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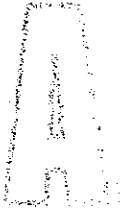
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BARRANQUILLA

**THE COMPREHENSIVE URBAN TRANSPORT STUDY
IN BARRANQUILLA METROPOLITAN REGION
OF THE REPUBLIC OF COLOMBIA**

FINAL REPORT

**MARCH 1985
JAPAN INTERNATIONAL
COOPERATION AGENCY**



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国際協力事業団	
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PREFACE

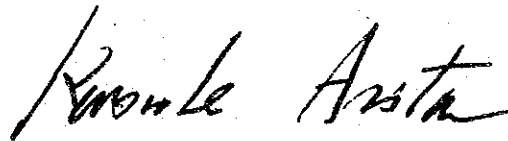
In response to the request of the Government of the Republic of Colombia, the Government of Japan decided to conduct a study on the Comprehensive Urban Transport System in Barranquilla Metropolitan Region and entrusted the study to the Japan International Cooperation Agency (JICA). The JICA sent to Colombia a study team headed by Mr. Takeo SATO from July 1983 to March 1985.

The team exchanged views on the Project with the officials concerned of the Government of Colombia and conducted to survey in Colombia. After the team returned to Japan, further studies were made and the present report has been prepared.

I earnestly hope that this report will serve for the development of the urban transport system in Barranquilla Metropolitan Region as well as for the urban renewal development in Barranquilla Central District and contribute to the promotion of friendly relations between our two countries.

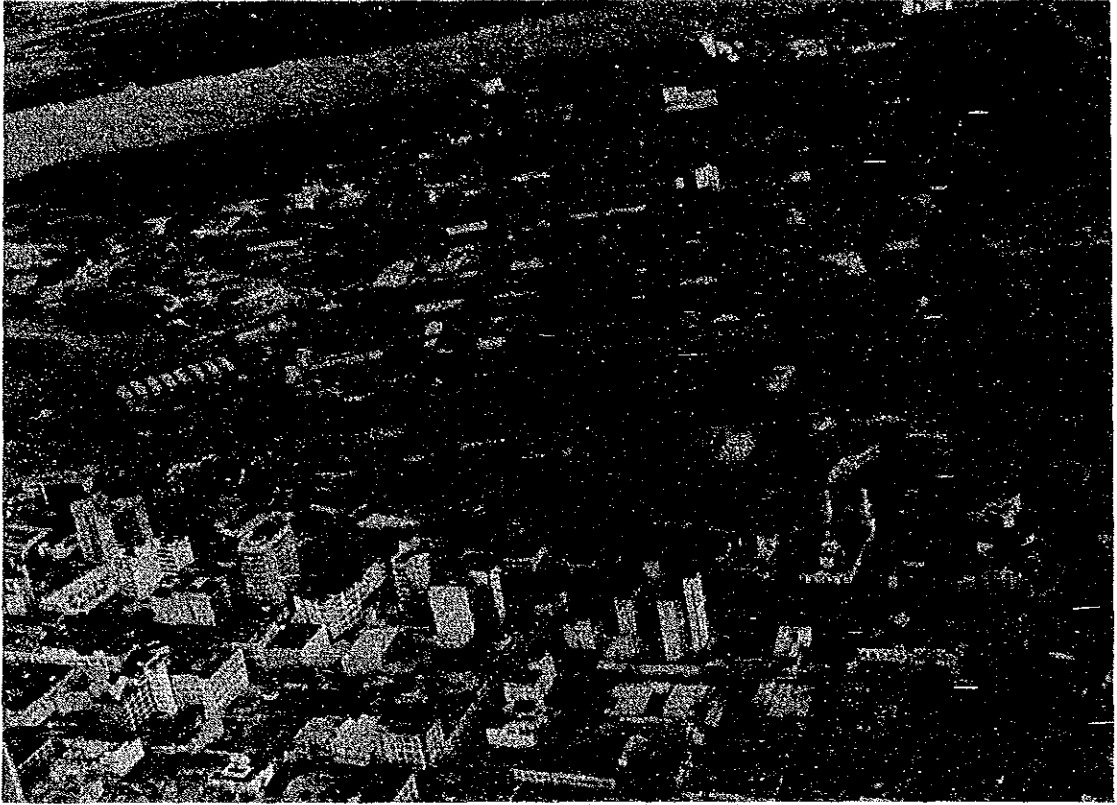
I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Colombia for their close cooperation extended to the team.

March 1985



Keisuke Arita
President

Japan International
Cooperation Agency



Barranquilla City



Main Street in Barranquilla



CONTENTS

CONCLUSIONS AND RECOMMENDATIONS

Chapter 1.	INTRODUCTION	
1-1	Background	1
1-2	Objectives	2
1-3	Organization	2
1-4	Study Area	4
1-5	Study Flow	4
	PART I: EXISTING CONDITIONS	
Chapter 2.	SOCIO-ECONOMIC BACKGROUND	
2-1	Population	9
2-2	Gross Regional Domestic Product (GRDP)	14
2-3	Current Industrial Situation	19
2-4	Employment	23
2-5	Car Ownership	27
2-6	Interregional Transport Facilities	27
Chapter 3.	EXISTING LAND USE AND URBAN STRUCTURE	
3-1	Barranquilla Metropolitan Region	35
3-2	Central District	39
3-3	Existing Problems	65
Chapter 4.	EXISTING CONDITION OF ROADS AND STREETS	
4-1	Existing Road Network	69
4-2	Physical Street Conditions	72
4-3	Existing Problems	76
Chapter 5.	CURRENT TRAFFIC CONDITIONS	
5-1	Traffic Volume	81
5-2	Travel Speed	81

5-3	Traffic Accidents	87
5-4	Parking	92
5-5	Traffic Regulations	98
5-6	Traffic Control Devices	100
5-7	Current Traffic Problems	102
Chapter 6.	CHARACTERISTICS OF EXISTING PERSON TRIP	
6-1	General (Outline of Person Trip Survey)	109
6-2	Trip Production	113
6-3	Trip Generation and Attraction	118
6-4	Existing Origin-Destination Pattern	120
6-5	Modal Choice	122
6-6	Other Characteristics	125
Chapter 7.	EXISTING PUBLIC TRANSPORT SYSTEM	
7-1	General	127
7-2	Bus Transport Demand & Bus Service	128
7-3	Bus Traffic	138
7-4	Administration and Institutions	140
7-5	Bus Operation	146
7-6	Other Public Transport	155
7-7	Existing Problems of Public Transport System	161
PART II: FORECAST AND PLAN		
Chapter 8.	SOCIO-ECONOMIC FRAMEWORK AND LAND USE PLAN	
8-1	Development Policy	169
8-2	Socio-Economic Framework	177
8-3	Land Use Plan	187
8-4	Population and Employment Distribution Plans	196
Chapter 9.	FORECAST OF FUTURE TRANSPORT DEMAND	
9-1	Procedure and Model Building	203
9-2	Results of Demand Forecast	221

9-3	Major Issues for Transport Planning	233
Chapter 10.	ALTERNATIVE TRANSPORT NETWORK PLANS IN THE LONG TERM	
10-1	Basic Planning Policy	237
10-2	Preparation of Alternative Network Plans	237
10-3	Preliminary Evaluation of Alternative Network Plans	252
Chapter 11.	TRANSPORT NETWORK MASTERPLAN	
11-1	Basic Policy	257
11-2	Transport Network Masterplan	260
11-3	Road and Street Plan	266
11-4	Street Drainage System	287
11-5	Estimation of Road Project Cost	291
11-6	Long Term Traffic Management Plan	298
Chapter 12.	PUBLIC TRANSPORT DEVELOPMENT PLAN	
12-1	Basic Policy	305
12-2	Future Public Transportation System	308
12-3	Urban Bus System in the Year 2000	311
12-4	Public Transportation System in the Central District	318
12-5	Bus Related Facility	345
12-6	Plan to Introduce an Intermediate Rail Transit	362
Chapter 13.	URBAN RENEWAL PLAN FOR THE CENTRAL DISTRICT	
13-1	Basic Urban Renewal Policy	379
13-2	Land Use Policy	387
13-3	Strategic Project Areas	395
13-4	Renewal Plan	399
13-5	Implementation Measures	411
Chapter 14.	SHORT TERM TRANSPORT IMPROVEMENT PLAN	
14-1	Traffic Management Plan	415
14-2	Public Transport	441

Chapter 15.	INVESTMENT PROGRAM	
15-1	Identified Projects	451
15-2	Investment Schedule	454
15-3	Financial Source of Road Development	458
Chapter 16.	EVALUATION OF PROPOSED PLAN	
16-1	Economic Evaluation	465
16-2	Financial Evaluation on Public Transportation Projects	481
16-3	Socio-Economic Impact of Masterplan	498

APPENDICES

LIST OF TABLES

Table 2-1-1	Population Trend by Census
Table 2-1-2	Population in the Study Area in 1983
Table 2-1-3	Population Estimates for Barranquilla and Soledad by Different Studies
Table 2-1-4	Age Composition in Barranquilla and Soledad
Table 2-1-5	Birth Rate and Death Rate in Colombia
Table 2-1-6	Population in Atlántico
Table 2-2-1	Movement of GDP of Colombia by Three Sectors of Economic Activity at '75 Constant Prices
Table 2-2-2	GRDP of Atlántico at '75 Constant Prices
Table 2-3-1	Status of Manufacturing Industries in Barranquilla-Soledad Compared with Atlántico and Colombia ('81)
Table 2-3-2	Manufacturing Industries by Activities in Barranquilla-Soledad ('80-'81)
Table 2-3-3	Distribution of Large Manufacturing Industries
Table 2-3-4	Number of Establishments in Barranquilla Metropolitan Region
Table 2-4-1	Labor Force in Study Area in 1973
Table 2-4-2	Labor Force Trend in Barranquilla and Soledad
Table 2-4-3	Employment by Three Sectors of Activity and Area ('73)
Table 2-4-4	Employment by Three Sectors of Activity and Area ('83)
Table 2-5-1	Vehicle Registration in Barranquilla
Table 2-5-2	Vehicle Ownership in Barranquilla and Soledad
Table 2-5-3	Past Trend of Vehicle Registration in Barranquilla
Table 2-6-1	Total Passengers at Barranquilla Airport
Table 2-6-2	Average Daily Traffic Volume by Station
Table 3-2-1	Features of Central District by Zone
Table 3-2-2	Land Use by Zone
Table 3-2-3	Land Use Ratio by Zone
Table 3-2-4	Land & Building Features by Zone
Table 3-2-5	Building Use by Zone
Table 3-2-6	Building Use Ratio by Zone
Table 3-2-7	Building Vacancy
Table 3-2-8	Public Land Tenure
Table 3-2-9	Number of Establishments by Zone and Industry

Table 3-2-10	Urban Zoning Ordinance
Table 4-1-1	The Road and Street Classification in Barranquilla Metropolitan Region
Table 5-1-1	Location with Large Traffic Volume
Table 5-1-2	Location with Small Traffic Volume
Table 5-3-1	Traffic Accidents by Type of Cars in Barranquilla City (1982)
Table 5-4-1	Average Parking Duration of Toll Parking Lot (Off-Street)
Table 5-7-1	Criteria for Evaluation of Traffic Conditions
Table 5-7-2	Existing Traffic Problems by Location
Table 6-1-1	Result of Sampling
Table 6-1-2	Vehicle Occupancy Obtained from Car Occupancy Survey
Table 6-1-3	Average Vehicle Occupancy
Table 6-1-4	The Rate of Vacant Taxis
Table 6-1-5	Traffic Volume on the Screen Line
Table 6-2-1	Trip Production Rate by Industry
Table 6-2-2	Trip Production Rate by Occupation
Table 6-2-3	Trip Production Rate by Ownership
Table 6-3-1	Trip Generation and Attraction by Zone
Table 6-5-1	Modal Share
Table 6-5-2	Modal Choice by Trip Purpose
Table 7-2-1	Integrated Urban Bus Routes
Table 7-2-2	Comparison of Demand and Supply of Urban Bus Transportation at the Boundary of Centro (Zone 001) (1983)
Table 7-5-1	Total Number of Bus/Buseta in Barranquilla 1983
Table 7-5-2	Reasons for Inactive Buses
Table 7-5-3	Facilities in Bus Company Terminals
Table 7-6-1	Trip Purpose of the Inter-regional Bus Passengers
Table 7-6-2	Terminal Facilities of Interdepartmental Bus Companies
Table 8-1-1	Investment by Sector 1983-1986
Table 8-2-1	Population Projection by DNP
Table 8-2-2	Population Projection for Barranquilla and Soledad
Table 8-2-3	Population Projection for Malambo, Galapa, Pto. Colombia
Table 8-2-4	Population Projection in Study Area
Table 8-2-5	Projection of Future GRDP of Atlántico by Three Sectors of Economic Activity at 1975 Constant Prices

Table 8-2-6	Projected Labor Force in Study Area
Table 8-2-7	Future Working Population by Sector and Area
Table 8-2-8	Future Employment by Sector in Study Area
Table 8-2-9	Vehicle Ownership in 2000
Table 8-3-1	Existing and Future Site Area and Employment of Main Industrial Zones
Table 8-3-2	Area by Use in the Year 2000
Table 8-4-1	Future Total Population and Employment of the Study Area
Table 9-1-1	Trip Generation and Attraction Model
Table 9-1-2	Trip Attraction Model for Shopping
Table 9-1-3	Intra-Zonal Trip Model
Table 9-1-4	Parameters of Split Model for Private/Public Modes
Table 9-1-5	Level of Services
Table 9-2-1	Total Population – 2000 –
Table 9-2-2	Composition of Population by Industry
Table 9-2-3	Vehicle Ownership
Table 9-2-4	Number of Trip Production by Purpose in 2000
Table 9-2-5	OD Table in 1983 (Person Trip/Day)
Table 9-2-6	OD Table in 2000 (Person Trip/Day)
Table 9-2-7	Average Trip Length
Table 9-2-8	Modal Share of Person Trips
Table 9-2-9	Modal Share of Vehicle Trips
Table 10-2-1	Comparison of Traffic Demand and Capacity
Table 10-2-2	Alternative Network Concepts
Table 10-2-3	Summary of Traffic Assignment on Alternative Network Plans
Table 10-2-4	Modal Share of Person Trips by Alternative Plan
Table 10-3-1	Total Economic Project cost by Alternative Network Plans
Table 10-3-2	Vehicle Cost and Time Cost in 2000
Table 10-3-3	Results of Preliminary Evaluation
Table 11-1-1	Geometric Elements of the Street
Table 11-3-1	List of Collector Streets in Centro District and Barranquillira
Table 11-5-1	Unit Construction Cost in Barranquilla 1984
Table 11-5-2	Road Projects
Table 11-5-3	Road Project Cost by Foreign and Local Currency
Table 11-6-1	Peak Hour Parking Demand and Development Needs of Parking Spaces in 2000

Table 12-1-1	Trip Purpose Composition of Bus Users
Table 12-3-1	Corridor and Bus Route
Table 12-3-2	Proposed Bus Routes
Table 12-3-3	Total Number of Bus Passengers Estimated
Table 12-4-1	Total Lane-km of Streets in Centro
Table 12-4-2	Number of Vehicles to be Found in Centro during Peak Hour
Table 12-4-3	Analysis of Limitation on Traffic Capacity in Centro
Table 12-4-4	Evaluation of Alternatives on Bus Route Improvement in the Central District
Table 12-4-5	Streets for the Bus Circular System
Table 12-4-6	Utilization of Gran Parada
Table 12-4-7	Bus Service Frequency in Peak Hour by Parada
Table 12-4-8	Land Area Required for Gran Parada
Table 12-4-9	Implementation Schedule of Gran Parada
Table 12-4-10	Construction Cost of Each Gran Parada
Table 12-5-1	Area of the Interdepartmental Bus Terminal in 1988
Table 12-5-2	Evaluation of Selected Sites
Table 12-5-3	Result of Field Investigation of Candidate Site
Table 12-5-4	Construction Cost of Interdepartmental Terminal 1st Stage
Table 12-5-5	Construction Cost of Interdepartmental Terminal 2nd Stage
Table 12-5-6	Areal Demand of Inter-Municipal Bus Terminal
Table 12-5-7	Construction Cost of Inter-Municipal Terminal
Table 12-5-8	Number of Check Points by Parts
Table 12-5-9	Number of Check Points by Inspection Measures
Table 12-5-10	Necessary Area for Inspection Center
Table 12-5-11	Cost of Construction and Equipments for Bus Inspection Center
Table 12-6-1	Transport Capacity of Public Transport System
Table 12-6-2	Candidate Alignment of Rail Transit
Table 12-6-3	Evaluation of Alternative Rail Transit Routes
Table 12-6-4	Construction Cost of Rail Transit
Table 13-1-1	Low Land Use Intensity Index by Sub-Division
Table 13-2-1	Coordination of Zone
Table 13-2-2	Floor Area per Capita for Tertiary Sector

Table 13-2-3	Framework and Land Use Density by Zone
Table 13-2-4	Land Use Area by Zone
Table 13-4-1	Road Standards
Table 13-4-2	Collectors in Centro
Table 13-4-3	Development Plan of Collector Streets in Barranquillita
Table 13-4-4	Arroyo Measures Facilities
Table 13-4-5	Land Preparation Features
Table 13-5-1	Summary of Implementation Measures by Area
Table 14-1-1	Criteria for the Type of Signal Control System
Table 14-1-2	Criteria for Coordinated Control System
Table 14-1-3	Methods of Intersection Improvement
Table 14-1-4	Inadequate Capacity Locations
Table 14-1-5	Basic Items of Traffic Channelization
Table 14-1-6	Parking Space Development Need
Table 14-2-1	Areas Requiring Bus Service
Table 14-2-2	Demand Capacity Ratio for the Bus Priority Lane Plan (East-West)
Table 14-2-3	Demand Capacity Ratio for the Bus Priority Lane Plan (North-South)
Table 14-2-4	Evaluation on Priority of Bus Bay Installation
Table 14-2-5	Selected Bus Stops for Bus Bay Construction
Table 14-2-6	Typical Length of Bus Bay
Table 14-2-7	Selection of Bus Bay Type
Table 15-2-1	Road Investment Schedule
Table 15-2-2	Drainage Projects Investment Schedule
Table 15-2-3	Public Transport Projects Investment Schedule
Table 15-3-1	Municipal Financial Resource for Road Investment 1985
Table 15-3-2	Road Investment in Barranquilla Metropolitan Area 1979-1984
Table 16-1-1	Vehicle Characteristics and Cost in Barranquilla 1984
Table 16-1-2	Fuel and Lubricant Cost
Table 16-1-3	Tire Cost
Table 16-1-4	Spare Tire and Maintenance Labour Cost
Table 16-1-5	Depreciation
Table 16-1-6	Crew Cost, Overhead Cost, Insurance Cost
Table 16-1-7	Summary of Vehicle Operating Cost in Barranquilla
Table 16-1-8	Travel Time Cost by Type of Vehicle

Table 16-1-9	Cost and Benefit of Road Masterplan
Table 16-1-10	Sensitivity Analysis of Road Masterplan
Table 16-1-11	Main Project/Packages for Evaluation
Table 16-1-12	Evaluation of Road Projects
Table 16-2-1	Inflation Rate in Colombia
Table 16-2-2	Annual Investment Amount of Interdepartmental Bus Terminal
Table 16-2-3	Revenue of Interdepartmental Bus Terminal
Table 16-2-4	Annual & Monthly Wage of Interdepartmental Bus Terminal in 1990
Table 16-2-5	Expenses of Interdepartmental Bus Terminal in 1990
Table 16-2-6	Sensitivity Analysis on Interdepartmental Bus Terminal Project
Table 16-2-7	Annual Investment Amount of Intermunicipal Bus Terminal
Table 16-2-8	Revenue of Intermunicipal Bus Terminal
Table 16-2-9	Annual & Monthly Wage of Intermunicipal Bus Terminal
Table 16-2-10	Expenses of Intermunicipal Bus Terminal in 1996
Table 16-2-11	Sensitivity Analysis on Intermunicipal Bus Terminal Project
Table 16-2-12	Investment Schedule of Rail Transit Project
Table 16-2-13	Revenue of Rail Transit System in 2000
Table 16-2-14	Operation Cost of Rail Transit System in 2000
Table 16-2-15	Sensitivity Analysis on Rail Transit Project (Centro-Soledad)

LIST OF FIGURES

Fig. 1-3-1	Study Organization
Fig. 1-4-1	Study Area
Fig. 1-5-1	Study Flow
Fig. 2-1-1	Estimation Procedure of Present Population Size
Fig. 2-4-1	Activity Rate and Unemployment Rate in Barranquilla
Fig. 3-1-1	Housing Development Projects under Construction or under Study
Fig. 3-1-2	Hydrographic Characteristics in Study Area
Fig. 3-1-3	Existing Land Use
Fig. 3-2-1	Study Area
Fig. 3-2-2	Topography
Fig. 3-2-3	Commercial Land Use
Fig. 3-2-4	Industrial Land Use
Fig. 3-2-5	Residential Land Use
Fig. 3-2-6	Building Area Ratio
Fig. 3-2-7	Floor Area Ratio
Fig. 3-2-8	Land Vacancy
Fig. 3-2-9	Public Land Tenure
Fig. 3-2-10	Public Facilities
Fig. 3-2-11	Unit Land Value
Fig. 3-2-12	Investment Intensity
Fig. 3-2-13	Unit Investment
Fig. 3-2-14	Water Supply Network
Fig. 3-2-15	Sewer Network
Fig. 3-2-16	Urban Zoning Ordinance
Fig. 3-2-17	Surface Storm Water Flow
Fig. 4-1-1	The Existing Road Network in Barranquilla
Fig. 4-1-2	The Existing Lanes of the Major Roads
Fig. 4-2-1	Existing Pavement Condition in Barranquilla
Fig. 4-2-2	Collapsed Pavement in the Streets in Barranquilla
Fig. 4-2-3	Location of the Public Works in Barranquilla
Fig. 4-3-1	Existing Routes of Arroyo in Barranquilla
Fig. 5-1-1	Traffic Volume

Fig. 5-1-2	Composition of Vehicle Types
Fig. 5-2-1	Average Vehicle Travel Speed
Fig. 5-3-1	Yearly Trend of Traffic Accidents ('73-'82)
Fig. 5-3-2	High Accident Frequency Points
Fig. 5-3-3	Collision Diagram
Fig. 5-4-1	Parking Density by Zone
Fig. 5-4-2	Average Walking Distance from Parking Space on Street
Fig. 5-4-3	Traffic Variation of Toll Parking Lot (Off-Street)
Fig. 5-4-4	Parking Problem Area
Fig. 5-5-1	One Way Street
Fig. 5-5-2	Speed Limit
Fig. 5-5-3	Road with Restricted Parking
Fig. 5-6-1	Location of Signalized Intersection
Fig. 6-2-1	Number of Trips by Purpose
Fig. 6-2-2	Number of Trips by Industry
Fig. 6-2-3	Number of Trips by Occupation
Fig. 6-3-1	Trip Generation/Attraction by Zone
Fig. 6-4-1	OD Pattern in 1983 (All Purpose)
Fig. 6-5-1	Modal Choice by Purpose
Fig. 6-5-2	Composition of Trip Purpose by Mode
Fig. 6-6-1	Hourly Traffic Distribution to CBD
Fig. 6-6-2	Hourly Traffic Distribution from CBD
Fig. 6-6-3	Travel Time Distribution
Fig. 7-2-1	Integrated Bus Routes (Present)
Fig. 7-2-2	Bus Service Area and Urbanized Area
Fig. 7-2-3	Generated Bus Passengers and Bus Dependence Ratio
Fig. 7-2-4	Comparison of Bus Transport Capacity and Demand
Fig. 7-2-5	Hourly Variation of Number of Bus Passengers
Fig. 7-3-1	Number of Bus Route in Central Area
Fig. 7-4-1	History of Subsidies Related to Bus Transportation
Fig. 7-4-2	Increase of Subsidy for "Corriente" Buses
Fig. 7-5-1	Number of Bus Units by Company
Fig. 7-5-2	Bus Fleet by Class of Capacity
Fig. 7-5-3	Bus Fleet by Model

Fig. 7-5-4	Bus Fleet by Car-Make
Fig. 7-5-5	Flow Chart of Financial Analysis by Bus Route
Fig. 7-5-6	Distribution of Urban Bus Facilities
Fig. 7-6-1	Interdepartmental Bus Services from Barranquilla
Fig. 7-6-2	Intermunicipal Bus Services in the Atlántico Department
Fig. 7-6-3	Pattern of Inter-regional Bus Passengers
Fig. 7-6-4	Location of Interdepartmental Bus Companies
Fig. 7-6-5	Number of Taxi by Model
Fig. 7-6-6	Number of Taxi by Car Make
Fig. 7-6-7	Location of Taxi Company and Taxi Station
Fig. 8-2-1	Projected Growth Curve of GDP in Future
Fig. 8-3-1	Development Project of Large Scale Facilities
Fig. 8-3-2	Land Use Plan for the Year 2000
Fig. 8-4-1	Zone Groups
Fig. 8-4-2	Population Distribution Plan
Fig. 8-4-3	Employment Distribution Plan
Fig. 9-1-1	Procedure for Future Transport Demand Forecast
Fig. 9-1-2	Distribution of Employees in Tertiary Industry and Educational Establishment
Fig. 9-1-3	Shopping Trip Attraction and Number of Employees in Tertiary Industry
Fig. 9-1-4	Classification of the Cluster (Shopping Trip Attraction)
Fig. 9-1-5	Procedure of Binary Choices
Fig. 9-1-6	Existing Walking Distance
Fig. 9-1-7	Modal Split Curve (Walk and Motorcycle)
Fig. 9-1-8	Modal Split Curve (Public Transport)
Fig. 9-1-9	Q-V Formula
Fig. 9-2-1	Trip Production in 2000
Fig. 9-2-2	Trip Generation in 1983 and 2000
Fig. 9-2-3	OD Pattern in 2000 (All Purpose)
Fig. 9-2-4	Traffic Demand in 1983 (Existing Network)
Fig. 9-2-5	Traffic Demand in 2000 (Existing Network)
Fig. 9-2-6	Traffic Congestion Degree in 2000 (Existing Network)
Fig. 10-2-1	Sections by Directions
Fig. 10-2-2	Physical Pattern of Main Axes

Fig. 10-2-3	Alternative Network 1
Fig. 10-2-4	Traffic Assignment on Alternative 1 (2000)
Fig. 10-2-5	Alternative Network 2
Fig. 10-2-6	Traffic Assignment on Alternative 2 (2000)
Fig. 10-2-7	Alternative Network 3
Fig. 10-2-8	Traffic Assignment on Alternative 3 (2000)
Fig. 10-2-9	Alternative Network 4
Fig. 10-2-10	Traffic Assignment on Alternative 4 (2000)
Fig. 10-2-11	Alternative Network 5
Fig. 10-2-12	Traffic Assignment on Alternative 5 (2000)
Fig. 11-2-1	Transport Network Master Plan for 2000 Barranquilla
Fig. 11-2-2	Transport Network Master Plan for 2000 Metropolitan Region
Fig. 11-3-1	The Future Road Network Plan
Fig. 11-3-2	Cross Section for the Streets Plan in Barranquilla
Fig. 11-4-1	The Future Plan of Arroyo Routes
Fig. 11-4-2	The Arroyo Counterplan for the Critical Point
Fig. 11-4-3	Detail of the Culvert Box and Manhole
Fig. 11-5-1	Composition of Project Cost
Fig. 11-5-2	Land and Building to be Compensated
Fig. 11-5-3	Composition of Road Project Cost
Fig. 11-6-1	Long Term Concept of Signal Control
Fig. 11-6-2	Parking Space Development Needs in 2000
Fig. 12-1-1	Generation and Attraction of Bus Passenger
Fig. 12-1-2	Percentage Share of Bus Passenger Trip-End by Zone
Fig. 12-1-3	Desire Line of Bus Passengers in 2000
Fig. 12-2-1	Tendency of the Route Charges in the Applications to INTRA from Bus Companies
Fig. 12-2-2	Concept of Future Basic Network
Fig. 12-3-1	Bus Service Area from Major Radial Route
Fig. 12-3-2	Bus Service Area from Circumferencial Route
Fig. 12-3-3	Future Bus Route Network
Fig. 12-3-4	Estimation Procedure of Number of Passenger by Bus Route
Fig. 12-3-5	Bus Traffic Pattern, 2000
Fig. 12-4-1	Existing Bus Routes in City Center

Fig. 12-4-2	Bus Route Improvement Plan
Fig. 12-4-3	Bus Circular System in Central District
Fig. 12-4-4	Rerouted Bus Route
Fig. 12-4-5	Bus Traffic Volume in Peak Hour
Fig. 12-4-6	Estimation of Usage of Gran Parada
Fig. 12-4-7	Model Plan for Gran Parada
Fig. 12-4-8	Bus Approach and Circulation in Gran Parada
Fig. 12-4-9	Parking Platform Pattern
Fig. 12-5-1	Interdepartmental Bus Routes in Barranquilla
Fig. 12-5-2	Candidate Sites for Interdepartmental Bus Terminal
Fig. 12-5-3	Candidate Sites of Interdepartmental Terminal in Site D-5
Fig. 12-5-4	Flow Diagram of Bus Center
Fig. 12-5-5	Interdepartmental Bus Terminal
Fig. 12-5-6	Distribution of Intermunicipal Bus Companies
Fig. 12-5-7	Site Condition of Intermunicipal Bus Terminal
Fig. 12-5-8	Intermunicipal Bus Routes in Barranquilla
Fig. 12-5-9	Model Plan of Intermunicipal Bus Terminal
Fig. 12-5-10	Model Plan of Bus Inspection Center
Fig. 12-6-1	Sectorial Demand of Public Transportation, 2000
Fig. 12-6-2	Candidate Route of Rail Transit
Fig. 12-6-3	Typical Structure of Intermediate Rail Transit
Fig. 12-6-4	Route of the Rail Transit
Fig. 12-6-5 (1)	Standard Cross-Section of Route 1
Fig. 12-6-5 (2)	Standard Cross-Section of Route 2
Fig. 13-1-1	Renewal Policy Area
Fig. 13-1-2	Low Land Use Intensity Area
Fig. 13-2-1 (1)	Coordination of Zones (Original P.T. Zones & Survey Sub-Divisions)
Fig. 13-2-1 (2)	Coordination of Zones (Final Zone)
Fig. 13-2-2	Estimation on Street Vendors
Fig. 13-2-3	Land Use Plan (2000)
Fig. 13-3-1	Strategic Project Areas
Fig. 13-4-1	Street Network Plan
Fig. 13-4-2	Renewal Plan
Fig. 14-1-1	Method of Countermeasures for Increasing Traffic Capacity

Fig. 14-1-2	Location of Bottleneck Intersections
Fig. 14-1-3	Location of Traffic Accidents
Fig. 14-1-4	Hourly Variation Pattern of Traffic at Bottleneck Intersections
Fig. 14-1-5	Typical Hourly Variation Patterns of Intersection Traffic
Fig. 14-1-6	Type of Signal Phase
Fig. 14-1-7	Signal Control Plan (Short Term Plan)
Fig. 14-1-8	Relationship between Traffic Volume and Capacity
Fig. 14-1-9	Standard Structure of Typical Intersection
Fig. 14-1-10	Intersection Improvement Plan
Fig. 14-1-11	Curb Parking Control Area
Fig. 14-1-12	Parking Space Development Need
Fig. 14-1-13	Traffic Safety Facility Plan
Fig. 14-2-1	Traffic Congestion due to Passenger Service at Bus Stops
Fig. 14-2-2	Typical Bus-Bay Plan
Fig. 15-1-1	Project Location Maps
Fig. 15-3-1	Sources and Flows of Road Funds
Fig. 15-3-2	Trend of Public Investment for Road Project in Barranquilla Metropolitan Area
Fig. 15-3-3	Geographical Distribution of Road Projects, 1979-1984
Fig. 16-1-1	Economic Benefit of the Masterplan and Project
Fig. 16-1-2	Vehicle Operating Cost in Barranquilla
Fig. 16-1-3	Distribution of Saved Time
Fig. 16-1-4	Unemployment in the Principal Cities
Fig. 16-1-5	Benefit of Road Masterplan
Fig. 16-1-6	Net Present Value and Internal Rate of Return
Fig. 16-2-1	Procedure of Financial Analysis
Fig. 16-2-2	Organization of Interdepartmental Bus Terminal
Fig. 16-2-3	Trend of Balance Carried Forward of Interdepartmental Bus Terminal
Fig. 16-2-4	Trend of Balance Carried Forward of Interdepartmental Bus Terminal
Fig. 16-2-5	Trend of Balance Carried Forward of Rail Transit (Centro-Soledad)

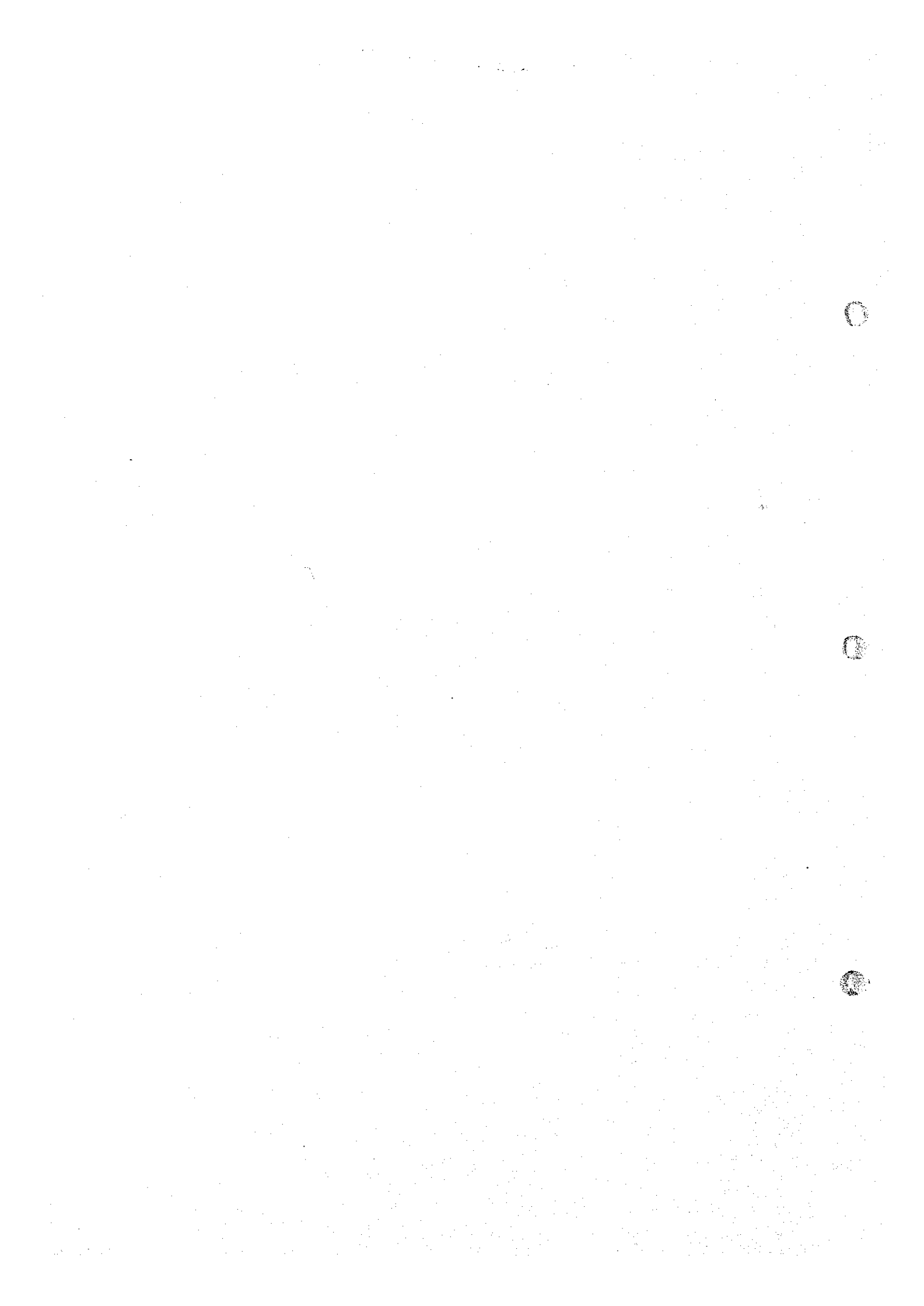
ABBREVIATION

1. AASHTO : American Association of State Highway and Transportation Officials
 - BCH : Banco Central Hipotecario
 - CAMACOL : Camara Colombiana de la Construcción
 - CFT : Cooperación Financiera de Transporte
 - CC : Camara de Comercio
 - DANE : Departamento Administrativo Nacional de Estadística
 - DNP : Departamento Nacional de Planeación
 - EMT : Empresa Municipal de Telefónica
 - EPM : Empresa Pública Municipal
 - FENALCO : Federación Nacional de Comerciantes
 - FFDU : Fondo Financiero Desarrollo Urbano
 - HIMAT : Instituto Colombiano de Hidrología y Adecuación de Tierras
 - ICA : Instituto Colombiano de Agropecuaria
 - ICT : Instituto de Crédito Terrestre
 - IGAC : Instituto Geográfico "Augustin Codazzi"
 - INTRA : Instituto Nacional de Transporte
 - JICA : Japan International Cooperation Agency
 - MOPT : Ministerio de Obras Públicas y Transporte
 - TT : Instituto Departamental de Transportes y Tránsito
 - SCA : Sociedad Colombiana de la Construcción
 - UNINORTE : Universidad del Norte
-
2. ADT : Average Daily Traffic
 - B/C : Benefit Cost Ratio
 - CBD : Control Business District
 - CIF : Cost of Insurance and Freight
 - EIRR : Economic Internal Rate of Return
 - FIRR : Financial Internal Rate of Return
 - FOB : Free on Board
 - GDP : Gross Domestic Product
 - GRDP : Gross Regional Domestic Product
 - NPV : Net Present Value

OD : Origin and Destination
PIDAMB : Plan Integral de Desarrollo Urbano del Area Metropolitana de Barranquilla
PT : Person Trip
VOC : Vehicle Operating Cost

3. g : Gram
hr. : Hour
ha. : Hectare
km : Kilo-meter
m² : Square-meter
m³ : Cubic-meter
pcu : Passenger Car Unit
\$: Colombian Peso (\$110 = US\$1.0)
veh./day : Vehicles per Day
t : Ton
US\$: United States Dollar
yr : Year

**CONCLUSIONS AND
RECOMMENDATIONS**



CONCLUSIONS AND RECOMMENDATIONS

Through the masterplan study, a variety of development plans in terms of land use, transport network, public transport, urban renewal were proposed. These plans should be thoroughly scrutinized and promptly authorized to define a development guideline of the Metropolitan Region.

It is also important to implement as soon as possible the proposed short term plans composed of traffic management plan, bus facilities development plan and a countermeasure plan for Arroyo.

As a whole, the concentration of various problems in the Central District have been identified. From the standpoint of transport, major traffic congestion and problems in the traffic management are common place in the District. Furthermore the public transport system is seriously in confusion in terms of the volume of buses and their routes.

These problems are closely related to the existing urban activities and environment in the District. Major urban activities, commercial and business show a tendency to flee from the District, moreover, the spatial configuration of the function are in disorder along with contamination of channels. In conclusion, the Central District has not been able to keep pace with the rapid urbanization process of the Metropolitan Region, and every aspect of urban problems is manifested in the District.

The future metropolitan development requires the Central District to be the primary regional center to undergo extensive urban renewal. This is because, from the viewpoint of reasonable regional development, more efficient regional core has to be established with appropriate creation of sub-centers.

Thus, the urban renewal in the Central District has to be a consolidated action to realize:

- 1) Revitalization of major urban activities
- 2) Development of rational transport systems
- 3) Improvement of physical environment

Restructuring of the District including Barranquillita is proposed with the development of

a road system, introduction of bus circulation system, measure against Arroyo, creation of open space, and other infrastructure development.

Integrating all these together, the renewal scheme in the Central District is a most significant action for the future development of the region.

To actualize the masterplan including the above renewal scheme, the following actions are recommended:

1. Establishment of New Planning Organization

All the planning aspects concerning urban development in Barranquilla are ranked behind those of other large cities in Colombia. This may be attributed to the shortcomings of the organization in charge of urban planning with close coordination with various institutions. It is our understanding that the establishment of a more effective planning office has been already proposed.

In this regard, it is recommended that this office will carry out, among others, the following functions:

(1) Planning Studies

Based on and in connection with this masterplan study, the office is expected to undertake: (a) preparations for guidelines and control system on urban development, (b) continuous studies on the various development plans in terms of more detailed analysis, preparations for their realization and so on. Special attention has to be paid to the urban renewal plan for the Central District, the introduction of a rail transit system and the Arroyo countermeasures.

(2) Information Development

For realistic planning and studies, data and maps on demography, economy, transport and land use have to be collected and compiled. In addition to ad-hoc surveys, a data collection/management system should be established permanently for their periodic up-dating.

(3) Monitoring and Review of Masterplan

A long-term masterplan must also be flexible, and needs to be revised on occasion,

monitoring the current urban growth situation and the adaptability of the masterplan. In this context, the masterplan has to be reviewed at least in the early 1990s. At that time, the introduction of a rail transit would be presumably an important and realistic planning objective, especially if road development projects have been delayed for some reasons.

(4) **Planning Coordination**

Various problems and programs have been made and implemented without comprehensive planning concepts. Examples are housing schemes expanding rapidly to suburban areas and the decision of new bus routes without coordination among bus companies. These facts have added much to the disorderly development of the city and the region.

Accordingly, the office of the New Planning Organization has to be the center for coordination of individual plans and proposals by different entities.

2. Financial Resources

In order to realize the masterplan, is essential to establish a solid self-sustained fund as well as to utilize the vitality of the private sector and to introduce the central government fund. In this respects, the following are suggested:

- (1) To apply the current tax system more strictly: A possibility exists to increase the tax revenue, even at the present rates, by more strict application of the tax regulations.
- (2) To apply, more strongly, the benefit principle: The primary beneficiaries of the road and bus facility development are car owners as well as inhabitants along the road, consequently in principle, the car owners and inhabitants should shoulder the costs.
- (3) To reform the current tax system: In connection with item (2) above, the current tax system should be reviewed, as necessary. Specifically the present rate of taxation being the principal source of FEI (Special Investment Fund) should be studied. In order to make road administration more flexible, it is also recommended to commingle the tax revenues for road development, currently managed by individual each local authority into a metropolitan road fund, if possible.
- (4) To establish public enterprises: New public enterprises should be set up to undertake such profitable public-type business as bus terminal and Barranquillita development. Their profits should be reinvested in public works.

- (5) To introduce new development method: Further efforts should be made to decrease the burden on the public investment, while increasing the public revenue. To accomplish this, it is desirable to look for new urban development methods such as "replotting system" and "right conversion method".

3. Public Relations

Well informed citizens, and cooperation on tax payments and the usage of such taxes are essential in order to carry out a large-scale urban reconstruction and infrastructure development. Consequently, citizen participation in the planning process is also important. On the other hand, the contents of a plan should be broadly disseminated through the mass-media and into appropriate concerned groups. Especially in case of urban renewal, no project could be accomplished without deepening the understanding of the directly interested people as to the purposes, method and effects of the project.

4. Feasibility Study

As the major large-scale projects, the following are identified through the masterplan study.

- 1) Urban Renewal/Development of the Central District
- 2) Road Network Development
- 3) Development of Bus Transport System
- 4) Development of Rail Transit System
- 5) Development of South Subcenter Area
- 6) Development of North Subcenter Area

As for the projects with high priority, it is recommended to undertake a feasibility study at an early stage.

Among the above, the study related to the urban renewal/development of the Central District should be most urgently carried out since the Central District has numerous problems in its land use, transport, environment, etc., while it is expected to be the most important regional core of the Caribbean coast.

This feasibility study may involve the studies on the urban renewal scheme and the supporting infrastructural development projects such as road, canal, terminals, etc.

In order to realize the urban renewal, it is necessary for the public sector to induce and involve the private sector. In this sense, the study may also include the study on the renewal/development measures which can be effectively applied to bring saving from the public investment for its implementation.

Chapter 1 INTRODUCTION

1-1 Background

Barranquilla, the fourth largest metropolis in the Republic of Colombia is about 700 km north of Bogota, the capital of the country. Its development has been principally brought about by the advantageous location of its maritime port. The Barranquilla Metropolitan Region is situated at the estuary of the Magdalena River.

Due to the influx of a large number of immigrants to the Region, its population has grown at a high pace, an average of about 4.2% annually for the past three decades. It is expected to continue to grow from 1.2 million in 1983 to about 2.0 million in the year 2000.

The economic growth of Atlantico Department in which Barranquilla Metropolitan Region is included, has been rather stagnant in recent years, due mainly to the world-wide economic recession and the increasing protectionism of the neighboring countries. According to the projection by the Study Team, however, the economic conditions in Colombia are expected to improve year by year. With the growth of the national economy, the GRDP growth of Atlantico is expected to recover from the economic recession by the year 1990, and is projected to grow from 31,000 million pesos in 1983 to 45,000 million pesos in 1990 and to 78,000 million pesos in 2000 at 1975 constant prices. The vehicle ownership in 2000 is also forecasted to increase 64% higher than the existing level.

Owing to the high growth in population, economic activities, and vehicle ownership, the traffic demand is expected to increase. The main streets in the Central District of Barranquilla are already congested by traffic, and because of the traffic demand growth, the congested area will expand toward the peripheral area of the city.

The bus transport, which is the major transport mode for person trips, has developed in terms of service area and number of buses in response to the expansion of the urbanized area. This expansion of bus services has further aggravated the traffic congestion in the Central District.

Buses are operated by many private companies in a radial pattern mostly destinating to the Central District, however, since there is no coordination among them, the bus route pattern

as a whole is complicated and disordered. This disorderly concentration of bus services in Centro further complicates the traffic problems.

In addition, the Central District has its own problems. Some of them are: concentration and mixture of various urban activities, flight of business and commercial activities from the District in conjunction with high vacancy of buildings, and environmental deterioration etc. In view of above problems, it is imperative to improve the urban transport system in Barranquilla Metropolitan Region, and to redevelop the Central District. To carry out the above program effectively, it is urgently required to establish a master urban transport plan including a renewal plan of the Central District.

With the above objectives in mind, the Government of Colombia requested the Government of Japan for assistance to conduct a Comprehensive Urban Transport Study in the Barranquilla Metropolitan Region in 1982. In response to this request, the Government of Japan, through its implementing body, the Japan International Cooperation Agency (JICA) began to carry out this study jointly with the Government of Colombia since July, 1983.

1-2 Objectives

The objective of the Study is to formulate a transport master plan comprising transport policies and a development plan and program for the short and long terms, including the planning of urban renewal for the Central District, that will effectively serve the present and future transport needs and contribute to the orderly urban development in the Barranquilla Metropolitan Region.

1-3 Organization

The Study was carried out in Colombia jointly by JICA and the Government of Colombia in coordination with other agencies. The organization involved in the Study is shown below.

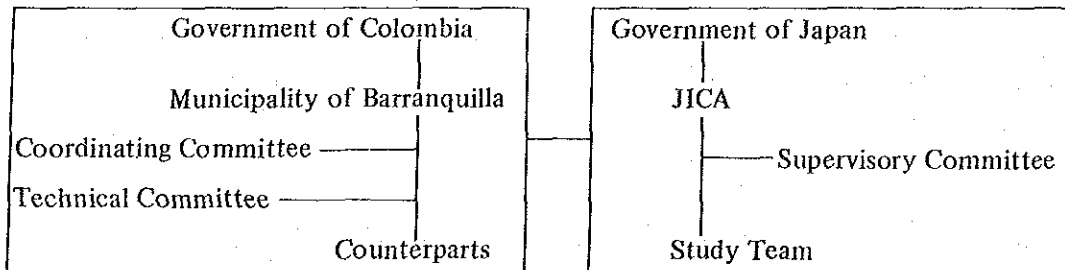


Fig. 1-3-1 Study Organization

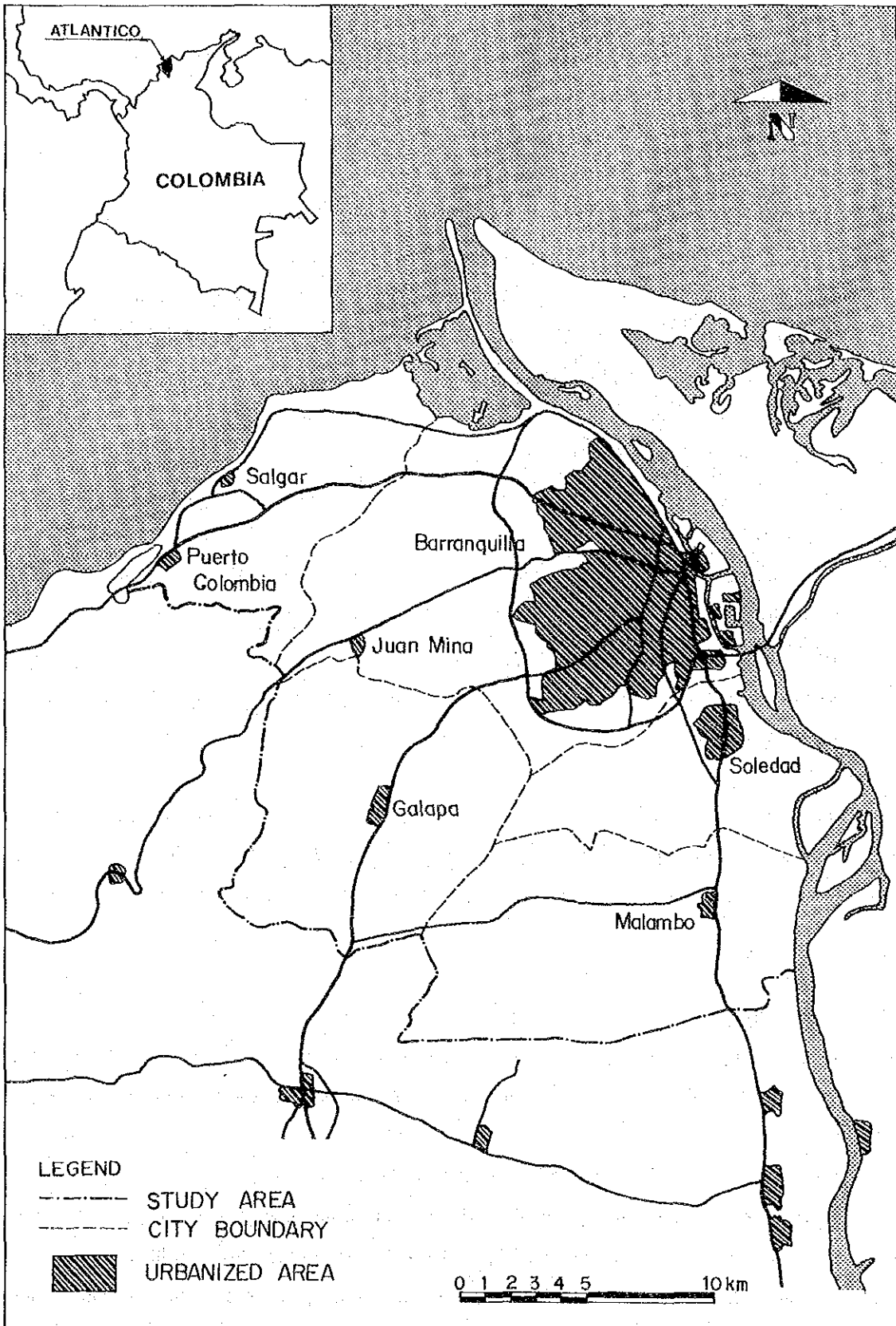


Fig. 1-4-1 Study Area

1-4 Study Area

The Study Area, as stipulated in the Scope of Work, covers the present and future urbanized area of the cities of Barranquilla, Soledad, Malambo, Galapa and Puerto Colombia, and is shown in Fig. 1-4-1.

Although the Study Area covers these cities, the actual study was focussed on the urbanized area in Barranquilla and Soledad, due to the following reasons.

- (1) The main objective is to formulate a comprehensive urban transport plan which will cope with the major transport problems for the present as well as for the future.
- (2) The urban transport problems in Barranquilla are especially critical in the Study Area at the present and are anticipated to become more serious in the future.
- (3) A considerable portion of residents in the other cities are commuting to Barranquilla; therefore, the intermunicipal transport has more importance than the intramunicipal transport for those cities.
- (4) The transport problems will extend to the surrounding cities of Barranquilla coincident with the population and economic growth, however, they may be solved within the framework of intermunicipal transport planning.
- (5) Because Soledad has already become a contiguous urban area with Barranquilla, it cannot be studied separately.

Accordingly, the other three cities, Malambo, Galapa and Puerto Colombia will be studied from the aspect of intermunicipal transport problems in Barranquilla and Soledad. The above direction of the study has been agreed to earlier between the study team and the Government of Colombia.

1-5 Study Flow

In order to accomplish the objectives of the Study, the various components of the Study have been conducted through the following four steps during the study period. (Refer to Fig. 1-5-1)

1) Step 1: Surveys of the Existing Conditions and Data Collection

A number of various surveys on the existing conditions related to the Study were made during the period from July to December 1983. The main survey items are as follows.

- (1) Person Trip Survey and its related surveys including Cordon Line Survey and Screen Line Survey.

- (2) Public Transport Survey including Bus Company Survey, Bus Passenger Interview Survey, Terminal Facilities Survey, etc.
- (3) Surveys for traffic management such as Traffic Volume Counting Survey, Travel Time Survey, Parking Survey, Traffic Facilities Survey, etc.
- (4) Road Inventory Survey including the existing Arroyo System.
- (5) Central District Survey for examining the infrastructural conditions, land use, building use and its distribution, etc.
- (6) Socio-economic Survey including the land use of the Study Area.

The above survey results were compiled and analyzed to clarify the existing conditions of the urban transport, the socio-economic activities and the land use pattern in the Study Area.

2) Step 2: Analysis of Existing Conditions

On the basis of the survey results, the existing problems on the urban transport and the urban structure with special attention to the Central District in the Study Area were identified. At the same time, future socio-economic framework was projected, and the future land use plan was prepared. In addition, the future transport demand was forecasted based on the future land use plan.

3) Step 3: Formulation of Alternative Transport Plans and Renewal Plan of the Central District

Transport plans were formulated for the long term and the short term. For the long term plan, in order to meet the future demand, 5 alternative transport network plans were formulated and roughly evaluated by calculating the project costs and the effects of each alternative in terms of traffic flow. In addition to the network plans, a public transport plan including the improvement of bus routes, bus terminal plan and a traffic management plans were prepared for the long term plan.

As for the short term plan, traffic management improvement plans, bus service improvement plans, and an Arroyo countermeasure plan were prepared. The traffic management plans include a traffic signal control, an improvement of interchanges, a traffic regulation system, a parking lot plan and a traffic safety plan, etc. The bus service improvement plans include an expansion of service area, an introduction of bus exclusive lane, etc. Regarding the Central District, a basic idea of the renewal plan, which identifies the land use of the District and a

strategic area, was established. Moreover the planning needs to be considered for the strategic project area were figured out.

4) Step 4: Preparation of Masterplan and Implementation Program

Based on the findings derived through the evaluation result in the Step 3, the transport network masterplan was formulated and economically evaluated by setting up the investment schedule of each project. The future public transport system proposed in the Step 3 was further analyzed in terms of the effectiveness of the services for passengers and the traffic flow as well as the financial viability. With regard to the Central District, an urban renewal plan was prepared taking into account the implementation measures to be applied for the strategic area. Finally through an evaluation of the projects arranged chronologically, the implementation program and necessary actions were proposed.

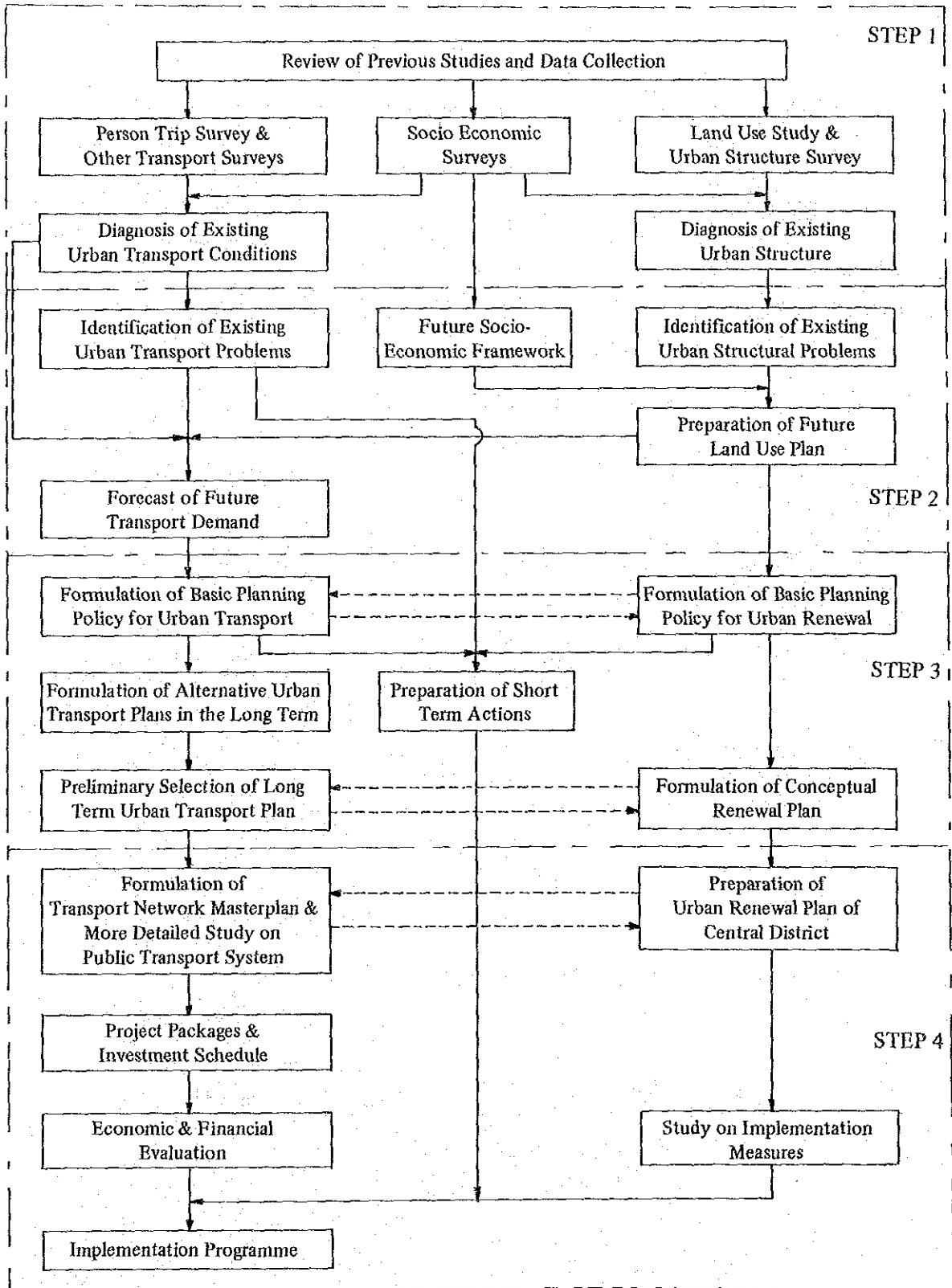
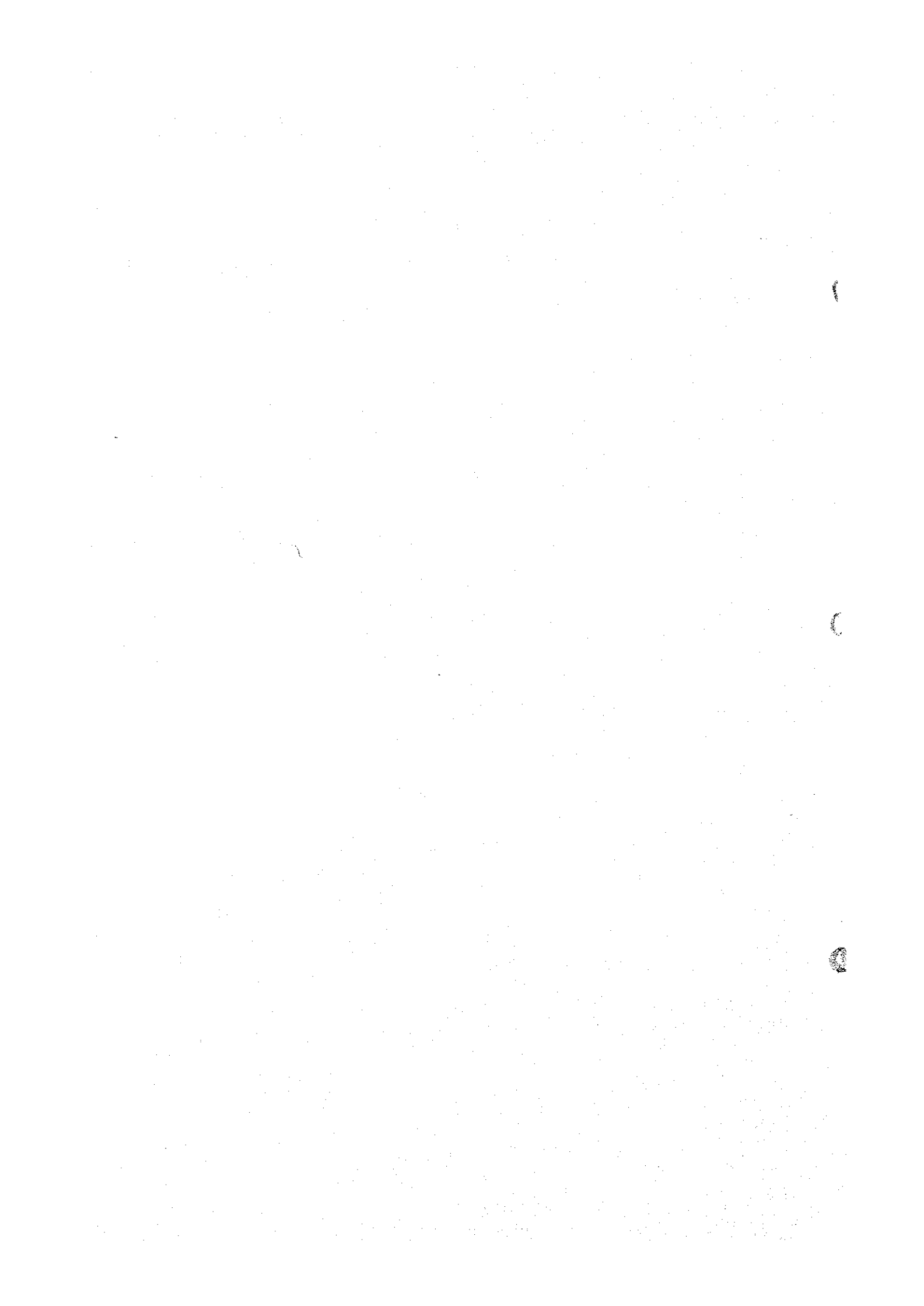


Fig. 1-5-1 Study Flow



PART I : EXISTING CONDITIONS



Chapter 2.

SOCIO-ECONOMIC BACKGROUND



Chapter 2 SOCIO-ECONOMIC BACKGROUND

2-1 Population

2-1-1 Population Size

1) Census

The population census conducted in 1973 is the most recent census available in Colombia. As shown in Table 2-1-1, the population in the Study Area has increased at a higher growth rate than those of the Atlantico Department and the national total. As a result, the population in the Study Area has grown to nearly 80% of the total population of Atlantico. The annual growth rate in the Study Area shows declining tendency, though the population size itself is increasing.

Table 2-1-1 Population Trend by Census

	Population				Annual Growth Rate (in thousands)	
	1951(1)	1964(1)	1973(1)	1973(2)	'51-'64	'64-'73
Barranquilla	279.6	498.3	665.9	703.5	4.5%	3.9%
Soledad	20.9	38.5	65.1	68.6	4.8%	6.6%
Malambo	4.5	7.6	11.3	12.3	4.1%	5.5%
Galapa	4.5	6.2	9.2	9.9	2.5%	5.3%
Pto. Colombia	8.2	10.3	13.2	14.6	1.8%	4.0%
Total Study Area	317.7	560.9	764.7	808.9	4.5%	4.2%
Percentage *	(74.4%)	(78.2%)	(79.3%)	(78.6%)		
Atlántico	427.3	717.4	964.1	1028.9	4.1%	4.1%
Colombia	11548.2	17484.5	22773.0	22915.2	3.2%	3.1%

Source : 1) Censo Población 1951, 1964, 1973, DANE

2) Ajuste por cobertura de la población,
DANE (Abril 1981)

* Population in Study Area as a percentage of the total population of Atlantico

2) Estimation of Present Population Size

The population of Barranquilla and Soledad was estimated by using the results of the person trip survey conducted in 1983.

As shown in Figure 2-1-1, the existing number of houses in each zone was identified by taking actual counts and by updating available information such as the survey results of the Departamento Administrativo Nacional de Estadística and the Malaria Eradication Service (Servicio de Erradicación de la Malaria). The present population size is estimated by multiplying the number of houses with the number of persons per house, which is obtained from the persons trip survey.

Based on the above procedure, the present population of Barranquilla and Soledad are estimated as shown in Table 2-1-2. In the same table, estimates made by the Instituto Nacional de Fomento Municipal are given for Malambo, Galapa and Puerto Colombia.

Table 2-1-2 Population in the Study Area in 1983

	Population		(in thousands)
	1973	1983	Ave Annual Growth Rate
Barranquilla	703.5	973.2 ⁽²⁾	3.3%
Soledad	68.6	134.8 ⁽²⁾	7.0%
Malambo	12.3	58.7 ⁽³⁾	16.9%
Galapa	9.9	12.8 ⁽³⁾	2.6%
Puerto Colombia	14.6	20.7 ⁽³⁾	3.6%
Total	808.9	1,200.2	4.0%

Source: 1) Censo Nacional de Población ajustado DANE
 2) Person Trip Survey in 1983
 3) Instituto Nacional de Fomento Municipal (estimated on the basis of the sample survey in 1979)

The population in the Study Area has increased from about 809,000 in 1973 to about 1,200,000 in 1983 at an average annual rate of 4.0%.

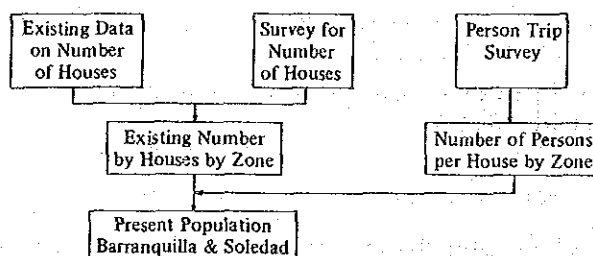


Fig. 2-1-1 Estimation Procedure of Present Population Size

The population estimates for Barranquilla and Soledad collected from different sources are shown in Table 2-1-3.

Table 2-1-3 Population Estimates for Barranquilla and Soledad by Different Studies

Area	Study	(in thousands)		
		1980	1983	1985
Barranquilla	JICA		973.2	
	PIDAMB (1)	906.0		1,079.8
	DANE (2)	886.8		
	DANE (3)	885.9	985.9	1,057.3
	PIN (4)		996.0	
Soledad	JICA	—	134.8	
	PIDAMB	97.7		125.8
Barranquilla & Soledad	JICA		1,108.0	
	PIDAMB	1,003.7		1,205.6
	DNP (5)		1,074.0	

Source: 1) Plan Integral de Desarrollo del Area Metropolitana de Barranquilla Agosto 1981.
 2) Encuesta de Hogares DANE 1980
 3) Colombia Estadística 1979 DANE
 4) Plan de Integración Nacional 1979-1982
 5) Dinámica Demográfica y Proyecciones de Población del País, los Territorios Nacionales, las 30 Principales Ciudades Sept. 1982 DNP

The estimates on Barranquilla made by different studies do not differ very much from one another, but the estimate on Soledad made by the JICA Study Team resulted in a somewhat higher figure than other estimates, owing to rapid housing development in recent years. Population growth in Malambo has shown a remarkable growth – nearly five-fold compared to ten years ago, in 1973.

The rapid population growth in the satellite cities of Barranquilla can be attributed to the following reasons:

- (1) The urbanized area of Barranquilla, particularly the area inside the Circunvalar Road, is already built up.
- (2) Housing cost in Barranquilla is relatively high while the satellite cities provide a large number of low-cost housing.
- (3) The satellite cities are located fairly close to Barranquilla (within about 10 km from Centro), and a frequent bus service to the Central District of Barranquilla is provided.
- (4) A less “extended family” life style is taking place, i.e. the number of persons per household is decreasing. Members of large families living in Barranquilla are setting up their own households in the satellite cities.

This tendency is anticipated to continue at least until 1990, since several large housing developments are being implemented in the suburbs. The rapid population growth may however lead to a shortage of public services such as electric power, water supply and sewage disposal and to traffic congestion as well.

2-1-2 Population Structure

1) Age Composition

Table 2-1-4 shows the changes of age composition of population for the year 1973 and 1983 in the region of Barranquilla and Soledad. During these 10 years, the proportion of persons in the productive age groups of 15 to 64 years has considerably increased, while the proportion of children aged 14 years or younger has substantially decreased. This change in the age composition is thought to be caused partly by a decrease in the birth rate and partly by the fact that most of the population migrating to this district belong to the productive age group.

Table 2-1-4 Age Composition in Barranquilla and Soledad

Age Group	(in thousands)			
	1973 (1)		1983 (2)	
	Population	%	Population	%
0 - 14	296.7	40.6	395.2	35.6
15 - 64	410.7	56.2	681.5	61.6
65 -	23.7	3.2	31.3	2.8
Total	731.1	100.0	1,108.0	100.0

Source : 1) Censo Nacional de Población Oct. 1973, DANE

2) Person Trip Survey in 1983

2) Population Increase by Natural and Social Causes

The birth rate decreased at a faster pace than the death rate between the year of 1964 and 1973, and as a result population increase due to natural causes showed a tendency to slow down (see Table 2-1-5).

Table 2-1-5 Birth Rate and Death Rate in Colombia

	1951	1964	1973
Birth Rate	—	4.80%(1)	3.31%(2)
Death Rate	1.42%(3)	1.24%(4)	0.90%(4)
Natural Increase	—	3.56%	2.41%

- Source : 1) Elkins H. "Cambio de Fecundidad" en la Fecundidad en Colombia, Encuesta Nacional de Fecundidad, Bogotá ASCOFAME, publicación No. 5 1973.
 2) DANE "La Fecundidad en Colombia 1978" Boletín Mensual de Estadística No.325 Agosto 1978.
 3) DANE Anuario General de Estadística 1966 - 1967.
 4) DANE Population Census Adjusted.

At the same time, the population in urban areas increased at a higher rate than the population in rural areas in Atlantico (see Table 2-1-6). This confirms the fact that the concentration of population in urban areas has been continuing during this period.

Table 2-1-6 Population in Atlantico

	(in thousands)					
	1951	1964	1973	Annual Growth Rate		
				'51-'64	'64-'73	
Urban Area	376.4	652.4	954.9	4.3%	4.3%	
Rural Area	52.0	65.0	74.0	1.7%	1.5%	
Total	428.4	717.4	1028.9	4.0%	4.1%	

Source : Censo Nacional de Población DANE

Average annual population growth in the metropolitan area of Barranquilla between 1964 and 1973 was about 4.2% (see Table 2-1-1), which was about 1 percentage point higher than the average annual natural increase rate (estimated to be about 3% based on the natural increase rates given in Table 2-1-5 and the population growth rates of Colombia given in Table 2-1-1). This implies that there was an average annual social increase of 1% during the same period.

2-2 Gross Regional Domestic Product

2-2-1 Gross Domestic Product

1) General Trends

Gross Domestic Product in Colombia grew at an annual rate of 5.8% between 1970 and 1980, nevertheless since 1981 the growth has been showing a tendency to level off. The growth rate was 2.3% in 1981, 0.9% in 1982 and 0.9% in 1983.

The slowdown is due to the fact that the production activities of leading sectors such as agriculture, manufacturing and private-sector construction have been stagnant. These three sectors together account for more than 40% of GDP, and they have strong influence on the conditions of other sectors such as commerce and transport. Table 2-2-1 shows the movement of GDP of Colombia by three sectors of economic activity.

Table 2-2-1 Movement of GDP of Colombia by Three Sectors of Economic Activity at 1975 Constant Prices

	(in million pesos)					
	1970	1973	1975	1980	1981	1982P
Primary	77,893	83,669	96,766	119,314	123,135	120,816
Secondary	86,875	112,275	118,365	147,175	145,841	145,164
Tertiary	142,728	175,454	189,977	259,276	268,760	276,777
Total	307,496	374,398	405,108	525,765	537,736	542,757

P : Provisional

Source : DANE

The main reasons for the declining activities of the leading sectors are:

- (1) Insufficient overall demand.
- (2) Increasing protectionist policies in the industrialized countries.
- (3) The difficult economic situation in many Latin American countries.

2) Subsector Characteristics of Leading Sectors

a. Agriculture

In recent years, with the exception of coffee and tobacco, the international prices of farm produce have declined due to the global recession. Farmers have been less inclined to expand

their farmlands or raise their production levels. In 1982, the production of cotton and sesame seed fell a substantial 58% and 38%, respectively, and exports of rice and sugar were seriously affected by a drop in international prices.

The livestock subsector showed a slight growth of 0.9% in 1982, and dairy production rose 5%. On the other hand, there was a major decrease in the number of cattle and hogs slaughtered for domestic consumption.

b. Manufacturing

The gross value added of the manufacturing industries fell 2.6% in 1981 and 2.2% in 1982, for two consecutive years.

The capital goods industry and the durable consumer goods industry showed sharp downward trends. For example, the annual production of automobiles was at the 35,000-unit level during the past two years, compared to 45,000 units annually between 1978 and 1980.

In the intermediate goods industry, the production of construction materials such as cement, iron and steel, plastic and lumber rose remarkably. The production volume of the non-durable goods industry rose slightly. Concerning apparels, although domestic demand declined, exports expanded somewhat.

c. Construction

The subsector of private construction was affected by a cutback in the Paz del Rio Steel Mill construction project. Since this project involves the installation of pipelines and the development of general urban areas, its influence on the subsector is substantial.

Public construction had the effect of halting the recessive tendency of production sectors. However, the necessity of reducing public expenditure must not be forgotten in view of the fiscal imbalance.

2-2-2 Gross Regional Domestic Product of Atlantico

1) Gross Regional Domestic Product until the Year 1975

According to Gross Regional Domestic Product (GRDP) estimates for individual departments made by INANDES for the years 1960-1975, the economic activity of Atlantico can be summarized as follows:

- (1) The share of Colombia's Gross Domestic Product (GDP) accounted for by Atlantico rose from 4.85% in 1960 to 5.59% in 1975. During the same period, the GRDP of Atlantico rose 6.6% annually while the GDP of Colombia rose 5.6% annually. Since the elasticity value was 1.17, Atlantico's GRDP grew 1.17% for every 1% increase of GDP

Per-capita GRDP of Atlantico was 1.2 times greater than per-capita GDP and rose from 6,287 pesos per person in 1960 to 9,118 pesos per person in 1975.

- (2) The primary industries (agriculture and mining) represented only 8.2% of the GRDP in 1975. Primary industries are located mainly in the southern part of Atlantico. Most of the agricultural products raised here are supplied to the metropolitan area of Barranquilla. Since local production does not meet demand, it is necessary to rely on supplies from adjacent departments and departments in the interior of the country as well.

Fishery is also an important industry in Atlantico. It represented 15.2% of primary industries in 1975.

The important agricultural crops of Atlantico are cotton, maize and cassava. Coffee, which is the most important export product of Colombia, is not produced in the department because its climate is unsuitable for its cultivation.

- (3) Secondary industries are concentrated in the metropolitan area of Barranquilla. Of these, the manufacturing industries are mainly located along Via 40, in Las Flores and Villanueva, and along Calle 17 and the Autopista al Aeropuerto. The main manufacturing industries under "Secondary Industries" are chemicals, food and beverages, and non-metal minerals. Together they account for more than 50% of the value added amount of the manufacturing industries. The construction industry represents 10% of the secondary industries.

- (4) The tertiary industries accounted for 62.3% of GRDP in 1975. This ratio is extremely high compared to that of Colombia in general, which is 49.8%. Commerce plays a more important role in Atlantico than in other areas of the country. While commerce represented 33.6% of the tertiary industries on a national basis, it represented 38.3% of the tertiary industries in Atlantico.

2) Recent Economic Trends

a. Agriculture

Agricultural activities in 1982 showed an unfavorable tendency. The area of planted land decreased 0.2%, production value decreased in real terms, and the total area of cultivated land expanded at a slower pace. In general, the productivity of land declined as a consequence of inadequate technical guidance and irregular climatic conditions.

In the principal agricultural region of Atlantico, certain prevailing factors bring about limitations on production activities. They are as follows:

- (1) Inadequate or inopportune maintained irrigation systems.
- (2) Many farms are below the minimum size which permits rational utilization of available resources.
- (3) The lack of an organization that promotes agricultural product sales and agricultural investments so that appropriate producers' prices can be ensured.

The livestock subsector was also sluggish in 1982. The number of livestock, volume of domestic consumption, and amount of subsidized loans all declined drastically compared to the previous year. Livestock exports fell 25.2%, at the beginning of the year, but because Argentina and Australia, the two largest meat-producing countries, decreased their meat exports, the international price of meat rose and Colombian exports of meat increased substantially.

b. Manufacturing

As of 1982, industrial land covered an area of 743 hectares, of which 69% were utilized. High electric power rates and the country's centralized system of government have long been obstacles to the region's industrial development. Industrial power rates in Barranquilla are 25%, 42% and 99% higher than in Bogota, Cali and Medellin, respectively. One of the reasons for this situation is the low efficiency of thermal power generation used in this region. A plan to eliminate the power rate imbalance between areas along the Atlantic coast and inland areas was effected in the latter half of 1982. The plan called for keeping the rates in the former area constant while gradually raising the rates in the latter area. The highly centralized form of government in this country makes the decision-making process very difficult for exercise of authority, and allocations of financial resources of departmental and municipal governments. As a result, new firms prefer to be located in the capital city.

The production of food, textile, apparel, wood, paper and non-ferrous metal industries fell to a low level in real terms. On the other hand, the beverage, furniture and fixture, chemical and non-metal industries did fairly well, though not as well as desired.

Under the "National Development Plan, 1983-1986," the industrial structure will be changed in the long run to one that places emphasis on the production of capital goods rather than consumer goods. Barranquilla is advantageous as a location for the capital goods industries because these industries use a great quantity of imported primary goods and require easy access

to the international market due to the fact that the domestic market is very small as yet. At present, the capital goods industries are concentrated in the inland areas, but it will probably be necessary in the future to locate these industries along the coastal areas so that they may compete more effectively in the international market.

c. Construction

Construction activity in Barranquilla increased 2.7% in 1982 based on total floor space. The construction of new houses and stores which represent more than half of the total decreased 19% based on total floor space, but this was offset by an increase in remodelings and additions. Public works mainly consisted of waterworks and the maintenance and repair of roads.

d. Commerce

Recently the informal sector, consisting of street vendors and the like, has been expanding and is starting to encroach on the market of regular retailers. At the same time, co-op type stores are offering products at relatively low prices and are contributing to the increase in purchasing power of low- and medium-income persons. Sales of products, however, dropped 9.8% in real terms during 1981 and 1982, which was considerably worse than the drop of 4.4% nationwide.

3) GRDP Estimate for 1983

Before estimating the GRDP of Atlantico for 1983, an estimate was made for 1980 using the following parameters:

- (1) Primary Industries: The growth rate recorded by primary industries nationwide between 1975 and 1980 is applied.
- (2) Secondary Industries: The percentage of manufacturing industries' value added amount accounted for by Atlantico according to the 1980 industrial statistics is applied to the secondary sector value added amount for GDP.
- (3) Tertiary Industries: The percentage of tertiary sector value added amount accounted for by Atlantico in INANDES' estimate for 1980 based on a 5.5% growth rate is applied to the tertiary sector value added amount for GDP.

Using the 1980 GRDP estimate as a basis, the following elements were taken into consideration when estimating GRDP for 1983:

- (1) Agricultural activity in Atlantico as well as in the country in general was affected by

a decrease in agricultural product prices.

- (2) The value added amount of the manufacturing industries in Atlantico in 1980 and 1981 showed a slight increase despite the fact that the national total recorded a decrease. However, the situation was less favorable thereafter, as mentioned above.
- (3) The tertiary industries are assumed to have experienced the same trends as those experienced nationwide.

Estimates for 1983 as well as the results registered in 1973, 1975 and 1980 are shown in Table 2-2-2.

Table 2-2-2 GRDP of Atlantico at 1975 Constant Prices

	1973	1975	1980	(in million pesos) 1983
Primary	1,260	1,600	2,050	2,100
Secondary	7,210	8,200	9,200	10,030
Tertiary	12,370	13,050	17,660	19,030
Total	20,840	22,910	28,910	31,160
Ratio to National Total	5.57%	5.66%	5.50%	5.69%

Source : Estimated by the Study Team.

The GRDP of Atlantico, which represents 5.69% of GDP (in 1983), grew 4.1% annually during the past 10 years. By sector, the primary industries recorded the highest average annual growth rate of 5.2%, owing to the fact that dramatic growths of 15% annually took place between 1973 and 1975. The secondary industries, which account for as much as one third of GRDP, have shown lower growth since 1979, with annual growth at 2.6%. The tertiary industries are showing a stable growth and have steadily expanded their share of GRDP.

2-3 Current Industrial Situation

2-3-1 Manufacturing

According to the 1981 industrial statistics as shown in Table 2-3-1, the number of industrial establishments (with 10 or more employees) located in the Department of Atlantico was 500, the value added amount was 27 billion pesos, and the number of employees, 37,650.

These represented 7.36%, 6.61% and 7.51%, respectively, of the national total.

Table 2-3-1 Status of Manufacturing Industries in Barranquilla-Soledad Compared with Atlántico and Colombia (1981)

	Barranquilla-Soledad(A)	Atlántico(B)	Colombia(C)	(A)/(B)	(B)/(C)
Number of establishments	493	500	6.792	0.986	0.0736
Value added (million pesos)	26,759	27,027	409.147	0.990	0.0661
Persons engaged	37,352	37,650	501.035	0.992	0.0751

Source : DANE

Manufacturing industries in Atlántico are concentrated in the metropolitan area of Barranquilla, especially in the Barranquilla-Soledad area. The rate of concentration is 98.6%, 99.0% and 99.2%, respectively, in number of establishments, value added amount and number of employees.

Of the 26,760 million pesos of value added amount recorded by the manufacturing industries in the Barranquilla-Soledad area, 75.8% (or 20,270 million pesos) were accounted for by the following industries: Chemicals, food and beverages, metal products, lumber, apparel, non-meal minerals, paper and paper products, and textiles (see Table 2-3-2).

The biggest employer was the apparel industry (5,845 persons, 15.6%), followed by the food industry (5,424 persons, 14.5%). Compared to 1980, the number of employees in nearly all industries, especially in the textile industry, decreased, reflecting the recent economic depression.

According to data released by the Chamber of Commerce, there are 1,976 manufacturing establishments in the metropolitan area of Barranquilla as of 1982. Many of the large-scale manufacturing establishments are located in industrial districts along major roads, in other words, along Via 40, Calles 30 and 17, and Barranquilla.

As shown in Table 2-3-3, the industrial district along Via 40 is dominated by the heavy chemical industries as well as other chemicals and metal products and that along Calle 17 and Barranquilla is dominated by light industries such as beverages and lumber.

Table 2-3-2. Manufacturing Industries by Activity in Barranquilla-Soledad (1980-1981).

Manufacturing Industries	Persons engaged		Value added (Millions of Pesos)	
	1980	1981	1980	1981
Food	5906	5424	3113	3733
Beverages	2376	2203	2365	3052
Tobacco	245	223	315	297
Textiles	3117	1975	1062	1010
Apparels	5412	5845	1365	1419
Leather	810	770	283	399
Footwear	405	581	68	166
Wood	2048	1889	1506	1815
Furniture	482	420	99	103
Paper	994	1011	998	1058
Printing	1061	926	333	412
Chemicals	2153	2080	3134	4679
Chemical Products	1494	1348	898	750
Petroleum	—	—	—	—
Petroleum Products	79	66	25	29
Rubber	153	217	45	53
Plastics	1859	1651	509	880
Ceramics	13	—	3	—
Glass	501	420	348	447
Other Non-metallic	1415	1456	1060	1351
Iron and steel	219	275	45	142
Non-ferrous	681	643	500	592
Fabricated metal	3370	3254	905	2154
Machinery	771	747	228	252
Electric machinery	994	795	501	668
Transport	2219	2157	864	878
Professional	96	73	22	28
Miscellaneous	1156	903	410	392
Total	40029	37352	21002	26759

Source: DANE

Table 2-3-3 Distribution of Large Manufacturing Industries

Industrial Area	Number of Establishments		Total
	Heavy Industries	Light Industries	
Via 40	58	27	85
Calle 30	35	55	90
Calle 17	6	35	41
Barranquillita	14	33	47

Source: Cámara de Comercio.

2-3-2 Other Industries

According to the Chamber of Commerce, there are 561 construction-related establishments, 7,191 commercial and financial establishments, 418 transportation/communication-related establishments and 1,860 service establishments in the metropolitan area of Barranquilla (see Table 2-3-4). About 150 of the commercial and financial establishments are large-scale institutions such as banks, insurance companies and cooperatives.

A large part of the establishments are located in the central district, but there is also an increasing concentration of establishments in the new commercial area along Calle 72.

Table 2-3-4 Number of Establishments in Barranquilla Metropolitan Region

Activity	No. of Establishments
Agricultural	322
Mining	12
Manufacturing Industries	1,976
Construction	561
Commerce & Finance	7,191
Transport/Communications	418
Public Service	88
Private Service	1,860
Total	12,428

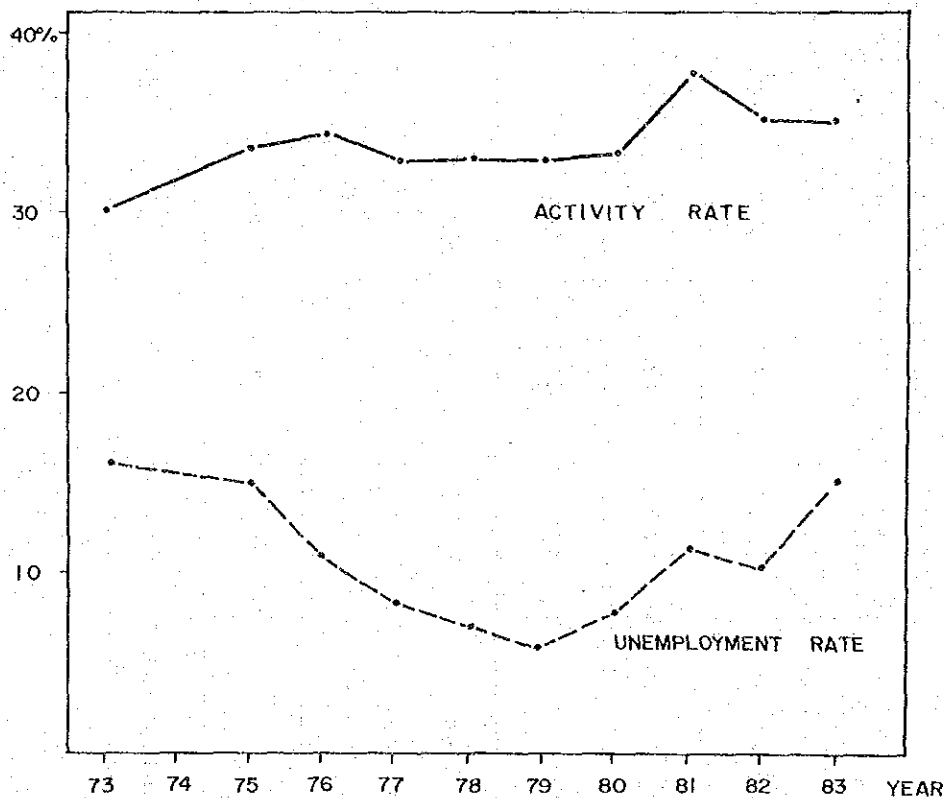
Source : Cámara de Comercio 1982. Study Team Estimation.

2-4 Employment

2-4-1 Labor Force

The labor force participation rate in Barranquilla in 1973, at 46.4%, was the highest in Atlantico (see Table 2-4-1). The labor force population in the Barranquilla-Soledad area in 1973 was 229,000 persons, compared to only 8,800 persons in the other three cities of the Study Area. As the population in general increased, the labor force population also increased — achieving an annual growth of 5.0% and reaching 372,000 persons by 1983 (see Table 2-4-2). The high rate of growth was partly due to an increase in the proportion of working age population and partly to a rise in the participation rate.

The 1973 census revealed that the unemployment rate in the Study Area was particularly high. Although the unemployment rate in Barranquilla improved during the latter half of the



SOURCE: Censo Nacional de Población '73
Encuesta de Hogares DANE
Person Trips Survey 1983 by Study
Team

Fig. 2-4-1 Activity Rate and Unemployment Rate in Barranquilla

Table 2-4-1. Labor Force in Study Area in 1973.

(in thousands)

	Atlántico	Barranquilla	Soledad	Sub-Total	Malambo	Galapa	Pto. Colombia	Sub. Total
Total Population	964.1	665.9	65.1	731.0	11.3	9.2	13.2	33.7
Working Age Population	638.4	453.7	40.9	494.6	6.9	5.6	8.4	20.9
Labor Force	289.5	210.6	17.9	228.5	2.9	2.4	3.5	8.8
Participation Rate	45.3%	46.4%	43.8%	46.2%	42.4%	42.4%	42.4%	42.4%
Activity Rate (Gross)	30.0%	31.6%	27.5%	31.3%	25.7%	26.1%	26.5%	26.1%
Unemployment Rate	17.3%	16.0%	21.8%	16.4%	24.1%	20.8%	28.6%	25.0%
Unemployment	50.0	33.6	3.9	37.5	0.7	0.5	1.0	2.2
Total Employment Persons	239.5	177.0	14.0	191.0	2.2	1.9	2.5	6.6

Source: Censo Nacional de Población '73 DANE (Sin ajustar)

Note: Working age population indicates the population over 12 years old.

Participation Rate: Labor Force/Working Age Population

Activity Rate: Labor Force/Total Population.

Table 2-4-2. Labor Force Trend in Barranquilla and Soledad.

(in thousands)

	1973	1982	1983	Ave. Annual Growth Rate (73 - 83)
Total Population	731.0	1,068.5	1,108.0	4.2%
Working Age Population	494.6	759.1	786.5	4.7%
Labor Force	228.5	369.7	371.6	5.0%
Participation Rate	46.2%	48.7%	47.3%	-
Activity Rate	31.2%	34.6%	33.6%	-
Unemployment Rate	16.4%	10.3%	14.9%	-
Unemployment	37.5	38.1	55.2	3.9%
Total Employment	191.0	331.6	316.4	5.2%

Source: 1 Censo Nacional de Población '73 DANE

2 Encuesta de hogares '82 DANE

3 Person Trip Survey '83. Study Team

1970s, the recent worldwide recession has caused the rate to rise once again (see Figure 2-4-1). According to the results of person trip survey, unemployment in Barranquilla was 14.9% in 1983; this is close to the figure given by DANE (according to the results of household survey conducted by DANE in 1983, the unemployment rate in Barranquilla-Soledad was 14.6%).

2-4-2 Employment by Sector

A point to note concerning the employment situation in the Study Area is that the primary industries account for only 2.3% of employment in the Area and the tertiary industries, 73.9% (as of 1983). The tertiary industries expanded their share of employment at an extremely rapid pace between 1973 and 1983. This phenomenon was caused by the fact that the primary industries in the Area did not provide much job opportunities while the secondary industries, hit by the recession, could not achieve much growth. As a result, the tertiary industries were forced to satisfy job demand through such low-income businesses as personal services and street vendors.

Table 2-4-3 Employment by Three Sectors of Activity and Area (1973)

	Atlántico	Study Area		Total	Rest of Atlántico
		B/quilla-Soledad	Others		
Primary	26,500	3,400	2,000	5,400	21,100
Secondary	71,400	61,200	63,100	63,100	8,300
Tertiary	152,600	130,800	4,000	134,800	17,800
Total	250,500	195,400	7,900	203,300	47,200

Source : Based the 1973 Census, the Study Team estimated.

Table 2-4-4 Employment by Three Sectors of Activity and Area (1983)

	Atlántico	Study Area		Total	Rest of Atlántico
		B/quilla-Soledad	Others		
Primary	37,360	4,600	3,400	8,000	29,300
Secondary	92,200	76,100	4,700	80,800	11,400
Tertiary	275,300	236,100	14,600	250,700	24,600
Total	404,300	316,800	22,700	339,500	65,300

Source : Based on the P.T. Survey, the Study Team estimated.

2-5 Car Ownership

According to INTRA, the number of motor vehicles registered in Barranquilla is 56,000 units, including unused or unusable vehicles, as of 1982. Of these, cars represent 40,000 units (see Table 2-5-1). This figure includes cars used in other cities of Atlantico, but most are thought to be used in Barranquilla and Soledad. Hence, the rate of car ownership in Barranquilla and Soledad is calculated to be about 35 units per 1,000 persons.

At the same time, the car ownership rate can also be roughly estimated from person trip surveys. According to the results, about 15% of all households in Barranquilla and Soledad own cars (see Table 2-5-2).

Table 2-5-3 shows that the number of vehicle registrations in Barranquilla has grown steadily during the past 10 years. Although growth in recent years, at 5.2% to 8.4%, has been rather low compared to the early part of 1970s, it is still high compared to population growth. This implies that the rate of vehicle ownership in Barranquilla has been rising year by year.

2-6 Interregional Transport Facilities

In the study area, there are 4 types of interregional transport modes: sea, river, air and road transport.

2-6-1 Sea Transport

The Barranquilla port, which is used for sea and river transport is located at the neighboring zone of Centro in Barranquilla. Presently, the Barranquilla port is the largest port on the Atlantic coast in terms of its area. It has 56 ha. with 7 piers of 1058 m in total length and 2 river piers totalling 420 m in length at the mouth of Rio Magdalena. COLPUERTOS is the entity in charge of maintaining the navigation channel which is 20 km long and about 10 m in water depth.

The Barranquilla port is very important for the region and the country, due to the large volume of cargo it handles. Its direct relationship with the industrial area and the free zone contributes substantially to the development of the region. The total cargo handled for import and export in 1983 was about 577,000 tons, of which 90% was imported cargo. About 70% of the imported goods are transported to the inner part of the country, especially for Bogotá, and about 150 trucks depart daily from the terminal carrying between 1500 and 2000 tons.

Table 2-5-1. Vehicle Registration in Barranquilla.

	1981				1982			
	Official	Public	Private	Total	Official	Public	Private	Total
Car	207	6.594	18.413	25.214	212	6.783	19.209	26.204
Jeep	463	918	5.782	7.163	492	929	6.436	7.857
Pick-up	412	971	7.121	8.504	419	971	7.711	9.101
Sub Total	1.082	8.483	31.316	40.881	1.123	8.683	33.356	43.162
Bus	74	2.898	338	3.310	75	2.987	346	3.408
Small Bus	12	319	96	427	13	365	101	479
Microbus	5	186	47	238	5	186	47	238
Sub Total	91	3.403	481	3.975	93	3.538	494	4.125
Truck	188	1.842	3.389	5.419	190	1.865	3.511	5.566
Lorry Truck	1	128	65	194	1	142	73	216
Special Truck	82	104	308	494	82	104	340	526
Sub Total	271	2.074	3.762	6.107	273	2.111	3.924	6.308
Motorcycle			1.712	1.712			1.855	1.855
OTHERS	47	8	173	228	47	8	228	283
TOTAL	1.491	13.968	37.444	52.903	1.536	14.340	39.857	55.733

Note: The figures include disused cars.

Source: Statistic Department INTRA

Table 2-5-2. Vehicle Ownership in Barranquilla and Soledad

	Vehicle owner House	Non-Vehicle House
Barranquilla	16.2 %	83.8 %
Soledad	5.2 %	94.8 %
Total	15.0 %	85.0 %

Source : Person Trip Survey in 1983.

Table 2-5-3. Past Trend of Vehicle Registration in Barranquilla.

Year	No. of Vehicles	Growth Rate %
1973	10,195	64.3
1974	16,760	33.9
1975	22,450	38.7
1976	31,150	25.1
1977	38,991	7.3
1978	41,873	8.0
1979	45,234	7.8
1980	48,793	8.4
1981	52,903	5.2
1982	55,692	

The main imported goods are food, metal and chemical products. Imports in the Barranquilla port generally had an increasing tendency till the year 1980, but in 1981 there was a sudden decrease due to the economic recession. A recovery took place in 1982 and again a new decrease in 1983. Regarding the future, imports are expected to grow at about 3.7% per annum till the year 1986 according to COLPUERTOS.

2-6-2 River Transport

Barranquilla was the first river port in the country. Until the last decade, the Magdalena River was the major transportation mode, mainly for cargo between the inner part of the country and the Atlantic coast.

At around 1925, the government started to promote the development of navigation via the Magdalena River using steamboats. In 1847 the river navigation was finally given a boost through the establishment of precise standards and the promotion of this service on a large scale for export.

During the second decade of the present century, as wood was replaced by fuel oil, transportation became faster. This period was very important until the introduction of the railway to Santa Marta and a road was built parallel to the river, both preferable transport modes, especially for short trips. Since the introduction of air transport, only a small budget has been allocated to the conservation, maintenance and improvement of river transport, except the Canal del Dique (between Calamar and Cartagena). The Magdalena River crosses almost all the Colombian territory and the zone which has the major influence from the river is very rich for agriculture, especially for coffee, livestock, cotton, banana, and other products that could be transported by the river. Unfortunately, the Magdalena River has been underutilized except for the transportation of hydrocarbon (which is keeping river transportation alive) from Barrancabermeja to Mamonal (Cartagena industrial port).

The Magdalena River can be used for transportation during any season of the year to Barrancabermeja, 630 km away. The largest vessel to be used during the rainy season is 900 tons, while during the dry season, vessels of upto 750 tons can be easily used. According to the statistics by COLPUERTOS, the cargo volume transported by river has been undergoing a decreasing tendency, and recorded only 2500 tons in 1983.

With regard to passengers transportation by river, row boats are operated by cooperatives along the Magdalena River. The people who use the river transport service embark at the port located in front of the Intendencial Fluvial which lacks adequate passenger's facilities. The total number of passengers by river in 1983 was only about 11,700 persons, since such river transport is used as a local service only for the areas along the river, where the road network is not well developed.

2-6-3 Air Transportation

The Colombian commercial airline was the first in South America and was commenced by Mr. Ernesto Cortizos in 1919 with the name of "Sociedad Colombo-Alemana (SCADTA) until 1930. It started an operation at the hydroport of Veranillo at the Naval Base. The first flight was made with 2 "Junker" planes in 1920, from Barranquilla to Girardot.

Afterwards, "Aerovías Nacionales de Colombia" (AVIANCA) started its flight service with the same route as SCADTA; making Barranquilla seemingly the aviation pioneer in Colombia.

The Ernesto Cortizos Airport located in Soledad of the Study area is one of the most important airports in Latin America, because of its modern architecture. It was inaugurated on April 7th, 1981. The airport has approximately 3000 direct employees and 5000 indirect workers. During the year 1983, it generated 168 million pesos to Aeronautica Civil.

The daily passengers flow has been estimated as 1500. Its reception capacity is 120 flights per day. Passenger statistics at Barranquilla airport show that the total number of passengers generally has had an increasing tendency with some fluctuations during the past decade for both international and domestic flights. The average growth rates for the above period were 2.4% and 2.2% respectively.

The total cargo imported by air at Barranquilla in 1983 was 5,590 tons, and the exported cargo reached 3,340 tons. The international cargo transportation has had a constant increase at 18% annually. As for the domestic cargo, the total cargo handled at Barranquilla airport reached at 23.1 thousand tons in 1982.

Table 2-6-1 Total Passengers at Barranquilla Airport

(person/year)

Year	Embarked	International Flight		Domestic Flight		
		Disembarked	Total	Embarked	Disembarked	Total
1973	54,294	49,455	103,749	256,177	275,006	531,183
1974	60,470	54,088	114,558	262,134	261,145	523,279
1975	62,929	56,441	119,370	279,147	285,485	564,632
1976	63,807	60,150	123,957	290,426	295,670	583,096
1977	71,813	63,989	135,802	307,900	319,202	627,102
1978	74,378	73,296	147,674	356,118	370,912	727,030
1979	84,379	77,954	162,333	368,779	362,465	731,244
1980	48,417	45,717	94,134	298,972	314,657	613,629
1981	75,980	73,407	149,387	322,641	348,118	670,759
1982	75,395	75,609	151,004	347,699	364,774	712,473
1983	66,641	64,272	130,913	327,954	333,642	661,416

Source : Departamento Administrativo de Aeronautica Civil (D.A.A.C.) 1983.

2-6-4 Road Transport

As of 1982, the country had a road network of 105,201 km, of which, 1,148 km belonged to the Atlantico Department, this is 1.1% of the total road network.

There are 5 interregional trunk roads originating from Barranquilla. As shown in Table 2-6-2, the total road traffic from/to Barranquilla has steadily grown at an average growth rate of 6% per annum during the years from 1979 to 1983.

At present, the station which has the largest traffic flow is the one on the road for Malambo, with a high average growth of 17% per annum especially because of the rapid urbanization and the industrial development. In second place is the one for Galapa, which was decreasing until 1981. The Pumarejo Bridge has the third place, it has grown at 10% annually during the past 4 years.

Table 2-6-2 Average Daily Traffic Volume by Station

Station	(Vehicles per day)				
	1979	1980	1981	1982	1983
Pte. Pumarejo	2,375	3,257	3,179	3,796	3,539
B/Q - Malambo	3,050	3,747	4,219	4,282	5,790
B/Q - Galapa	5,172	4,198	3,916	3,956	4,238
B/Q - Pto. Colombia	2,368	2,822	2,289	2,413	2,926
B/Q - Tubará	434	454	423	410	435
Total	13,399	14,478	14,026	14,857	16,928

Source : MOPT



Chapter 3.

**EXISTING LAND USE AND
URBAN STRUCTURE**



Chapter 3 EXISTING LAND USE AND URBAN STRUCTURE

3-1 Barranquilla Metropolitan Region

3-1-1 General Land Use

The Barranquilla Metropolitan Region covers an area of 51,400 hectares, of which 12,000 hectares are urbanized. From the large built-up area surrounded by the Circunvalar, urbanization extends southward to Malambo and northwestward to Puerto Colombia. Heretofore, the western part of Barranquilla outside the Circunvalar had not been confronted with strong urbanization pressure, but recently there have been some spot developments. Recent development projects are shown in Figure 3-1-1. The non-urbanized areas are located in the southwestern part of the Study Area and are classified as follows:

Forest	20%
Stubbles	40%
Pasture land	30%
Cultivated land	Negligible
Sandy land	10%
Dunes and Beaches	Negligible

Land used for cultivating crops is very small because the climatic conditions are unfavorable for developing an efficient and profitable agricultural industry.

3-1-2 Topographic and Hydrographic Characteristics

There are no high mountains in the Study Area, but several low hills form a watershed. Three basins are formed by the Magdalena River and several Arroyos (streams). See Figure 3-1-2.

The Magdalena River basin is the widest one, and is located at the eastern part of the Study Area and includes the urbanized areas of Barranquilla, Soledad and Malambo. There are many swamps in Soledad and Malambo, along the Magdalena River. During the rainy season, rainwater rushes down the streets of Barranquilla from the uptown residential area to the river-side Centro Districts.

The Central basin formed by the Arroyo Grande covers Galapa, the western part of Barranquilla and the eastern part of Puerto Colombia. New residential developments and squatter areas are forming along the western slopes of Barranquilla. Urbanization in these areas is progress-

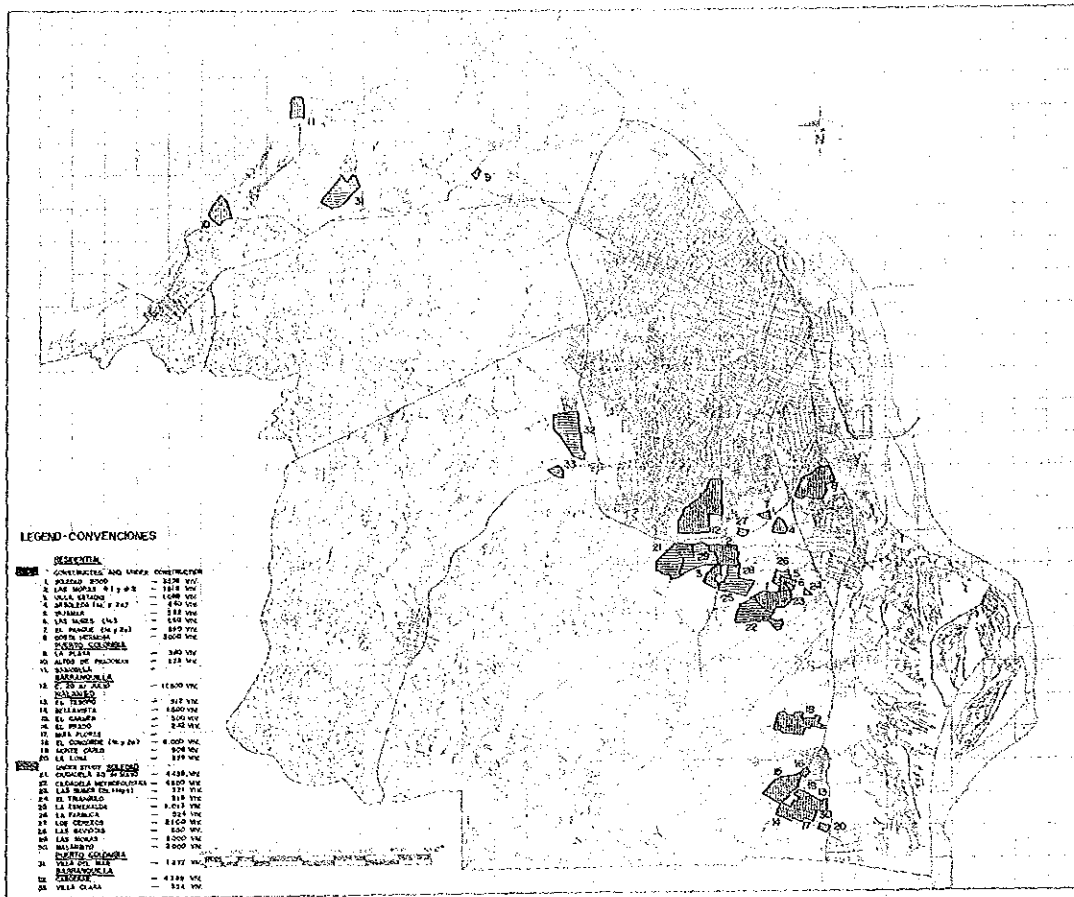


Fig. 3-1-1 Housing Development Projects under Construction or under Study

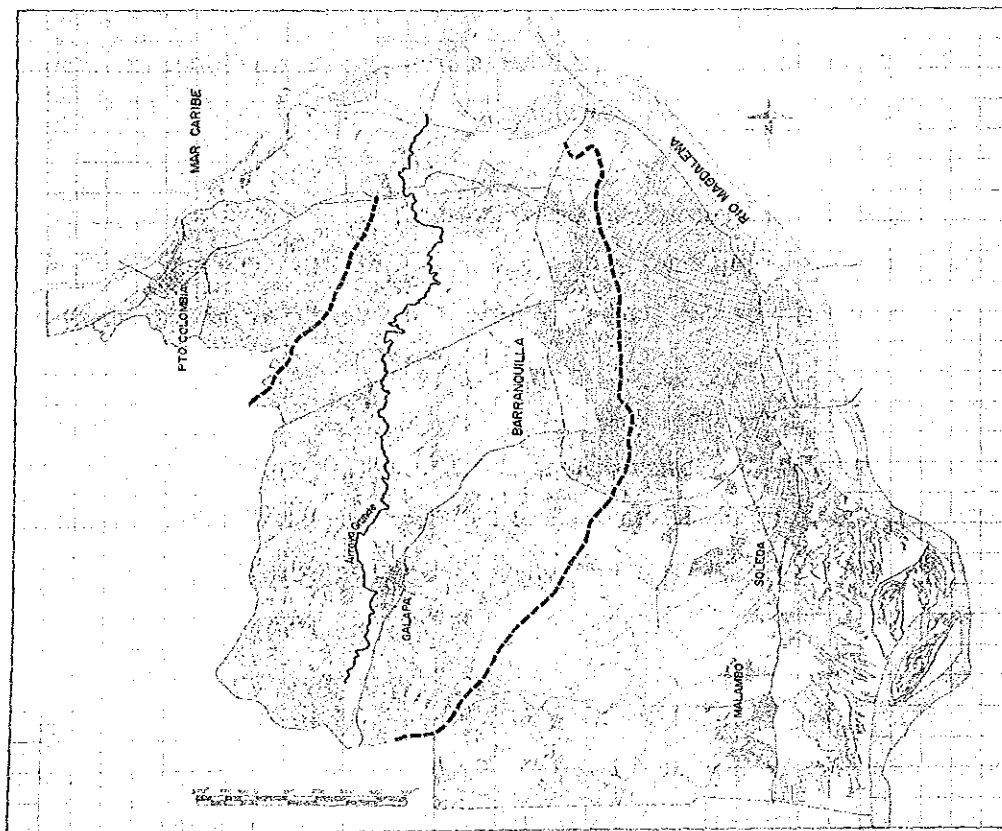


Fig. 3-1-2 Hydrographic Characteristics in Study Area

ing without any appropriate flood control, and the entire basin is in danger of facing the same drainage problems as the built-up area of Barranquilla.

The western basin is located in Puerto Colombia and is separated from the central basin by Loma Pan de Azúcar. The main part of Puerto Colombia is included in this basin.

3-1-3 Urban Land Use

The 12,000 hectares of urbanized land consist of the following (see Figure 3-1-3):

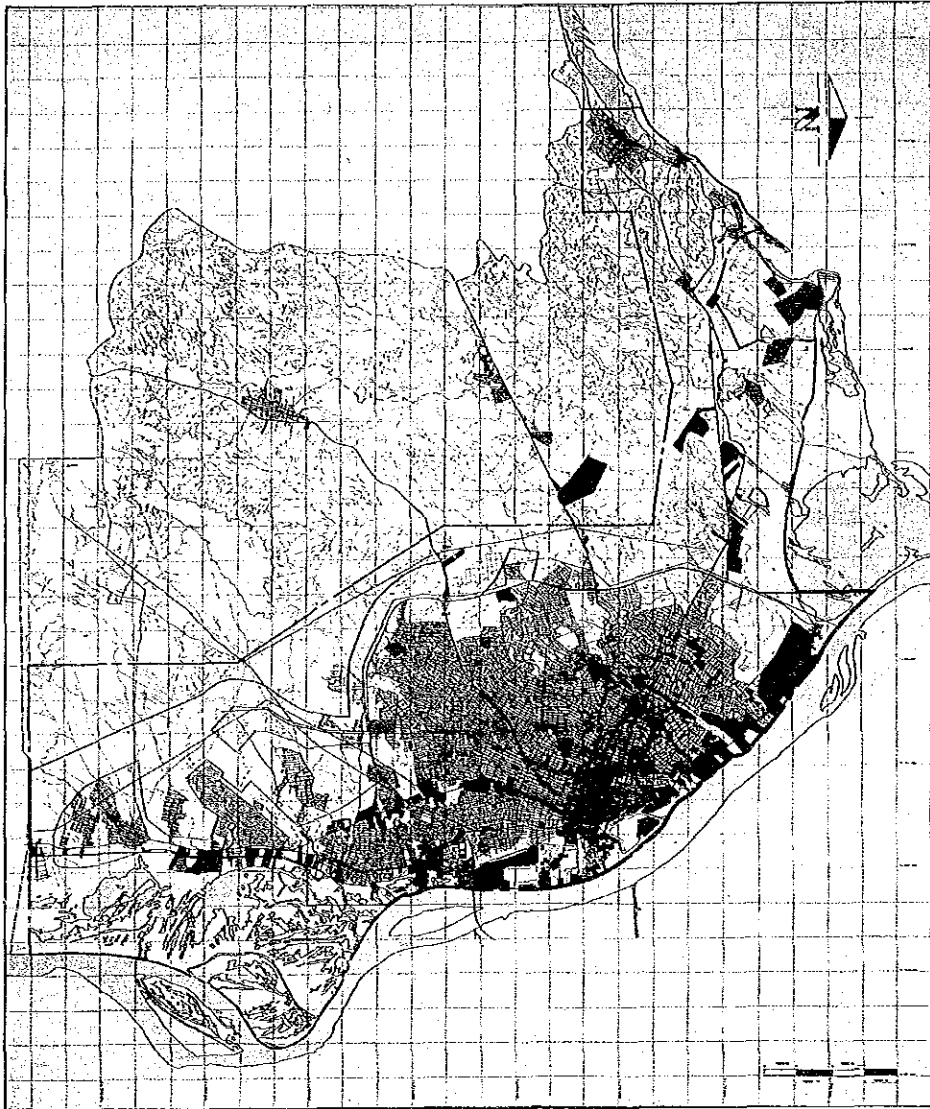
Residential district	6,500 ha.
Commercial/business district	500 ha.
Industrial district	1,000 ha.
Public service district	2,000 ha.
Others	2,000 ha.

The urban area of Barranquilla spreads gradually upwards from the banks of the Magdalena River to the inland hilly area. First, the old urban area took shape behind the harbor. Following this, a high-class residential district spread out in a northwestward direction, and a residential district for low- and middle-income families expanded southwestwards.

Currently, Centro is still the city's center of commercial and business activities, however, a new commercial center is being formed near Calle 72, where many highclass boutiques, hotels and restaurants, as well as discotheques and branch offices of foreign-based companies, have recently converged.

As mentioned earlier, heavy chemical industries are located along Via 40, and light industries are located along Calles 17, Calle 30, and the Autopista al Aeropuerto. In addition, an industrial complex is being planned in Malambo. Textile and machinery factories and warehouses are located in the Free Zone next to the harbor.

The airport is located at the border of Soledad and Malambo. Various projects are now being planned for the surrounding areas, such as large-scale housing developments, a central wholesale market, airport free zone, and the expansion of military facilities, so that the formulation of a comprehensive land use plan and the strengthening of relevant regulations are matters requiring urgent attention.



LEGEND

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|----------------------------------|-------------------------|----------------------------|
| RESIDENTIAL | TRANSPORTATION | GAS PIPE LINE |
| EDUCATIONAL, MEDICAL & RELIGIOUS | PUBLIC SERVICE | ELECTRICAL LINE |
| COMMERCIAL | ADMINISTRATION | PIDAMB PERIMETER YEAR 1990 |
| INDUSTRIAL | COMMERCIAL, RESIDENTIAL | PIDAMB PERIMETER YEAR 2000 |
| RECREATIONAL | VACANT | SANITARY PERIMETER |

Fig. 3-1-3 Existing Land Use