

FIGURES

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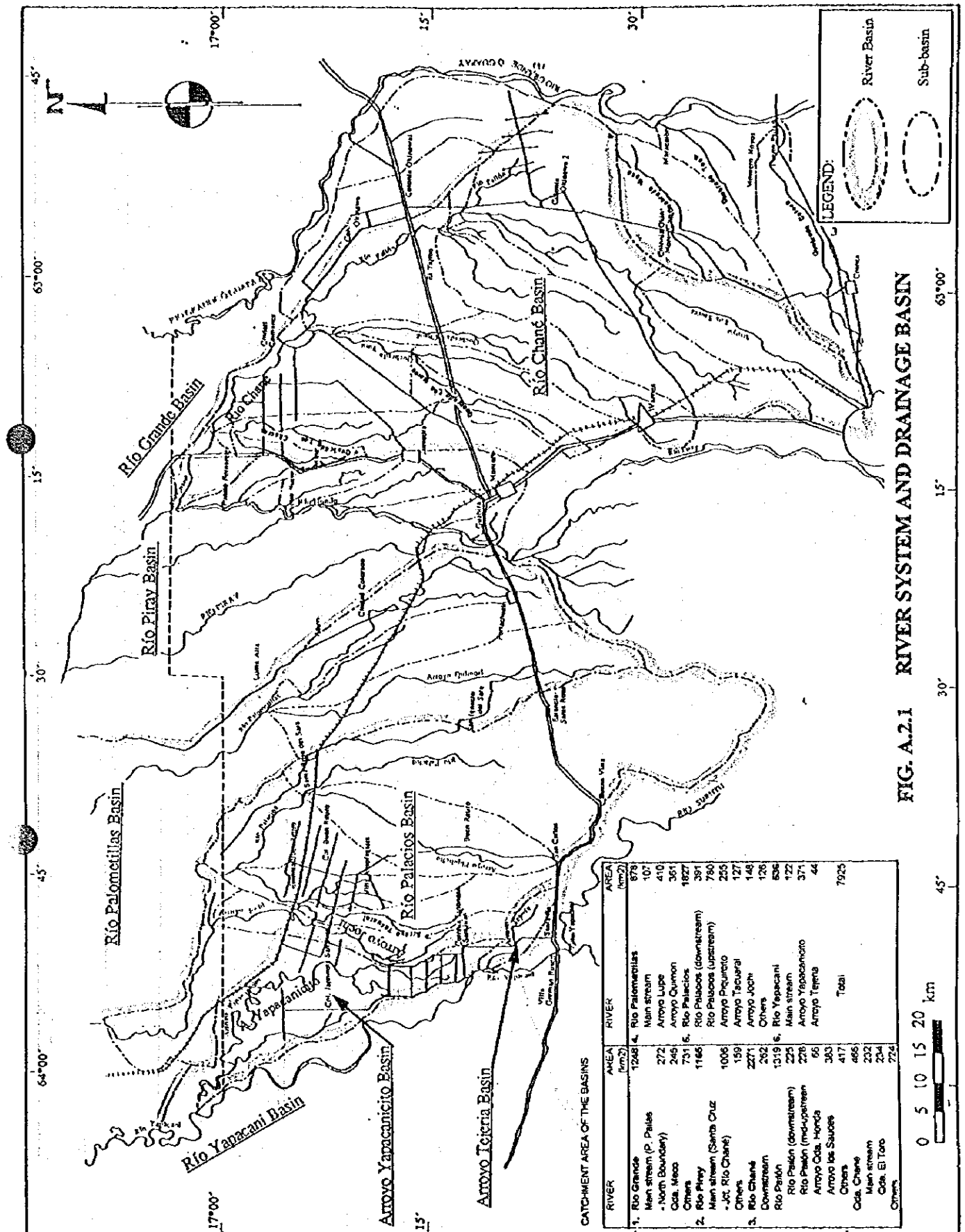
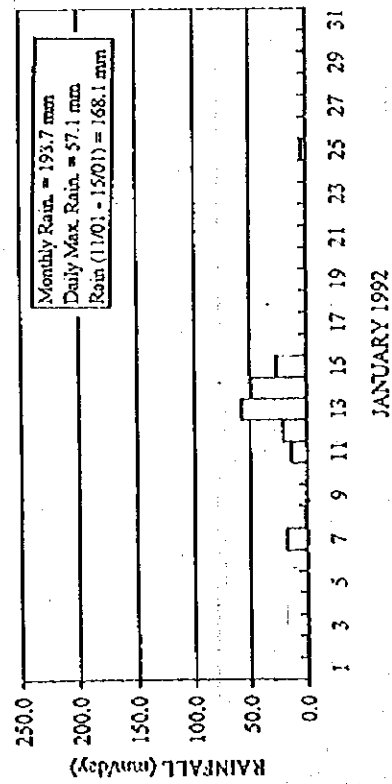
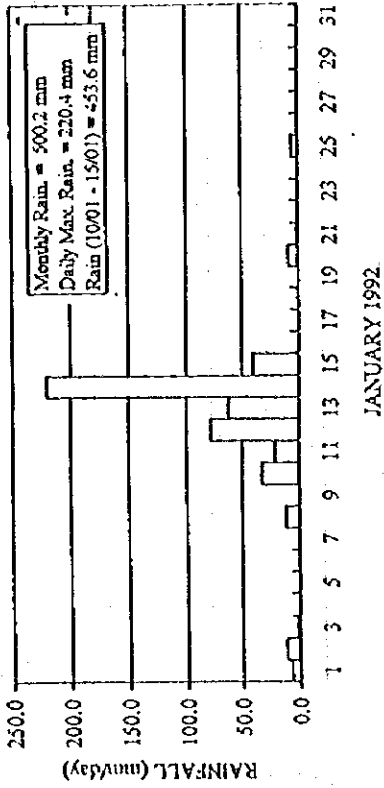


FIG. A.2.1 RIVER SYSTEM AND DRAINAGE BASIN

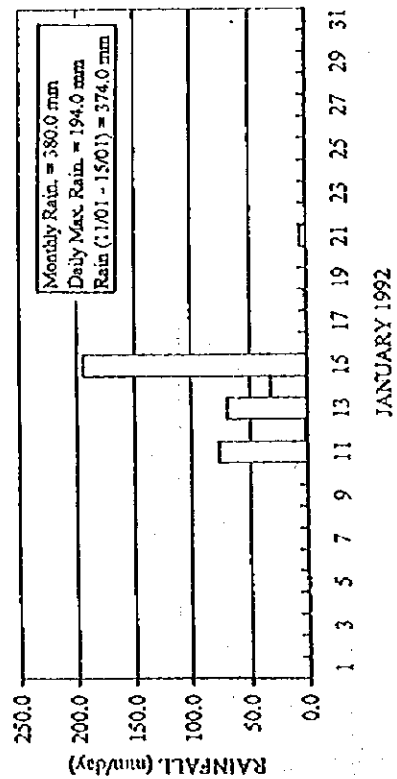
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Saavedra (Jan., 1992)



Okinawa 2 (Jan., 1992)



Col. San Juan de Yapacani (Jan., 1992)

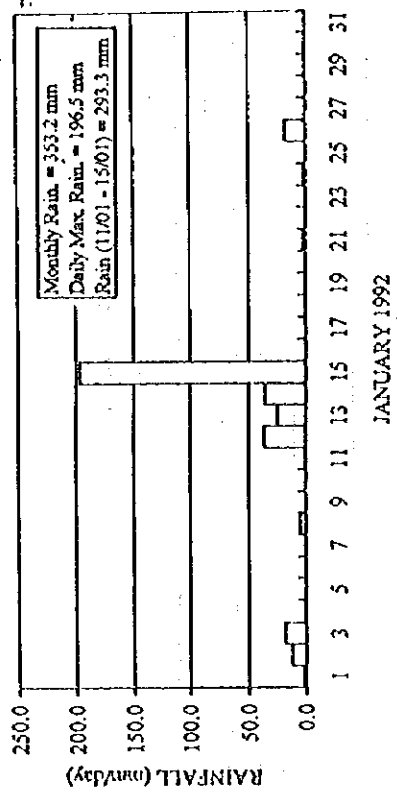
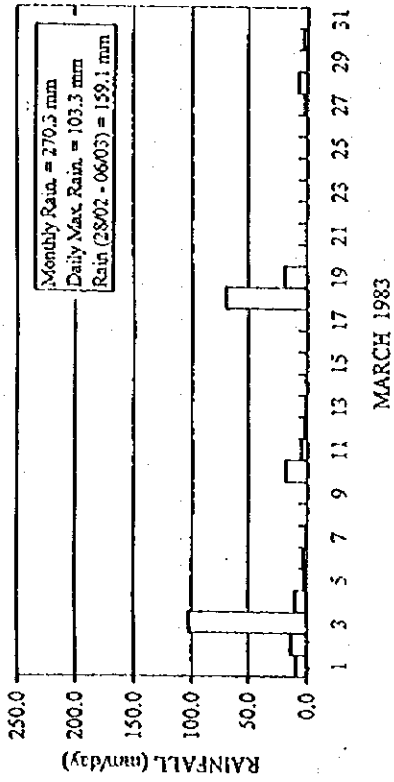
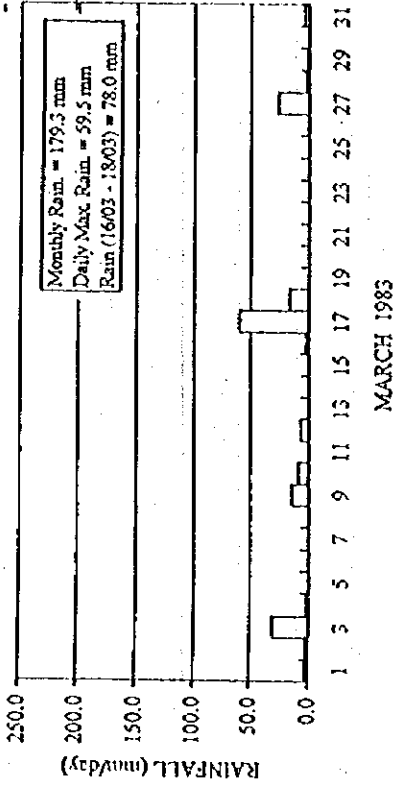


FIG. A.5.1 DAILY RAINFALL IN JANUARY 1992

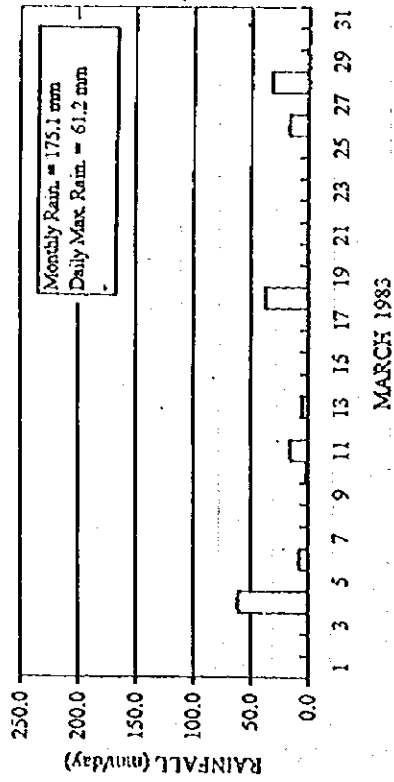
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Okinawa 2 (Mar., 1983)



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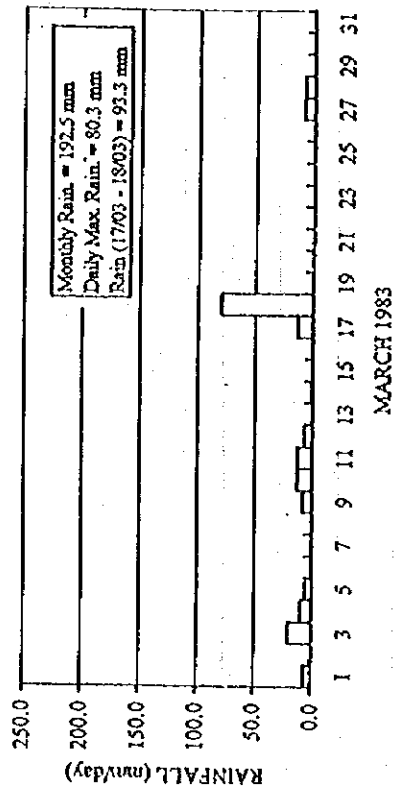


FIG. A.5.2 DAILY RAINFALL IN MARCH 1983

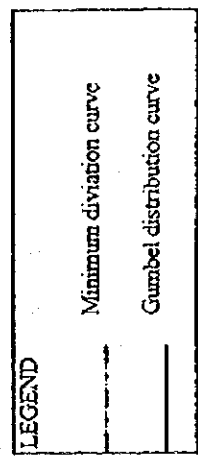
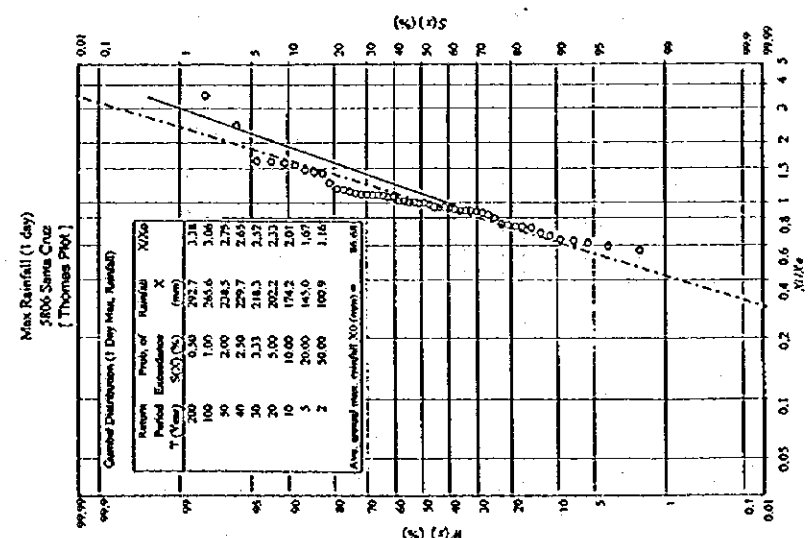
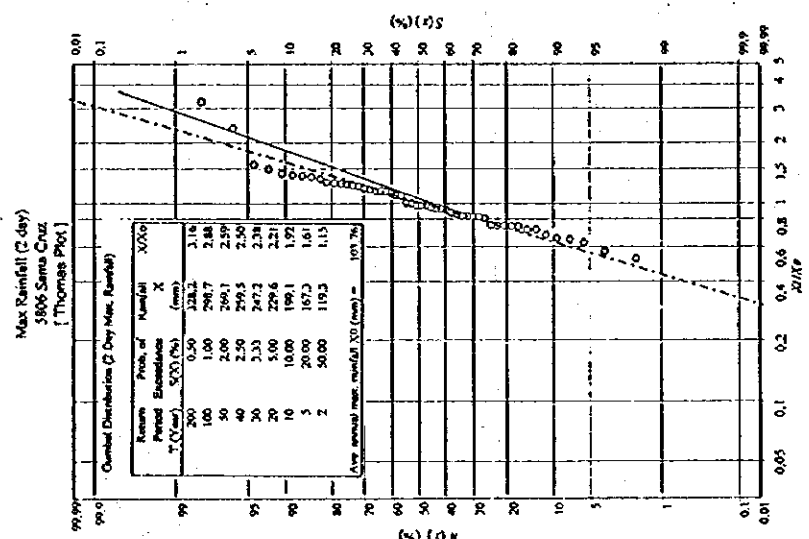
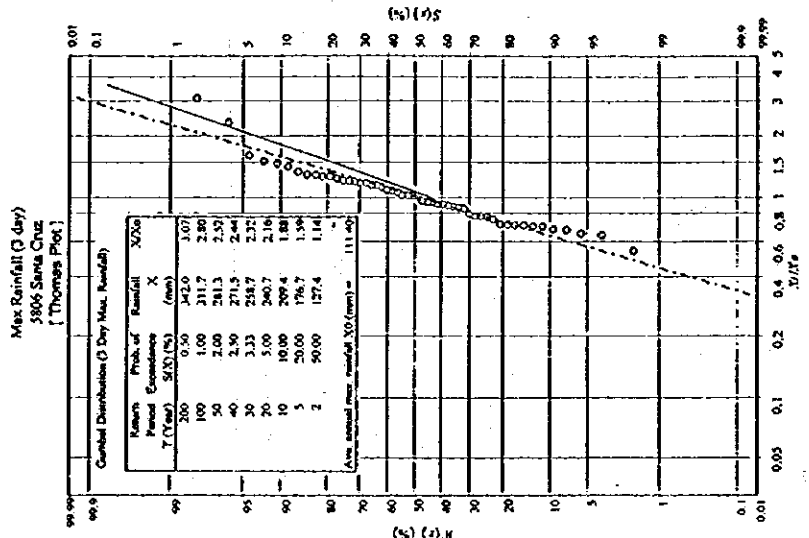
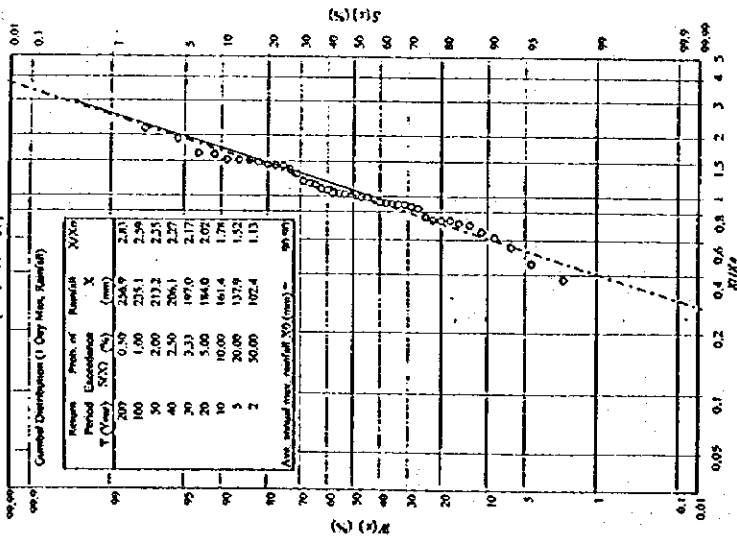
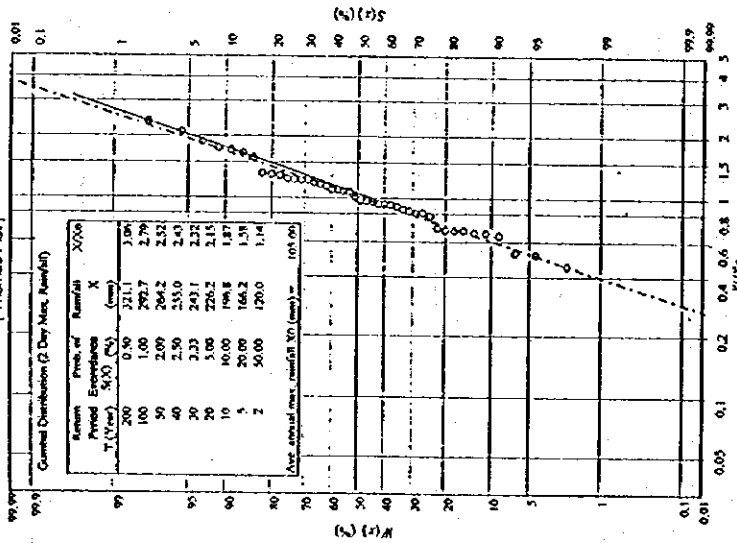


FIG. A.5.3 DISTRIBUTION OF PROBABLE MAXIMUM RAINFALL BY GUMBEL METHOD
STATION: 5806 SANTA CRUZ - TROMPILLO

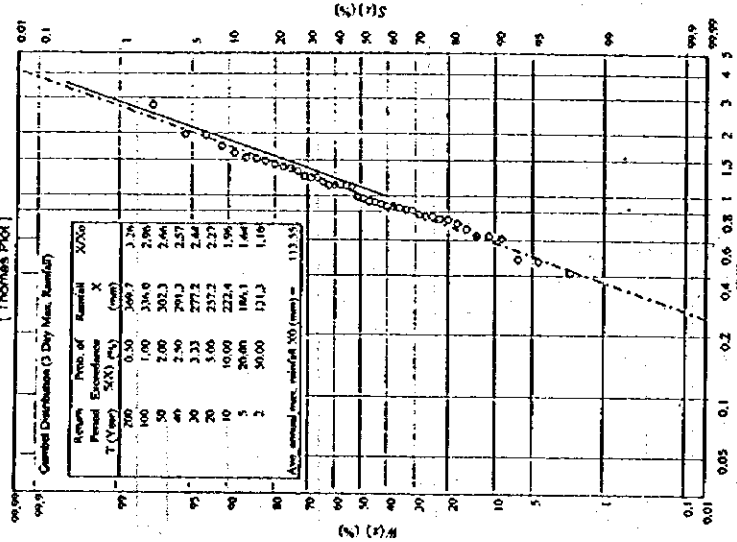
Max Rainfall (1 day)
6INP Saavedra
[Thomas Plot]



Max Rainfall (2 day)
6INP Saavedra
[Thomas Plot]



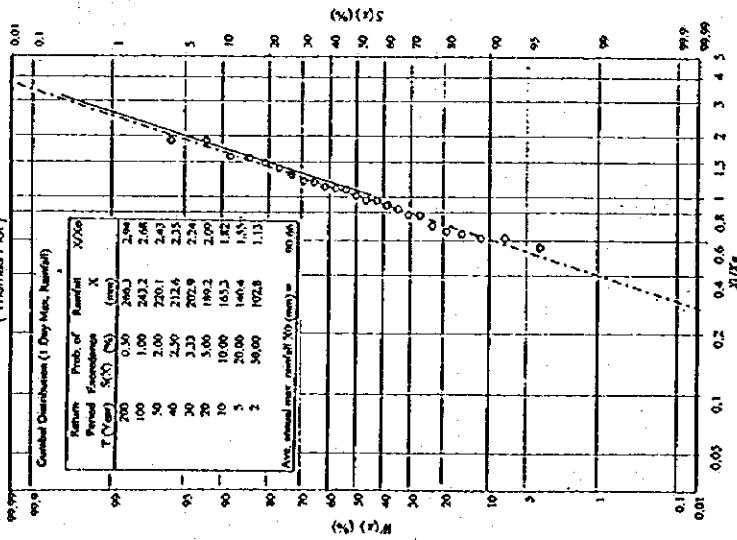
Max Rainfall (3 day)
6INP Saavedra
[Thomas Plot]



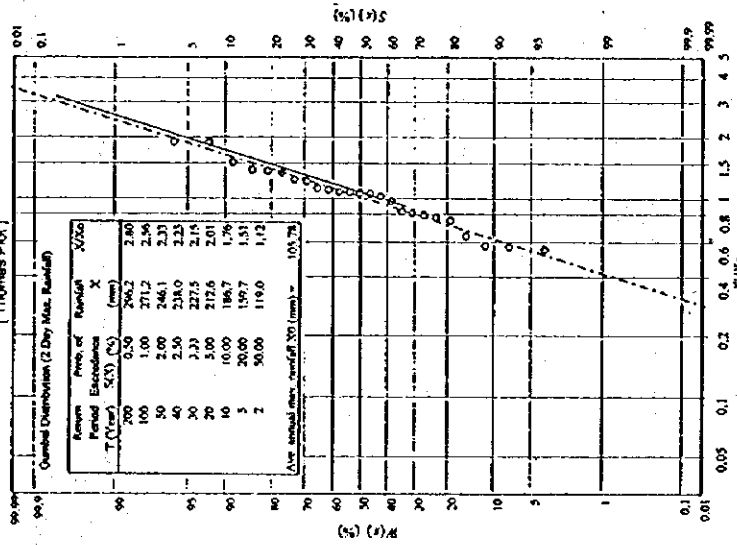
LEGEND
 Minimum deviation curve
 Gumbel distribution curve

FIG. A.5.4 DISTRIBUTION OF PROBABLE MAXIMUM RAINFALL BY GUMBEL METHOD STATION: 6INP SAAVEDRA

Max Rainfall (1 day)
Okinawa 2 (CETABOL - JICA)
[Thomas Plot]



Max Rainfall (2 day)
Okinawa 2 (CETABOL - JICA)
[Thomas Plot]



Max Rainfall (3 day)
Okinawa 2 (CETABOL - JICA)
[Thomas Plot]

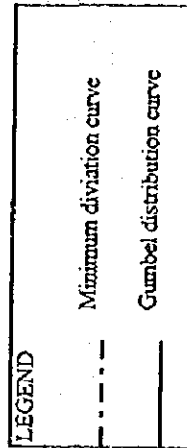
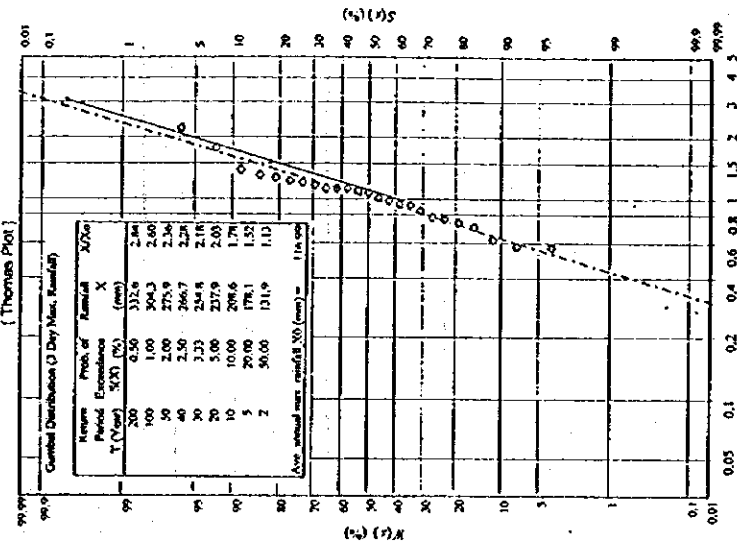
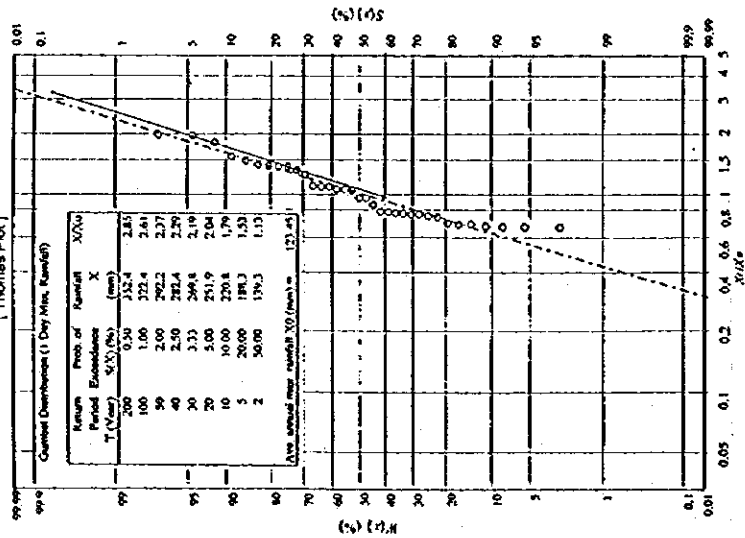
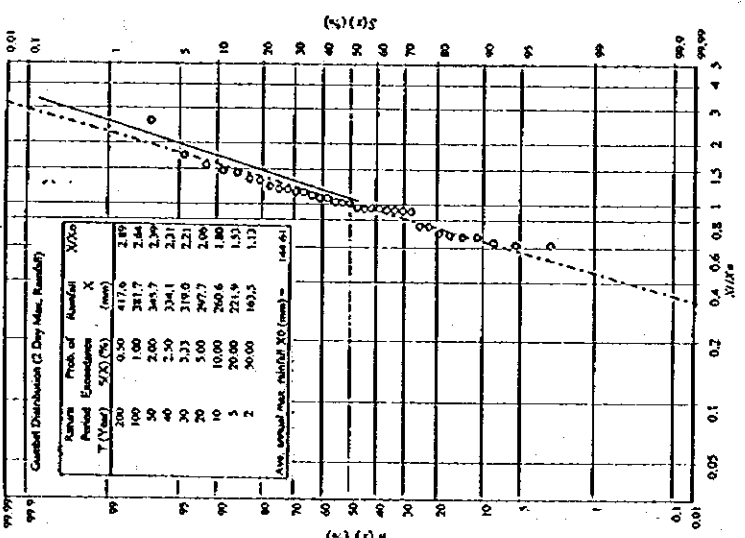


FIG. A.5.5 DISTRIBUTION OF PROBABLE MAXIMUM RAINFALL BY GUMBEL METHOD
STATION: OKINAWA II (CETABOL - JICA)

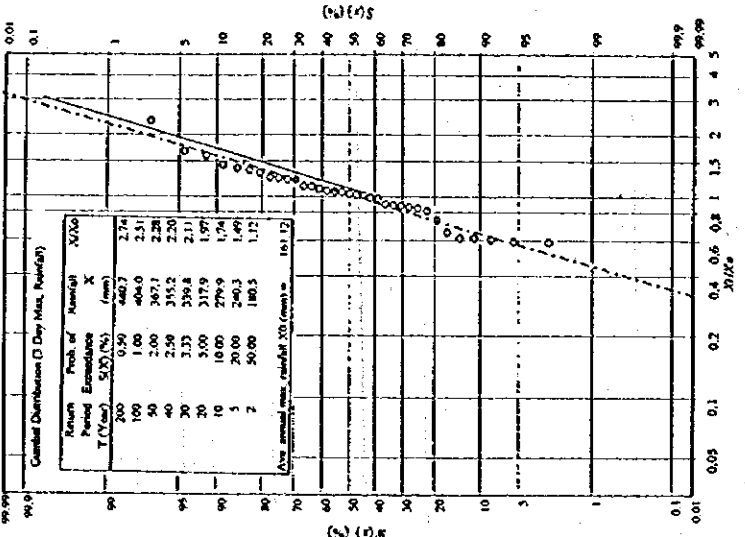
Max Rainfall (1 day)
Col. San Juan de Yapacani
[Thomas Plot]



Max Rainfall (2 day)
Col. San Juan de Yapacani
[Thomas Plot]



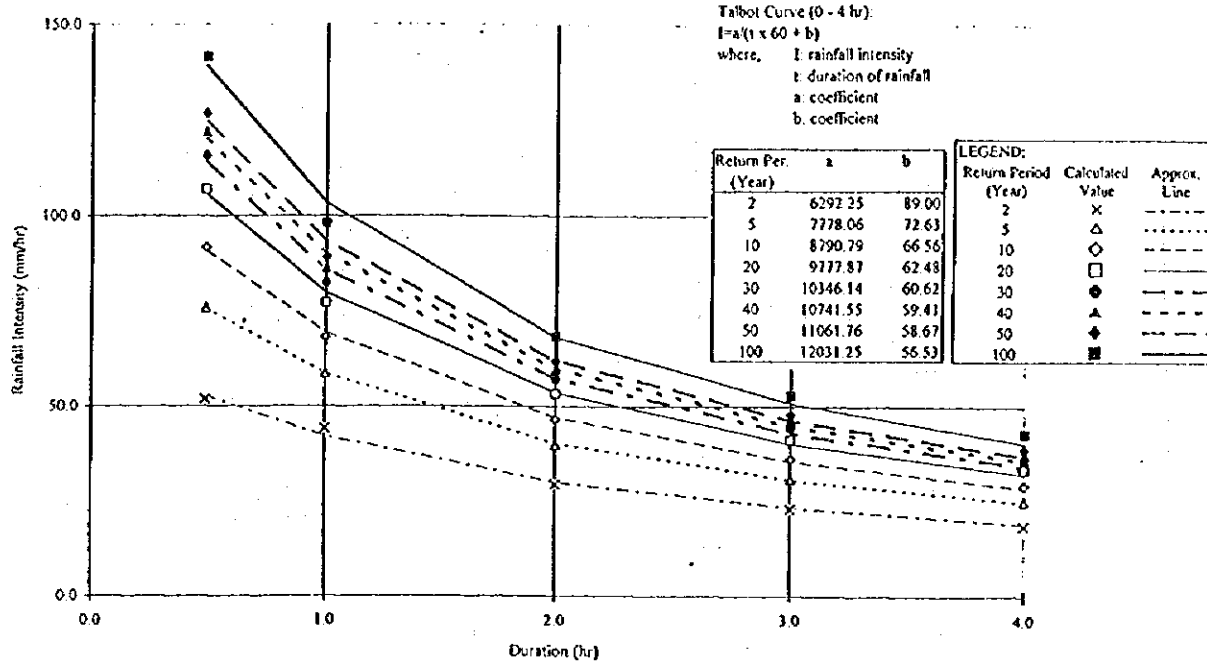
Max Rainfall (3 day)
Col. San Juan de Yapacani
[Thomas Plot]



LEGEND
 Minimum deviation curve
 Gumbel distribution curve

FIG. A.5.6 DISTRIBUTION OF PROBABLE MAXIMUM RAINFALL BY GUMBEL METHOD
STATION: COLONIA SAN JUAN DE YAPACANI (JICA/CAISY)

RAINFALL INTENSITY - DURATION CURVE (0 - 4 HRS)
STATION: SAAVEDRA



RAINFALL INTENSITY - DURATION CURVE (4 - 24 HRS)
STATION: SAAVEDRA

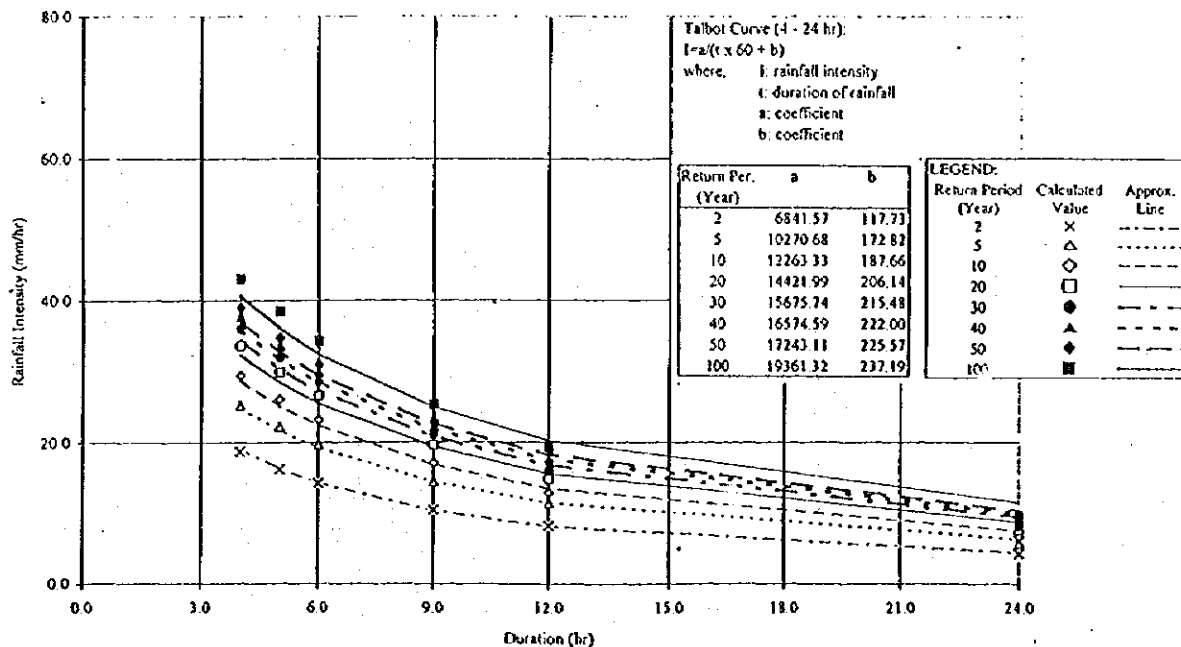
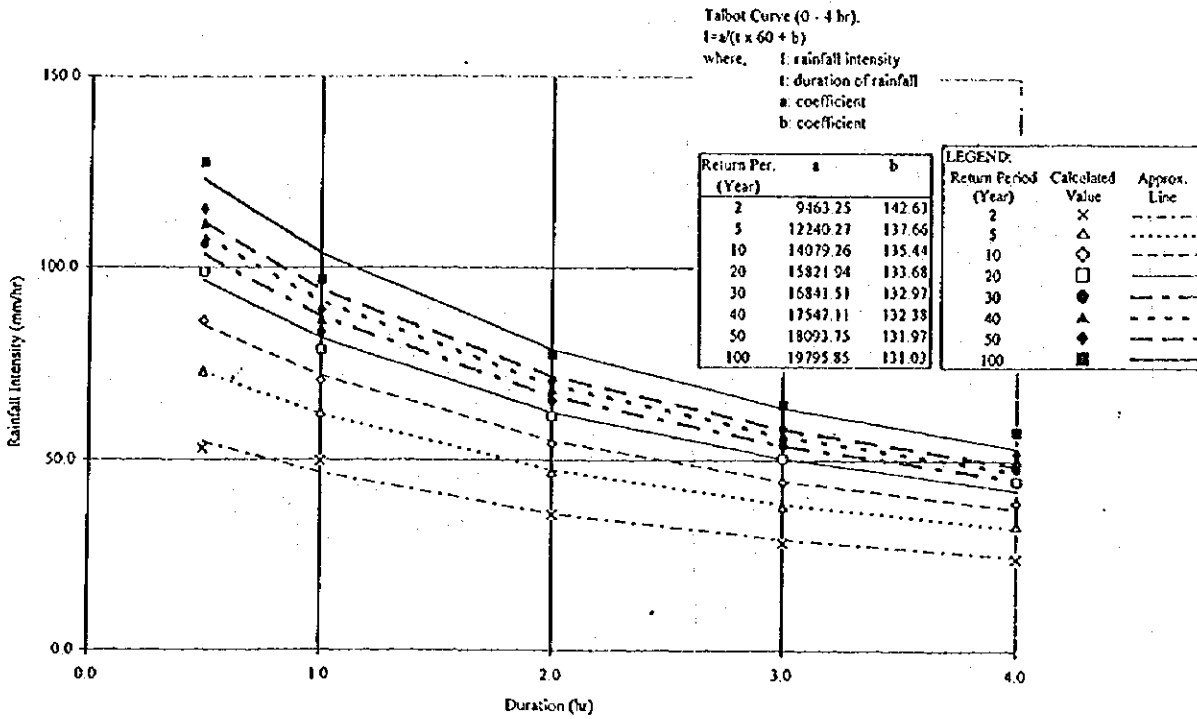


FIG. A.5.7 RAINFALL INTENSITY CURVES OF SAAVEDRA

RAINFALL INTENSITY - DURATION CURVE (0 - 4 HRS)
STATION: SC-OFICINA



RAINFALL INTENSITY - DURATION CURVE (4 - 24 HRS)
STATION: SC-OFICINA

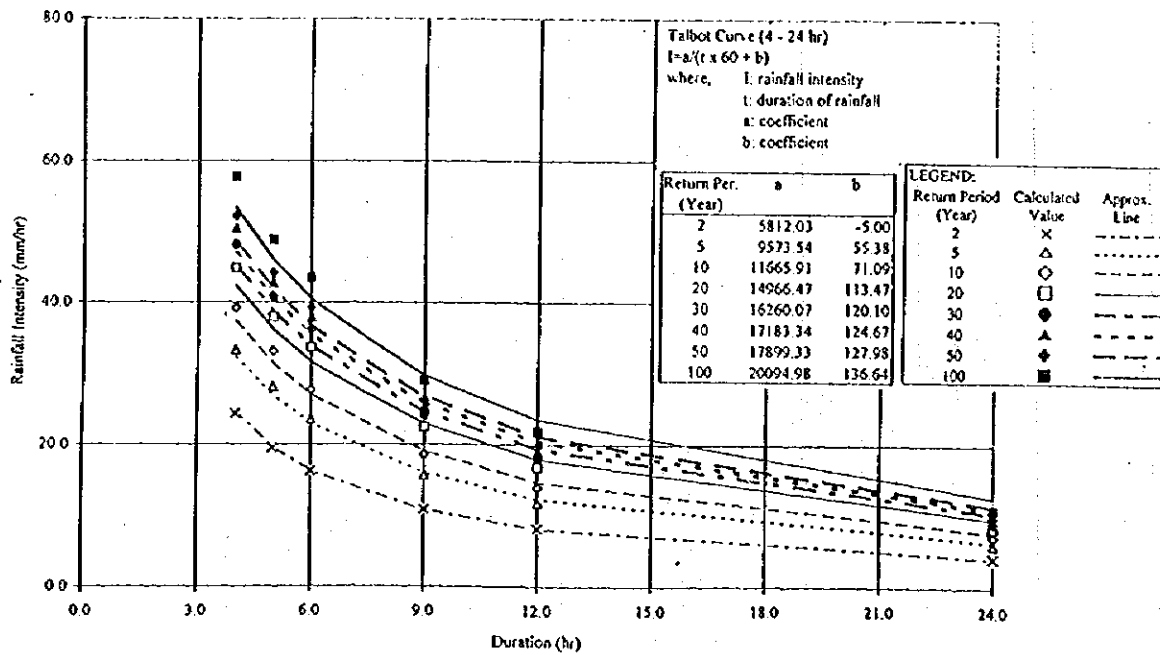


FIG. A.5.8 RAINFALL INTENSITY CURVES OF SANTA CRUZ - OFICINA

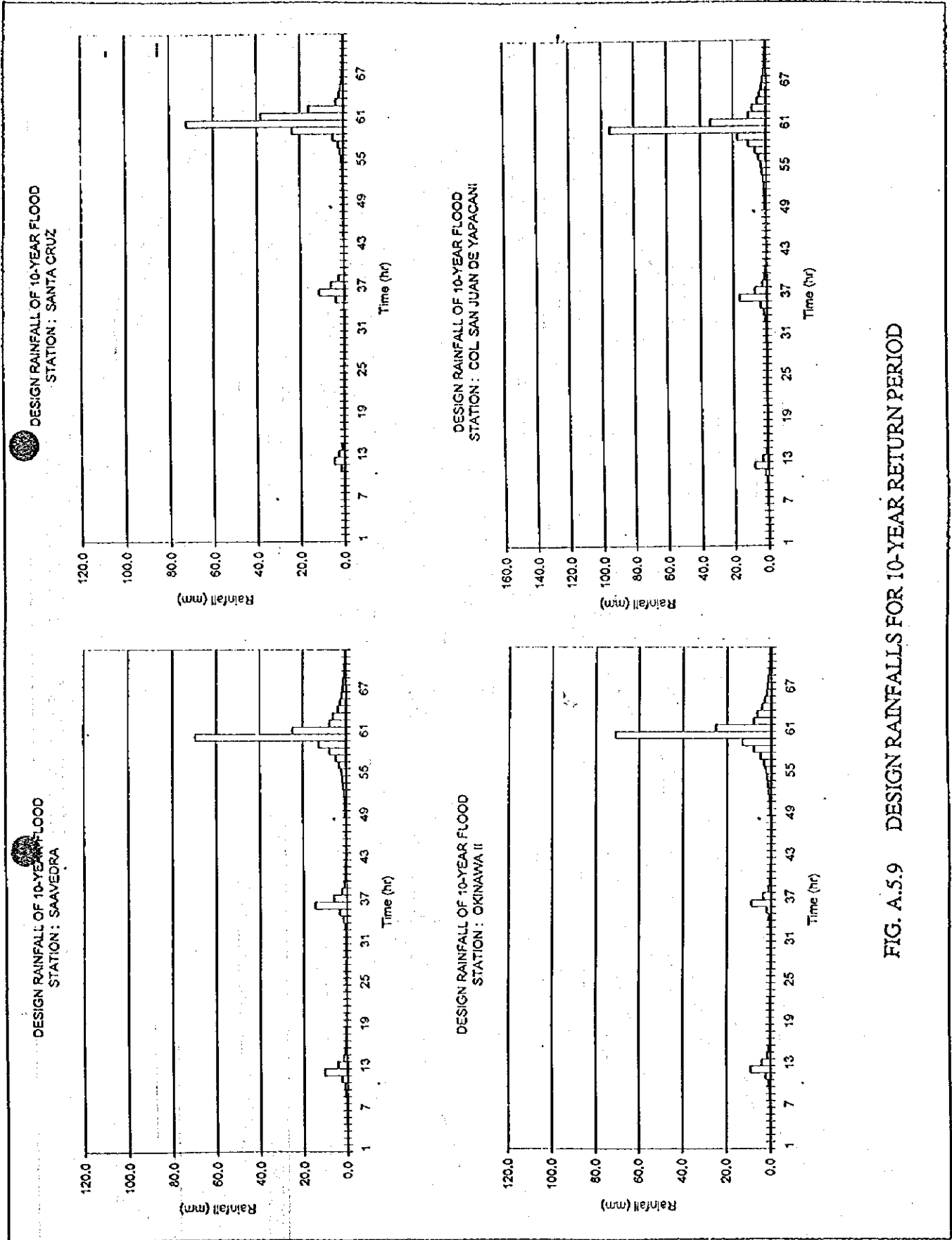
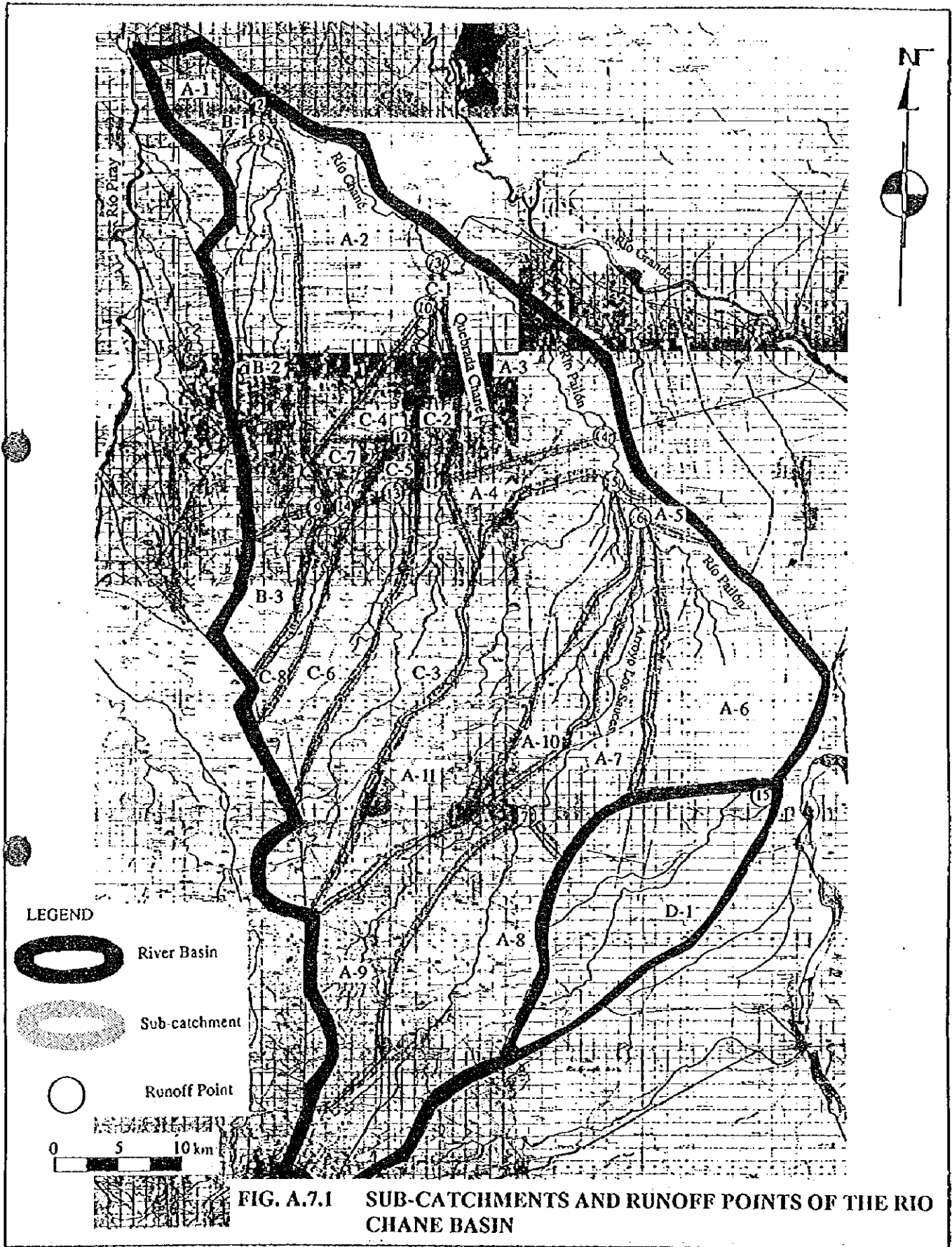


FIG. A.5.9 DESIGN RAINFALLS FOR 10-YEAR RETURN PERIOD



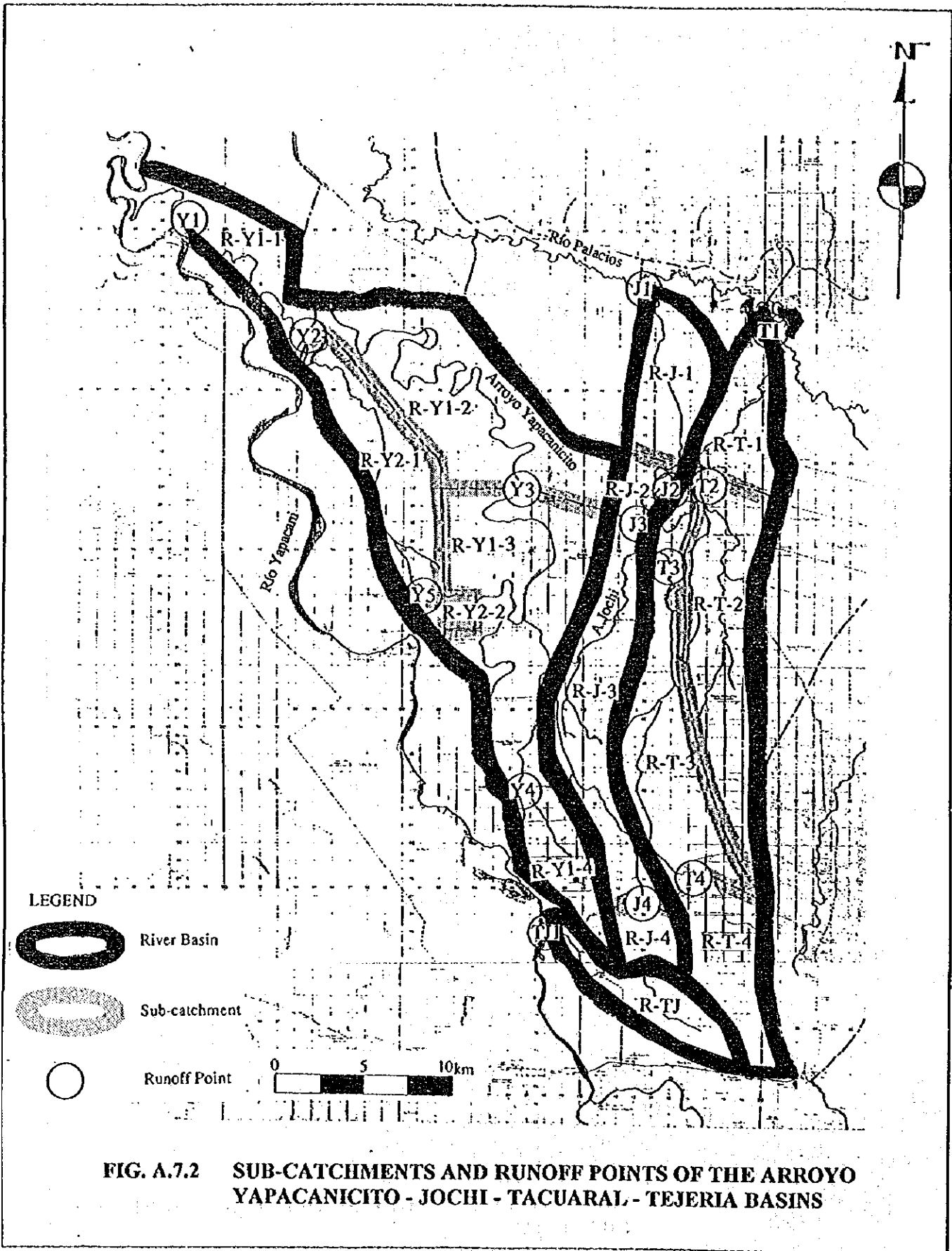
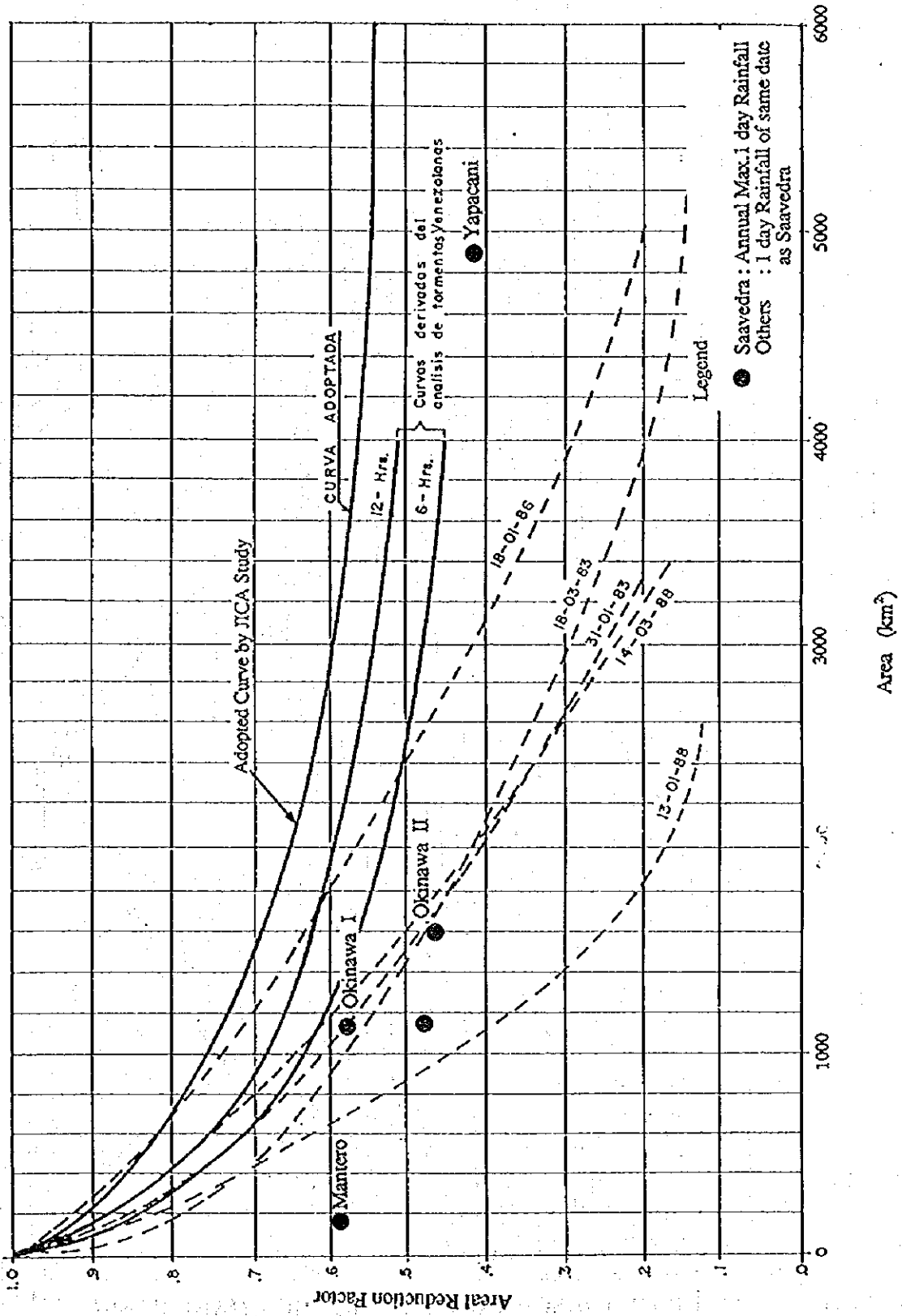


FIG. A.7.2 SUB-CATCHMENTS AND RUNOFF POINTS OF THE ARROYO YAPACANICITO - JOCHI - TACUARAL - TEJERIA BASINS

Areal Reduction Factor (SEARPI)



Source : Programa de Proteccion Contra Las Inundaciones, SEARPI, 1991.

FIG. A.7.3 AERIAL REDUCTION CURVE

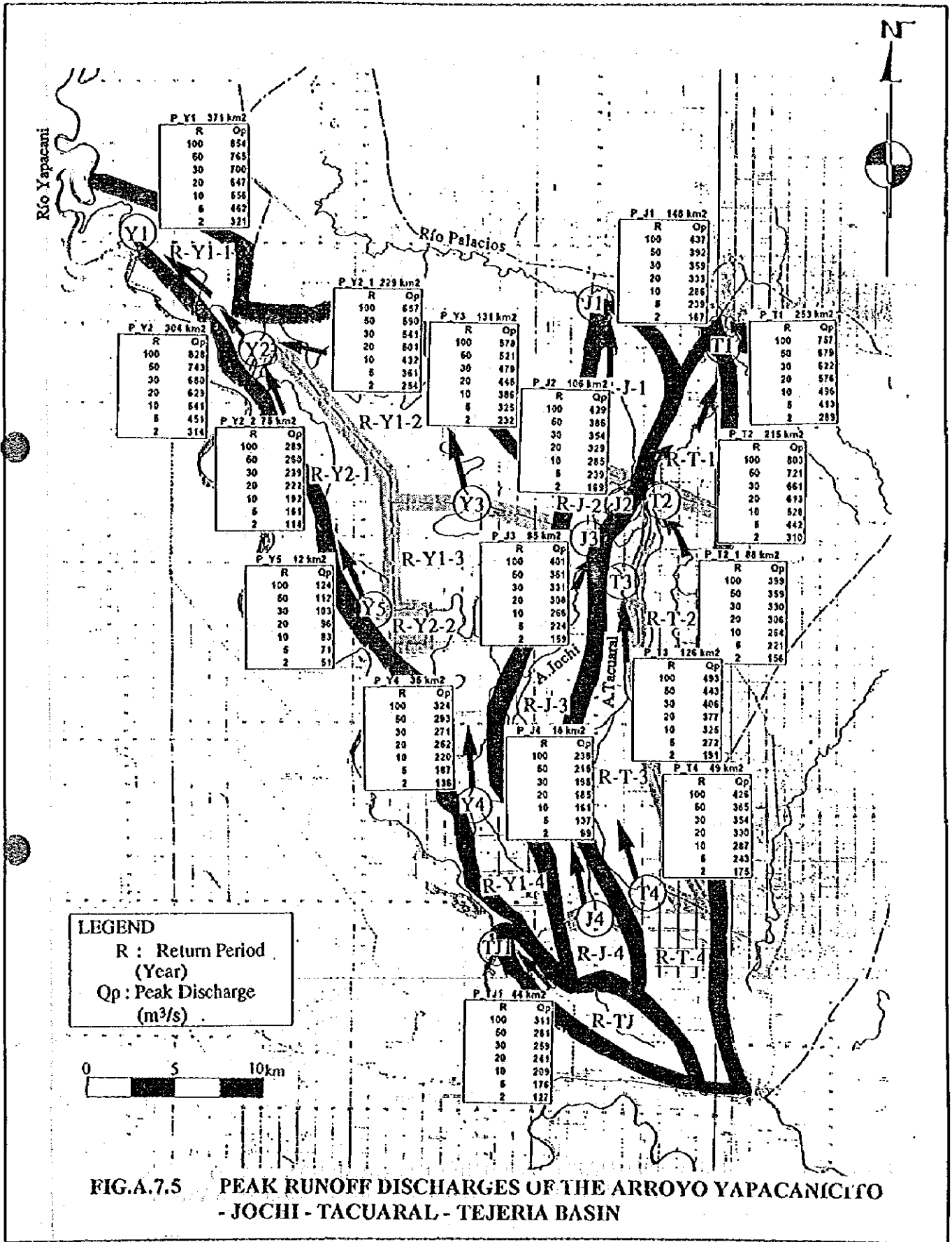
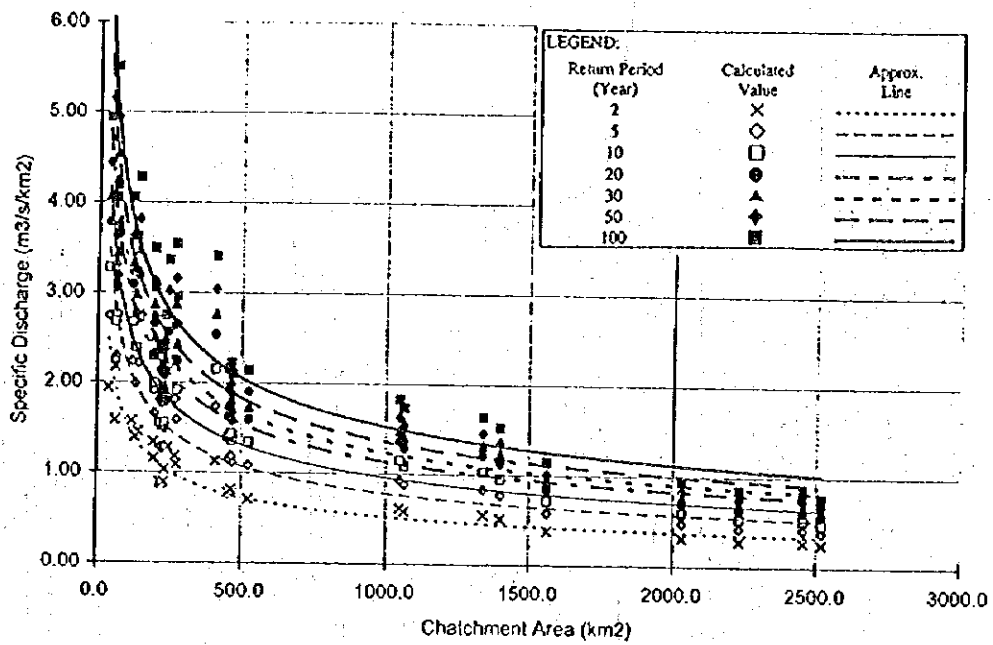


FIG.A.7.5 PEAK RUNOFF DISCHARGES OF THE ARROYO YAPACANICITO - JOCHI - TACUARAL - TEJERIA BASIN

SPECIFIC DISCHARGE OF THE RIO CHANE BASIN



SPECIFIC DISCHARGE OF THE ARROYO YAPACANICITO-JOCHI-TACUARAL-TEJERIA BASINS

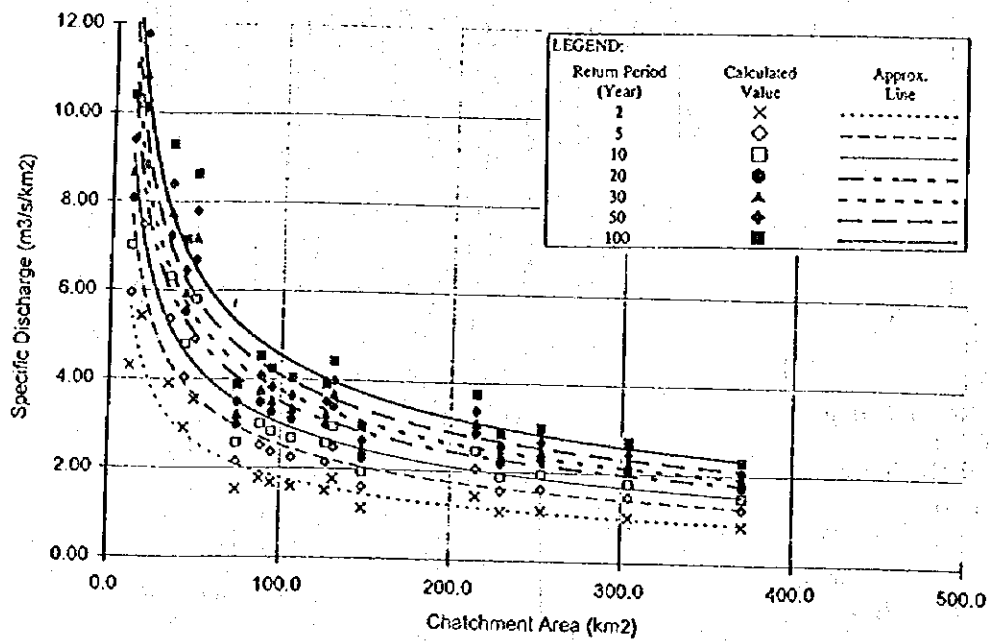
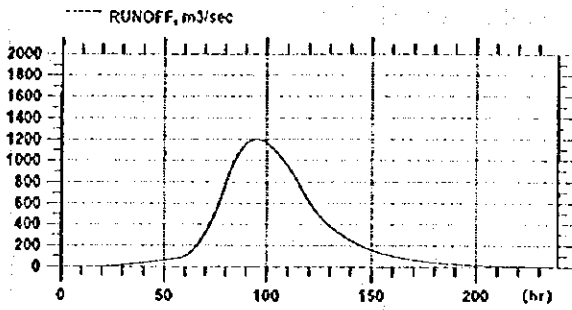
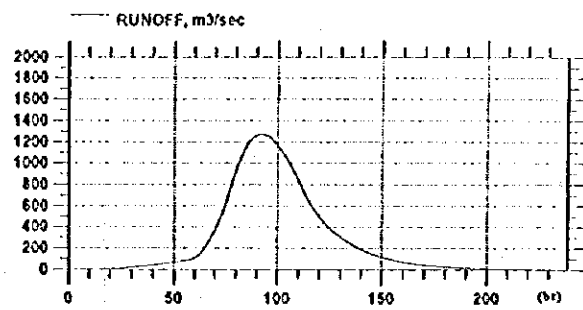


FIG. A.7.6 SPECIFIC DISCHARGES OF THE RIO CHANE BASIN AND ARROYO YAPACANICITO-JOCHI-TACUARAL-TEJERIA BASINS

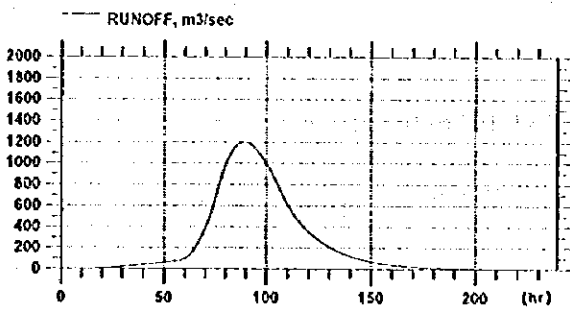
RUNOFF POINT: NO. 1



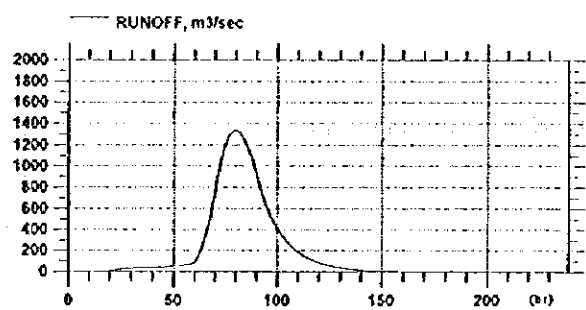
RUNOFF POINT: NO. 2



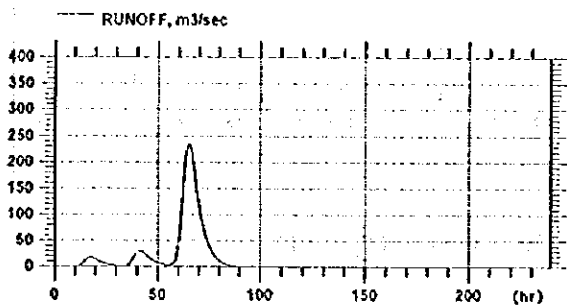
RUNOFF POINT: NO. 3



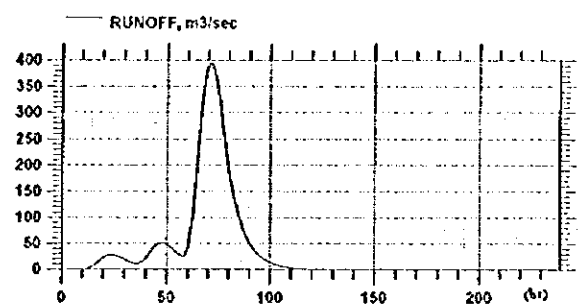
RUNOFF POINT: NO. 4



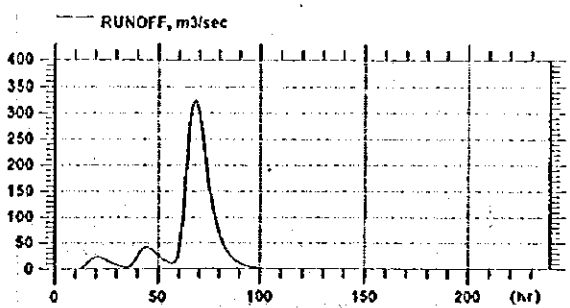
RUNOFF POINT: NO. 9



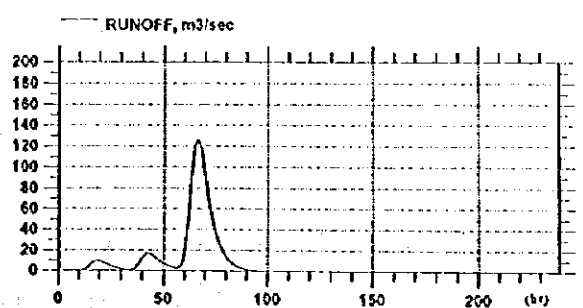
RUNOFF POINT: NO. 11



RUNOFF POINT: NO. 13



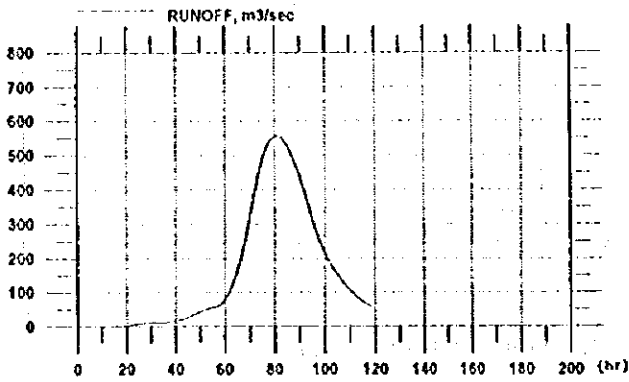
RUNOFF POINT: NO. 14



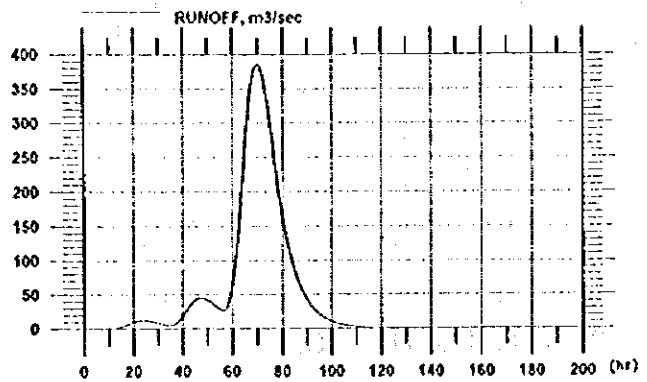
Notes: 1) Locations of runoff points are shown in Fig. A.7.1.
2) Hydrographs are the runoff discharges at 10-Year Floods.

FIG. A.7.7 RUNOFF HYDROGRAPH OF CHANE RIVER BASIN

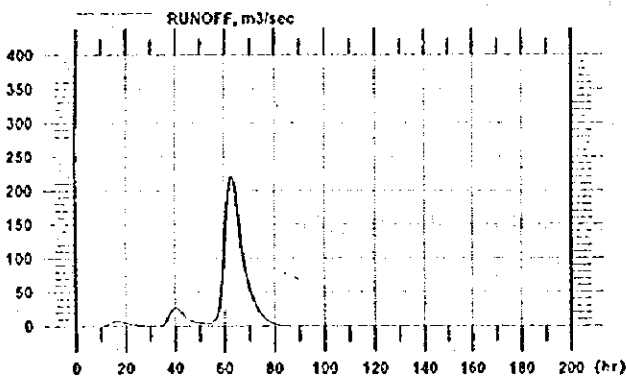
RUNOFF POINT: Y1



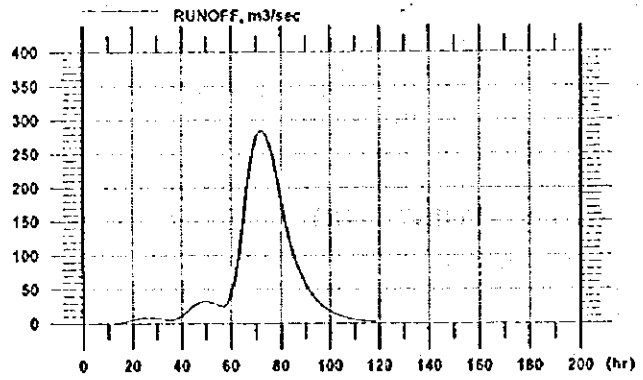
RUNOFF POINT: Y3



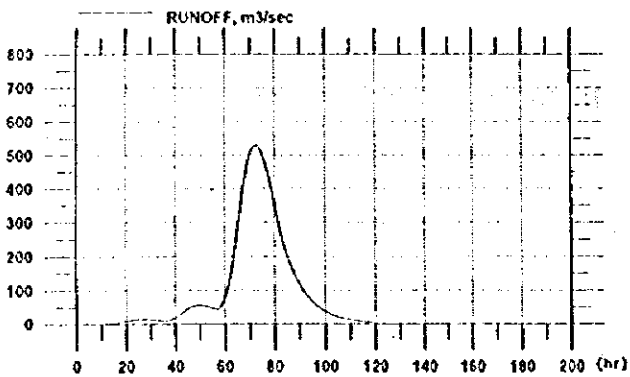
RUNOFF POINT: Y4



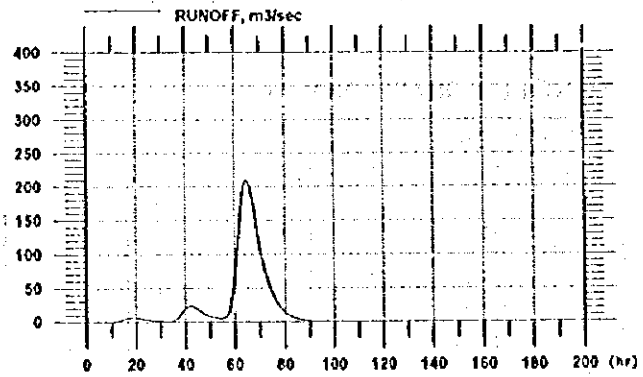
RUNOFF POINT: J2



RUNOFF POINT: T2



RUNOFF POINT: TJ1



Notes: 1) Locations of runoff points are shown in Fig. A.7.2
 2) Hydrographs are the runoff discharges at 10-Year Floods.

FIG. A.7.8 RUNOFF HYDROGRAPH OF ARROYO YAPACANICITO-JOCHI-TACUARAL BASINS

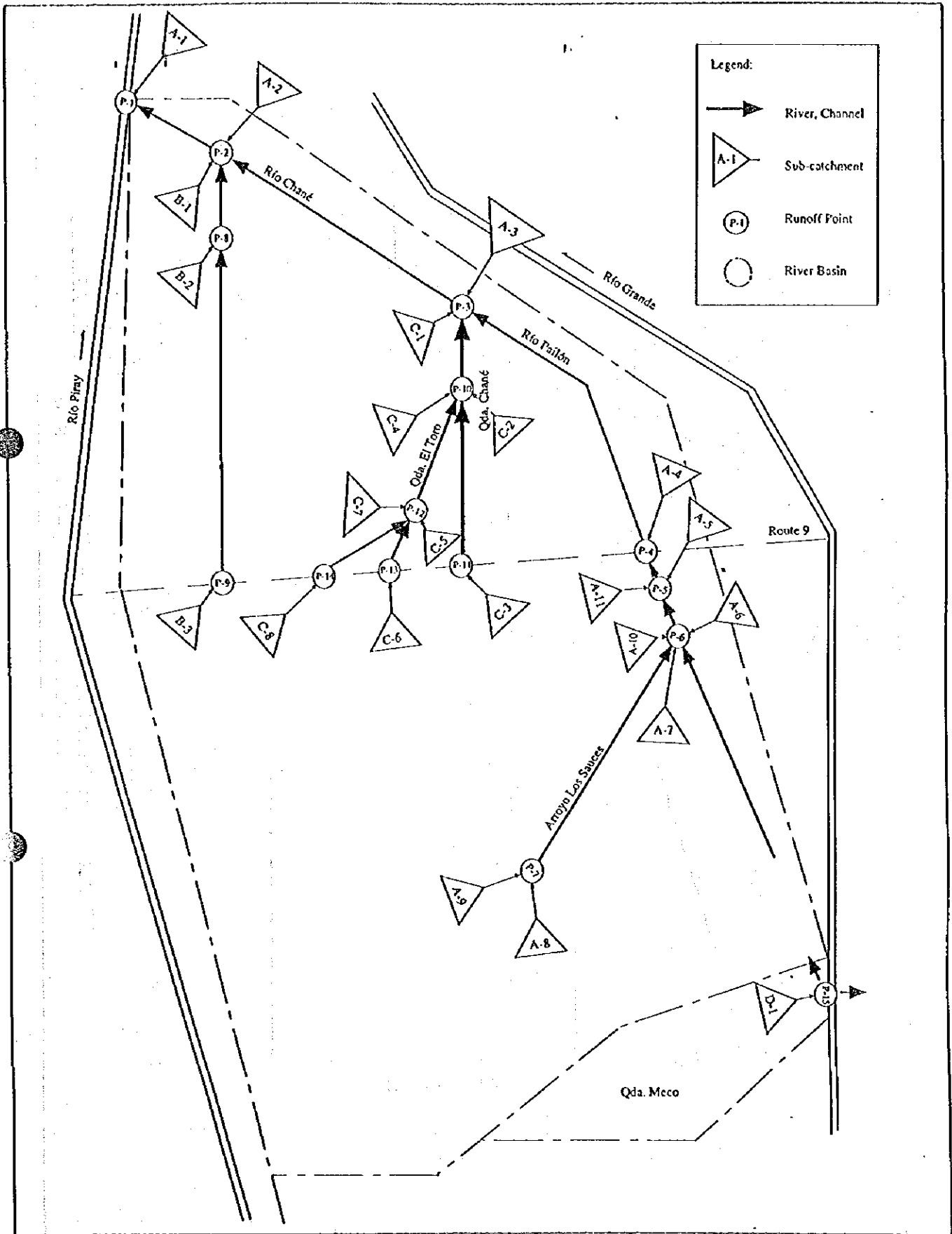


FIG. A.8.1 MODEL STRUCTURE OF FLOOD ANALYSIS FOR THE RIO CHANE BASIN

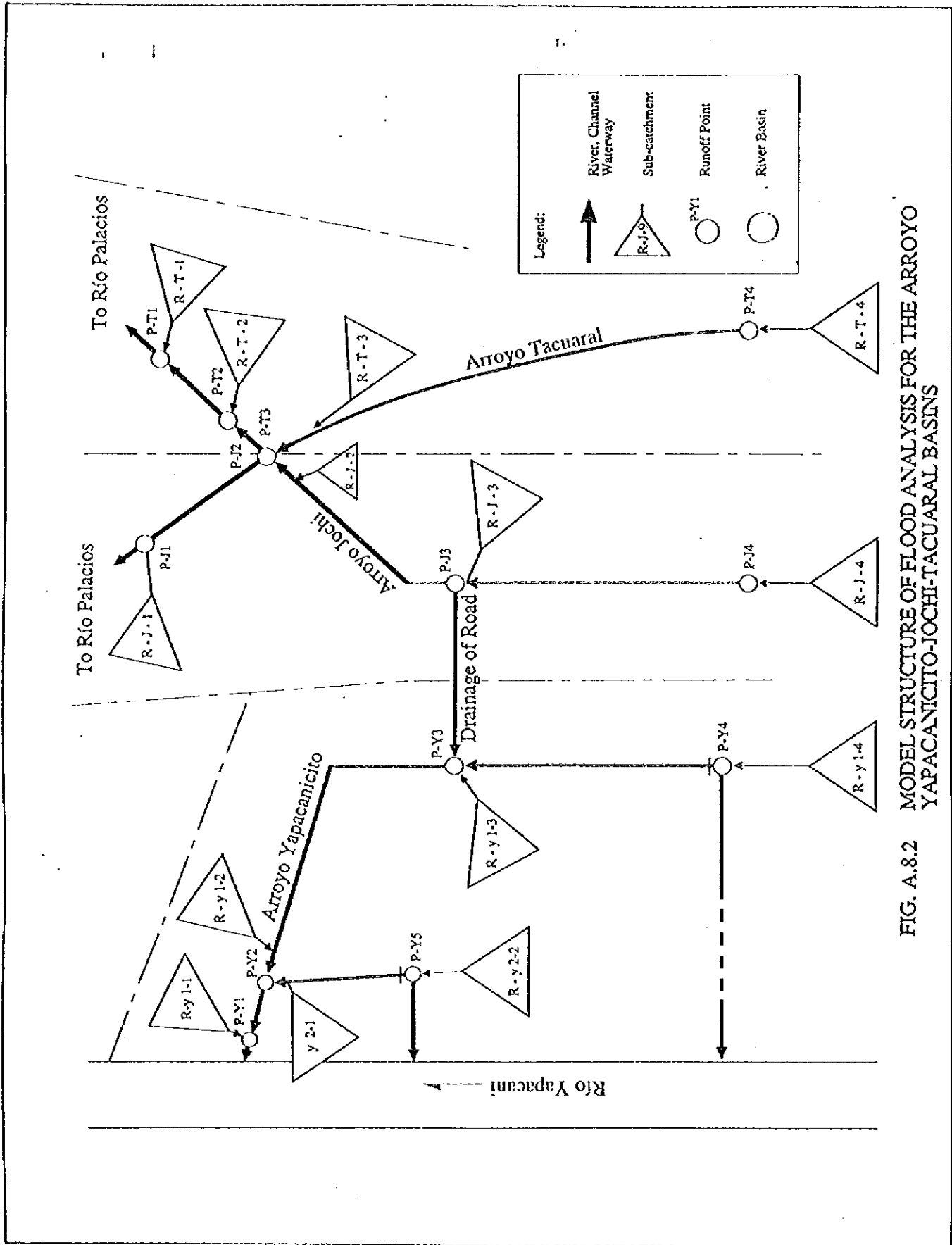


FIG. A.8.2 MODEL STRUCTURE OF FLOOD ANALYSIS FOR THE ARROYO YAPACANICITO-JOCHI-TACUARAL BASINS

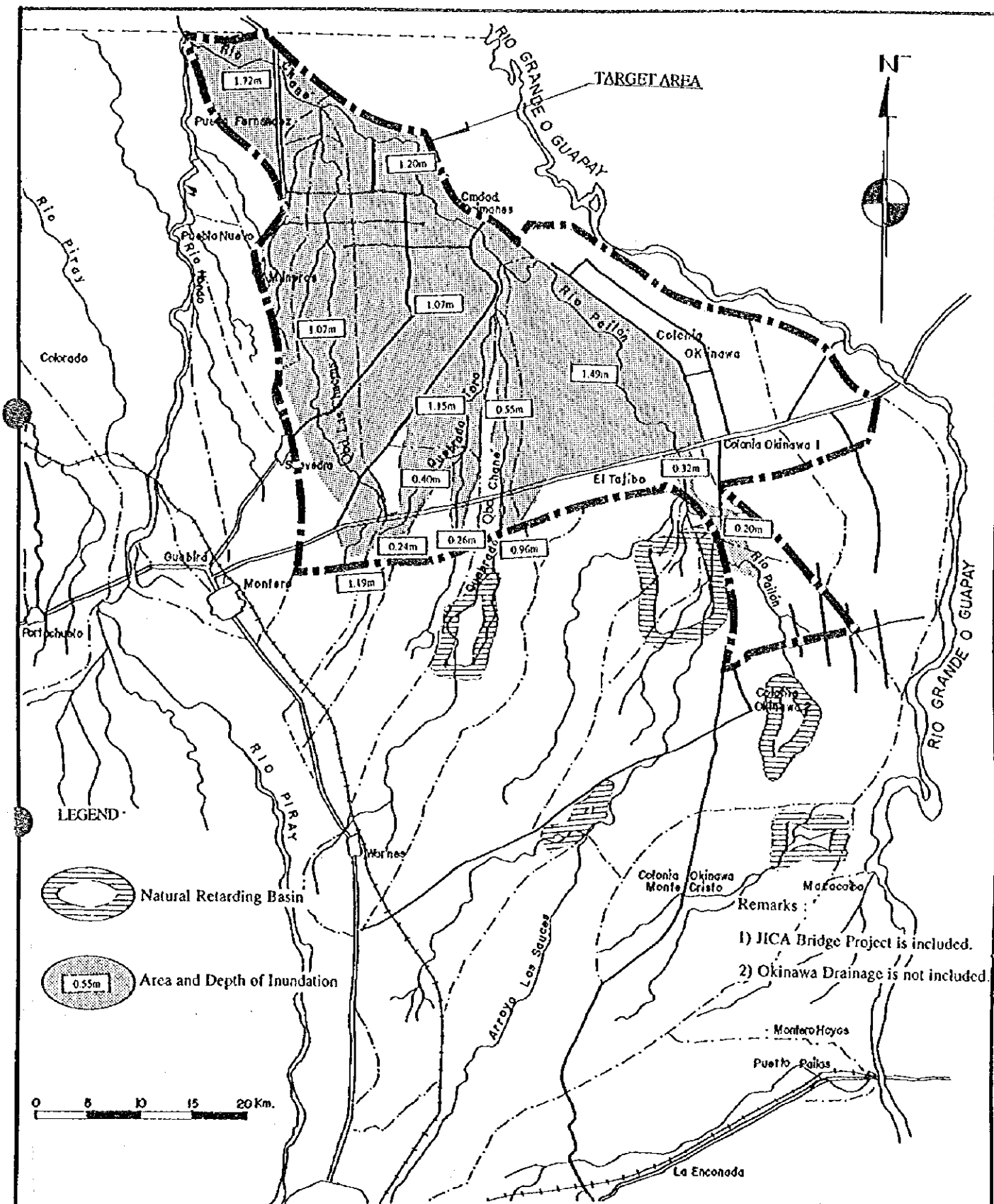
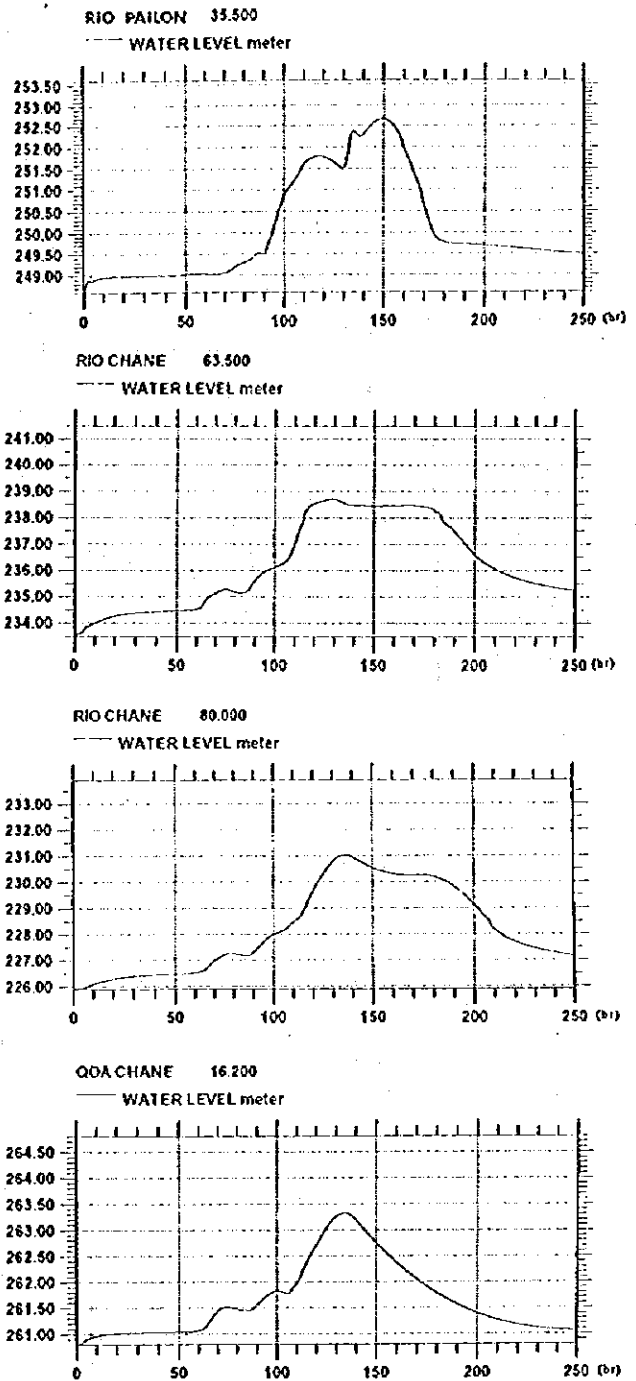
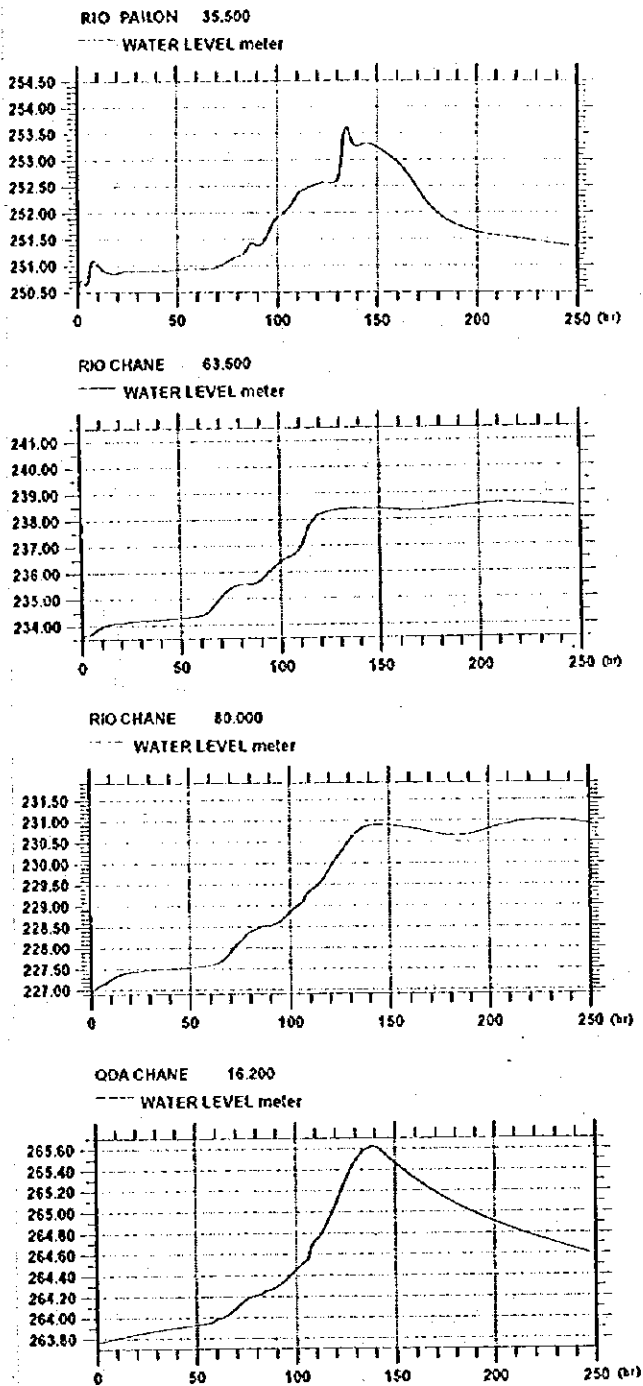


FIG. A.8.5 SIMULATION OF 10 YEAR FLOODS WITHOUT FLOOD MITIGATION AND DRAINAGE IMPROVEMENT - CHANE - PAILON AREA (RIO CHANE BASIN)

Without Project

With Alternative I

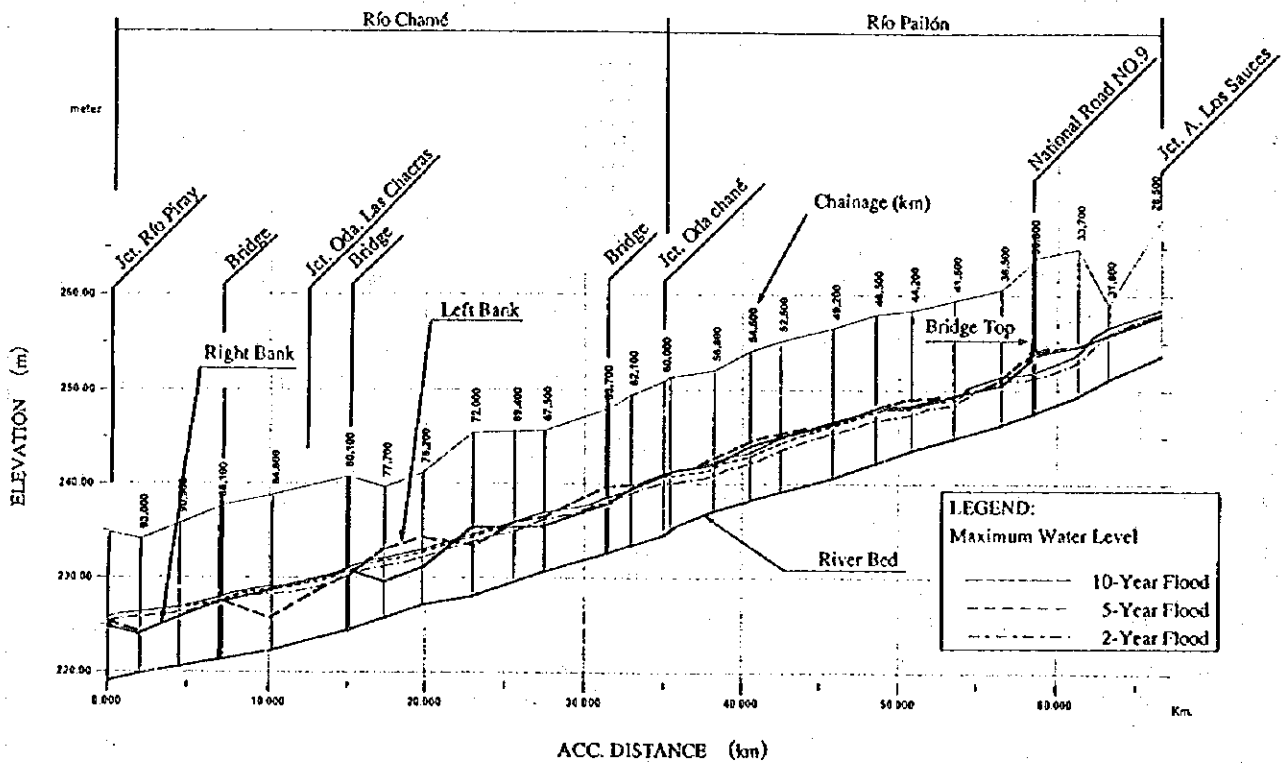


Notes: 1) Title of each water level hydrograph means the river name with chainage (km).
 2) Hydrographs are the water level of 10-Year Floods.

FIG. A.8.7

COMPARISON OF SIMULATED HYDROGRAPH OF FLOOD WATER LEVEL CHANE-PAILON; WITHOUT PROJECT AND ALTERNATIVE I

(1) RIO CHANE AND RIO PAILON



(2) QUEBRADA CHANE

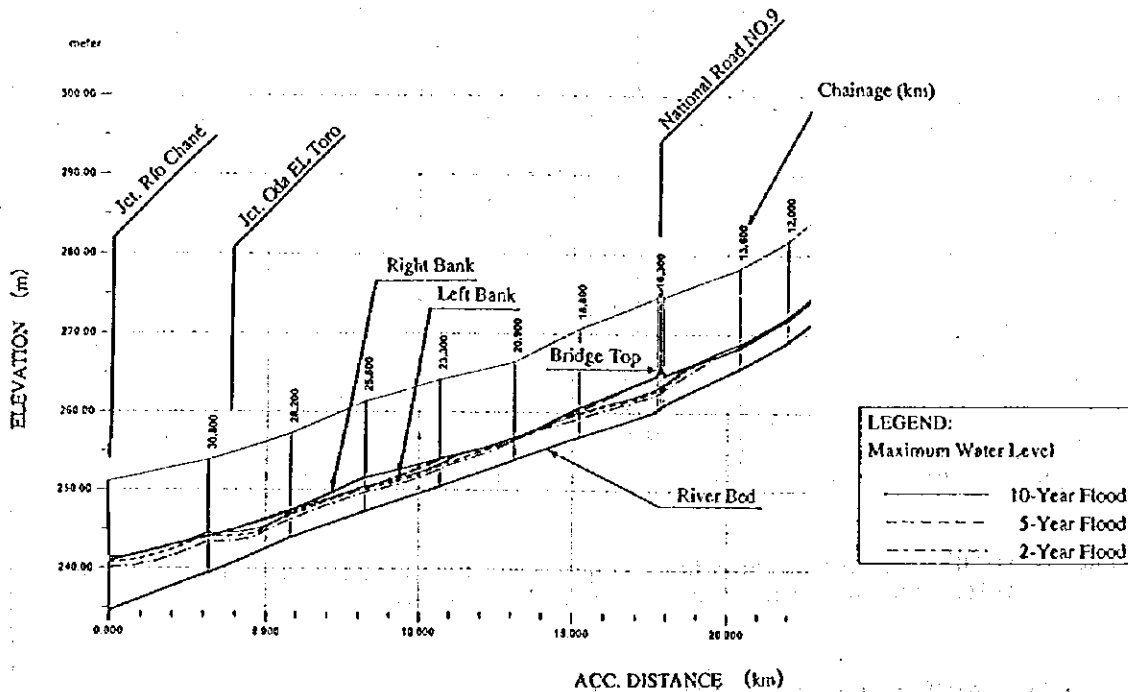


FIG. A.8.8 SIMULATED MAXIMUM WATER LEVEL OF PROBABLE FLOODS CHANE - PAILON: ALTERNATIVE I

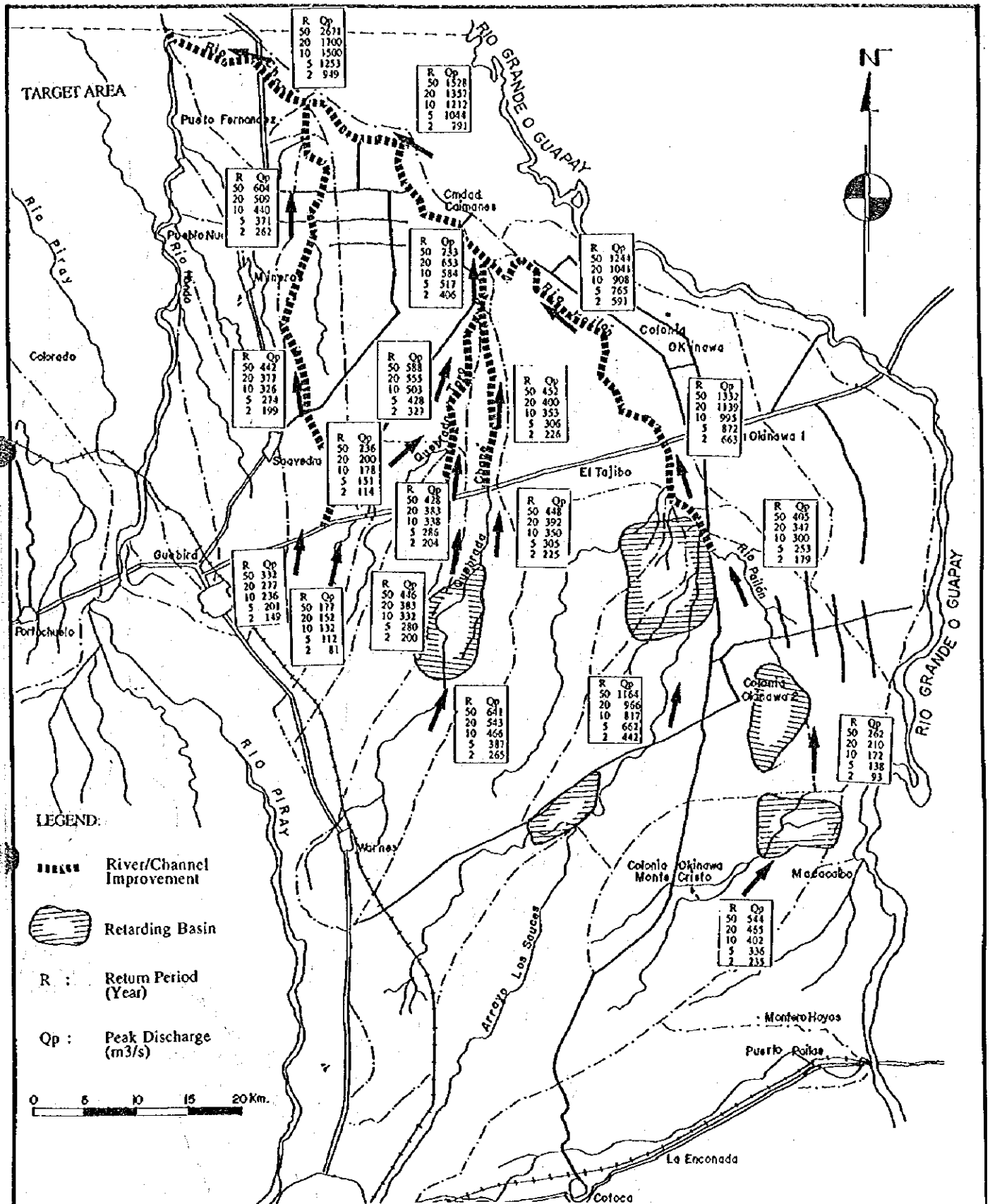
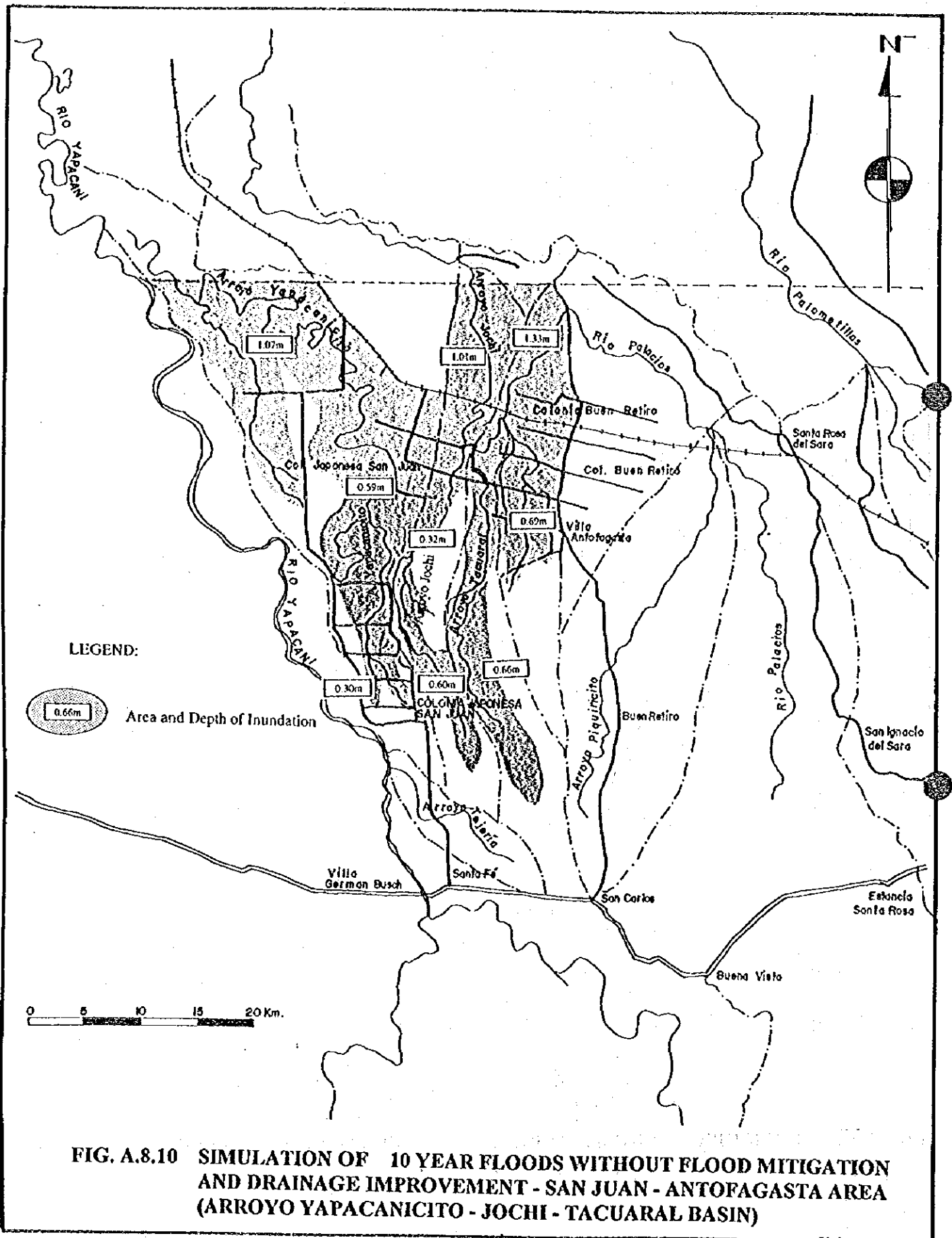
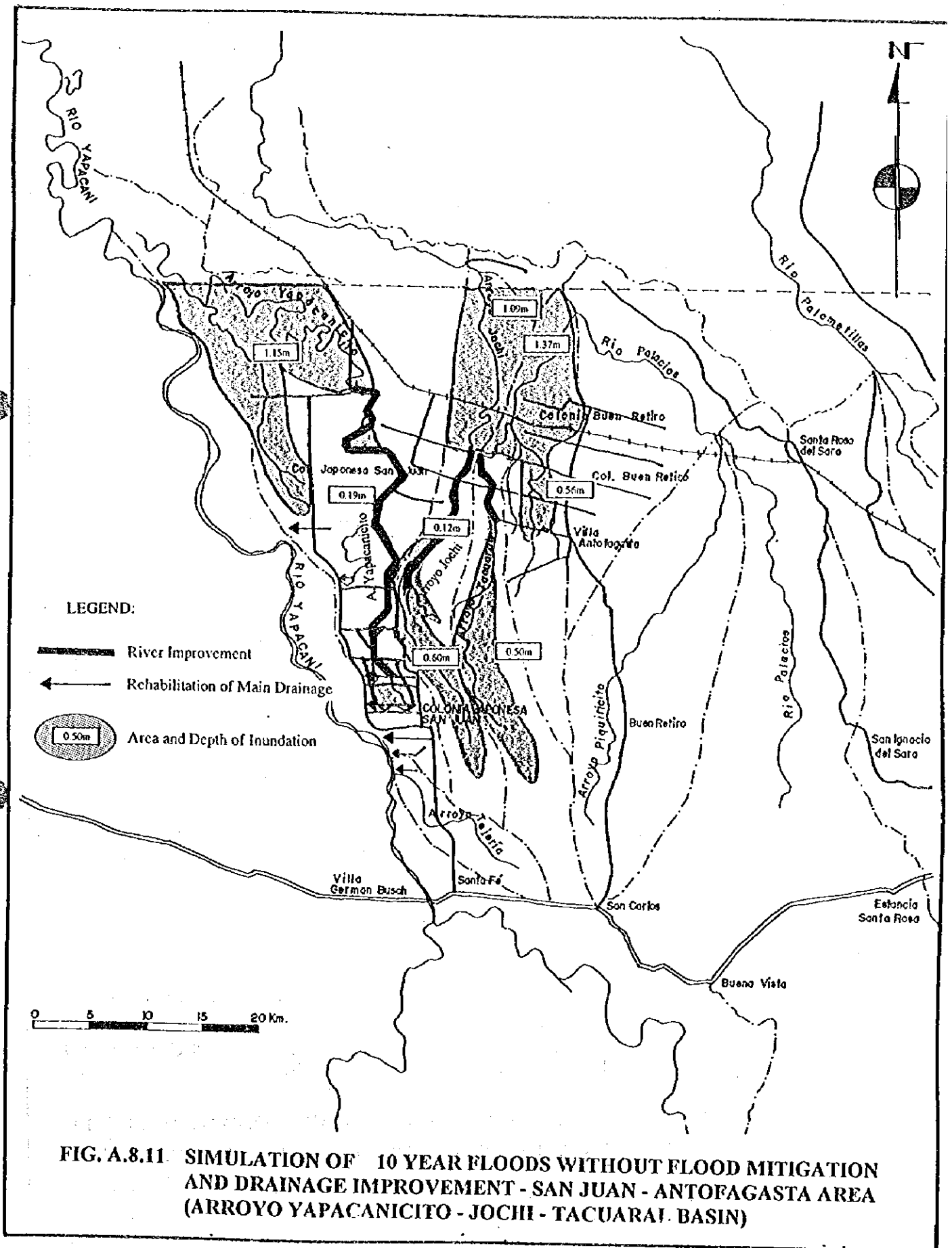


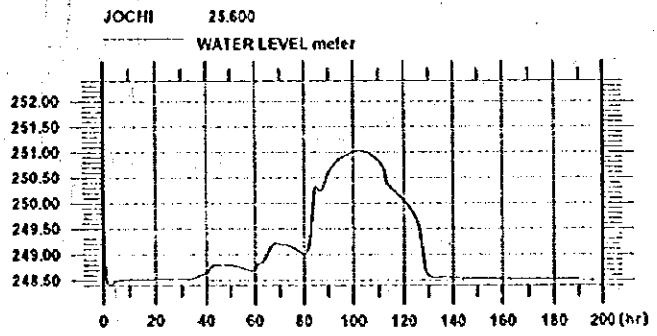
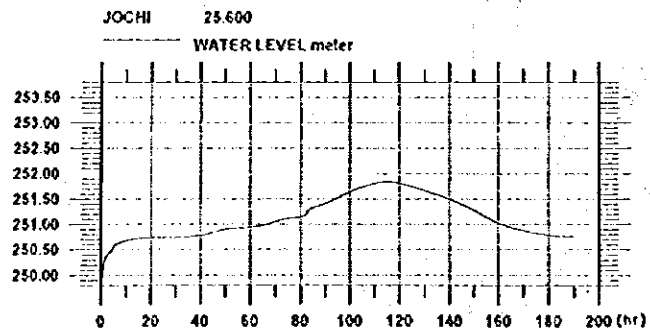
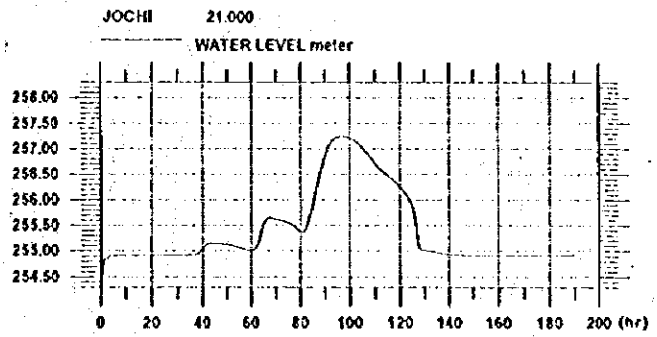
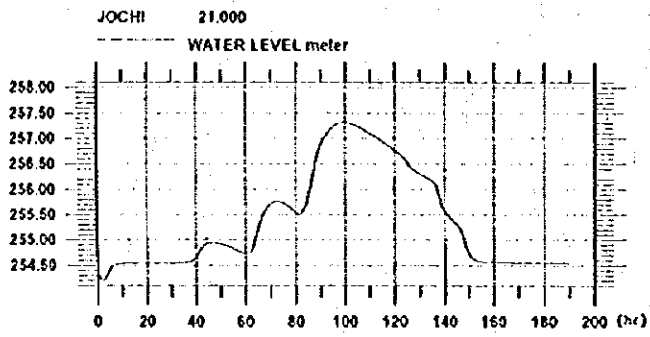
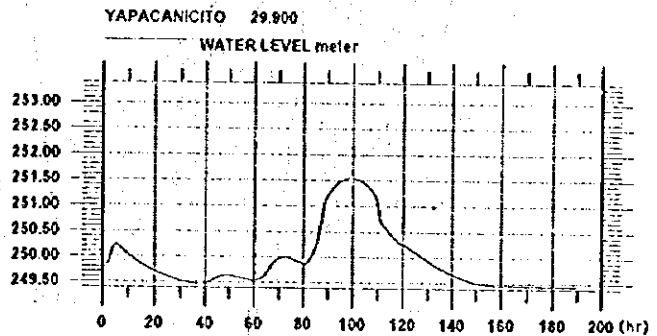
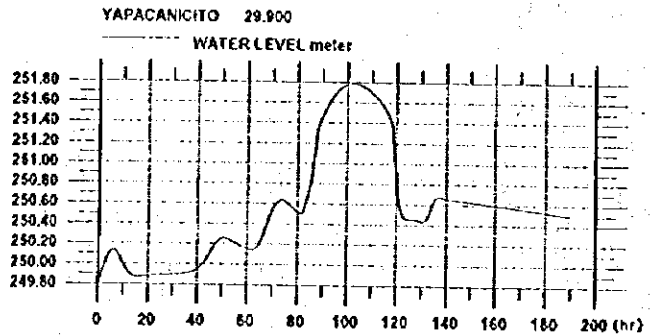
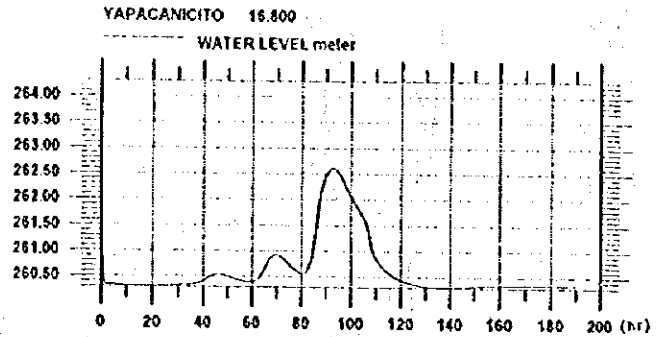
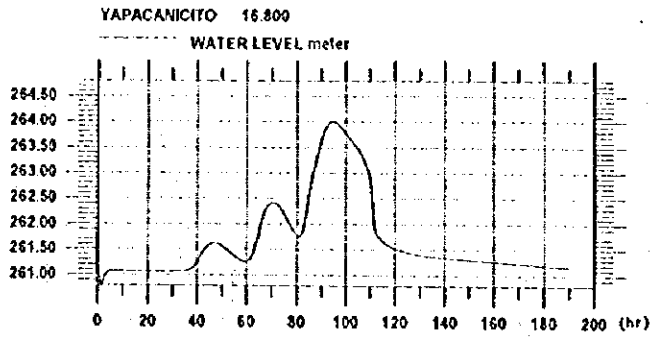
FIG. A.8.9 PEAK DISCHARGE BY HYDRAULIC SIMULATION FOR CHANE - PAILON AREA : ALTERNATIVE I (RIO CHANE BASIN)





Without Project

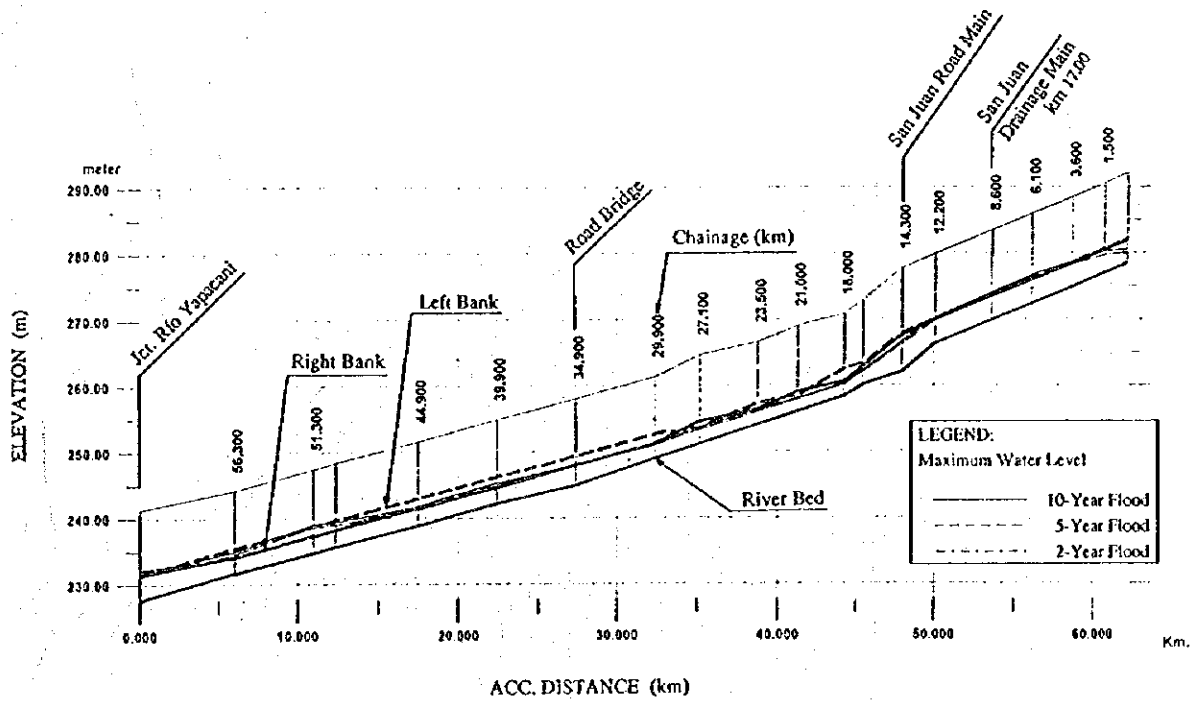
With Alternative I



Notes: 1) Title of each water level hydrograph means the river name with chainage (km).
2) Hydrographs are the water level at 10-Year Floods.

FIG. A.8.12 COMPARISON OF SIMULATED HYDROGRAPH OF FLOOD WATER LEVEL SAN JUAN-ANTOFAGASTA: WITHOUT PROJECT AND ALTERNATIVE I

(1) Arroyo Yapacanicito



(2) Arroyo Jochi

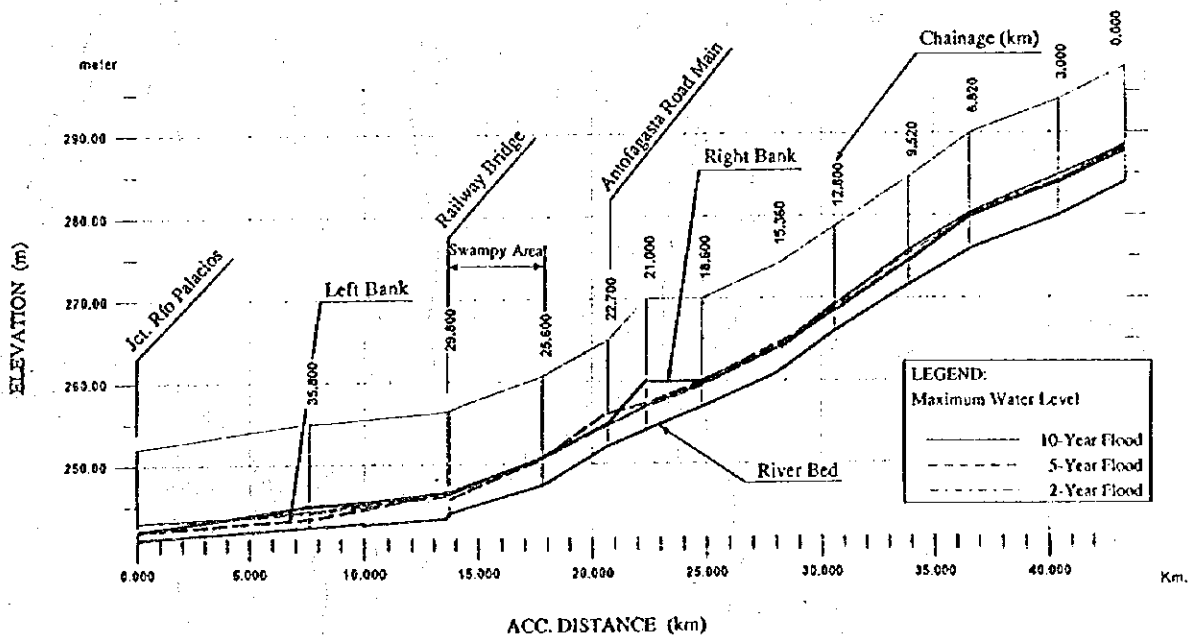


FIG. A.8.13 SIMULATED MAXIMUM WATER LEVEL OF PROBABLE FLOODS SAN JUAN - ANTOFAGASTA ; ALTERNATIVE I

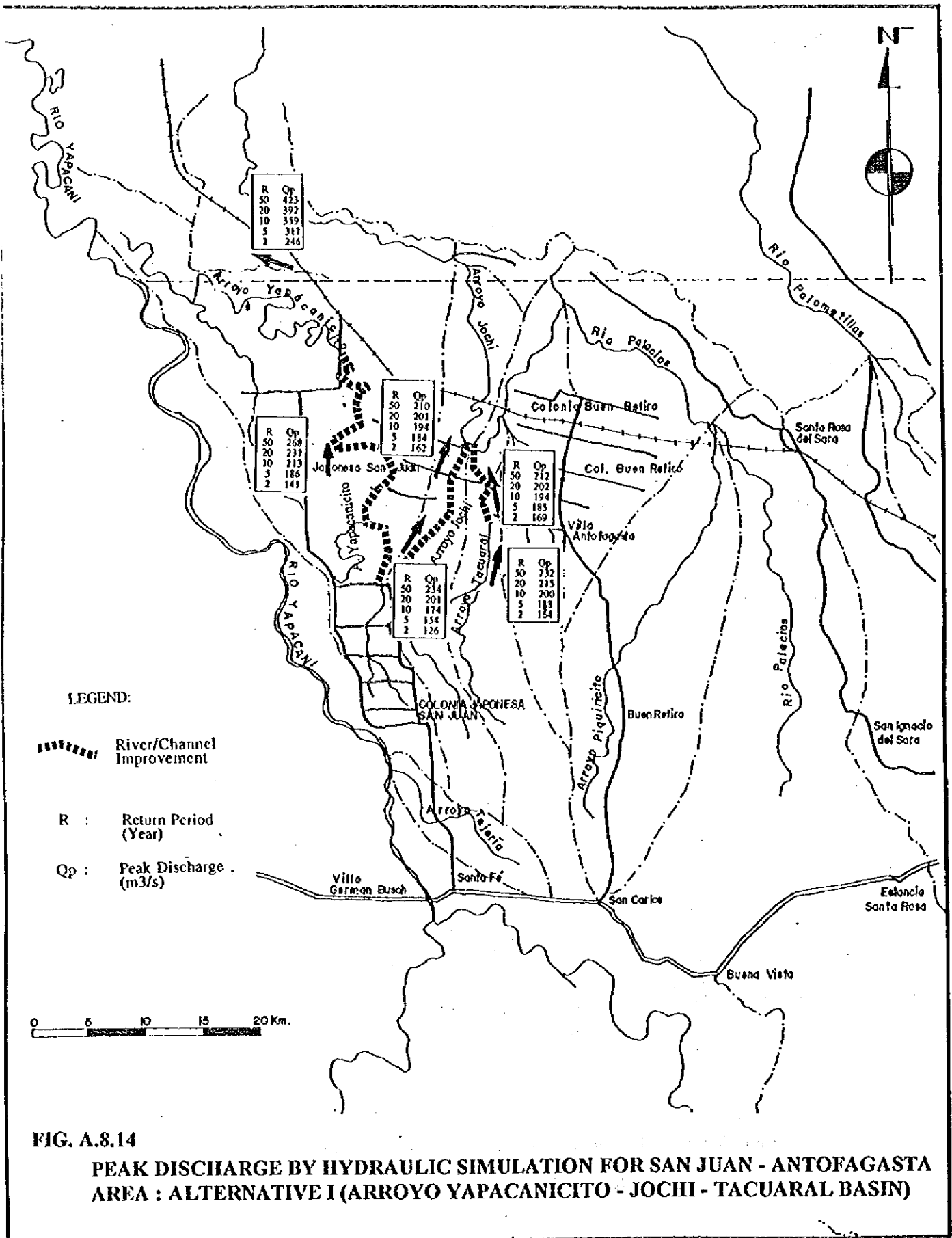


FIG. A.8.14

PEAK DISCHARGE BY HYDRAULIC SIMULATION FOR SAN JUAN - ANTOFAGASTA AREA : ALTERNATIVE I (ARROYO YAPACANICITO - JOCHI - TACUARAL BASIN)

SUPPORTING REPORT B

SOCIO-ECONOMY

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SUPPORTING REPORT B SOCIO - ECONOMY

1. General

The Republic of Bolivia is located between 57° 25' and 69° 38' of east longitude and 2° 38' and 22° 53' of south latitude, in the centre of the South America. It borders the Republic of Brazil on the north and east, the Republics of Paraguay and Argentina on the south, and the Republics of Chile and Peru on the west. The country occupies a total land of 1,098,582 km² and has a population of 6,420,792 according to the 1992 Census.

The capital of Bolivia is Sucre city in the Department of Chuquisaca, but the national administrative affairs are carried out in La Paz where has the Central Government. The Central Government consists of 10 ministries: Foreign Affairs, Sustainable Development and Environment, Human Development, Housing and Economic Development, Justice, Employment, Government, President, National Defense, and Communications. It is administered by twelve Ministers (including two without portfolio) under the command of the President of Republic.

The Regional Governments, under the jurisdiction of the Central Government, are administratively composed of nine Departments; Chuquisaca, La Paz, Cochabamba, Santa Cruz, Oruro, Potosi, Tarija, Beni and Pando. Each Department has several Provinces which consist of 112 units in the country as a whole. Further, the Provinces are divided into Municipal Sections and Cantons which number in 296 and 1,648 respectively in the whole country.

The Department of Santa Cruz, which includes the Study Area, consists of 15 Provinces, 46 Municipal Sections and 162 Cantons. It has an area of 370,621 km² and a population of 1,364,389 in the 1992 Census. The Santa Cruz city, a capital of the Department, has the 697,278 population and forms a centre of political, administrative, commercial and industrial aspects as the second greater city in the country.

The Study Area is located in the northern part of the Santa Cruz city and spreads over five provinces; Andres Ibanez, Warnes, Ichilo, Sara and Obispo Santistevan. It has an area of approximately 7,000 km² and the 220,000 population.

2. Population

2.1 Census Population

2.1.1 Bolivia

Since 1950, a population census of the Republic of Bolivia has been conducted three times: 1950, 1976 and 1992. The Bolivian population reached 6,420,792 in 1992, growing at an average annual rate of 2.09 % for the period 1976-1992 and 1.64 % for the period 1950-1976, and in 1992 the population density reached 5.84 persons/km² which corresponds to over twice of the 1950 population density (see *Table B.2.1*).

2.1.2 Department of Santa Cruz

The population of the Department of Santa Cruz amounted to 1,364,389 in 1992, which corresponded to 21 % of the whole country population. The average annual growth rate of population was 3.56 % for the periods 1950-1976 and 4.16 % for the periods 1976-1992. As shown in *Table B.2.1*, these population growth rates are the rapidest among the nine Departments, and further are showing an upward trend.

The population density of the Department of Santa Cruz in 1992 indicated 3.68 persons/km², which is lower than the national average density, due to the extensive territory. However, It is expected that the population density in the Department of Santa Cruz will be rapidly increased from now on, owing to a favorable natural and social environments.

2.1.3 Provinces in the Department of Santa Cruz

Table B.2.2 presents a provincial distribution of the population in the Department of Santa Cruz in 1976 and 1992. In 1992 the Andres Ibanez province had a population of 784,678 which accounted for 57 % of the total population of Department. In the Andres Ibanez province, the Santa Cruz city had a population of 725,087 which corresponds to 92 % of the provincial population. Accordingly, the Santa Cruz city accounted for more than half (53 %) of the department population in 1992.

During the intercensal period from 1976 to 1992, the average annual growth rate of the Department of Santa Cruz indicated 4.16 %, consisting of 6.21 % for the urban area and 0.80 % for the rural area. It is noticeable that the urban population was a

considerably increase during this period. Especially, the urban population of Ichilo province indicated high growth at an annual rate of 9.24 % on average for the same period. Following the Ichilo province, the urban populations of Valasco, Warnes and Andres Ibanez provinces were the annual growth rate of 7.68 %, 7.41 % and 6.59 % respectively (*Table B.2.2*).

2.1.4 Study Area

The Study Area is composed of five provinces; Andres Ibanez (except the Santa Cruz city), Warnes, Ichilo, Sara and Obispo Santistevan. It contains 23 Cantons in total and has the 219,771 population in 1992, composed of the urban population of 119,485 and the rural population of 100,286. In the same year, the number of households was 46,801, and the family size indicated 4.70 persons per household on average. These distributions by province and canton are given in *Table B.2.3*.

Communities in the Study Area reaches about 370 in number. *Tables B.2.4 to B.2.8* give population, number of households and family size according to each community. These data will be utilized as a basic material for the flood damage analysis described in the **Supporting Report "K"**.

2.2 Population Projections

The population projections for the whole country and the Department of Santa Cruz were prepared by INE and Cordecruz, respectively. These summaries are as follows:

- (1) Estimaciones y Proyecciones de La Poblacion 1950-2050, Bolivia, Instituto Nacional de Estadistica, 1994

In December 1994, the national population projection was carried out at 5-year interval for 100 years from 1950 to 2050, under some assumptions on fertility, mortality and migration, using the principal population data such as Censo Demografico (1950), Encuesta Demografica Nacional (EDEN 1975), Censo Nacional de Poblacion y Vivienda (CNPV 1976), Encuesta Demografica Nacional (EDEN 1980), Encuesta Nacional de Poblacion y Vivienda (ENPV 1988), Encuesta Nacional de Demografia y Salud (ENDSA 1989), and Censo Nacional de Poblacion y Vivienda (CNPV 1992).

Table B.2.9 lists a result of the projections for the period from 1995 to 2010, together with the census populations in 1976 and 1992. According to these projections, the

national population is estimated to reach 7,413,834 in the year 1995, 8,328,700 in the year 2000, 9,274,963 in the year 2005 and 10,229,399 in the year 2010. As the result, the average annual growth rate of the national population would indicate 2.44 % for the period 1995-2000, 2.18 % for 2000-2005 and 1.98 % for 2005-2010.

(2) Proyecciones de Poblacion por Sexo y Edad 1991-2010, Dept. de Santa Cruz, Cordecruz, 1991

Earlier than the national population projections above, the population projection for the Department of Santa Cruz was conducted in 1991 by Cordecruz, using the principal population data such as Censo de Poblacion de 1950, Censo de Poblacion y Vivienda de 1976, and Resultados de la Encuesta Nacional de Poblacion y Vivienda, 1988.

The projections were carried out for each year starting from 1991 to 2010, by using a demographic component method under two different scenarios (high and low variants for fertility), and the results of two scenarios together with their medium value are summarized in *Table B.2.9*.

According to the medium scenario of these projections, population of the Department of Santa Cruz is estimated to be 1,575,324 in the year 1995, 1,881,218 in the year 2000, 2,233,977 in the year 2005 and 2,635,717 in the year 2010. Accordingly, the average annual growth rate of population would become 3.61 % for the period 1995-2000, 3.50 % for the 2000-2005 and 3.36 % for the 2005-2010.

These growth rates indicate a fairly high percentage compared with the growth rate of the national population, due to an increase in number of the projected net migrants. Further the projections indicate that a ratio of population of the Department of Santa Cruz to the national population will increase year by year during the period 1995-2010, i.e. 21.2 % in 1995, 22.6 % in 2000, 24.1 % in 2005 and 25.8 % in 2010 (*Table B.2.9*).

These population projections exclude the result of the 1992 census in a condition of projection since the projections were conducted in 1991. As a result, the projected population in 1992 was estimated to be 1,409,226, increased by 44,837 (3.3 %) compared to the 1992 census population (1,364,389).

If it is assumed that the future population projected herein will indicate a high figures by

approximately 3.3 %, the adjusted figures of the future population are given as follows:

<u>Year</u>	<u>1992</u>	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
Adjusted Population ('000)	1,364	1,525	1,821	2,163	2,552
Ratio to National Pop. (%)	21.2	20.5	21.9	23.3	24.9
<u>Period</u>	<u>(1992-95)</u>	<u>(1995-2000)</u>	<u>(2000-05)</u>	<u>(2005-10)</u>	
Annual Growth Rate (%)	3.79	3.61	3.50	3.36	

As shown in the above table, the ratio of population of the Department of Santa Cruz to the national population would decrease somewhat compared with the original ratio given in *Table B.2.9*. While, the average annual growth rate of population would be given as the same rate as the original one.

Besides the projections above, according to the population projection which was published on the August of 1995 by Cordecruz, population of the Department of Santa Cruz was estimated to be 1,545,741 in 1995 and 1,903,559 in 2000, using an average annual growth rate of 4.16 % for the intercensal period 1976-1992.

3. Gross Domestic Product (GDP)

3.1 GDP and Per Capita GDP

The Bolivian GDP at current prices amounted to US\$ 5,534,945 thousand in 1992, increasing at an average annual rate of 4.56 % from US\$ 4,629,969 thousand in 1988. The per capita GDP grew at an annual rate of 2.37 % (US\$ base) on average during the same period and reached US\$ 804 in 1992 as shown in *Table B.3.1*.

On the other hand, GDP of the Department of Santa Cruz achieved US\$ 1,672,301 thousand in 1992, increasing at a high average annual rate of 8.11 % from US\$ 1,223,997 thousand in 1988. In 1992 the GDP of the Department of Santa Cruz accounted for approximately 30 % of the Bolivian GDP.

In the same year, the per capita GDP of the Department indicated US\$ 1,177, which corresponded to about 1.5 times of the average GDP per capita of Bolivia. During the period 1988-1992, the annual growth rate was 4.29 % on average.

3.2 Sectorial GDP

Table B.3.2 provides the GDP at 1990 constant prices by economic activity of Bolivia. The real annual growth rate of GDP indicated 3.85 % on average for the period 1988-1992. Of all sectorial GDP, the rapidest growth was the agro-industrial sector with the annual rate of 14.39 % on average during the same period, and in contrast the agricultural sector was the slowest growth rate of 0.83 %. Following the agro-industrial sector, communications and mineral sectors indicated a high average annual growth rate of 12.02 % and 9.80 %, respectively.

The total GDP of agricultural sector and its related sectors (agro-industry, Stock raising, hunting, forestry and fishing) accounted for 17.7 % of the Bolivian GDP in 1992. Following these sectors, manufacturing industrial sector had a share of 15.4 % in the same year.

Table B.3.3 gives the GDP at 1990 constant prices by economic activity of the Department of Santa Cruz. The real average annual growth rate of GDP indicated 4.82 % during the period 1988-1992. This growth rate is higher by about 1 % than the growth rate of the Bolivian GDP.

Of all sectorial GDP of the Department of Santa Cruz, the agro-industrial sector also indicated the rapidest growth, an average annual rate of 16.27 % during the same period. Following the agro-industrial sector, the communications and construction & public works sectors indicated a high average annual growth rate of 16.50 % and 13.40 %, respectively. Concerning the agricultural sector, despite the Bolivian GDP was the slowest growth rate, the Department's GDP achieved a comparatively rapid growth at an annual rate of 10.32 % during the same period.

In the Department of Santa Cruz, the agriculture and its related sectors (agro-industry, Stock raising, hunting, forestry and fishing) made the greatest contribution to economic growth of the Department, with a share of 21.1 % of the Departmental GDP in 1992. Following the agricultural sector, the manufacturing industrial and trade sectors indicated the high shares of 19.2 % and 12.5 %, respectively.

4. Agricultural Production

4.1 Bolivia

In 1992, agricultural production of Bolivia amounted to Bs. 4,729,961 thousand, consisting of Bs. 2,068,845 thousand of non-industrial agricultural products, Bs. 481,382 thousand of industrial agricultural products, Bs. 240,467 thousand of coca leaf, Bs. 1,569,316 thousand of livestock products and Bs. 369,951 thousand of forest, hunting and fishing products (see *Table B.4.1*).

The major agricultural products are grains, legumes, vegetables, tubers and fruits in the non-industrial agricultural products, oily grains and sugar cane in the industrial products, coca leaf, and cattle and poultry in the livestock products. In 1992, the total production of these products amounted to Bs. 3,716,002 thousand, and it accounted for 79 % of the total amount of agricultural products.

During the period 1988-1992, the agricultural production of Bolivia showed a high average annual growth rate of 17.78 % at current prices (nominal growth), however, the real average annual growth was only the rate of 2.94 % as shown in *Table B.4.2*.

Of the major products above, the production of oily grains indicated the rapidest real growth rate of 23.78 % per annum during the same period, and following oily grains production, the sugar cane production indicated the high growth rate of 12.36 %. While, despite the cattle production showed the highest amount in the agricultural production every year during the same period, its growth was a low rate of 0.1 % per annum for the same period. The lowest growth rate was -6.45 % of the coca leaf production (*Table B.4.2*).

4.2 Department of Santa Cruz

The agricultural production in the Department of Santa Cruz amounted to Bs. 1,592,470 thousand in 1992, consisting of Bs. 573,504 thousand of non-industrial agricultural products, Bs. 422,406 thousand of industrial agricultural products, Bs. 449,049 thousand of livestock products, and Bs. 147,511 thousand of forest, hunting and fishing products (see *Table B.4.3*).

During the period 1988-1992, the real average annual growth rate of the production was 9.13 % for the whole agricultural products, composed of 10.35 % for the non-industrial

agricultural products, 19.99 % for the industrial agricultural products, 2.82 % for the livestock products and -0.36 % for the forest, hunting and fishing products (see *Table B.4.4*).

The main agricultural products in the Department of Santa Cruz are grains, oily grains, sugar cane and cattle. During the same period, these productions except cattle production indicated the high real average annual growth rate of 17.32 %, 23.96 % and 15.08 %, respectively (*Table B.4.4*), and these productions amounted to Bs. 350,639 thousand, Bs. 198,164 thousand and Bs. 149,050 thousand in 1992, respectively (*Table B.4.3*). The cattle production was Bs. 236,032 thousand in 1992, an low annual growth rate of 0.74 % during the same period. The total amount of the above four productions in 1992, Bs. 933,876 thousand, accounted for 59 % of the whole agricultural production in the Department of Santa Cruz.

Table B.4.5 gives a summary of the agricultural productions in the Department of Santa Cruz compared with the whole Bolivia. In 1992, the total amount of agricultural production in the Department of Santa Cruz, Bs. 1,592,470 thousand, had a high share of 33.67 % of the whole production in Bolivia. It is noticeable especially that on the industrial agricultural production, the Department of Santa Cruz accounted for 87.75 % of the whole Bolivia.

5. Manufacturing Industrial Production

5.1 Bolivia

The major manufacturing industrial products of Bolivia are listed in *Table B.5.1*. The total amount of these productions achieved Bs. 11,017,361 thousand in 1992, increasing at an average annual nominal rate of 23.03 % (real rate of 6.69 %) from Bs. 4,808,586 thousand in 1988.

Of all products, the production amounts of fresh and processed meat, mill and bakery products, and oil refinery products had the share of 16.87 %, 13.90 % and 14.44 % of the whole manufacturing industrial production in 1992, but they were the relatively low increase rates of 2.25 %, 5.24 % and -1.38 % respectively, during the period 1988-1992 (see *Tables B.5.1* and *B.5.2*).

5.2 Department of Santa Cruz

The manufacturing industrial production in the Department of Santa Cruz achieved Bs. 3,841,336 thousand in 1992, increasing at an average annual nominal rate of 24.71 % (real rate of 8.65 %) since the year 1988 (see *Tables B.5.3 and B.5.4*).

Production of the major products such as fresh and processed meat, mill and bakery products, sugar and confectionery, wood and wooden products, and oil refinery products which had the share of 13.96 %, 12.60 %, 10.83 %, 14.56 % and 16.77 % of the entire production of the Department in 1992, indicated the average annual real increase rates of 3.36 %, 6.33 %, 24.75 %, 20.87 % and -3.56 % respectively, during the period 1988-1992. Such a rapid growth in sugar and confectionery productions and wood and wooden productions seems to be due to a rapid improvement of the economic conditions of inhabitants in the Department.

Table B.5.5 gives a summary of the manufacturing industrial productions in the Department of Santa Cruz compared with the whole country in 1992. The total amount of manufacturing industrial production in the Department, Bs. 3,841,336 thousand, had a share of 34.87 % of the whole production of Bolivia. In particular, sugar and confectionery productions and wood and wooden productions in the Department indicated the high rate of 66.32 % and 58.10 % of the respective total productions in Bolivia.

6. External Trade

6.1 Exports

In 1994, the exports of Bolivia amounted to US\$ 722.9 million, and its distribution was US\$ 307.3 million (share of 42.5 %) for minerals, US\$ 74.0 million (share of 10.2 %) for hydrocarbons, and US\$ 341.6 million (share of 47.3 %) for non-traditional products. During the period 1988-1994, the average annual growth rate indicated 3.15 % for the whole products, 1.99 % for the minerals, -16.54 % for the hydrocarbons, and 21.12 % for the non-traditional products (*Table B.6.1*).

As shown in *Table B.6.1*, dominant products in amount are not found in the Bolivian exports. Products such as tin, zinc, gold, natural gas, soybeans and jewelry had a comparatively high share of 9.5 %, 11.1 %, 12.0 %, 10.1 %, 9.7 % and 11.0 % in the

1994 exports, respectively.

6.2 Imports

On the other hand, the imports amounted to US\$ 825.9 million in 1994, increasing at an average annual rate of 5.75 % since 1988. Breakdown of the imports was US\$ 210.2 million (share of 25.3 %) for the consumption goods, US\$ 307.2 million (share of 37.2 %) for the interim goods, US\$ 300.3 million (share of 36.4 %) for the capital goods, and US\$ 8.2 million (share of 1.0 %) for the other goods. During the period 1988-1994, the average annual increase rate indicated 8.58 %, 5.07 %, 4.41 % and 25.49 %, respectively (*Table B.6.2*).

During the period 1988-1994, although the exports exceeded the imports for the period from 1988 to 1990, after that period the imports have exceeded the exports.

6.3 Balance of International Payments

Table B.6.3 gives the balance of international payments in 1992 and 1993. The exports of goods were US\$ 638 million in 1992 and US\$ 710 million in 1993, in FOB prices. On the other hand, the imports were US\$ 1,090 million and US\$ 1,206 million in each year, in CIF. Accordingly, the external trade of Bolivia indicated an unfavorable balance of 452 million and 496 million in each year.

The balance of services and interests of investment also indicated a deficit in both year. Accordingly, the deficit of current account (except the transfers account) amounted to US\$ 655 million in 1992 and US\$ 710 million in 1993. These deficits are a great amount to be compared with the total export amount in respective years. Such deficits in both years were almost compensated by transfers and capital accounts. However, as a result the international payments of Bolivia indicated an unfavorable balance of US\$ 146 million in 1992 and US\$ 123 million in 1993, due to the negative values of errors and omissions.

6.4 Foreign Exchange Rate

Table B.6.4 lists a trend of the average monthly exchange rate of Bolivians to US\$ for the period 1990-1994. The average exchange rate indicated Bs. 4.62/US\$ in 1994, changing at the annual rate of 9.91 % on average from Bs. 3.17/US\$ in 1990.

However, this variation rate was on the downward trend in recent years, for example,

an average monthly variation rate reduced from 1.09 % in 1990 to 0.43 % in 1994.

7. Consumer Prices

Table B.7.1 shows the consumer price indices at the national average, the La Paz city and the Santa Cruz city in the year 1994 (1991=100). During the period 1991-1994, the general consumer prices recorded a rise rate of 32.2 % in the national average and the La Paz city, and 30.3 % in the Santa Cruz city, namely, the average annual inflation rate was 9.76 % and 9.22 %, respectively. These inflation rates are close to the average annual variation rate (9.91 %) of the exchange rate shown in Table B.6.4.

During the same period, the consumer prices of foods and beverages, which have a weight of 49.1 % of the whole consumer goods in 1991, indicated a rise rate of 33.2 % in the national average and 31.5 % in the La Paz city, and 31.7 % in the Santa Cruz city, at the average annual inflation rate was 10.02 %, 9.57 % and 9.63 %, respectively. The price indices of other sectors are listed in Table B.7.1.

8. Wage

According to the wage statistics of Bolivia, an average wage of the private employees for the period 1990-1993 is as follows:

Average Monthly Wage of Private and Public Employees

Items	1990	1991	1992	1993	Average Annual Rate (%)
1. Private Sector (La Paz)					
Nominal Wage (Bs)	626.0	710.1	827.8	958.2	---
Nominal Rise Rate (%)	20.0	13.4	16.6	15.8	16.5
2. Public Sector (Bolivia)					
Nominal Rise Rate (%)	18.5	34.9	27.6	19.3	25.1

Source : Anuario Estadístico 93, INE

The average wage of employees in the private sector achieved Bs. 958.2/month in 1993, rising at the annual rate of 16.5 % on average from Bs. 626.0/month in 1990. On the other hand, the wage of employees in the public sector indicated an annual rise rate of

25.1 % during the same period.

These rise rates are fairly rapid compared with the inflation rate for the same period. Such a favorable situation for the employee would be due mainly to a rapid economic growth in the industrial sector, and it shows that the economic conditions of Bolivian people have been fairly improved in the 1990's.

9. Budgets

9.1 Central Government

Table B.9.1 gives a financial statement of the Central Government of Bolivia for the period from 1988 to 1991. Revenue of the Central Government achieved Bs. 2,775 million in 1991, increasing as many as 2.2 times compared with the revenue of Bs. 1,246 million in 1988. The average annual growth showed a high rate of 30 % during the said period.

Of the total revenue, the revenue of the petroleum royalty accounted for approximately 50 %, and amounted to Bs. 1,348 million in 1991 at the average annual growth rate of 25 % for the period 1988-1991. Following the petroleum royalty, the domestic tax revenue indicated Bs. 819 million in 1991 at the annual growth rate of 31 % during the same period.

On the other hand, the budget expenditure of the Central Government amounted to Bs. 2,725 million in 1991, at the average annual rise rate of 28 % the same period. The expenditure amount in 1991 corresponds to 2.1 times of the 1988 expenditure.

Of the expenditure, it is noticed that the public debt amounted to Bs. 690 million in 1991 which corresponded to 3.7 times the 1988 public debt, at the high annual increase rate of 55 %.

9.2 Cordecruz

In 1994, the income of Cordecruz amounted to US\$ 42,413 thousand, consisting of US\$ 27,934 thousand for the own income and US\$ 14,479 thousand for the external income. The oil bonus, which took the highest share of 30 % in the total income, was US\$ 12,788 thousand in the same year. Following the oil bonus income, the internal credit and the tax revenue indicated US\$ 9,436 thousand and US\$ 8,008 thousand,

respectively. However, the 1994 income of Cordecruz decreased somewhat compared with those in 1991, 1992 and 1993, as shown in *Table B.9.2*.

On the other hand, the expenditure amounted to US\$ 40,994 thousand in 1994, composed of US\$ 27,249 thousand for the own expenses and US\$ 13,745 thousand for the external expenses. Of individual expenses, in 1994 the investment to projects amounted to US\$ 8,766 thousand accounting for 21.4 % of the total expenses. Expenses to the debt service with US\$ 8,563 thousand (20.9 %) and the internal credits with US\$ 8,116 thousand (19.8 %) followed the investment to projects.

As shown in *Table B.9.2*, the investment expenses had the highest share in the budget expenditure of Cordecruz every year, and it is expected that this share will be maintained for the time being. According to the investment plan of Cordecruz, it is expected that in 1999 the investment will amount to US\$ 142,926 thousand, consisting of US\$ 102,302 thousand (71 %) for the transportation sector, US\$ 21,032 thousand (15 %) for the agricultural sector, US\$ 15,310 thousand (11 %) for the basic sanitation sector, and US\$ 4,282 thousand for other sectors (*Table B.9.3*). A large investment to the transportation sector is noticed.

9.3 Public Investment of Municipalities

The department of Santa Cruz is composed of 47 municipalities. *Table B.9.4* lists the budget for public investment of each municipality in the Department in 1995. The public investment budget amounted to Bs. 342 million (US\$ 71.2 million) for the whole municipalities, of which the Santa Cruz city had Bs. 251 million (US\$ 52.3 million) corresponding to 73 % of the whole budget. The average budget per municipality, except the Santa Cruz city, is estimated at Bs. 1.94 million (US\$ 0.40 million).

On the other hand, the public investment budget is divided into two categories; local and external finances. The 1995 budget was Bs. 306 million (US\$ 63.7 million) for the former and Bs. 36 million (US\$ 7.5 million) for the latter. Of the external finance, the grant in foreign aid was Bs. 14 million (US\$ 3.0 million).

10. International Aid to Bolivia

10.1 Outline of International Aid

The Republic of Bolivia, which is an agricultural country located in the central part of

the South America, had an area of 1,098,581 square km, a population of 6,420,792, and the GDP of US\$ 1,177 per capita in 1992. In view of such a situation, the Republic has received external aid throughout several sectors since 1960s.

Table B.10.1 shows the economic aid which was given from major countries and international fund agencies for the period 1990-1994. During this period, the external aid amounted to US\$ 2,095 million, consisting of US\$ 824 million (39 %) from the foreign countries and US\$ 1,271 million (61 %) from the international fund agencies. The average annual amount was approximately US\$ 400 million. Among these countries and agencies, United State of America (USA), Banco Interamericano de Desarrollo (BID) and Banco Internacional de Reconstruccion y Fomento (BIRF) had a comparably high share on the aid amount, as shown in the said table.

Table B.10.2 gives a breakdown of the aid from major countries such as USA, Germany, Canada, Belgium, France, Switzerland and Italy. Among them, the USA's aid covers all sectors from administration to foods throughout USAID. During the period from 1988 to 2000, the aid amounts to US\$ 475 million as a grant-in-aid. Following USA, Germany provided an amount of US\$ 322 million as a loan for the development of infrastructure, mining, administration and finance, during the period 1987-1993.

A breakdown of the BID's aid, which indicates the largest amount, is shown in *Table B.10.3*. During the period 1987-1994, the BID's aid covered all sectors, and amounted to approximately US\$ 1,200 million, at the annual amount of US\$ 150 million on average. Almost all of the aid were provided as project loans.

Following BID, BIRF has also provided the large loan for development and improvement of various sectors. The BIRF's aid is estimated at US\$ 562 million during the period 1988-1999. *Table B.10.4* gives the contents of aid of BIRF together with Corporacion Andiana Fomento (CAF) and Comunicad Economica Europa (CEB).

Table B.10.5 lists contents of the Japanese aid on provides of machine, equipment and materials, and the technical cooperation to projects. Almost all of them were carried out in a form of grant-in-aid, amounting to Yen 609 million for the provides of machine, equipment and materials for the period 1965-1995, and Yen 35,046 million for the project cooperation during the period 1977-1994.

10.2 International Aid Projects in the Department of Santa Cruz

Table B.10.6 provides contents of the projects related to the international aid by industrial sectors in the Department of Santa Cruz. During the period 1991-1995, the number of projects reached 50 in total, consisting of 19 agricultural projects, 2 livestock projects, 2 manufacturing industrial projects, and 27 transportation projects. The total cost of projects for the period 1991-1995 amounted to US\$ 126,260 thousand, composed of US\$ 41,742 thousand (33 %) in the local currency portion (own cost) and US\$ 84,518 thousand (67 %) for the foreign currency portion (aid cost). The average annual cost is estimated at US\$ 25,252 thousand, consisting of US\$ 8,348 thousand for the own cost and US\$ 16,904 thousand for the foreign aid cost.

On the other hand, the international technical cooperation projects in the Department of Santa Cruz for the period 1988-1995 are listed in *Table B.10.7*. The projects reached 33 in number, and these costs amounted to US\$ 57,214 thousand in total, comprised of US\$ 44,394 thousand (78 %) for the agricultural projects, US\$ 2,558 thousand (4 %) for the industrial projects, and US\$ 10,262 thousand (18 %) for the transportation projects. Almost all of them have been covered by the grant-in-aid, at the average amount of US\$ 7,152 thousand per annum.

10.3 Aid Conditions of International Agencies

Table B.10.8 lists aid conditions of the international agencies on the projects which have been executed in Bolivia up to the present. The aid modality is generally divided into two categories; reimbursable and non-reimbursable conditions. The multilateral organizations such as World Bank and Interamerican Development Bank have based on a reimbursable condition to most projects. On the other hand, the bilateral aid of each country has adopted either reimbursement or non-reimbursement in accordance with the project situation.

In the reimbursable conditions, the annual interest rate of loan ranges between 0 % and 8.5 % among the international aid agencies. In addition to the interest rate, service and/or undertaking commissions are imposed ranging from 0.2 % to 1.0 % of the loan amount on the occasion of the agreement with the multilateral organizations. The repayment term ranges between 3 and 40 years, including the grace period from 0 to 10 years. As mentioned above, it is recognized that there is a fair difference among the reimbursable conditions of the international aid agencies.