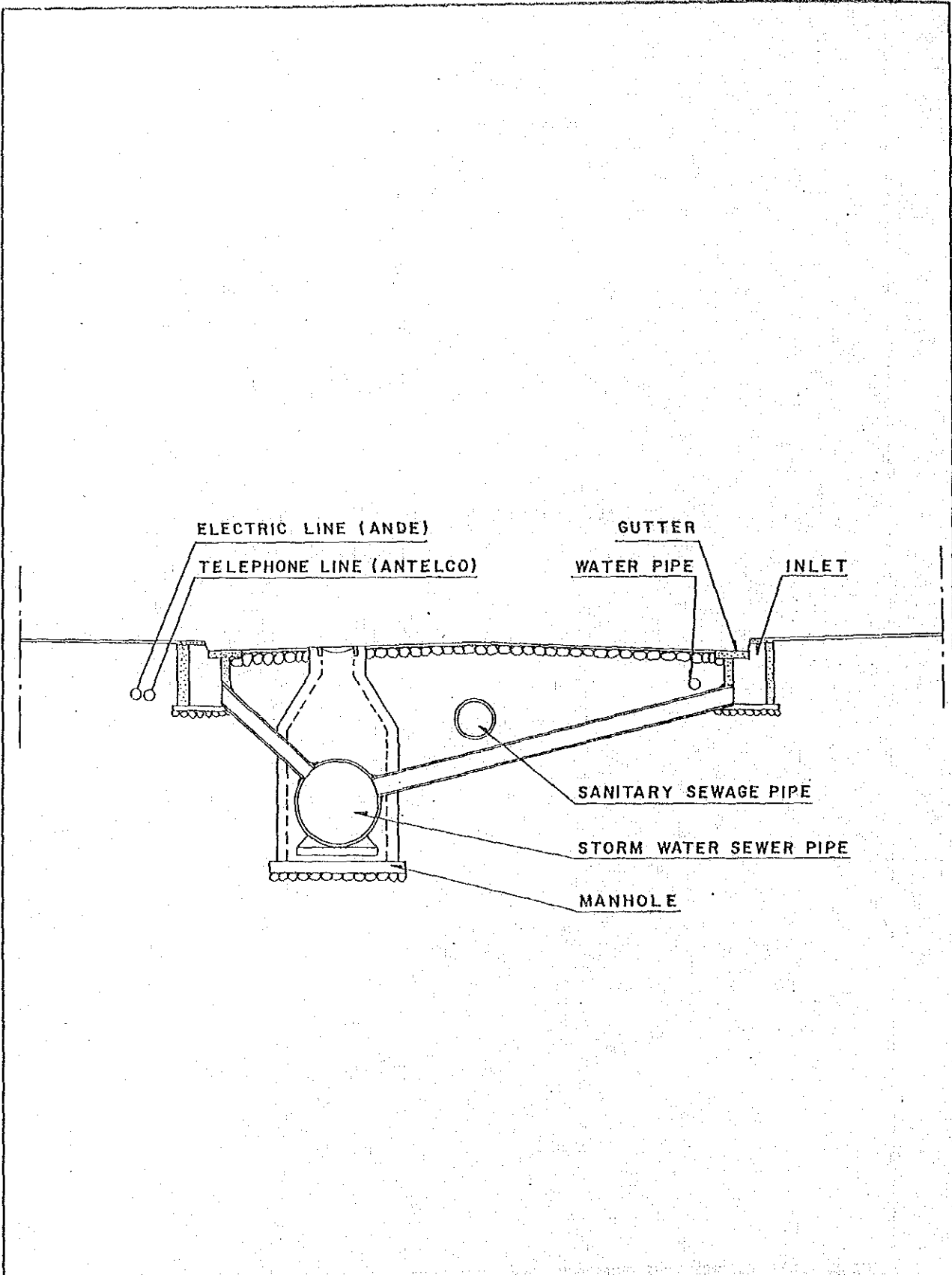
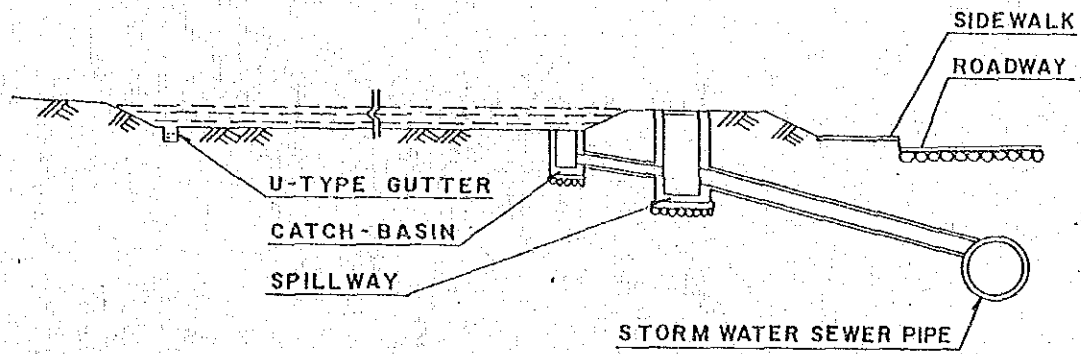


图 6 - 6 排水施設標準構造図

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
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JAPAN INTERNATIONAL COOPERATION AGENCY

STORAGE IN PUBLIC COMPOUNDS



STORAGE IN HOUSE LOTS

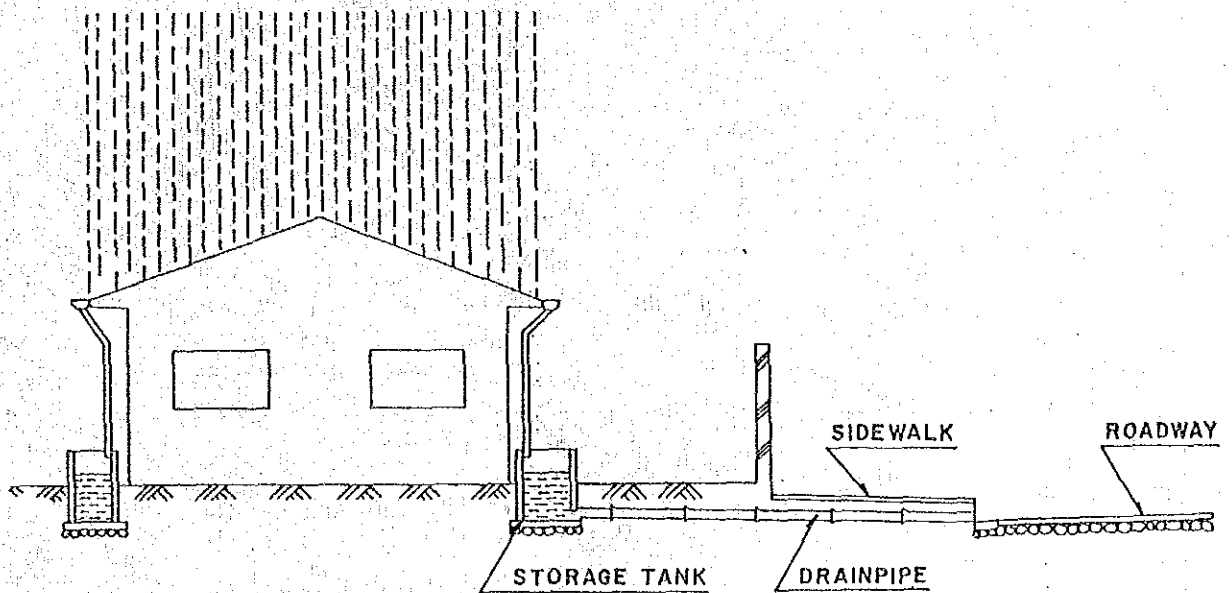


图6-7 貯留施設標準構造図

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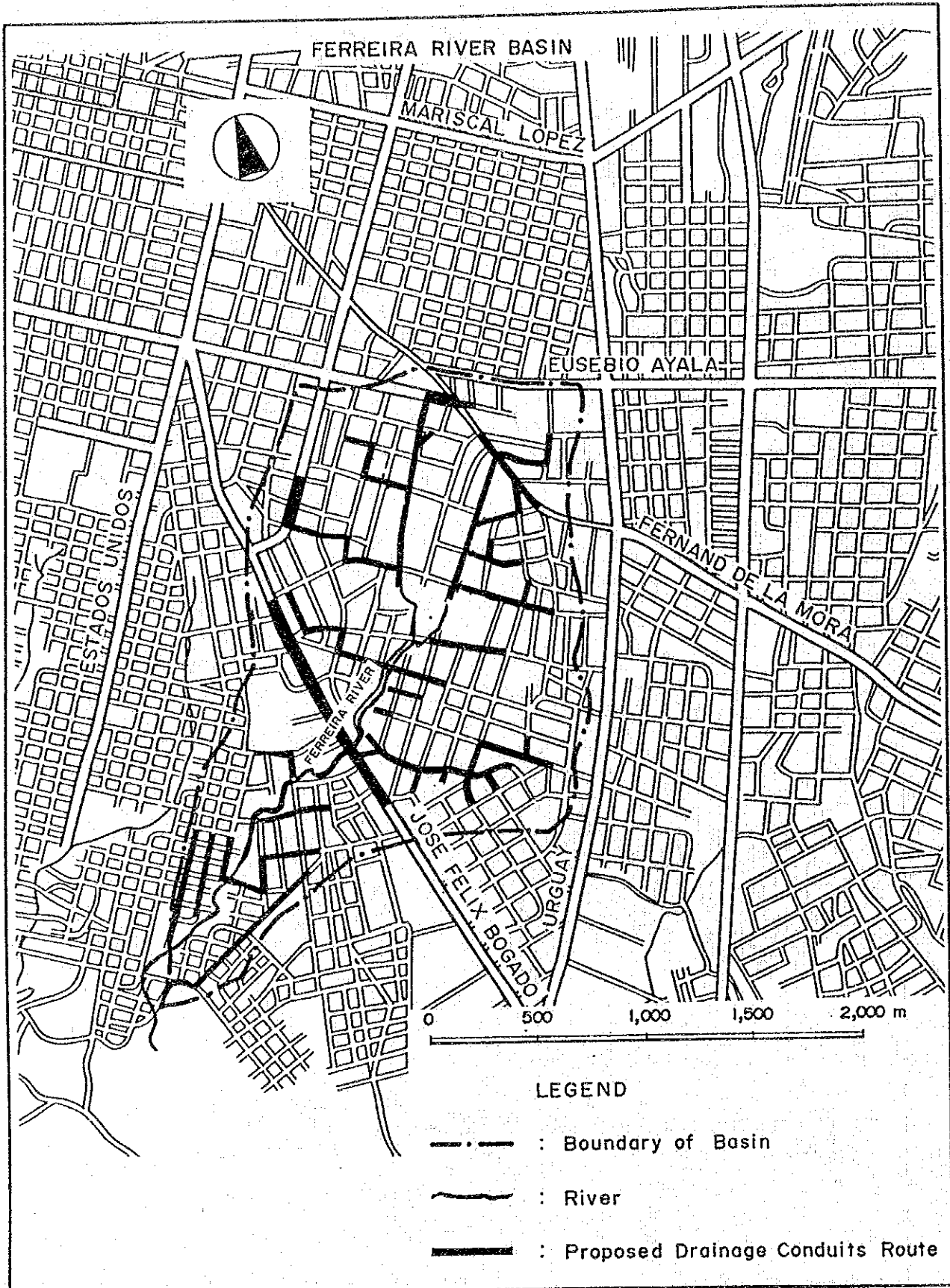
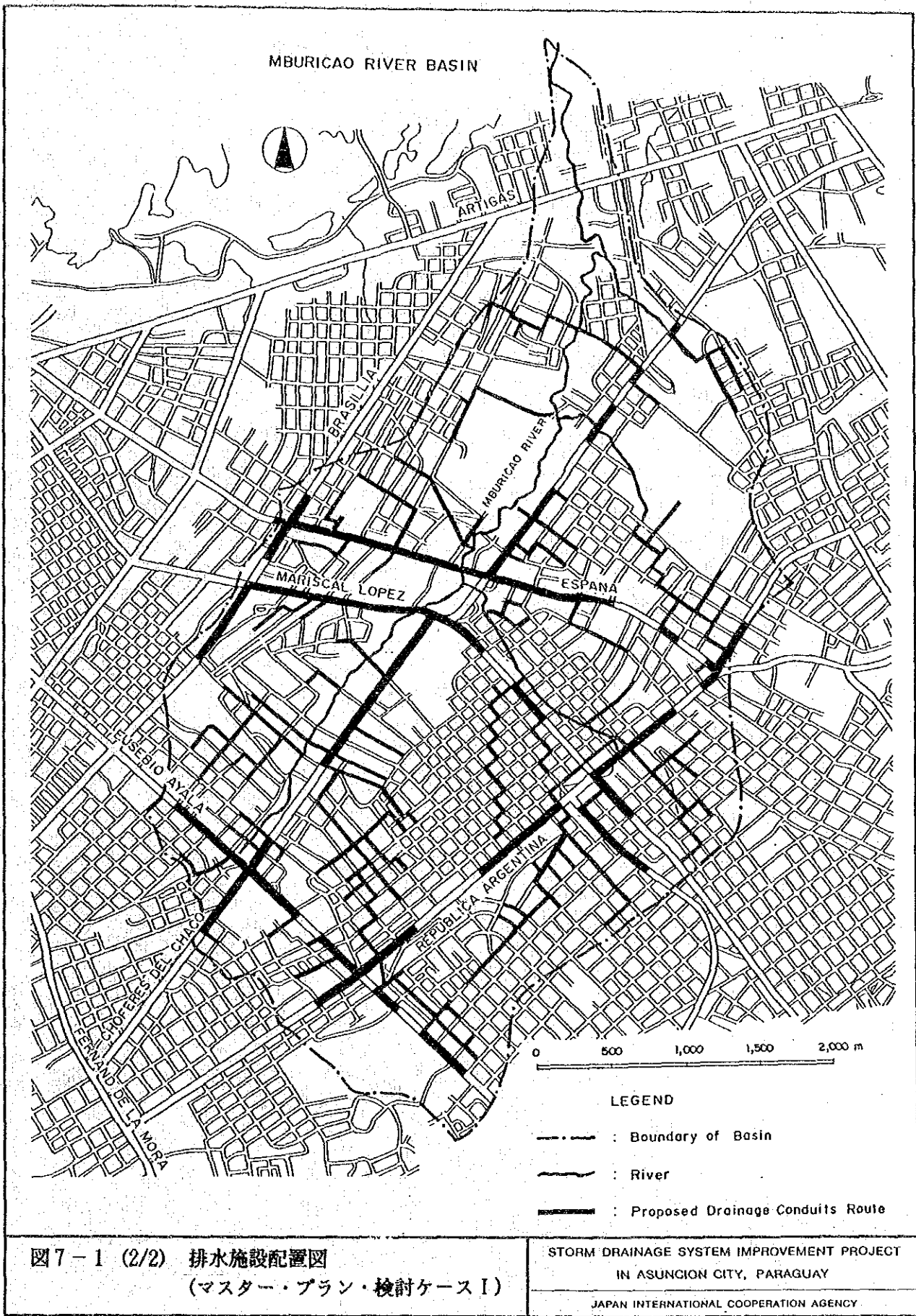


図7-1 (1/2) 排水施設配置図  
(マスター・プラン・検討ケース I)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
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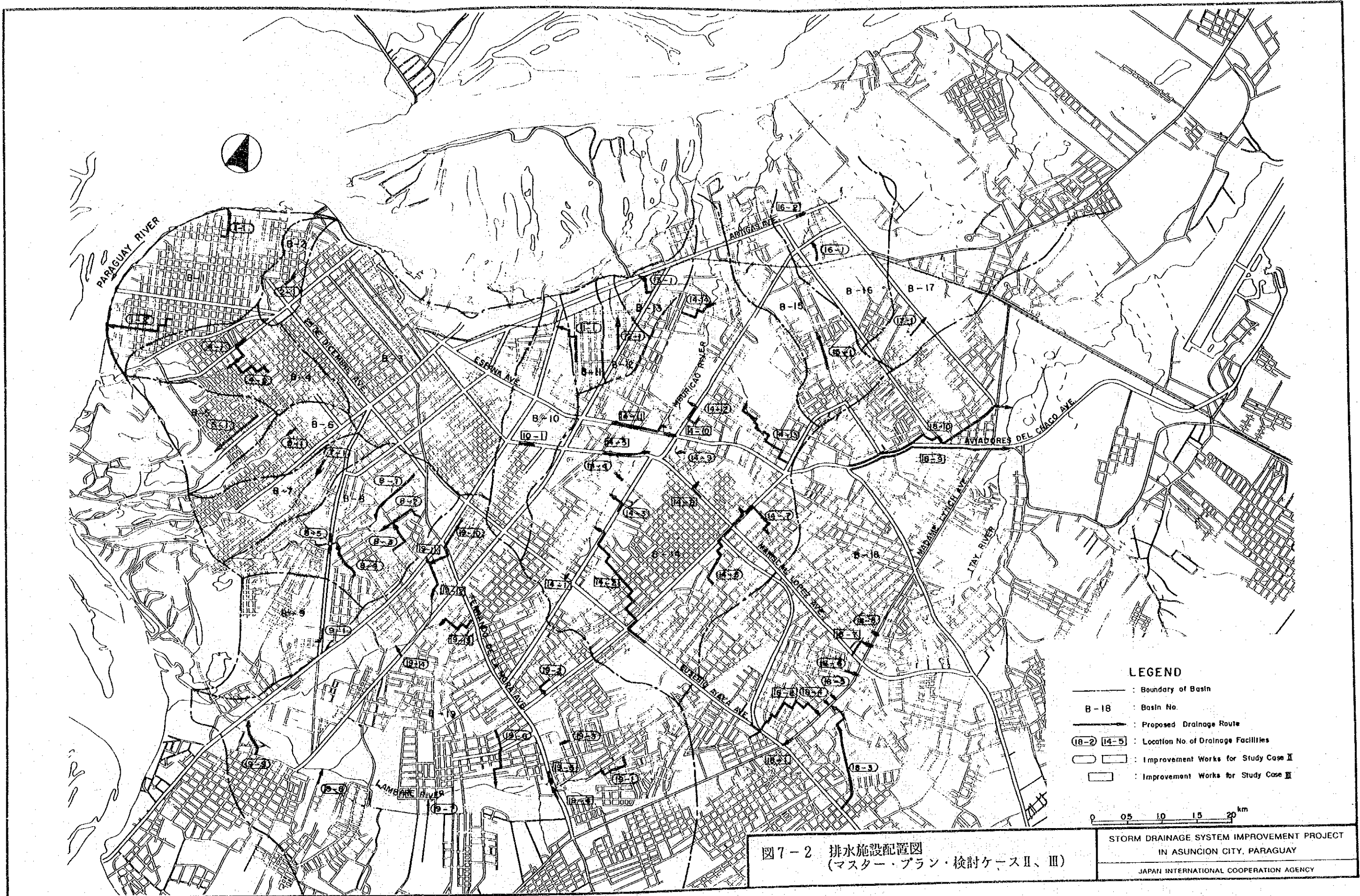


図7-2 排水施設配置図  
(マスター・プラン・検討ケースⅡ、Ⅲ)

**LEGEND**

- : Boundary of Basin
- B-18 : Basin No.
- : Proposed Drainage Route
- (18-2) (14-5) : Location No. of Drainage Facilities
- : Improvement Works for Study Case II
- : Improvement Works for Study Case III

0 0.5 1.0 1.5 2.0 km

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
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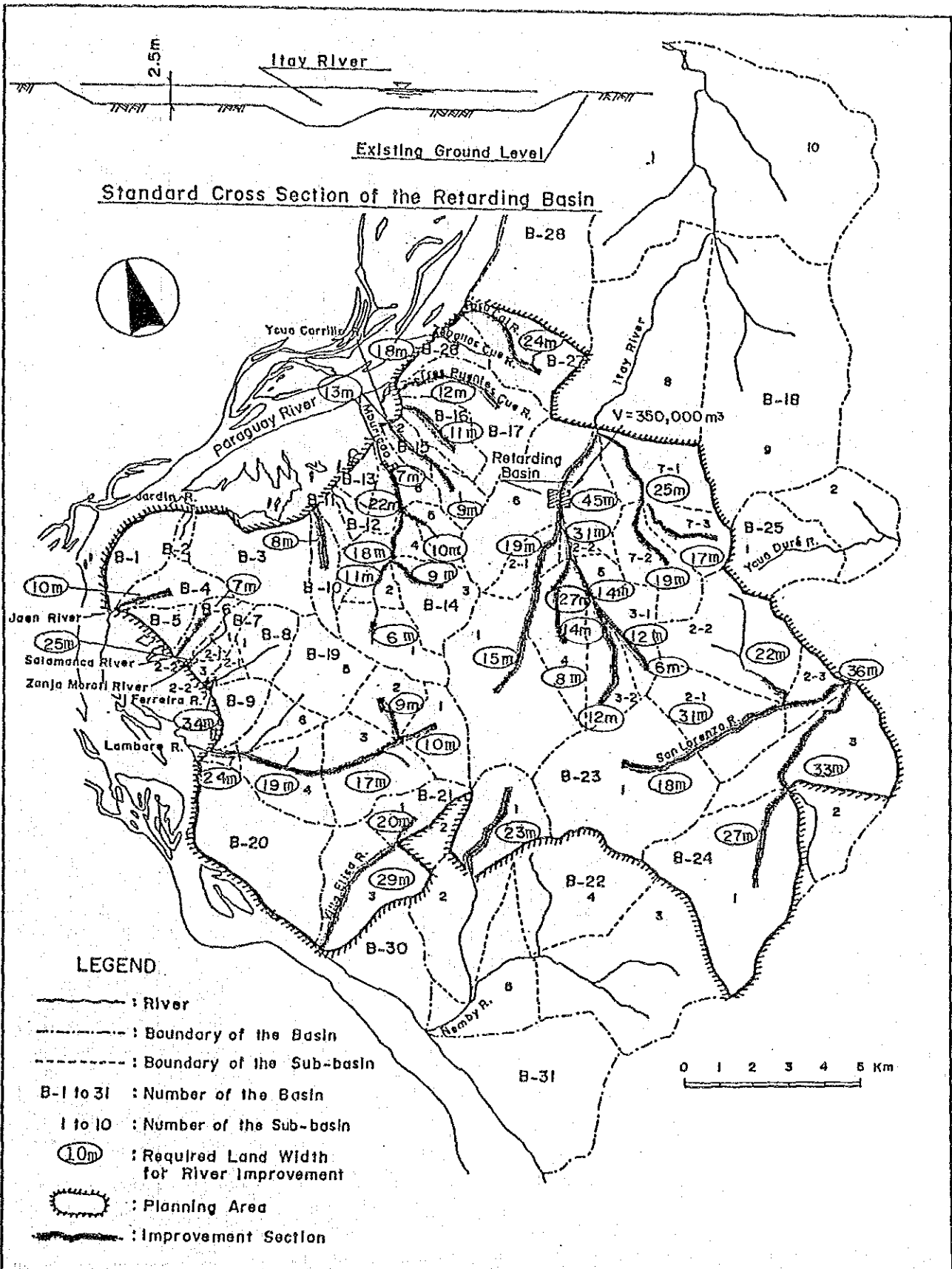


図7-3 河川改修計画区間  
(マスター・プラン)

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IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

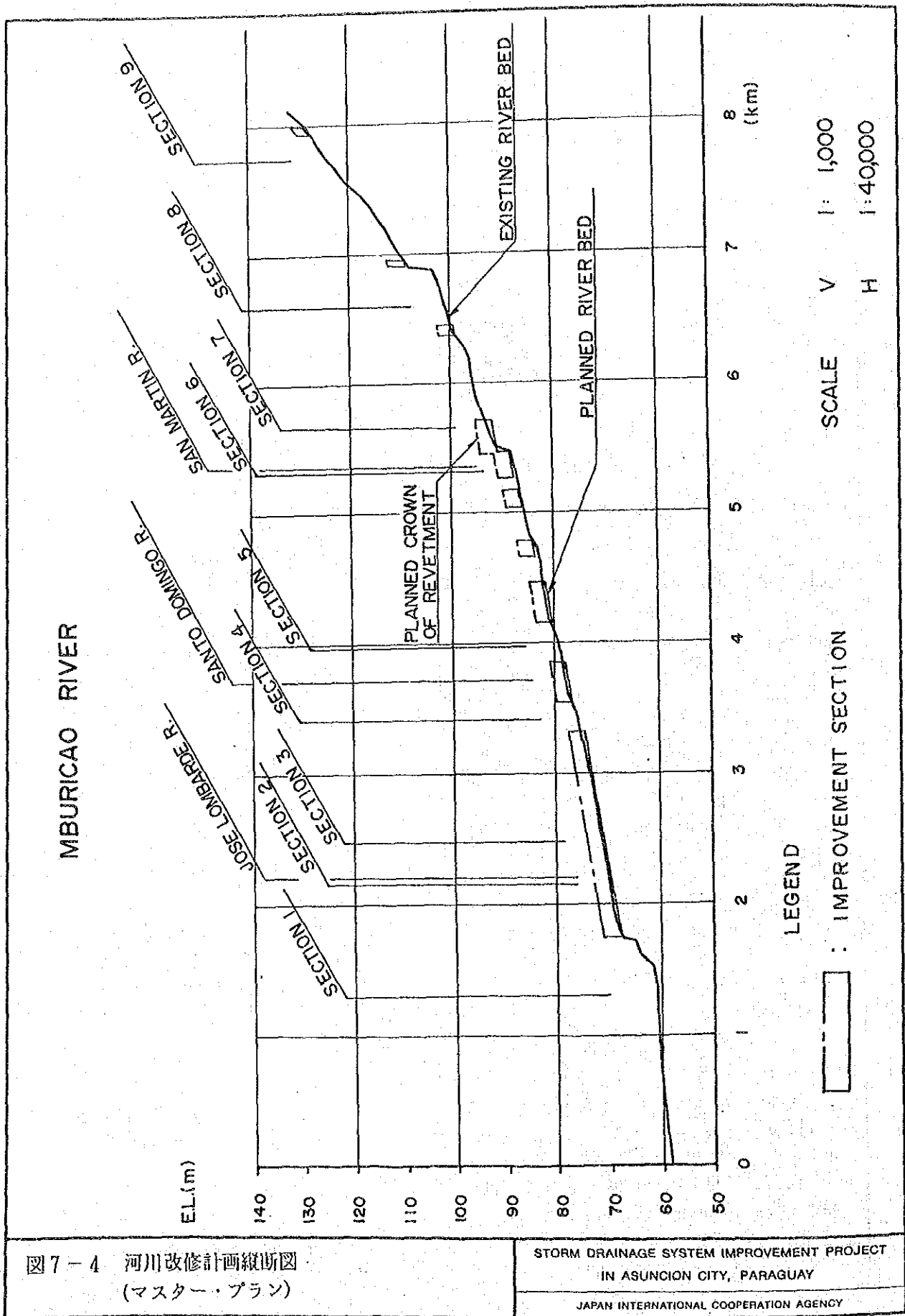
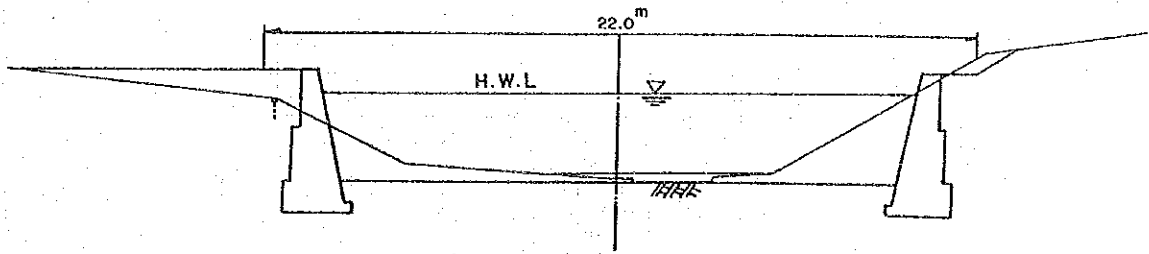


図7-4 河川改修計画縦断面図  
(マスター・プラン)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
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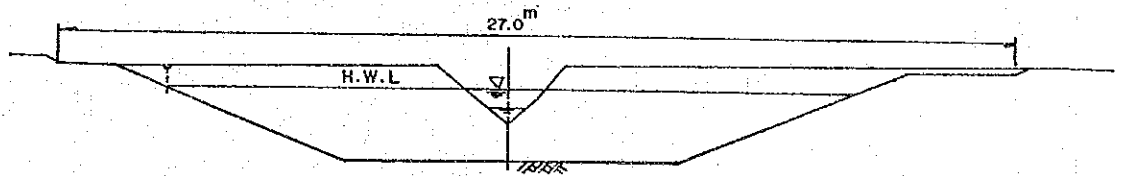
JAPAN INTERNATIONAL COOPERATION AGENCY

MBURICAO RIVER



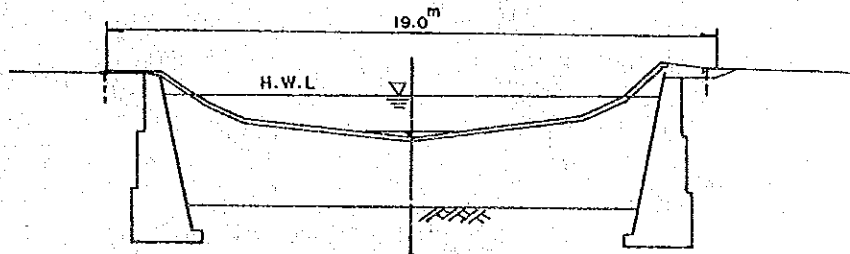
SECTION-3

ITAY RIVER



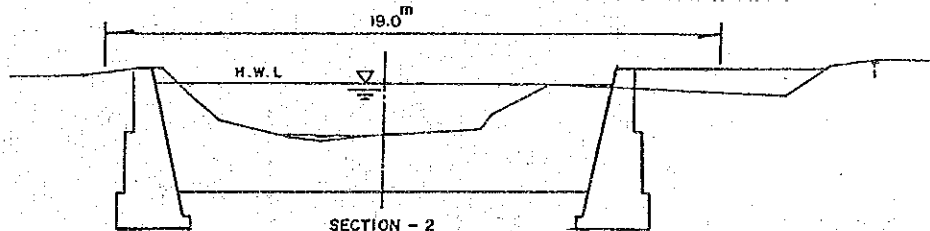
SECTION - 25

ITAY RIVER



SECTION - 20

LAMBARE RIVER



SECTION - 2

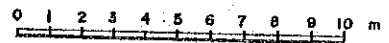


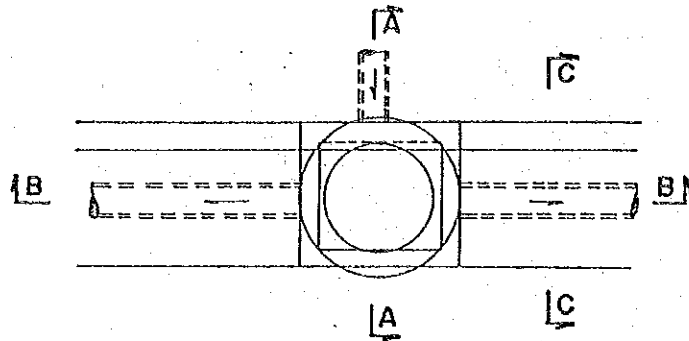
図7-5 河川改修計画横断図  
(マスター・プラン)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

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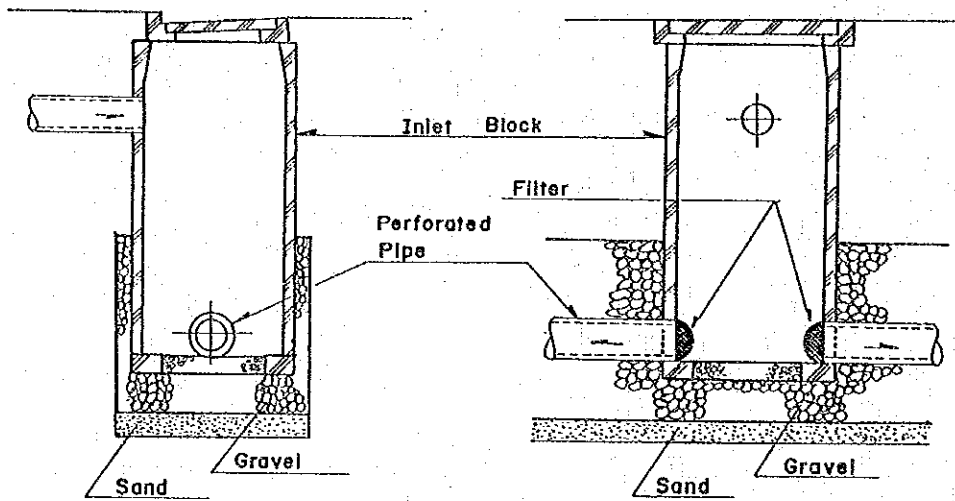
# INFILTRATION INLET AND TRENCH

## PLAN



## SECTION A-A

## SECTION B-B



## SECTION C-C (TRENCH)

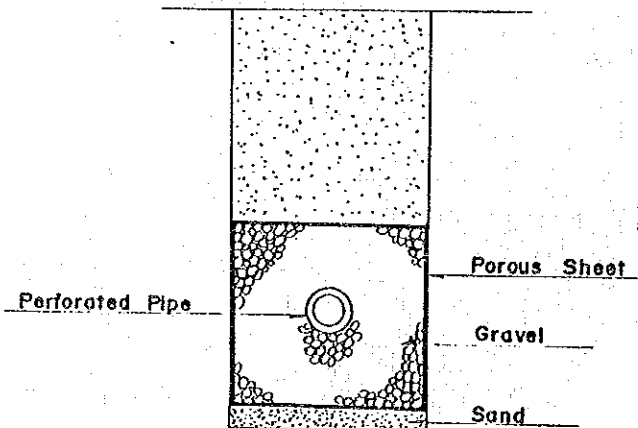


図 7 - 6 浸透施設標準構造図

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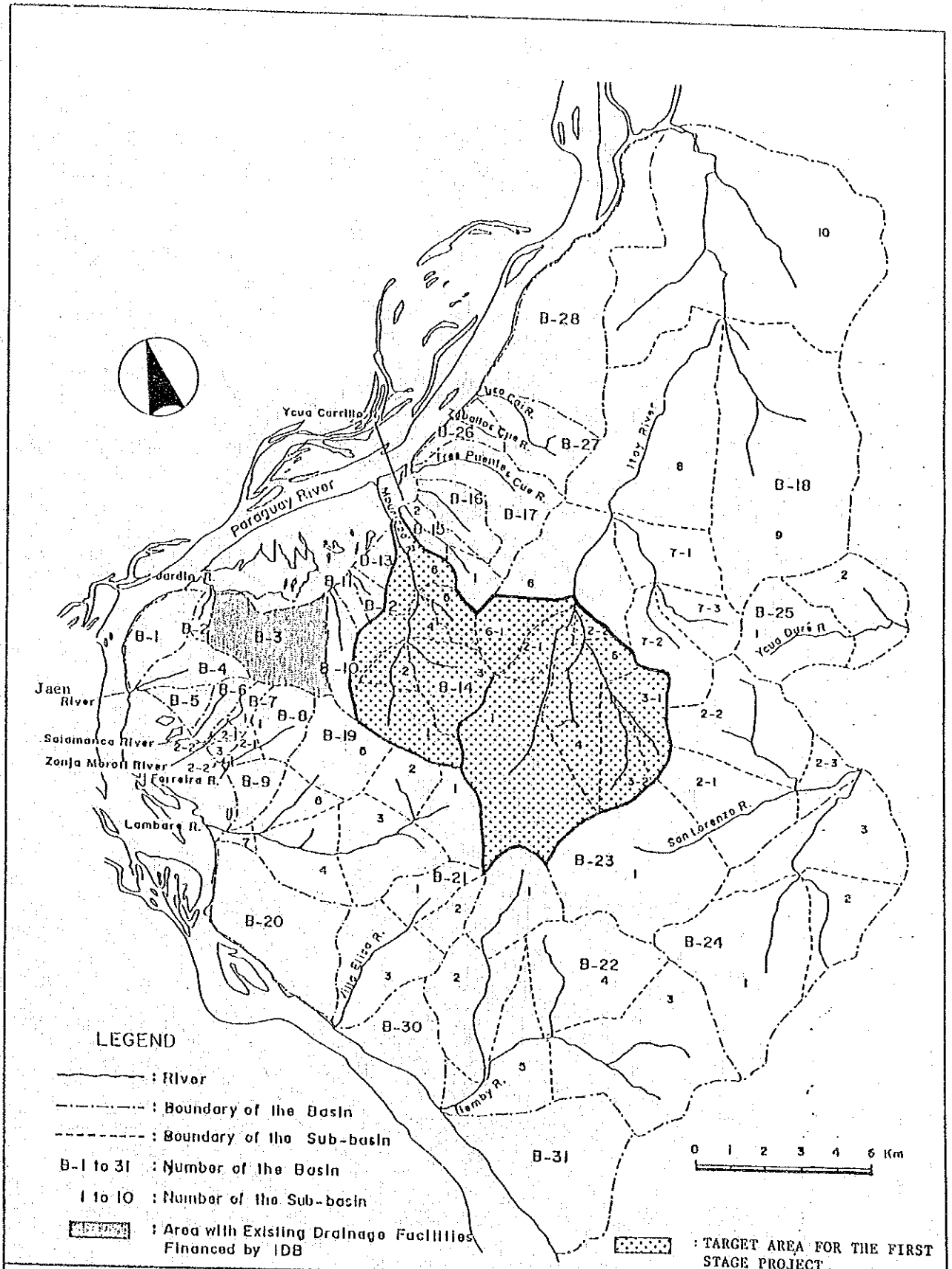


図8-1 ファースト・ステージ・プロジェクト対象域

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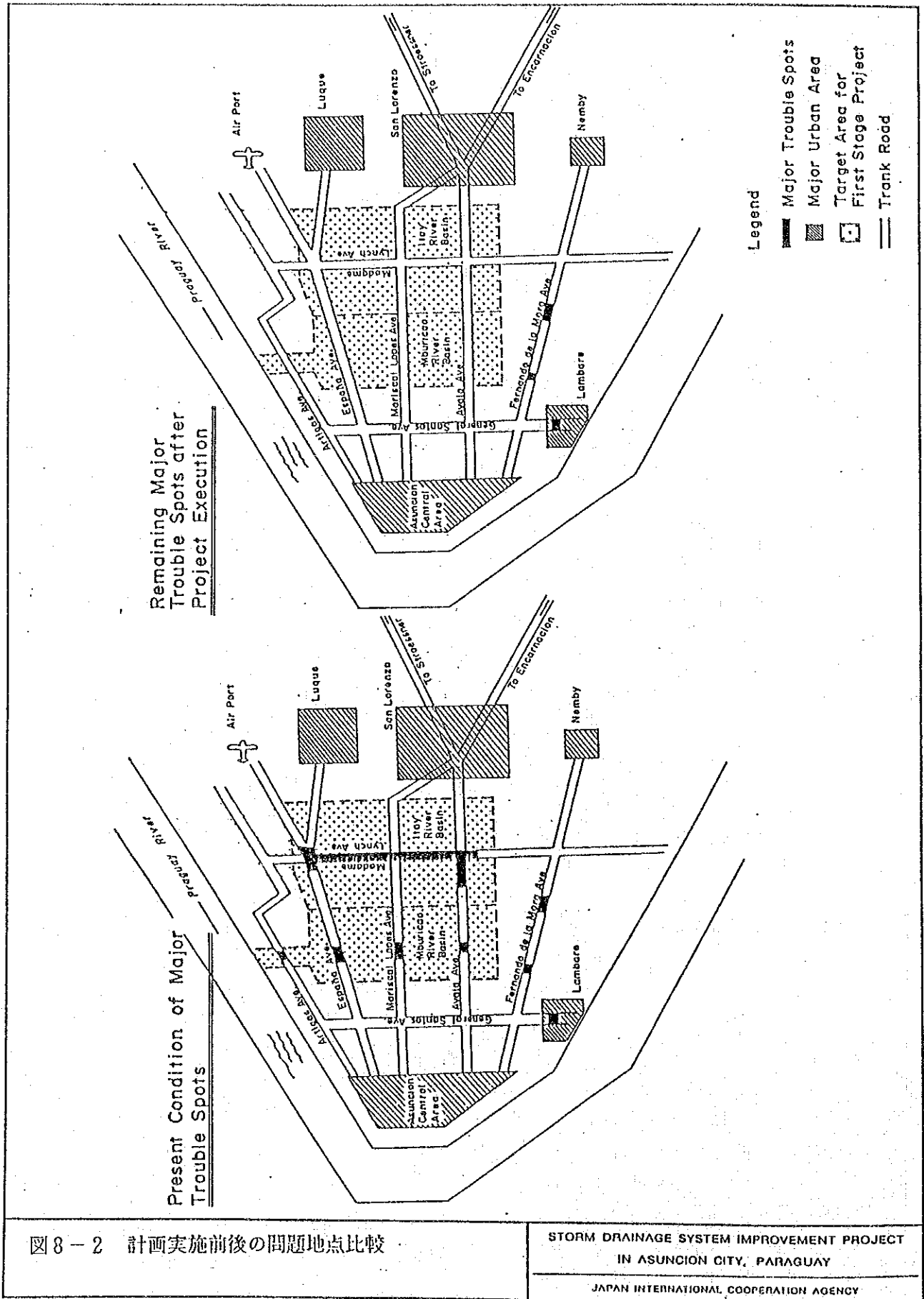


図8-2 計画実施前後の問題地点比較

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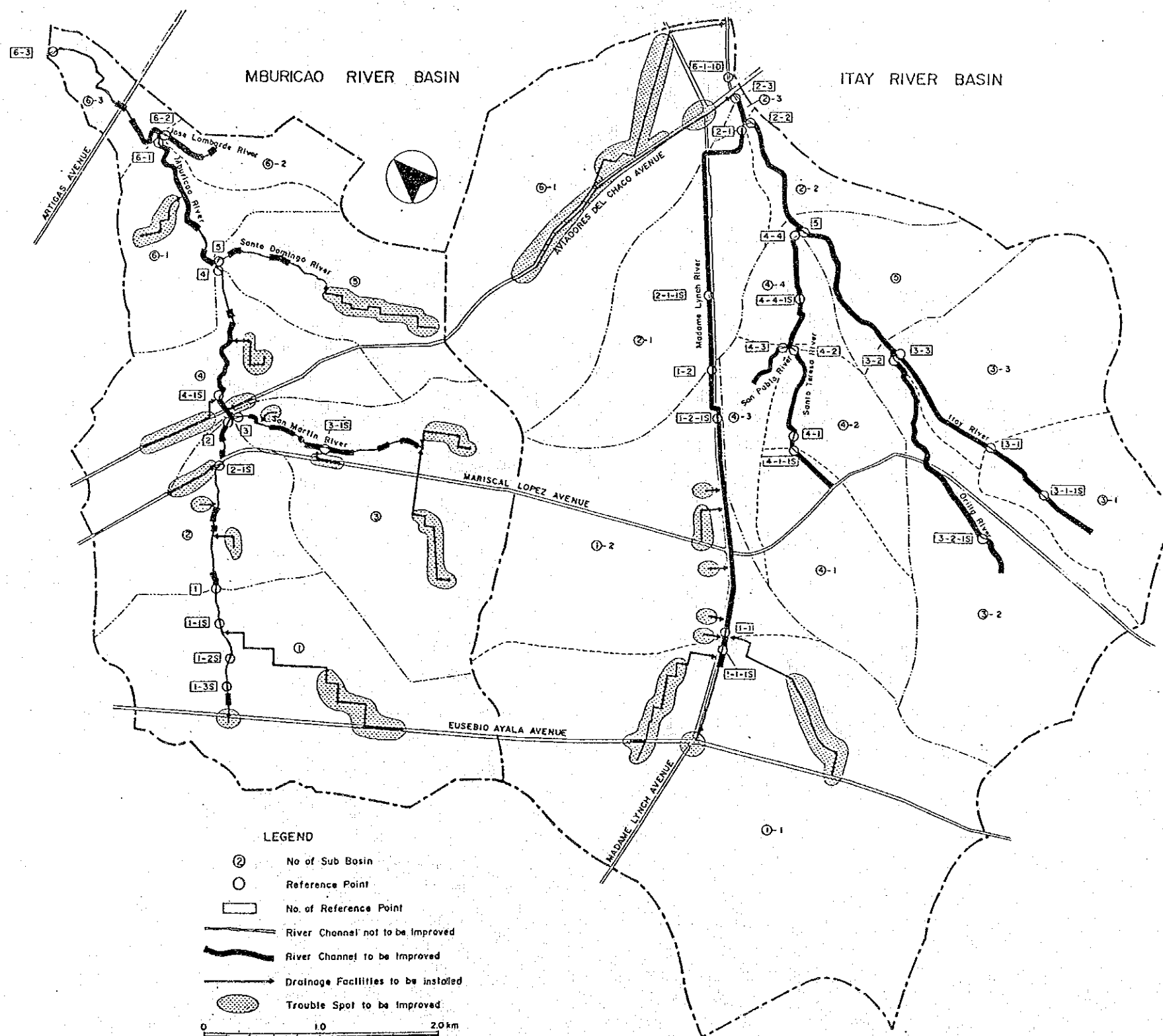
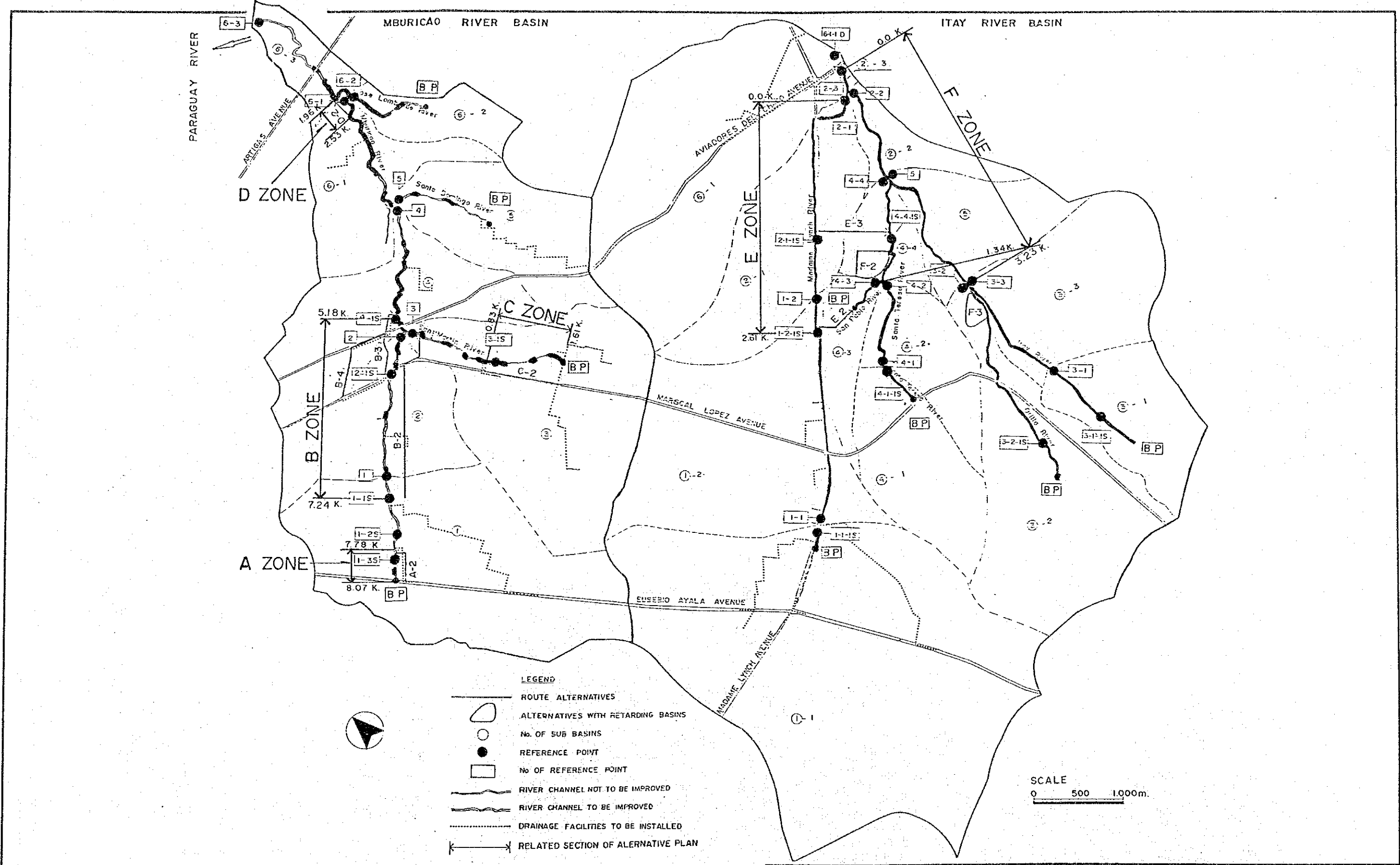


図8-3 ムブリカオ、イタイ川流域の問題地点

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 JAPAN INTERNATIONAL COOPERATION AGENCY

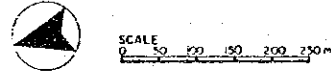
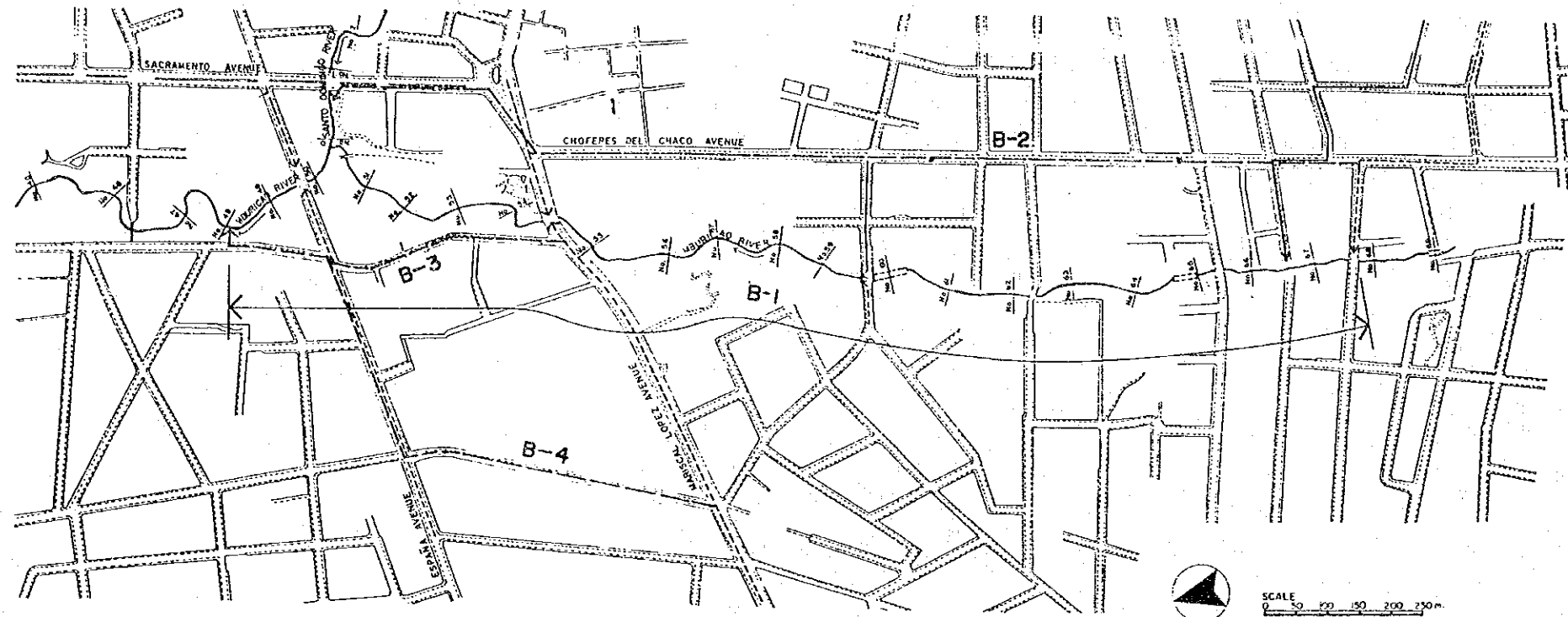


- LEGEND**
- ROUTE ALTERNATIVES
  - ALTERNATIVES WITH RETARDING BASINS
  - No. OF SUB BASINS
  - REFERENCE POINT
  - No. OF REFERENCE POINT
  - RIVER CHANNEL NOT TO BE IMPROVED
  - RIVER CHANNEL TO BE IMPROVED
  - DRAINAGE FACILITIES TO BE INSTALLED
  - RELATED SECTION OF ALTERNATIVE PLAN

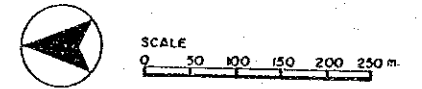
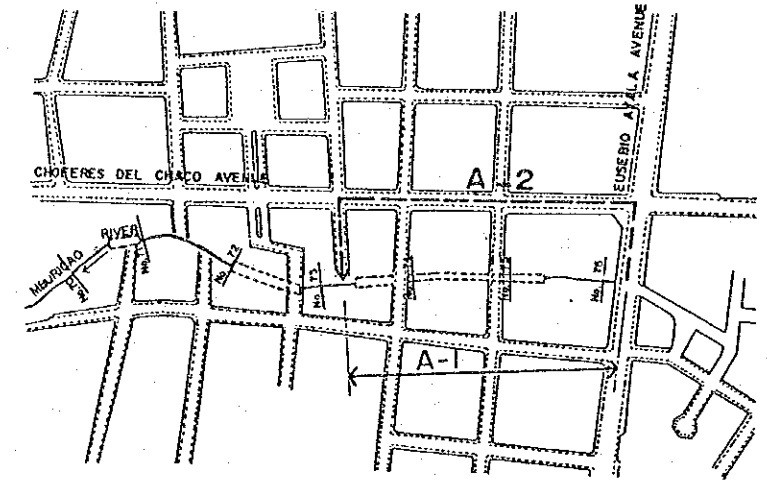
图 8-4 代替案位置图

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

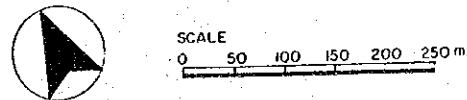
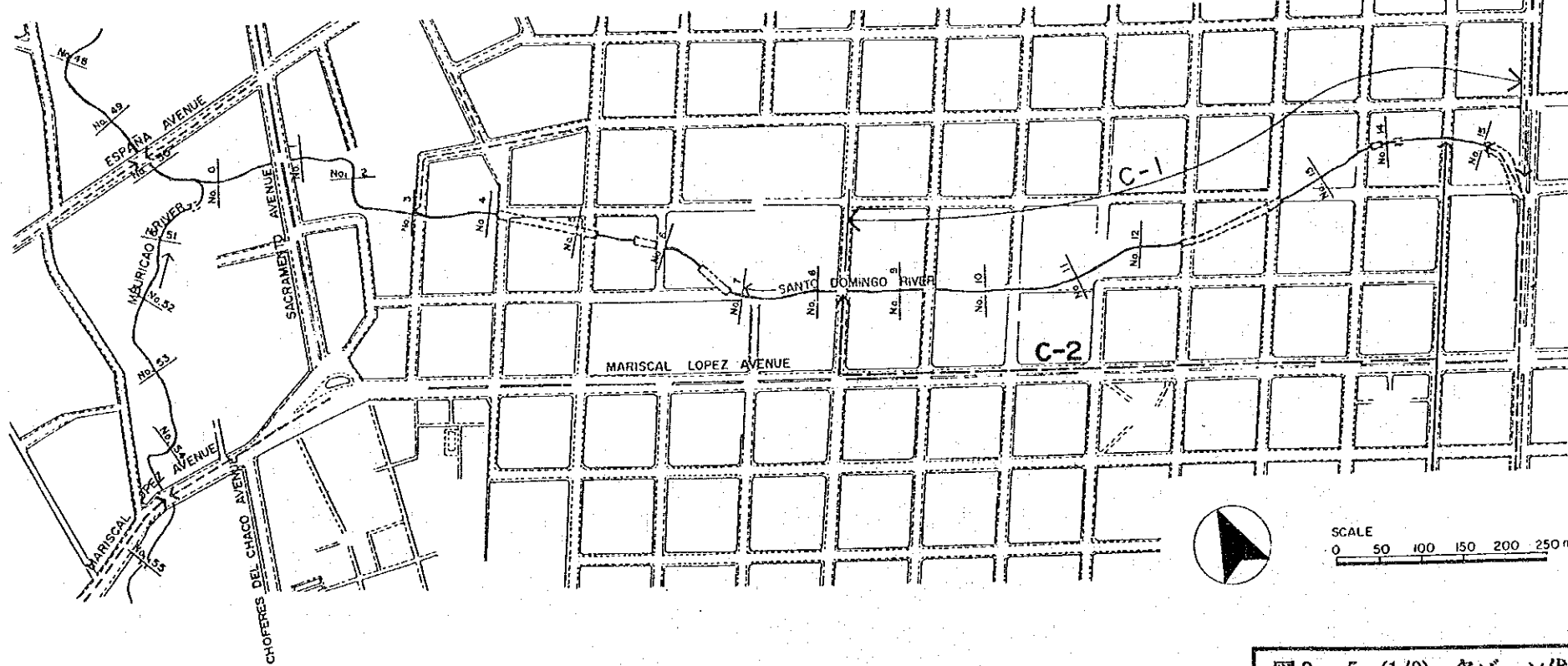
MBURICAO RIVER BASIN ( ZONE B )



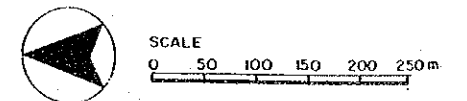
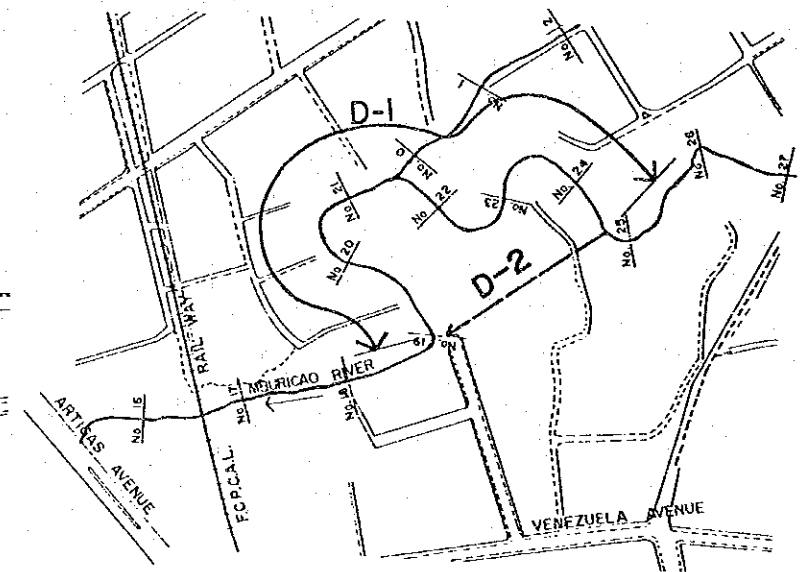
MBURICAO RIVER BASIN ( ZONE A )



MBURICAO RIVER BASIN ( ZONE C )



MBURICAO RIVER BASIN ( ZONE D )

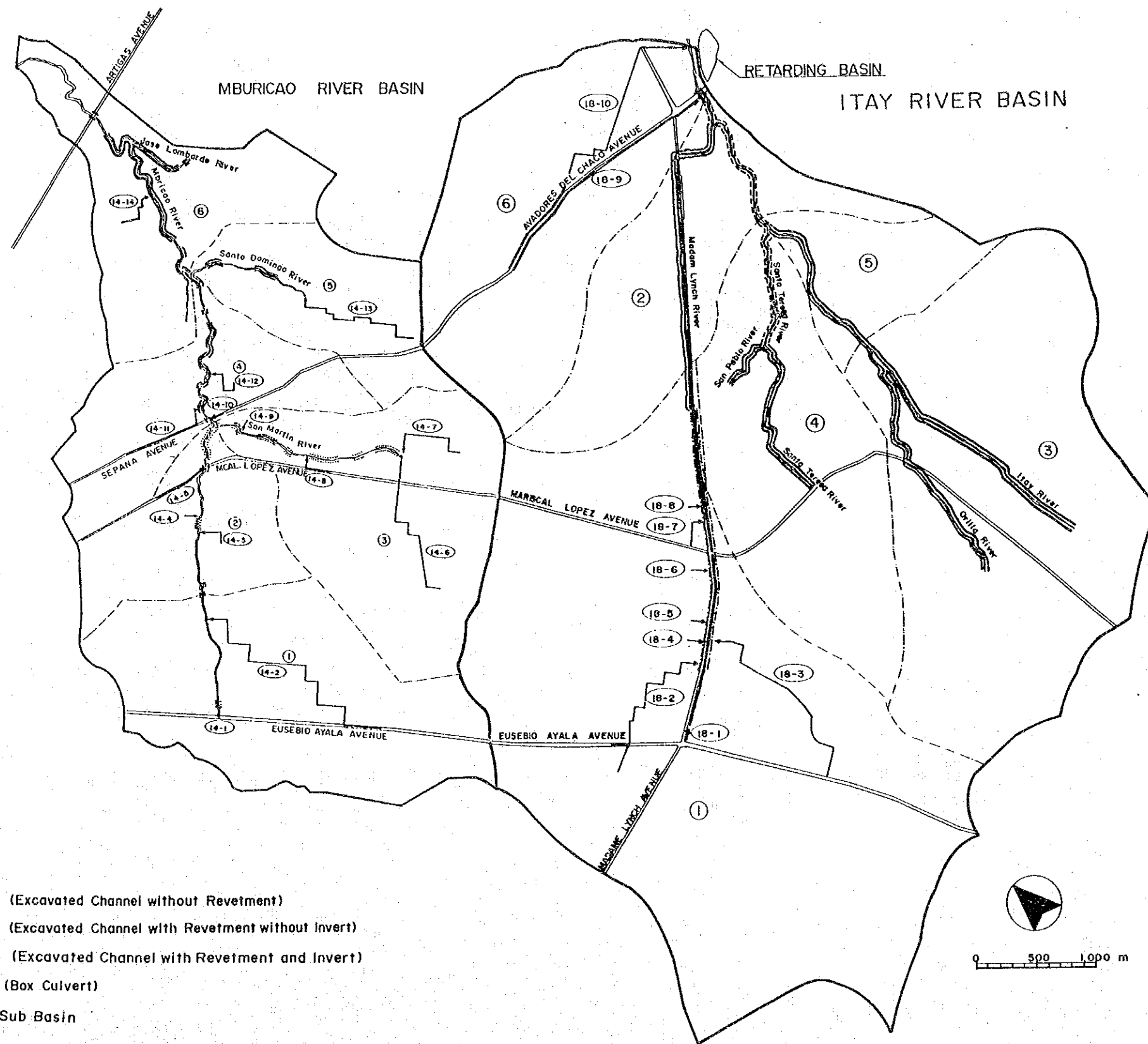


LEGEND

- : ROUTE ALTERNATIVES
- - - : PLANNED DRAINAGE FACILITIES
- : EXISTING DRAINAGE FACILITIES
- : UNDERGROUND CONDUIT

図8-5 (1/3) 各ゾーン代替排水路 (ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
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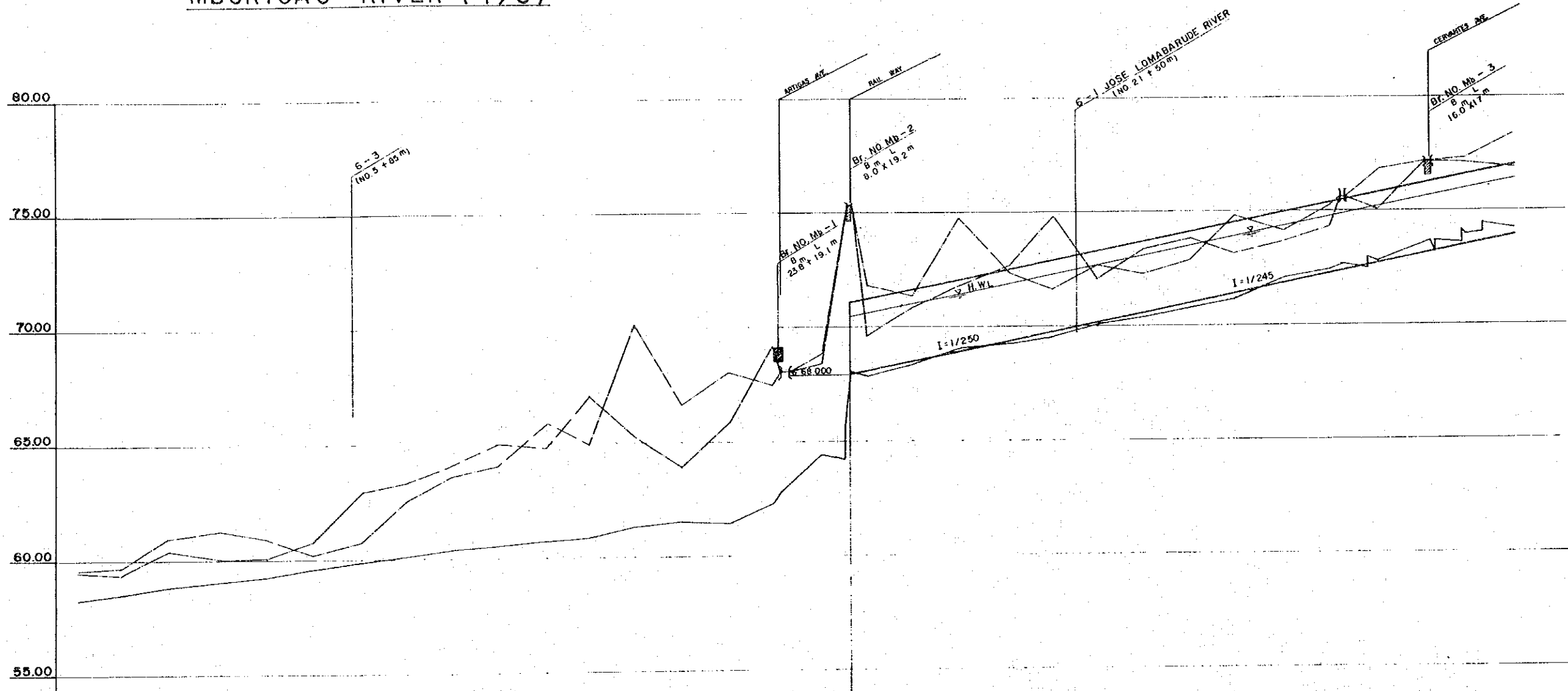
LEGEND

- : Type A (Excavated Channel without Revetment)
- : Type B (Excavated Channel with Revetment without Invert)
- .....: Type C (Excavated Channel with Revetment and Invert)
- +—+—: Type D (Box Culvert)
- ③ : No. of Sub Basin
- ⑭-④ : Route of Drainage Facilities and its Location No.

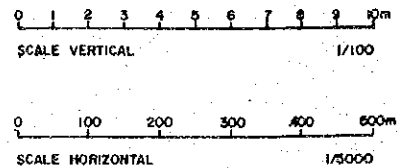
図 8 - 8 河川改修計画区域  
(ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

# MBURICAO RIVER (1/3)



ACCUMULATIVE DISTANCE (m)	0.0	91.3	196.1	308.9	413.1	513.2	620.6	723.0	828.8	923.7	1029.5	1123.5	1227.7	1328	1432.6	1538	1640.0	1742.7	1846.5	1952.2	2058	2167.9	2271.8	2380	2484	2593.9	2704.5	2778.6	2800.8	2881.8	2984.7	3082.7	3182.1	3282.1
STATION	NO 0	NO 1	NO 2	NO 3	NO 4	NO 5	NO 6	NO 7	NO 8	NO 9	NO 10	NO 11	NO 12	NO 13	NO 14	NO 15	NO 16	NO 17	NO 18	NO 19	NO 20	NO 21	NO 22	NO 23	NO 24	NO 25	NO 26	NO 27	NO 28	NO 29	NO 30	NO 31	NO 32	

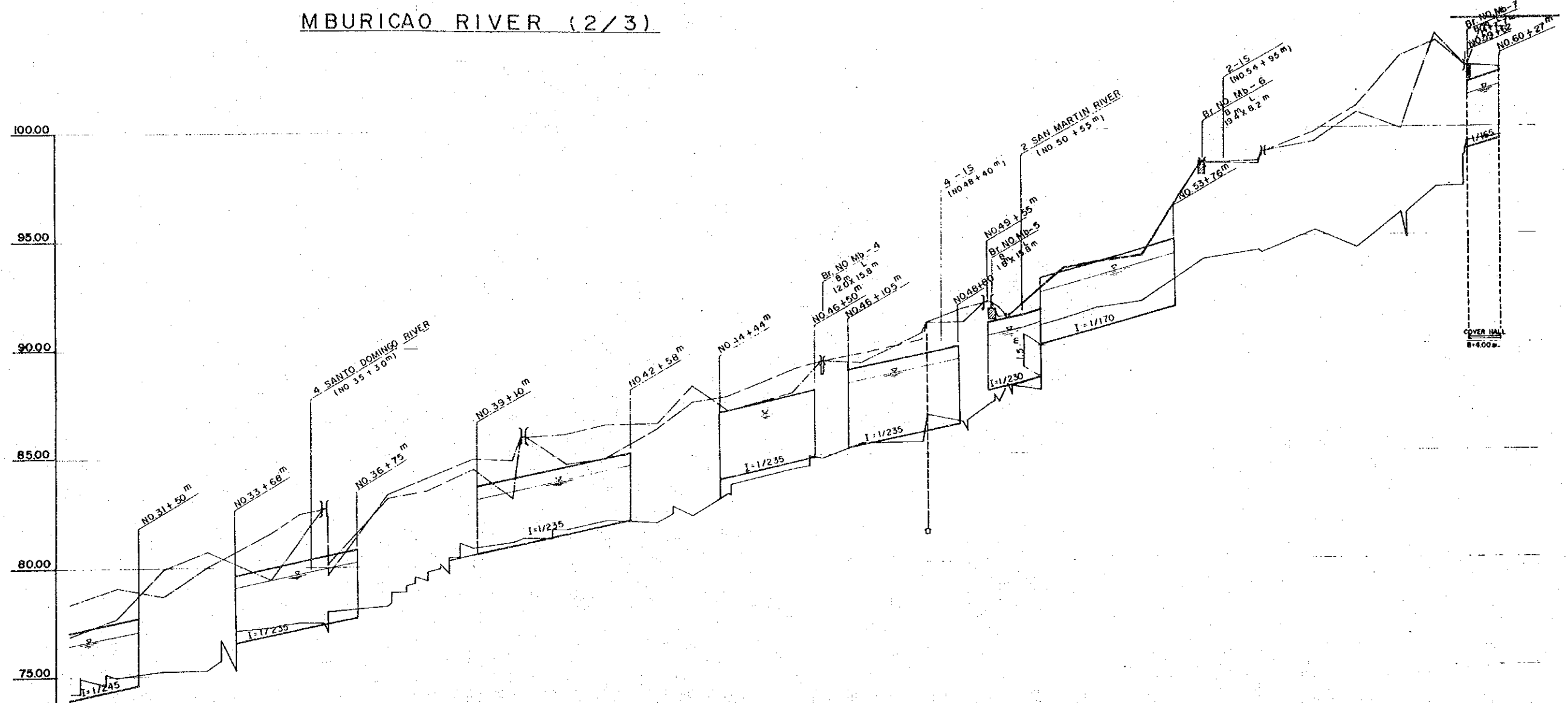


- LEGEND
- — — — — : EXISTING RIGHT BANK CROWN
  - — — — — : EXISTING LEFT BANK CROWN
  - — — — — : EXISTING RIVER BED
  - — — — — : DESIGN RIVER BED, DESIGN BANK CROWN
  - ▽ H.W.L. : DESIGN HIGH WATER LEVEL

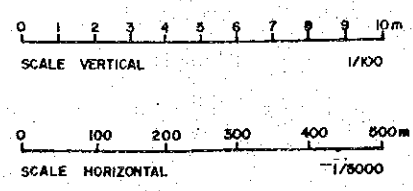
図8-9 (1/7) 河川改修計画縦断図 (ファースト・ステイジ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

# MBURICAO RIVER (2/3)



ACCUMULATIVE DISTANCE (m)	3182.1	3202.1	3248.7	3287.4	3350.7	3401.9	3452.9	3503.9	3554.9	3605.9	3656.9	3707.9	3758.9	3809.9	3860.9	3911.9	3962.9	4013.9	4064.9	4115.9	4166.9	4217.9	4268.9	4319.9	4370.9	4421.9	4472.9	4523.9	4574.9	4625.9	4676.9	4727.9	4778.9	4829.9	4880.9	4931.9	4982.9	5033.9	5084.9	5135.9	5186.9	5237.9	5288.9	5339.9	5390.9	5441.9	5492.9	5543.9	5594.9	5645.9	5696.9	5747.9	5798.9	5849.9	5900.9	5951.9	6002.9
STATION	NO.30	NO.31	NO.32	NO.33	NO.34	NO.35	NO.36	NO.37	NO.38	NO.39	NO.40	NO.41	NO.42	NO.43	NO.44	NO.45	NO.46	NO.47	NO.48	NO.49	NO.50	NO.51	NO.52	NO.53	NO.54	NO.55	NO.56	NO.57	NO.58	NO.59	NO.60																										



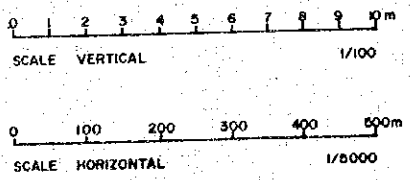
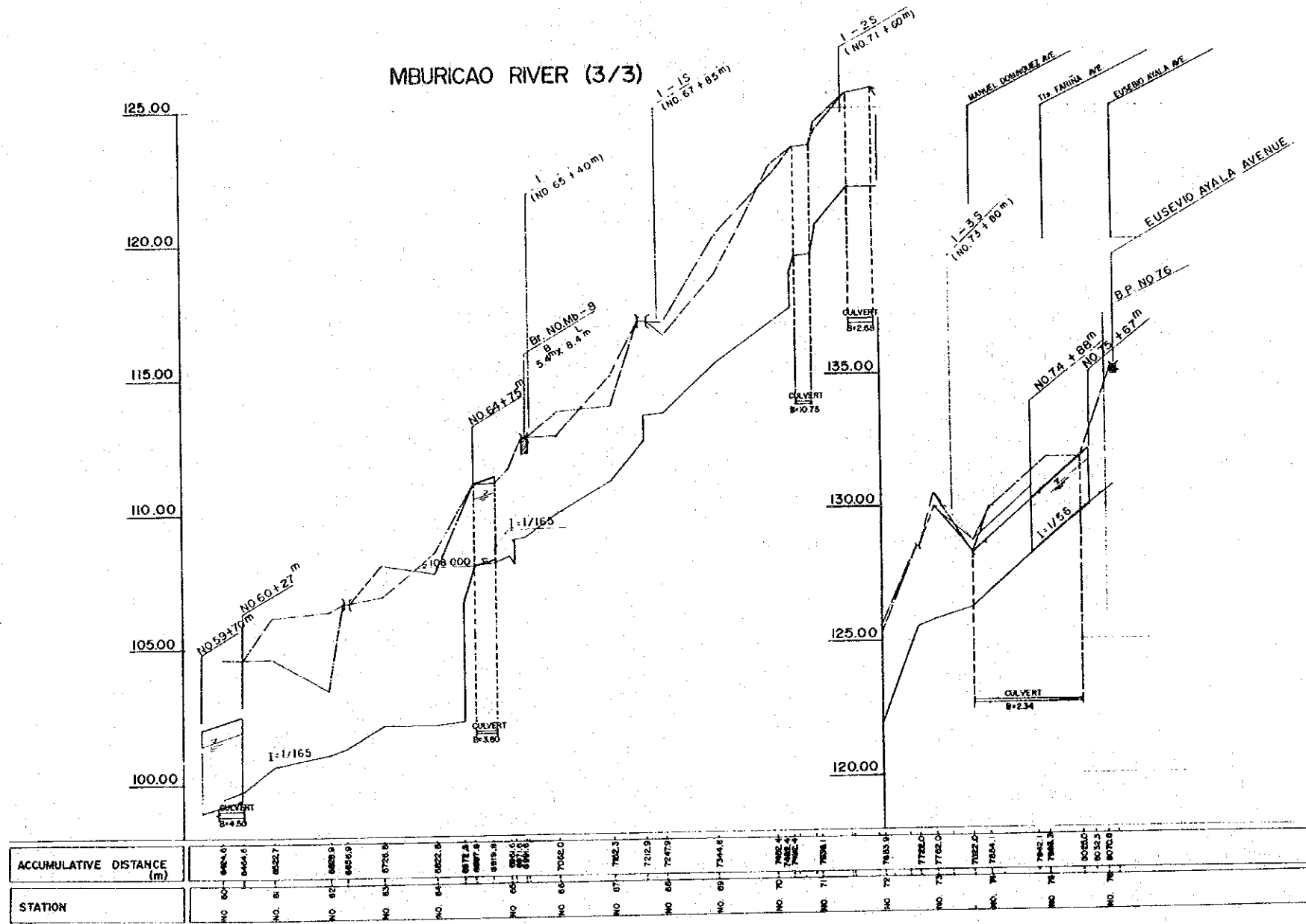
- LEGEND
- : EXISTING RIGHT BANK CROWN
  - : EXISTING LEFT BANK CROWN
  - : EXISTING RIVER BED
  - : DESIGN RIVER BED, DESIGN BANK CROWN
  - ▽ H.W.L. : DESIGN HIGH WATER LEVEL

図8-9 (2/7) 河川改修計画縦断面図  
(ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY



MBURICAO RIVER (3/3)

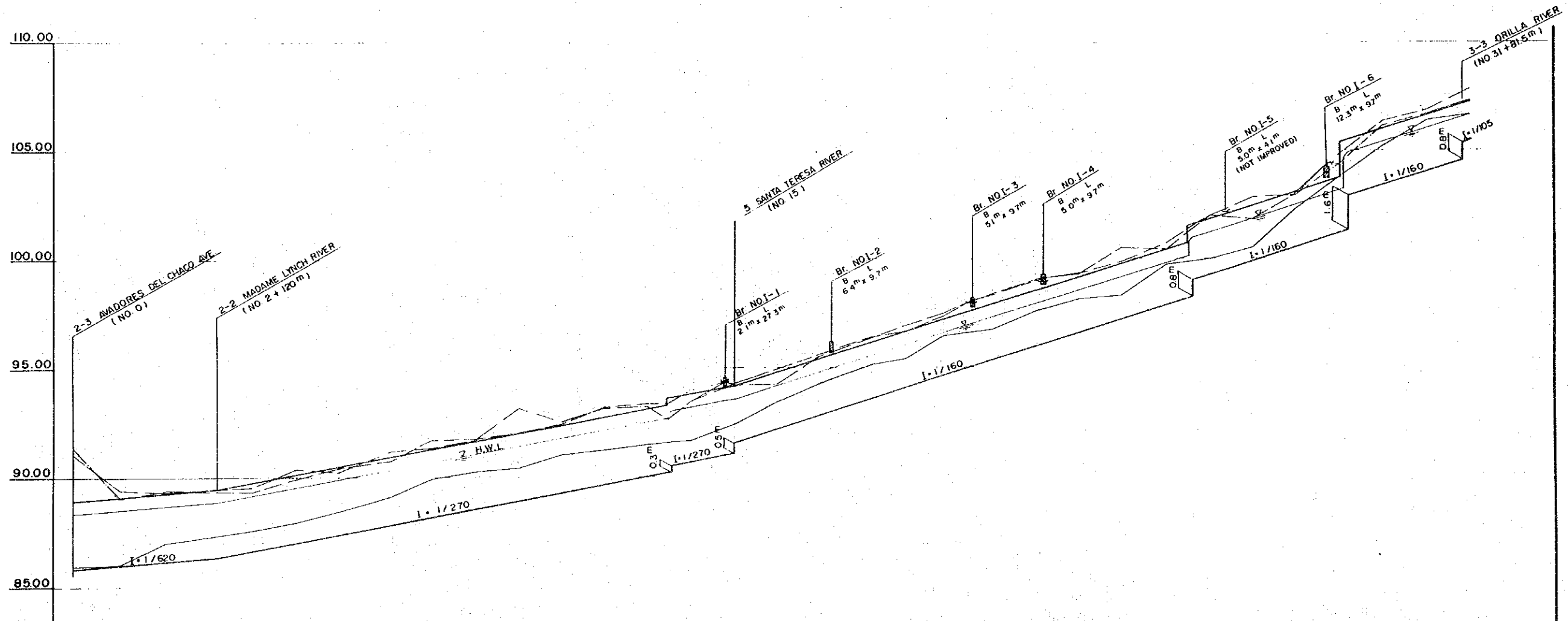


- LEGEND
- : EXISTING RIGHT BANK CROWN
  - : EXISTING LEFT BANK CROWN
  - : EXISTING RIVER BED
  - : DESIGN RIVER BED, DESIGN BANK CROWN
  - ▽ H.W.L. : DESIGN HIGH WATER LEVEL

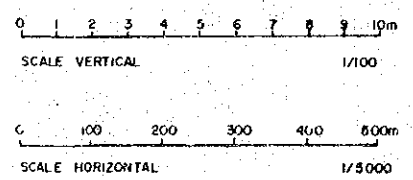
図8-9 (3/7) 河川改修計画縦断図  
(ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

# ITAY RIVER (1/2)



ACCUMULATIVE DISTANCE (m)	0	100	203.4	323.4	402.3	507.1	604.9	728.7	823.8	923.3	1022.8	1122.8	1222.9	1322.4	1422.1	1522.9	1622.1	1723.5	1823.3	1924.2	2024.0	2120.8	2242.2	2342.0	2441.3	2542.9	2640.8	2755.4	2845.1	2948.9	3048.7	3148.4	3250.9
STATION	NO. 0	NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	NO. 9	NO. 10	NO. 11	NO. 12	NO. 13	NO. 14	NO. 15	NO. 16	NO. 17	NO. 18	NO. 19	NO. 20	NO. 21	NO. 22	NO. 23	NO. 24	NO. 25	NO. 26	NO. 27	NO. 28	NO. 29	NO. 30	NO. 31	NO. 32

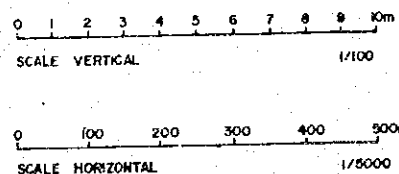
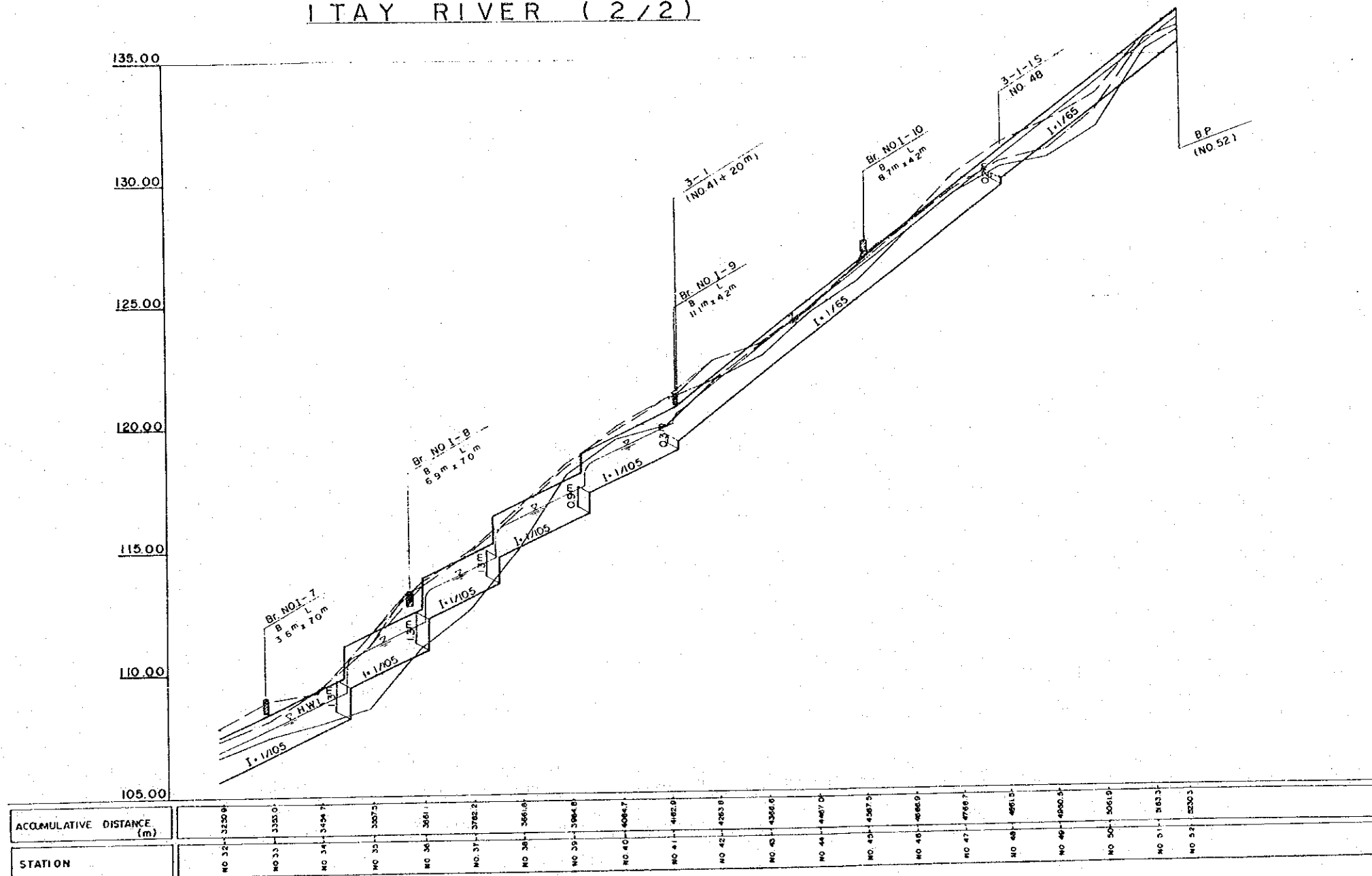


- LEGEND
- : EXISTING RIGHT BANK CROWN
  - : EXISTING LEFT BANK CROWN
  - : EXISTING RIVER BED
  - : DESIGN RIVER BED, DESIGN BANK CROWN
  - ▽ H.W.L. : DESIGN HIGH WATER LEVEL

図8-9 (4/7) 河川改修計画縦断面図  
(ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

ITAY RIVER (2/2)

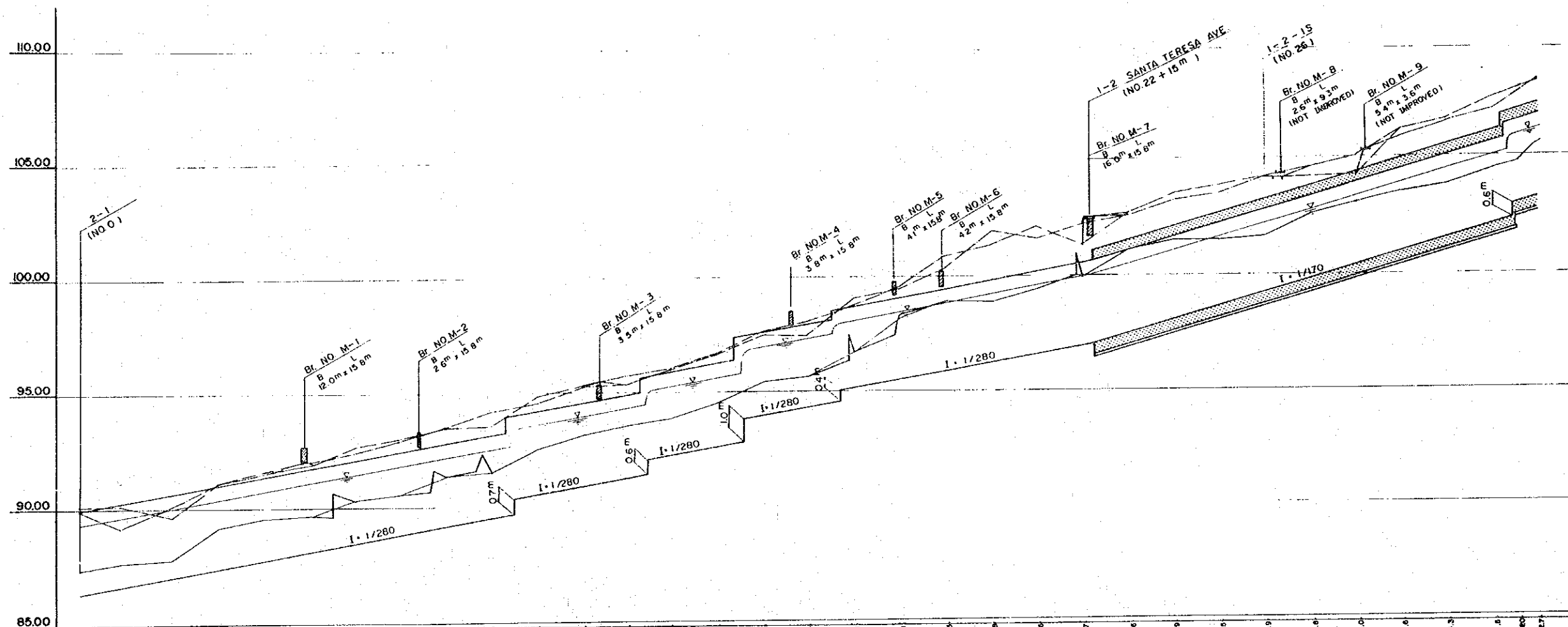


- LEGEND
- — — — — : EXISTING RIGHT BANK CROWN
  - — — — — : EXISTING LEFT BANK CROWN
  - — — — — : EXISTING RIVER BED
  - — — — — : DESIGN RIVER BED, DESIGN BANK CROWN
  - ▽ H.W.L. : DESIGN HIGH WATER LEVEL

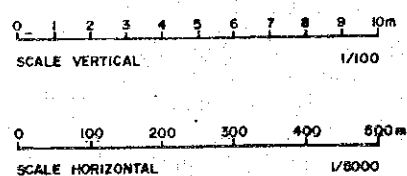
図8-9 (5/7) 河川改修計画縦断面図  
(ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

# MADAME LYNCH RIVER (1/2)



ACCUMULATIVE DISTANCE (m)	0+00	0+1.883	0+2.98.0	0+3.286.2	0+3.965.7	0+5.088.5	0+5.877.4	0+6.873	0+7.99.8	0+9.00.1	0+10.000.5	0+11.110.1	0+12.120.5	0+13.130.1	0+14.140.37	0+15.150.6	0+16.160.9	0+17.170.8	0+18.180.7	0+19.190.6	0+20.200.6	0+21.210.6	0+22.220.7	0+23.230.6	0+24.240.9	0+25.250.9	0+26.260.9	0+27.271.6	0+28.281.0	0+29.291.6	0+30.303.3	0+31.312.5	0+32.321.7
STATION	NO. 0	NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	NO. 9	NO. 10	NO. 11	NO. 12	NO. 13	NO. 14	NO. 15	NO. 16	NO. 17	NO. 18	NO. 19	NO. 20	NO. 21	NO. 22	NO. 23	NO. 24	NO. 25	NO. 26	NO. 27	NO. 28	NO. 29	NO. 30	NO. 31	NO. 32

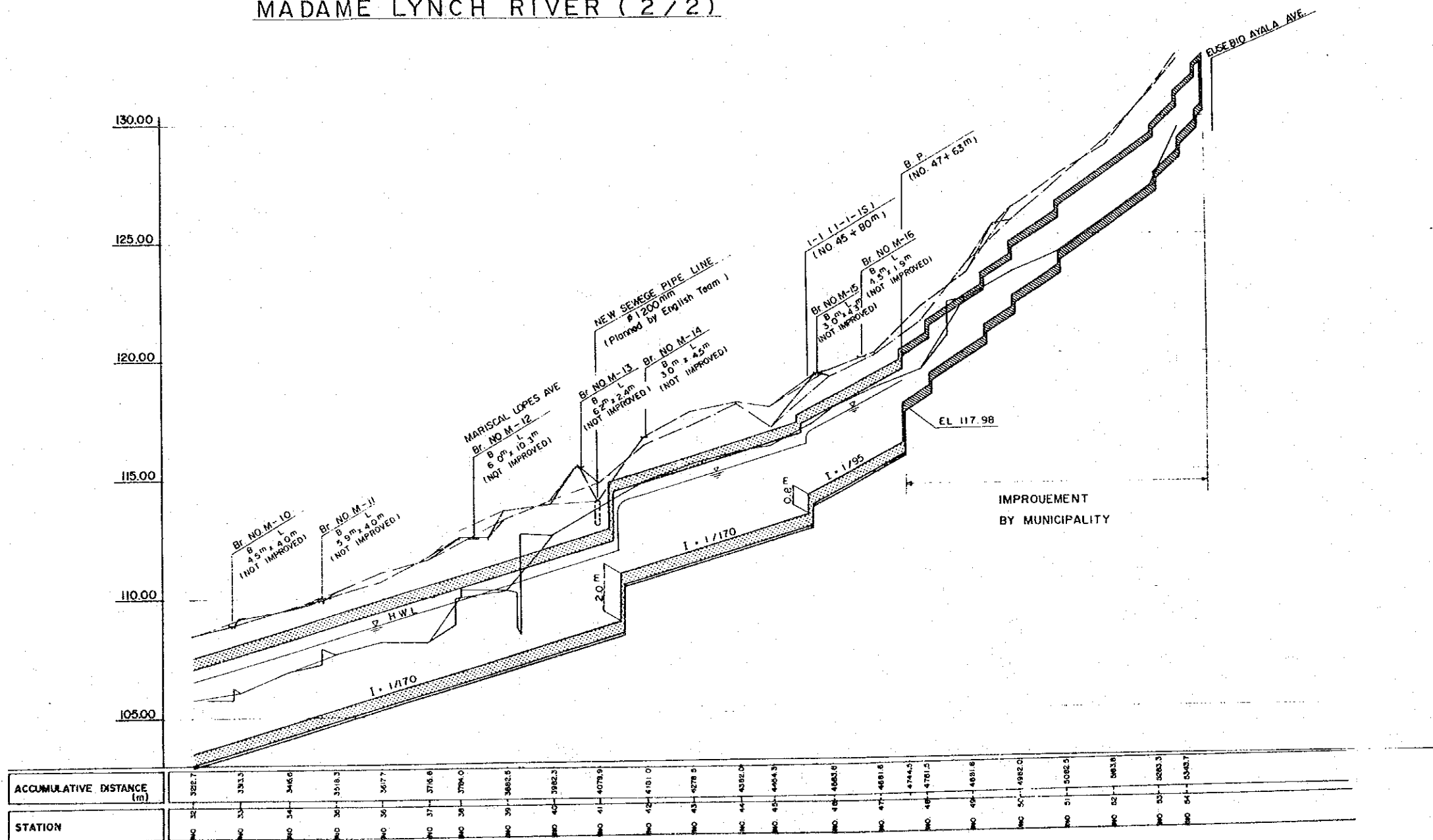


- LEGEND
- : EXISTING RIGHT BANK CROWN
  - : EXISTING LEFT BANK CROWN
  - : EXISTING RIVER BED
  - : DESIGN RIVER BED, DESIGN BANK CROWN
  - ▽ H.W.L. : DESIGN HIGH WATER LEVEL
  - ▨ : PROPOSED BOX CULVERT

図8-9 (6/7) 河川改修計画縦断面図  
(ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

# MADAME LYNCH RIVER ( 2 / 2 )



### LEGEND

- : EXISTING RIGHT BANK CROWN
- ..... : EXISTING LEFT BANK CROWN
- : EXISTING RIVER BED
- : DESIGN RIVER BED; DESIGN BANK CROWN
- △ H.W.L. : DESIGN HIGH WATER LEVEL
- ▨ : PROPOSED BOX CULVERT

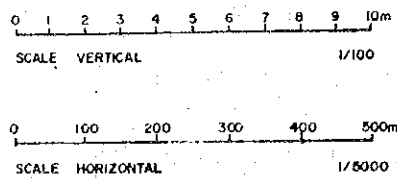
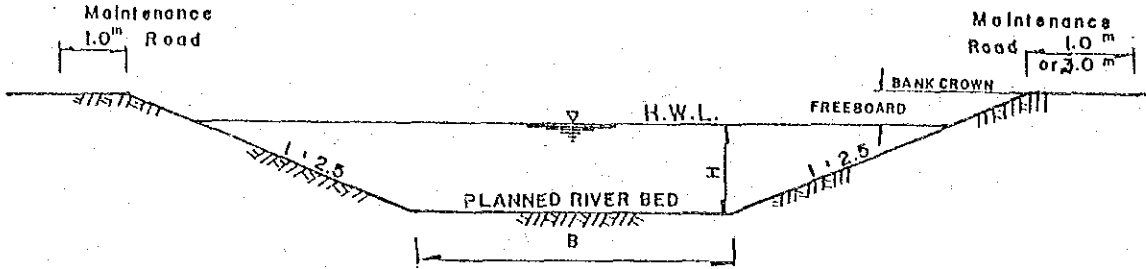


図8-9 (7/7) 河川改修計画縦断面図  
(ファースト・ステージ・プロジェクト)

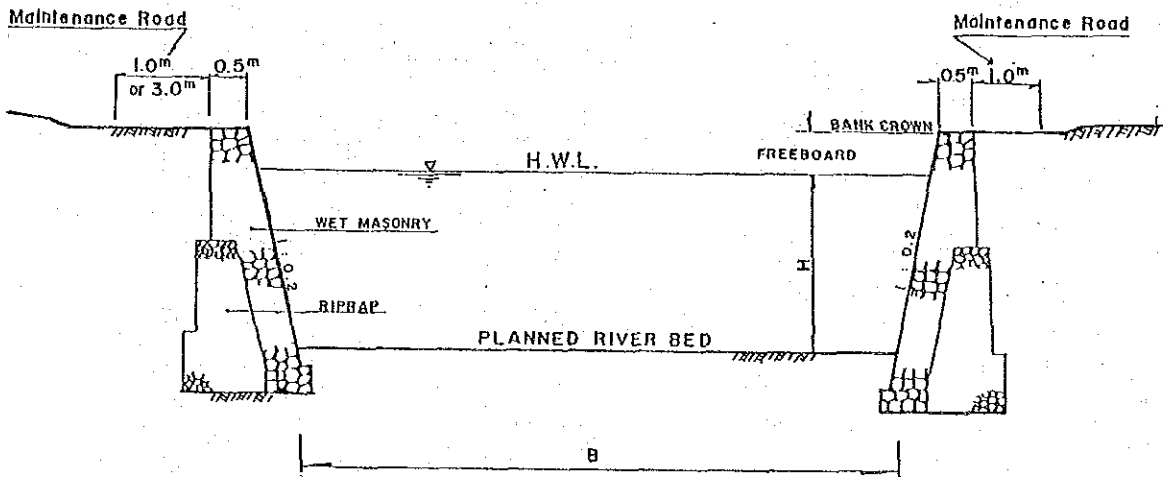
STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY



### Channel without Revetment (TYPE A)



### Channel with Revetment and without Invert (TYPE B)



### Channel with Revetment and Invert (TYPE C)

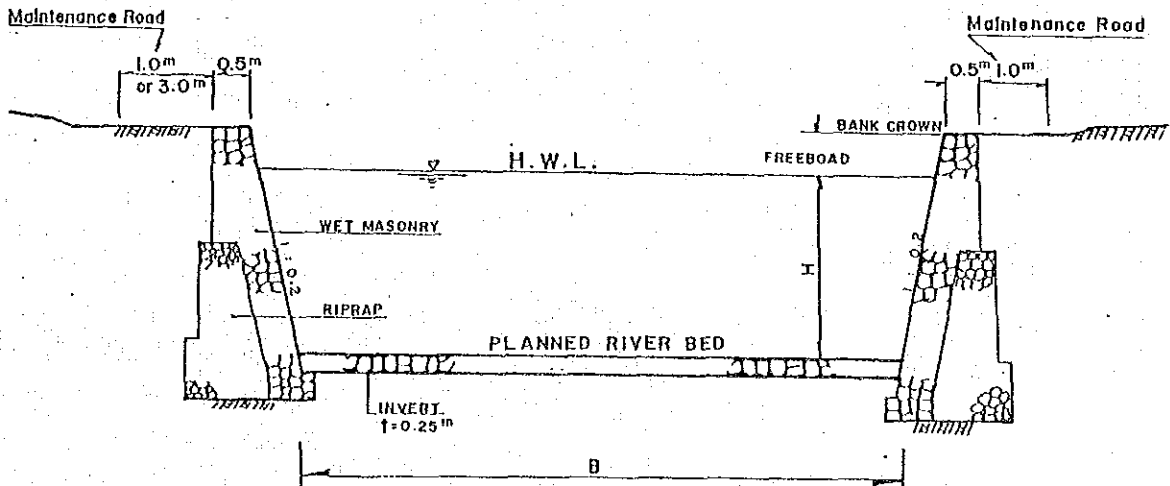


図8-10 (1/2) 河川改修計画横断面図 (ファースト・ステイジ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

Box Culvert (TYPE D)

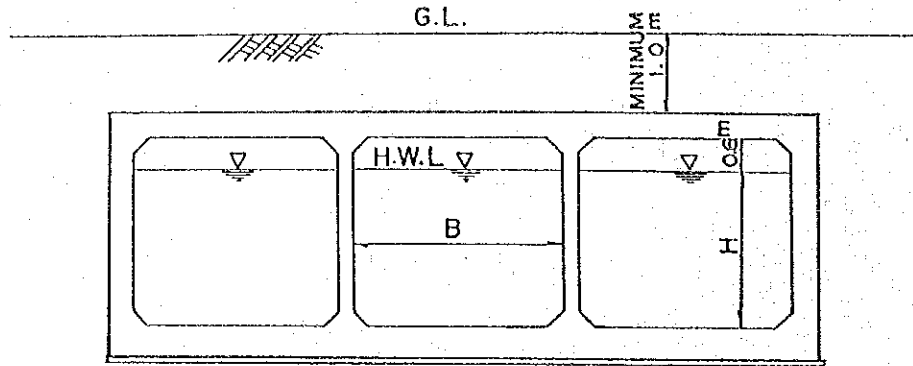


図 8-10 (2/2) 河川改修計画横断図 (ファースト・  
ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY



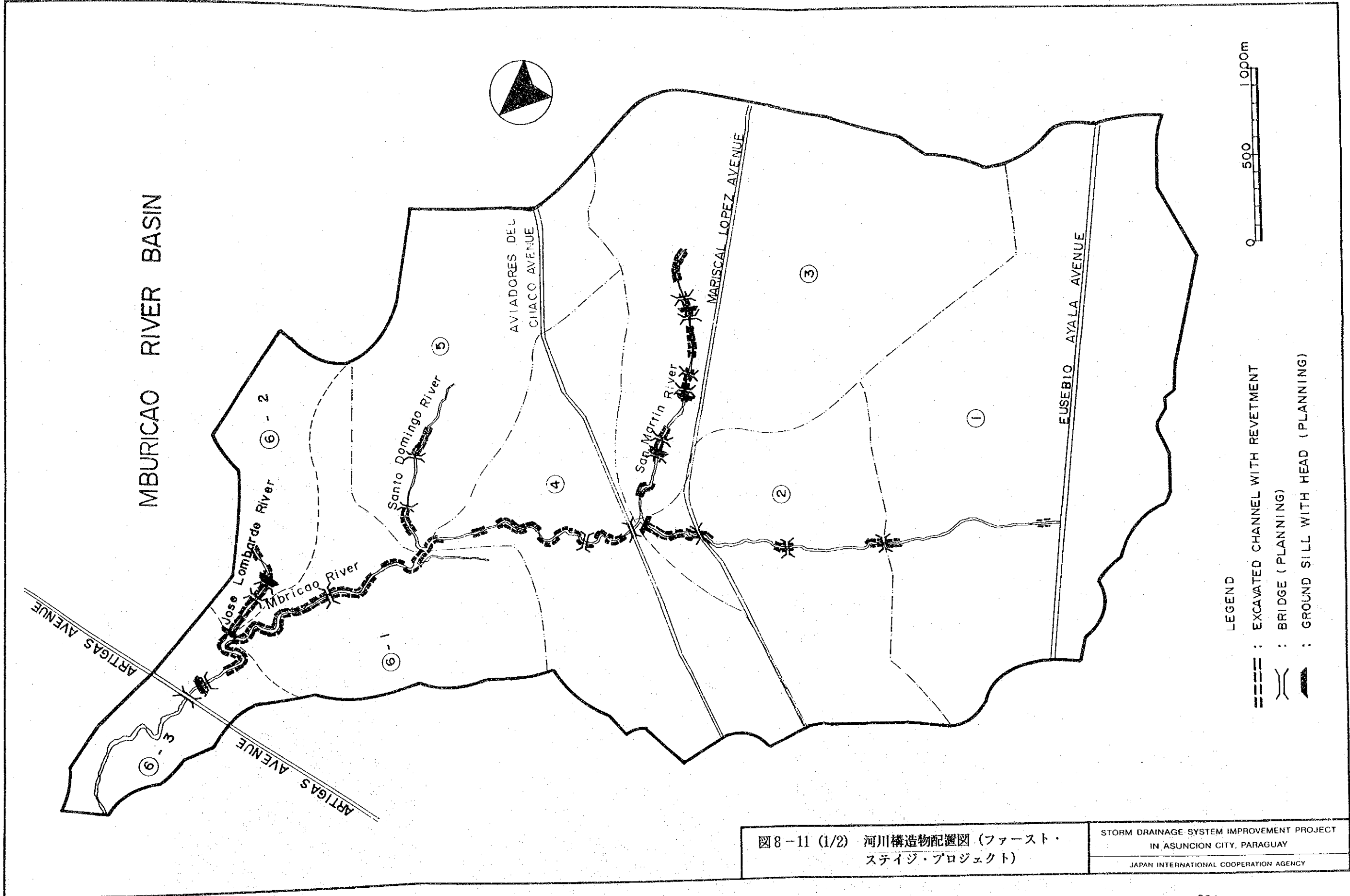


図8-11 (1/2) 河川構造物配置図 (ファースト・  
ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

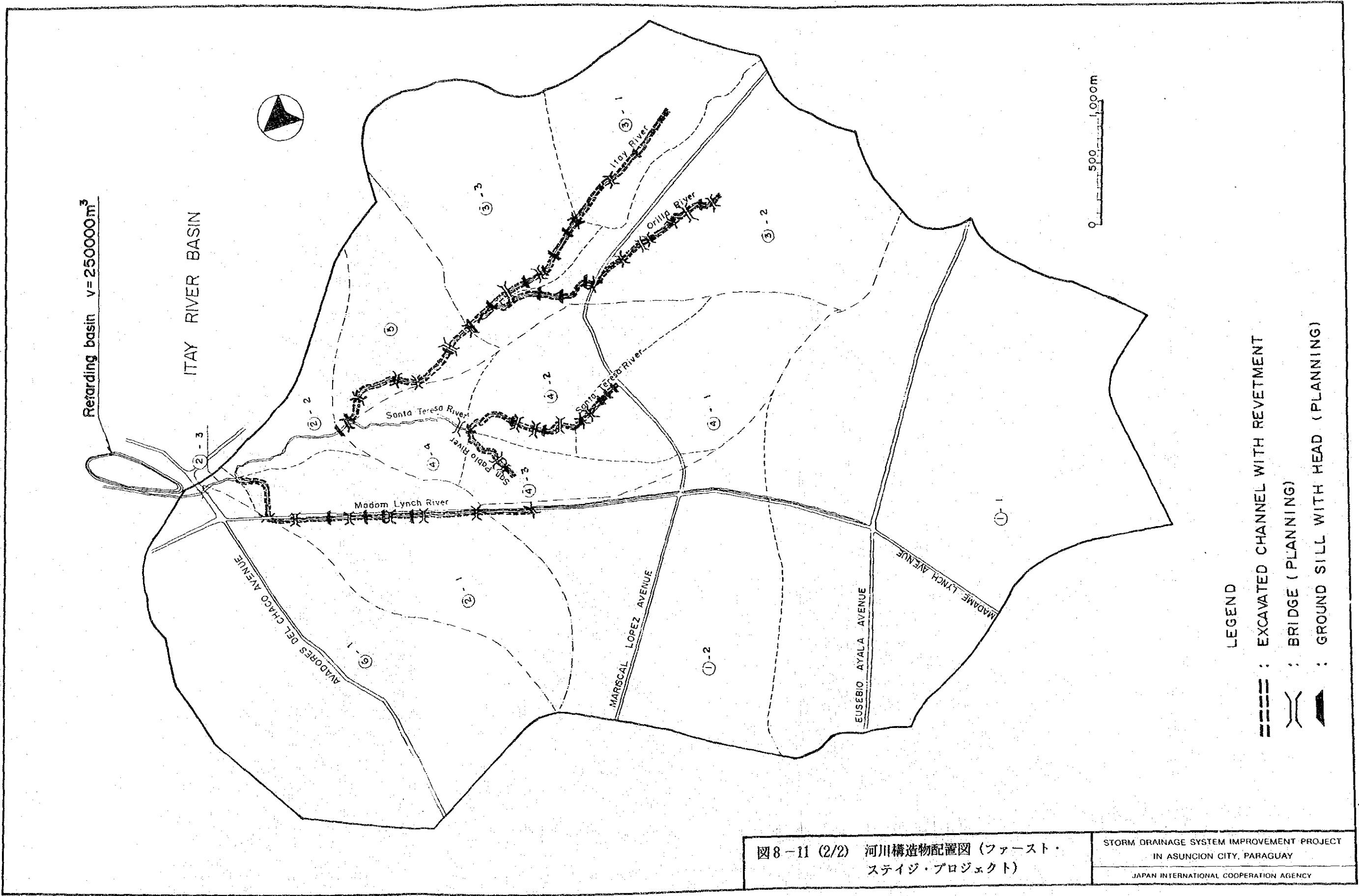


図8-11 (2/2) 河川構造物配置図 (ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
 IN ASUNCION CITY, PARAGUAY  
 JAPAN INTERNATIONAL COOPERATION AGENCY

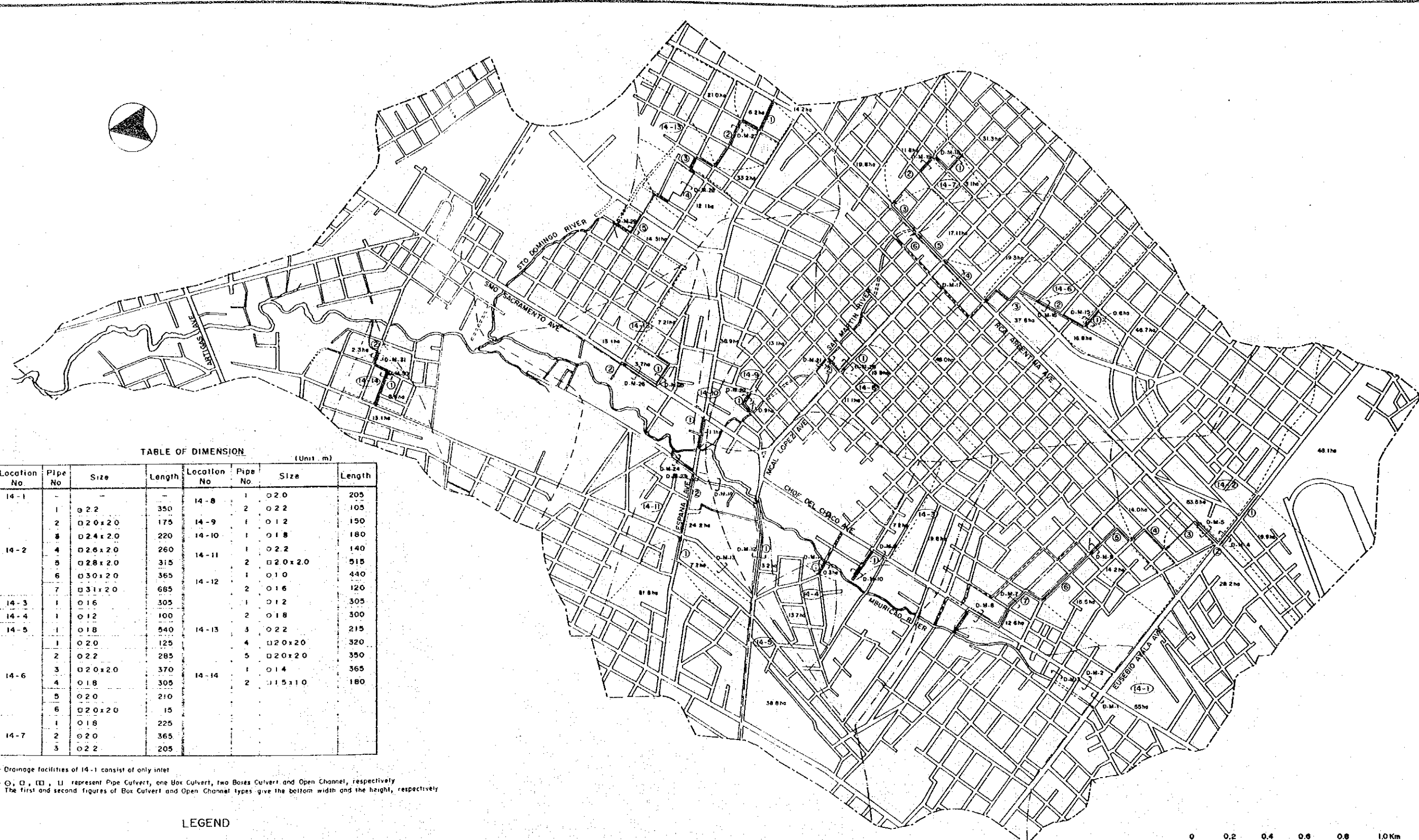


TABLE OF DIMENSION (Unit: m)

Location No	Pipe No	Size	Length	Location No	Pipe No	Size	Length
14-1	-	-	-	14-8	1	Ø 20	205
	2	Ø 20 x 20	350		2	Ø 22	105
	8	Ø 24 x 20	220	14-9	1	Ø 12	150
14-2	4	Ø 26 x 20	260	14-10	1	Ø 18	180
	5	Ø 28 x 20	315	14-11	1	Ø 22	140
	6	Ø 30 x 20	365	14-11	2	Ø 20 x 20	515
	7	Ø 31 x 20	665	14-12	1	Ø 10	440
14-3	1	Ø 16	305	14-12	2	Ø 16	120
	1	Ø 12	100	14-13	1	Ø 12	305
14-4	1	Ø 12	100	14-13	2	Ø 18	300
	1	Ø 18	540	14-13	3	Ø 22	215
14-5	1	Ø 20	125	14-13	4	Ø 20 x 20	320
	2	Ø 22	285	14-13	5	Ø 20 x 20	350
	3	Ø 20 x 20	370	14-14	1	Ø 14	365
	4	Ø 18	305	14-14	2	Ø 15 x 10	180
	5	Ø 20	210				
	6	Ø 20 x 20	15				
14-7	1	Ø 18	225				
	2	Ø 20	365				
	3	Ø 22	205				

Drainage facilities of 14-1 consist of only inlet  
 O, □, [ ] represent Pipe Culvert, one Box Culvert, two Boxes Culvert and Open Channel, respectively  
 The first and second figures of Box Culvert and Open Channel types give the bottom width and the height, respectively

LEGEND

- BOUNDARY OF BASIN
- BOUNDARY OF SUB-BASIN
- BOUNDARY OF DRAINAGE AREA
- BOUNDARY OF SUB-DIVIDED DRAINAGE AREA
- PROPOSED DRAINAGE ROUTE
- EXISTING DRAINAGE ROUTE BY IDB PROJECT
- (14-2) LOCATION NO. OF DRAINAGE FACILITIES
- ② PIPE NO.
- 28.2ha DRAINAGE AREA
- [0-M-15] STANDARD CROSS-SECTION NO.

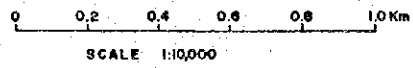


図 8-12 (1/2) 排水施設配置図 (ファースト・ステイジ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
 IN ASUNCION CITY, PARAGUAY  
 JAPAN INTERNATIONAL COOPERATION AGENCY

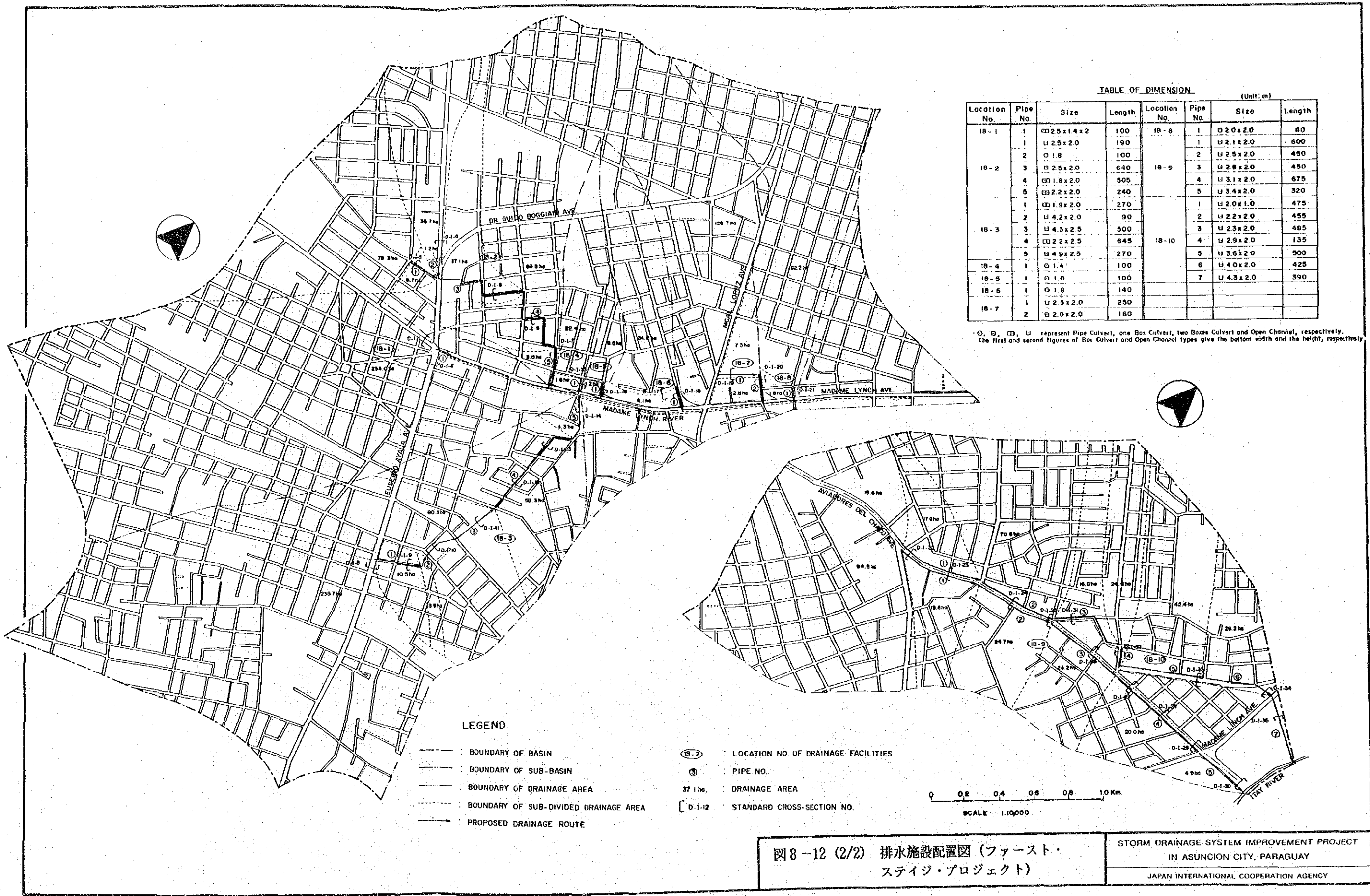


TABLE OF DIMENSION (Unit: m)

Location No.	Pipe No.	Size	Length	Location No.	Pipe No.	Size	Length
18-1	1	□ 2.5 x 1.4 x 2	100	18-8	1	□ 2.0 x 2.0	80
	2	U 2.5 x 2.0	190		1	U 2.1 x 2.0	500
18-2	1	□ 1.8	100	18-9	2	U 2.5 x 2.0	450
	3	□ 2.5 x 2.0	640		3	U 2.8 x 2.0	450
	4	□ 1.8 x 2.0	505	4	U 3.1 x 2.0	675	
	5	□ 2.2 x 2.0	240	5	U 3.4 x 2.0	320	
	6	□ 1.9 x 2.0	270	1	U 2.0 x 1.0	475	
18-3	1	□ 4.2 x 2.0	90	18-10	2	U 2.2 x 2.0	455
	3	U 4.3 x 2.5	500		3	U 2.3 x 2.0	485
18-4	4	□ 2.2 x 2.5	645	18-10	4	U 2.5 x 2.0	135
	5	U 4.9 x 2.5	270		5	U 3.6 x 2.0	500
	6	□ 1.4	100		6	U 4.0 x 2.0	425
18-5	1	□ 1.0	100	18-10	7	U 4.3 x 2.0	390
18-6	1	□ 1.8	140				
18-7	1	U 2.5 x 2.0	250				
	2	□ 2.0 x 2.0	160				

□, □, □, U represent Pipe Culvert, one Box Culvert, two Boxes Culvert and Open Channel, respectively. The first and second figures of Box Culvert and Open Channel types give the bottom width and the height, respectively.

- LEGEND**
- BOUNDARY OF BASIN
  - BOUNDARY OF SUB-BASIN
  - BOUNDARY OF DRAINAGE AREA
  - BOUNDARY OF SUB-DIVIDED DRAINAGE AREA
  - PROPOSED DRAINAGE ROUTE
  - ⑩-2 LOCATION NO. OF DRAINAGE FACILITIES
  - ③ PIPE NO.
  - 37.1 ha DRAINAGE AREA
  - [ D-1-12 STANDARD CROSS-SECTION NO.

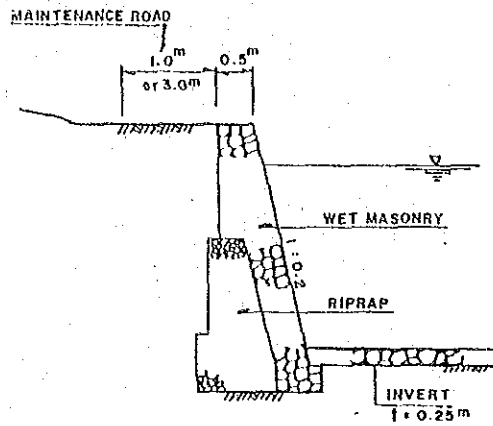
0 0.2 0.4 0.6 0.8 1.0 Km.  
SCALE 1:10,000

図 8-12 (2/2) 排水施設配置図 (ファースト・ステージ・プロジェクト)

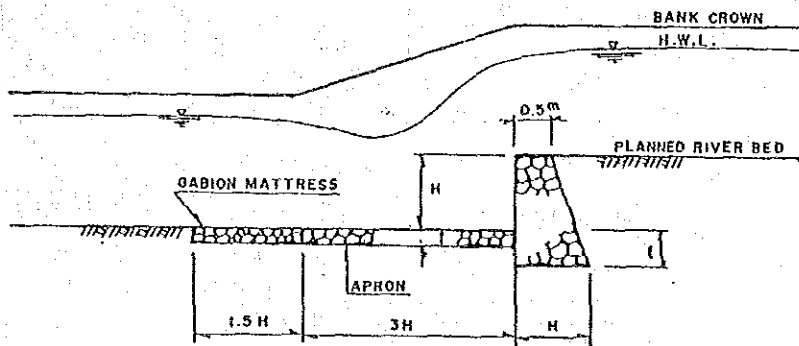
STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY



### REVETMENT



### OUNDSILL WITH HEAD



### BRIDGE

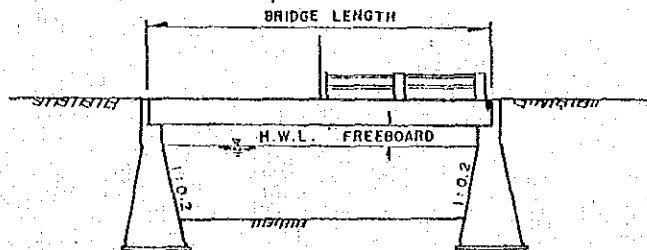


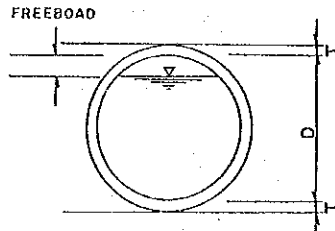
図8-13 (1/3) 計画構造物標準図 (ファースト・  
ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION-AGENCY

## DRAINAGE CONDUIT

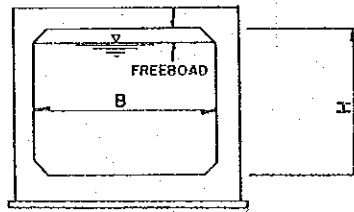
### PIPE SECTION



#### DIMENSION

D (mm)	T (mm)
1,000	83.5
1,200	110.0
1,400	116.0
1,600	100.0
1,800	110.0
2,000	110.0
2,200	120.0

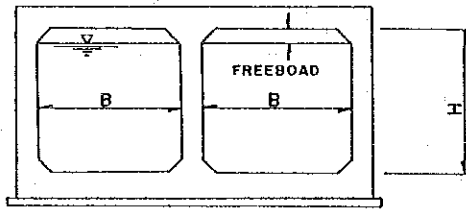
### ONE-BOX SECTION



#### DIMENSION (mm)

B	H	B	H
2,000	2,000	3,000	2,000
2,400	2,000	3,100	2,000
2,500	2,000		
2,600	2,000		
2,800	2,000		

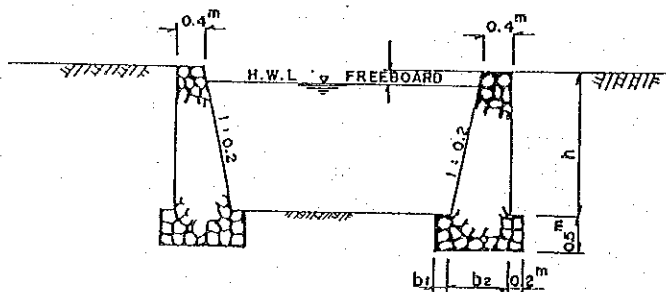
### TWO-BOX SECTION



#### DIMENSION (mm)

B	H
1,800	2,000
1,900	2,000
2,200	2,000
2,200	2,500
2,500	1,400

### CHANNEL SECTION



#### DIMENSION (mm)

h	b <sub>1</sub>	b <sub>2</sub>
1,000	100	600
2,000	200	800
2,500	300	900

図 8-13 (2/3) 計画構造物標準図 (ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

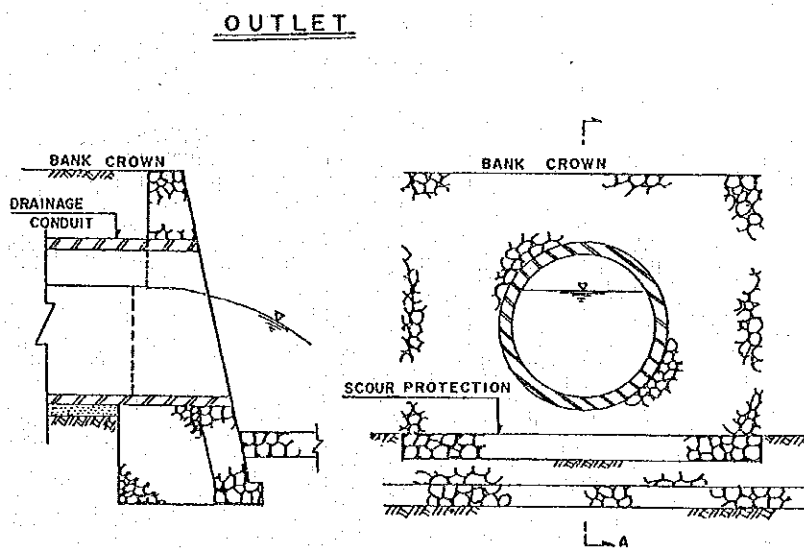
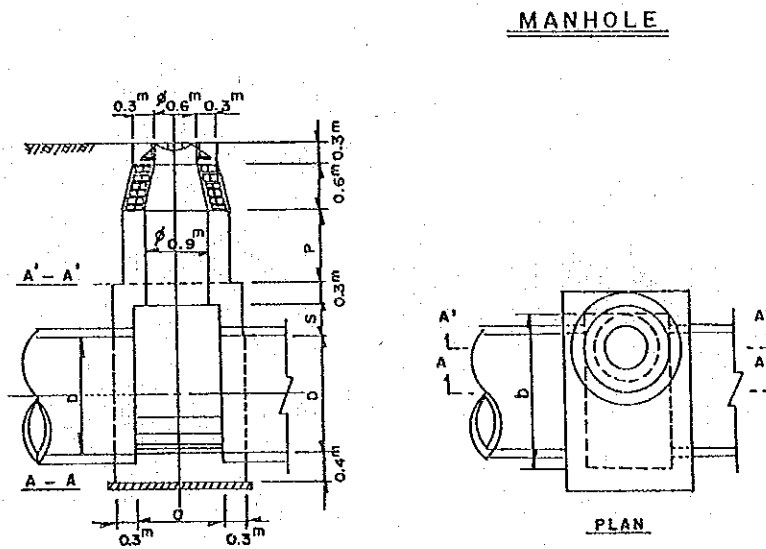
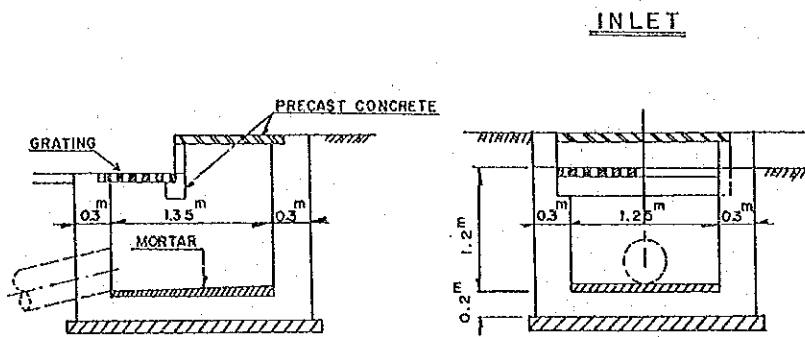


図 8-13 (3/3) 計画構造物標準図 (ファースト・  
ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY



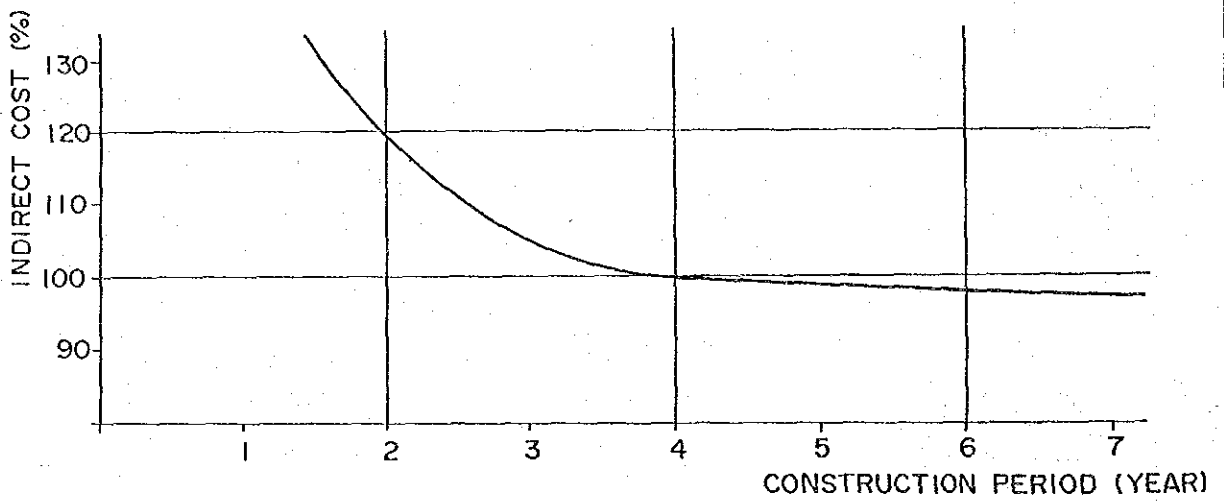


圖 8-14 工事期間～建設費關係圖

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

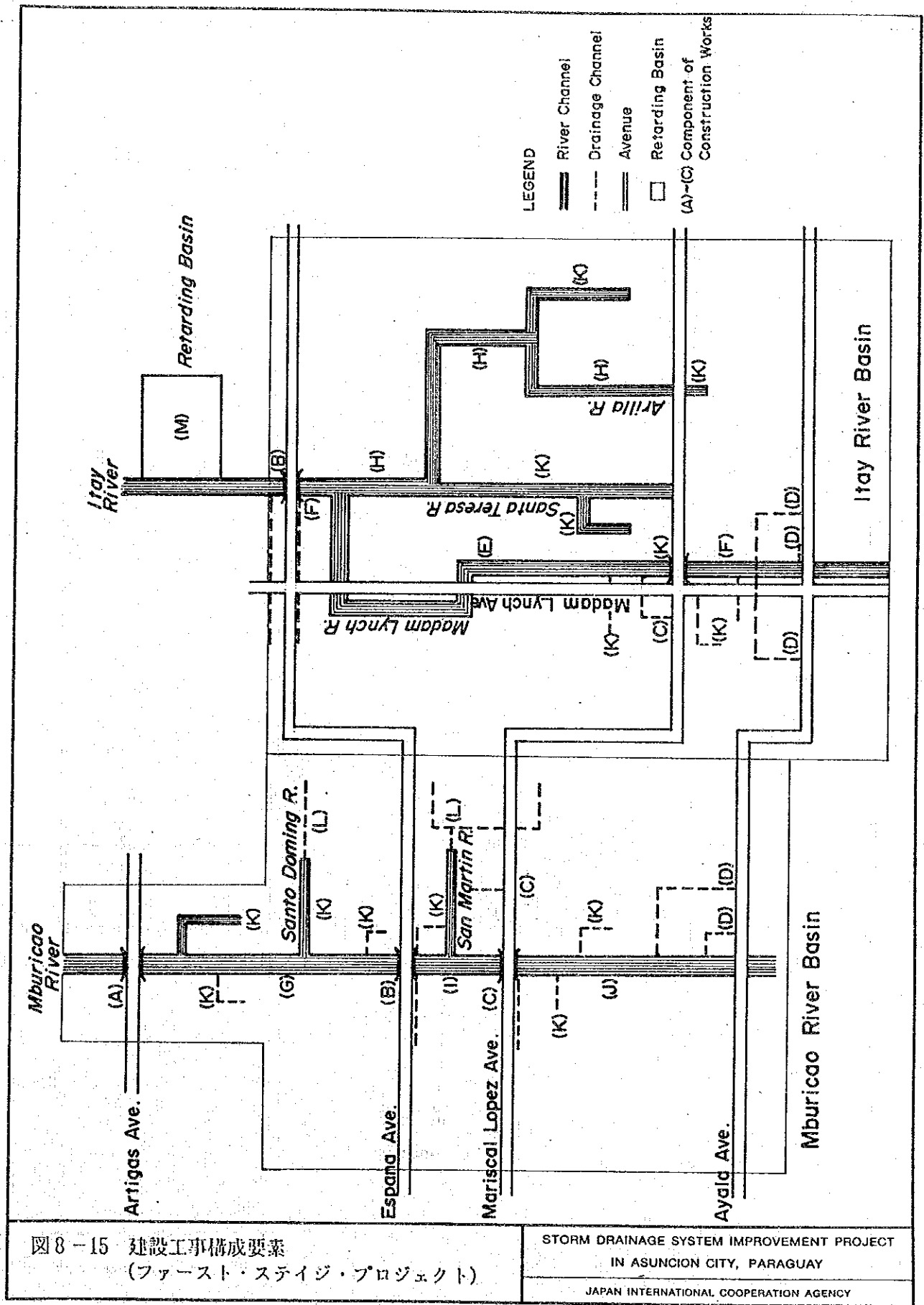


図8-15 建設工事構成要素  
(ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

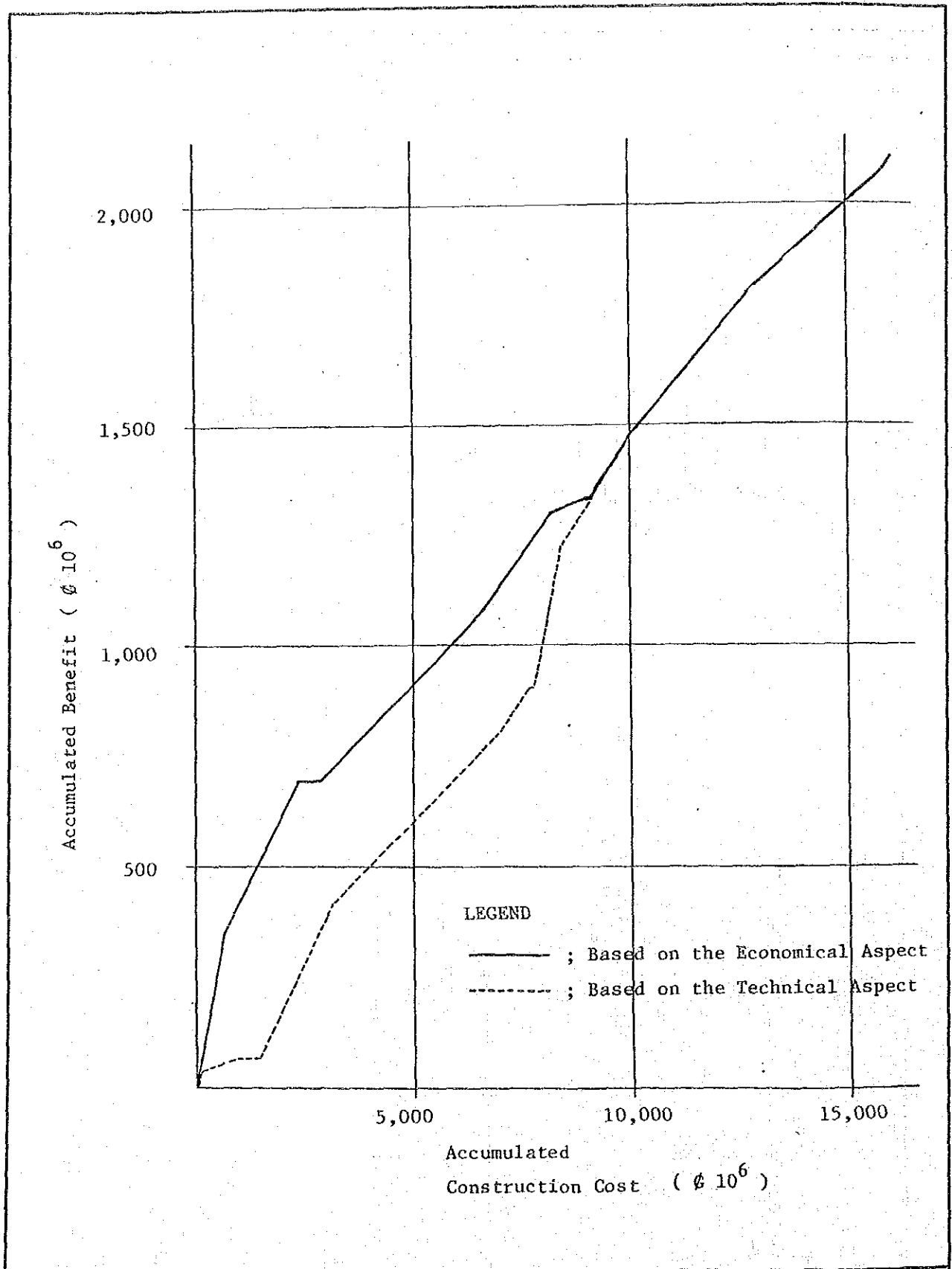


図 8-16 累加建設費及び便益関係  
(ファースト・ステージ・プロジェクト)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY  
JAPAN INTERNATIONAL COOPERATION AGENCY

Component	Descriptions	1st Yr (1990)	2nd Yr (1991)	3rd Yr (1992)	4th Yr (1993)
Mobilization and Preparatory Works					
Mariscal Lopez Avenue	Construction of 3 bridges and 3 routes of drainage facilities	■			
Artigas Avenue	Construction of 1 bridge	■			
Espana Avenue	Construction of 1 bridge, 4 routes of drainage facilities and ground-sill in Itay River	■			
Retarding Basin	Construction of retarding basin	■			
Madame Lynch River (I)	River improvement of Itay River and Madame Lynch River		■		
Madame Lynch River (II)	River improvement of Madame Lynch River		■		
River Channel (I)	River improvement of Mburicao River			■	
River Channel (III)	River improvement of Mburicao River			■	
River Channel (IV)	River improvement of Mburicao River			■	
Ayala Avenue	Construction of 5 routes of drainage facilities			■	
River Channel (II)	River improvement of Itay River and Orilla River			■	
River Channel (V)	River improvement of 7 tributaries and 7 routes of drainage facilities				■
Drainage Facilities	Construction of 5 routes of drainage facilities				■

図8-17 ファースト・ステージ・プロジェクト  
工事工程表

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

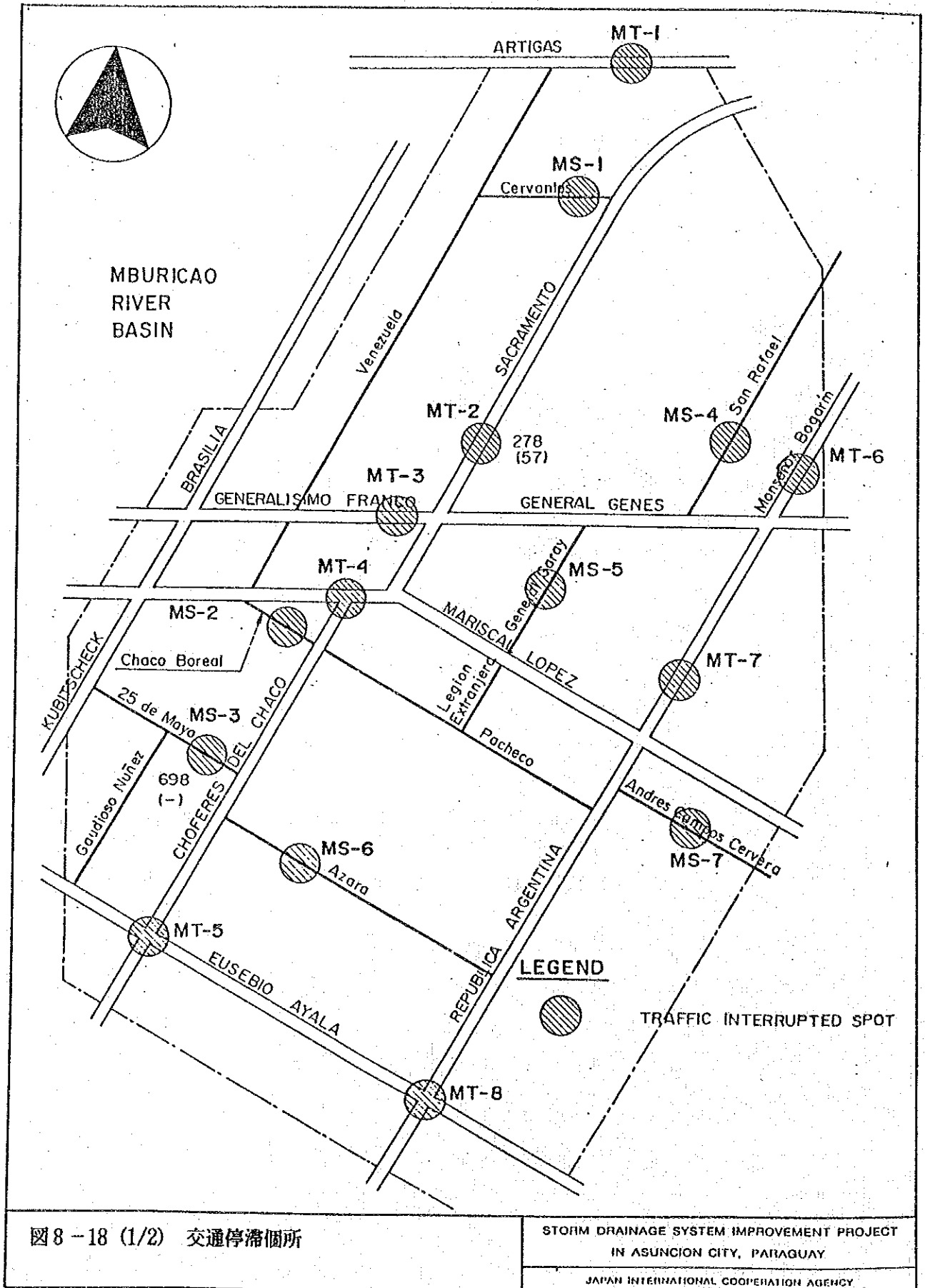


図 8-18 (1/2) 交通停滞箇所

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

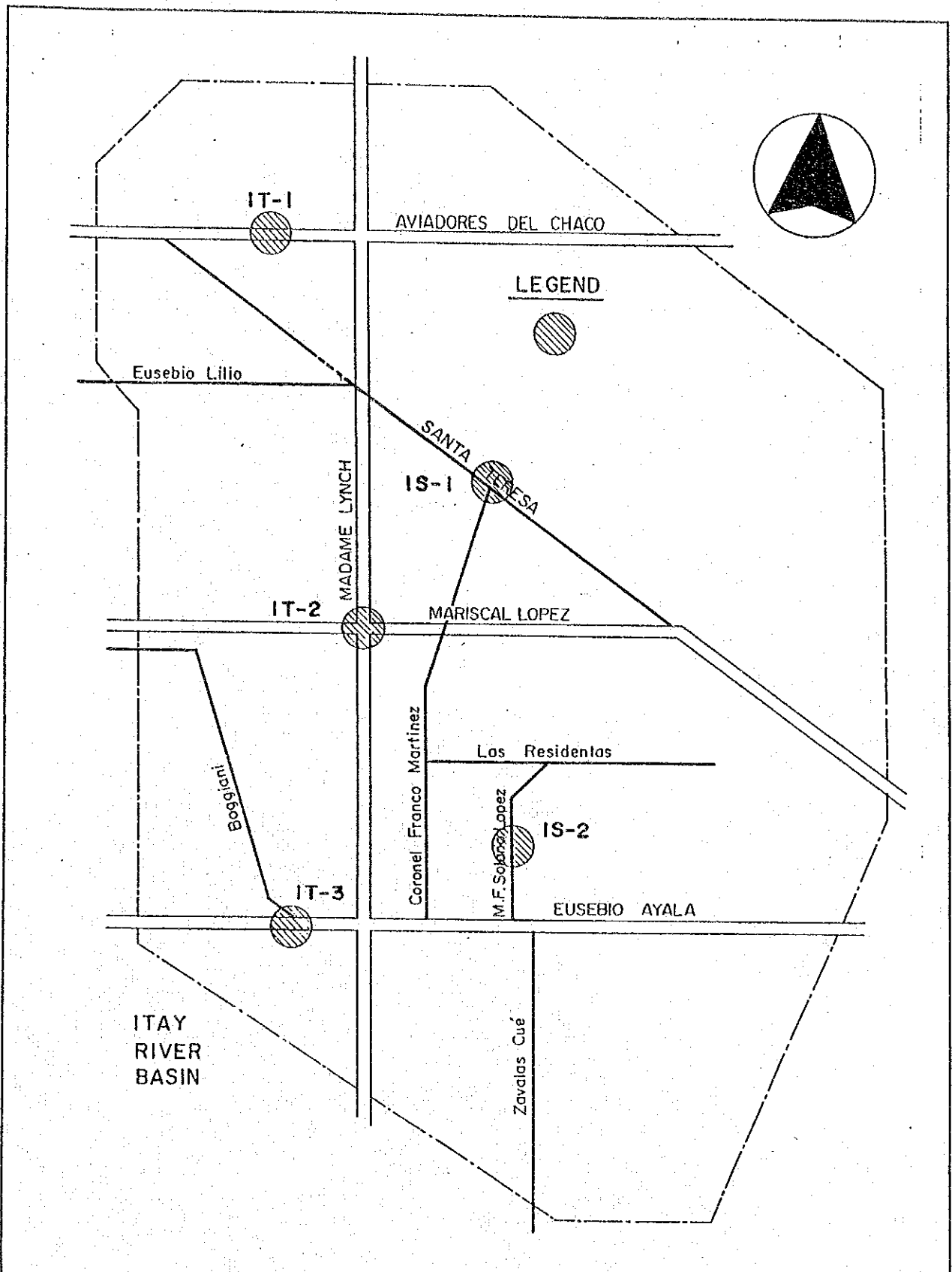


図8-18 (2/2) 交通停滞箇所

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY



**ANNEX**





. MINUTES OF MEETING  
FOR  
MASTER PLAN AND FEASIBILITY STUDY  
ON  
STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN  
ASUNCION CITY  
OF  
THE REPUBLIC OF PARAGUAY

Joint meeting between CORPOSANA (la Corporación de Obras Sanitarias) and the JICA Study Team together with the advisory committee was held on August 12, 1985 at the office of CORPOSANA.

The JICA Study Team submitted 35 copies of the Inception Report to CORPOSANA in compliance with the scope of works and explained such items described in the report as Methodology of the Study, Plan of Operation, Undertaking of both sides, etc.

The contents of the report except a part of undertaking of Paraguayan Side were duly agreed upon by and between the both parties.

The following items on the undertaking of Paraguayan Side were modified:

1. Four counterparts will be assigned as follows:
  - one counterpart for Team Leader (time to time),
  - one counterpart for Hydrologist and Flood analyst (full time),
  - one counterpart for River Planning Engr., Drainage Planning Engr. and Drainage Structural Engr. (full time),
  - and one counterpart for Institutional Expert and Project Economist (full time).
2. Non-technical support personnel consisting of one secretary, two typists, three assistants, two draftmen and one janitor will be provided.
3. Office space, and several desks with chairs being urgently needed will be prepared by the Team, while office equipments except the above will be supplied by CORPOSANA.

*[Handwritten signatures and initials]*  
Y.W.

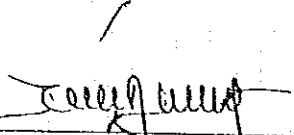
Besides the above, the following views were made:

1. CORPOSANA strongly desired early realization of the project by the aid of the Japanese Government.
2. CORPOSANA emphasized the necessity of training of the counterpart personnel for the project implementation. In this connection, CORPOSANA requested the dispatch of the Paraguayan trainees to Japan during the study period.

In response to the request, CORPOSANA was suggested to submit the application form of trainee to JICA by the end of October.

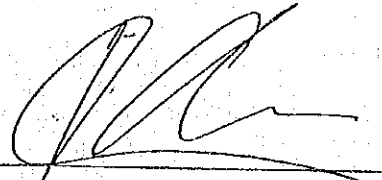
The list of attendance is attached hereto.

August 13, 1985 in Asunción



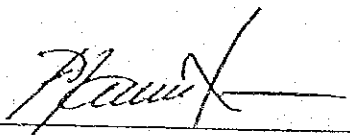
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Ing. Ronald Chenú Abente  
Gerente de Alcantarillado de la  
Corporación de Obras Sanitarias



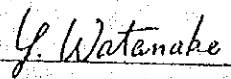
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Katsuhisa Abe  
Team Leader  
JICA Study Team



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Dr. Alberto Ramírez Patiño  
Gerente General de la  
Corporación de Obras Sanitarias

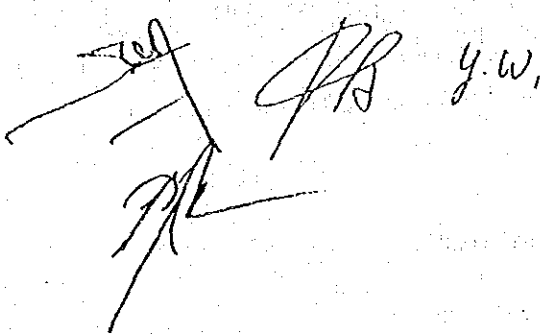


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Yoshinobu Watanabe  
Acting Chairman  
Advisory Committee

LIST OF ATTENDANCE

Ing. Ronald Chenú Abente	Gerente de Alcantarillado
Ing. Elena María Mallorquín	Jefe de Sección Técnica y Cálculo
Ing. Moisés G. Cohenca	Counterpart
Mr. Yoshinobu Watanabe	Member of Advisory Committee
Mr. Noboru Yamaguchi	Member of Advisory Committee
Mr. Junji Ishizuka	Project Coordinator
Mr. Katsuhisa Abe	Team Leader of JICA Study Team
Mr. Yoshiyuki Tomioka	Assist. Team Leader of JICA Study Team
Mr. Yoshiharu Matsumoto	Member of JICA Study Team
Mr. Motonori Yoshii	Member of JICA Study Team
Mr. Junji Kamata	Member of JICA Study Team
Mr. Akio Shichijugari	Member of JICA Study Team
Mr. Hiroaki Sakamoto	Member of JICA Study Team

Handwritten signatures and initials, including 'y.w.', 'AB', and 'PL'.

MINUTES OF MEETING  
FOR  
MASTER PLAN AND FEASIBILITY STUDY  
ON  
STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT  
IN  
ASUNCION CITY  
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THE REPUBLIC OF PARAGUAY

An explanatory meeting on the Progress Report (I) between CORPOSANA and the JICA Study Team together with the Advisory Committee was held at the office of CORPOSANA on November 21, 1985. The list of attendants is attached hereto.

In accordance with the scope of works, the JICA Study Team submitted 35 copies of the Progress Report (I) and 3 Albums of photographs related to the Study.

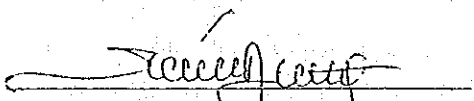
The JICA Study Team explained the methodology taken for the study, the progress and schedule of the study and the contents of the report, which were well understood. And CORPOSANA expressed a strong desire for further cooperation from the Government of Japan to put this project into implementation without losing time.

In addition to the above, the following were discussed and confirmed mutually:

- (1) It would be most desirable from the social viewpoint that this project should be formulated on the 2- to 5-year return-period basis, though economic and financial considerations should be given to the determination of project scale.

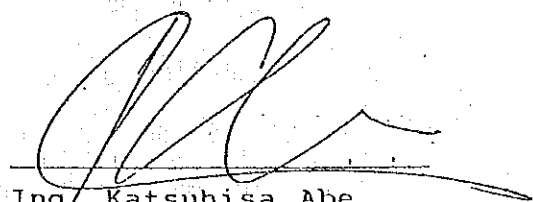
- (2) Itay and Mburicaó River Basins were taken up as the target areas for the Feasibility Study, and in addition, Lambaré and Sosa River Basins should be also taken into consideration.
- (3) JICA took note of the CORPOSANA's request for two vehicles to be supplied for the field study in 1986.

November 22, 1985



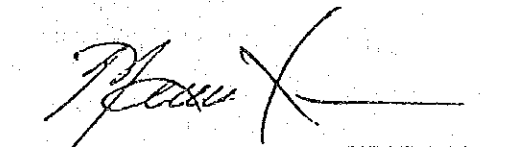
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Ing. Ronald Chenú Abente  
Gerente de Alcantarillado  
Corporación de Obras  
Sanitarias



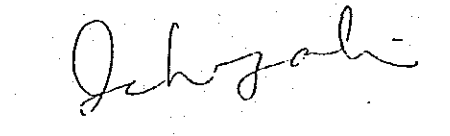
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Ing. Katsuhisa Abe  
Team Leader  
JICA Study Team



---

Dr. Alberto Ramírez Patiño  
Gerente General de la  
Corporación de Obras  
Sanitarias



---

Dr. Katsuyoshi Ishizaki  
Chairman  
Advisory Committee

LIST OF ATTENDANTS

Ing. Ronald Chenú Abente	Gerente de Alcantarillado
Ing. Miguel Ramón Canale	Jefe Dpto. Alcantarillado Sanitario
Ing. Moisés Gabriel Cohenca	Counterpart
Dr. Katsuyoshi Ishizaki	Chairman of Advisory Committee
Mr. Eiichi Nakamura	Member of Advisory Committee
Mr. Junji Ishizuka	Project Coordinator
Ing. Katsuhisa Abe	Team Leader
Ing. Yoshiyuki Tomioka	Assistant Team Leader
Ing. Yoshiharu Matsumoto	Member of Study Team
Mr. Teru Sasaki	Member of Study Team
Ing. Akio Shichijugari	Member of Study Team
Ing. Motonori Yoshii	Member of Study Team
Ing. Junji Kamata	Member of Study Team
Mr. Kimio Shimomura	Member of Study Team

MINUTES OF MEETING  
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An explanatory meeting on the Interim Report between CORPOSANA and the JICA Study Team in presence of the Advisory Committee was held at the office of CORPOSANA on March 14, 1986. The list of attendance is attached hereto.

In accordance with the Scope of Study, the JICA Study Team submitted 35 copies of Interim Report in English (composed of main and supporting reports) and 30 copies of Summary Reports in Spanish.

Through the explanation, CORPOSANA has well understood the contents of the report without any objection on the technical aspects. Major Items discussed and mutually agreed in the meeting are summarized hereunder.

(1) Naming of the Storm Drainage Improvement Plans

The Master Plan and the Execution Plan incorporated in the Interim Report are re-named Basic Plan and Master Plan, respectively to facilitate better understanding.

(2) Additional Study

A study on the countermeasures against the incremental damage caused by future urbanization will be additionally undertaken in the Phase II Study. This includes:

- Demonstration of pilot detention facilities, and
- Discussion with a so-called government coordinating group to successfully put the project into implementation.



The above-mentioned facilities will be installed by CORPOSANA under the direction of JICA Study Team, but the detailed scope is subject to mutual agreement.

(3) Documentation for Further Assistance

Documentation required for further financial assistance from foreign countries will be included in the Phase II Study.

(4) Surveying Works

CORPOSANA will conduct surveying works and if necessary boring works for the Phase II Study, covering Mburicao and Itay river basins under the direction of the JICA Study Team.

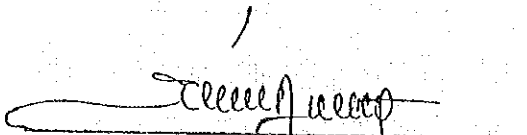
(5) Training of Counterparts in Japan

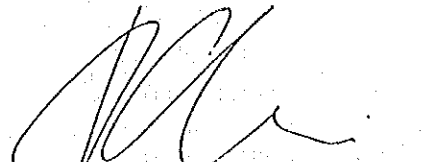
CORPOSANA strongly requested the JICA Study Team to program the training in Japan of its staff during the Phase II Study, and the JICA Study Team suggested CORPOSANA to submit the application to the Japanese side at the earliest date.

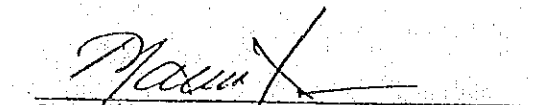
(6) Provision of Vehicles

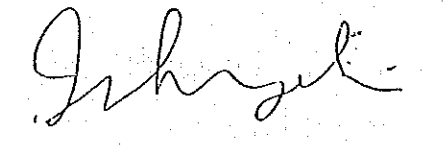
CORPOSANA requested the JICA Study Team to provide two (2) vehicles which are required for the successful undertaking of the Phase II Study. The JICA Study Team promised to convey the request to the concerned authorities in Japan.

March 17, 1986

  
Ing. Ronald Chenú Abente  
Gerente de Alcantarillado  
Corporación de Obras  
Sanitarias

  
Ing. Katsuhisa Abe  
Team Leader  
JICA Study Team

  
Dr. Alberto Ramírez Patiño  
Gerente General de la  
Corporación de Obras  
Sanitarias

  
Dr. Katsuyoshi Ishizaki  
Chairman  
Advisory Committee

LIST OF ATTENDANTS

Ing. Ronald Chenú Abente	Gerente de Alcantarillado
Ing. Miguel Ramón Canale	Jefe Dpto. Alcantarillado Sanitario
Dr. Katsuyoshi Ishizaki	Chairman of Advisory Committee
Mr. Noboru Yamaguchi	Member of Advisory Committee
Mr. Hiroshi Saito	Project Coordinator
Mr. Chihiro Oishi	Staff of JICA Asunción Office
Mr. Katsuhisa Abe	Team Leader of JICA Study Team
Mr. Yoshiyuki Tomioka	Assistant Team Leader
Mr. Kimio Shimomura	Member of Study Team

MINUTES OF MEETING  
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On the occasion of the commencement of Phase II Study, an explanatory meeting on the Plan of Operation between CORPOSANA and the JICA Study Team was held at the office of CORPOSANA on June 3, 1986. The list of attendance is attached hereto.

At first, it is confirmed that the target area for the feasibility study in this stage includes Mburicao river basin and the upper basin from Aviadores del Chaco in Itay river basin.


Then explanation was made putting emphasis on Undertaking of the Paraguayan Side. Major items discussed and mutually agreed in the meeting are summarized hereunder.


- (1) CORPOSANA will provide the necessary personnel and equipment in accordance with the request by the Team after the minor change of contents stipulated in the Plan of Operation.
- (2) CORPOSANA will recommend the sites for the infiltration test as early as possible after the field investigation with the Study Team.
- (3) CORPOSANA will make an arrangement for setting up a so-called Government Coordinating Group through the discussion with the Study Team.

CORPOSANA presented the following requests, which will be conveyed to the Japanese Side by the Study Team.

- (1) To put into implementation the project covering Mburicao and Itay river basins at the earliest date through the financial assistance of the Japanese Government.
- (2) To conduct a feasibility study on storm drainage system improvement project in Lambare river basin which also suffers severely from flood damages.

June 9, 1986

*p.a.*   
Ing. Ronald Chenu Abente  
Gerente de Alcantarillado  
Corporacion de Obras  
Sanitarias

  
Ing. Katsuhisa Abe  
Team Leader  
JICA Study Team

LIST OF ATTENDANCE

Ing. Ronald Chenu Abente	Gerente de Alcantarillado
Ing. Miguel Ramon Canale	Counterpart
Ing. Moises G. Cohenca	Counterpart
Mr. Katsuhisa Abe	Team Leader of JICA Study Team
Mr. Yoshiyuki Tomioka	Assist. Team Leader of JICA Study Team
Mr. Yoshiharu Matsumoto	Member of JICA Study Team
Mr. Iwao Irie	Member of JICA Study Team
Mr. Motonori Yoshii	Member of JICA Study Team
Mr. Junji Kamata	Member of JICA Study Team
Mr. Akio Shichijugari	Member of JICA Study Team
Mr. Hiroaki Sakamoto	Member of JICA Study Team
Mr. Kimio Shimomura	Member of JICA Study Team

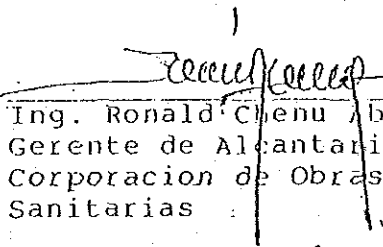
MINUTES OF MEETING  
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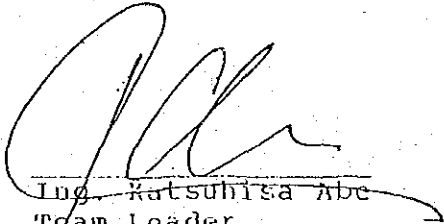
An explanatory meeting on the Progress Report (II) between CORPOSANA and the JICA Study Team in presence of the Advisory Committee was held at the office of CORPOSANA on August 20, 1986. The list of attendance is attached hereto.

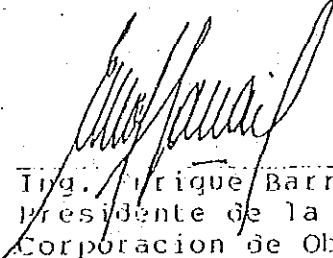
In accordance with the Scope of Study, the JICA Study Team submitted 35 copies of Progress Report (II) in English together with 30 copies of Summary Report in Spanish.


The contents of the report were satisfactorily understood without any objection to the technical aspects. Besides, CORPOSANA requested the Team to open a seminar on storm water control system by Japanese experts in November, 1986 when an explanatory meeting on the Draft Final Report is held in Asuncion.

August 20, 1986 in Asuncion

  
Ing. Ronald Chenu Abente  
Gerente de Alcantarillado  
Corporacion de Obras  
Sanitarias

  
Ing. Katsuhisa Abe  
Team Leader  
JICA Study Team

  
Ing. Enrique Barrail  
Presidente de la  
Corporacion de Obras  
Sanitarias

  
Eiichi Nakamura  
Acting Chairman  
Advisory Committee

LIST OF ATTENDANCE

Ing. Ronald Chenu Abente	Gerente de Alcantarillado
Ing. Miguel Ramon Canale	Counterpart
Ing. Moises G. Cohenca	Counterpart
Mr. Eiichi Nakamura	Acting Chairman of Advisory Committee
Dr. Katsuhide Yoshikawa	Member of Advisory Committee
Mr. Toru Take	Project Coordinator
Mr. Nobukatsu Nakajima	Chief of Technical Cooperation Department of JICA Asuncion Office
Mr. Tsuneo Kishi	Member of Technical Cooperation Department of JICA Asuncion Office
Mr. Masatomi Sato	Member of Technical Cooperation Department of JICA Asuncion Office
Mr. Katsuhisa Abe	Leader of JICA Study Team
Mr. Yoshiyuki Tomioka	Assistant Leader of JICA Study Team
Mr. Yoshiharu Matsumoto	Member of JICA Study Team
Mr. Motonori Yoshii	Member of JICA Study Team
Mr. Kimio Shimomura	Member of JICA Study Team



MINUTES OF MEETING  
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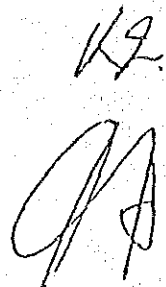
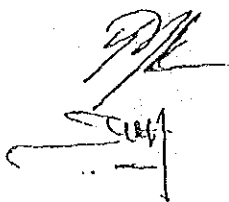
An explanatory meeting on the Draft Final Report between CORPOSANA and the JICA Study Team in the presence of the Advisory Committee was held at the office of CORPOSANA on December 1st., 1986. The list of attendance is attached hereto.

In accordance with the Scope of the Study, the JICA Study Team submitted 35 copies of the Draft Final Report in English together with 30 copies of Summary Report in Spanish.

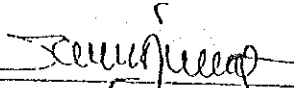
Through the explanation and the discussion in the meeting, the contents of the reports were satisfactorily understood by CORPOSANA without any objection to all aspects of the project formulation.

It is confirmed by and between both parties that the final report will be made by the end of January, 1987, and in case CORPOSANA has any comments for the Draft Final Report, the comments should be sent to JICA by December 15, 1986.

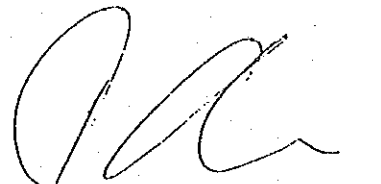
The meeting was concluded with the sincere gratitude of both parties.



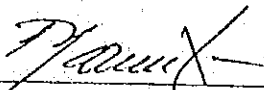
December 1st., 1986 in Asunción




Ing. Ronald Chenú Abente  
Gerente de Alcantarillado  
Corporación de Obras  
Sanitarias



Ing. Katsuhisa Abe  
Team Leader  
JICA Study Team



Dr. Alberto Ramírez Patiño  
Gerente General de la  
Corporación de Obras  
Sanitarias



Dr. Katsuyoshi Ishizaki  
Chairman  
Advisory Committee

LIST OF ATTENDANTS

Paraguayan Side

Ing. Ronald Chenú Abente

Ing. Miguel Ramón Canale

Japanese Side

Dr. Katsuyoshi Ishizaki

Dr. Nobuyuki Tamai

Mr. Noboru Yamaguchi

Mr. Fumio Kikuchi

Mr. Masatomi Sato

Mr. Zentarou Ihara

Mr. Katsuhisa Abe

Mr. Yoshiyuki Tomioka







パラグアイ国

アスンシオン市雨水排水施設整備計画調査

報告書

昭和62年1月

国際



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