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Santa Fe de Bogota

The Republic of Colombia

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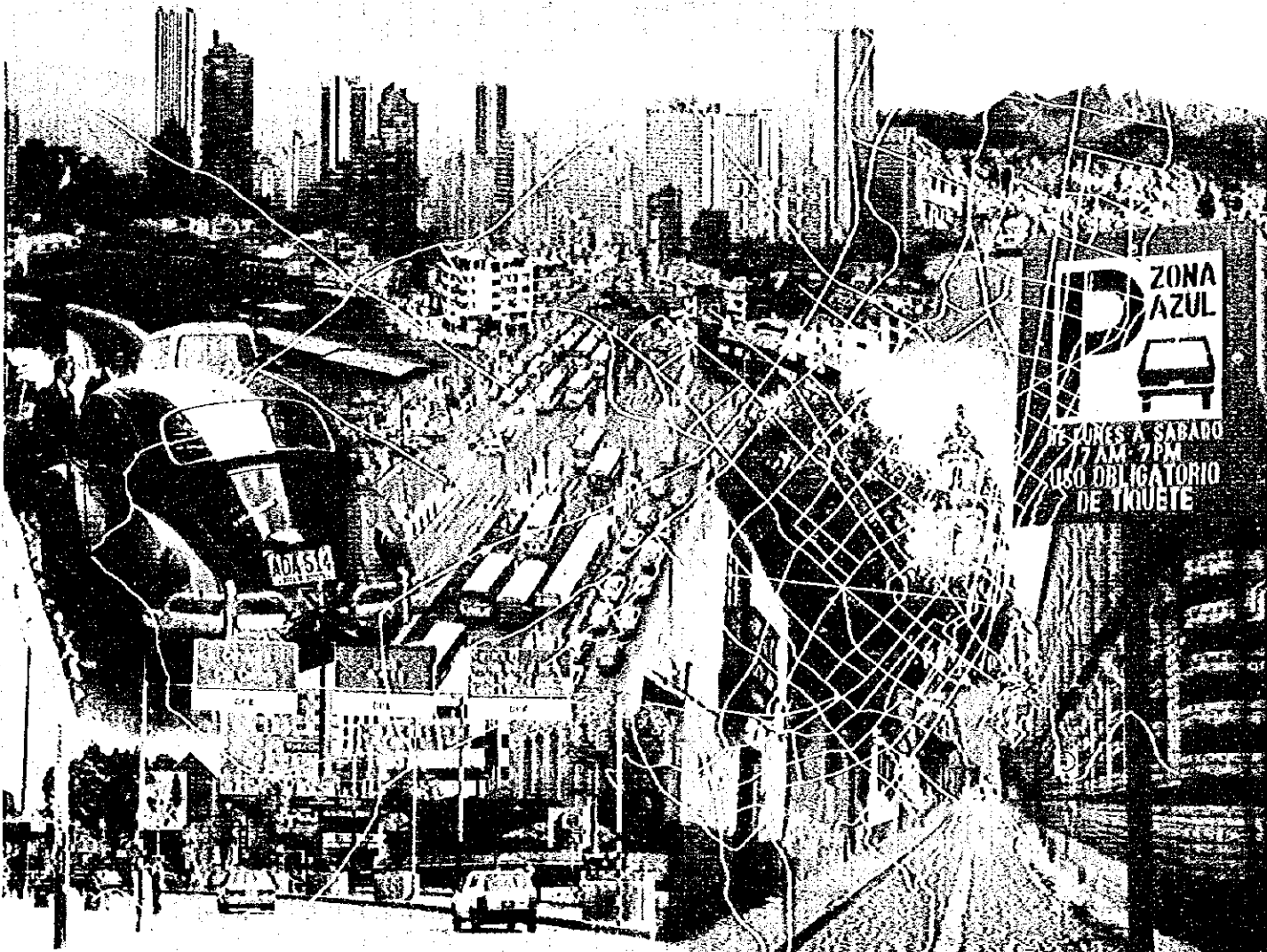
The Study on the Master Plan for Urban Transport of Santa Fe de Bogota in the Republic of Colombia Final Report (Main Report)

The Study on the Master Plan for Urban Transport
of Santa Fe de Bogota in the Republic of Colombia

Final Report
(Main Report)

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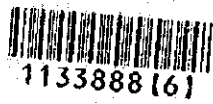
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Japan International Cooperation Agency (JICA)
Santa Fe de Bogota, The Republic of Colombia

The Study on the Master Plan
for Urban Transport of Santa Fe de Bogota
in the Republic of Colombia

Final Report (Main Report)

December 1996

Chodai Co., Ltd.
in Association with
Yachiyo Engineering Co., Ltd.

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Letter of Transmittal

December, 1996

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Dear Sir.

It is a great honor for me to submit herewith the final reports of the Study on the Master Plan for Urban Transport of Santa Fe de Bogota in the Republic of Colombia.

A study team, which consists of Chodai Co., Ltd. and Yachiyo Engineering Co., Ltd., headed by myself, conducted field surveys, data analysis and planning works of urban transport master plan in Colombia based on the terms of references instructed by the Japan International Cooperation Agency (JICA) from July, 1995 to December, 1996.

The study team held thorough discussions and investigations with officials concerned of the Government of Colombia, accordingly, conducted various traffic surveys, present condition analysis, future socioeconomic framework, travel demand, planning policy, and finally composed a comprehensive urban transport master plan. The results were collected in the final reports, main and urban transport training manual reports.

On behalf of the team I wish to express my heartfelt appreciation to the Officials concerned of the Government of Colombia for their warm friendship and cooperation extended to us during our stay in Colombia.

Also, I wish to express my sincere appreciation to JICA, the Ministry of Foreign Affairs, the Ministry of Construction, the Ministry of Transport, the Embassy of Japan in Colombia and other concerned government authorities for their valuable advice and cooperation given to us in the course of the site surveys and preparation of the final reports.

Yours Faithfully,

都筑弘一

Koichi Tsuzuki

Team Leader
The Study on the Master Plan for
Urban Transport of Santa Fe de Bogota
in the Republic of Colombia

Preface

In response to a request from the Government of the Republic of Colombia, the Government of Japan decided to conduct the Study on the Master Plan for Urban Transport of Santa Fe de Bogota in the Republic of Colombia and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Colombia a study team headed by Mr. Koichi Tsuzuki, Chodai Co., Ltd., from July 1995 to December 1996.

The Team held discussions with the officials concerned of the Government of Colombia, and conducted a field survey at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Colombia for their close cooperation extended to the team.

December 1996



Kimio Fujita

President

Japan International Cooperation Agency

The Study on The Master Plan for Urban Transport of Santa Fe de Bogota In The Republic of Colombia

Study Duration: July 1995 - December 1996
Requesting Organization: Santa Fe de Bogota

Outline of the Study

1. Study Background

Santa Fe de Bogota, the capital city of Colombia, is recently experiencing urban transport problems caused by insufficient transport facilities against to the rapid growth of population. Since Bogota does not have an urban railway transport system, road traffic is becoming heavily congested due to increase in car ownership. Although several types of transport plans were made as urgent measures, the investment effects of these projects were insufficient due to lack of comprehensive urban transport master plan.

In order to resolve the urban transport problems, assistance to prepare the comprehensive urban transport master plan study in Santa Fe de Bogota was requested by the Colombian government from the Japanese government. The Study was conducted in accordance with the agreed Scope of Work.

2. Objectives

The objectives of the Study are as follows;

- 1) To formulate a Master Plan on the Comprehensive Urban Transport System in Santa Fe de Bogota.
- 2) To transfer relevant technology to Colombia counterpart personnel in the course of the Study.

The year 2020 is defined as the target year for the Master Plan Study, and the years 2010 and 2001 are adopted as target years for the Mid- and Short- Term Plans, respectively.

3. Study Area

The Study Area for the Master Plan covers the city of Santa Fe de Bogota, but the socioeconomic framework study focuses on the city of Bogota and its surrounding areas.

4. Study Duration

The Study was commenced in July, 1995 and completed in December, 1996.

5. Outline of the Study

(1) Present Condition Analysis

- Data collection and its analysis.
- Various traffic and transport surveys.
- Identification of transport problems.

(2) Future Socioeconomic Framework and Travel Demand

- Population: 8.6 million in Bogota and 2.4 million in surrounding municipalities in 2020 (1.45 times the present population).

- Total number of person trips: 17.41 million (1.55 times that of the present).
- Car ownership: 1.35 million (2.7 times the present).

(3) Planning Policies

- To orient to a public transport network and system.
- To improve and to strengthen road network.
- To improve traffic management system.

(4) Comprehensive Urban Transport Master Plan

A total of 67 package projects are recommended in the Comprehensive Urban Transport Master Plan of Bogota. All projects are economically and technically feasible. Total cost is estimated at US\$ 9,239 million (1996 prices). The investment allocation is about 30% of the total amount for public transport projects. The balance will be 20% for urban expressway projects and 50% for road projects.

1) Road sector

- Existing Road Improvement Projects.
- New Road Construction Projects.
- Urban Expressway Construction Projects.

2) Public Transport sector

- Trunk Bus System Development Projects.
- Bus Express System Development Projects.
- Railway System Development Projects.

3) Traffic Management sector

- Traffic Control System Improvement Projects.
- Parking Facility Projects.
- Bicycle Road Network Projects.

(5) Evaluation of the Master Plan

1) Economic Aspects

- Economic evaluation: EIRR = 42.4%
- B/C = 5.33
- NPV = US\$ 12,100 million

2) Financial Aspects

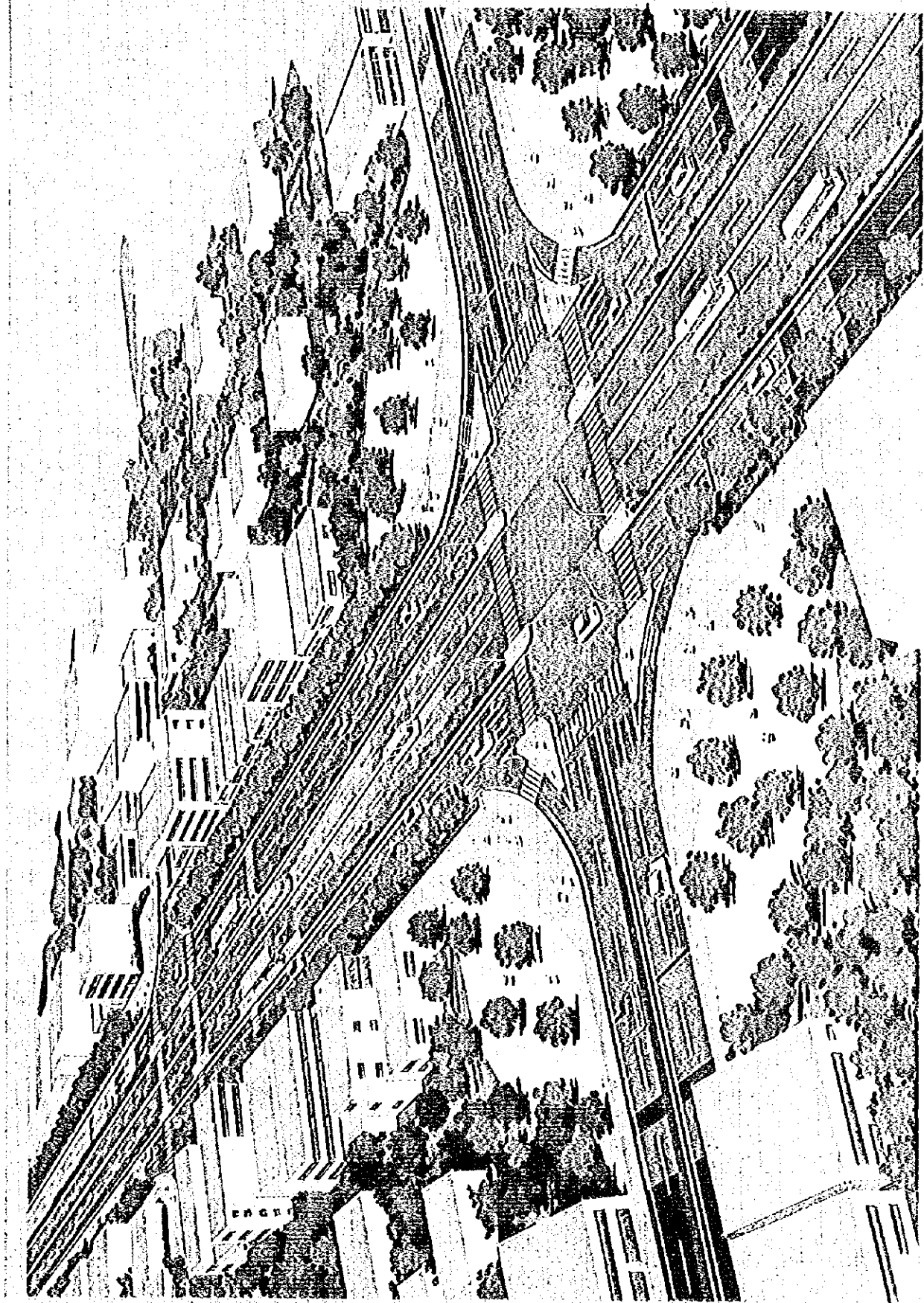
About US\$ 250 to 350 million will be required annually for execution, while the average annual budget for the infrastructure in Bogota is about US\$ 100 to 150 million. Therefore, introduction of the toll system, tax increase, and other financial measures should be considered for the implementation of the Master Plan.

3) Environment Aspects

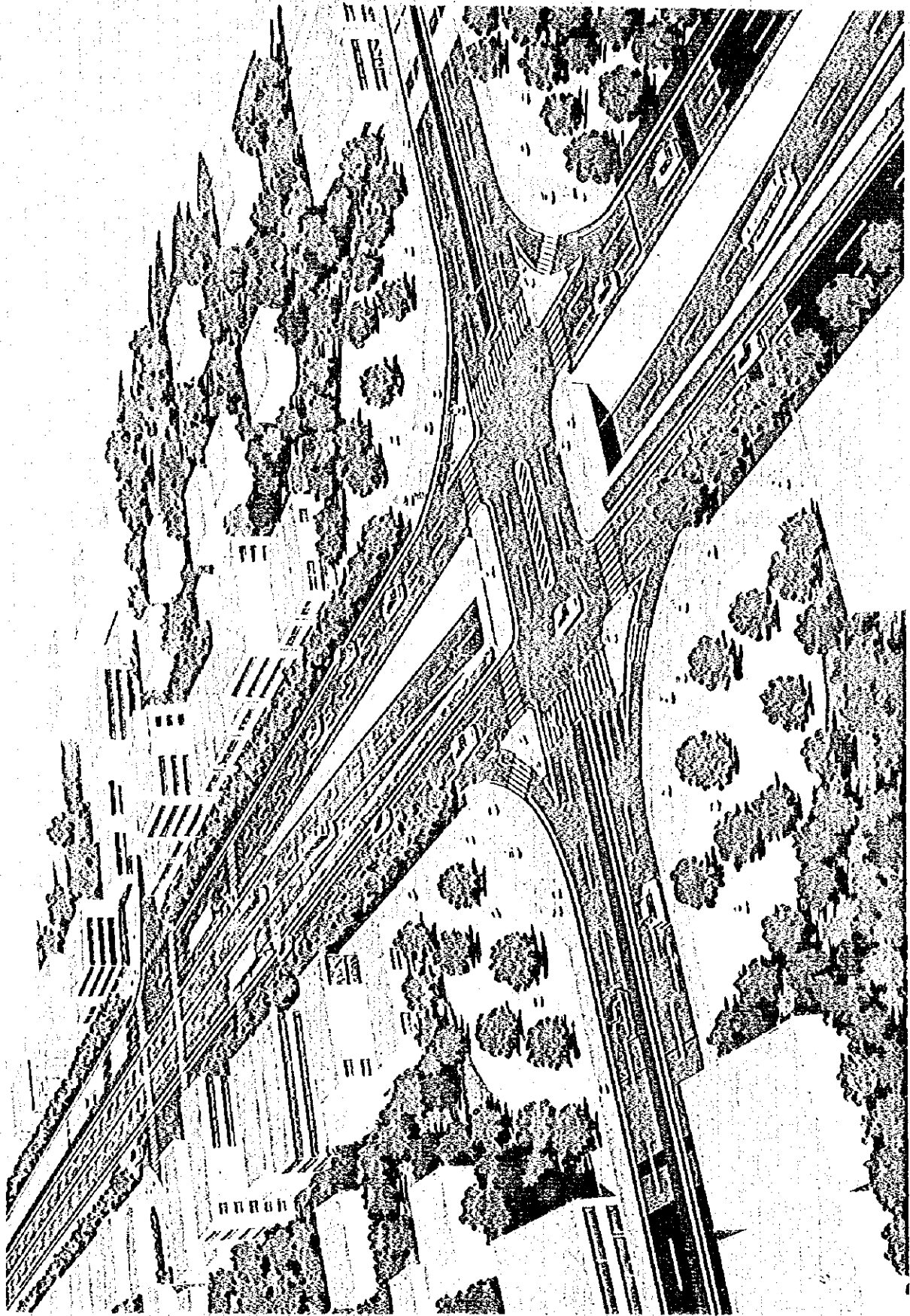
The adverse environmental impacts by proposed projects will be low near the project areas. In planning the urban expressway, landscape harmony with surrounding areas should be maintained.

4) Traffic Aspects

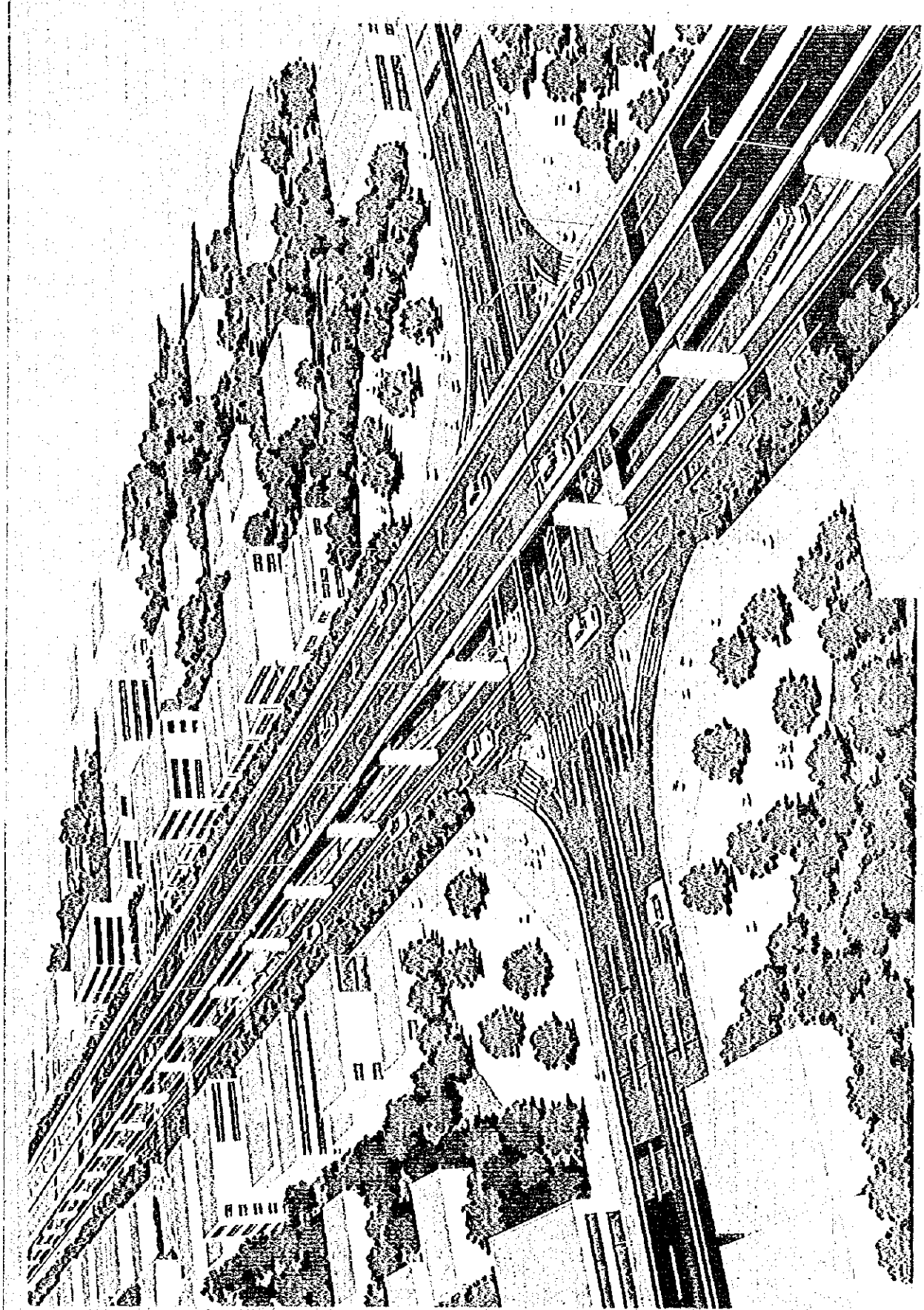
The traffic conditions in Bogota will be significantly improved by the Master Plan projects. The traffic service level in 2020, however, will be insufficient. It is necessary to execute traffic demand management measures for mitigation of the traffic congestion without large investment.



Perspective View of Proposed Trunk Bus Project



Perspective View of Proposed Express Bus Project



Perspective View of Proposed Urban Expressway and Express Bus Project

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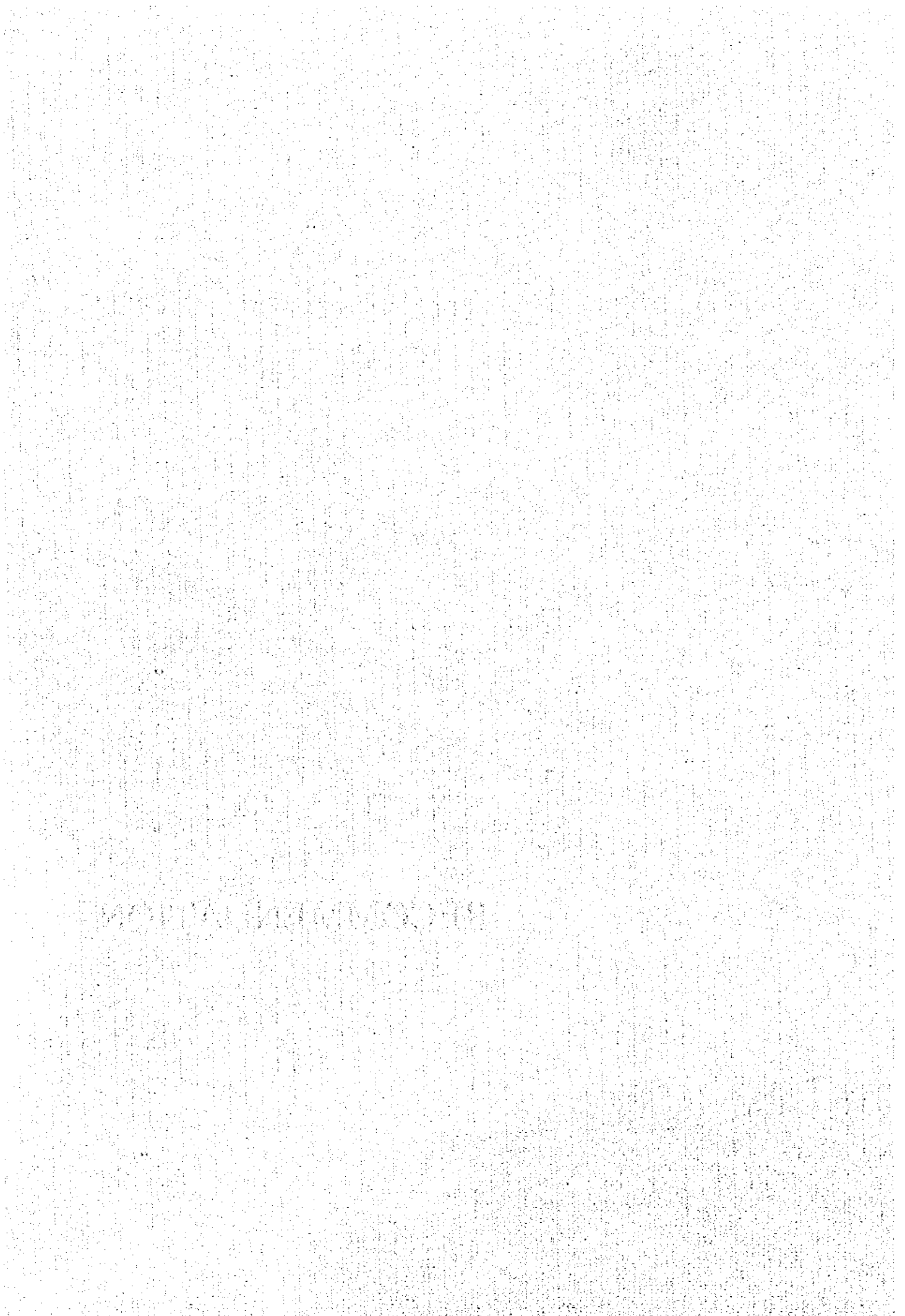
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Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
B/C	Benefit/Cost
BMA	Bogota Metropolitan Area
Bogota	Santa Fe de Bogota
CBD	Central Business District
CAR	Corporación Autónoma Regional
C/D	Capacity/Demand
DAMA	Departamento Técnico Administrativo del Medio Ambiente
DANE	Departamento Administrativo Nacional de Estadística
DAPD	Departamento Administrativo de Planeación Distrial
DNP	Departamento Nacional de Planeación
FEDESARROLLO	Fundación para la Educación Superior y el Desarrollo
EIRR	Economical Internal Rate of Return
FIRR	Financial Internal Rate of Return
GDP	Gross Domestic Product
GRDP	Gross Reginal Domestic Product
HRT	Heavy Rail Transit
IBRD	International Bank for Reconstruction and Development
IDU	Instituto de Desarrollo Urbano
JICA	Japan International Cooperation Agency
LRT	Light Rail Transit
OD	Origin-Destination
PCU	Passenger Car Unit
PT	Person Trip
ROW	Right of Way
SOP	Secretaría de Obras Públicas de Distrito
STT	Secretaría de Transporte y Transito
TDM	Transport Demand Management
TTC	Travel Time Cost
UTP	Unidad de Transporte Publico
V/C	Vehicle/Capacity
VOC	Vehicle Operating Cost
NPV	Net Present Value
\$	Colombian Peso
US\$	US Dollar

RECOMMENDATION



RECOMMENDATIONS

(1) Necessity for Implementing the Master Plan

The urbanization of Bogota will be anticipated to spread into the surrounding cities. The economic growth in 2020 will show an increase in GRDP of 3.5 times the present value. This will contribute to an increase in travel demand which is anticipated to be 1.55 times the present demand in the whole Study Area. The forecast indicates the high rate of increase of private mode of transportation (passenger car), approximately 2.2 times. In order to meet the future transport demand, the comprehensive transport networks should be developed in accordance with the recommended implementation schedule. The Comprehensive Urban Transport Master Plan proposed in the Study will contribute to promote the socioeconomic activities in Bogota and surrounding cities.

(2) The Projects in the Master Plan

A total of 67 package projects are recommended in the Comprehensive Urban Transport Master Plan of Bogota. All projects in the Master Plan are economically and technically feasible. Total cost is estimated at US\$ 9,239 million (1996 prices). The investment allocation is about 30% of the total amount for public transport projects. The balance involves 20% for urban expressway projects and 50% for road projects.

The Master Plan includes the following projects;

- a) Trunk Bus System Development Projects,
- b) Bus Express System Development Projects,
- c) Railway System Development Projects,
- d) Existing Road Improvement Projects,
- e) New Road Construction Projects,
- f) Urban Expressway Construction Projects, and
- g) Traffic Management Development Projects.

(3) Necessity for Transport Demand Management (TDM)

Even if all the projects proposed in the Master Plan are implemented, the recommended transport network and facilities in 2020 would still be insufficient to maintain a good traffic service level in Bogota. To improve the traffic service, traffic demand should be managed to lessen the traffic burden on the network as soon as possible.

(4) Financial Resources

The total investment to implement the Master Plan is estimated at US\$ 9,239 million. Comparatively, this investment apparently exceeds the historical budget of Bogota Municipality. Other major financial resources which should be considered are as follows;

- a) Revenue from transport demand management (TDM),
- b) Increase of budgets of local and central government,
- c) Revenue from toll system,
- d) City development tax, and
- e) Foreign loan.

Public facilities and infrastructure generate benefits to the users. Therefore, it is strongly recommended that the necessary funds be properly collected from the beneficiaries in proportion to the amount of benefit accruing.

(5) Institutional Reforms

To secure the financial resources for implementation of the Comprehensive Urban Transport Master Plan, it is necessary to create a revenue system exclusively dedicated for urban transport infrastructure development.

Bogota lacks an organization to coordinate the various official agencies related to urban transport in Bogota. As the population and socioeconomic activities increase, Bogota and surrounding cities will become intertwined. Considering the future socioeconomic situation, it is necessary to create an organization such as Bogota Metropolitan Transport Commission: with representative from the local governments, the central government and the private sector.

Moreover, for continuous execution of the Master Plan and related development projects, a new organization to coordinate transport issues among the existing related agencies should urgently be established. In addition, adequate engineering and professional staff should be recruited. When a new organization is established, it should have the following qualifications:

- a) be capable to maintain smooth coordination among related authorities,
- b) have strong authority, and
- c) maintain adequate technologies; planning, design, construction, and maintenance.

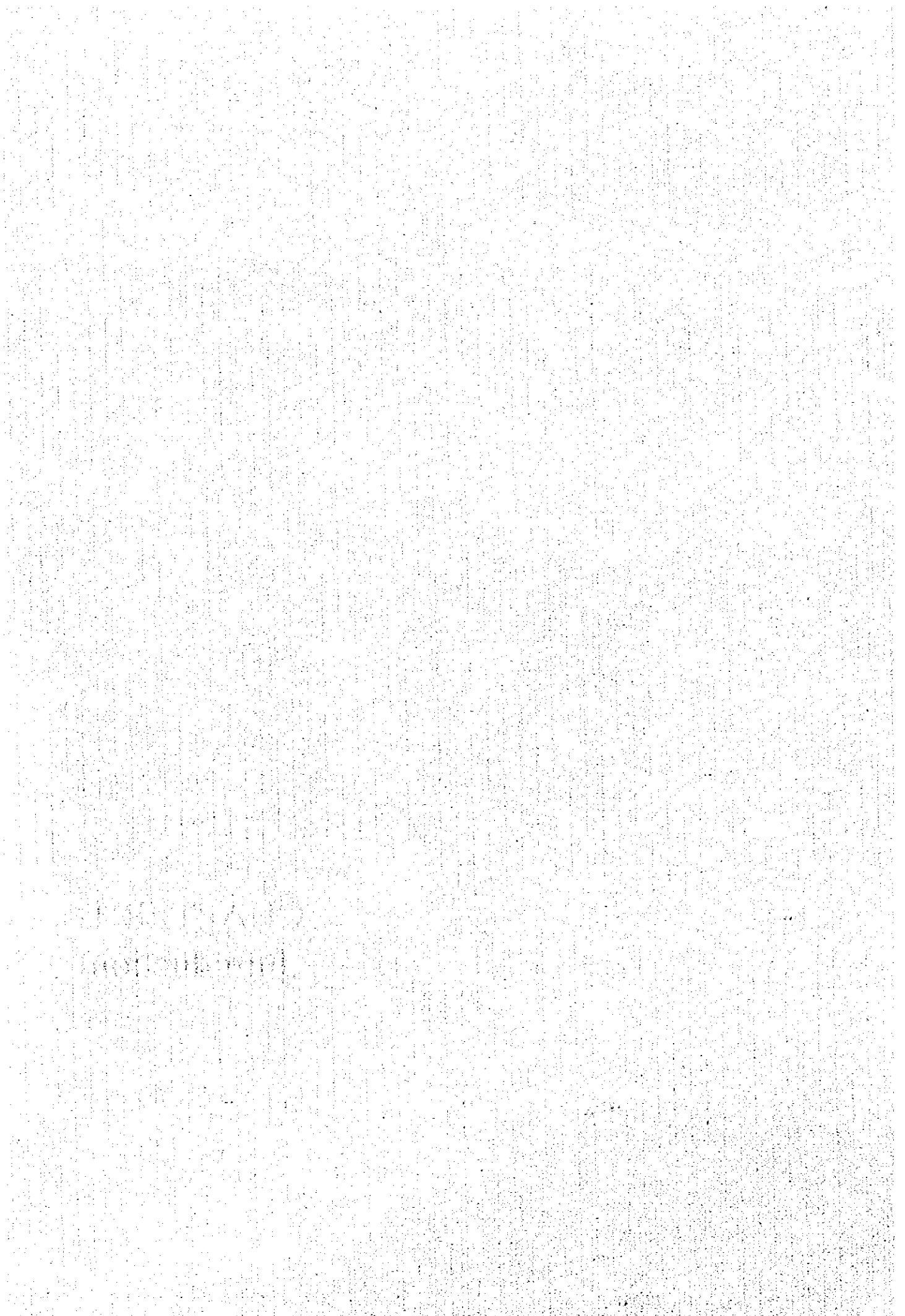
(6) Further Studies Needed

For advancing the Master Plan, further studies are required in the next stage.

- 1) Feasibility studies should be conducted on large scale road and public transport projects proposed in the Short- and Mid-Term plans.
 - a) Parking Facilities.
 - b) Trunk Bus Projects.
 - c) Main Terminal Projects.
 - d) Truck Terminal.
 - e) Grade Separated Interchange Improvement.
 - f) Cundinamarca Road Construction Project.
 - g) Cali Road Construction Project.
 - h) Urban Expressway Construction Projects (total 65 km).
- 2) Considering the importance of strengthening the public transport system in Bogota, a more detailed study of mass transit systems should be conducted to introduce a mass transit system in the Bogota Metropolitan Area.
- 3) As the city grows, the socioeconomic conditions in the Bogota Metropolitan Area will be changed. Taking into account the changes in socioeconomic conditions in the future, the Comprehensive Urban Transport Master Plan should be periodically reviewed and updated.

CHAPTER 1

Introduction



1. INTRODUCTION

In response to the request of the Government of the Republic of Colombia (hereinafter referred to as "Colombia"), the Government of Japan has decided to conduct a Study on the Master Plan for Urban Transport of Santa Fe De Bogota in the Republic of Colombia (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, undertook the Study in close cooperation with the authorities concerned in Colombia.

The Preparatory Study Team, headed by Dr. Koichi Yamagata, was dispatched by JICA in March 1995. After discussion with officials of the Government of Colombia, the Scope of Work for the Study was agreed upon by both sides, and signed on March 15, 1995.

JICA has organized the Study Team to conduct the Study. The Study Team works in close cooperation with the Colombian counterpart team in accordance with the agreed Scope of Work.

The Inception Report was submitted to Government of Colombia on July 1995 and the contents of the Inception Report were agreed upon by both sides. The various traffic and transport surveys, data collection and analysis, and other related studies for the Study were commenced at the same time.

The Interim Report was submitted to Government of Colombia on June 1996 and the contents of the Interim Report were agreed upon both sides. The Interim Report covers the contents of the results of various traffic and transport surveys and their analysis, the future transport demand, and the preparation and evaluation of the alternative transport network for the Master Plan.

The Draft Final Report was submitted to Government of Colombia on September 1996. This Draft Final Report covers implementation schedule of the Project, and the comprehensive Urban Transport Plan and its evaluation, in addition to Interim Report.

The Final Report was submitted to Government of Colombia on December 1996. The Final Report was amended in accordance with the comments on the Draft Final Report from Colombian side.

1.1 Study Objectives

The objectives of the Study are as follows:

- 1) To formulate a Master Plan on the Comprehensive Urban Transport System in Santa Fe De Bogota.
- 2) To transfer relevant technology to Colombia counterpart personnel in the course of the Study.

1.2 Target Years for Master Plan

The year 2020 is defined as the target year for the Master Plan Study, and the years

2010 and 2001 are adopted as the target years for the Mid Term and Short Term Development Plan.

1.3 Study Area

The Study Area for the Master Plan covers Bogota as shown in Figure 1.3-1, but for the socioeconomic framework study focuses particularly on Bogota and its surrounding cities.

1.4 Scope of the Study

The major subjects of the Study are illustrated in Figure 1.4-1 in form of the Study Flow. The Study is conducted in three major stages. Stage-1 is for examination of the traffic and transport characteristics throughout the various traffic and transport surveys, stage -2 is for projection of the future traffic and transport, and stage -3 is for preparation and evaluation of the Master Plan.

1.5 Study Progress

The major study activities are as follows:

(1) July 31, 1995

A Steering Committee Meeting was held on July 31, 1995, with the JICA Study Team and the Members of Steering Committee at the STT conference room. The JICA Study Team submitted the Inception Report to the Colombia. After the discussion, the contents of the Inception Report were accepted.

(2) September 8, 1995

A technical meeting was held on September 8, 1995, with the JICA Study Team and the members of STT, DNP, and DAPD concerning the population in 1995 in the city of Bogota. After the discussion, the population within the city of Bogota in 1995 was determined to be about 6,025,000.

(3) October 13, 1995

A technical meeting was held on October 13, 1995, with the JICA Study Team and the members of STT, DNP, DAPD, Presidential Office of Bogota, and Mayors Office concerning the estimation of the population and land use plan. After the discussion, the trends of the land use were confirmed.

(4) November 3, 1995

A technical meeting was held on November 3, 1995, with the JICA Study Team and the members of STT, DANE, DAPD, Presidential Office of Bogota, and Mayors Office concerning the population projection and the future land use. After the discussion, the total population in 2020 and outline of the future land use were agreed upon.

(5) November 15, 1995

A meeting was held on November 15, 1995, with JICA Study Team and various Public Corporations of Bogota concerning the Master Plan Study; especially, estimation of population and future land use. After the discussion, the importance of the Master Plan Study for the future of Bogota and its surrounding areas was confirmed.

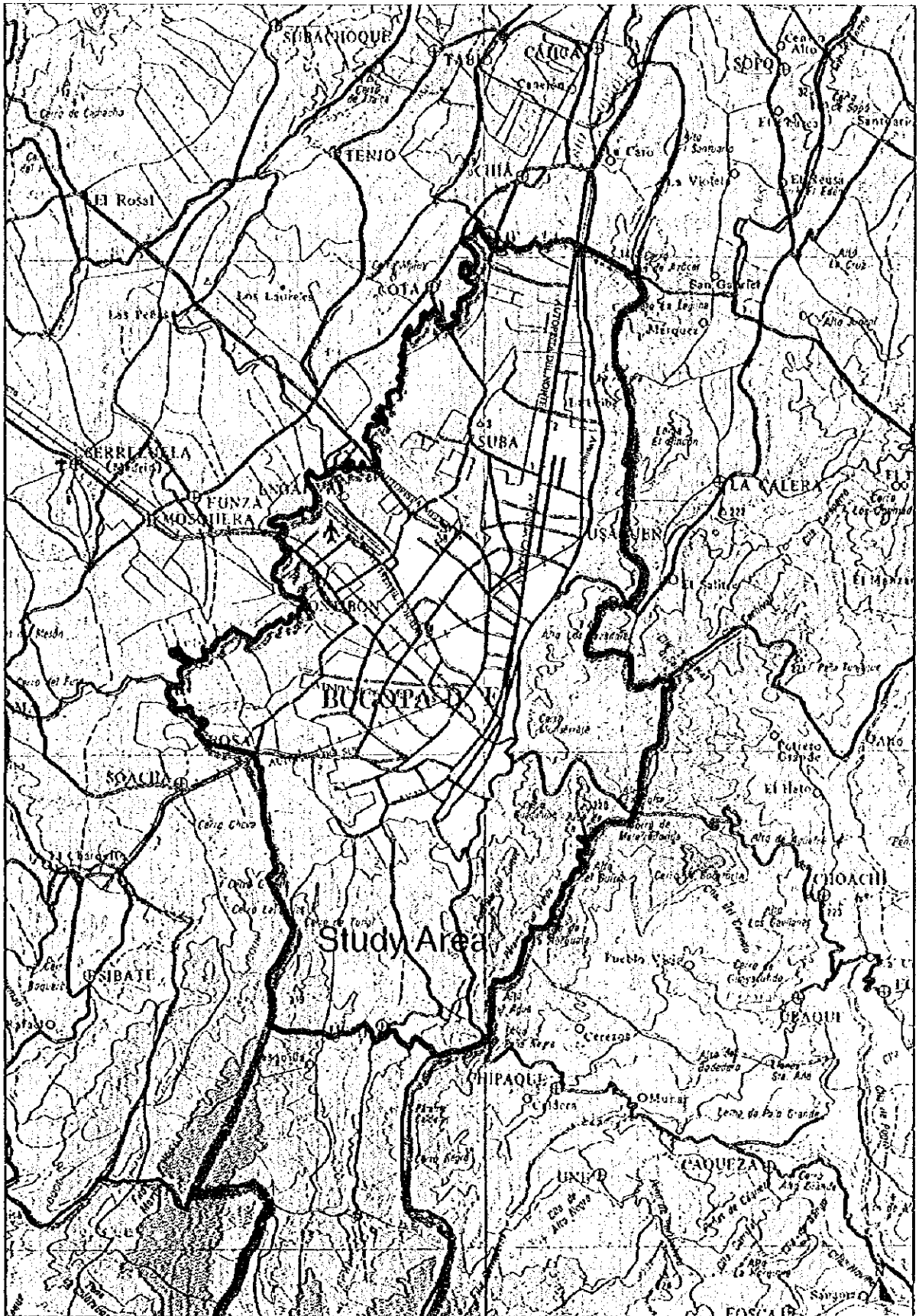


Figure 1.3-1 Location Of The Study Area

(6) November 24, 1995

A Steering Committee Meeting was held on November 24, 1995, with the JICA Study Team and the members of steering committee concerning the study progress and estimation of population and land use plan. After the discussion, the population in 1995 and 2020, the future land use pattern, and the future economic framework were confirmed.

(7) December 13, 1995

A technical meeting was held on December 13, 1995, with JICA Study Team and members of Steering Committee and counterpart personnel of the Study, concerning the results of various traffic and transport surveys and their analysis as well as existing traffic and transport conditions of the city of Bogota.

(8) June 14, 1996

A Steering Committee Meeting was held on June 14, 1996 with JICA Study Team, members of Steering Committee and counterparts of the Study at the SIT conference room. JICA Study Team submitted the Interim Report to the Colombia. After the discussion, the contents of the Interim Report were accepted.

(9) July 4, 1996

A technical meeting was held on July 4, 1996 with JICA Study Team and members of Steering Committee and counterpart personnel of the Study, concerning 1) public transport planing; 2) priority projects of the Master Plan; and 3) Transport Demand Management (TDM). Proposed public transport plan, Implementation Schedule and the contents of TDM were accepted after the discussion.

(10) September 26, 1996

A Steering Committee Meeting was held on September 26, 1996 with JICA Study Team and members of Steering Committee concerning the contents of Draft Final Report. After the discussion, the contents of the Draft Final Report were accepted.

The Study Flow

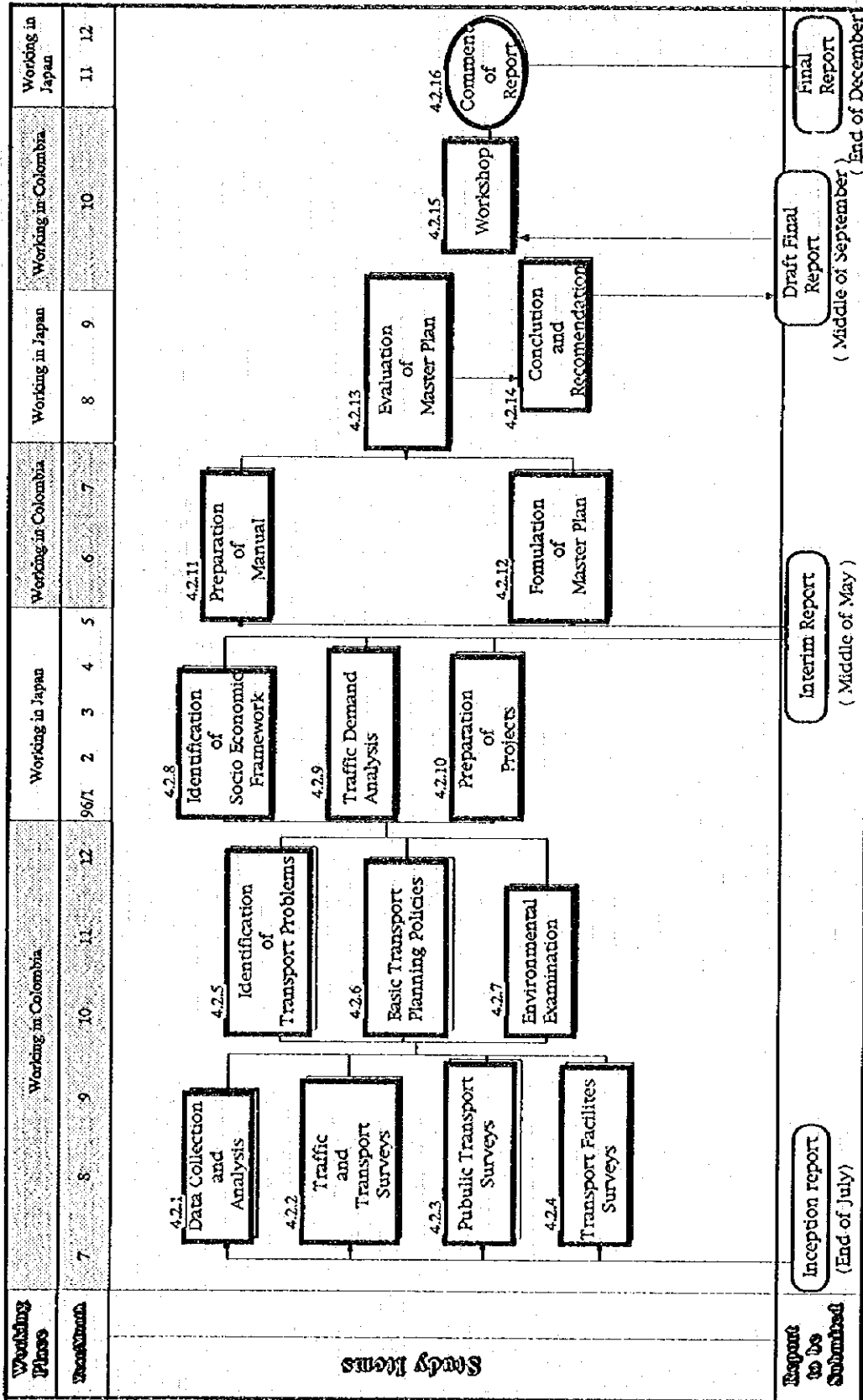


Figure 1.4-1 The Study Flow

1.6 Study Organizations

JICA has organized both the Study Team, headed by Mr. Koichi Tsuzuki, and the Advisory Committee, chaired by Dr. Koichi Yamagata. The Government of Colombia has formed the Counterpart Team, headed by Mr. Fernando Rubiano under Bogota Municipality. Bogota Municipality has organized the Steering Committee, chaired by Dr. Antanas Mockus Mayor of Santa Fe De Bogota, consisting of Bogota Municipality, Presidential Office of the Republic of Colombia, Ministry of Transport, and National Planning Department.

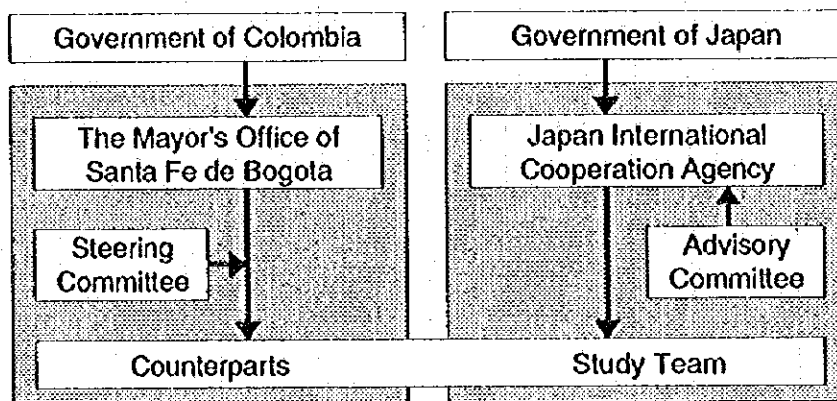


Figure 1.6-1 Study Organization

Study Organization Members

JICA STUDY TEAM		COLOMBIA COUNTERPART TEAM	
Mr. Koichi Tsuzuki	Project Manager	Dr. Fernando Rubiano	Leader of Counterparts
Mr. Kenichi Sekine	Road planner(Deputy Manager)	Dra. Piedad Gutierrez	Highway Planner
Mr. Iwane Mizuno	Urban Development Planner	Dr. Jorge Otalorameo	Highway Engineer
Mr. Tetsuo Wakui	Public Transport Planner	Dra. Ana Luisa Flecha	Urban Development Planner
Mr. Nobuyoshi Sugimoto	Rail Transport Planner	Dr. William Fabian Escobar	Urban Development Planner
Mr. Masaaki Tsuda	Traffic Management Planner	Dr. Rafael Morroy	Public Transport Planner
Mr. Hisayuki Yamaguchi	Traffic Demand Analyst	Dra. Marta Corredor	Traffic and Transport Planner
Mr. Kimio Kaneko	Traffic Management	Dr. Calos Garcia	Traffic Management Planner
Mr. Yoshiaki Nishikatsu	Traffic Surveyor	Dr. Henry Tarazona	Traffic and Transport Planner
Mr. Osamu Ohtsu	Construction Planner		
Mr. Fumiaki Shino	Cost Estimator		
	Economist		
	Environment Analyst		

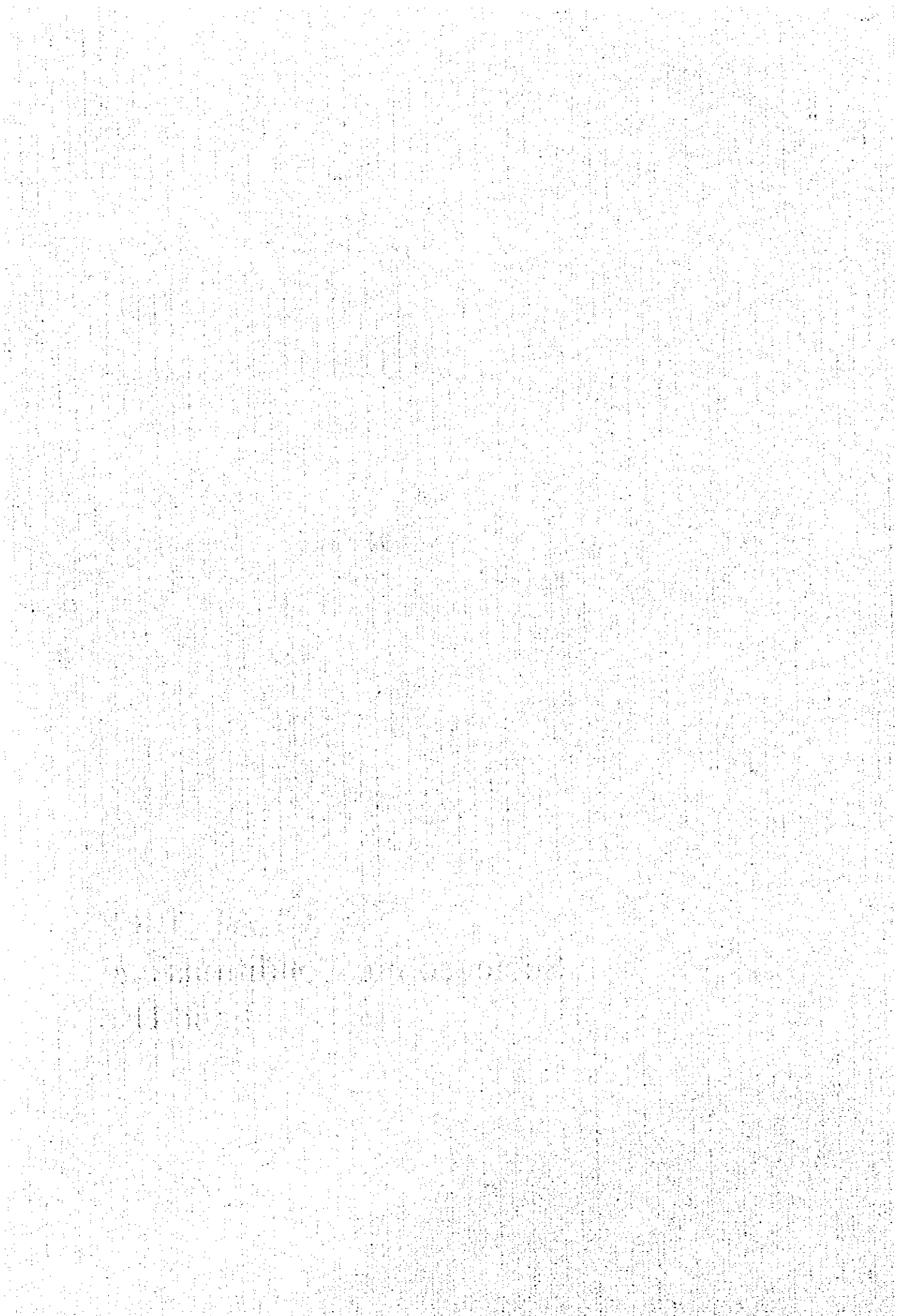
JICA ADVISORY COMMITTEE		STEERING COMMITTEE			
Chairman:	Dr. Koichi Yamagata	Professor. University of Ibaraki	Chairman	Dr. Antanas Mockus	Alcalde Mayorde Santa Fe de Bogota
Member:	Mr. Toshio Neguchi	Ministry of Transport	Vice-chairman	Dr. Efraim A. Becerra	Director of SIT
Member:	Mr. Eiji Nemura		Member	Dra. Maria Piedad Mosquera*	Director of SIT
				Dra. Maria Elisa Bernal	Chief of Special Division DNP
				Dr. Jaime Ortiz Marino	Presidential Council for Santa Fe de Bogota
				Dr. Mario Noriega	Mayor's Advisor
				Dr. Carlos Hernan Lopez	Ministry of Transport
				Dr. Jorge Rodriguez M	Director of IDU
				Dr. Maria Elvira Perez	Director of SOP
				Dr. Alberto Villate	Director of DAPO
				Dr. Carlos Rodriguez	Council of FNUJ
					*Predecessor

JICA PROJECT COORDINATORS	
Mr. Tomoyuki Kosawa	Japan International Cooperation Agency
Mr. Yuji Ikeda *	Japan International Cooperation Agency

PART I

CURRENT CONDITIONS  

CHAPTER 2
Socioeconomic Conditions and
Land Use



2. SOCIOECONOMIC CONDITIONS AND LAND USE

2.1 Current Socioeconomic Conditions

2.1.1 Socioeconomic Outlines of Colombia

(1) Social Conditions

In 1995, the population of Colombia is estimated at 35 million, more than 70% of which is living in urban areas. The rate of population increase is gradually declining to the 1.5% per annum level, but urban population is increasing rapidly.

The rural-urban migration has been accelerated by factors such as the difficult economic conditions, lack of adequate public services and deterioration of security in the countryside. The existence of various opportunities such as jobs, education and health in the cities also encouraged this migration to urban centers. The governments' successive efforts have not been able to catch up with the urbanization, and as a result, serious shortages have occurred in the fields of public services, health, education and housing.

Table 2.1-1 Population Increase and Urbanization

Year	Population 1)	Annual rate Increase (%)	% of urban population 2)
1980	26,524,871	-	-
1985	29,480,995	2.14	67
1990	32,299,790	1.84	70
1995	35,098,737	1.68	72

Source: 1) DANE, Revised Figures

2) Flore, C.; Mendez, R.; Echeverri, R.: Caracterizacion de la transicion demografica en Colombia. Mision Empleo

Colombia is suffering from many socioeconomic problems. In addition to the guerrilla war, incidents involving the drug trade, terrorism, paramilitarism and general violent crime have become common and daily happenings. The recent political crisis has been discouraging the investment mindset of the private sector.

(2) Economic Conditions

In spite of the above-mentioned social problems, the Colombian economy has generally been enjoying a steady growth. During the first half of the 1980s, the annual average economic growth rate was relatively low, at 2.2%. But during the second half, a sectorially balanced 4.6% growth was achieved. In 1991, the primary sector registered a considerably high growth of 4.2%, with production increases of coffee (15%), cotton (32%) and fruits (37%), but the secondary and tertiary sectors were stagnant. Since 1992, a steady economic growth has been continuing, supported mainly by the tertiary sector, for example, finance, insurance and real estate (7% in 1993 and 11% in 1994), and government services (8% in 1993 and 12% in 1994).

Table 2.1-2 GDP Growth Trend by Economic Sector (at 1975 Constant Prices)

	Value (million pesos)				Economic sector
	GDP	Primary	Secondary	Tertiary	
1970	307,496	77,893	86,875	142,728	Primary:
1975	405,108	96,766	118,365	189,977	-Agriculture
1980	525,765	119,314	147,175	259,275	-Livestock
1985	587,561	128,456	170,092	289,013	-Fisheries
1990	735,259	160,245	221,416	353,598	Secondary:
1991	749,976	166,918	222,793	360,265	-Mining
1992	780,312	163,844	229,691	386,777	-Manufacturing
1993p	821,765	168,268	235,157	418,340	-Electricity, gas and water
1994p	868,881	171,685	243,584	453,612	-Construction
1995e	915,801	179,411	251,379	485,011	Tertiary:
					-Wholesale and retail trade
					-Transport and communications
					-Finance, insurance and real estate
					-Services
	Annual growth rate (%)				
	GDP	Primary	Secondary	Tertiary	
1970-75	5.67	4.43	6.38	5.89	
1975-80	5.35	4.28	4.45	6.42	
1980-85	2.25	1.49	2.94	2.20	
1985-90	4.59	4.52	5.42	4.12	
1991	2.00	4.16	0.62	1.89	
1992	4.04	-1.84	3.10	7.36	
1993p	5.31	2.70	2.38	8.16	
1994p	5.73	2.03	3.58	8.43	
1995e	5.40	4.50	3.20	6.92	
1990-95e	4.49	2.29	2.57	6.52	
1980-92	3.35	2.68	3.78	3.39	
1980-95e	3.77	2.76	3.63	4.26	
1970-95e	4.46	3.39	4.34	5.01	

1) Including charged banking services and duties and import taxes

Source: DANE and Study Team Estimate

As the average annual population growth rates were about 2% in the 1980s and about 1.7% during the first half of the 1990s, the GDP per capita has steadily been rising. The GDP per capita in 1994 was about 1.6 million pesos. Considering the exchange rate of about 1 dollar = 800 pesos in 1994, the GDP per capita expressed in US dollars is about 2,000 dollars.

As for the expected economic growth in 1995, there are two alternatives. One is 5.4% by the government, and the other is 4.8% by the private sector (FEDESARROLLO and ANIF). In spite of the large difference between the two projections, the following can be concluded coincidentally: no recession, but deceleration of economy, mainly caused by high interest rates, fall of construction, and coffee crisis. The economic growth of 1995 is being supported by the oil sector and the government sector. Without these sectors, the growth rate for 1995 is estimated at only 3.5%.

According to the IMF analysis made in the beginning of 1995, the average economic growth rates of Latin American countries will be 2.25% in 1995. In this analysis, Colombia's GDP as well as Chile's will increase by 5.5% this year, which is the highest rate given by the organization. Although this estimation was revised downward to 1.8% for the Latin America total, Colombia is expected to enjoy a steady economic growth. On the other hand, the CEPAL (la Comision Economica para America Latina y Caribe) published a document entitled "Panorama Economico de America Latina" which calculated for 1995 an increase of between 1.5% and 2.0% in the GDP of the region. It classified Latin American countries into 4 groups: 1. Chile and Peru (nearly 7% growth); 2. Argentina, Uruguay and Venezuela (0% or very low growth); 3. Mexico (strong recession); and 4. other countries (growth of between 3% and 5%). Colombia is one of the Group 4 countries.

Considering these projections, it can be said that the economic growth of Colombia in 1995 will be around 5%. The unemployment rate continuously declined from 1990 until 1994, but in 1995 it rose a little, as shown in Table 2.1-3. This phenomenon appears to reflect the above-mentioned economic deceleration.

Table 2.1-3 Unemployment Rate in 7 Metropolitan Areas 1)

(September, %)	
Year	Unemployment rate
1990	10.2
1991	9.8
1992	9.1
1993	7.8
1994	7.6
1995	8.7

Note: 1) Bogota, Medellin, Cali, Barranquilla, Bucaramanga, Manizales and Pasto

Source: DANE, Encuesta Nacional de Hogares

The inflation of Colombia has been between 20% and 30% during the past 5 years. The government set a target of 18% for 1995, but it seems to be difficult to achieve it. According to the recent government announcement, inflation will stand at 19-20% at the end of this year. On the other hand, FEDESARROLLO and ANIF estimate inflation at a little more than 20%.

Table 2.1-4 Change in Consumer Price Index

(December, %)	
Year	Rate of change
1990	32.4
1991	26.8
1992	25.1
1993	22.6
1994	22.6

Source: DANE

2.1.2 Historical Background of Bogota

Bogota was founded on the slope of La Candelaria at the foot of Monserrate in 1538, when the surrounding areas were covered by many lakes and swamps. Until 1890, during the 350-year period from its foundation, the city grew very slowly, and the urban area was limited to only 900 ha. However, during the succeeding 100-year period since, a rapid urbanization has been proceeding. This urbanization started to the north direction towards Chapinero, then after 1940 to the west towards Fontibon, Engativa and Suba, and to the south towards Bosa. The existing urbanized area is more than 30,000 ha. The following is a summary of the development process of Bogota dividing the 450 years of its growth into 4 stages as shown in Figure 2.1-1.

1) The 1st Stage - Period of the founding of the now historical city property (1538-1890)

The period during which Bogota grew very slowly around the Plaza de Bolivar in La Candelaria, where at present the Presidential Office of Colombia and the Mayor's Office of Bogota are located. The estimated population in 1890 was about 100,000.

2) The 2nd Stage - Period of development into a modern city (1891-1940)

During this 50-year period, Bogota expanded to the north towards Chapinero. Railroads and main roads like Avenida Caracas and Avenida 7a were constructed. Economic development based on coffee export supported this urban growth. The

population was estimated at about 360,000 in 1940.

3) The 3rd Stage - Period of the establishment of a great Capital City (1941-1980)

The period during which Bogota became one of great metropolises in the world with a population of nearly 4 million. In addition to the northward expansion, urbanization proceeded to the west and to the south, and the towns of Fontibon, Engativa, Suba and Bosa were incorporated into Bogota. The population exceeded 1 million in 1958 and reached 3.8 million in 1980. The main "push" factors for the great migration from rural areas to Bogota were economic stagnation and political and social violence in rural areas. Large construction projects like Eldorado International Airport, Autopista Eldorado, Autopista Norte, Autopista Sur, Ciudad Universitaria and Centro Administrativo Nacional were completed, and the construction of Ciudad Salitre was started. The rapid and large-scale migration from the rural areas has led to the formation of a vast extension of low-structured but high-density slums in mainly hilly areas.

4) The 4th Stage - Period of the creation of the Bogota Metropolitan Area (1981-)

Bogota cannot supply a sufficient extent of land or adequate number of houses at affordable prices for newcomers and families who need houses appropriate for their family size at reasonable prices. So, the surrounding towns like Chia, Soacha, Funza and Mosquera are being used to meet these demands, sometimes illegally in the form of squatter zones. Problems typical of large cities like traffic congestion, air pollution, contamination of Rio Bogota, increase of city crimes, and lack of housing for low-income classes are becoming more and more serious.

From the standpoint of public utility services, most of the surrounding towns depend on the public corporations of Bogota for water supply and drainage, electricity, and telecommunications. Traffic between Bogota and the adjacent municipalities are growing rapidly. Some municipalities are displeased about the increase of demand for their public works and administrative measures due to the growth of Bogota. Therefore, the necessity of creating a place for discussing and making agreements about the common and crucial matters between Bogota and the surrounding towns is becoming strong as the time passes.

2.1.3 The Study Area and Bogota Metropolitan Area

The Study Area is limited to the terrestrial extension covering 19 wards of Bogota Capital District. However, for making a master plan for urban transport of Santa Fe de Bogota, it is important to take into account the existing and future socioeconomic conditions of the surrounding municipalities.

Based on the studies on the establishment of Bogota Metropolitan Area (see Figure 2.1-2) conducted by DAPD, it has been that the Bogota Metropolitan Area can be called a regional extension composed of Bogota Capital District and 17 adjacent municipalities which have tight relations with the capital from the standpoint of daily traffic and utility services. As shown in Figure 2.1-2, the municipalities included in the Metropolitan Area are Chia, Cajica, Zipaquirá, Sopo, Tocancipa, Gachancipa, Cota, Tenjo, Tabio, Funza, Mosquera, Madrid, Facatativa, Bojaca, Soacha, Sibate and La Calera.

In order to understand the present socioeconomic conditions of the Bogota Metropolitan Area, interviews of the planning staff of 17 municipalities were conducted by the Study Team members and the Colombian counterpart. The 1995

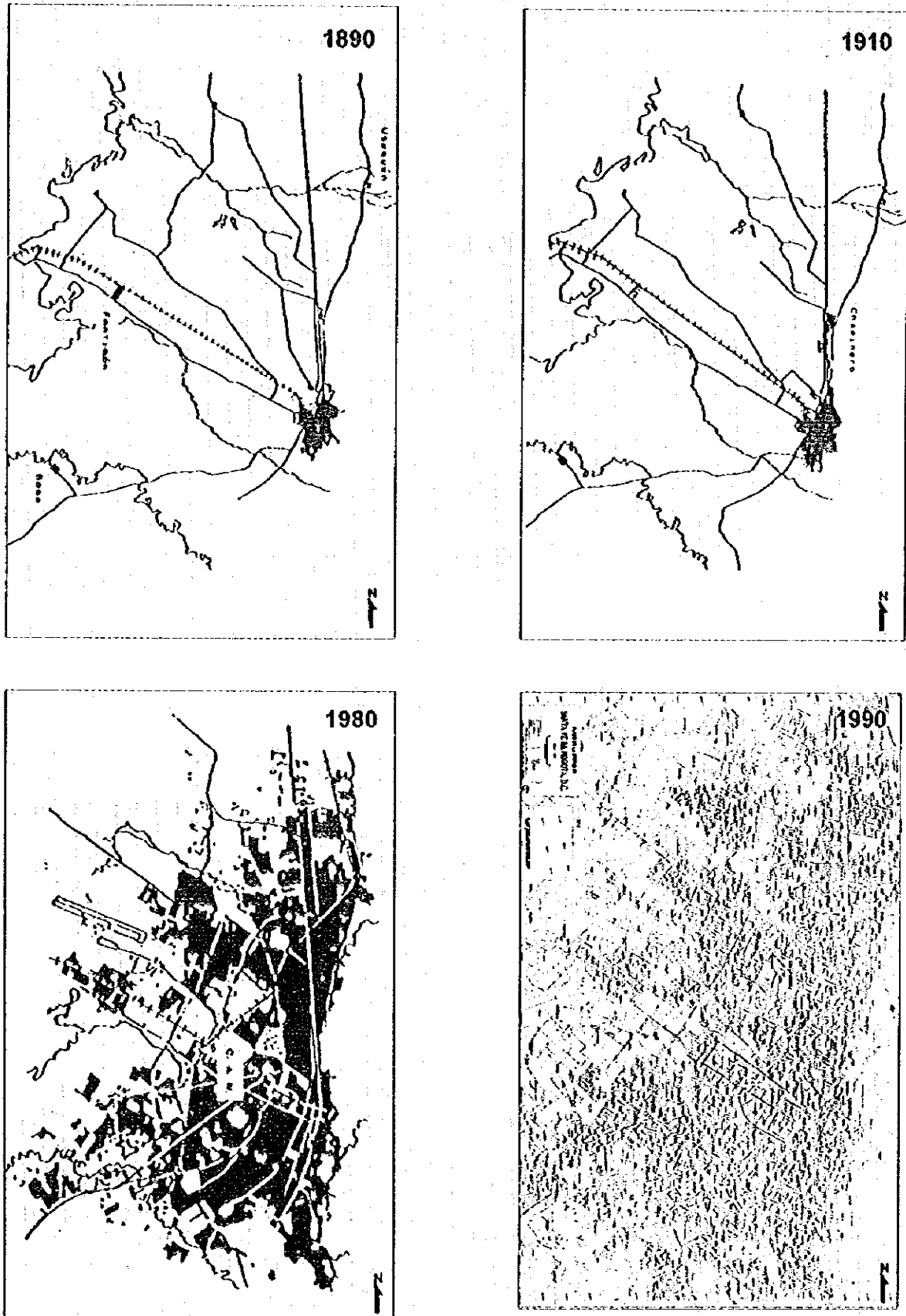


Figure 2.1-1 The Development Process of Bogota during 450 Year Period

population of the Bogota Metropolitan Area(BMA) is estimated at 6.8 million.

2.1.4 Demographic Characteristics

The official revision result of the 1993 Population Census has not yet been published by DANE. The total population of the Study Area, therefore, is estimated at 5,995,000 by the Study Team through discussion with DANE. The estimation process is as follows:

1) The preliminary results of 1993 Census published by DANE

Total population of Bogota: 5,726,957

Urban area: 5,698,657

Rural area: 28,300

2) The estimates by DAPD for 19 Wards

1993: 5,236,588

1995: 5,509,577

Annual rate of increase: 2.57%

3) The estimated population of the urban area (Study Area)

$$5,698,657 \times (1 + 0.0257)^2 = 5,995,000$$

Based on the above-mentioned preliminary result of 28,300 for the rural area, the population of Sumapaz of Bogota is assumed to be 30,000. The populations of the 17 municipalities in the BMA are estimated based on the followings:

- a) The population projections by municipality for 1995 published by DANE
- b) The preliminary results of the 1993 Census
- c) The opinion of the planning staff of each municipality
- d) The discussions with DANE

The estimation results are shown in Table 2.1-5. Table 2.1-6 shows the estimated population by sex and age in 1995 for the Study Area and the surrounding municipalities in the Bogota Metropolitan Area. The result of expanded tabulation of household data of the Person Trip Survey is applied to the age-sex structure of the population of the Study Area. The age-sex structure of the population of the surrounding municipalities is estimated by grouping urban and rural areas of the municipalities into the four following types:

- a) Chia type: Urban area of Chia
- b) Madrid type: Urban areas of Madrid, Funza and Mosquera
- c) Soacha type: Urban area of Soacha
- d) Cundinamarca type: Rural areas of the above-mentioned municipalities and urban and rural areas of the other municipalities

The age-sex structure of each town obtained from a study conducted by CEDE-ORSTOM was applied for the Chia, Madrid and Soacha types. 1)

- 1) *La Movilidad de las Poblaciones y su Impacto sobre la Dinamica del Area Metropolitana de Bogota, Resultados Preliminares de la Encuesta Cuantitativa, Francoise Dureau con la colaboracion de Olivier Barbary and Carmen Elisa Florez, junio 1994, CEDE (Centro de Estudios sobre Desarrollo Economico, Facultad de Economia, Universidad de los Andes) y ORSTOM (Instituto Frances de Investigacion Cientifica para el Desarrollo en Cooperacion).*

For the Cundinamarca type, the 1995 age-sex structure of the Departamento de Cundinamarca estimated by DANE was utilized. The sex ratios of Bogota and the Metropolitan Area are 94.5 and 95.1, respectively. The sex ratio is a measure giving the

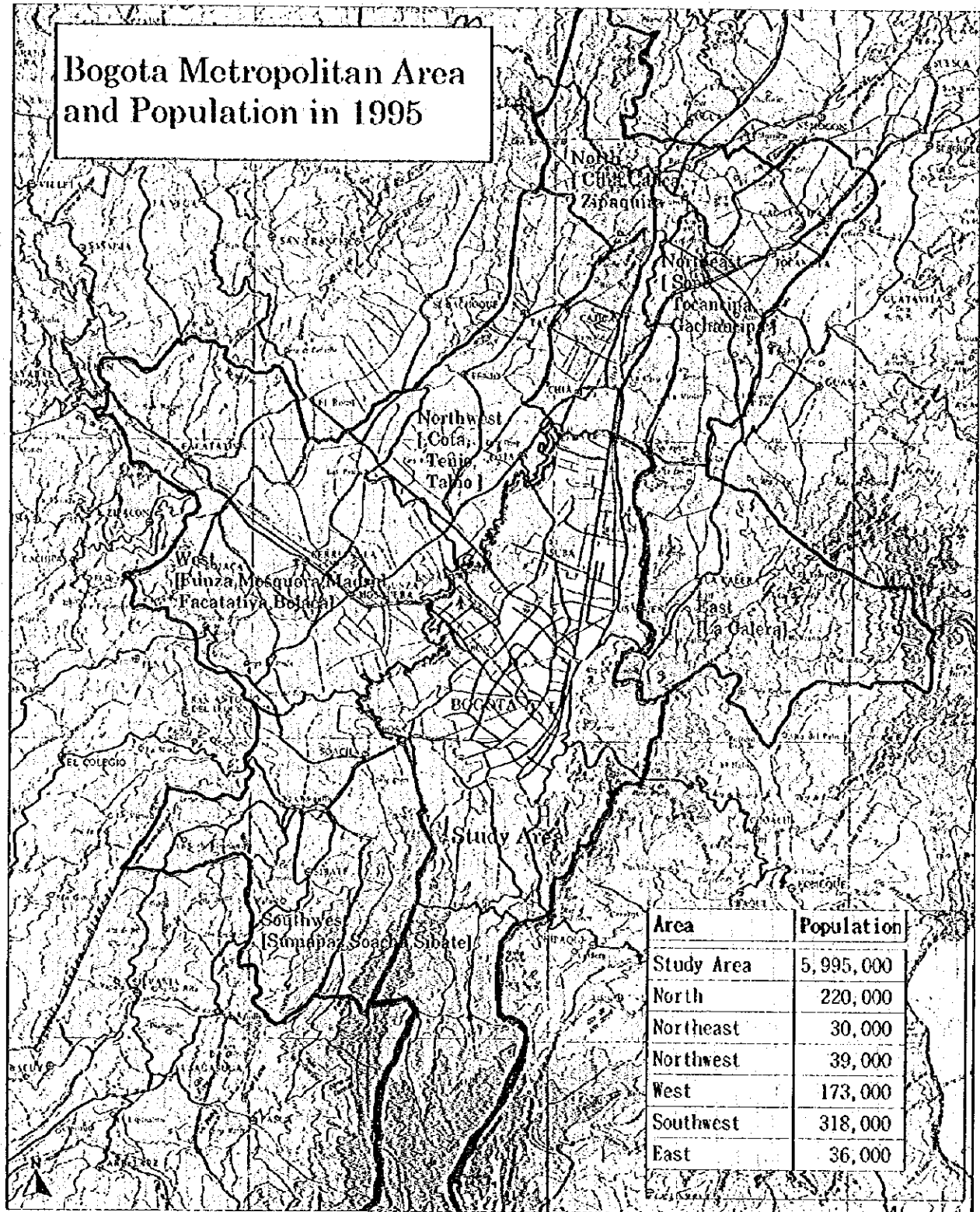


Figure 2.1-2 Bogota Metropolitan Area and Population in 1995

number of males per 100 females, and shows that in Bogota females exceed males. As for the age structure, the age groups between 15 and 29 years are prominent, especially in females.

Table 2.1-5 Estimated Populations of Municipalities in Bogota Metropolitan Area (1995)

Municipalities	Estimated population		
	Urban	Rural	Total
Chia	83,500	6,500	90,000
Cajica	17,000	13,000	30,000
Zipaquirá	91,000	9,000	100,000
North subtotal	191,500	28,500	220,000
Sopó	6,000	6,000	12,000
Tocancipa	4,000	8,000	12,000
Gachancipa	2,500	3,500	6,000
Northeast subtotal	12,500	17,500	30,000
Cota	5,500	6,500	12,000
Tenjo	2,500	13,500	16,000
Tabio	3,500	7,500	11,000
Northwest subtotal	11,500	27,500	39,000
Funza	30,000	10,000	40,000
Mosquera	20,000	1,000	21,000
Madrid	33,000	6,000	39,000
Facatativa	62,000	5,000	67,000
Boyacá	4,000	2,000	6,000
West subtotal	149,000	24,000	173,000
Sumapaz of Bogota	0	30,000	30,000
Soacha	264,000	3,000	267,000
Sibaté	16,000	5,000	21,000
Southwest subtotal	280,000	38,000	318,000
La Calera	26,000	10,000	36,000
East subtotal	26,000	10,000	36,000
Total	670,500	145,500	816,000

Source: Study Team Estimates

Table 2.1-6 Estimated Population by Sex and Age for Bogota Metropolitan Area in 1995

Age	Metropolitan Area			Bogota D.C.			Surrounding Municipalities		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0 - 4	283,315	241,755	525,070	233,163	192,737	425,900	50,152	49,018	99,170
5 - 9	333,132	286,726	619,858	292,780	247,494	540,274	40,352	39,232	79,584
10 - 14	327,248	311,284	638,532	280,394	265,703	546,097	46,854	45,581	92,435
15 - 19	341,694	384,386	726,080	301,598	344,373	645,971	40,096	40,013	80,109
20 - 24	359,257	379,980	739,237	315,226	337,123	652,349	44,031	42,857	86,888
25 - 29	321,266	350,955	672,221	277,557	309,559	587,116	43,709	41,396	85,105
30 - 34	287,016	305,573	592,589	248,653	272,908	521,561	38,363	32,665	71,028
35 - 39	228,944	266,908	495,852	204,653	242,510	447,163	24,291	24,398	48,689
40 - 44	183,375	218,599	401,974	163,364	195,571	358,935	20,011	23,028	43,039
45 - 49	158,208	187,475	345,683	141,391	168,574	309,965	16,817	18,901	35,718
50 - 54	145,652	170,407	316,059	131,739	155,907	287,646	13,913	14,500	28,413
55 - 59	104,416	114,286	218,702	95,739	103,597	199,336	8,677	10,689	19,366
60 - 64	92,518	106,765	199,283	85,956	97,733	183,689	6,562	9,032	15,594
65 - 69	67,512	66,783	134,295	62,712	60,940	123,652	4,800	5,843	10,643
70 - 74	41,378	42,757	84,135	37,711	38,129	75,840	3,667	4,628	8,295
75 +	44,704	56,726	101,430	39,658	49,848	89,506	5,046	6,878	11,924
Total	3,319,635	3,491,365	6,811,000	2,912,294	3,082,706	5,995,000	407,341	408,659	816,000

Source: Study Team Estimates

2.1.5 Economic Situations

The Gross Regional Domestic Product (GRDP) of the Study Area occupies about 20% of the GDP. DANE has made public GRDP of Bogota until 1992. For the estimation of GRDP of Bogota in 1995, the annual average growth rates by economic sector of Bogota and Colombia as a whole were compared during the period of 1980-92. The estimation process is as follows:

1) Primary Sector

- a) Assumed to be 100 million pesos (1975 constant prices)

2) Secondary Sector

- a) Annual growth rate in Bogota, 1980-1992: 4.13%
 b) Annual growth rate in Colombia, 1980-1992: 3.78%
 c) Ratio of Bogota/Colombia: $4.13/3.78=1.093$
 d) Annual growth rate in Colombia, 1980-1995: 3.63%
 e) Estimated annual growth rate in Bogota, 1980-1995: $3.63 \times 1.093=3.97$
 f) Estimated value added in Bogota, 1995: $29,610 \times (1+0.0397)^{15}=53,100$

3) Tertiary Sector

- a) Annual growth rate in Bogota, 1980-1992: 3.10%
 b) Annual growth rate in Colombia, 1980-1992: 3.39%
 c) Ratio of Bogota/Colombia: $3.10/3.39=0.914$
 d) Annual growth rate in Colombia, 1980-1995: 4.26%
 e) Estimated annual growth rate in Bogota, 1980-1995: $4.26 \times 0.914=3.89$
 f) Estimated value added in Bogota, 1995: $78,728 \times (1+0.0389)^{15}=139,550$

Table 2.1-7 GRDP Growth by Economic Sector in Bogota, 1980-1985
(at 1975 constant price)

	Value (million pesos)			
	GRDP	Primary	Secondary	Tertiary 1)
1980	108,796	458	29,610	78,728
1985	122,337	187	34,211	87,939
1990	154,221	337	45,098	108,786
1991	152,544	127	45,674	106,743
1992	161,746	92	48,134	113,520
1995e	192,750	100	53,100	139,550
	Annual growth rate (%)			
	GRDP	Primary	Secondary	Tertiary
1980-85	2.37	-16.40	2.93	2.24
1985-90	4.74	12.50	5.68	4.35
1991	-1.09	-62.31	1.28	-1.88
1992	6.03	-27.56	5.39	6.35
1980-92	3.36	-12.52	4.13	3.10
1990-95e	4.56	-21.57	3.32	5.11
	Share in Colombia (%)			
	GRDP	Primary	Secondary	Tertiary
1980	20.7	0.4	20.1	30.4
1985	20.8	0.1	20.1	30.4
1990	21.0	0.2	20.4	30.8
1991	20.3	0.1	20.5	29.6
1992	20.7	0.1	21.0	29.4
1995e	21.0	0.1	21.1	28.8

Note: 1) Including charged banking services, duties, and import taxes
 Source: DANE and Study Team Estimate

According to the estimation results, the annual growth rate of the regional economy during the period of 1990-95 is 4.56%, which is a little higher than the 4.49% rate for the national economy during the same period. In the Study Area, the primary sector is almost negligible. As the Capital City, the tertiary sector (especially government and financial sectors) is prominent and occupies about 30% of the national total. However, the share in the nation gradually decreased from 30.4% in 1980 to 29.4% in 1992 (for example, government services: from 39.3% in 1980 to 35.4% in 1992), although the financial sector grew and increased its share from 33.4% in 1980 to 36.3% in 1992 (see Table 2.1-7).

The economic participation of population aged 12 years and above is shown in Table 2.1-8. Economically active population or labor force is 2,635,000 people and represents 54.8% of the population aged 12 years and above (working age population). On the other hand, 2,177,700 people (45.2%) are not in the labor force, and live as students, housewives, or individuals without specific activities. The unemployment rate is about 10%.

Table 2.1-8 Economic Participation

Economic Category	Value
Total Population (A)	5,995,000
Population 12 Years and Over (B)	4,812,700
Economically Active Population (C)	2,635,000
Employed	2,365,700
Unemployed (D)	269,300
Economically Inactive Population	2,177,700
Student	1,047,700
Household Work	943,600
Other Inactive	186,400
Crude Activity Rate (C/A)	44.0%
Refined Activity Rate (C/B)	54.8%
Unemployment Rate (D/C)	10.2%

Source: Person Trip Survey

The numbers of employees by economic sector are shown in Table 2.1-9.

Table 2.1-9 Employees by Sector and Places of Work

Economic sector	Employees		Inside	Outside
	People	%	Bogota	Bogota
Primary	27,700	1.2%	16,800	10,900
Secondary	573,400	24.2%	549,400	24,000
Tertiary	1,764,600	74.6%	1,708,300	56,300
Total	2,365,700	100.0%	2,274,500	91,200

Source: Person Trip Survey

Although the secondary sector occupies more than 20%, the tertiary sector is prominent. A total of 91,200 people (3.9% of the total employees) go to work in the surrounding towns.

2.2 Current Land Use Structures

2.2.1 Urban Scale and Land Use Pattern

Bogota has an administrative area of 173,170 ha, of which 49,220 ha is the area of the Study Area covering 19 wards. The urban area is 33,780 ha, and occupies 68.6% of the Study Area. The Study Area is limited by the hills on the east and by Rio Bogota on the west. The urban form of Bogota is a little longer from the north to south. The administrative, commercial and business center is located at the traditional Centro, but the commercial/business activities are moving in the northern direction; originally towards Chapinero, then to the area around Calle 72, and most recently to Santa Barbara.

Roughly speaking, the high-class residential areas are extending northward, the middle class westward, and the lower class southwestward and southward. Parts of the hills located in Usaquen Ward (north), Usme Ward (south) and Ciudad Bolivar Ward (southwest) are occupied by squatters, where low-storied but high-density poor residential zones extend. Urbanization is proceeding beyond the city boundary and forming a conurbated area to Chia and Cajica in the north direction and to Soacha in the southwest direction.

The main roads radiating from the Centro are Autopista Norte toward the north, Autopista a Medellin, Autopista Eldorado and Avenida Centenario toward the west, and Avenida de las Americas and Autopista Sur toward the southwest. The semi-ring roads are Avenida Ciudad de Quito, Avenida del Espectador and Avenida Boyaca outward from the center.

Figure 2.2-1 shows the comparison of Bogota and Tokyo at the same scale. The total population of the 23 Wards of Tokyo, about 8 million, lives in a territorial extension of about 60,000 ha, which is about 1.2 times larger than the Study Area. A transport network of railroads and the Urban Expressways is densely established in Tokyo. On the other hand, neither commuter railroads nor a Urban Expressway are found in Bogota.

2.2.2 Land Use Regulations

The land use of the Study Area is regulated by the legal standard in accordance with the Resolution 6 of 1990. DAPD prepared and made public land use regulation maps at a scale of 1:5,000, which show zoning and treatment. The land use classification is as follows:

- 1) Special Residential Zone
- 2) General Residential Zone
- 3) Institutional Zone
- 4) Industrial Zone
- 5) Metropolitan Green Zone
- 6) Metropolitan Service Facility Zone
- 7) Multipurpose-Use Zone

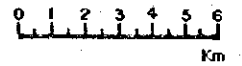
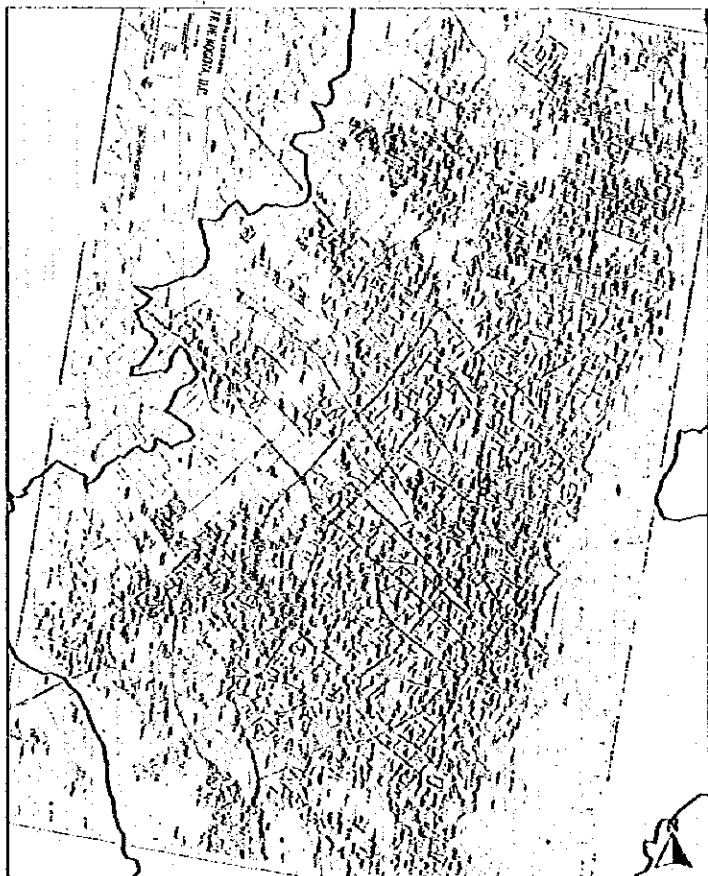
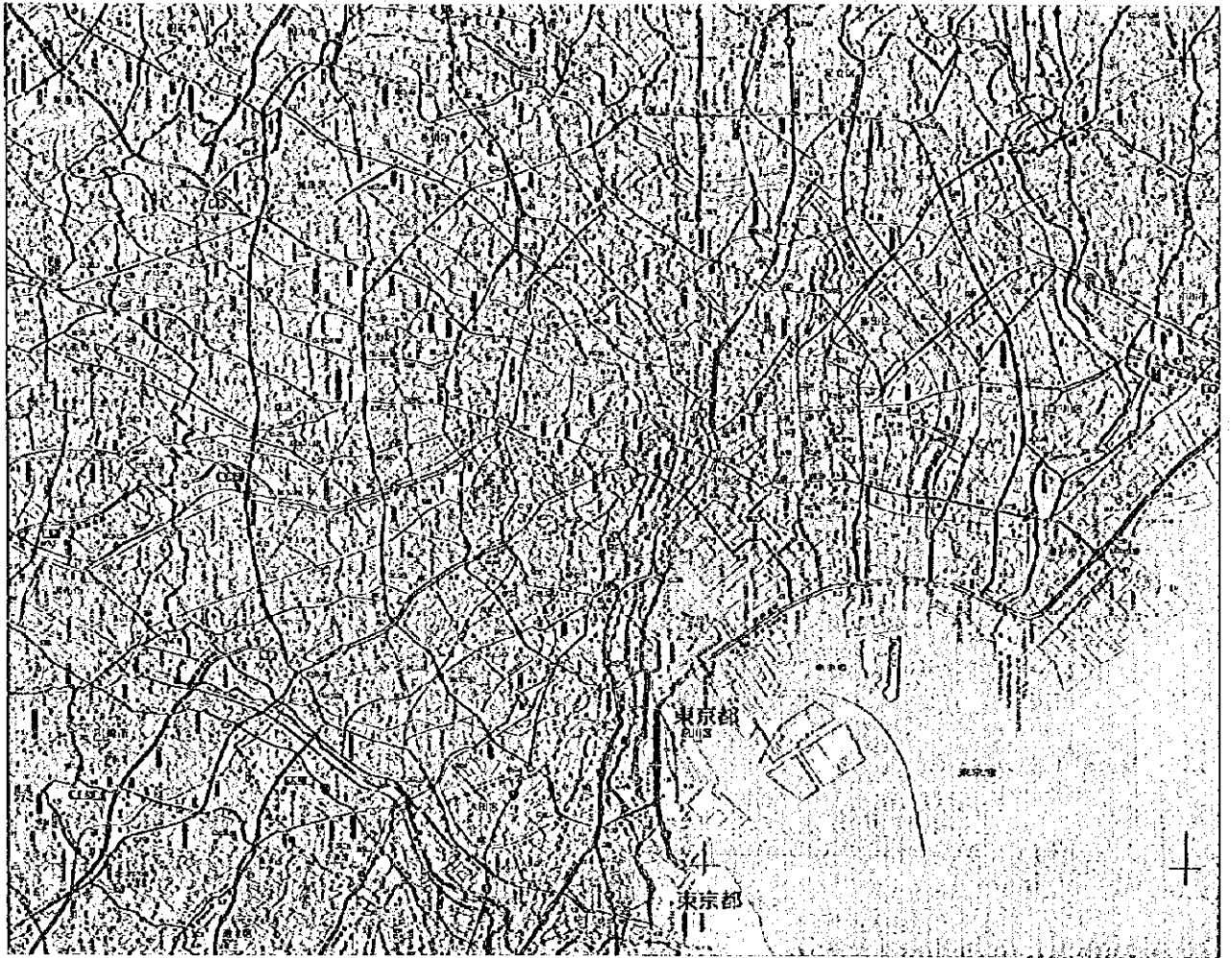


Figure 2.2-1 Comparison of Urban Scale of Bogota and Tokyo