Table 8-14. FUTURE FINANCIAL STATUS OF CORPOSANA'S DRAINAGE SECTOR

Unit: ¢ million

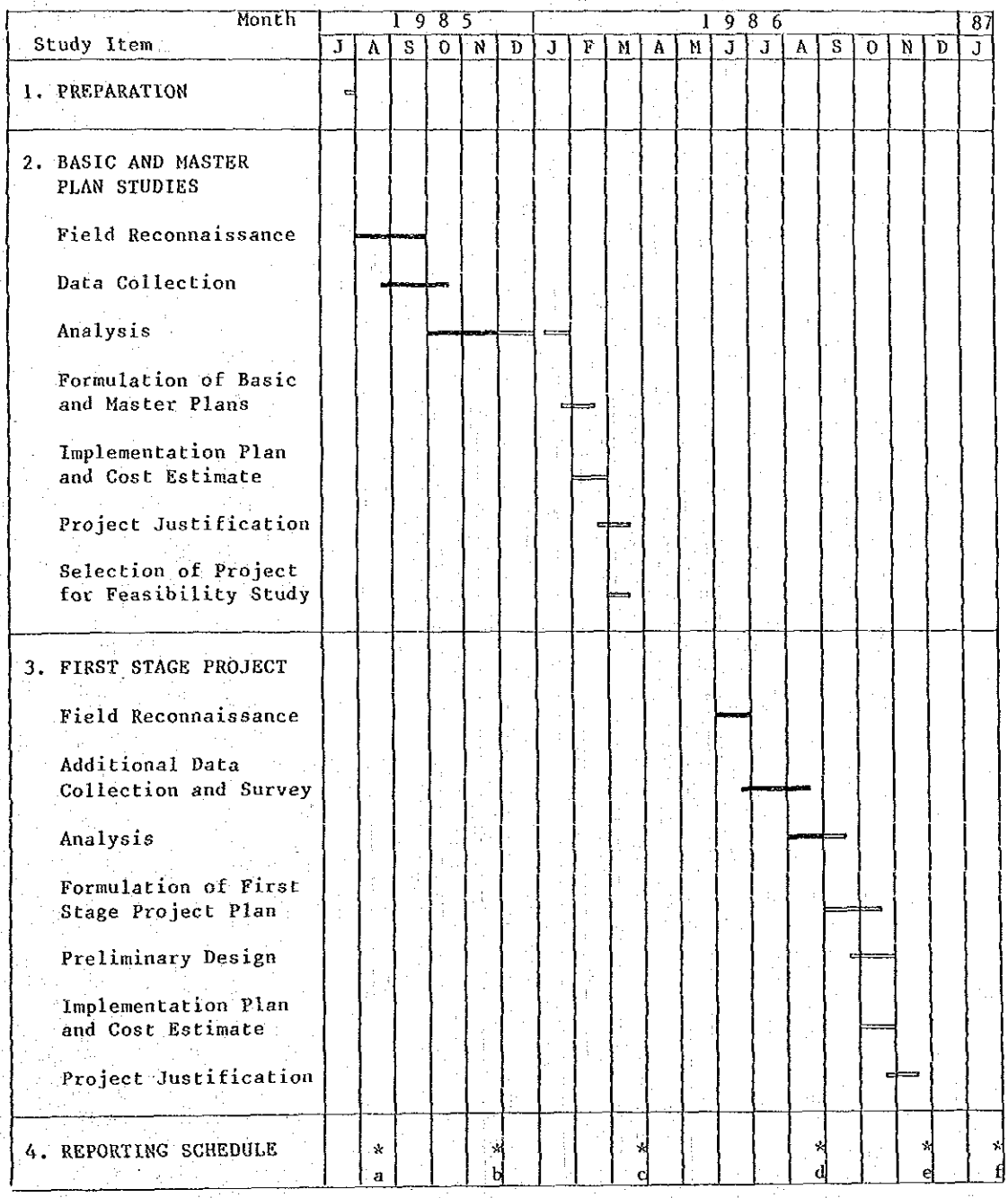
Year	Surplus Fund /1	Expenditure For The First Stage Project				Balance
		F.C. /2	L.C. /3	O/M /4	TOTAL	
1987	341.1	-	-	-	.0	341.1
1988	435.3	18.0	69.2	-	87.2	348.1
1989	585.8	36.0	76.1	-	112.1	473.7
1990	947.5	119.5	2,047.5	-	2,167.0	-1,219.5
1991	1,005.2	263.9	3,726.2	42.8	4,032.9	-3,027.7
1992	1,064.7	378.4	4,638.8	49.6	5,066.8	-4,002.1
1993	1,129.0	458.7	3,839.6	71.2	4,369.5	-3,240.5
1994	1,204.3	458.7	-	83.1	541.8	662.5
1995	1,286.0	458.7	-	87.3	546.0	740.0
1996	1,363.7	458.7	-	91.7	550.4	813.3
1997	1,439.2	458.7	-	96.3	555.0	884.2
1998	1,516.7	484.4	-	101.1	585.5	931.2
1999	1,616.4	509.2	-	106.2	615.4	1,001.0
2000	1,702.7	626.7	-	111.5	738.2	964.5
2001	1,793.2	827.0	-	117.1	944.1	849.1
2002	1,888.2	977.4	-	123.0	1,100.4	787.8
2003	1,988.0	1,073.2	-	129.2	1,202.4	785.6
2004	2,092.6	1,050.3	-	135.7	1,186.0	906.6
2005	2,202.3	1,027.4	-	142.5	1,169.9	1,032.4
2006	2,317.6	1,004.4	-	149.6	1,154.0	1,163.6
2007	2,438.5	981.5	-	157.1	1,138.6	1,299.9
2008	2,565.5	958.5	-	165.0	1,123.5	1,442.0
2009	2,698.6	935.6	-	173.3	1,108.9	1,589.7
2010	2,838.3	912.7	-	182.0	1,094.7	1,743.6
2011	2,985.1	889.7	-	191.1	1,080.8	1,904.3
2012	3,139.1	866.8	-	200.7	1,067.5	2,071.6
2013	3,300.6	843.9	-	210.7	1,054.6	2,246.0
2014	3,470.3	820.9	-	221.2	1,042.1	2,428.2
2015	3,648.3	798.0	-	232.3	1,030.3	2,618.0
2016	3,835.3	775.1	-	243.9	1,019.0	2,816.3
2017	4,062.4	752.1	-	256.1	1,008.2	3,054.2
2018	4,298.3	703.5	-	268.9	972.4	3,325.9
2019	4,513.2	655.8	-	282.3	938.1	3,575.1
2020	4,738.9	515.3	-	296.4	811.7	3,927.2
2021	4,738.9	292.1	-	311.2	603.3	4,135.6
2022	4,738.9	118.7	-	326.8	445.5	4,293.4
TOTAL	85,929.7	22,509.5	14,397.4	5,356.9	42,263.8	43,665.9

Note /1: Refer to Table 7-9.
/2: Amortization for the foreign currency portion.
/3: Expenses in the local currency portion.
/4: Operation and maintenance cost.

Table 9-1. ACTION PLAN

Time Range	Authority in Charge		
	Coordinating Committee	CORPOSANA	Other Agencies Concerned
Current Situation	Preparation Stage	° Management of storm water drainage system. ° Taxation to beneficiaries.	° Project execution related to the storm water drainage system.
Short Term Plan	° Mobilization of Coordinating Committee. ° Recognition and coordination of the problems on storm water drainage system among the agencies concerned. ° Coordinating development projects related to storm water drainage system. ° Publication of flood risk map and limitation of land use.	° Consolidation of the organization. ° Land acquisition for First Stage Project. ° Execution of First Stage Project. ° Delineation of the stretch and area to be managed. ° Collection of flood data and preparation of flood risk map.	° Recognition of the importance of the storm water drainage system. ° Modification of the ongoing projects related to the storm water drainage system. ° Strengthening of the capacity for garbage collection and of inspection for illegal dumping of garbage.
Long Term Plan	° Coordination on the installation of the storm water drainage system. ° Instructions on the development of flood-prone area and the flood risk area.	° Land acquisition for the Master Plan. ° Execution of the Master Plan. ° Increment of the government subsidies for storm water drainage system and taxation to beneficiaries.	° Preparation of necessary regulations for land development. ° Approval of land development in coordination with the storm water drainage project.

FIGURES



LEGEND: ——— : Study in Project Site
═══ : Study in Japan
* : Submittal of Report

a : Inception Report
b : Progress Report (I)
c : Interim Report
d : Progress Report (II)
e : Draft Final Report
f : Final Report

Fig. 1-1 STUDY SCHEDULE

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

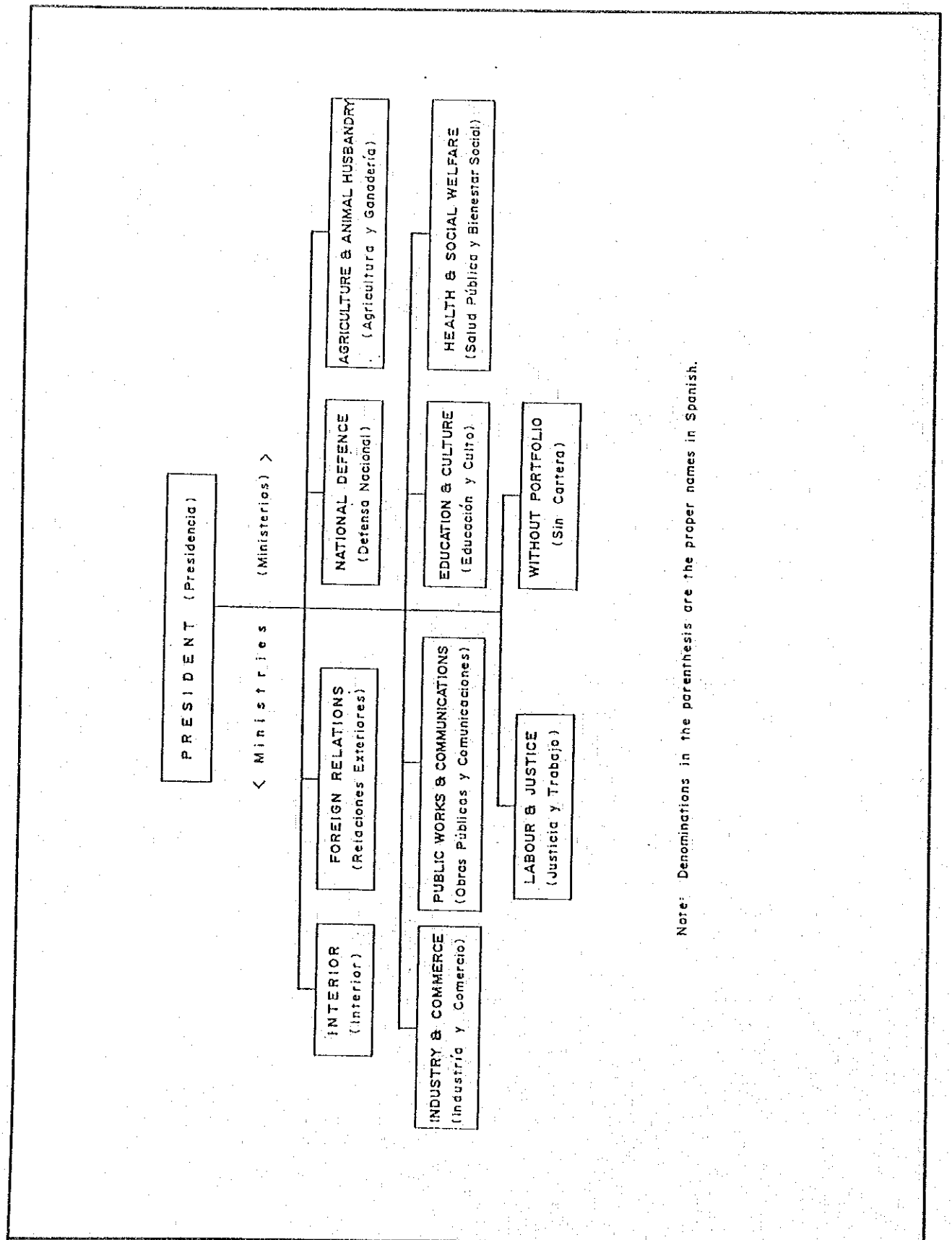


Fig. 2-1 ADMINISTRATIVE ORGANIZATION OF THE GOVERNMENT OF PARAGUAY

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

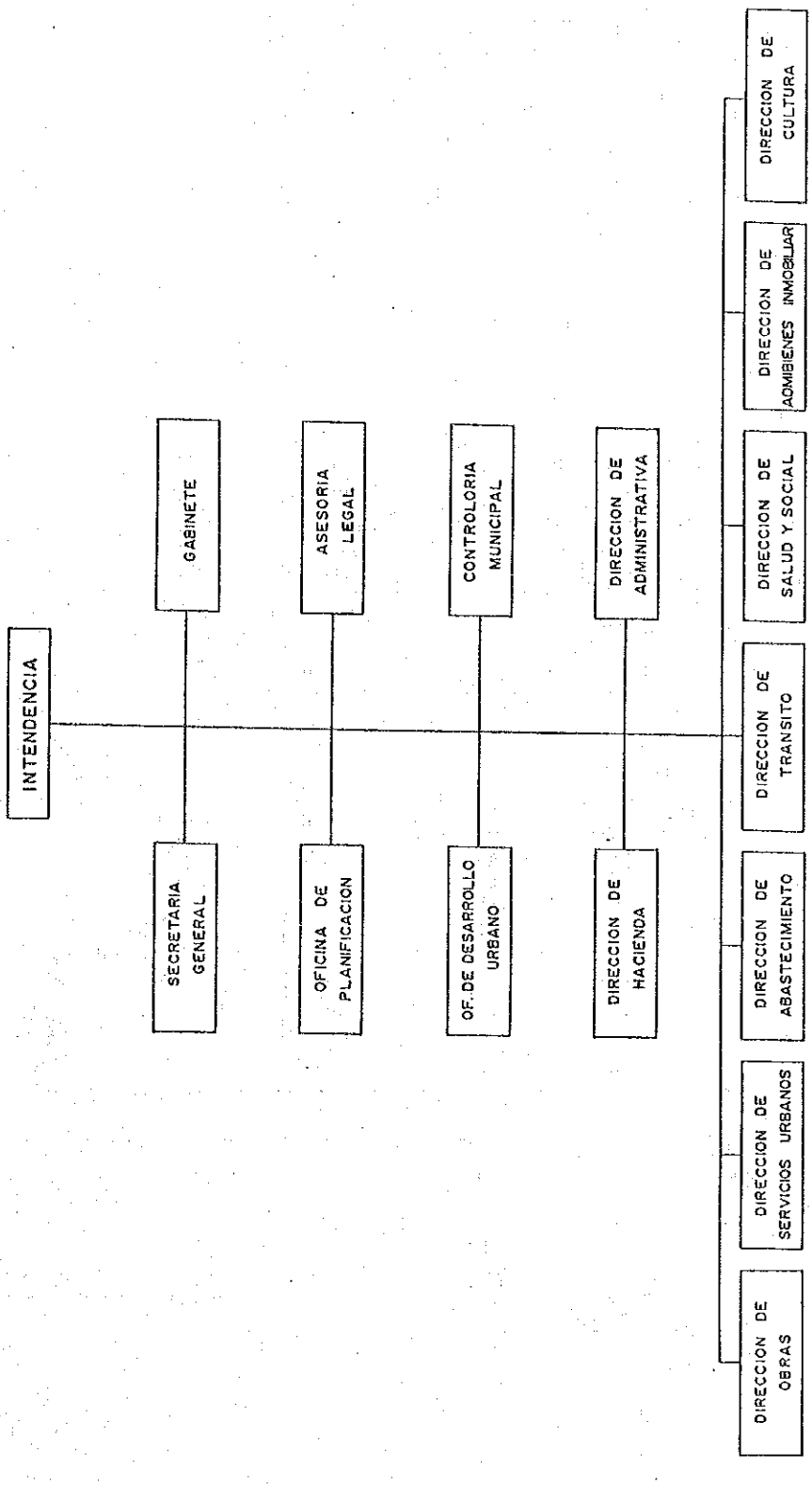


Fig. 2-2 ADMINISTRATIVE ORGANIZATION OF THE MUNICIPALITY OF ASUNCION

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

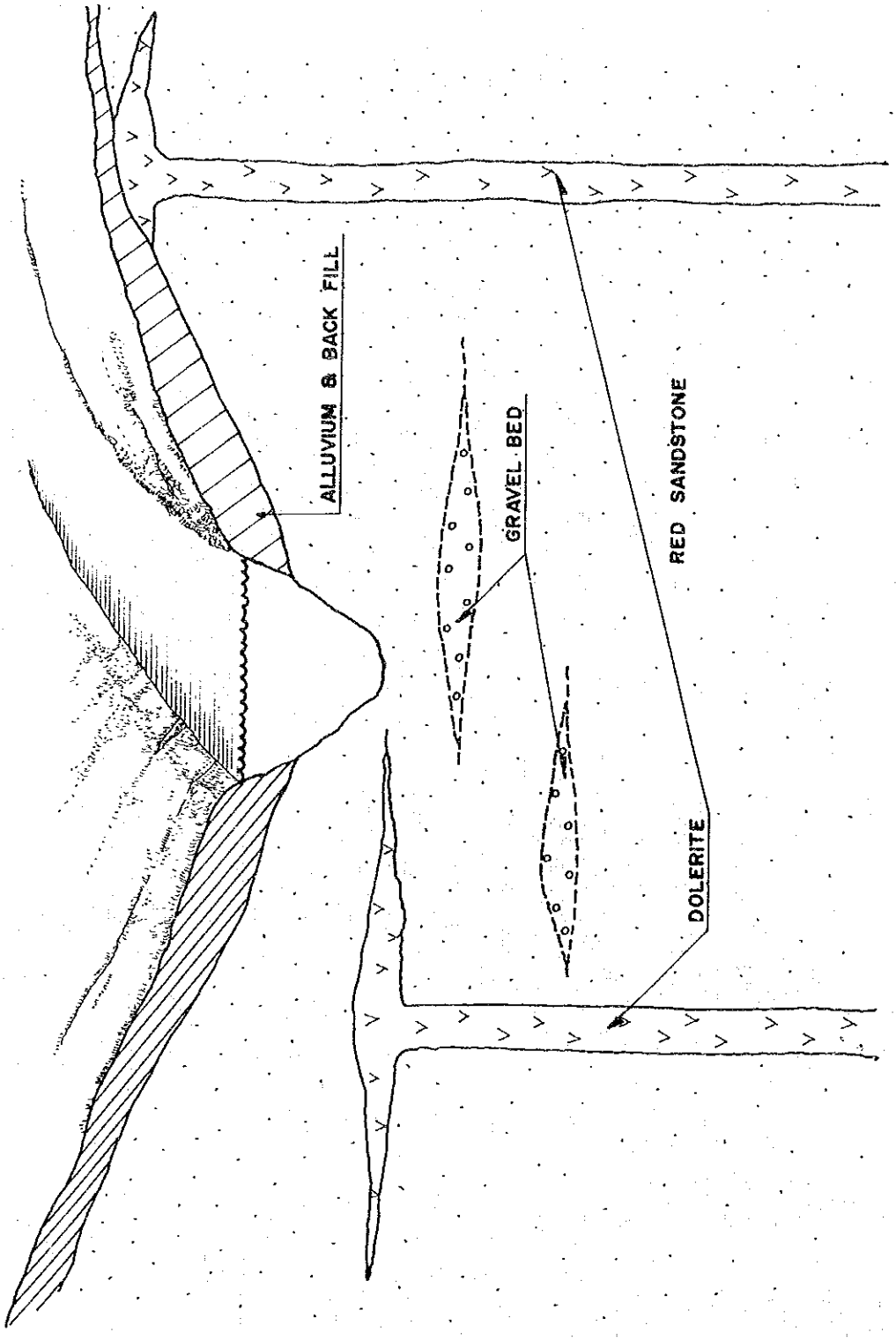


Fig. 2-3 SCHEMATIC GEOLOGICAL SECTION OF STUDY AREA

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

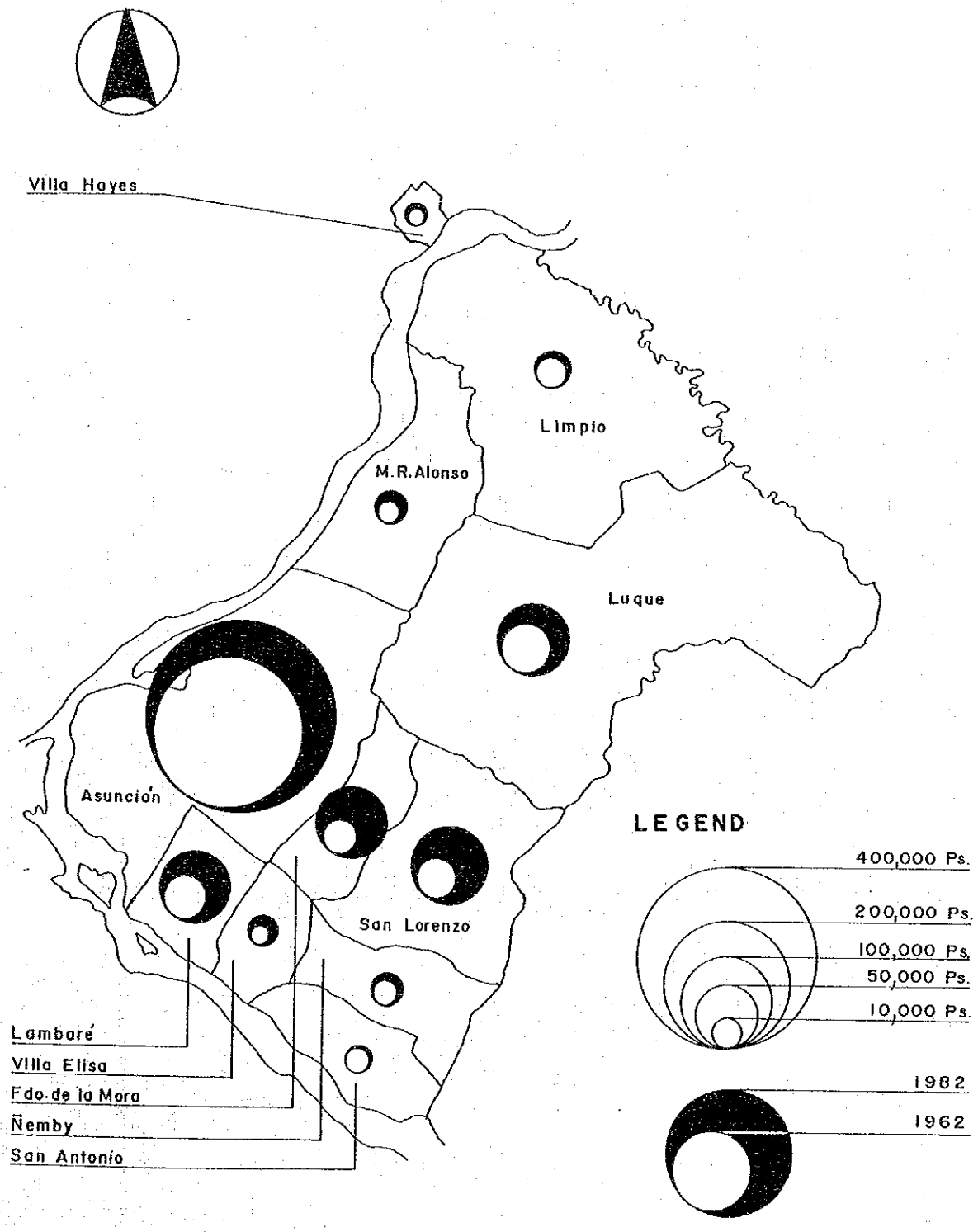


Fig. 2-4 GROWTH OF POPULATION IN METROPOLITAN AREA

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

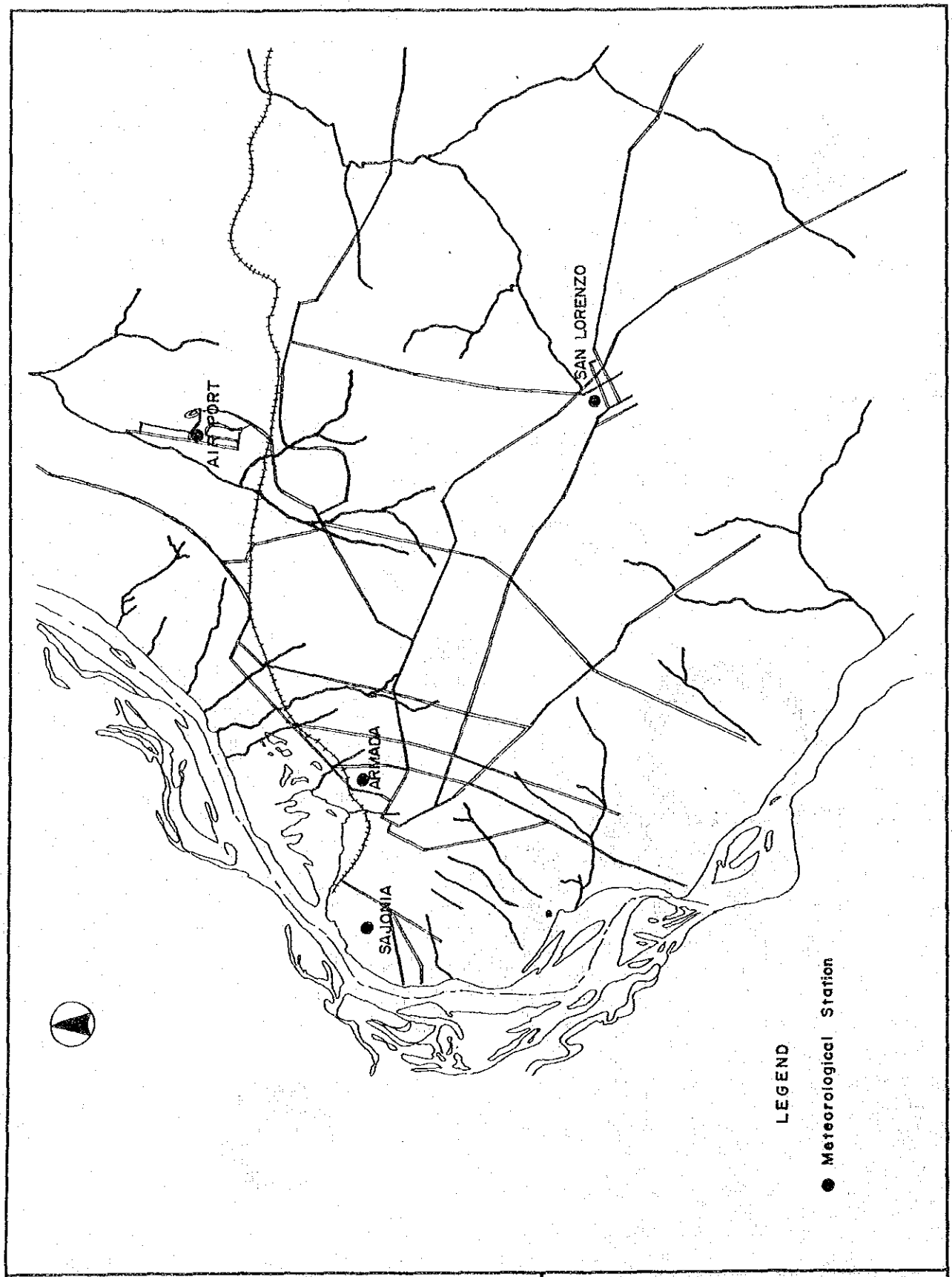


Fig. 2-5 LOCATION OF METEOROLOGICAL STATIONS

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

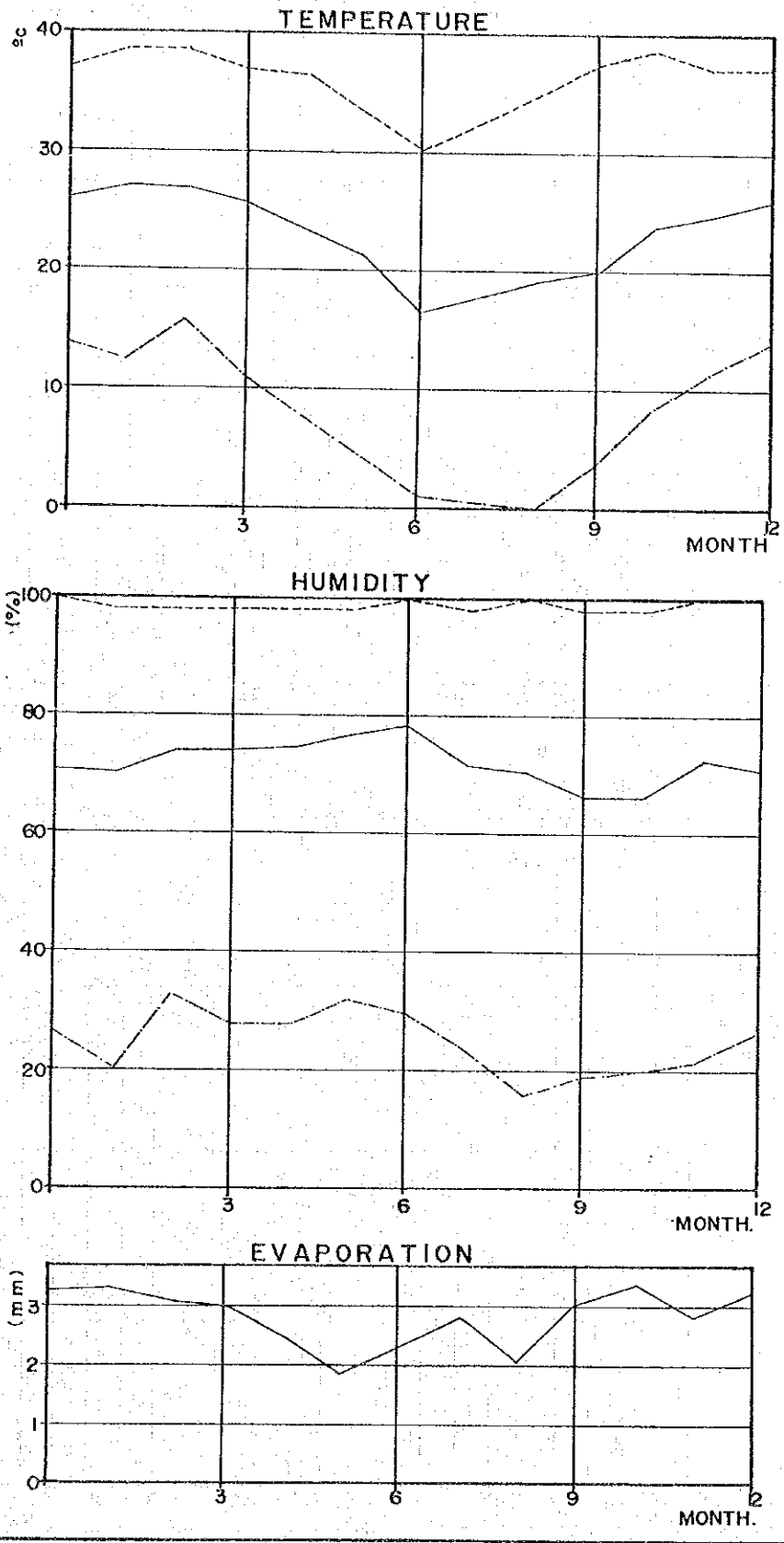
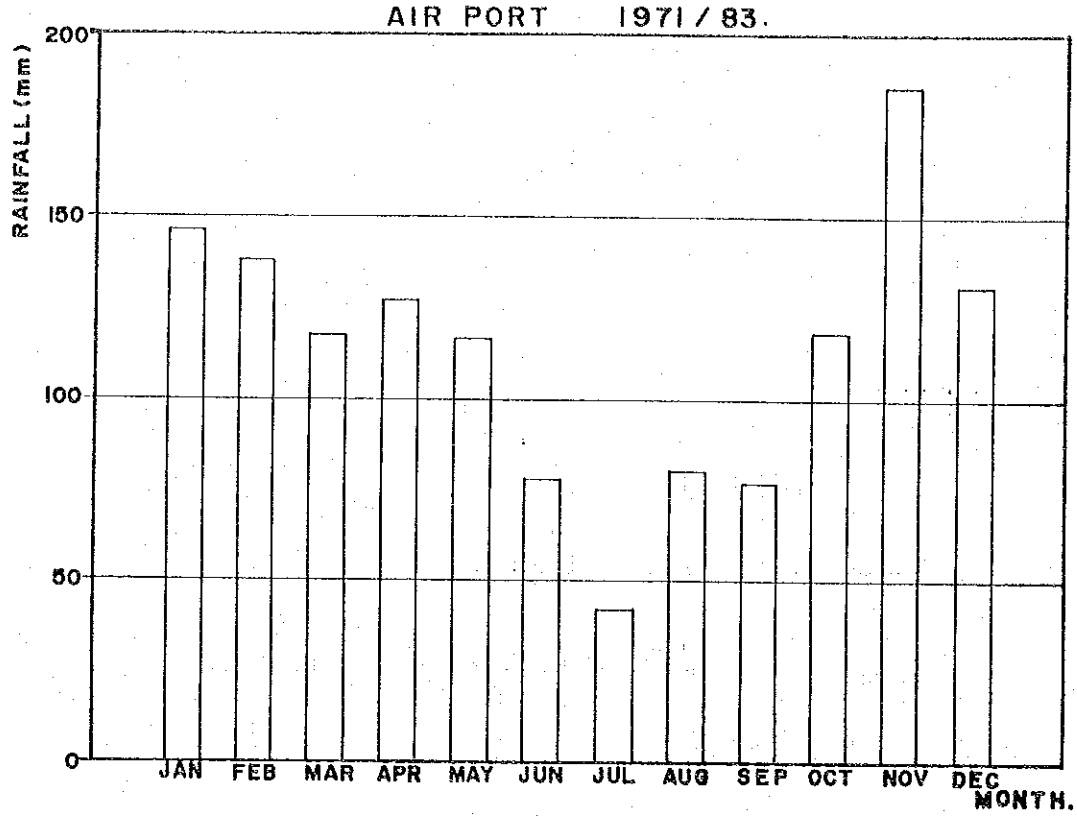


Fig. 2-6 TEMPERATURE, HUMIDITY AND EVAPORATION

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY



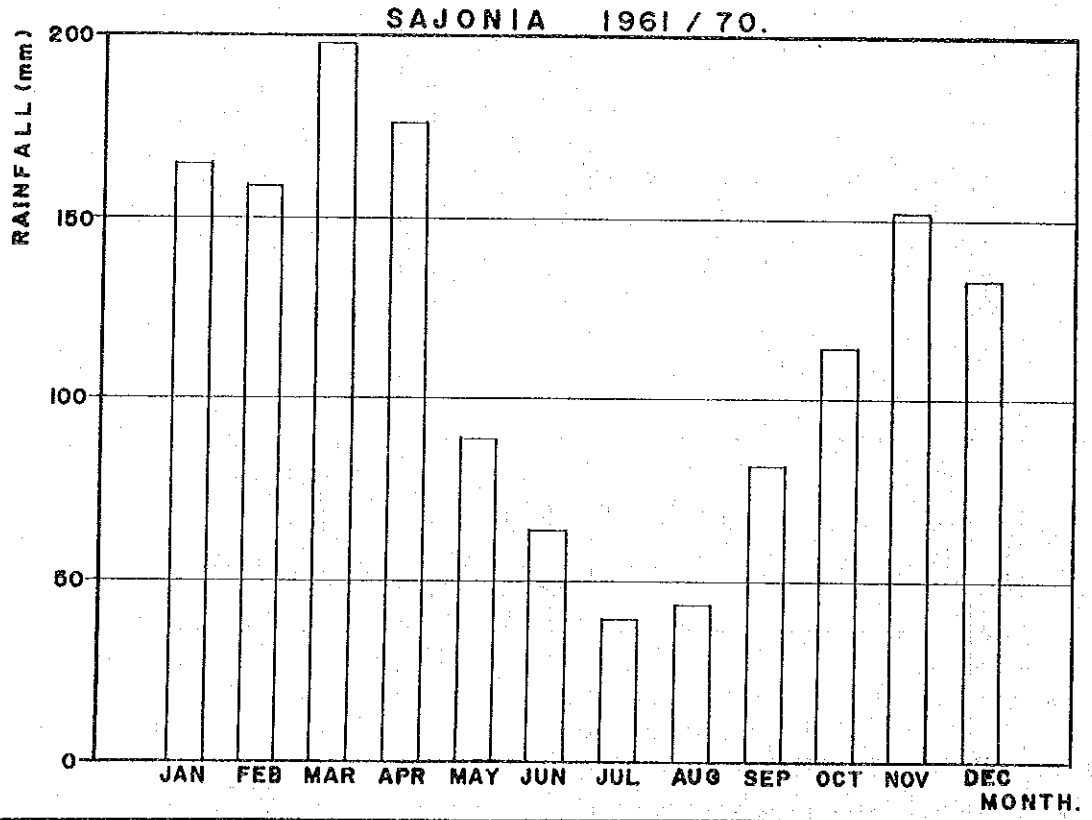


Fig. 2-7 MEAN MONTHLY RAINFALL

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

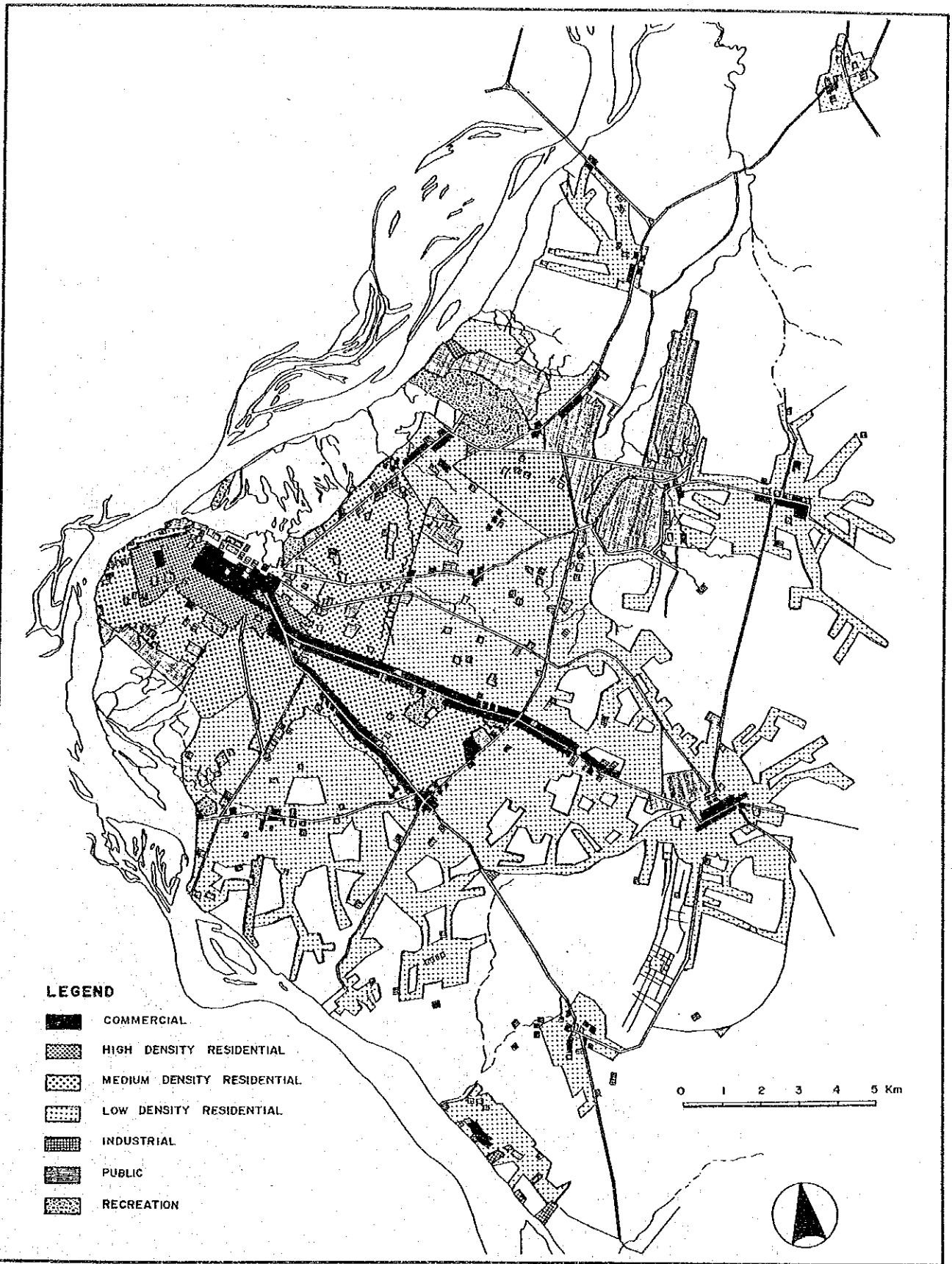


Fig. 2-8 PRESENT LAND USE

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

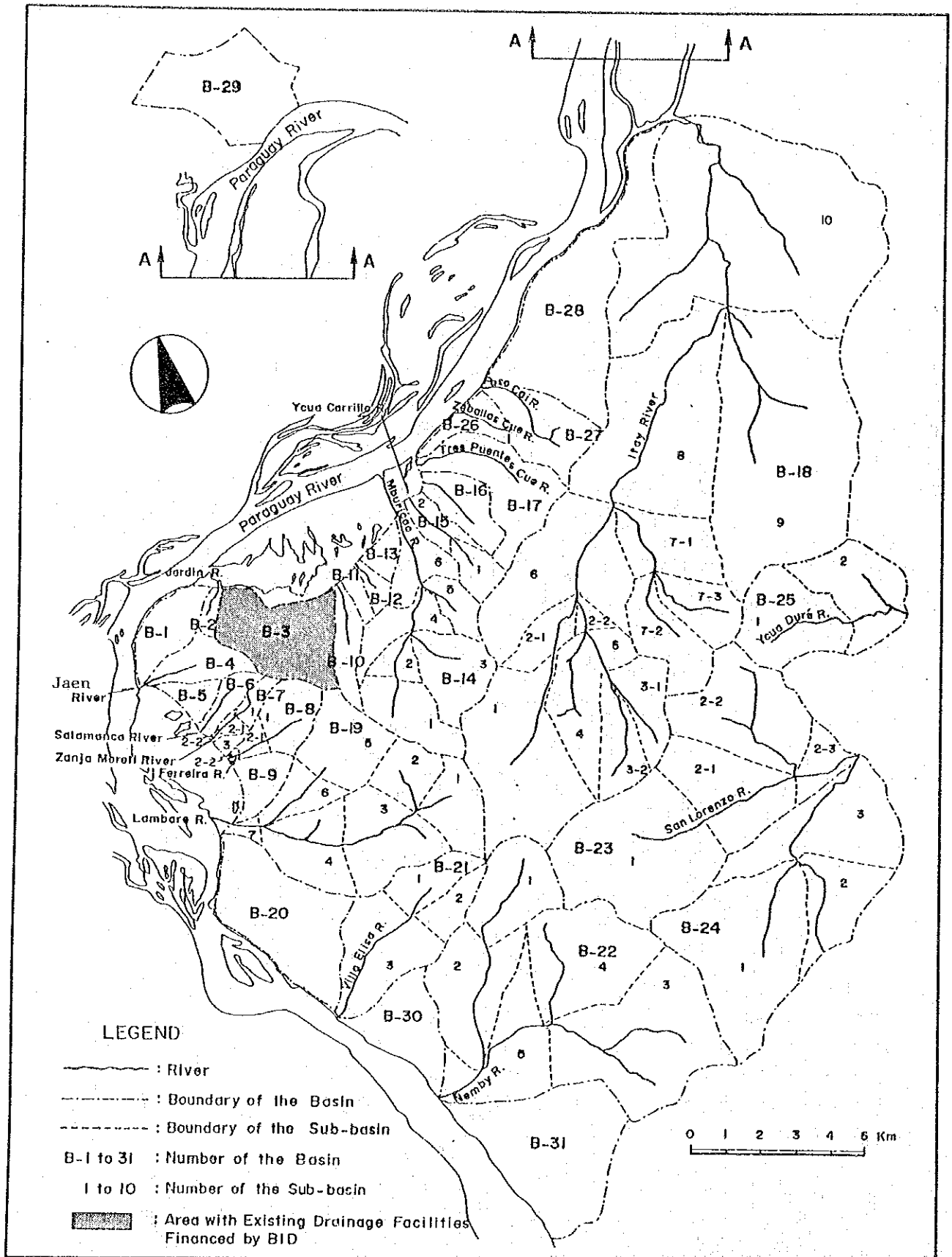


Fig. 3-1 STUDY AREA AND ITS DIVIDED BASIN

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

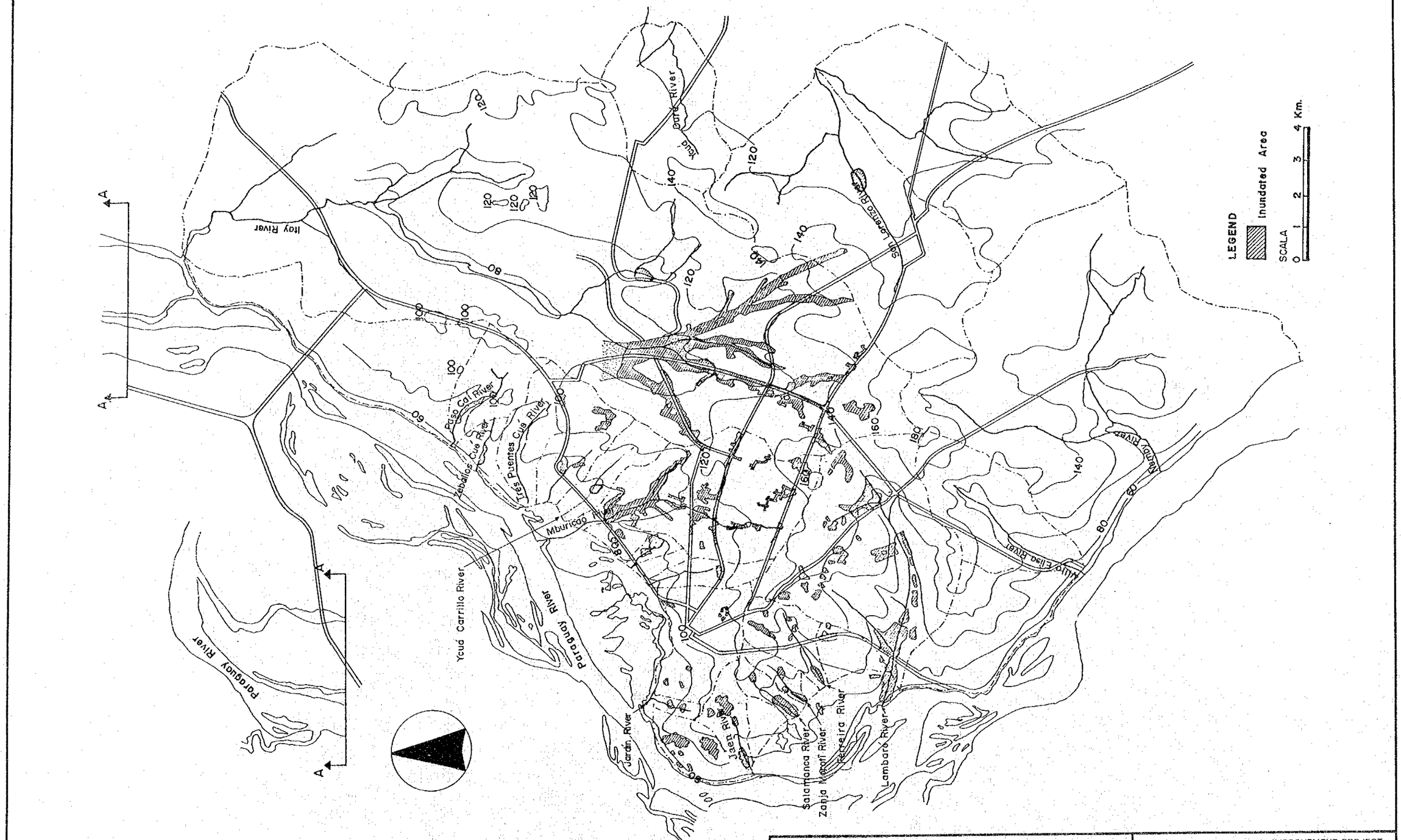


Fig. 3-2 RECORDED MAXIMUM FLOODED AREA IN STUDY AREA

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

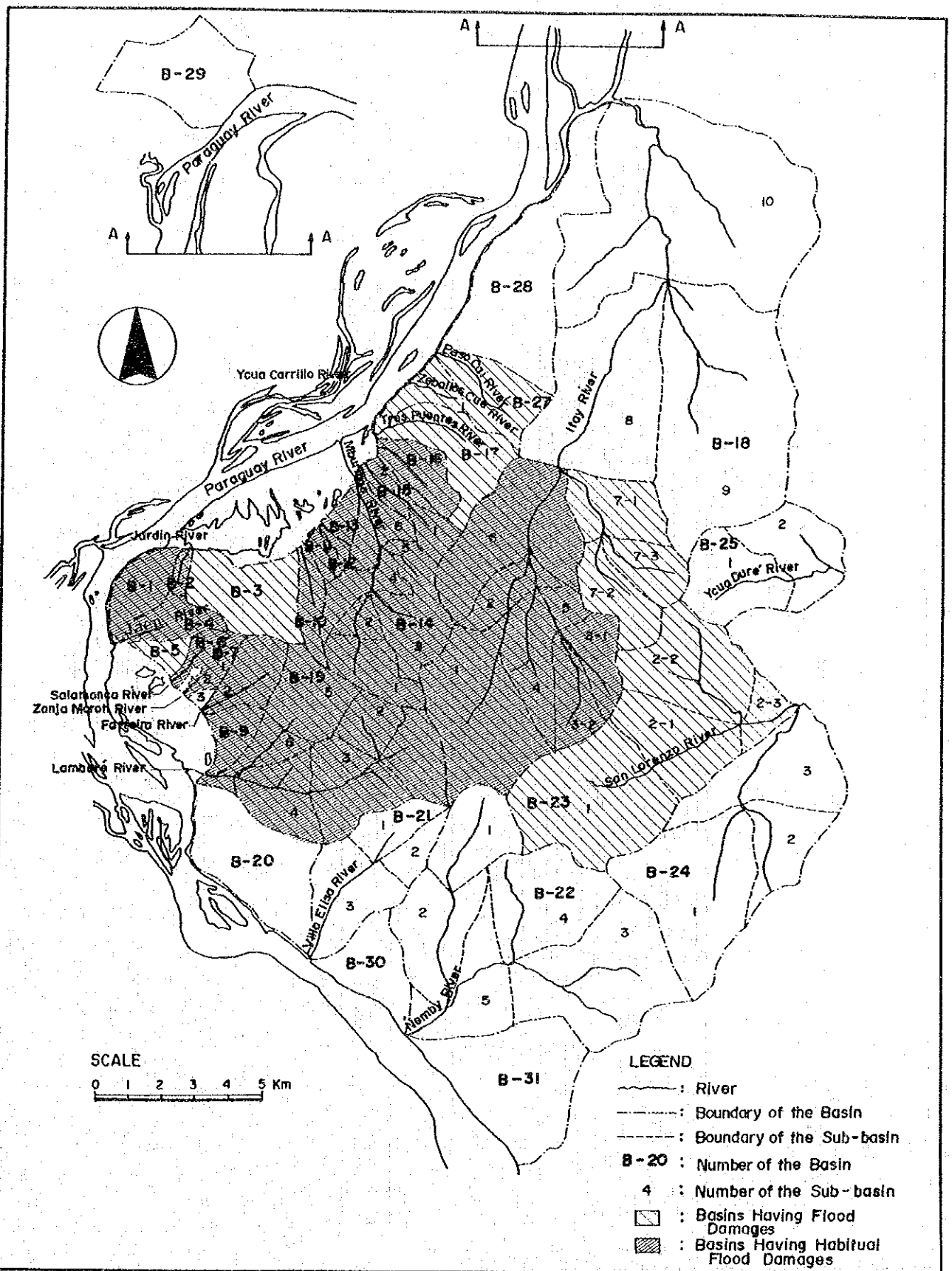


Fig. 3-3 DEGREE OF FLOOD DAMAGE PER BASIN

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

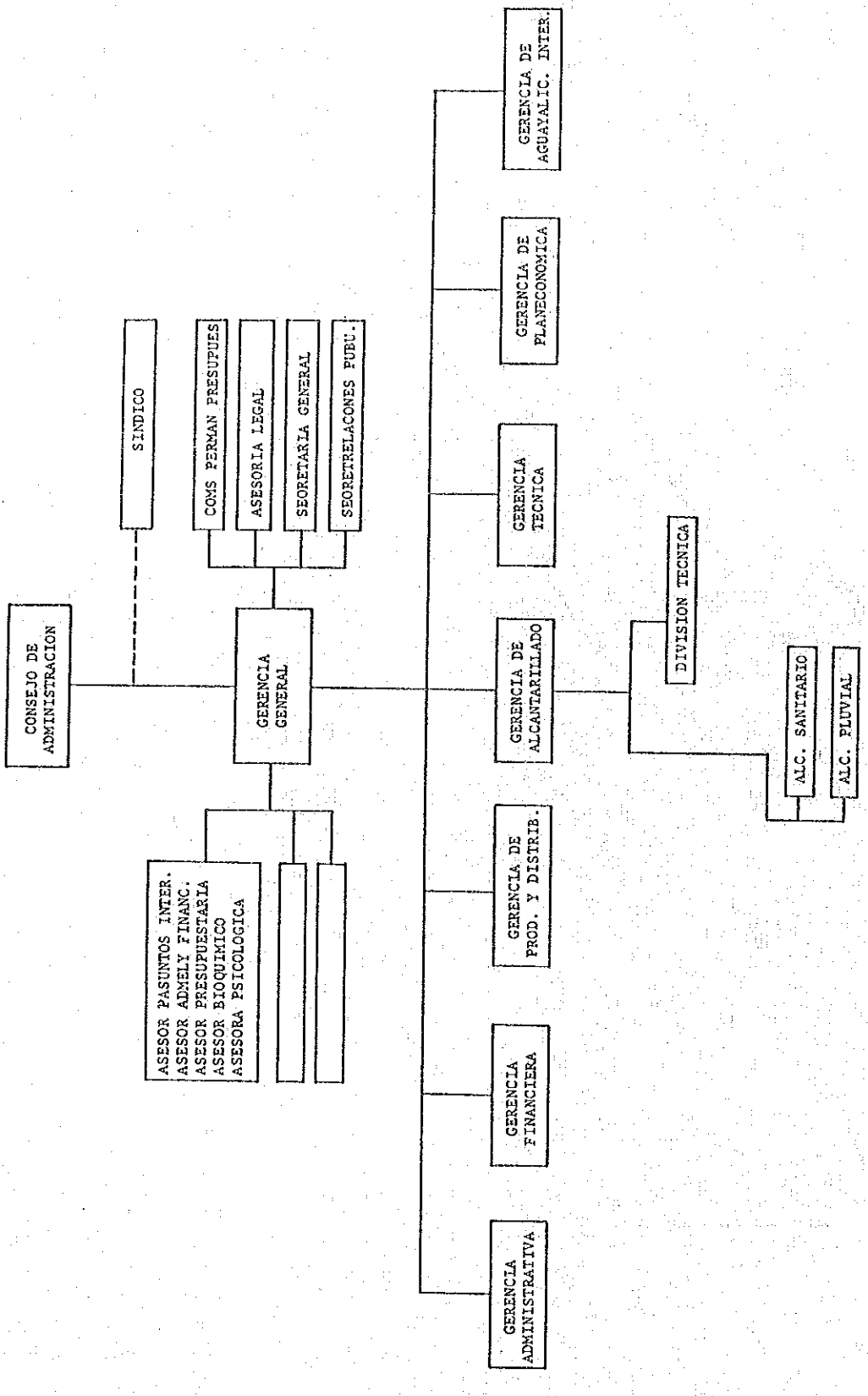


Fig. 3-4 ORGANIZATION OF CORPOSANA

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

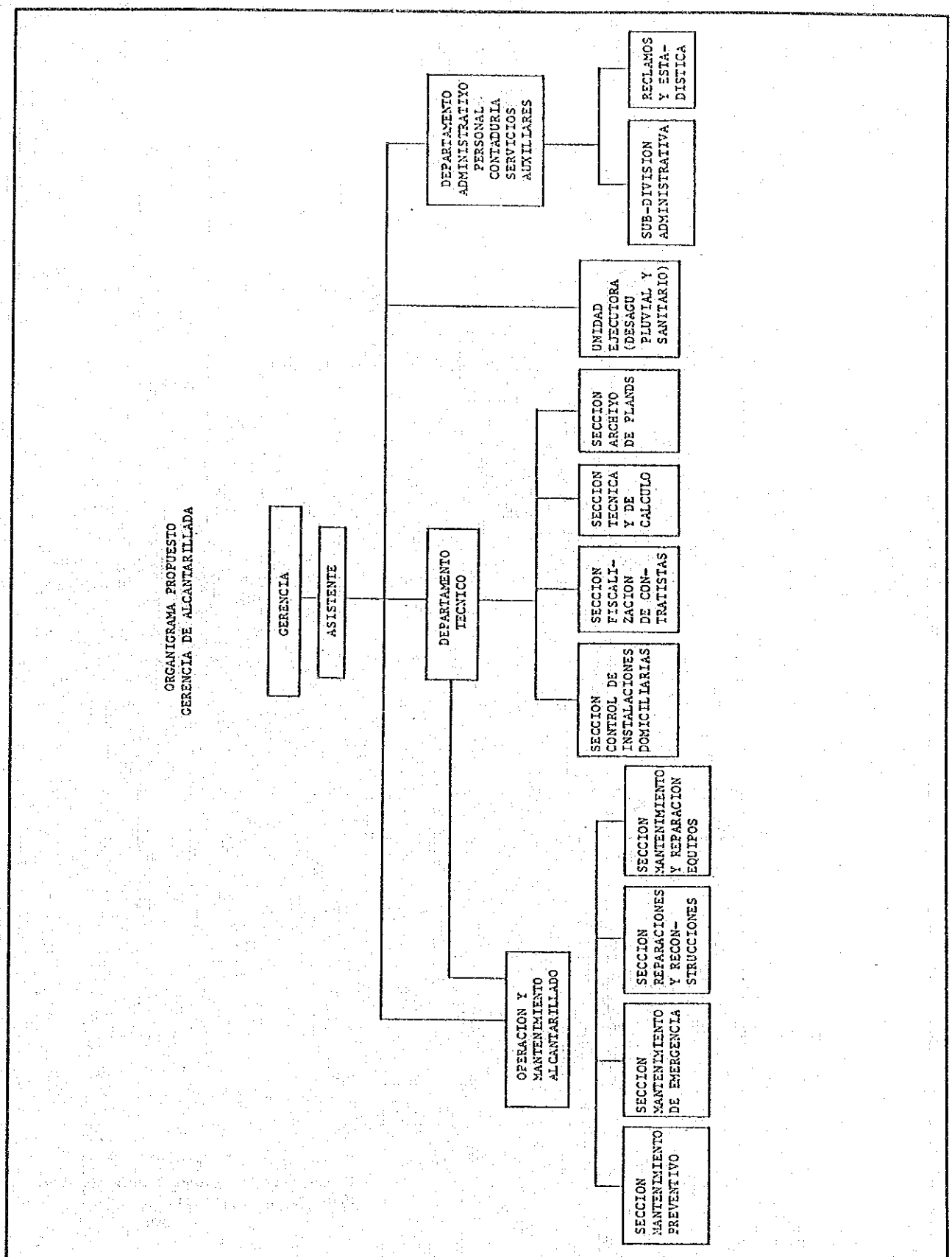


Fig. 3-5 ORGANIZATION OF THE SEWERAGE DIVISION OF CORPOSANA

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

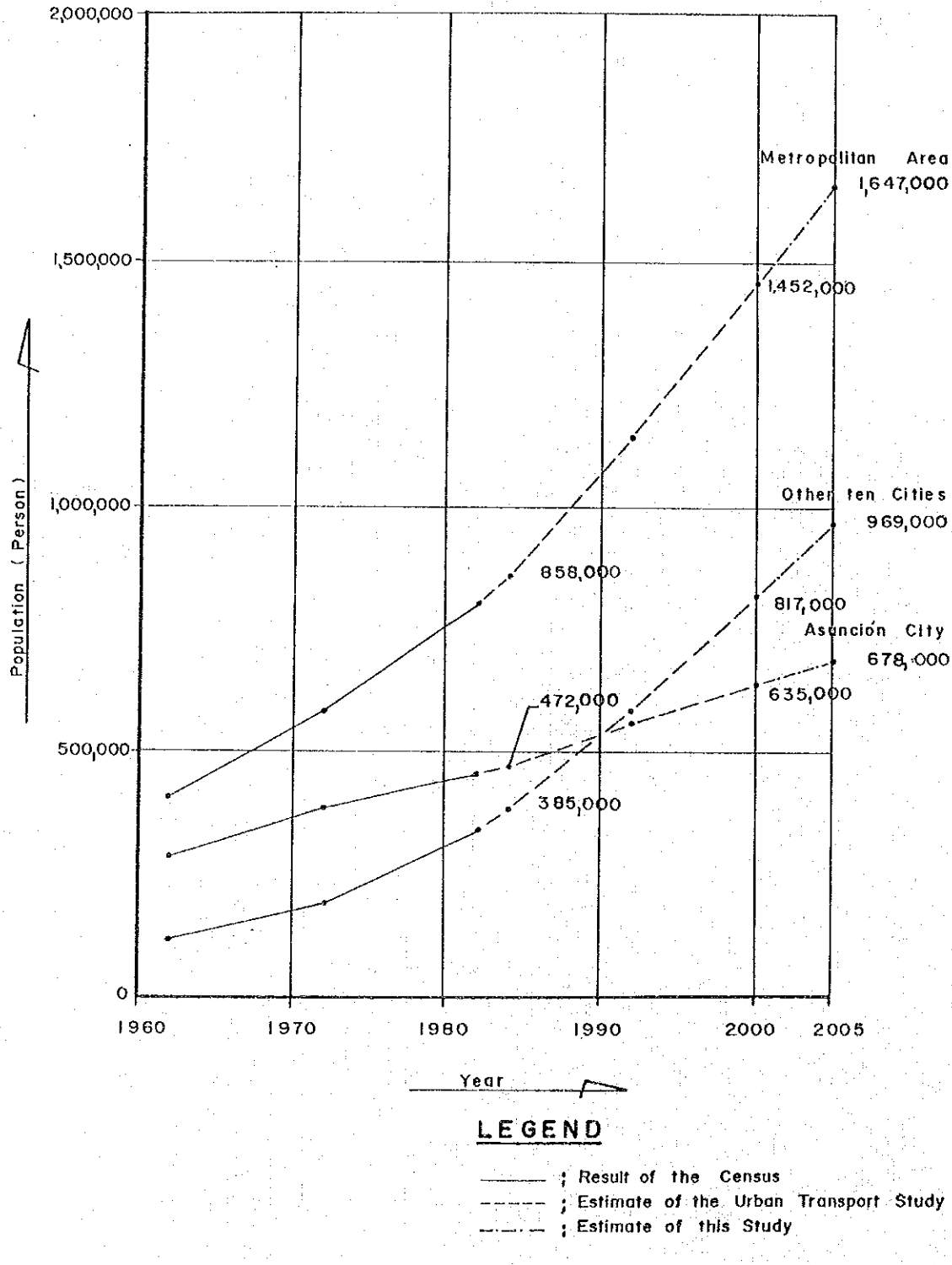


Fig. 5-1 EXPECTED POPULATION GROWTH

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

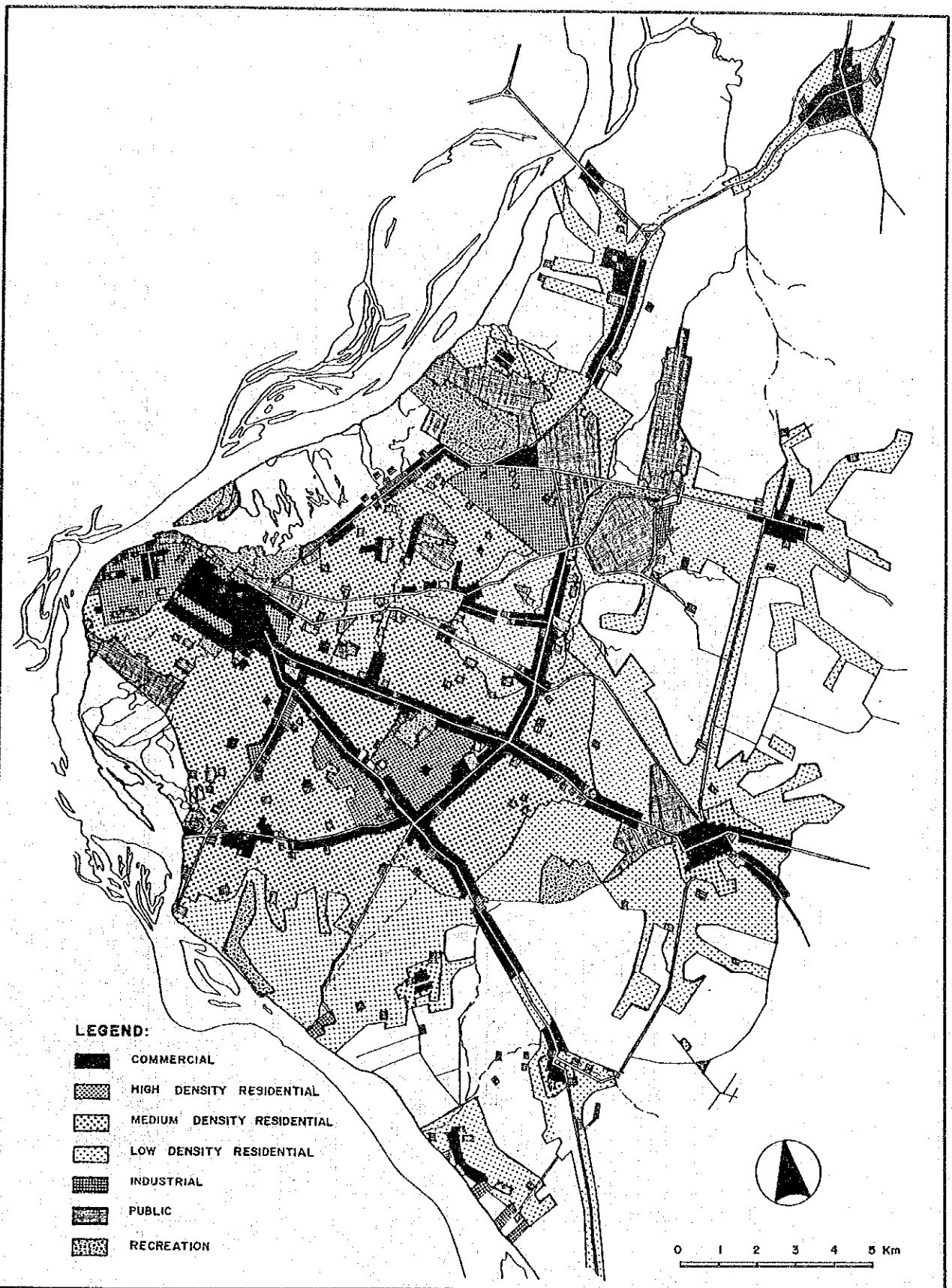


Fig. 5-2 FUTURE LAND USE OF YEAR 2000

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

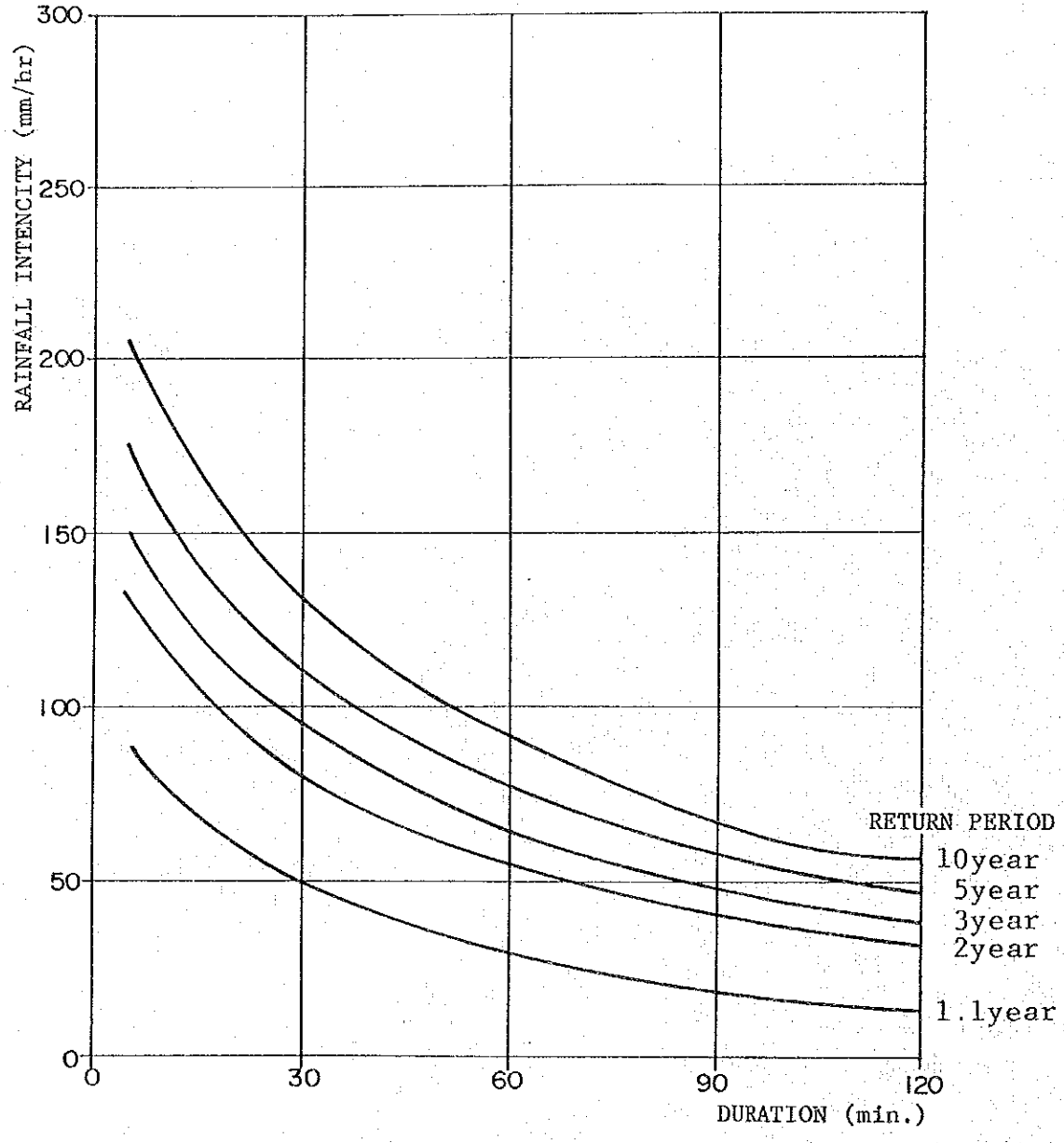
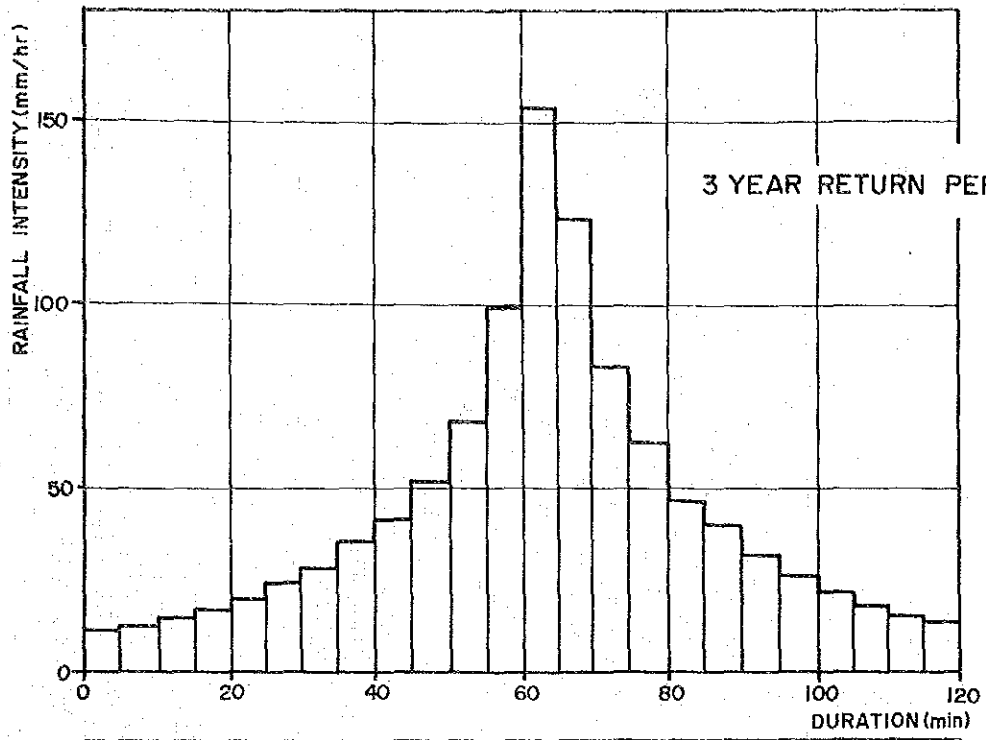


Fig. 5-3 RAINFALL INTENSITY-DURATION CURVE

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



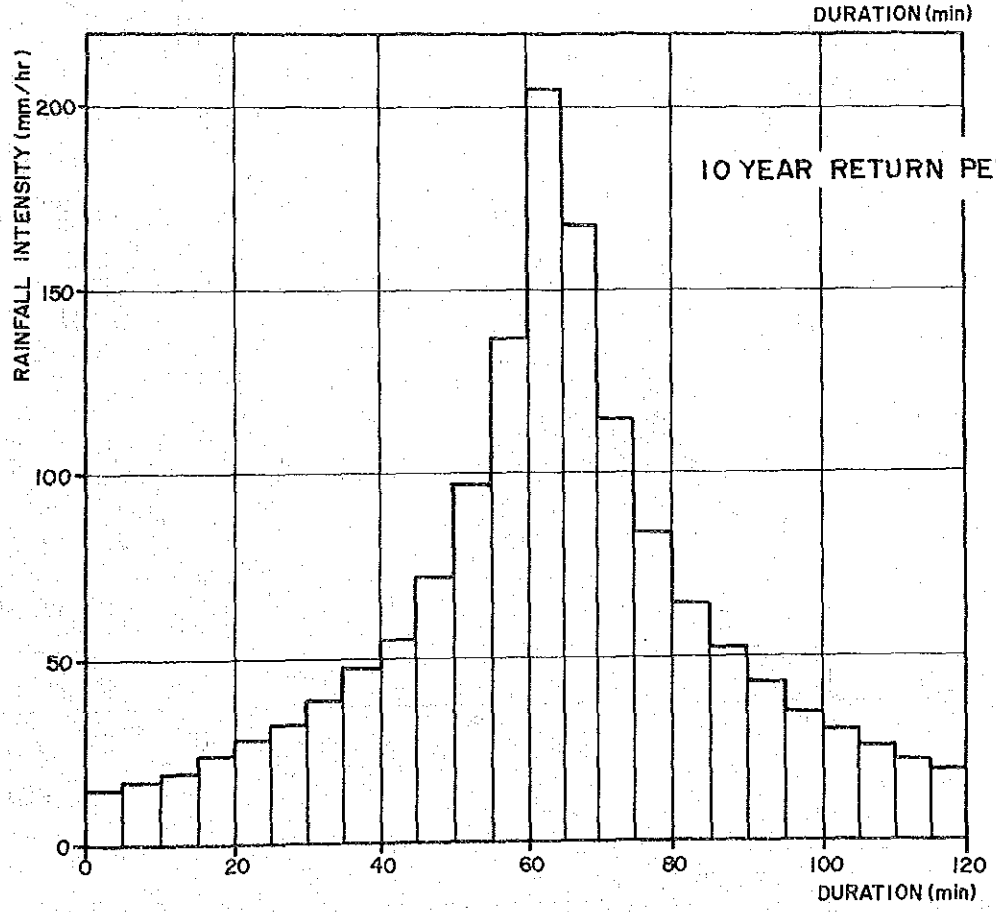


Fig. 5-4 MODEL HYETOGRAPH

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

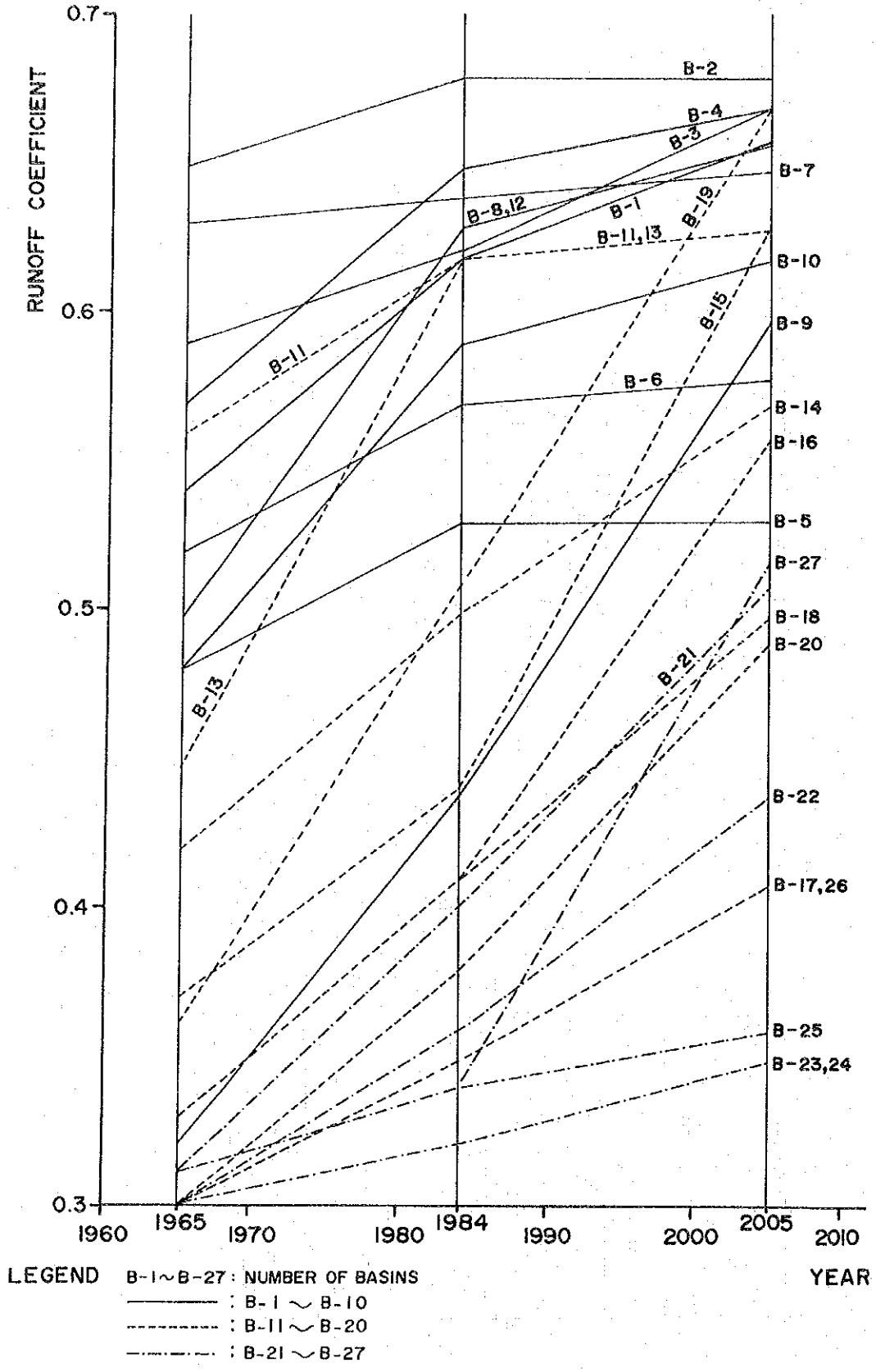


Fig. 5-5 INCREMENT OF RUNOFF COEFFICIENT FOR EACH BASIN

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

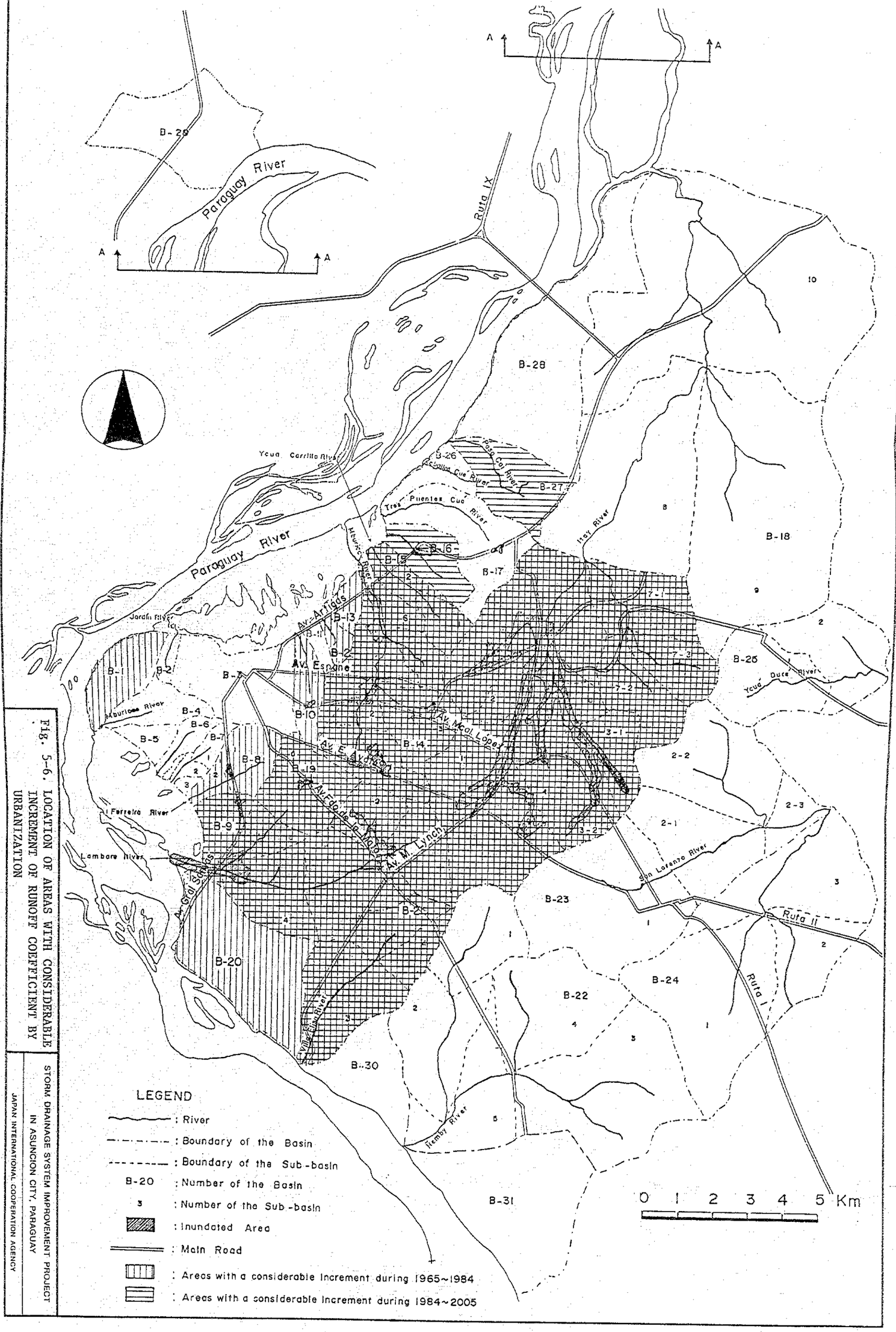
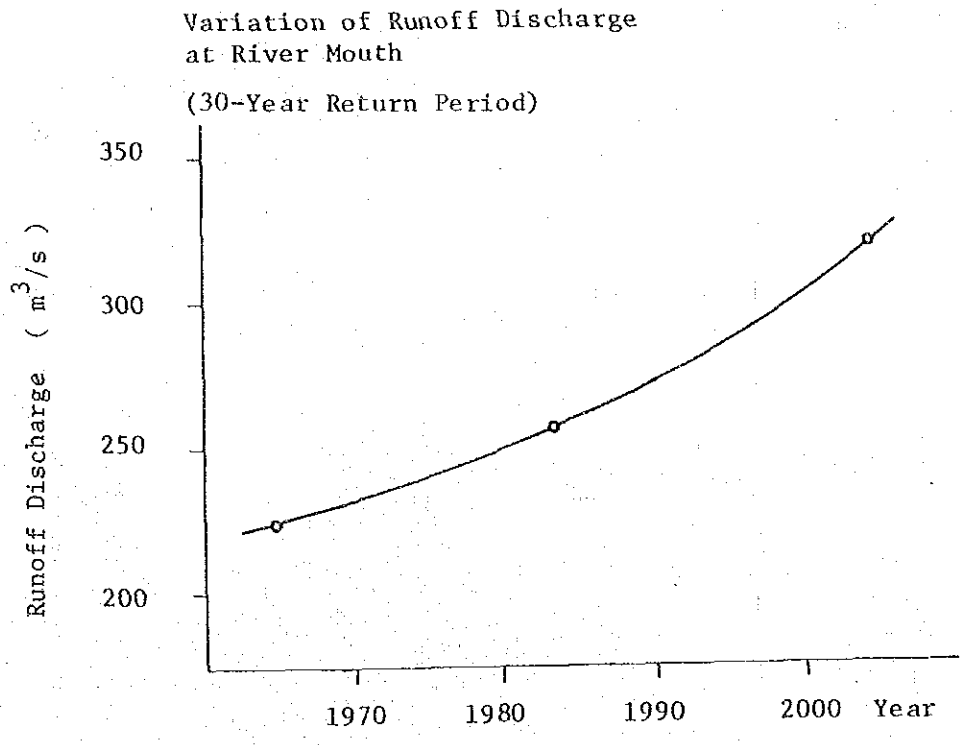


Fig. 5-6. LOCATION OF AREAS WITH CONSIDERABLE INCREMENT OF RUNOFF COEFFICIENT BY URBANIZATION

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY



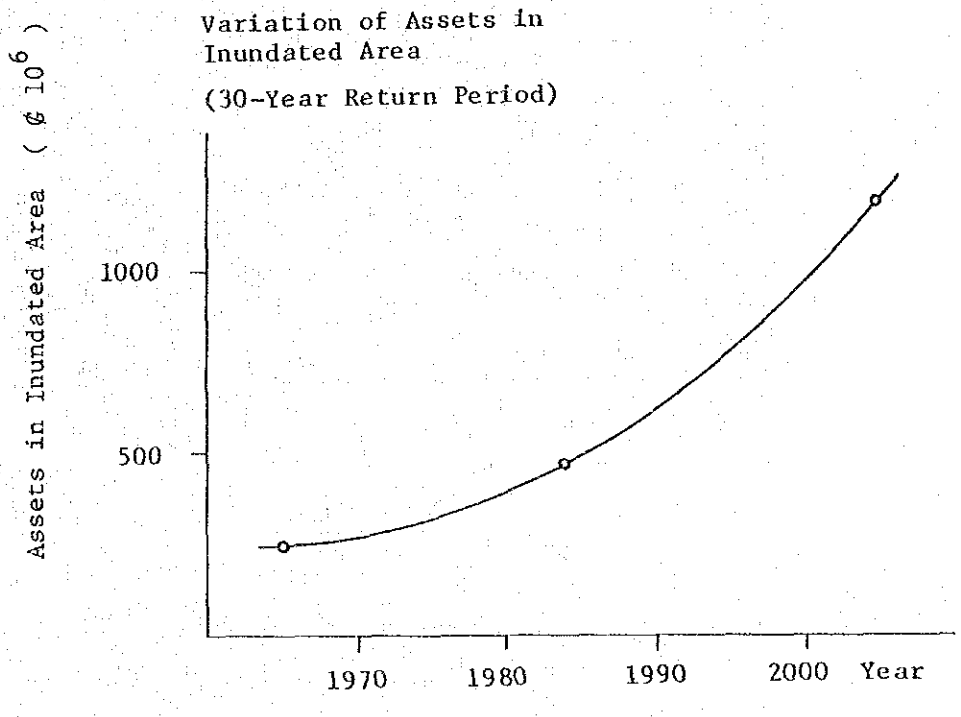


Fig. 5-7 INCREMENT OF RUNOFF DISCHARGE AND ASSETS (MBURICAO RIVER BASIN)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

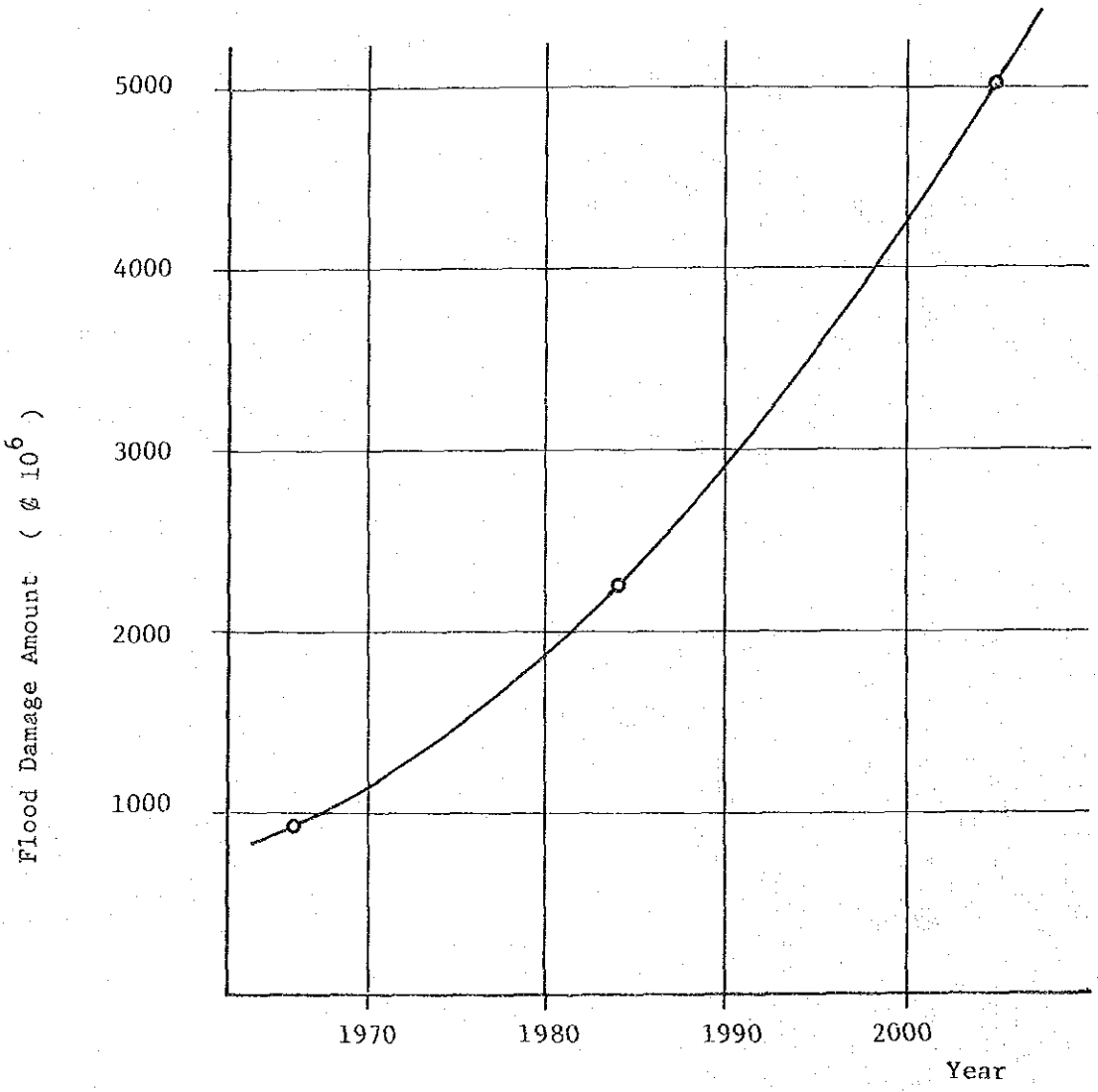


Fig. 5-8 TOTAL FLOOD DAMAGE AMOUNT IN PLANNING AREA

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

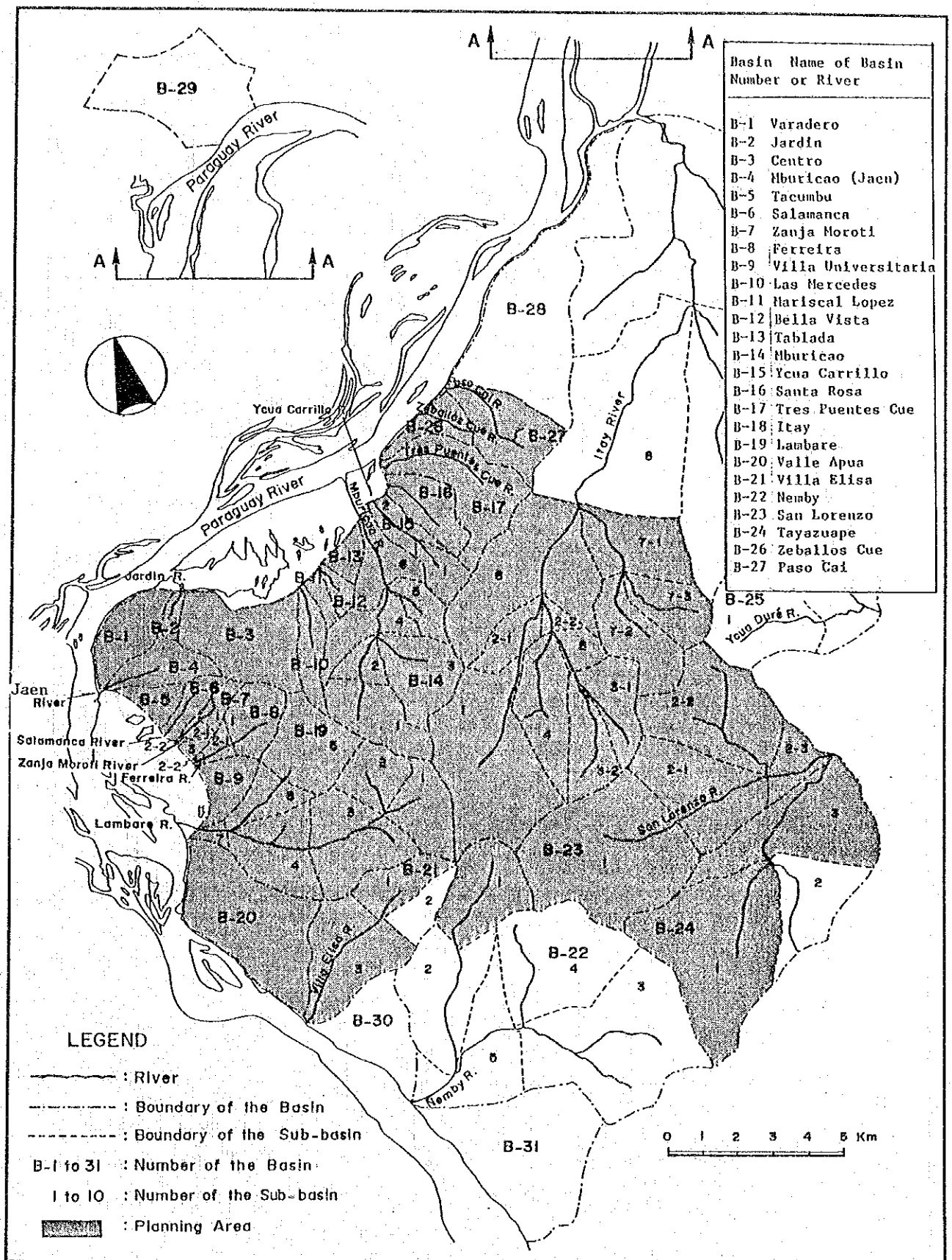
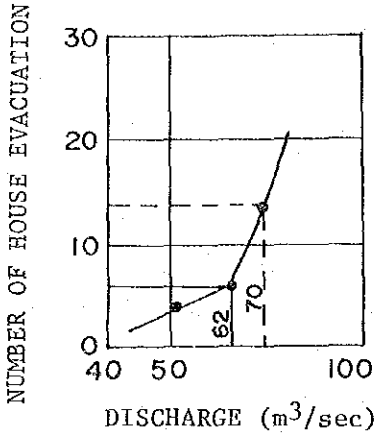


Fig. 6-1 PLANNING AREA

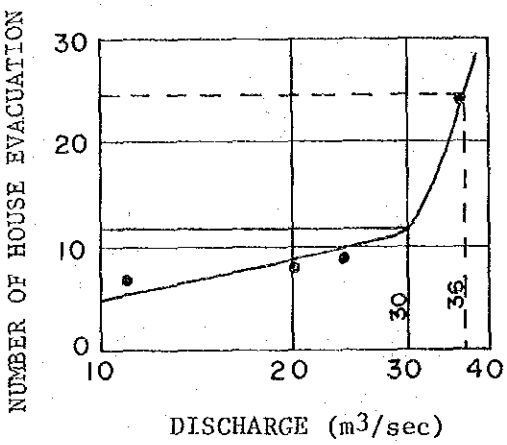
STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

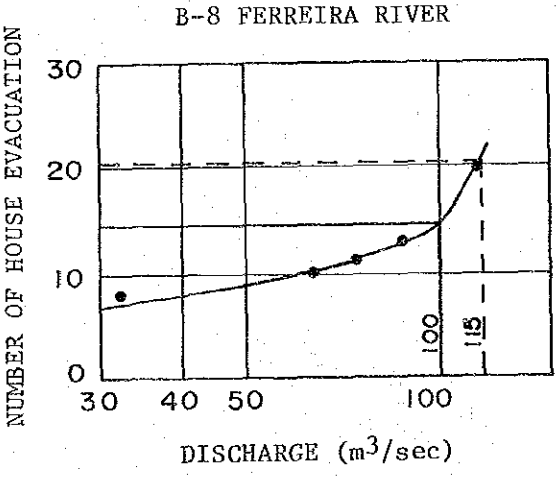
B-4 JAEN RIVER



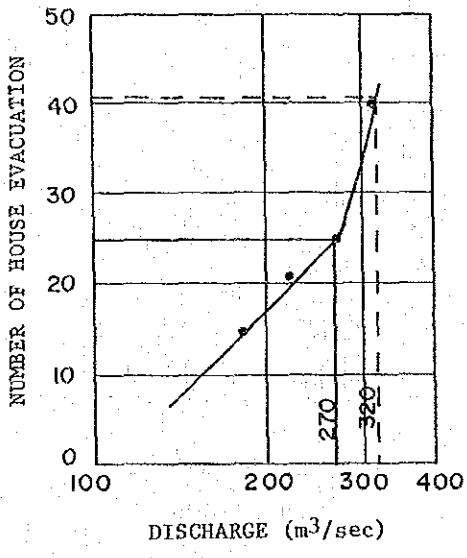
B-7 ZANJA MOROTI RIVER



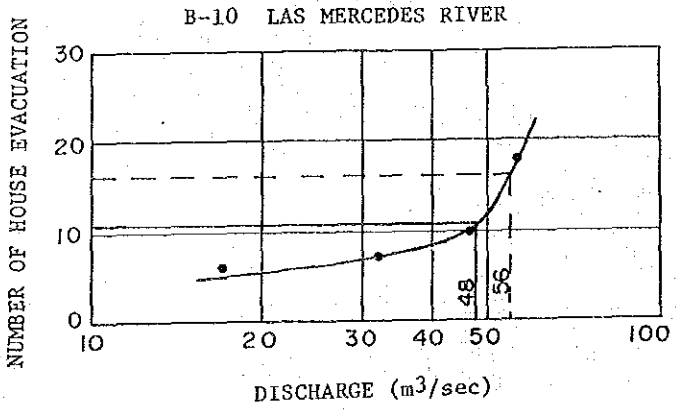
B-8 FERREIRA RIVER



B-14 MBURICAO RIVER



B-10 LAS MERCEDES RIVER



LEGEND

——— : DESIGN DISCHARGE FOR OPTIMUM PLAN

- - - - : DESIGN DISCHARGE FOR CASE I

Fig. 6-2(1/2) DISCHARGE AND NUMBER OF HOUSE EVACUATION

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

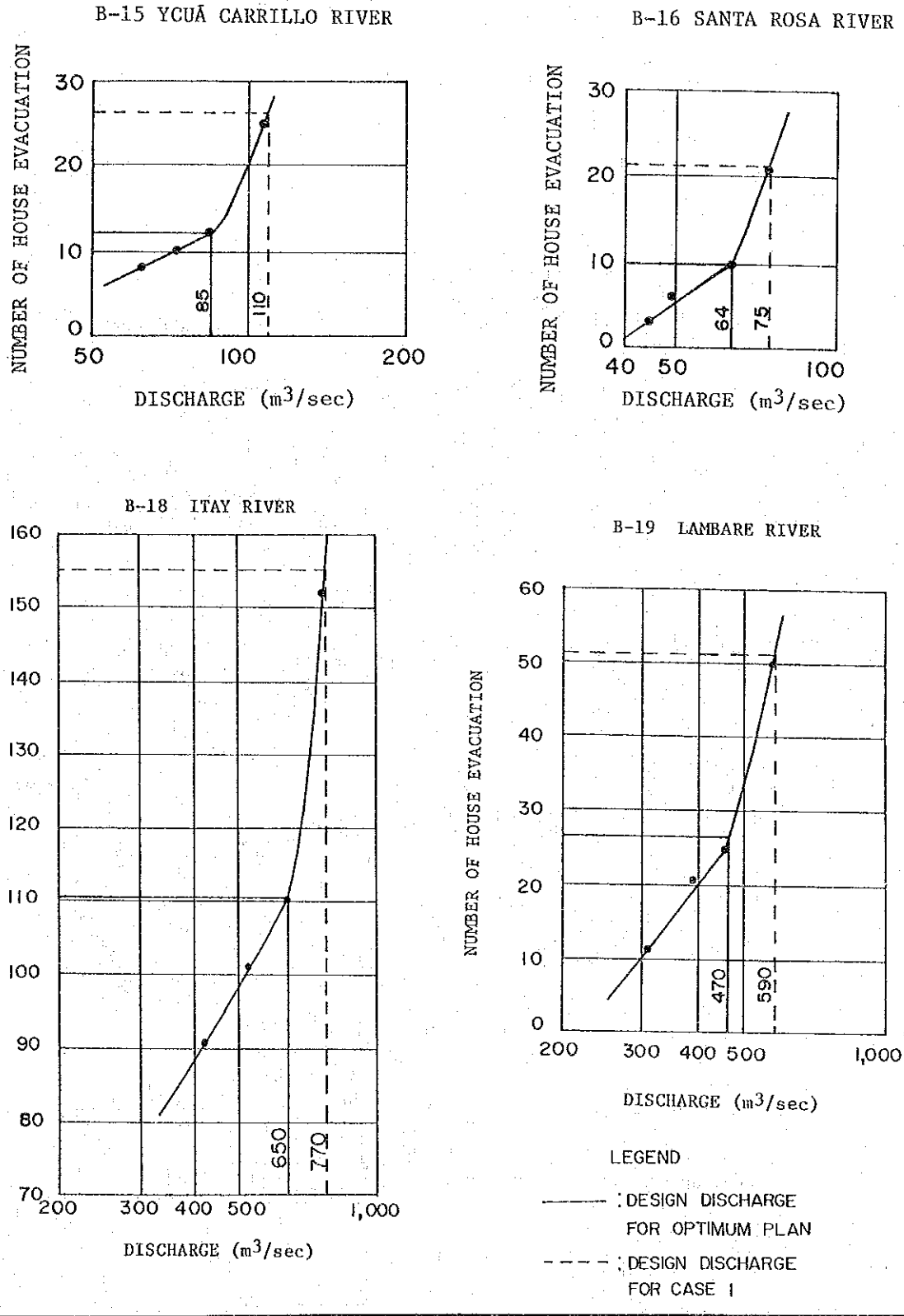


Fig. 6-2(2/2) DISCHARGE AND NUMBER OF HOUSE EVACUATION

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

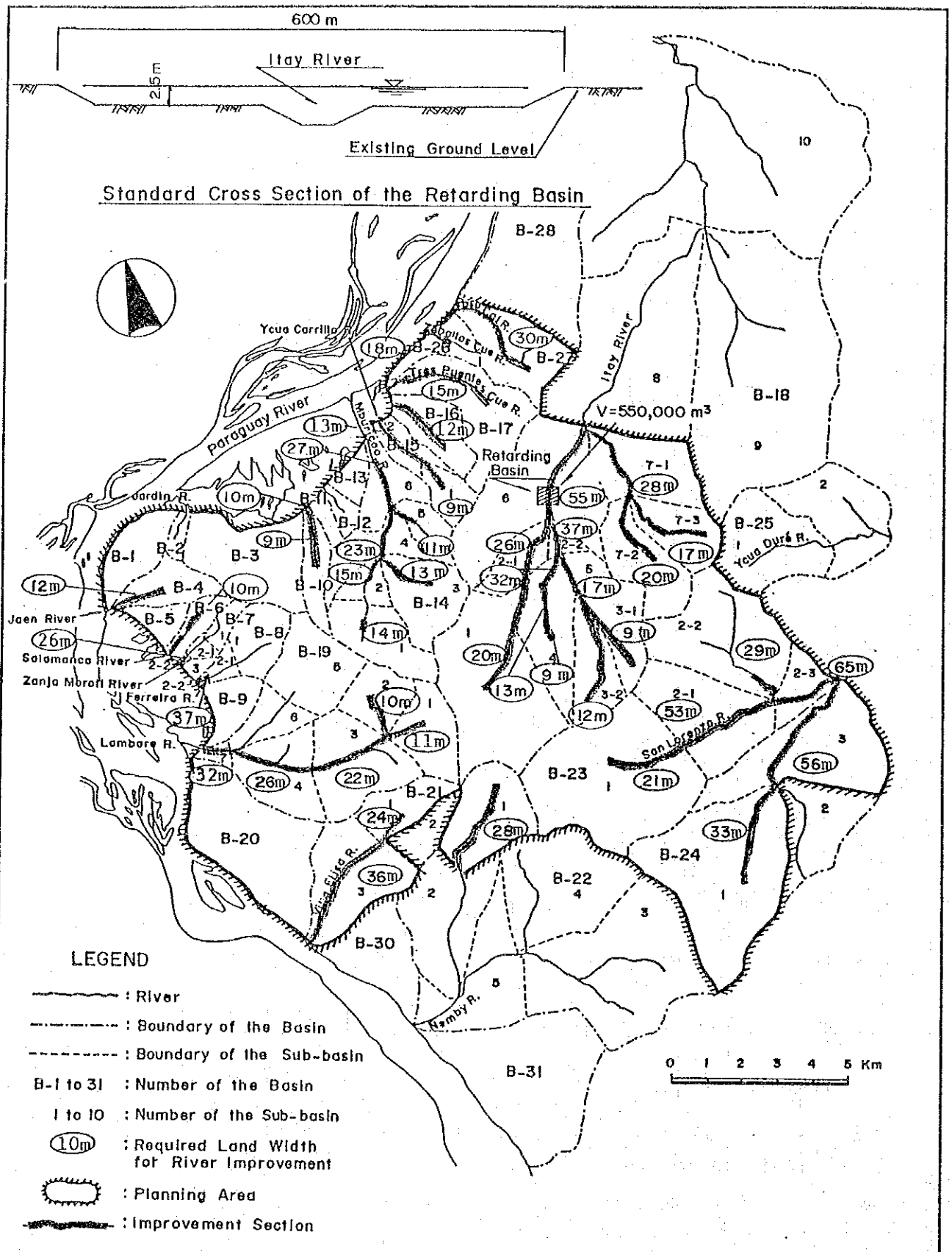
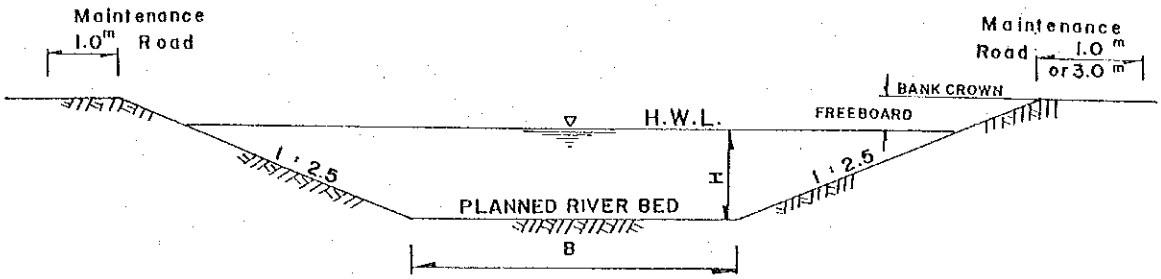


Fig. 6-3 REQUIRED WIDTH OF RIVER CHANNEL FOR BASIC PLAN

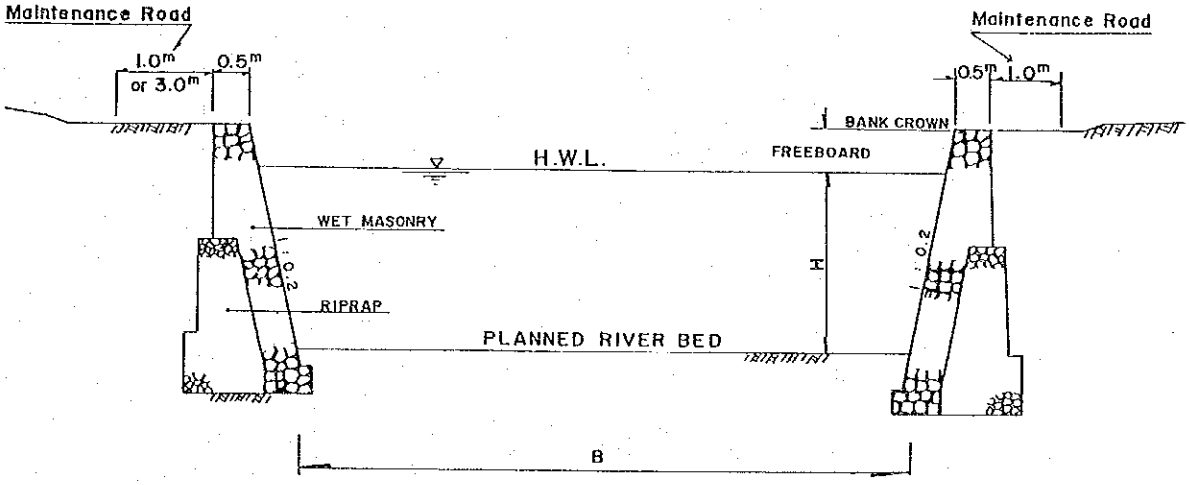
STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

Channel without Revetment (TYPE A)



Channel with Revetment and without Invert (TYPE B)



Channel with Revetment and Invert (TYPE C)

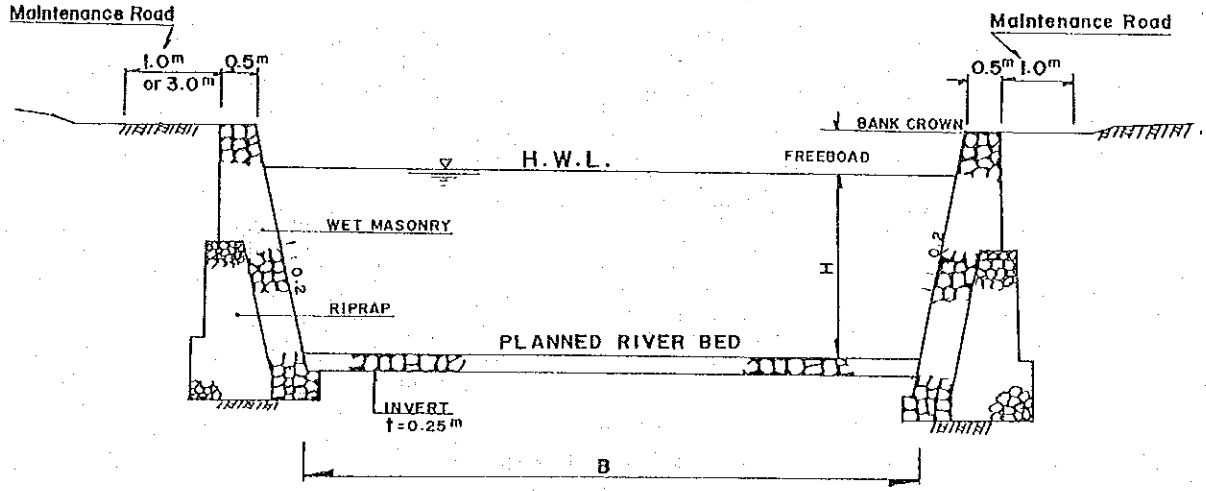
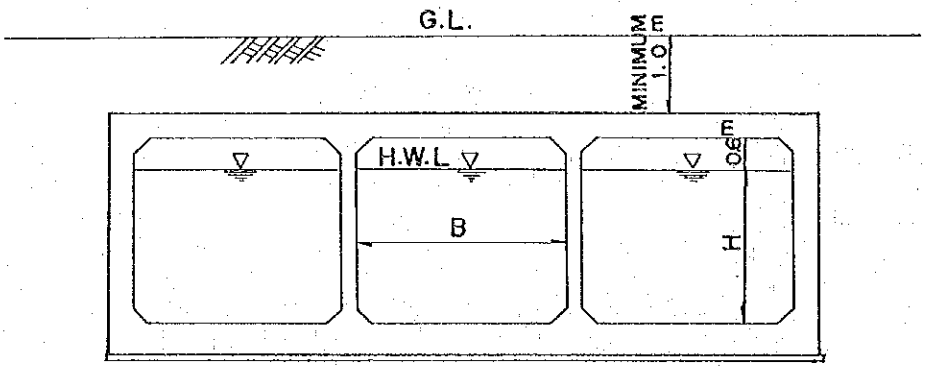


Fig. 6-4(1/2) STANDARD DRAWING OF RIVER CROSS SECTION

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

Box Culvert (TYPE D)



Channel with Embankment (TYPE E)

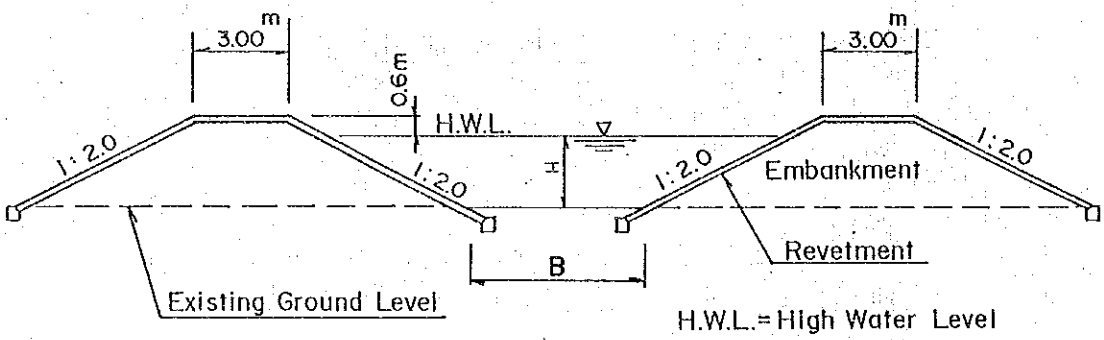
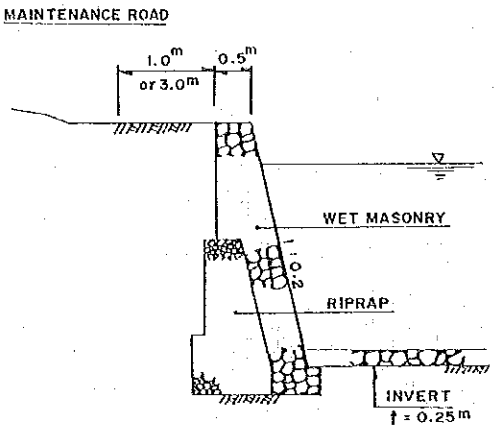


Fig. 6-4(2/2) STANDARD DRAWING OF RIVER CROSS SECTION

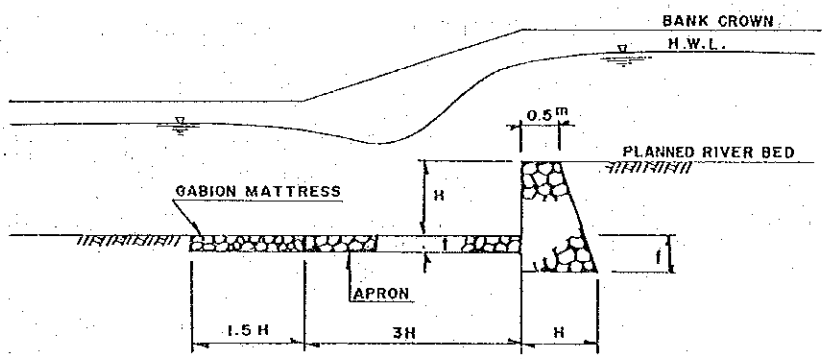
STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

REVETMENT



GROUNDSILL WITH HEAD



BRIDGE

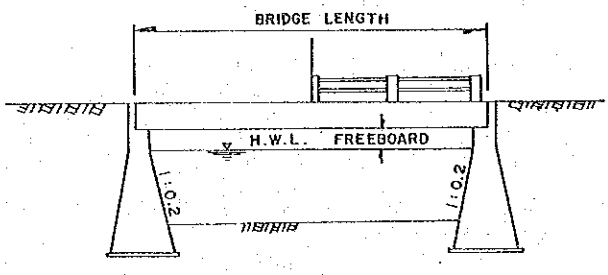


Fig. 6-5 STANDARD DRAWING OF RIPARIAN STRUCTURES

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

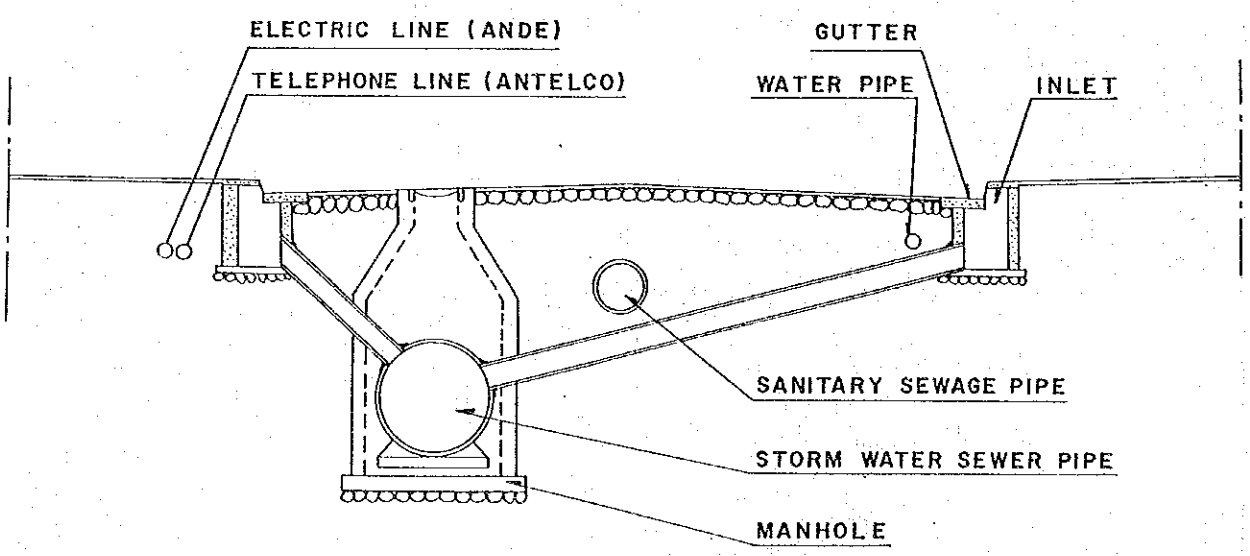
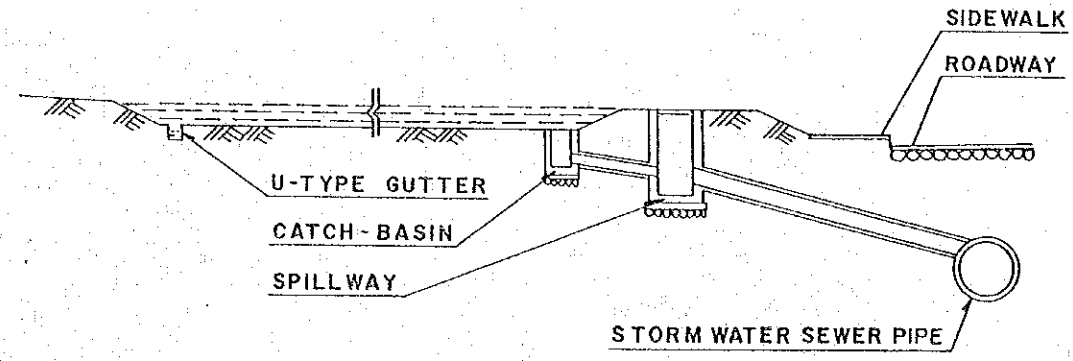


Fig. 6-6 STANDARD DRAWING OF DRAINAGE FACILITIES

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

STORAGE IN PUBLIC COMPOUNDS



STORAGE IN HOUSE LOTS

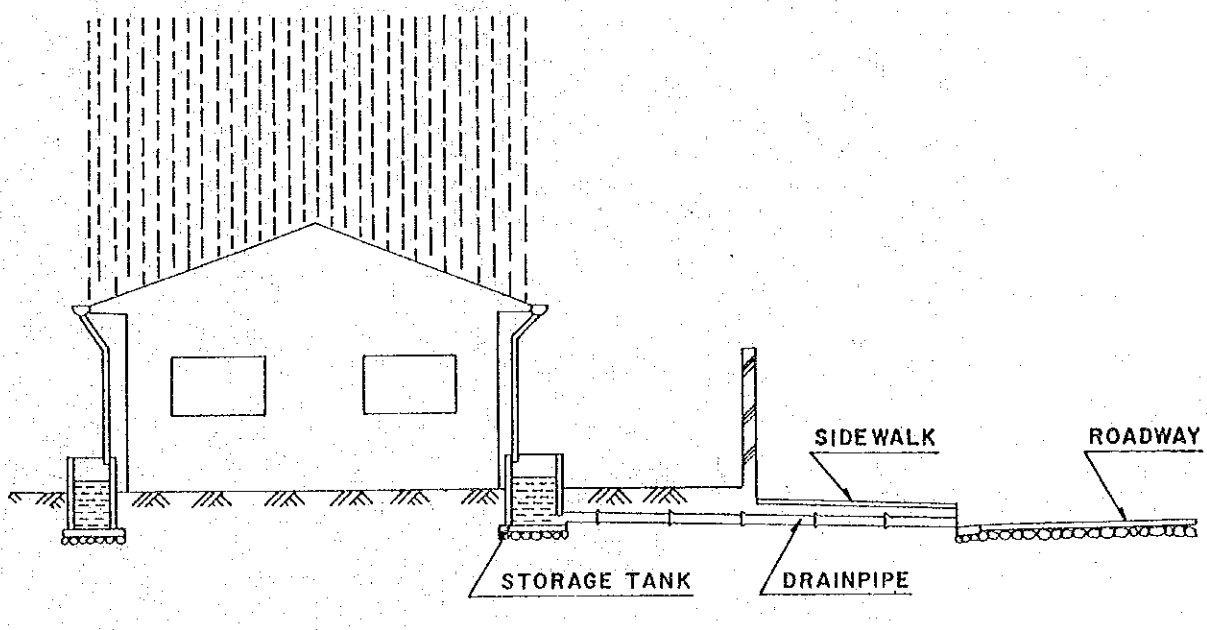


Fig. 6-7 STANDARD DRAWING OF STORAGE FACILITIES

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

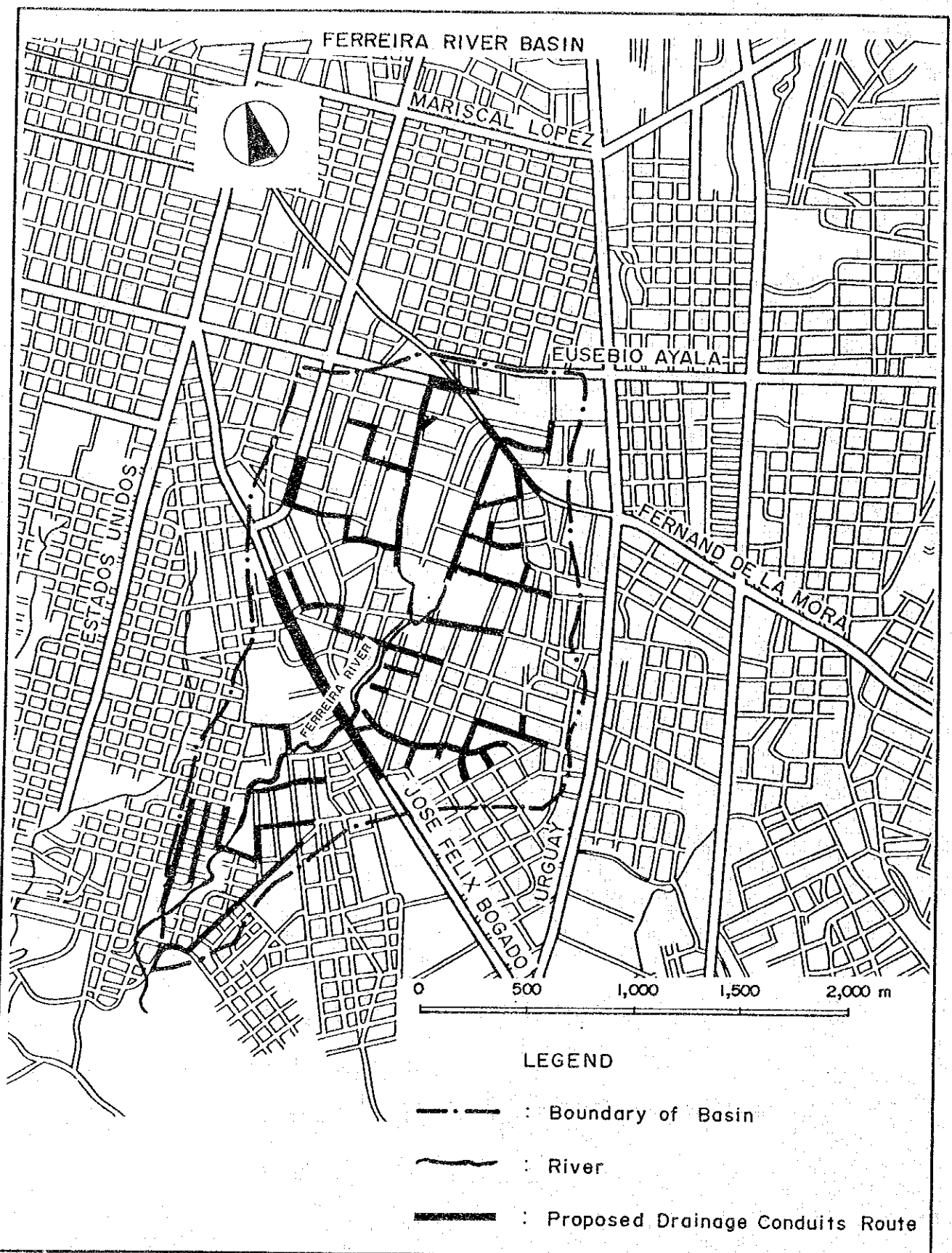


Fig. 7-1(1/2) LAYOUT OF THE DRAINAGE FACILITIES FOR STUDY CASE I FOR MASTER PLAN (FERREIRA RIVER BASIN)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

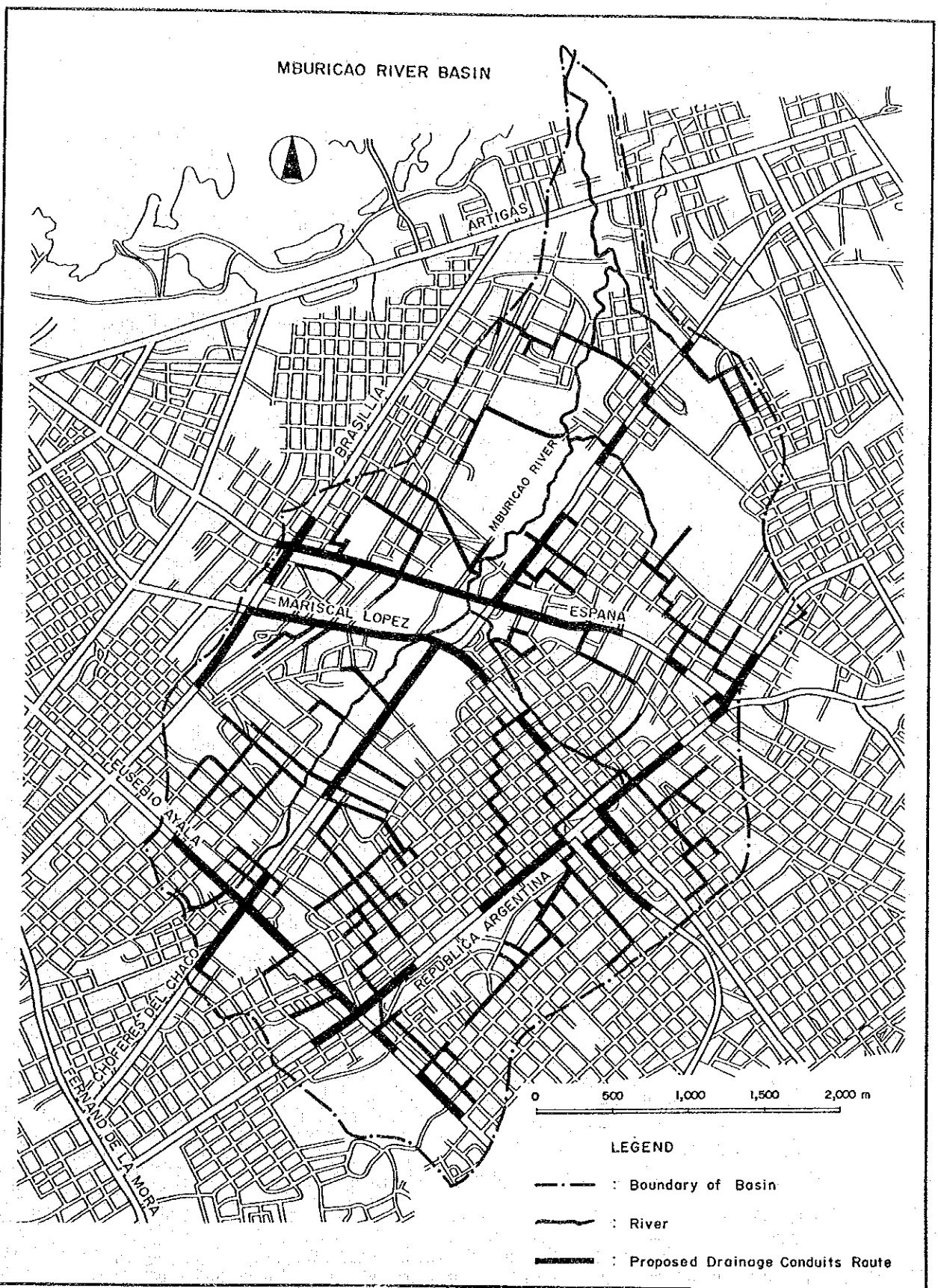


Fig. 7-1(2/2) LAYOUT OF THE DRAINAGE FACILITIES FOR STUDY CASE I FOR MASTER PLAN (MBURICAO RIVER BASIN)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

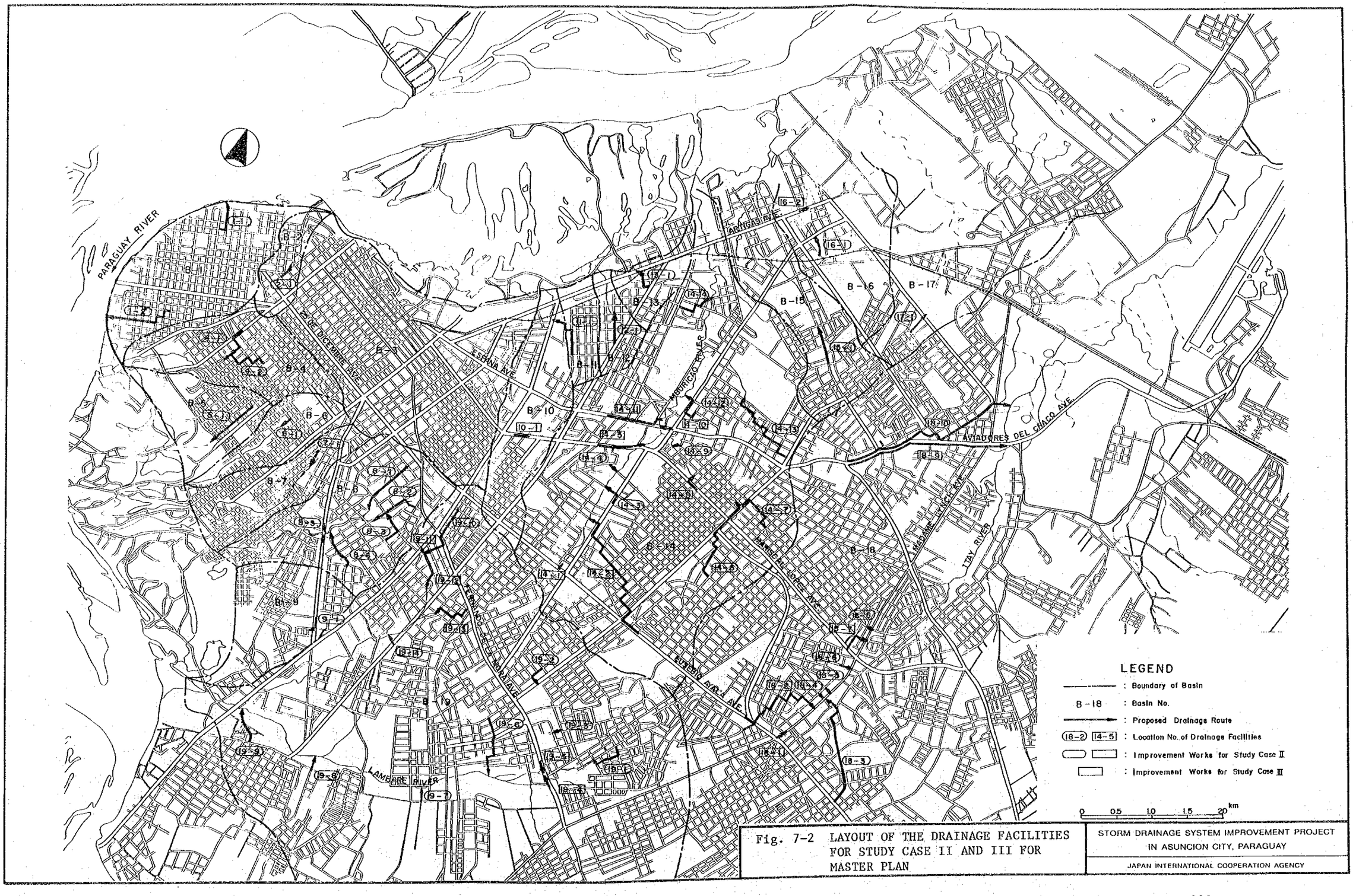


Fig. 7-2 LAYOUT OF THE DRAINAGE FACILITIES FOR STUDY CASE II AND III FOR MASTER PLAN

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

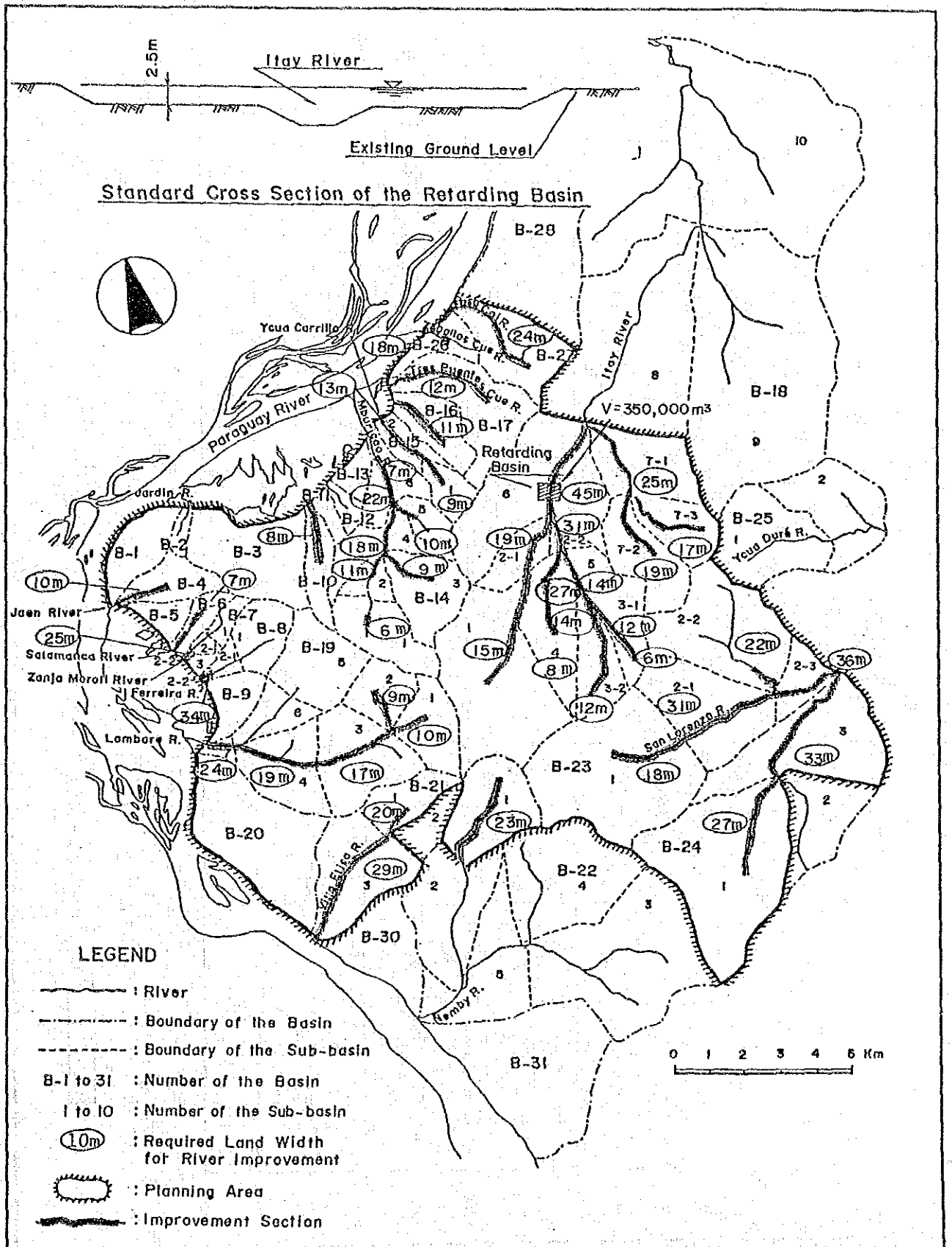


Fig. 7-3 LAYOUT OF PROPOSED RIVER CHANNEL IMPROVEMENT PORTION FOR MASTER PLAN

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

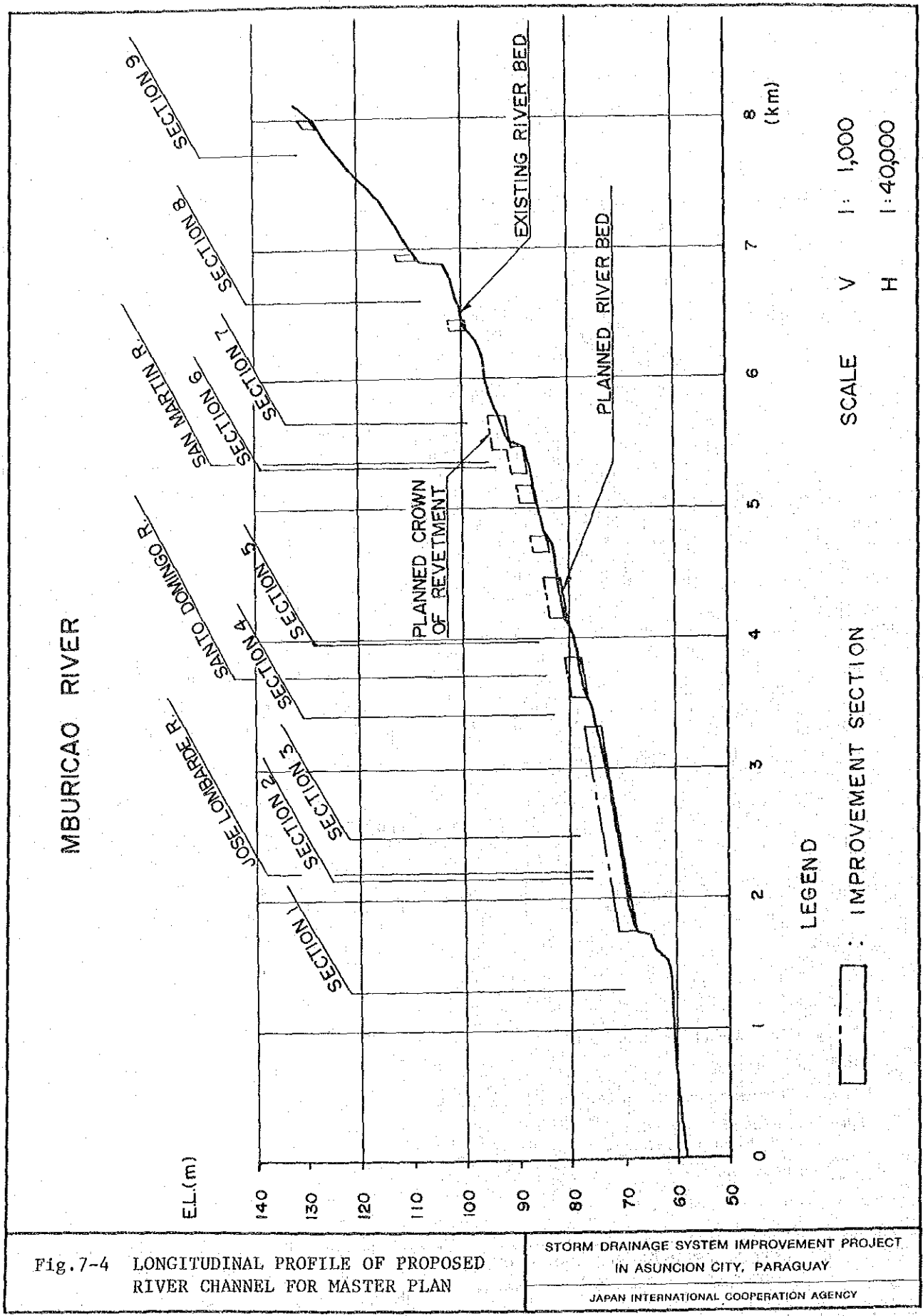
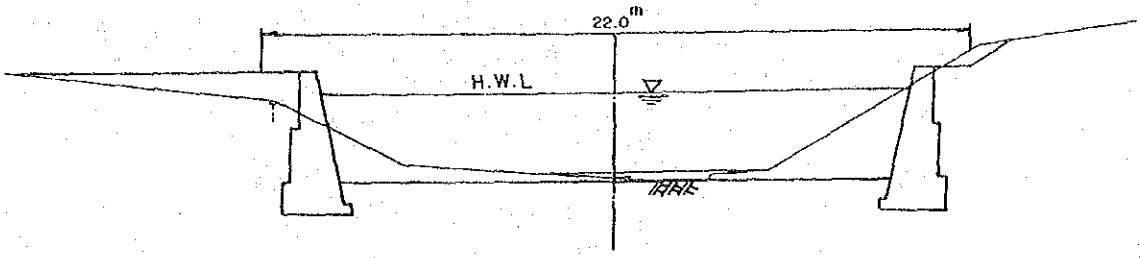


Fig.7-4 LONGITUDINAL PROFILE OF PROPOSED RIVER CHANNEL FOR MASTER PLAN

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

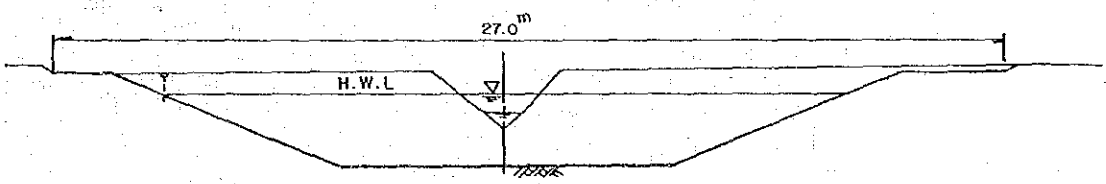
JAPAN INTERNATIONAL COOPERATION AGENCY

MBURICAO RIVER



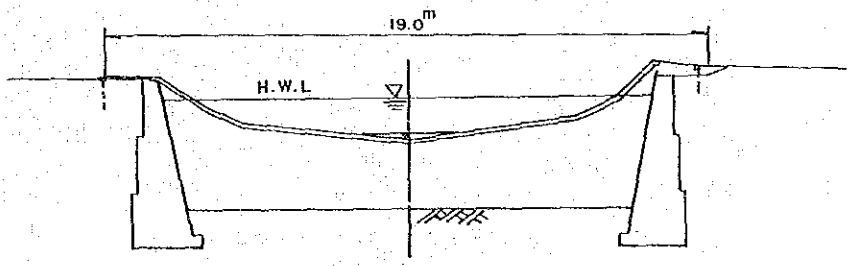
SECTION-3

ITAY RIVER



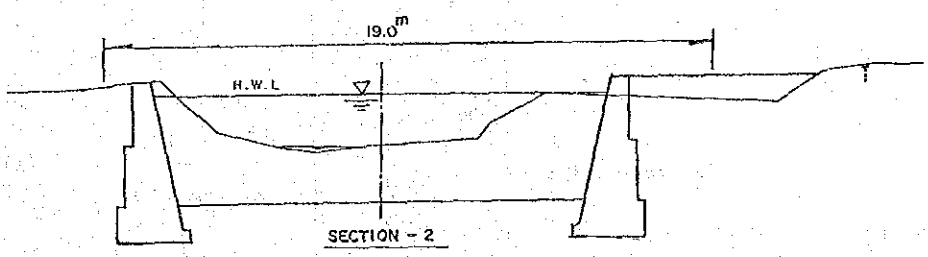
SECTION - 25

ITAY RIVER



SECTION - 20

LAMBARE RIVER



SECTION - 2

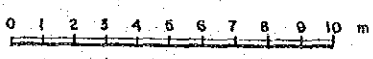
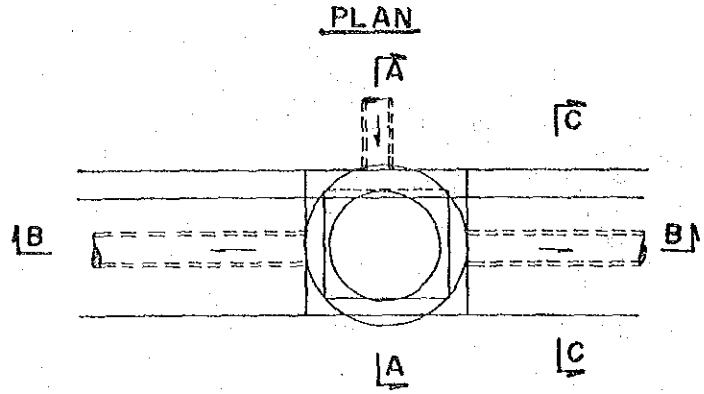


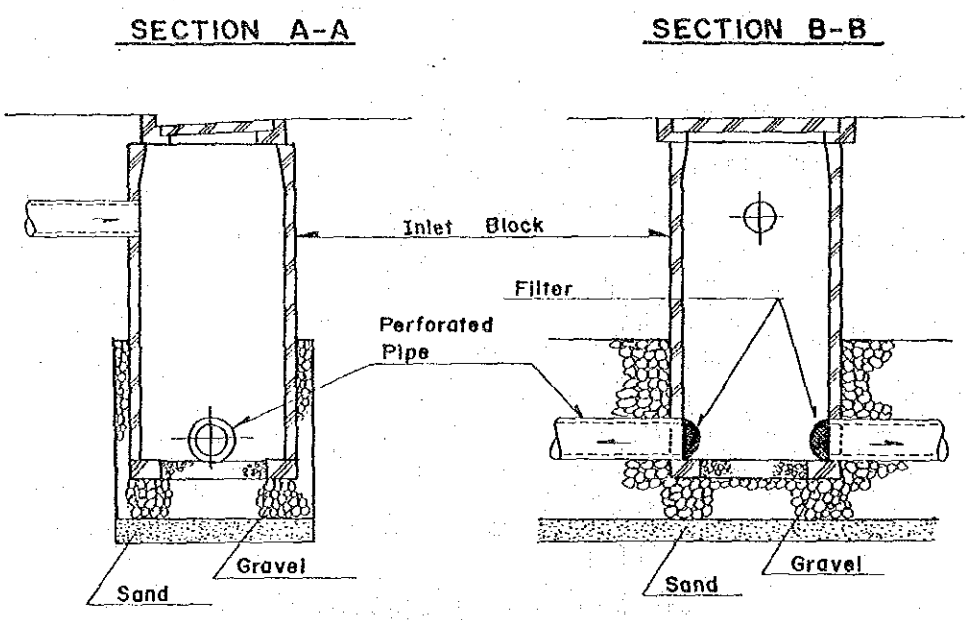
Fig. 7-5 CROSS SECTION OF PROPOSED RIVER CHANNEL FOR MASTER PLAN

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

INFILTRATION INLET AND TRENCH





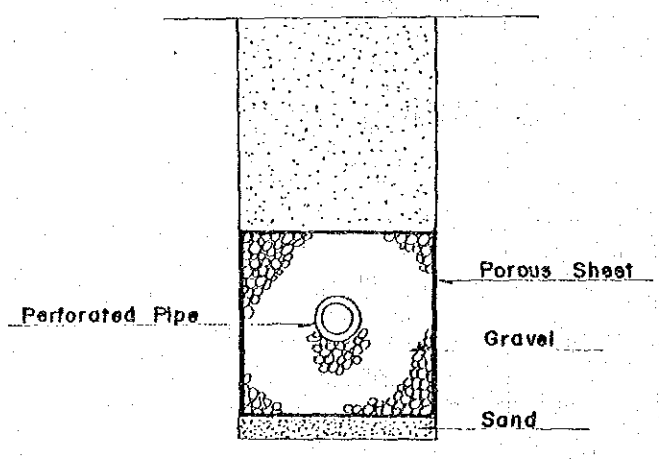


Fig. 7-6 STANDARD DRAWING OF INFILTRATION TRENCH

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

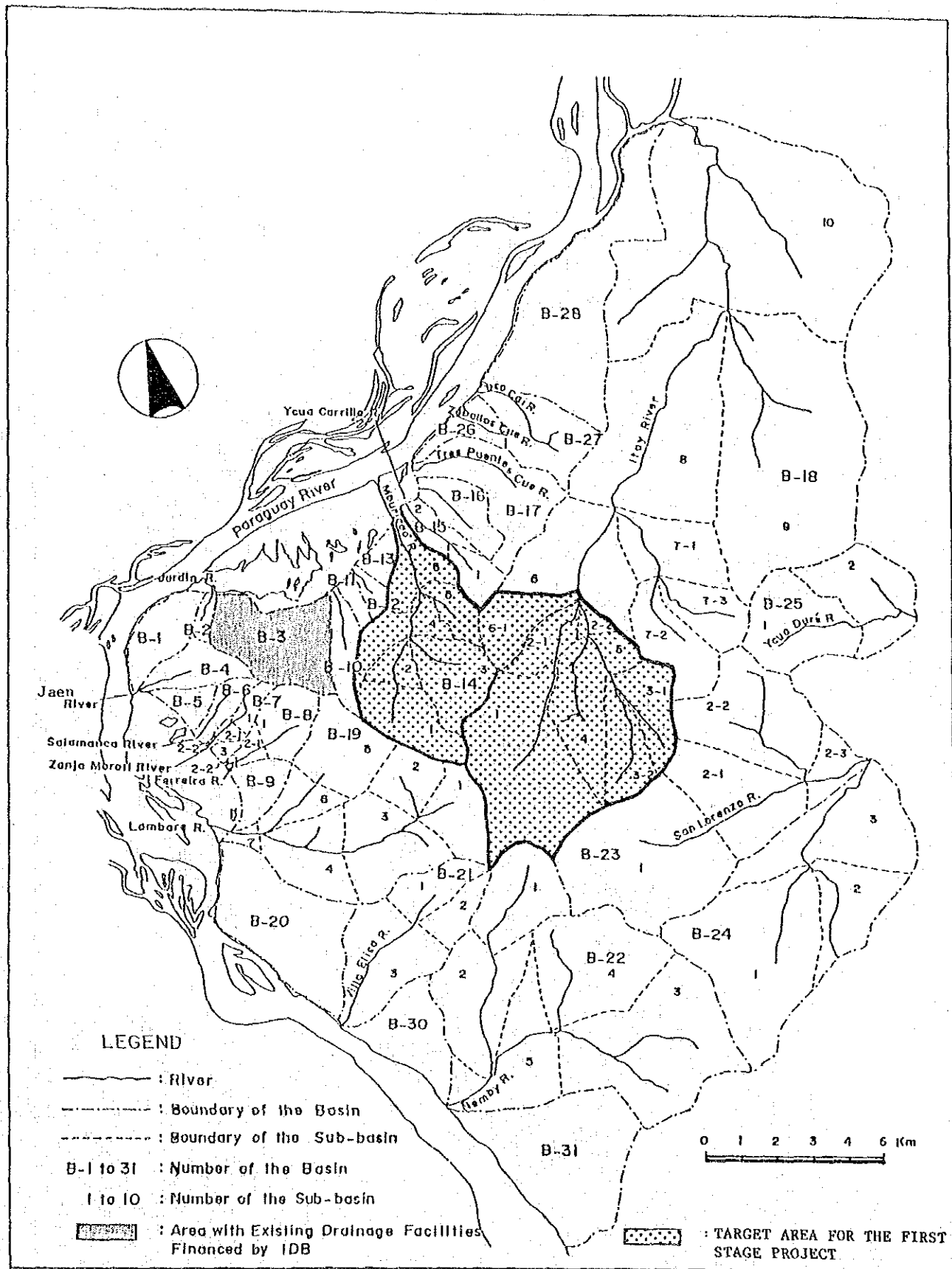


Fig. 8-1 TARGET AREA FOR THE FIRST STAGE PROJECT

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

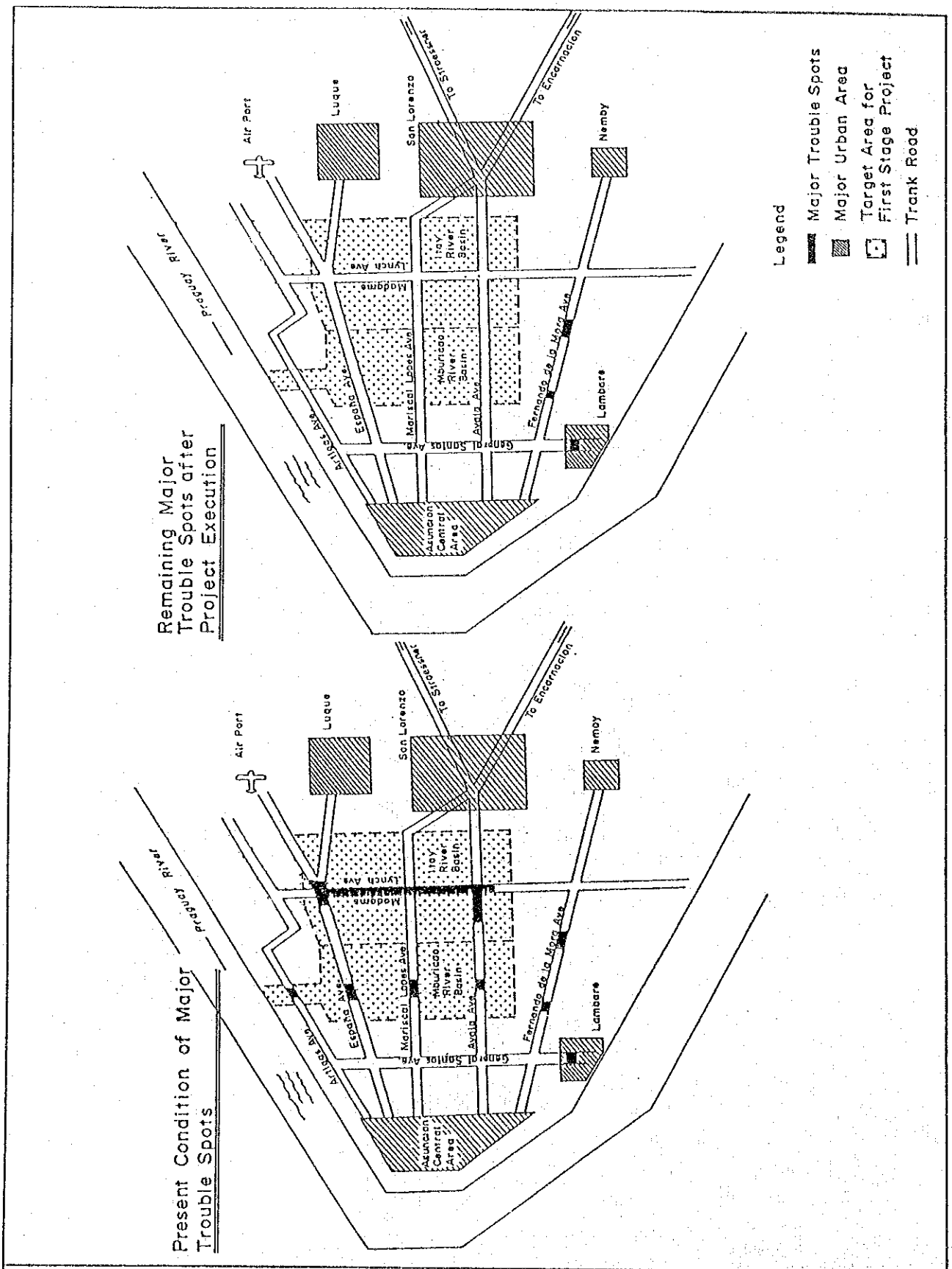


Fig. 8-2 COMPARISON OF SERIOUS TROUBLE SPOTS WITH AND WITHOUT THE PROJECT

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

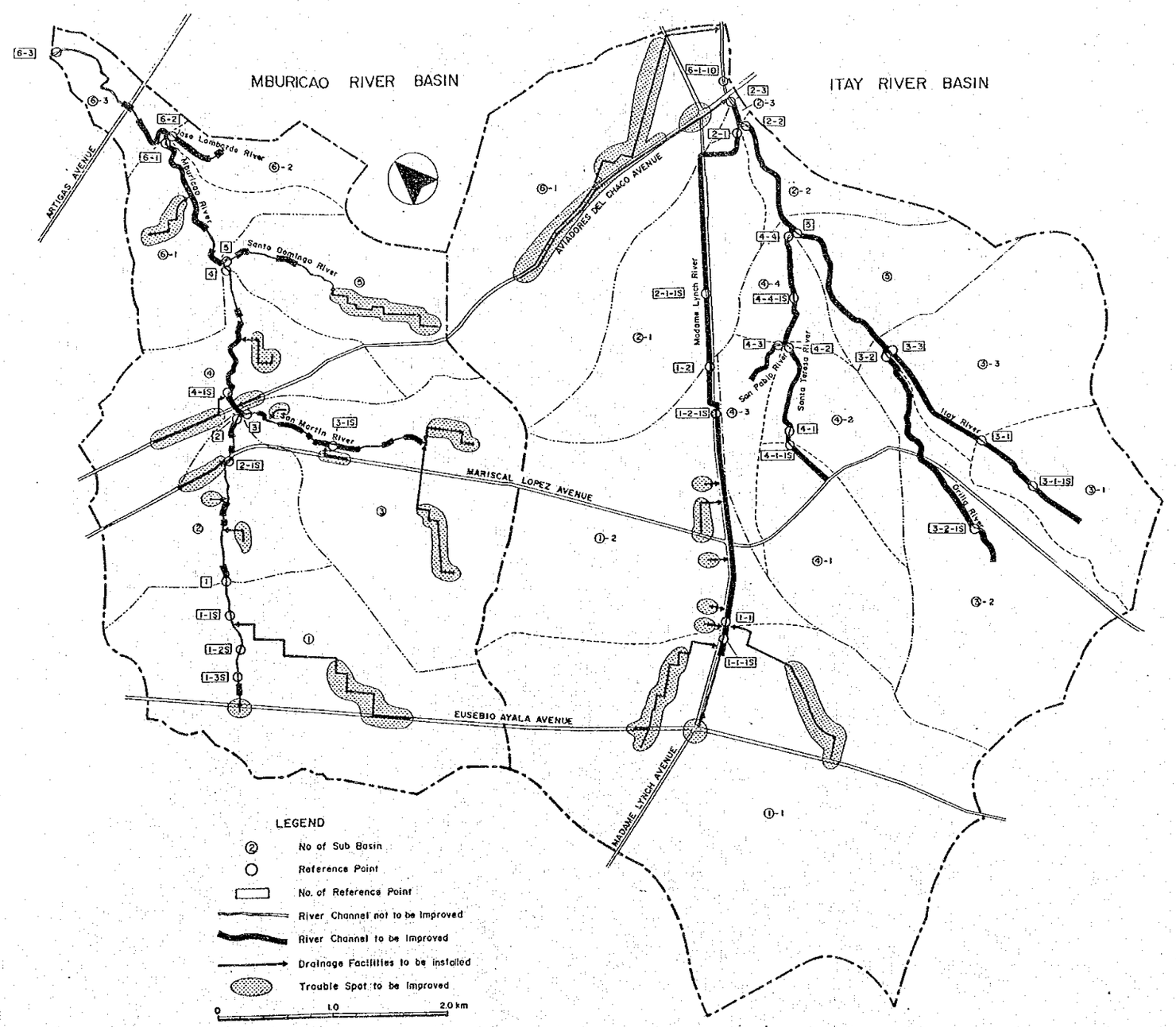


Fig. 8-3 TROUBLE SPOT IN MBURICAO AND ITAY RIVER BASINS

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

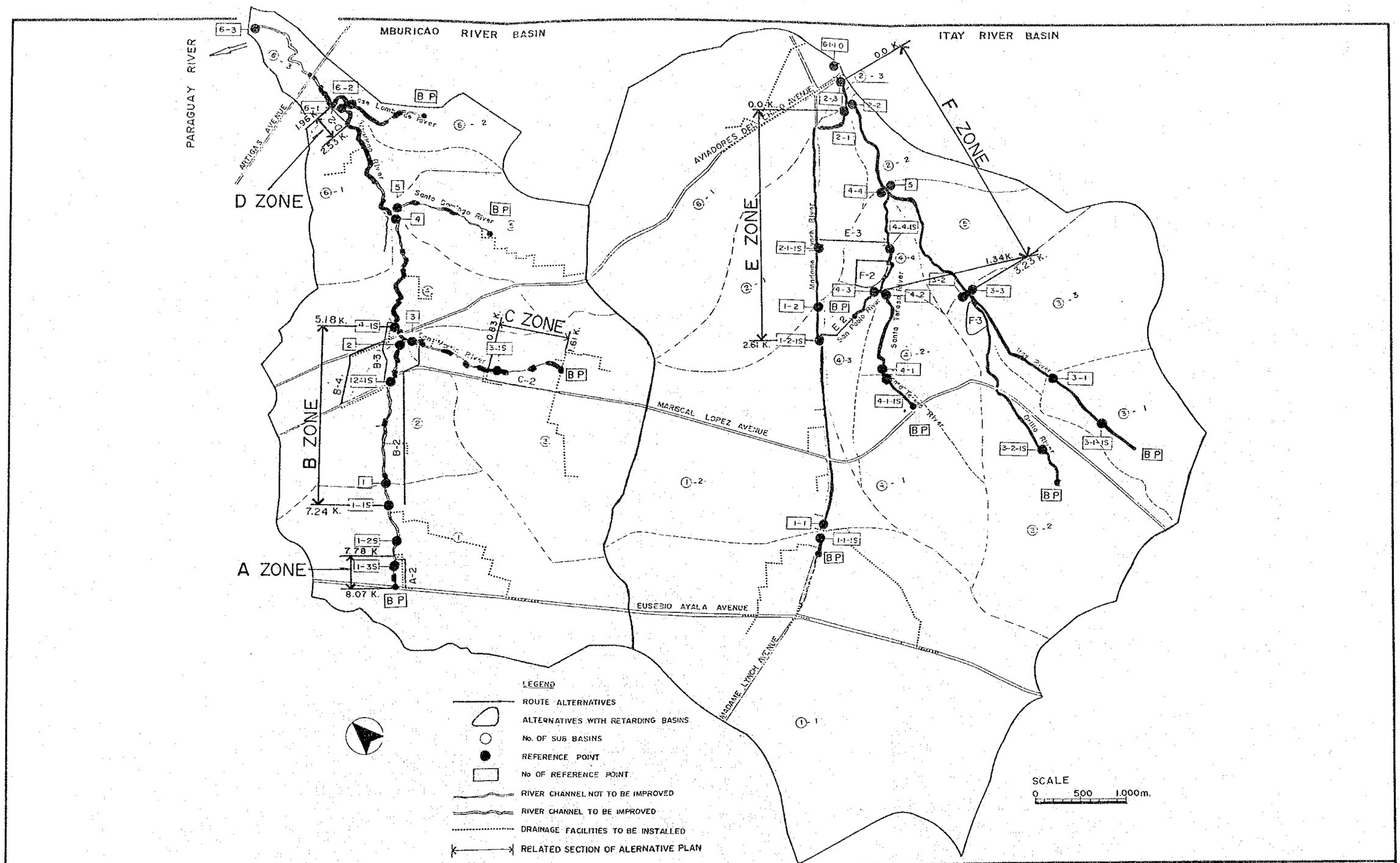
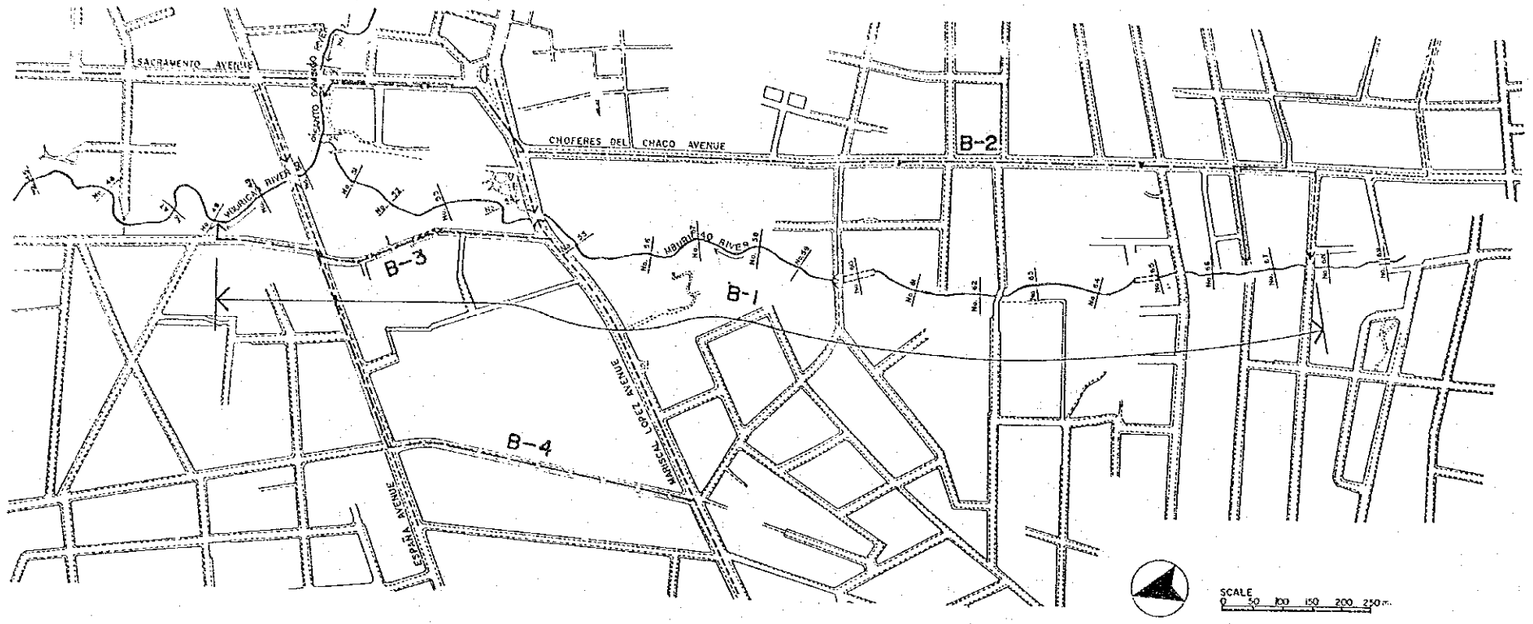


Fig. 8-4 LOCATION OF ALTERNATIVE PLANS

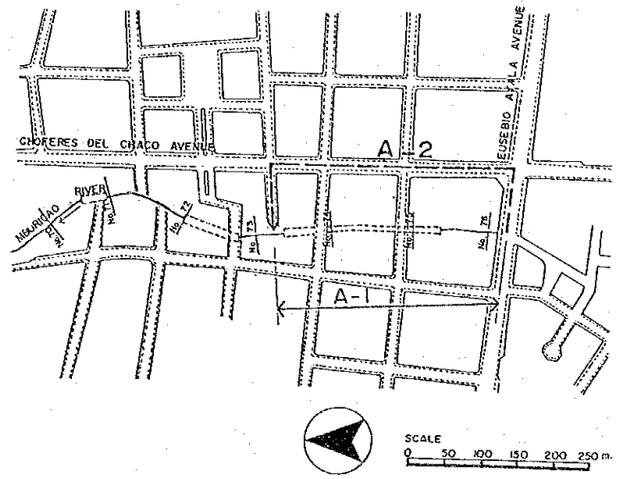
STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT
IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

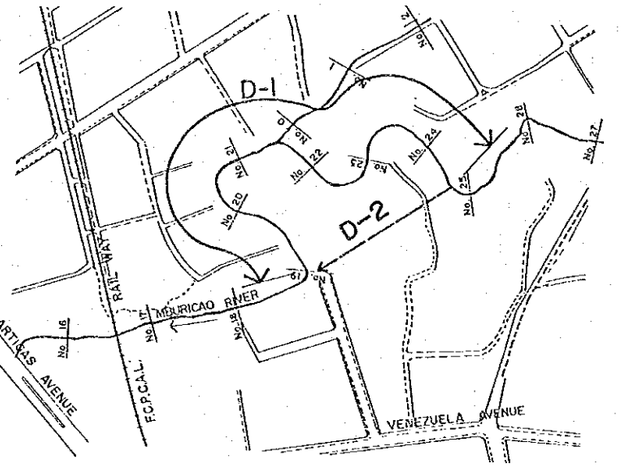
MBURICAO RIVER BASIN (ZONE B)



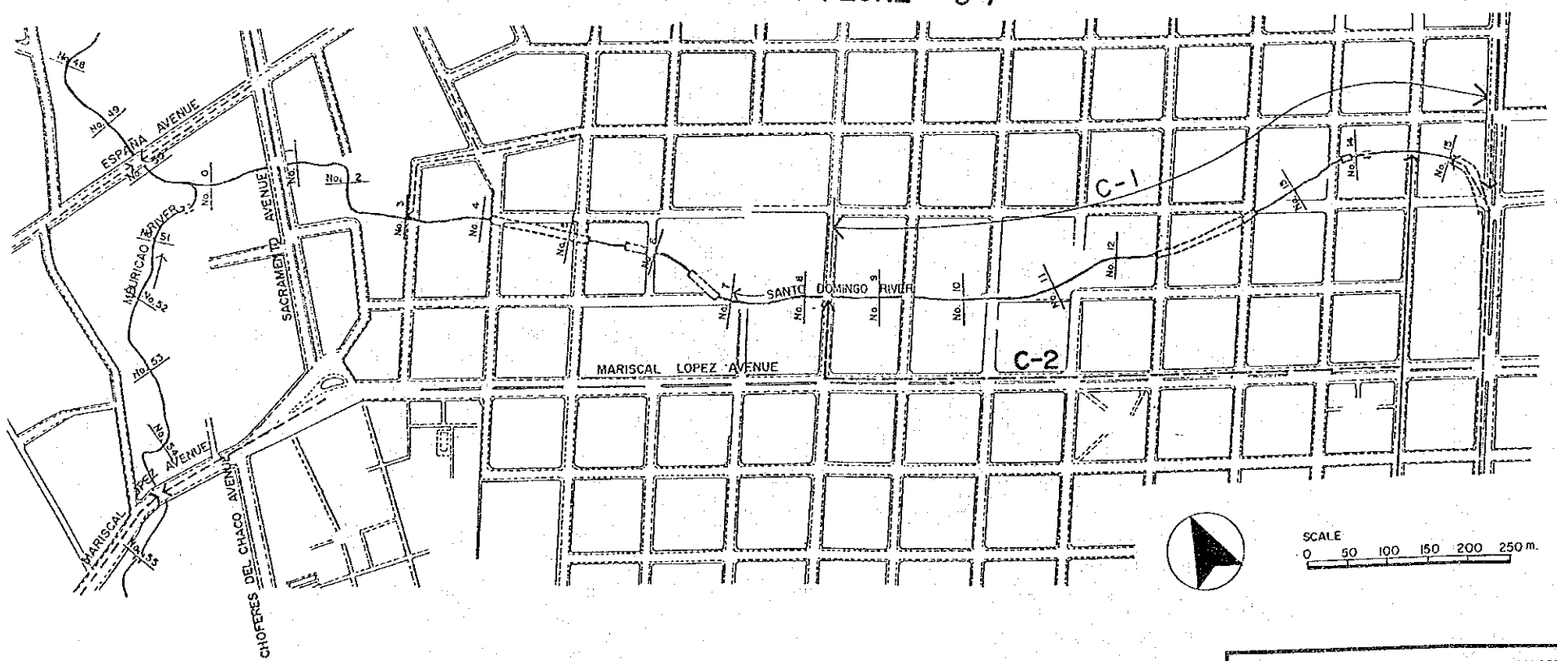
MBURICAO RIVER BASIN (ZONE A)



MBURICAO RIVER BASIN (ZONE D)



MBURICAO RIVER BASIN (ZONE C)



LEGEND

: ROUTE ALTERNATIVES

: PLANNED DRAINAGE FACILITIES

: EXISTING DRAINAGE FACILITIES

: UNDERGROUND CONDUIT

Fig.8-5(1/3) ROUTE ALTERNATIVES OF EACH ZONE FOR FIRST STAGE PROJECT (MBURICAO RIVER BASIN)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

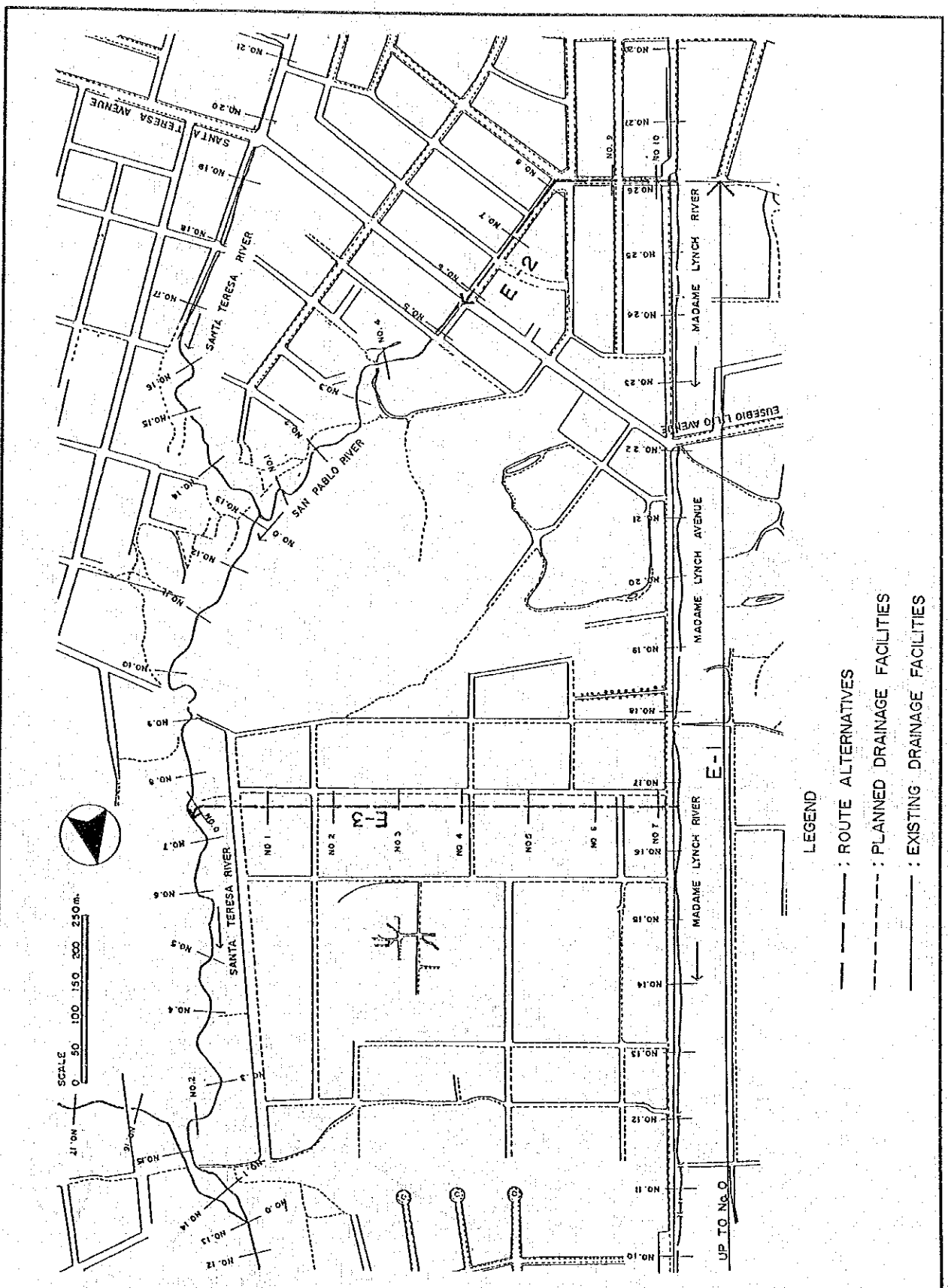


Fig.8-5(2/3) ROUTE ALTERNATIVES OF EACH ZONE FOR FIRST STAGE PROJECT (ITAY RIVER BASIN)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

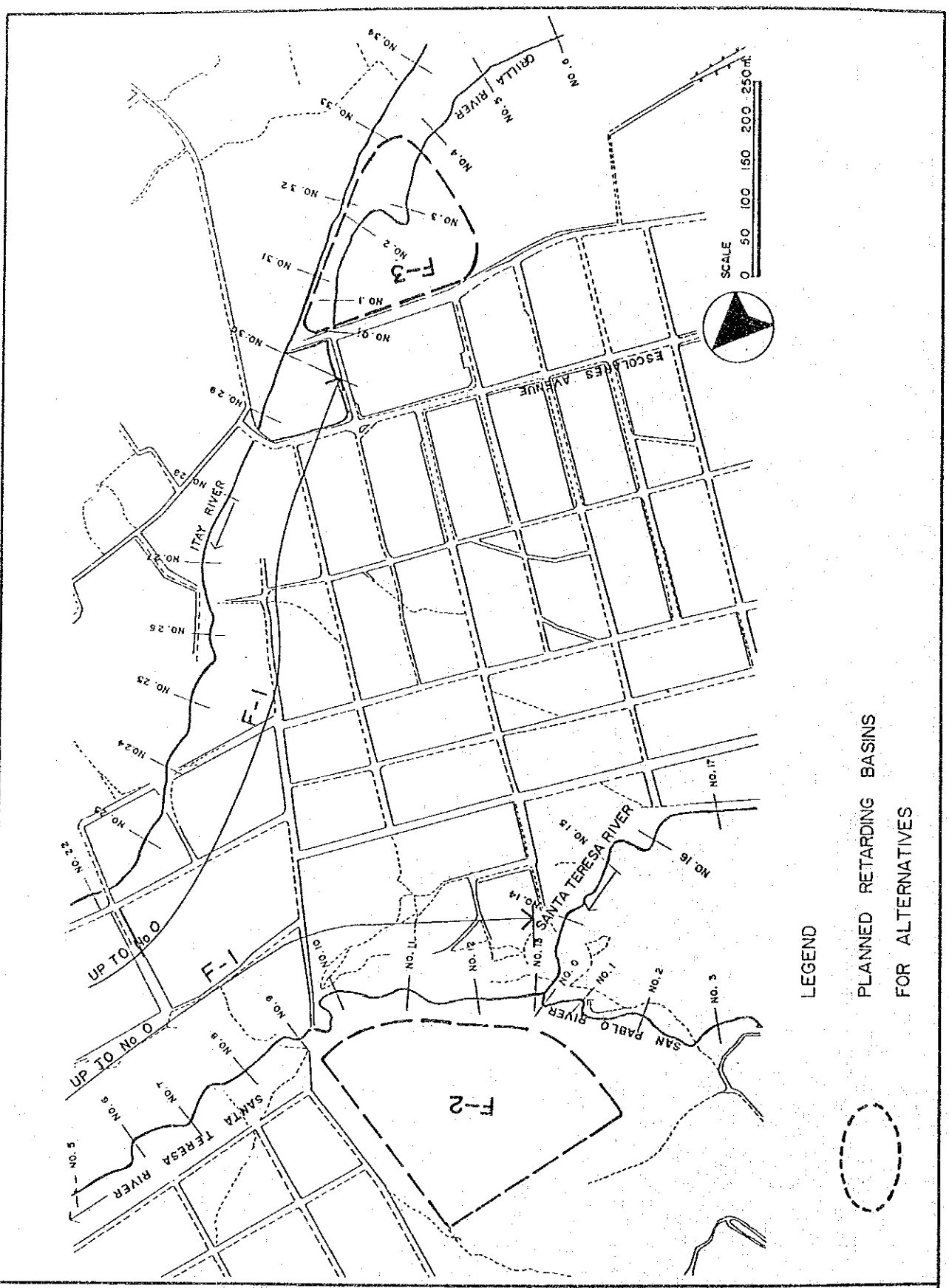


Fig.8-5(3/3) ROUTE ALTERNATIVES OF EACH ZONE FOR FIRST STAGE PROJECT (ITAY RIVER BASIN)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

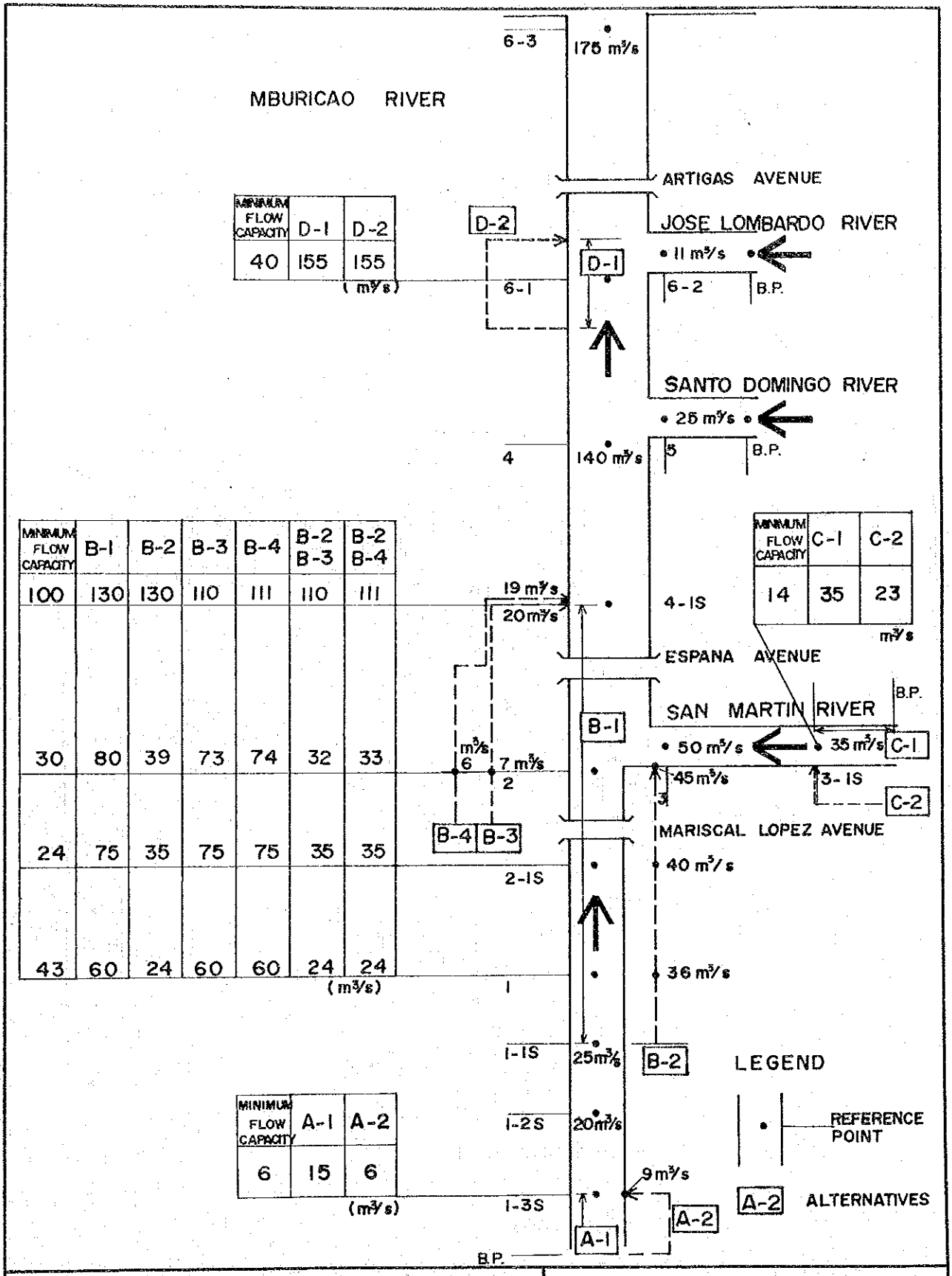


Fig. 8-6(1/3) DESIGN DISCHARGE DISTRIBUTION OF ALTERNATIVES FOR FIRST STAGE PROJECT (MBURICAO RIVER)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

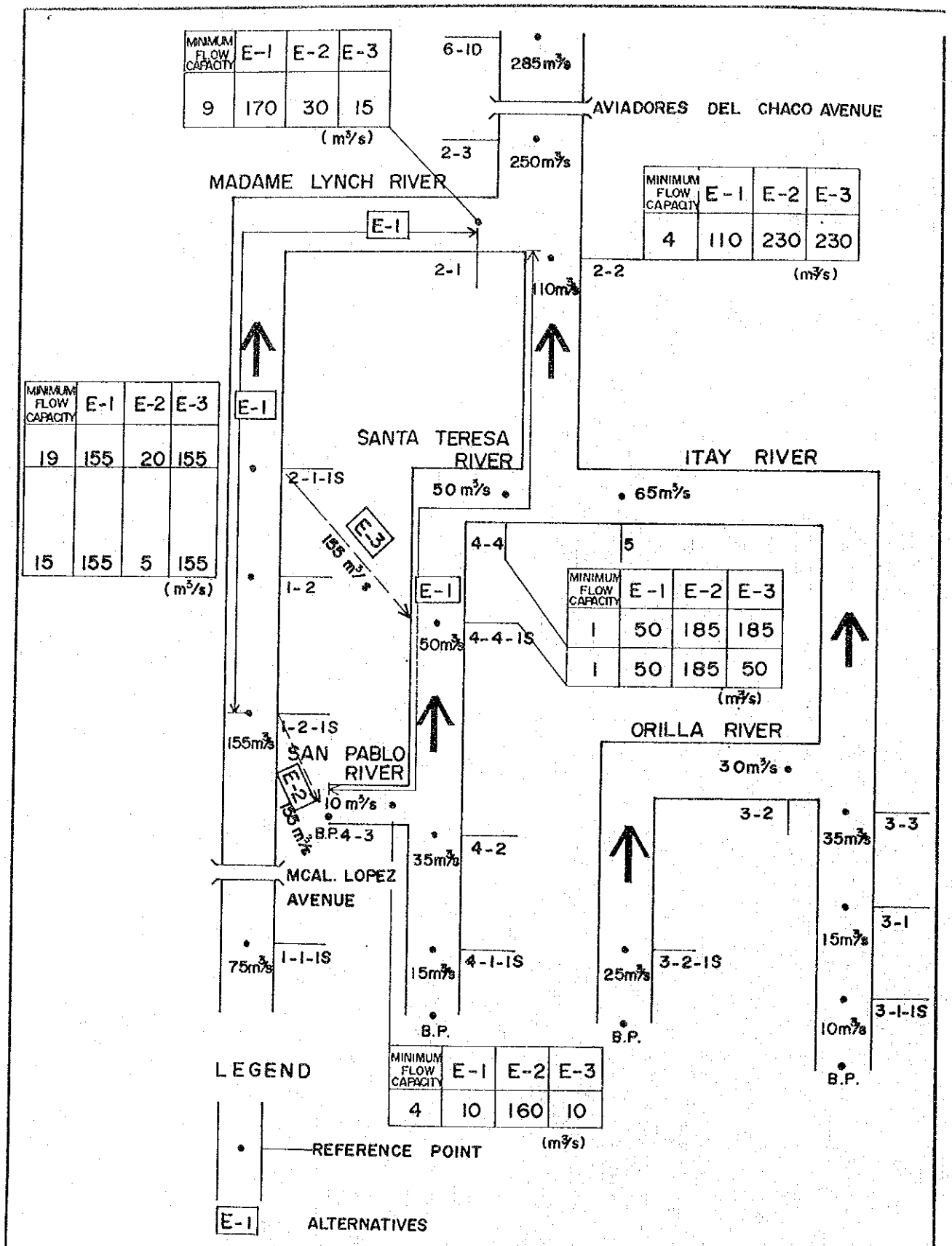


Fig. 8-6(2/3) DESIGN DESCHARGE DISTRIBUTION OF ALTERNATIVES FOR FIRST STAGE PROJECT (ITAY RIVER-1)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

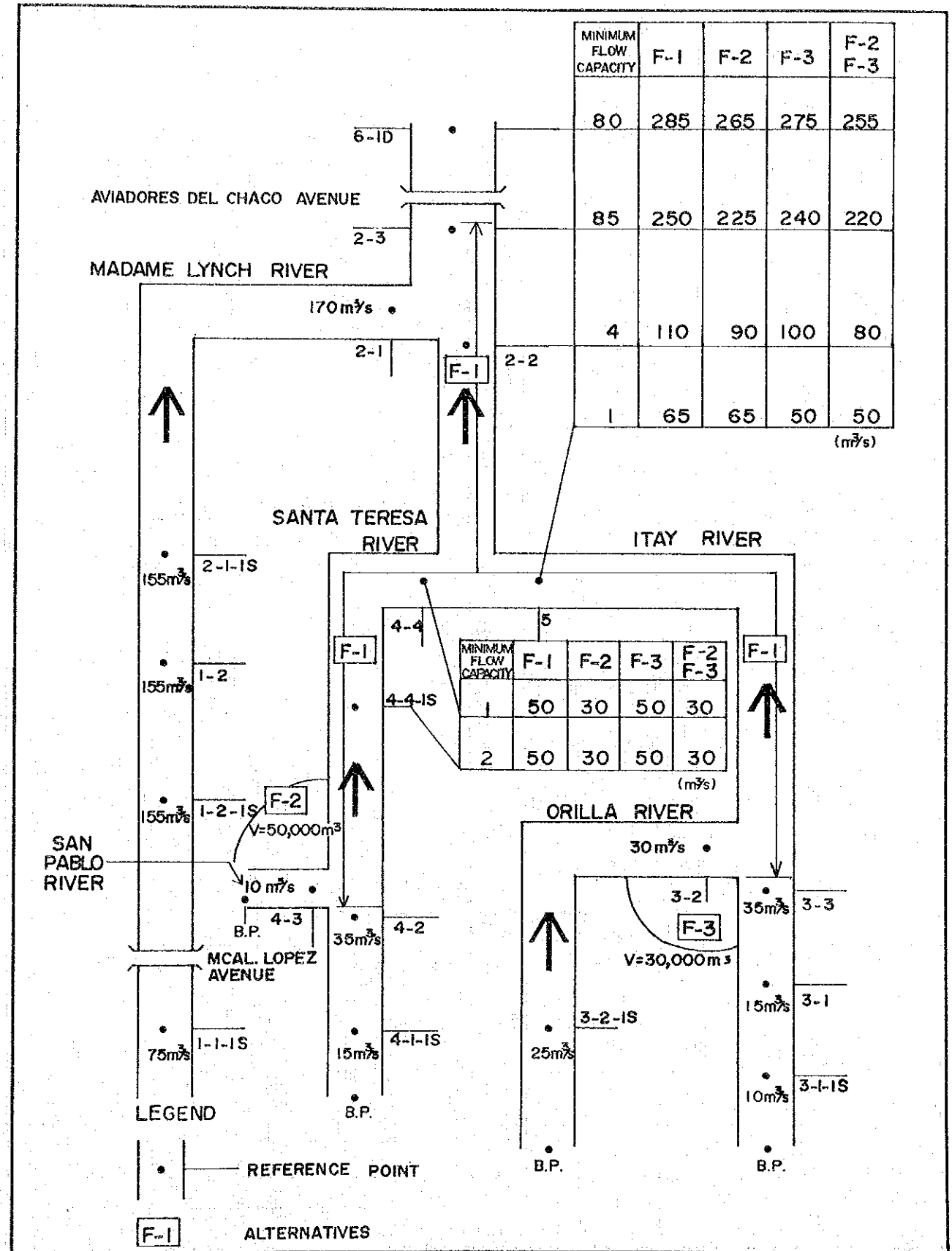


Fig. 8-6(3/3) DESIGN DISCHARGE DISTRIBUTION OF ALTERNATIVES FOR FIRST STAGE PROJECT (ITAY RIVER-2)

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

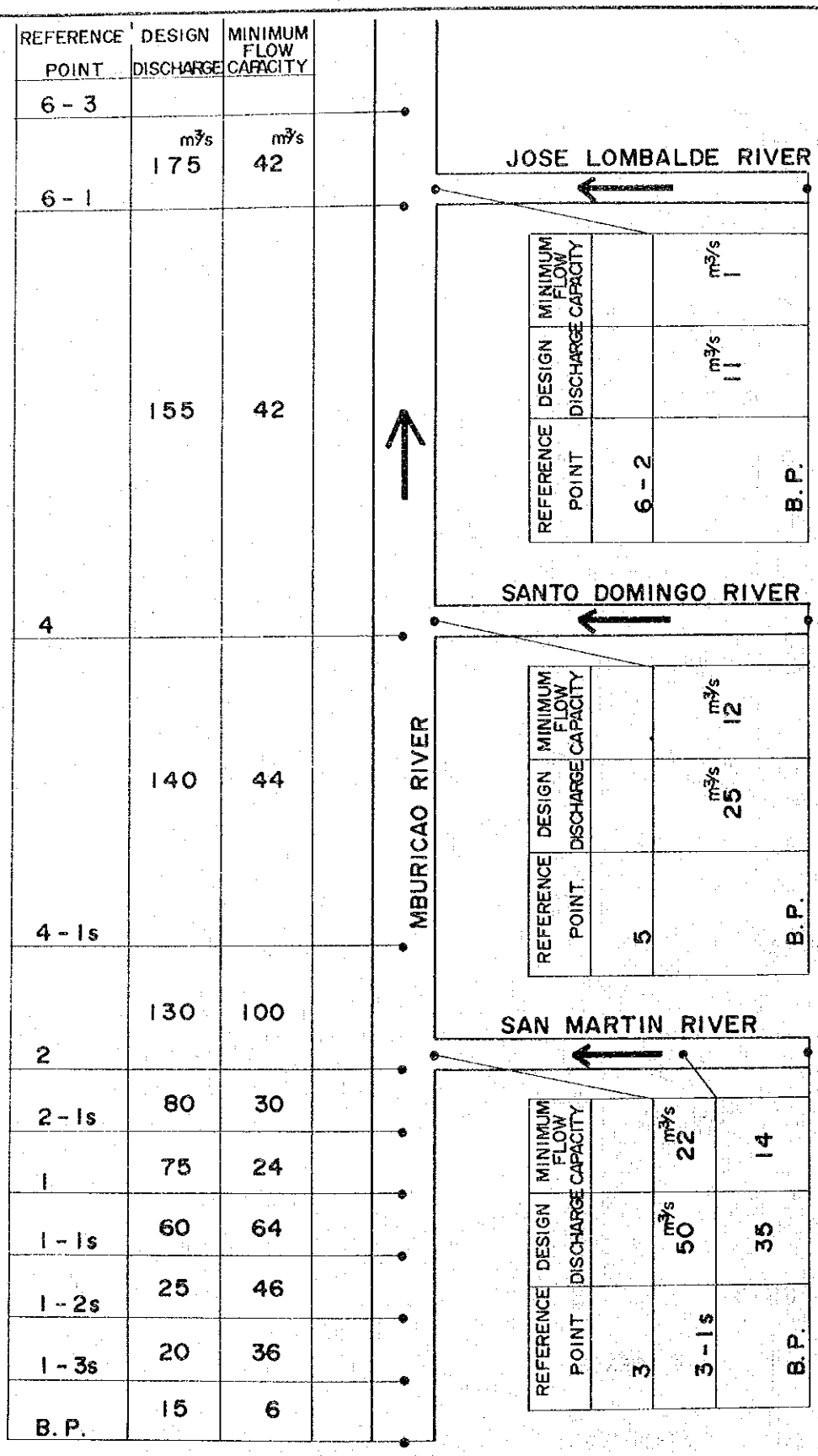


Fig.8-7(1/2) DESIGN DISCHARGE DISTRIBUTION FOR OPTIMUM PLAN FOR FIRST STAGE PROJECT

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY

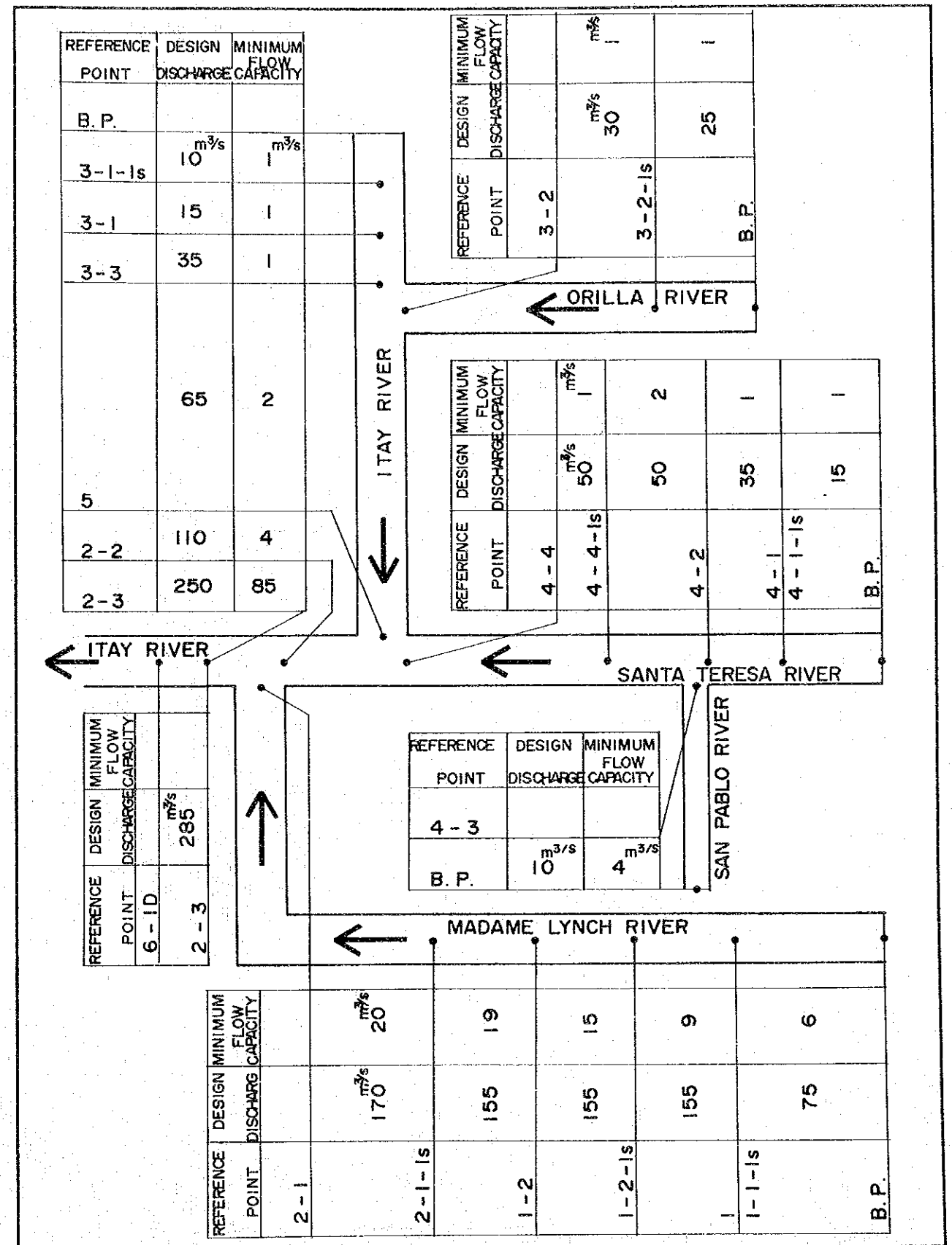
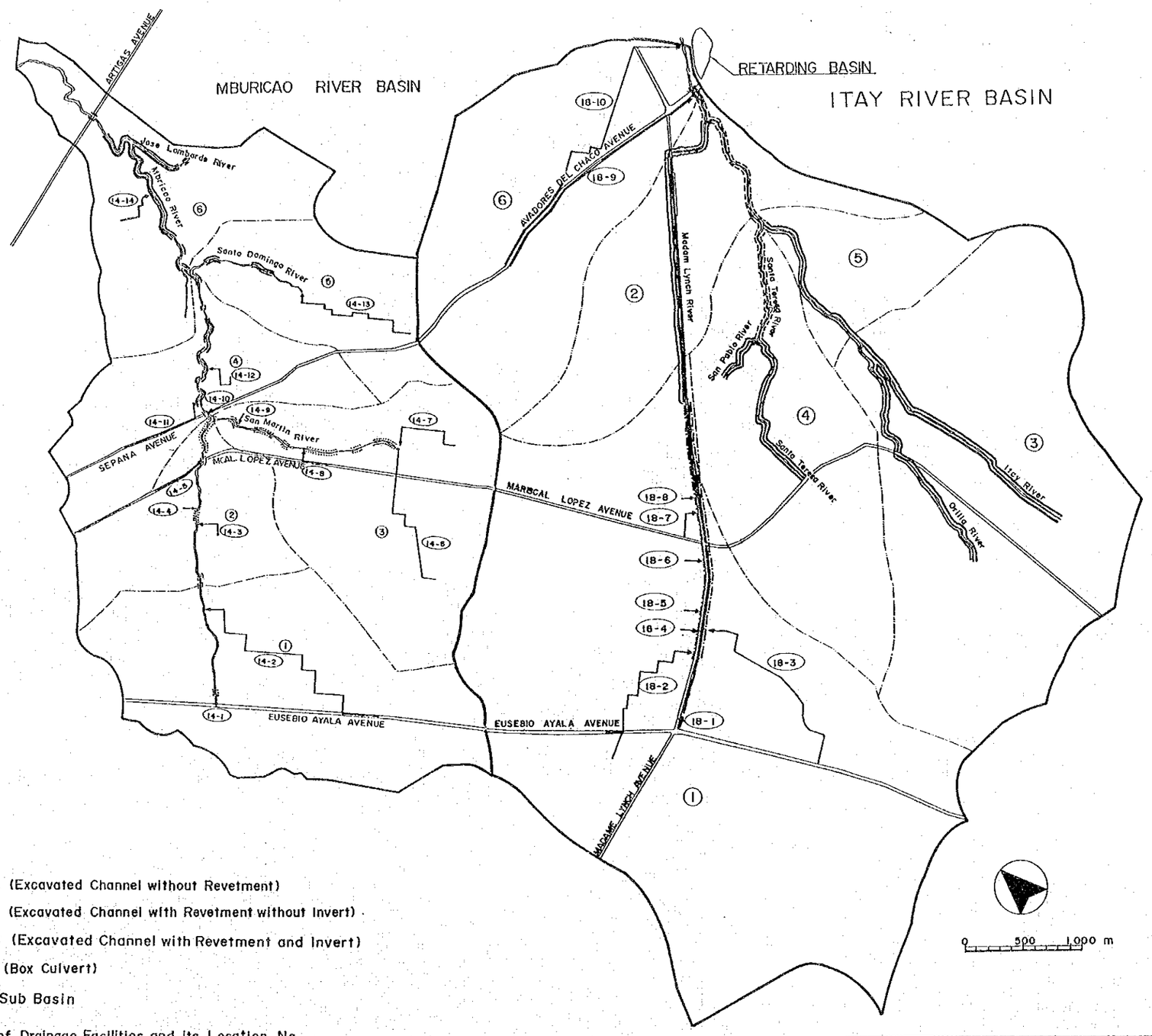


Fig.8-7(2/2) DESIGN DISCHARGE DISTRIBUTION FOR OPTIMUM PLAN FOR FIRST STAGE PROJECT

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY



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.

Fig. 8-8 PROPOSED RIVER IMPROVEMENT STRETCH FOR FIRST STAGE PROJECT

STORM DRAINAGE SYSTEM IMPROVEMENT PROJECT IN ASUNCION CITY, PARAGUAY

JAPAN INTERNATIONAL COOPERATION AGENCY