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THE REPUBLIC OF INDONESIA

UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY

FINAL REPORT

RECOMMENDATIONS AND SUMMARY

March 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

THE REPUBLIC OF INDONESIA

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PREFACE

In response to a request from the Government of Indonesia, the Government of Japan decided to conduct the Ujung Pandang Area Highway Development Study and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a study team headed by Dr. Kaoru Ichihara, comprised of members from Central Consultant Inc. and Chodai Co., Ltd. from December, 1987 to March 1989.

The team held discussions with the officials concerned of the Government of Indonesia, and conducted field surveys. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will serve for the development of various projects and contribute to the promotion of friendly relations between our two countries.

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

March, 1989

Kensuke Yanagiya
President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

March, 1989

His Excellency Mr. Kensuke Yanagiya
President
The Japan International Cooperation Agency
Sinjuku Mitsui Building
Nishi Shinjuku 2-1
Shinjuku-ku, Tokyo
Japan

Dear Mr. President:

It is my great pleasure to submit herewith the Report of the Study on Ujung Pandang Highway Development in the Republic of Indonesia.

This report is the result of studies carried out by the Study Team consisting of the Central Consultant Inc. and Chodai Co.,Ltd. of Japan. During the service period, the Study Team conducted the road and various traffic surveys for the urban road network and prepared the Master Plan of arterial highway development in the Study Area to solve the various urban traffic problems.

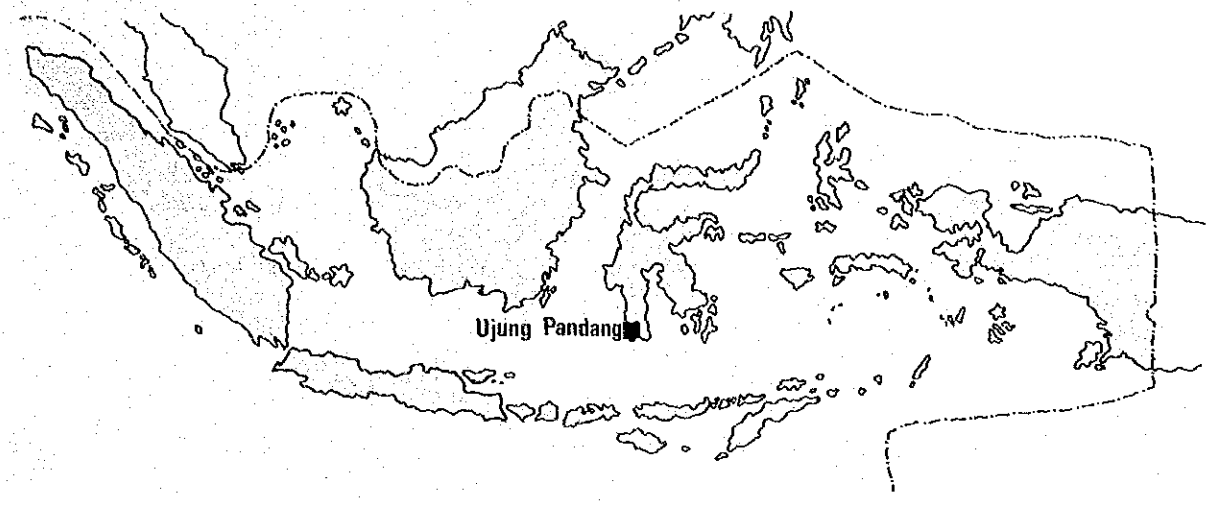
The Study Team has completed the above service with a firm belief that implementation of above plans will substantially contribute to the improvement of the very serious road traffic problems in Ujung Pandang Area, in particular the heavy traffic congestion and frequent occurrence of traffic accidents.

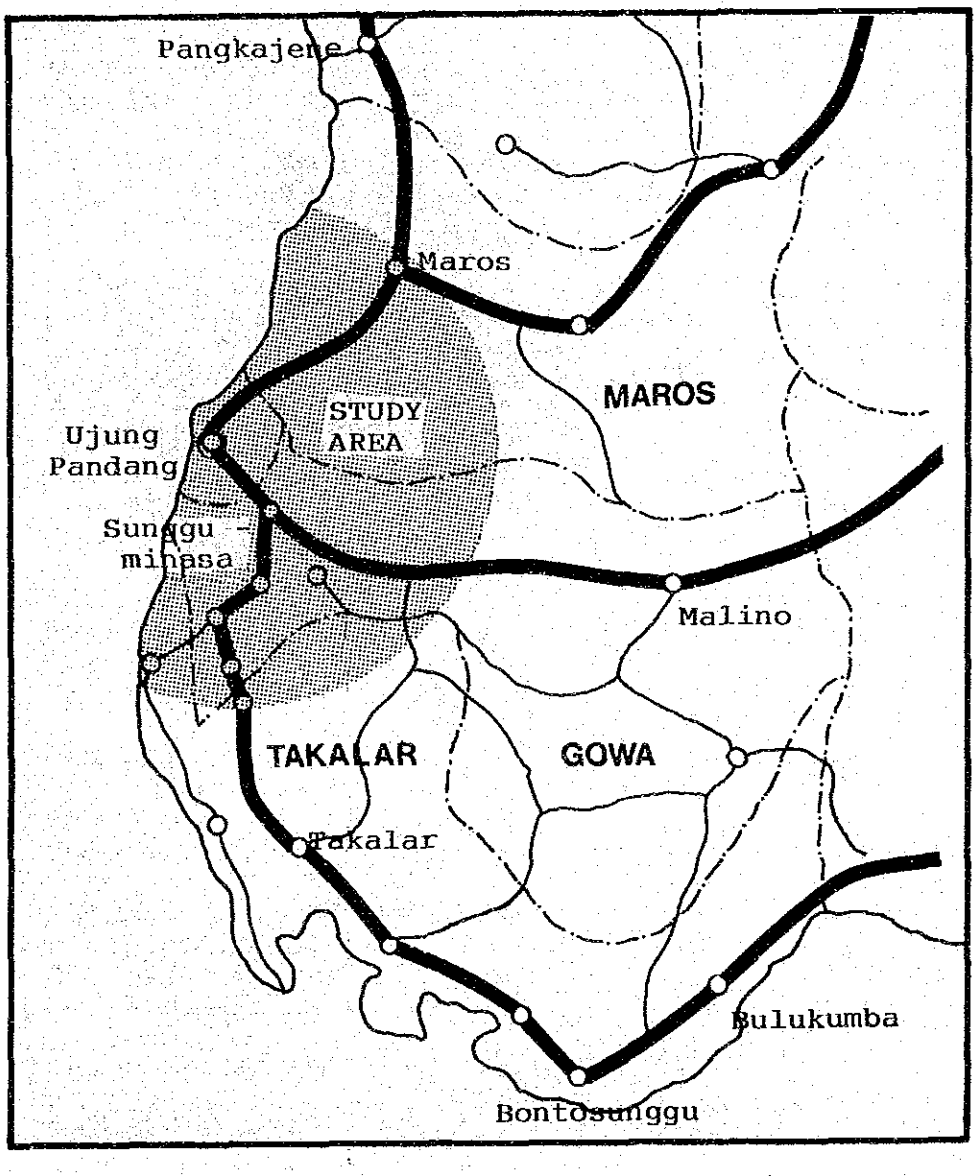
Our gratitudes are due to the Japan International Cooperation Agency, the JICA Advisory Committee, Ministry of Foreign Affairs, Embassy to Indonesia as well as officials and individuals of Indonesia for their assistance extended to the Study Team.

In conclusion, the Study Team sincerely hopes that the study results would contribute to socio-economic development and well-being in general and to the future highway network development in the country.

Yours sincerely,

Kaoru Ichihara
Team Leader
Ujung Pandang Area
Highway Development Study
(Central Consultant Inc.)





Location Map of Study Area

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RECOMMENDATIONS AND SUMMARY

A. RECOMMENDATIONS

A.1 It is recommended that the construction of arterial road network, which consists of five (5) Radial Roads and three (3) Ring Roads as shown in Fig.A.1 should be implemented under the Long Term Highway Development Project by the year 2009.
This project is judged to be technically and economically feasible.

A.2 In considering the importance of a part of the arterial road network mentioned above, however, three (3) Radial Roads and one (1) Ring Road as shown in Fig. A.2 should be constructed by the year 1994 as the first stage constructions of the Long Term Highway Development.
This stage construction is also judged to be technically and economically feasible.

A.3 It is also recommended that the seven (7) Traffic Management Projects as described below should be implemented as the Short Term Development Project with the target year of 1994.
However, the urgent implementation of these projects are required taking into account of the functions and characteristics of projects.

(1) Road Widening Projects
(2) Intersection Improvement Projects
(3) Road Rehabilitation Projects
(4) Pedestrian Facilities Improvement Projects
(5) Bus Facilities Improvement Projects
(6) Becak Transport Improvement Projects
(7) Traffic Regulation Improvement Projects

A.4 Improvement of Jl. Toll (Prof. Dr. Ir. Sutami) Jl. Gowa Jaya (Urip Samoharjo), Jl. Gowa Rara (St. Alauddin), Industrial Estate Access Road, Inner Ring Road and seven (7) Traffic Management Projects mentioned above in A.2 and A.3 are considered as the High Priority Projects in order to solve the various existing traffic problems in Ujung Pandang Area.
Therefore, the farther study of those projects should be commenced at the early stage.

A.5 The road network development contributes not only to activate the urban socio-economic functions, but also to guide and induce orderly urban developments as the indispensable infrastructure of the urban spatial structure.
Therefore, in addition to the arterial roads recommended above, the construction of collector roads and local roads should be carried out at the same time, with close coordination with the land use/urban development plan, in order to form an effective integrated urban road network.

A.6 In addition to the Highway Development Master Plan, which has been formulated in the Study to solve transportation problems in Ujung Pandang City and its surrounding areas, it is strongly recommended that the Government would establish a plan to improve the comprehensive

transportation system for a broad Ujung Pandang Area putting particular emphasis on securing effective operation of the public transport system.

A.7 Finally, it is strongly recommended to increase the number of engineers in the Municipality of Ujung Pandang and related agencies in order to secure the smooth implementation of the above mentioned projects as well as the daily road maintenance.

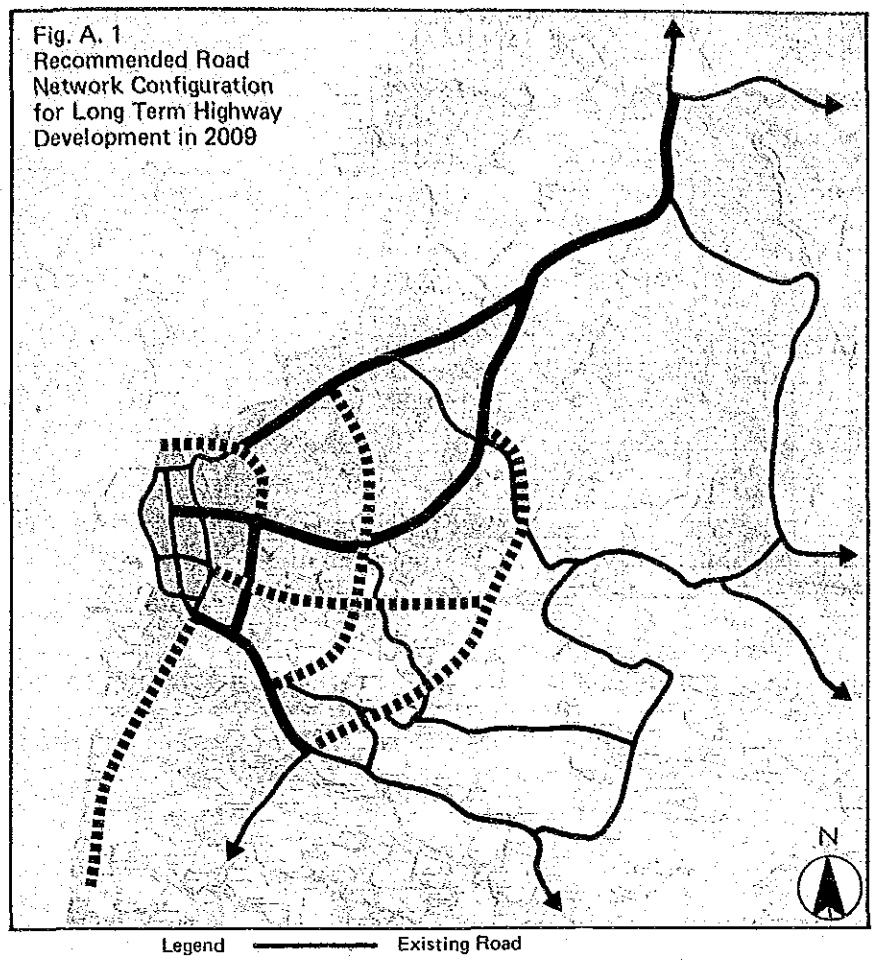


Fig. A. 1
Recommended Road
Network Configuration
for Long Term Highway
Development in 2009

Legend
Existing Road
Proposed Road as Widening
Proposed Road as New Construction

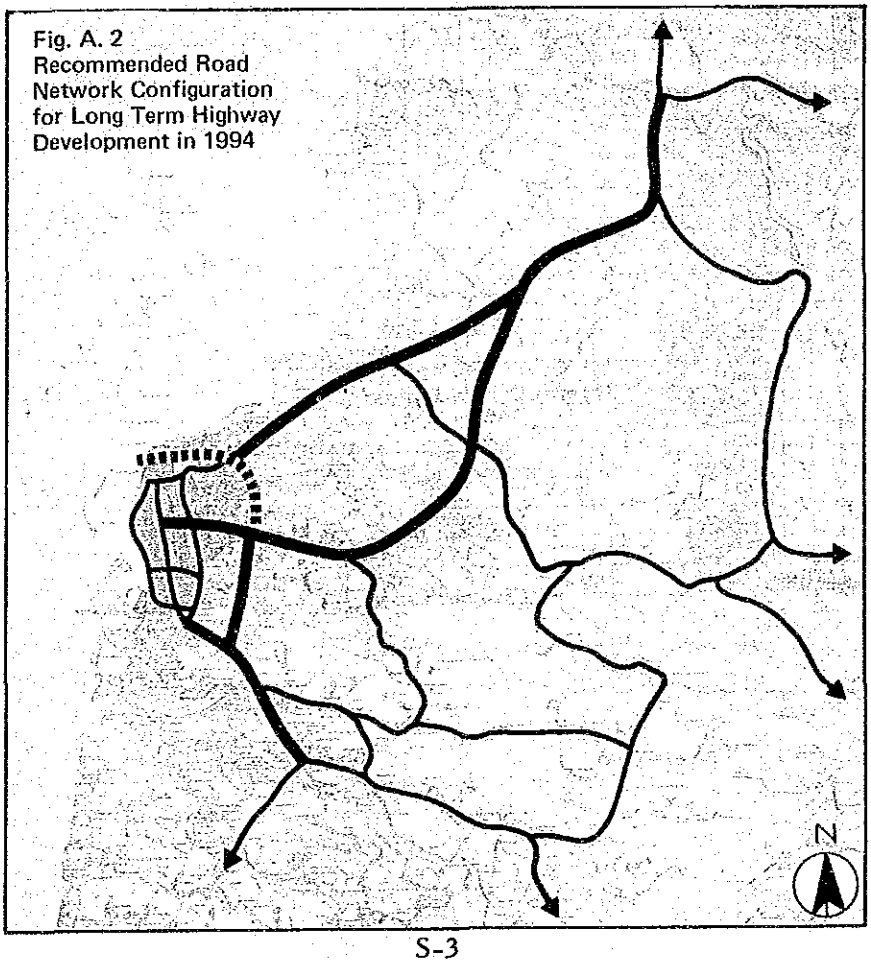


Fig. A. 2
Recommended Road
Network Configuration
for Long Term Highway
Development in 1994

B. Summary

B.1 INTRODUCTION

Ujung Pandang area is already encountering various urban transport problems and these problems are anticipated to be enlarged in the near future. In addition, the recent sprawling trend of the urbanized area is making the situation more disordered.

In this connection, the Government of the Republic of Indonesia requested the Government of Japan to conduct the Ujung Pandang Area Highway Development Study (hereinafter referred to as "the Study").

In response to the request, the Government of Japan, through the Japan International Cooperation Agency (JICA), sent a study team to carry out the Study in close cooperation with the Indonesian counterpart team.

The Study commenced in December, 1987 when the Inception Report for the Study was submitted and accepted by the Government of the Republic of Indonesia.

The Interim Reports (1) and (2) were submitted and accepted by the Government of the Republic of Indonesia in March and October, 1988 respectively.

The Draft Final Report contains the contents of above mentioned reports, an implementation program and recommendation on organizational plan. The Draft Final Report was submitted and accepted by the Government of the Republic of Indonesia in the end of December, 1988.

This Final Report contains the contents of above mentioned all reports and it is submitted to the Government of the Republic of Indonesia in March, 1989.

B.2. PRESENT CONDITIONS

B.2.1 Field Survey Conducted

The following field surveys were conducted by the Study Team to collect basic data for preparation of long term and short term plans.

a) Home Interview Survey
b) Cordon Line Survey
c) Traffic Flow Survey
d) Public Transportation Survey
e) Company and Government Office Survey
f) Road Inventory Survey
g) Traffic Signal Survey
h) Pedestrian Facilities Survey
i) Parking Condition Survey
j) Bus Facilities Survey

B.2.2 Present Traffic and Transport Facility Problems

The present conditions of traffic and transport facilities are described in Interim Reports (1) and (2), while photographs of some of present conditions are presented in page S-7. Based on the various field surveys and related data analyses, major traffic and transport facility problems are identified as follows:

1) Traffic Congestion

Traffic congestion in Ujung Pandang are mainly occurred on Jl. Bawakaraeng, Jl. Gowa Jaya (Urip Sumoharjo), Jl. Bulusaraung, Jl. Gowa Raya (St. Alauddin) and Jl. A. Pettarani. In addition, traffic congestion observed inside the urbanized area are mostly occurred at intersections.

2) Mixed Traffic

Confusions of traffic flows frequently occur on major roads inside the urbanized area of Ujung Pandang mainly due to the mixed traffic of motorized 4-wheel vehicles, motorcycles and becaks. In fact, various types of vehicles running on the same carriageway even on the major roads. In addition, it seems that the mixed traffic also leads to a high rate of traffic accidents.

3) Road Network System

In the light of effective traffic control and traffic safety, the road network configuration is required to be formed based on road functions and characteristics, which are arterial road, collector road and local road. The existing road network, however, does not seem to be used effectively in accordance with the function of each road.

4) Road Ratio

The road ratios (road area/land area) of the urbanized, suburban and rural areas of the Study Area are 17.7%, 5.8%, and 1.9%, respectively. Even though the new housing development projects are undergoing in the suburban area, road ratio of suburban area is very low.

5) Utilization of Road Space

Even though the right of way of roads in the Study Area are considerably wide, shoulders of most of roads are unpaved. Hence, every type of vehicle, including becak, is running on the carriageway.

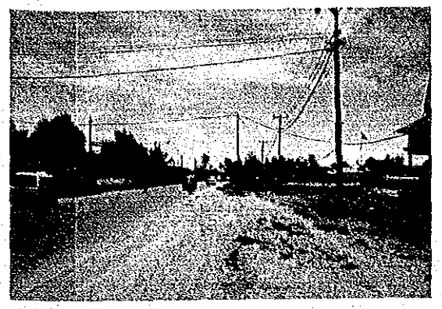
6) Driving Manner

The driving manner in the Study Area cannot be regarded as "good", judging from an extensive reconnaissance survey on traffic conditions in the city. This is one of the causes to induce the traffic accidents.

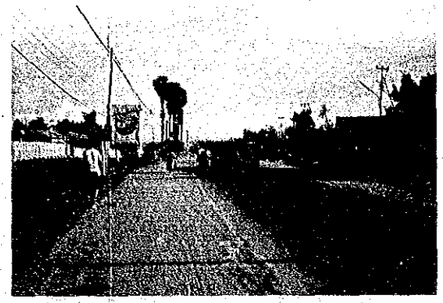
7) Transport Facilities

The main public transport mode in the Study Area is urban bus and pete-pete, however condition of public transport facilities such as bus terminals and bus stops are in a low standard. In addition, existing facilities are not well maintained.

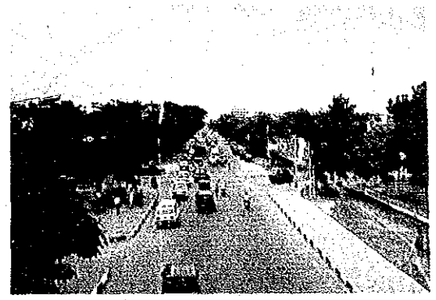
1 Jl. Gowa Jaya (Jl. Urip Sumoharjo)



2 Jl. A. Pettarani

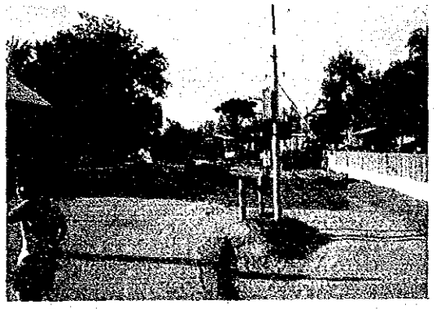


3 Jl. Gowa Raya



4 Jl. Sudirman

5 Intersection of Jl. Urip Sumoharjo/
Jl. A. Pettarani



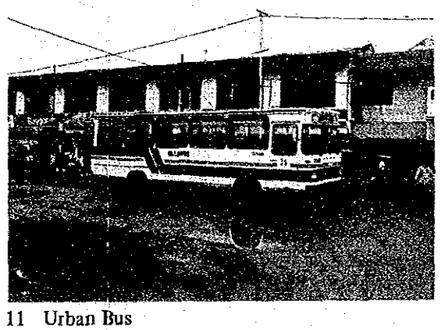
6 Sungguminasa

7 Antang Area

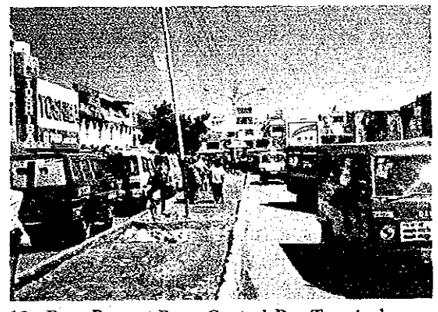
8 Daya Area

9 Intersection of Jl. Veteran/
Jl. Gowa Raya/Jl. Raturangi

10 Becak



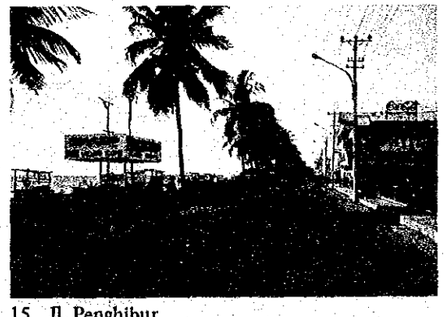
11 Urban Bus



12 Pete-Pete at Pasar Central Bus Terminal

13 Jl.Rappocini Raya

14 Panaikang Bus Terminal



15 Jl. Penghibur

16 Sunset in Losari Beach

B.3. LAND USE PLAN AND SOCIO-ECONOMIC STUDY

B.3.1 Land Use Plan

B.3.1.1 General

The Master Plan with the target year of 2004 for urban development of Ujung Pandang city was prepared in 1984 by Pemerintah Kotamadya Daerah Tingkat II Ujung Pandang. A review on the land use plan described in this Master Plan has been made by the Study Team for formulation of the land use plan with the target year of 2009.

The land use plan in 2009 is studies on the basis of reviewing the Master Plan and analysis of the general conditions and the socio-economic potencials of Ujung Pandang.

B.3.1.2 Planning Policy

In order to solve the urban problems, following two (2) planning policies for land use plan are conceived.

a) To distribute the urban activities to the outside of urbanized area.
b) To provide sufficient infrastructure in the suburban area.

B.3.1.3 Planning Guideline

Based on the above planning policies, the following guidelines are identified for preparation of the land use plan in year 2009.

a) Location of future residential areas in good environmental condition.
b) Shifting the urban activities to the suburban area.
c) Separation of industrial area from residential area.
d) Location of transportation facility area to be connected with arterial roads.
e) Adjustment of land use along roads.
f) Preservation and rearrangement of agricultural zone.

B.3.1.4 Future Land Use (2009)

The areas by functional classification of land use and respective composition rate of land use plan in 2009 are shown below:

a)	Residential Area	9,900 ha.	56.4 %
b)	Commercial Area	200	1.1
c)	Commercial and Business Area	1,000	5.7
d)	Educational Area	880	5.0
e)	Industrial Area	244	1.4
f)	Port Terminal and Related Area	321	1.9
g)	Agricultural Area	1,500	8.5
h)	Swamp Area	1,400	8.0
i)	Green and Park	425	2.4
j)	Recreational Area	200	1.1
k)	Other Area	1,500	8.5
		17,570 ha.	100 %

The future land use plan 2009 are illustrated in Fig. 3.1.1 and Fig. 3.1.2.

B.3.2 Socio-Economic Frame Work

B.3.2.1 Future Population

The population of Ujung Pandang City in 1986 is presented as 778,000 persons. The future population of Ujung Pandang in 1994, 2004 and 2009 are estimated based on a comparative study of various population projections. The results of the future population study are summarized below.

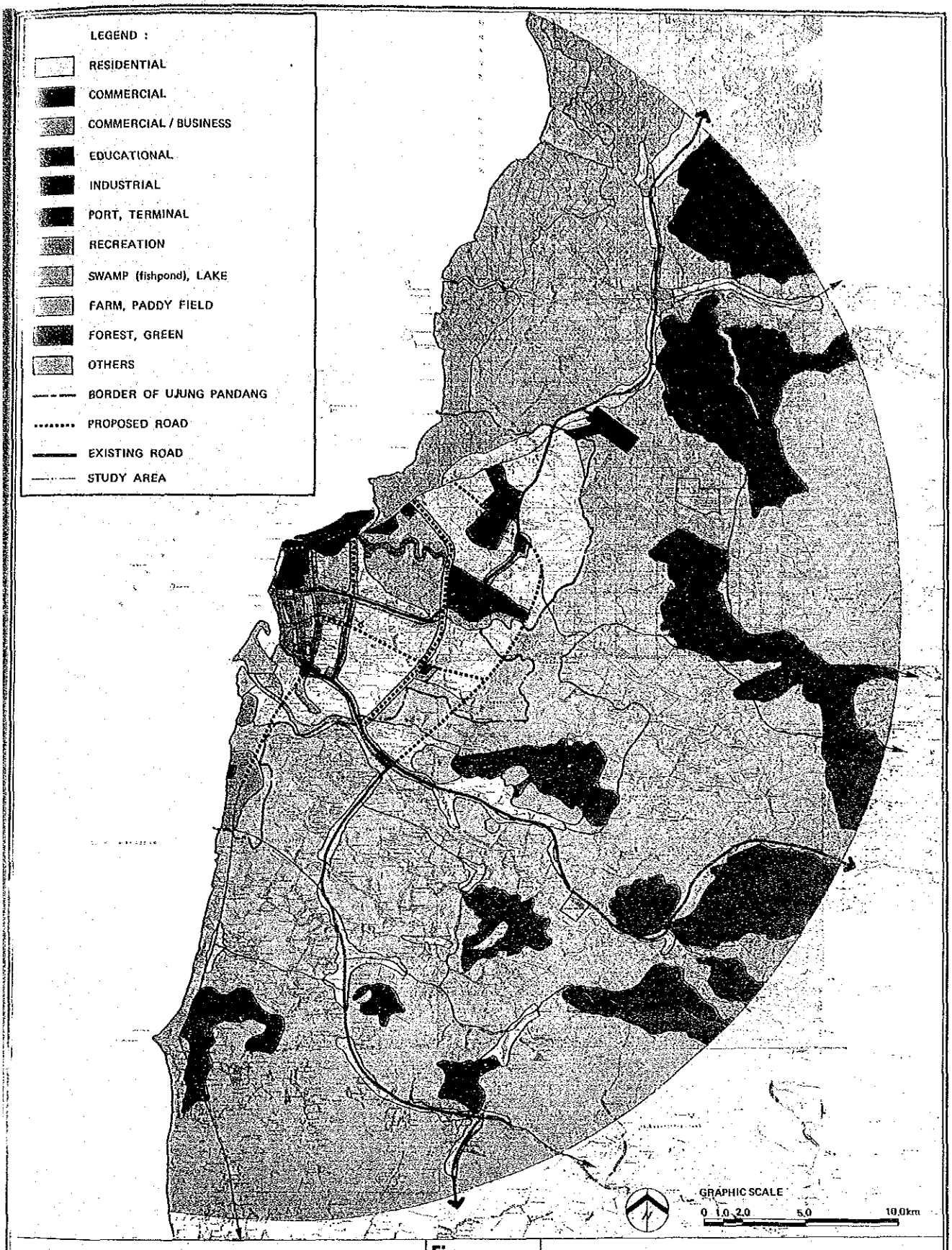
Year	Population Frame (persons)	
1994	976,000	
2004	1,310,000	(based on Master Plan)
2009	1,520,000	

B.3.2.2 Population Distribution

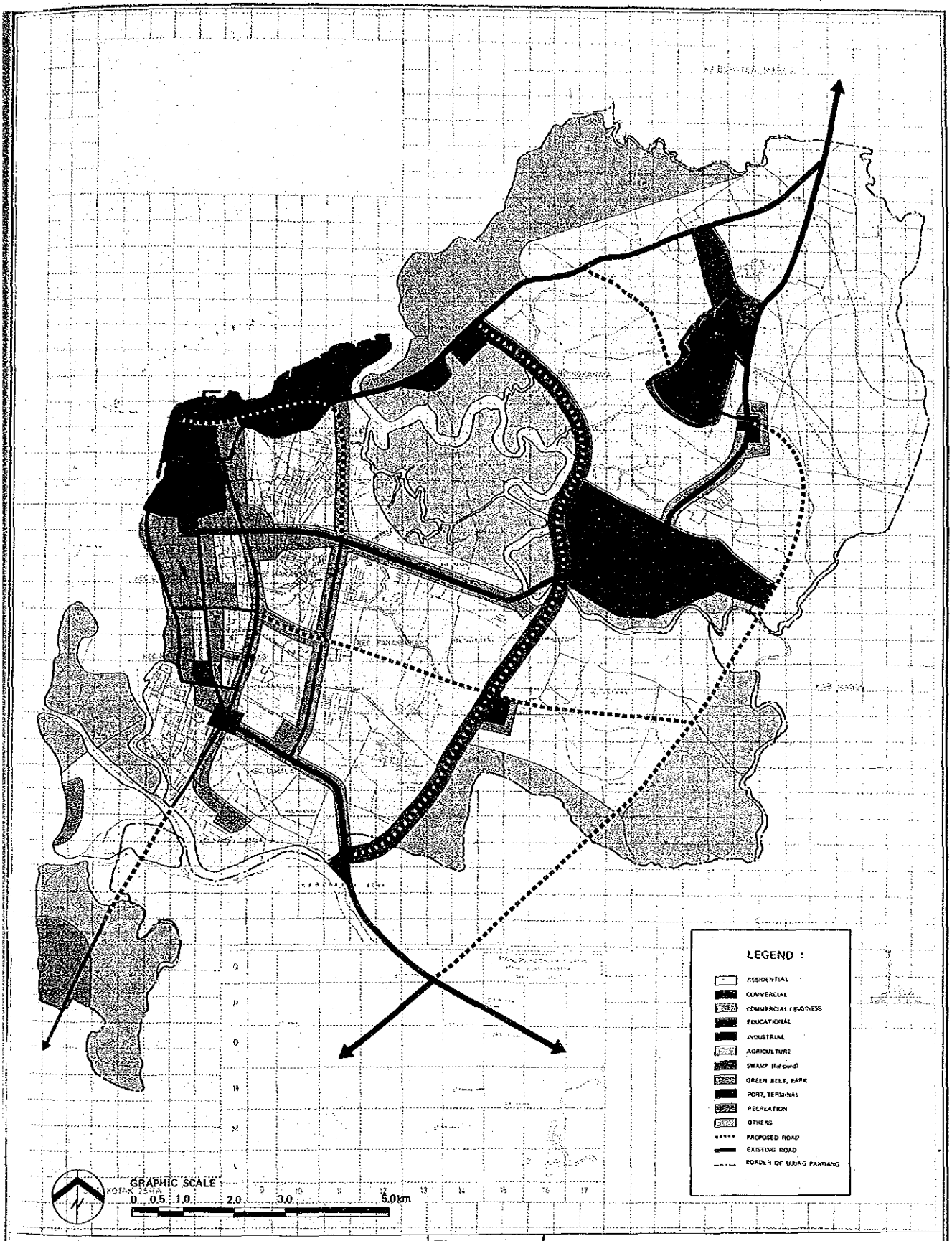
The forecasted future population in each target year are allocated to three (3) zones as described below, and population density of each zone are shown in Table 3.2.1.

a) Central zone
b) Transitional Zone
c) Border Zone

The future population of each zone is incorporated in the traffic demand projection which is dealt with in the next section.



UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 3.1.1	LAND USE PLAN OF STUDY AREA
		JAPAN INTERNATIONAL COOPERATION AGENCY



UJUNG PANDANG AREA
HIGHWAY DEVELOPMENT STUDY

Fig. 3.1.2 LAND USE PLAN OF UJUNG PANDANG CITY

JAPAN INTERNATIONAL COOPERATION AGENCY

Table 3.2.1 Future Population and Density

Zone	1986 population 1	Planned Population (residence area) 2	2004 Population (1+2)	2009 Population	Population Density Gross (Kecamatan)	Net (residence area)
	(Persons)	(persons)	(persons)	(persons)	(persons/ha)	(persons/ha)
Central Zone	414,794	not planned	400,000	400,000	200	300 -
Transitional Zone	320,217	469,000	790,000	790,000	100	150 - 200
Border Zone	43,582	72,000	120,000	330,000	40	100
			+ about 200,000			
Total	778,593	541,000	1,310,000	1,520,000	90	150
		by the MASTER PLAN	(= MASTER PLAN)	(= FRAME)		

B.4. TRAFFIC PROJECTION

B.4.1 Procedure

Since the traffic is a result of socio-economic activities, the future perspectives of surrounding conditions should be duly taken into account in forecasting future traffic demand.

Based on the analysis of the existing person trip characteristics with a special attention to the relationship with the socio-economic conditions, the traffic forecasting model is formulated.

The forecasting procedure in this study is composed of 4 steps; trip generation/attraction, trip distribution, modal split and traffic assignment. Each step requires a corresponding forecasting model.

B.4.2 Future Person Trips

The trip generation and attraction will generally increase in the future corresponding to the socio-economic growth in each zone.

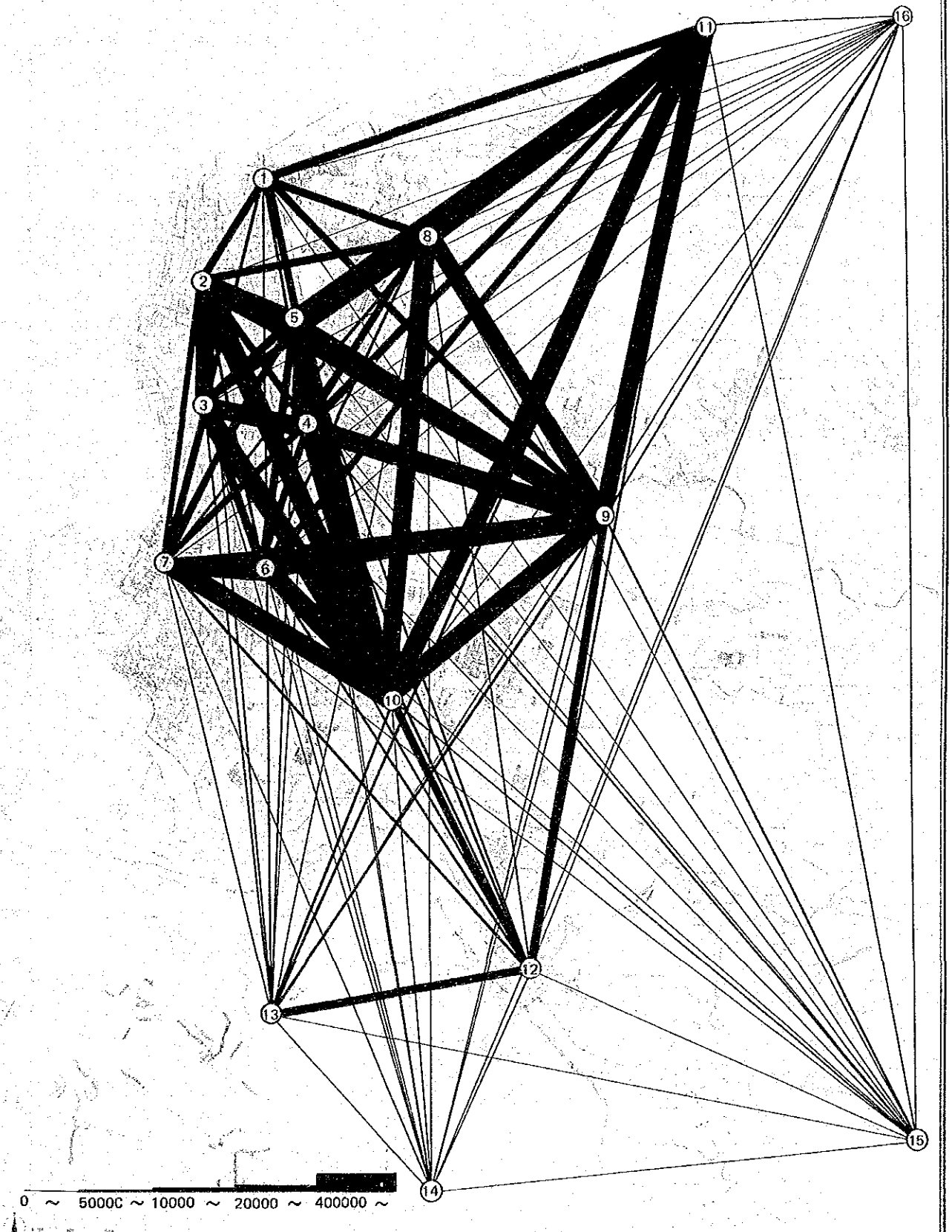
The growth rate of trip generation/attraction in the suburban area of Ujung Pandang is extremely high. In Kec. Birigkanaya, for instance, the number of trip ends grows from 221,000 person trips in 1988 to 456,000 person trips in 1994 and 1,126,000 person trips in the year 2009.

On the other hand, the growth rate in the built-up area is relatively low, particularly in the central area i.e. Kec. Wajo and Ujung Pandang, the trip generation/attraction in 2009 is only 1.35 times of that in 1988. As a result, the desire line of O-D pattern in the year 2009 is illustrated in Fig. 4.2.1.

B.4.3 Total Vehicular Traffic

The volume of vehicular traffic in the Study Area is obtained by converting the forecasted person trips to vehicular trips combined with the company vehicle trips. The resultant vehicular traffic flow is illustrated in Fig. 4.3.1.

The total vehicular traffic in the Study Area grows to 1.33 times the existing traffic in the year 1994 and 2.59 times in the year 2009 in terms of passenger car unit (p.c.u).



UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 4. 2. 1	Desire Line 2009 (Basedan Person)
	JAPAN INTERNATIONAL COOPERATION AGENCY	

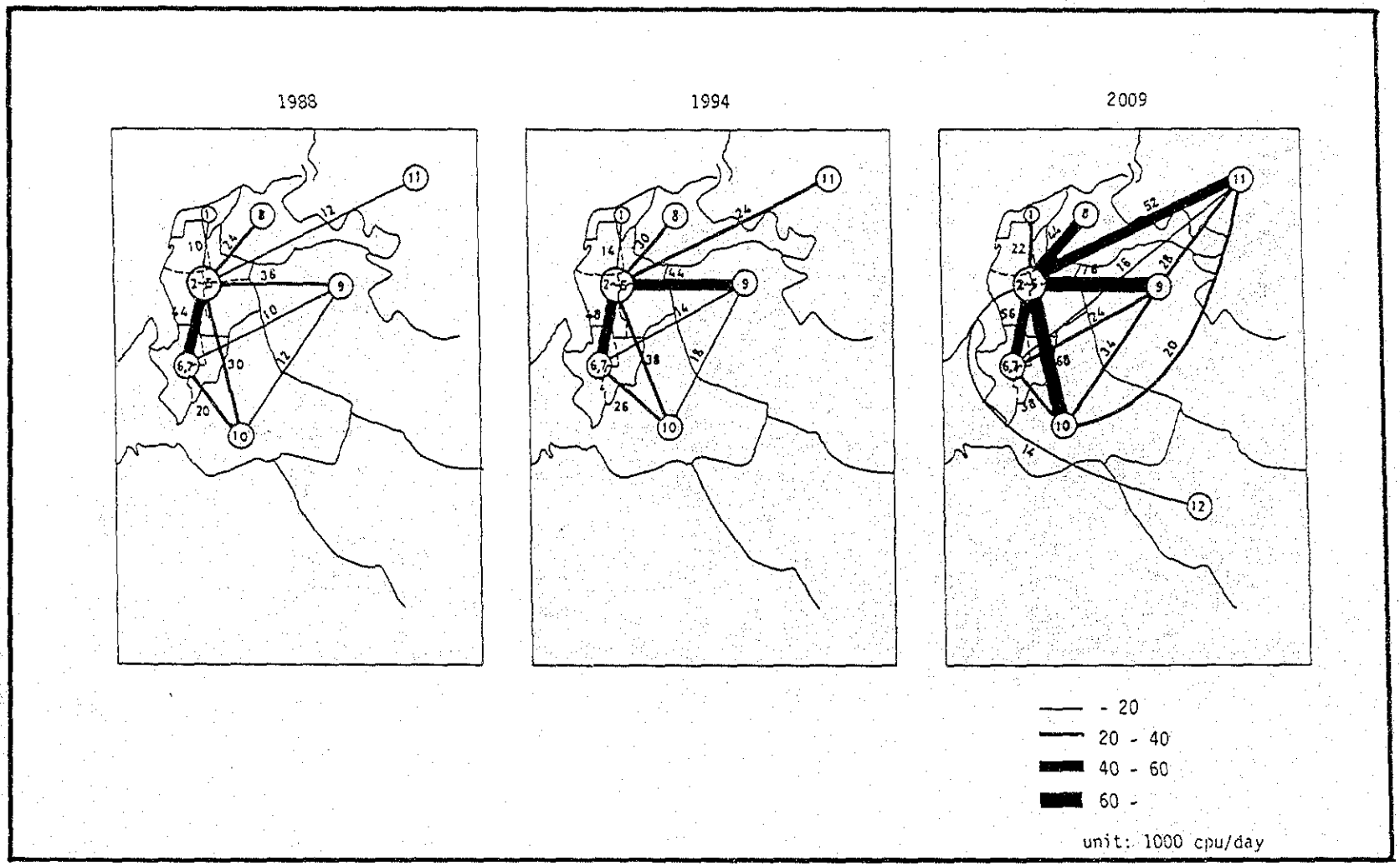


Fig. 4.3.1 Growth of Vehicular Traffic Flow

B.4.4 Traffic Assignment to the Proposed Road Network for the Year 2009

Based on the planning policy and strategy, future road network configuration is formulated as described in Chapter 5 of the Main Volume. Fig. 4.4.1 shows the result of traffic assignment to the proposed road network for the year 2009. In this assignment, the bus transport network is expanded so as to cover the proposed new roads.

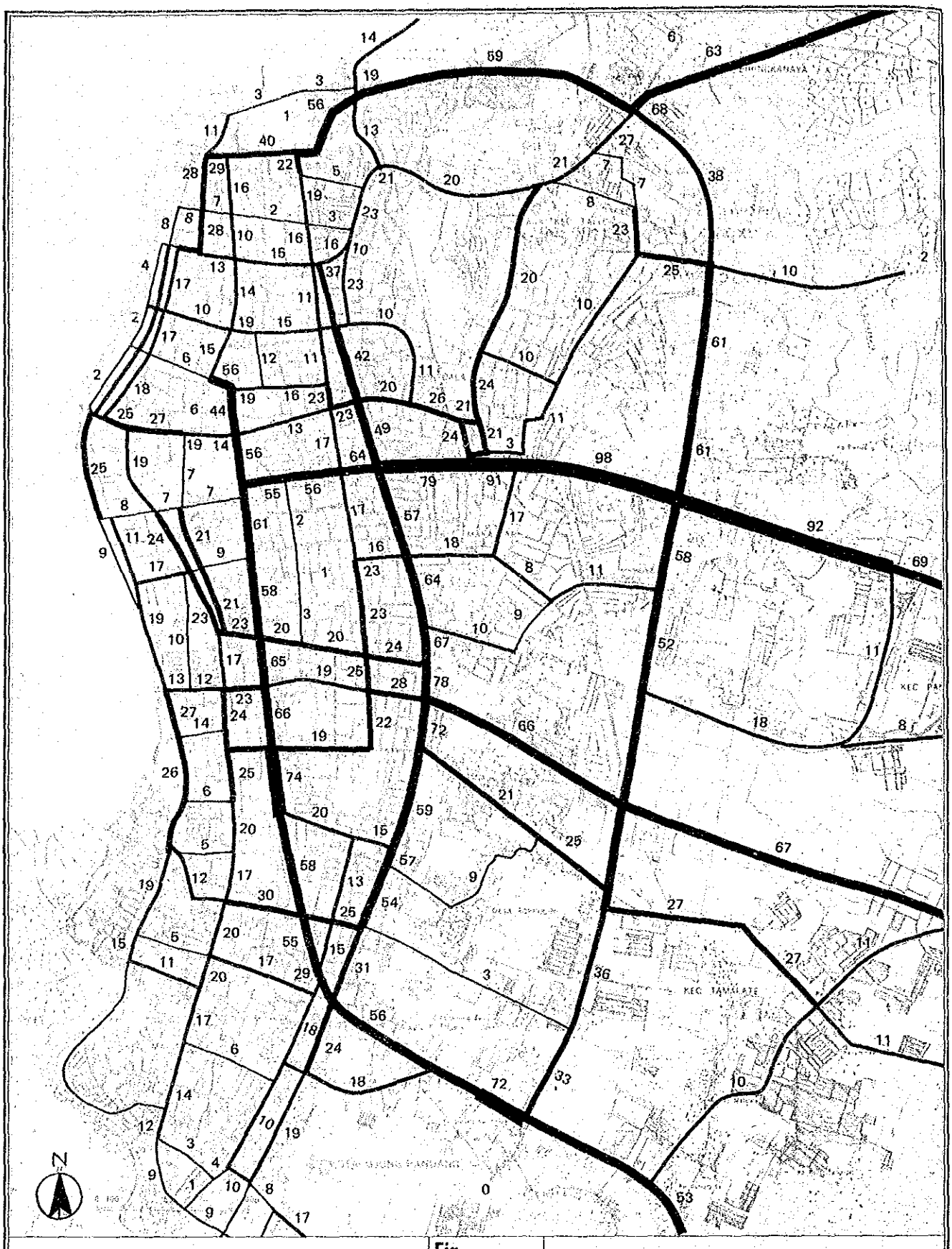
The following points are identified from the result.

a) Jl. Gowa Jaya (Urip Sumoharjo) has an extremely large traffic demand, ranging from 40,000 pcu/day to 98,000 pcu/day in the section from Jl. Veteran to Industrial Estate Area.

b) Jl. Toll (Prof. Dr. Ir. Sutami) and Jl. Gowa Raya (St. Alauddin) can also expect large traffic demand which requires 4-lanes in the section inside of the Outer Ring Road.

c) All the new roads proposed in this study will function well. In the case of Outer Ring Road, the assigned volume is relatively small, however, this road might be used more effectively in accordance with the development of city's sub-centers.

d) On the main roads in the built-up area, like Jl. Veteran, Jl. Sudirman and Jl. Ratulangi etc., an excessive demand is expected in some sections. Since the widening of these roads is difficult, some other measures including traffic management would be necessary.



UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 4.4.1(1)	Traffic Assignment to Case F (2009)
		JAPAN INTERNATIONAL COOPERATION AGENCY

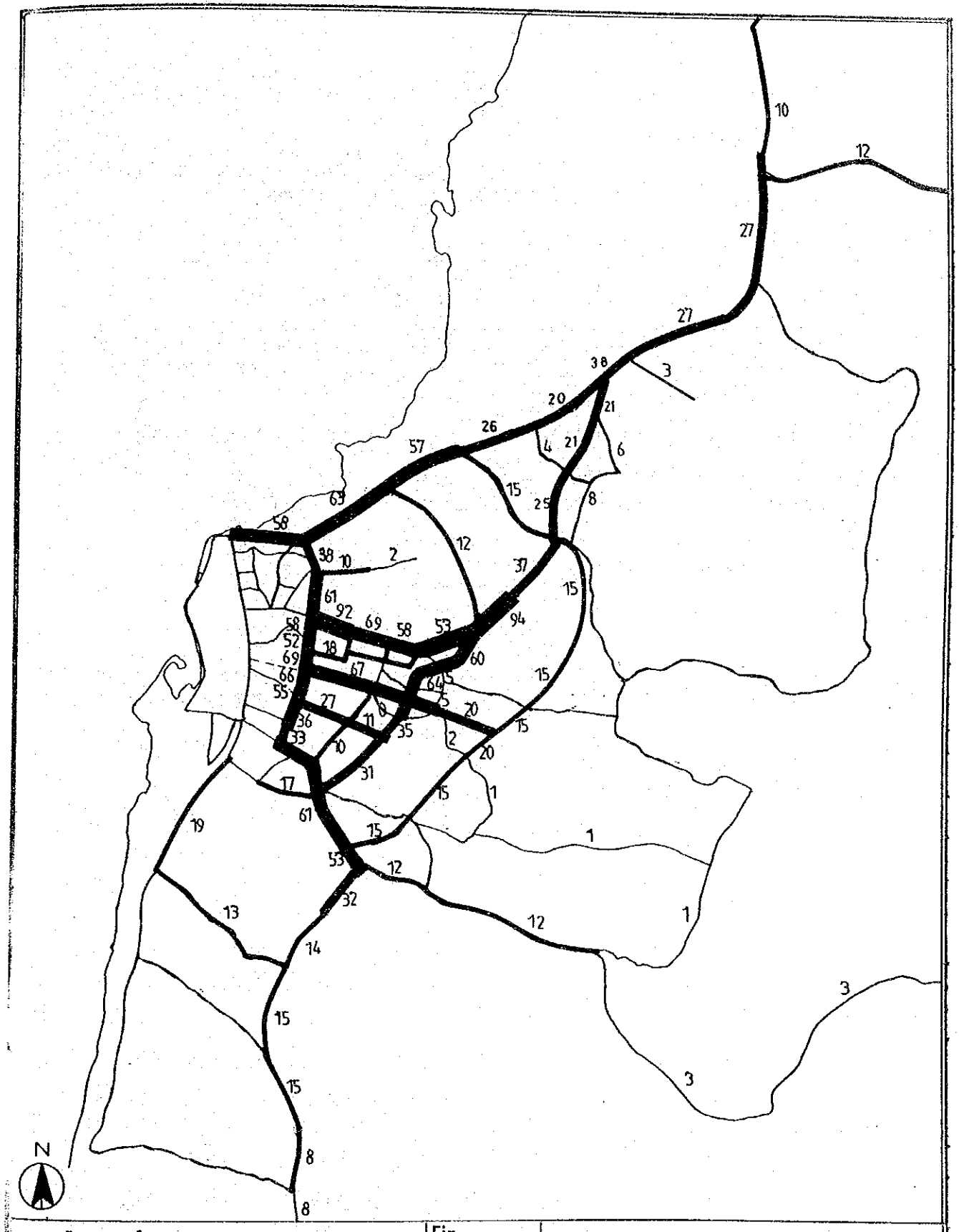


Fig. 4.4.1(2) Traffic Assignment to Case F (2009)

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B.5. LONG TERM PLAN

B.5.1 Planning Goals and Strategy

In order to prepare Master Plan for solution of the urban transportation problems in the Study Area, following plans are examined.

a) Long Term Plan
b) Short Term Plan

The long term plan with target year of 2009 is studied for road network development planning and the short term plan with target year of 1994 is studied mainly for traffic management planning including improvement of existing intersections and short length urban roads, traffic regulation system and bus terminals.

Taking into account the existing traffic conditions, future development directions and future socio-economic potencials, the Study Team identified the following planning goals for the future highway development master plan in the Study Area.

a) To maximize the benefits of urban transport economy.
b) To maximize the utilization of existing transport facilities.
c) To maintain a high quality urban environment.
d) To provide a smooth and safe means of transport.
e) To contribute to the development of urban socio-economic activities.

In order to achieve the planning goals above mentioned, following planning strategies for highway development planning are identified as shown below.

a) To arrange systematic road network
b) To arrange functional road network
c) To arrange structural road network
d) To maintain open spaces

B.5.2 Road Network Planning

B.5.2.1 The Premises of Planning

Prior to the road network study, the premises of the road network planning are defined as described below:

a) The final target year of the road network plan is adopted as the year 2009.
b) The primary and secondary arterial road network is examined in the Study, but the other road network that is collector and local road network are excluded.

B.5.2.2 Conceptual Development Pattern

The population of Ujung Pandang Area in 1986 was about 778,000 persons and the future population in 1994 and 2009 is forecasted to be about 976,000 and 1,520,000 persons respectively.

The existing housing development has gradually spread towards east and south-east directions from Ujung Pandang urbanized area. The future development needs will not change considering the ground conditions of Ujung Pandang which is suitable for housing.

B.5.2.3 Future Road Network Pattern

The existing road network pattern within urbanized area of Ujung Pandang City is formed as a ladder or grid pattern and its surrounding area is formed as radial pattern. In view of the economic activities in Ujung Pandang and its surrounding area, Ujung Pandang City is connected to three (3) directions, that is to Maros, to Malino and to Takalar.

Even in the future, the above mentioned economic activities pattern will not dramatically change. Therefore, radial road network also will remain unchanged.

The ring and radial road network pattern or grid road network pattern can be considered for application within this area. However, to set up the ring and radial road network pattern in this area seems to be more appropriate than the grid network pattern.

B.5.2.4 Road Network Planing Concepts and Guideline

1) Road Network Planning Concepts

Road network planning is carried out based on the planning goals and planning strategies for road network study.

Considering the above mentioned goals and strategies, existing road network condition and results of reconnaissance survey, the planning concepts for road network location study are formulated as follows:

a) To meet the future land-use
b) To meet the existing road network
c) To meet the development schedule
d) To meet the road functions and characteristics

2) Planning Guideline

There are many items to be considered for road network planning study, taking into account the above mentioned planning concept. The planning guideline items for road network study are explained below:

a) Existing road network configuration
b) Development pressure
c) Housing development pattern
d) Industrial cargo traffic flow
e) Port cargo traffic flow

f) Cargo terminal traffic flow
g) Recreation development traffic flow
h) Urban development traffic flow

The relation of planning guideline and basic road network pattern are presented in Fig. 5.2.1.

B.5.3 Future Road Network Configuration

In accordance with the road planning goals and strategies, planning concept and guideline for road network planning, the future road network configuration of Ujung Pandang Area is examined. As a result of the examination, future road network configuration for the year 2009 is formulated as illustrated in Fig. 5.3.1.

Basically, the future road network configuration comprises five (5) radial roads and three (3) ring roads for primary and secondary arterial road network. The future road network configuration consists of the roads proposed to be constructed as shown below.

a) Inner Ring Road (Primary Arterial Road)
b) Middle Ring Road (Secondary Arterial Road)
c) Outer Ring Road (Secondary Arterial Road)
d) Radial Road (Jl. Toll (Prof. Dr. Ir. Sutami) (Primary Arterial Road)
e) Radial Road (Jl. Gowa Jaya (Urip Sumoharjo)) (Primary Arterial Road)
f) Center Radial Road (Secondary Arterial Road)
g) Radial Road (Jl. Gowa Raya (St. Alauddin)) (Primary Arterial Road)
h) South Radial Road (Secondary Arterial Road)

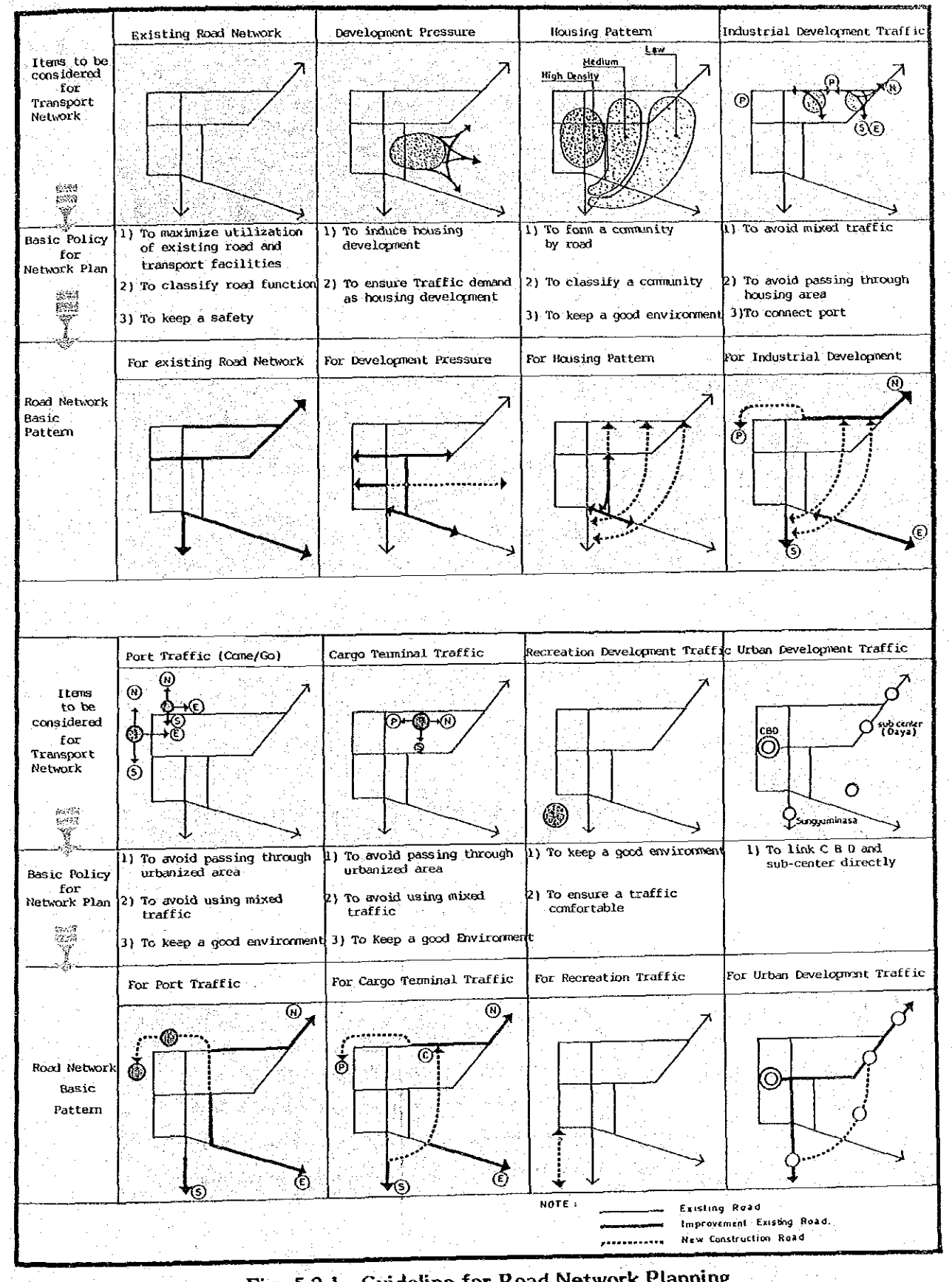
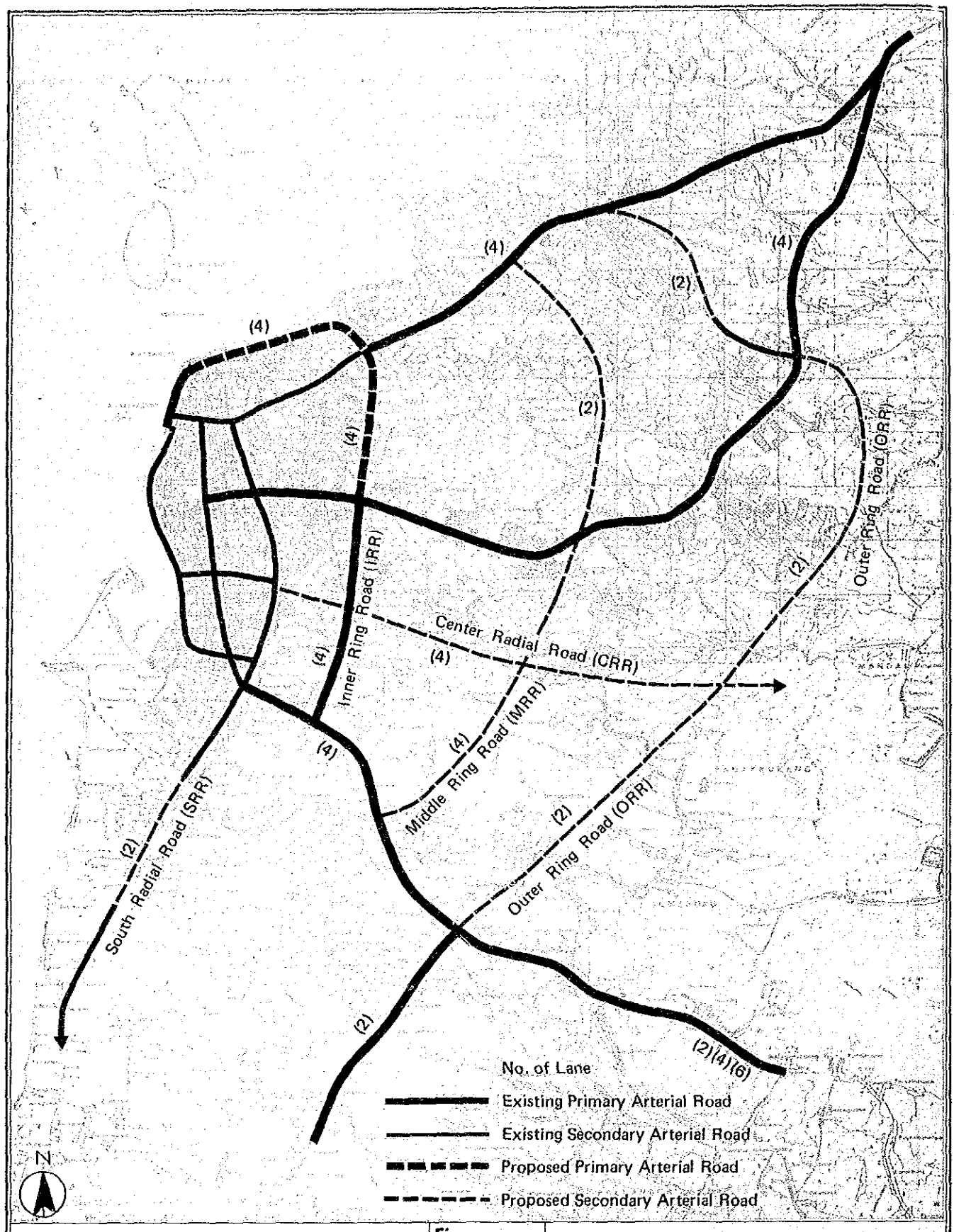


Fig. 5.2.1 Guideline for Road Network Planning



UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 5.3.1	Road Network Configuration (2009)
	JAPAN INTERNATIONAL COOPERATION AGENCY	

B.6 SHORT TERM PLAN

B.6.1 Objectives

The short term improvement plan with target year 1994 mainly consists of the traffic management plans and improvement plans of public transport facilities. This plan is intended for effective solution to the existing urban traffic problems by means of optimum utilization of limited road spaces and traffic/transport facilities with the minimum cost.

B.6.2 Planning Strategy and Concept

B.6.2.1 Planning Strategy

The planning strategy for the short term improvement plan is elaborated in consideration of the existing traffic problems as shown below.

a) To increase traffic capacity.
b) To control traffic demand.
c) To decrease traffic accidents.

B.6.2.2 Planning Concept

Based on the planning strategies elaborated above, the following planning concepts for each short term improvement measure are formulated:

1) Road and Intersection Improvement Plans

a) To prepare the most effective plans for the utilization of the existing road spaces, without additional land acquisition.
b) To secure the safety of road users.
c) To prepare improvement plans without large amount of investment.
d) To prepare realistic plans for implementation in an early stage.

2) Traffic and Transport Facilities Improvement Plans

a) To optimize the utilization of existing road spaces as well as traffic/transport facilities.
b) To maximize the function of traffic/transport facilities.
c) To prepare improvement plans to secure the good urban environment.

3) Traffic Regulation Improvement Plans

a) To secure the smooth traffic flows.
b) To secure the safety of road users.

B.6.3 Planning Formulation

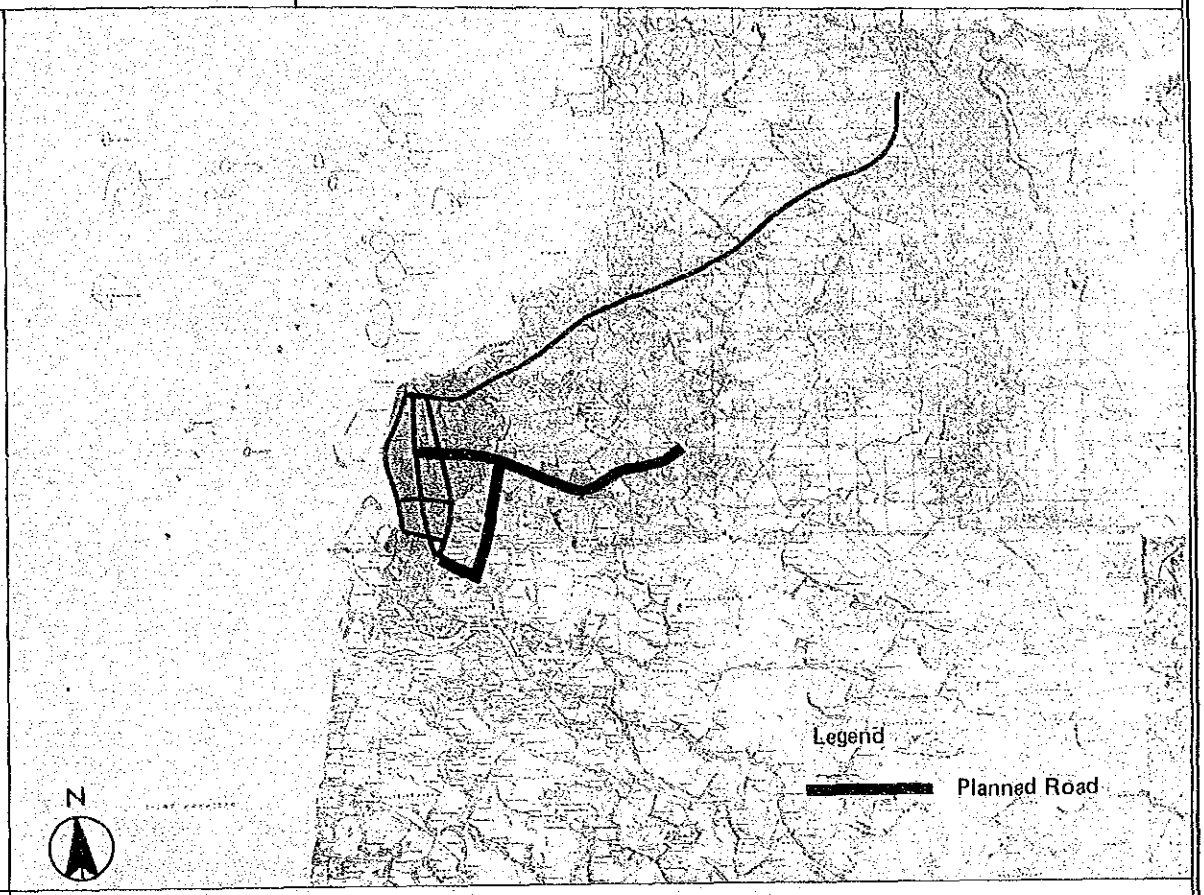
Based on the planning strategy and concepts, following seven (7) improvement plans regarding the traffic management study are formulated.

a) Road Widening Plan.
b) Intersection Improvement Plan.
c) Road Rehabilitation Plan.
d) Pedestrian Facilities Improvement Plan.
e) Bus Facilities Improvement Plan.
f) Becak Transport Improvement Plan.
g) Traffic Regulation Improvement Plan.

The location outline and necessity of above mentioned seven (7) plans are described in Fig. 6.3.1 - Fig. 6.3.7.

Name of Plan	Road Widening Project

Project Location Map



Outline of Plan

1) Existing Jl. (Urip Samoharjo) National Road with 2 lanes is widened to 4 lanes.
   The improved road length is 10,200 m.
2) Existing Jl. Pettarani with 2 lanes is widened to 4 lanes.
   The improved road length is 4,200 m.
3) Existing Jl. Gowa Raya (St. Alauddin) with 2 lanes is widened to 4 lanes.
   The improved road length is 1,450 m.
4) Total project cost is 7,915 Million Rupiah at 1988 prices.

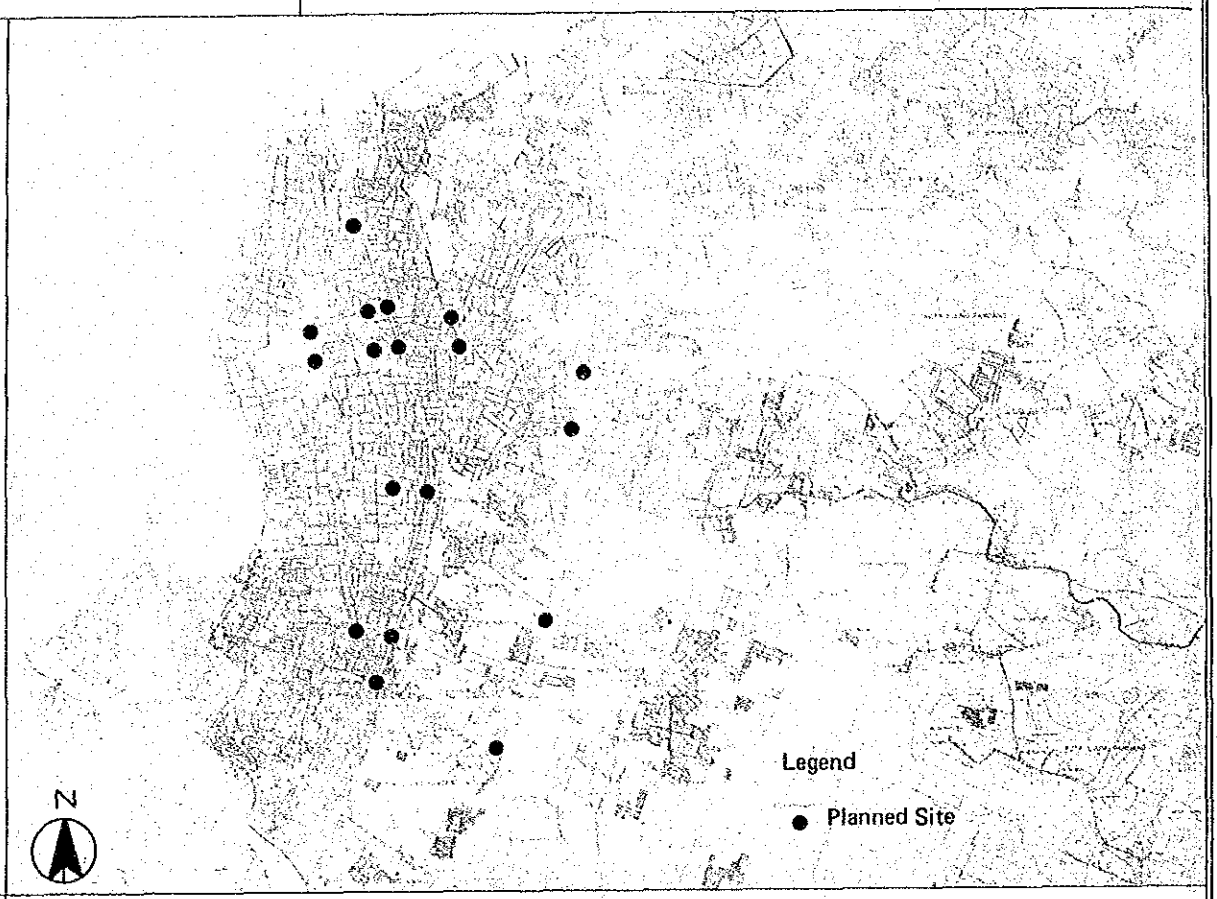
Necessity of Project

1) The existing traffic volume in 1988 on these three(3) roads is exceeding traffic capacity.
2) This project is economically and technically feasible.
3) B/C and IRR are presented as 4.2 and 42.4% respectively.

UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 6.3.1	Plan Location Map (Short Term Plan)
		JAPAN INTERNATIONAL COOPERATION AGENCY

Name of Plan	Intersection Improvement Project

Project Location Map



Outline of Plan

1) 19 intersections to be improved are selected.
2) Major improvement measures for 13 intersections are improvement of channelization and provision of markings including pedestrian cross walk.
3) Major improvement measures for 6 intersections are improvement of channelization and installation of traffic signal.
4) Total project cost is 1146 Million Rupiah at 1988 prices.
5) B/C and IRR are presented as 3,2 and 51,5% respectively.

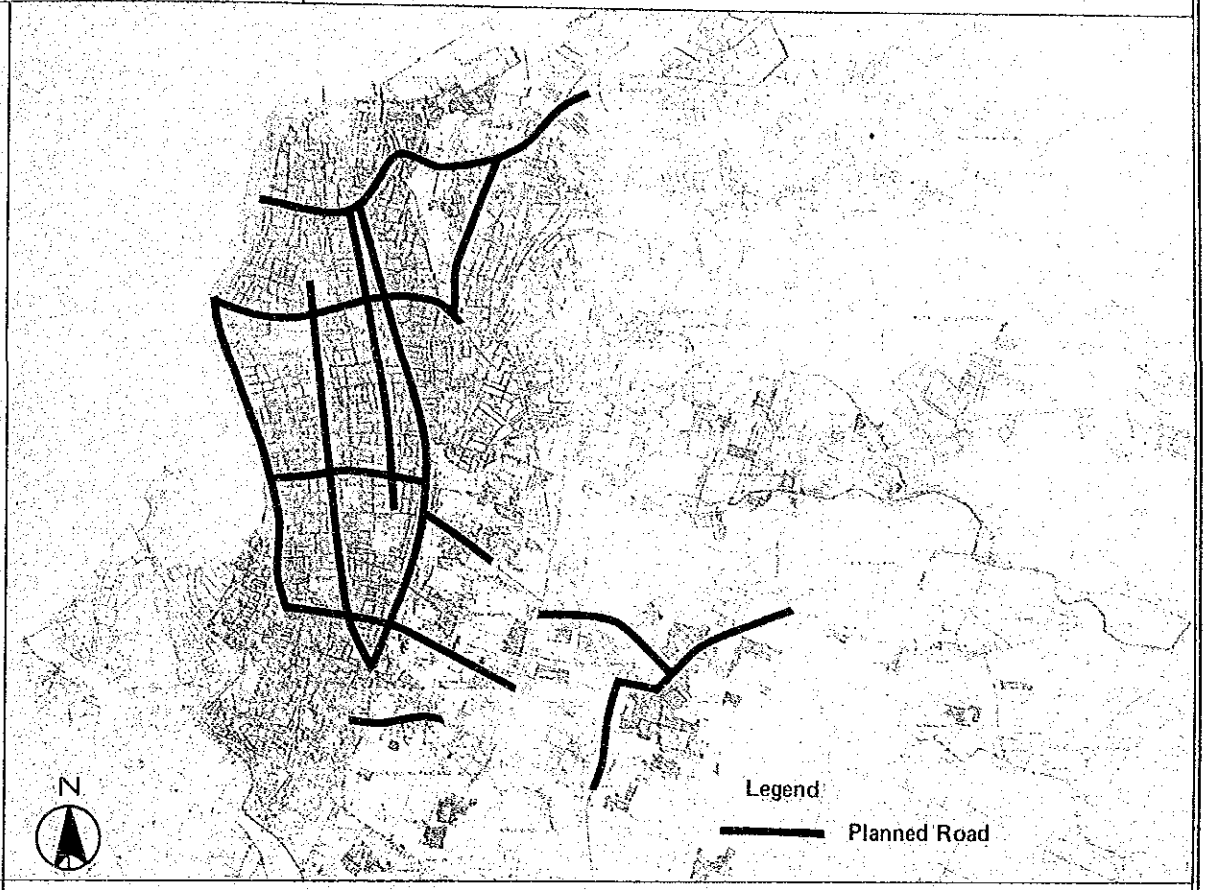
Necessity of Project

1) It is necessary to increase traffic capacity and to secure smooth traffic flow, and also to decrease traffic accidents.
2) This project is economically feasible with B/C ratio of 3.2 and IRR of 51.5%.

UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 6.3.2	Plan Location Map (Short Term Plan)
	JAPAN INTERNATIONAL COOPERATION AGENCY	

Name of Plan	Road Rehabilitation Project

Project Location Map



Outline of Plan

1) 14 road sections to be rehabilitated are selected in which shoulder pavement is required for 4 road sections.
2) The heavy rehabilitation including subgrade raising is needed for 4 road sections.
3) Overlay is required for 2 road sections.
4) Total project cost is 2,043 Million Rupiah at 1988 prices.

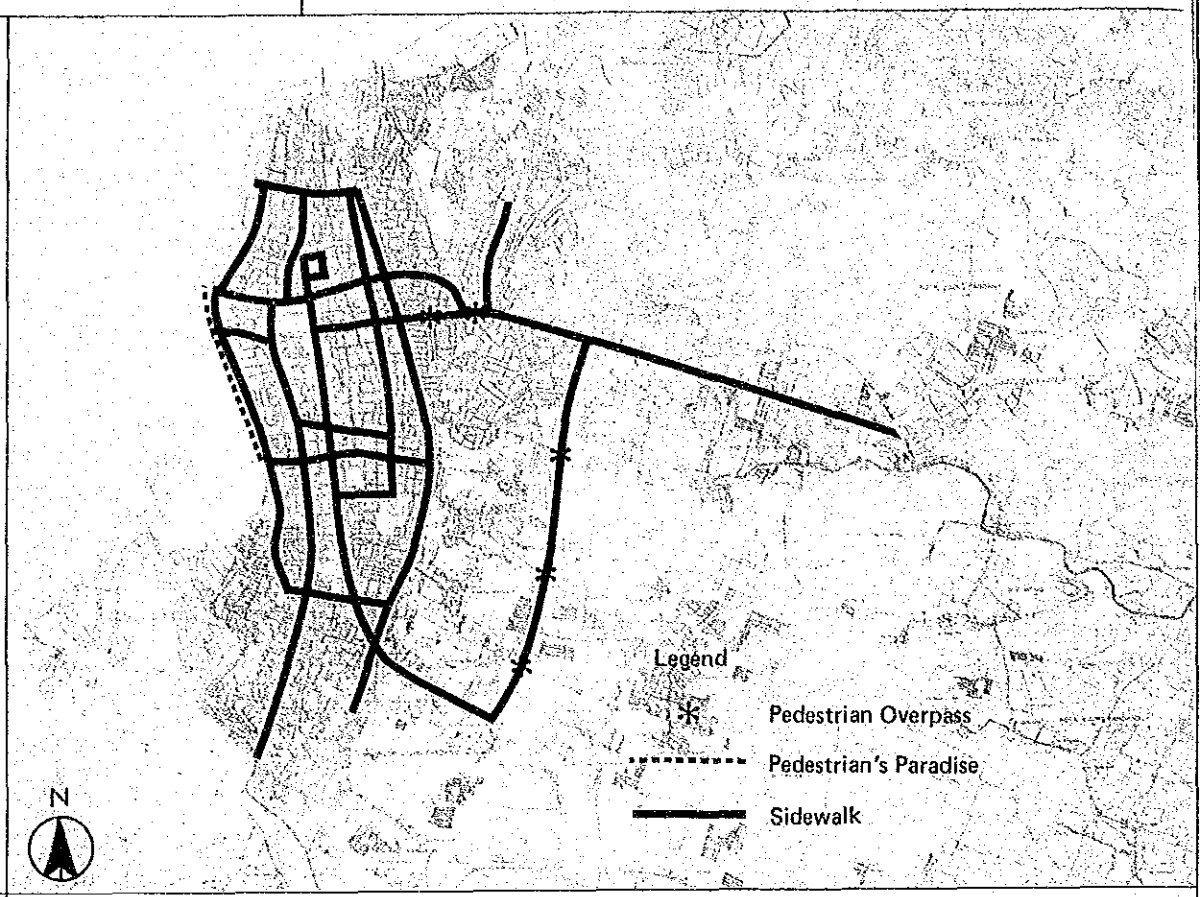
Necessity of Project

1) It is necessary to secure traffic function of road and smooth traffic flow, and also to protect road structure.

UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 6.3.3	Plan Location Map (Short Term Plan)
	JAPAN INTERNATIONAL COOPERATION AGENCY	

Name of Plan	Pedestrian Facilities Pmprovement Project

Project Location Map



Outline of Plan

1) Side walk provision plan
   - About 4,5 km sidewalk shall be provided along the arterial roads and collection roads, at near school, around park and market.

2) Pedestrian overpass provision plan
   Five pedestrian overpasses shall be provided at Jl. Urip-Sumoharjo and Jl. Pettarani where many traffic accidents involving pedestrian occurred and traffic volumes are large, furthermore, crossing length is comparatively long.

3) Pedestrian's paradise
   Jl. Penghibur running along Losari Beach shall be open for pedestrians between 5:00 p.m. and 10:00 p.m. on every Saturday (for the section) between Benteng Park and intersection of Jl. Monginsidi.
   All vehicles shall be prohibited during same time band.

4) Total project cost is 4,960 Million Rupiah at 1988 prices.

Necessity of Project

1) Side walk provision plan
   - To decrease the traffic accidents
   - To increase traffic capacity
   - To promote the good environmental aspects
   - To utilize the road as multi purpose facility.

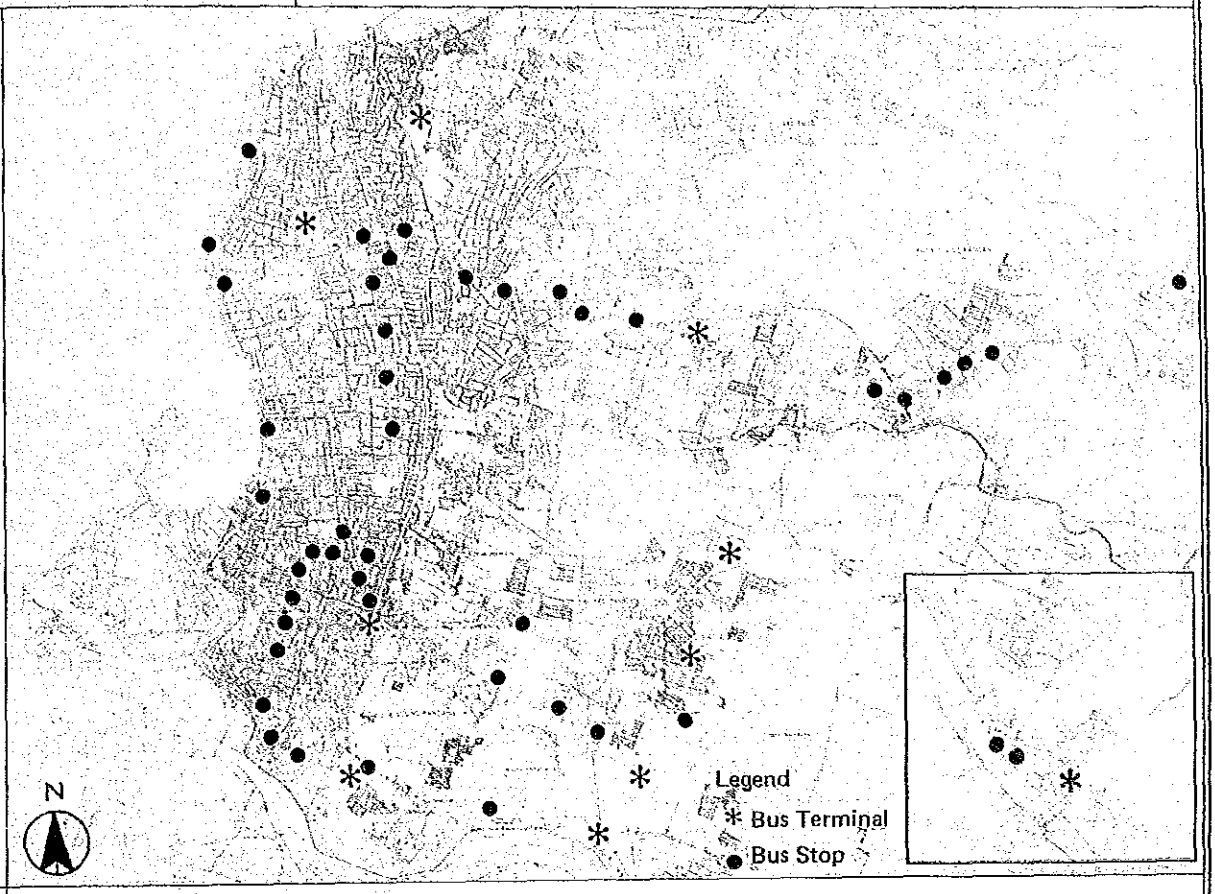
2) Pedestrian overpass provision plan
   - To decrease traffic accidents
   - To increase traffic capacity

3) Pedestrian's paradise provision plan
   - To utilize the good perspective place as pedestrian's plaza
   - To promote the civilian activities
   - To increase the amusement aspects of civilian.

UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 6.3.4	Plan Location Map (Short Term Plan)
	JAPAN INTERNATIONAL COOPERATION AGENCY	

Name of Plan	Bus Facilities Improvement Project

Project Location Map



Outline of Plan

1) Bus bay is provided for 43 bus stops.
2) Bus stop markings are provided for 183 bus stops.
3) Shelter and benches are installed at 64 bus stops.
4) Bus terminal is improved for 9 terminals.
5) Total project cost is 838 Million Rupiah at 1988 prices.

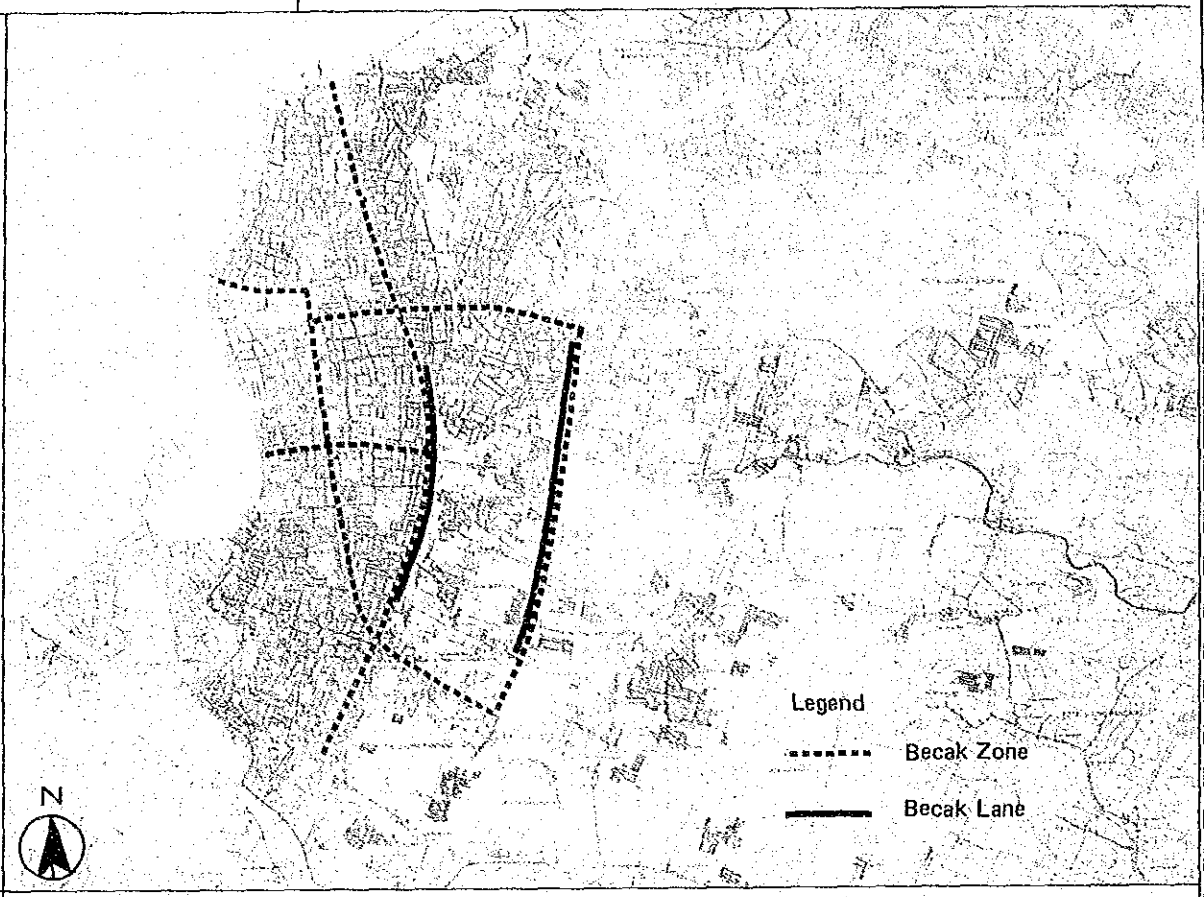
Necessity of Project

1) It is necessary to increase the operational efficiency of the terminals and to improve bus passenger services.
2) It is necessary to improve bus passenger services and to secure smooth traffic flow, and to ensure traffic safety when buses stop to load/unload passengers.

UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 6.3.5	Plan Location Map (Short Term Plan)
	JAPAN INTERNATIONAL COOPERATION AGENCY	

Name of Plan	Becak Transport Improvement Project

Project Location Map



Outline of Plan

1) Procedure

Step 1 The becak is shut out from major intersections and road sections and becak entry prohibition shall be impelemented at above locations.

Step 2 The becak service shall be limited within certain areas.

Step 3 The becak service shall be phased out in consideration of road congestion and bus service (expansion of routes and increase of service frequency) shall be provided instead of becak service.

2) Total project cost is 112 Million Rupiah at 1988 prices.

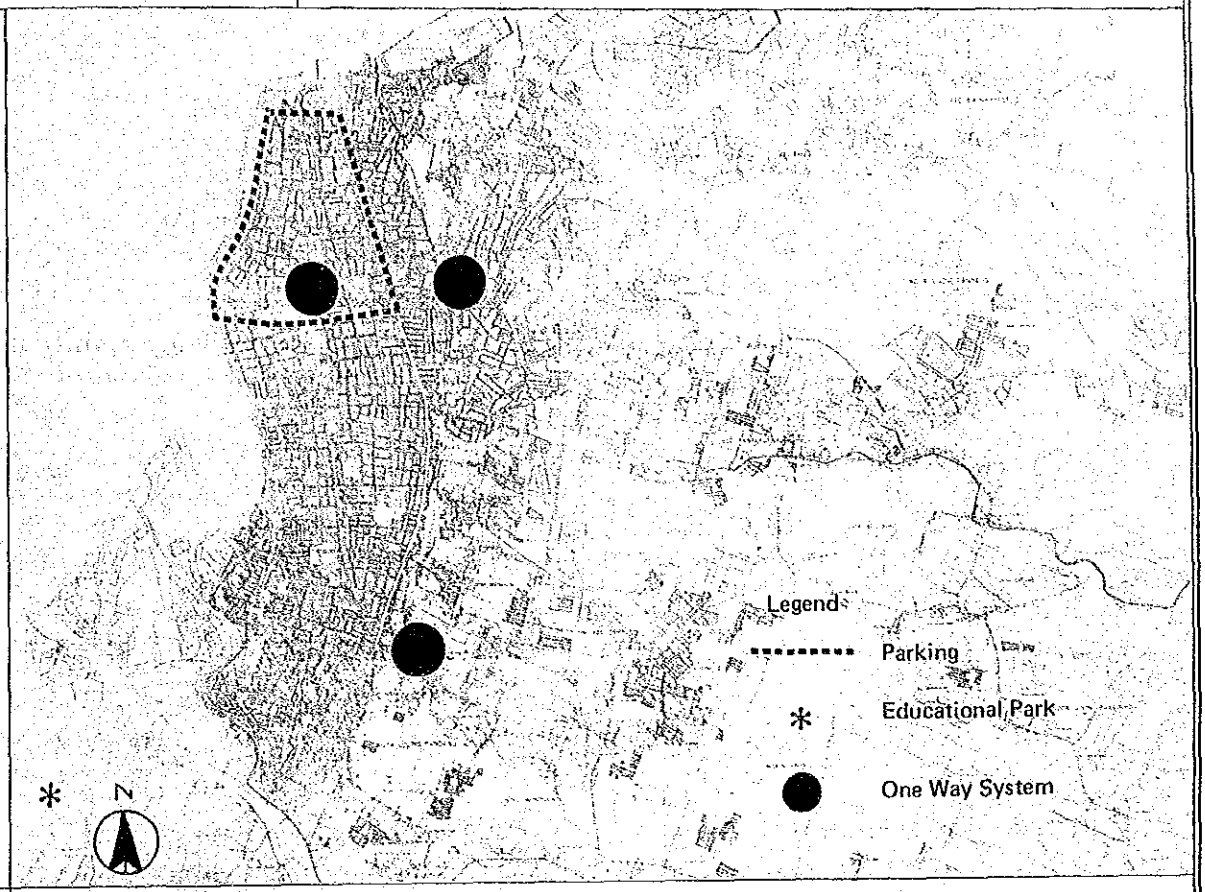
Necessity of Project

1) It is necessary to secure the function of arterial road and to decrease becak accidents.

UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 6.3.6	Plan Location Map (Short Term Plan)
	JAPAN INTERNATIONAL COOPERATION AGENCY	

Name of Plan	Traffic Regulation Project

Project Location Map



Outline of Plan

1) One way system
   - Changing the one way section at Jl. Bulusaraung near intersection of Jl. Sudirman - Jl. Bulusaraung.
   - One way system shall be introduced to the intersection of Jl. Mesjid Raya - Jl. Sunu.
   - The one way regulation shall be changed into two ways regulation on Jl. Gowa Raya at Pa'baeng-baeng after implementation of Jl. Gowa Raya widening.
2) Parking
   - Parking enforcement is strengthened at the place where traffic flow is influenced by parking vehicles.
   - On street parking lot indication in CBD is improved.
3) Traffic education park
   This park (area = 10 ha) is developed to have traffic and amusement facilities for citizen at Barombong.
4) Total project cost is 2,242 Million Rupiah at 1988 prices.

Necessity of Project

1) One way system
   - to secure smooth traffic
   - to decrease traffic accidents
2) Parking
   - to secure smooth traffic
   - to prevent randon parking
3) Traffic education park
   - to educate proper driving manner
   - to improve pedestrian's crossing attitude

UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 6.3.7	Plan Location Map (Short Term Plan)
	JAPAN INTERNATIONAL COOPERATION AGENCY	

B.7 ECONOMIC ANALYSIS AND PLAN EVALUATION

B.7.1 Procedure

B.7.1.1 Plan Formation

The output of Ujung Pandang Area Highway Development Study is the Master Plan for improvement and development of the arterial road network in the Study Area.

This Master Plan has been composed of many plans, which are divided into two (2) plans, Short and Long Term Plans, considering the characteristics, functions and objectives of the plans.

As to the Long Term Plan, in consideration of a fairly long time span up to 2009, phasing has been worked out 1994 and 2009, namely, Long Term Plan (Stage I) for implementation by 1994 and (Stage II) by 2009. There are three (3) alternatives for the Long Term Plan (Stage I) for evaluation.

Therefore, the number of alternative plans to be evaluated accounts for six (6); one (1) for Long Term Plan (Stage II) to verify the economic feasibility of the plan of the best highway network in 2009 from the engineering standpoint, three (3) for Long Term Plan (Stage I) for selection of the best plan meeting the traffic demand in 1994, and two (2) in Short Term Plan for justification of economic feasibility.

B.7.1.2 Procedure for Analysis

The economic analysis in this study was made under the following procedure:

a) Estimation of economic cost including maintenance cost of each alternative plan.
b) Estimation of unit value of time saving and reduction of vehicle operating cost (VOC) by type of vehicles.
c) Calculation of yearly investment amount of each alternative according to implementation schedule.
d) Estimation of total vehicle-hours and vehicle-kms on the existing road network and those on each alternative per year in terms of vehicle-hour and vehicle-km by type of vehicle.
e) Calculation of the difference of the total time value and VOC between the existing road network and each alternative in a set time span.

B.7.2 Plans for Evaluation

In reference to the previous section B.7.1, economic analysis was made for the following alternative plans or cases, which are illustrated in Fig. 7.2.1.

a) Short Term Plan
   Case A - Intersection Improvement Plan
   Case B - Road widening Plan
b) Long Term Plan (Stage I)
   Case C - Road widening & New Construction Plan
   Case D - Road Widening & New Construction Plan
   Case E - Road Widening & New Construction Plan
c) Long Term Plan (Stage II)
   Case F - Road widening & New Construction Plan

B.7.3 Economic Analysis and Plan Evaluation

B.7.3.1 Short Term Plan

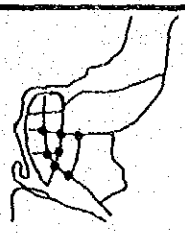
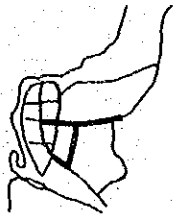
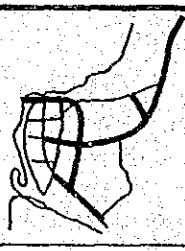
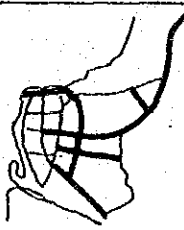
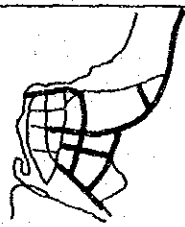
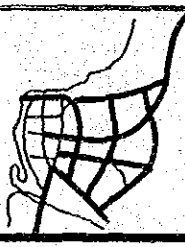
Judging from this analysis, both Case A and Case B proposed in Short Term Plan yield net benefit of about 1,400 and 15,200 million Rupiah respectively against the initial investment amounts of 1,150 and 7,900 million Rupiah with the benefit/cost (B/C) ratios of 3.2 and 4.2 and economic internal rate of return (IRR) of 51.6 and 42.4 percent.

These values well indicate quite a high economic feasibility of both cases. It is also emphasized that these two cases are exactly in line with the urban road development strategy for solution to the traffic problems and increase in traffic capacity by full utilization of existing facilities with least cost.

B.7.3.2 Long Term Plan (Stage I)

Regarding three alternatives proposed in Long Term Plan (Stage I), Case C is considered to yield highest economic return with the net benefit of 24,500 million Rupiah against the initial investment of 39,100 million Rupiah, and B/C ratio of 2.2 and IRR of 23.3%.

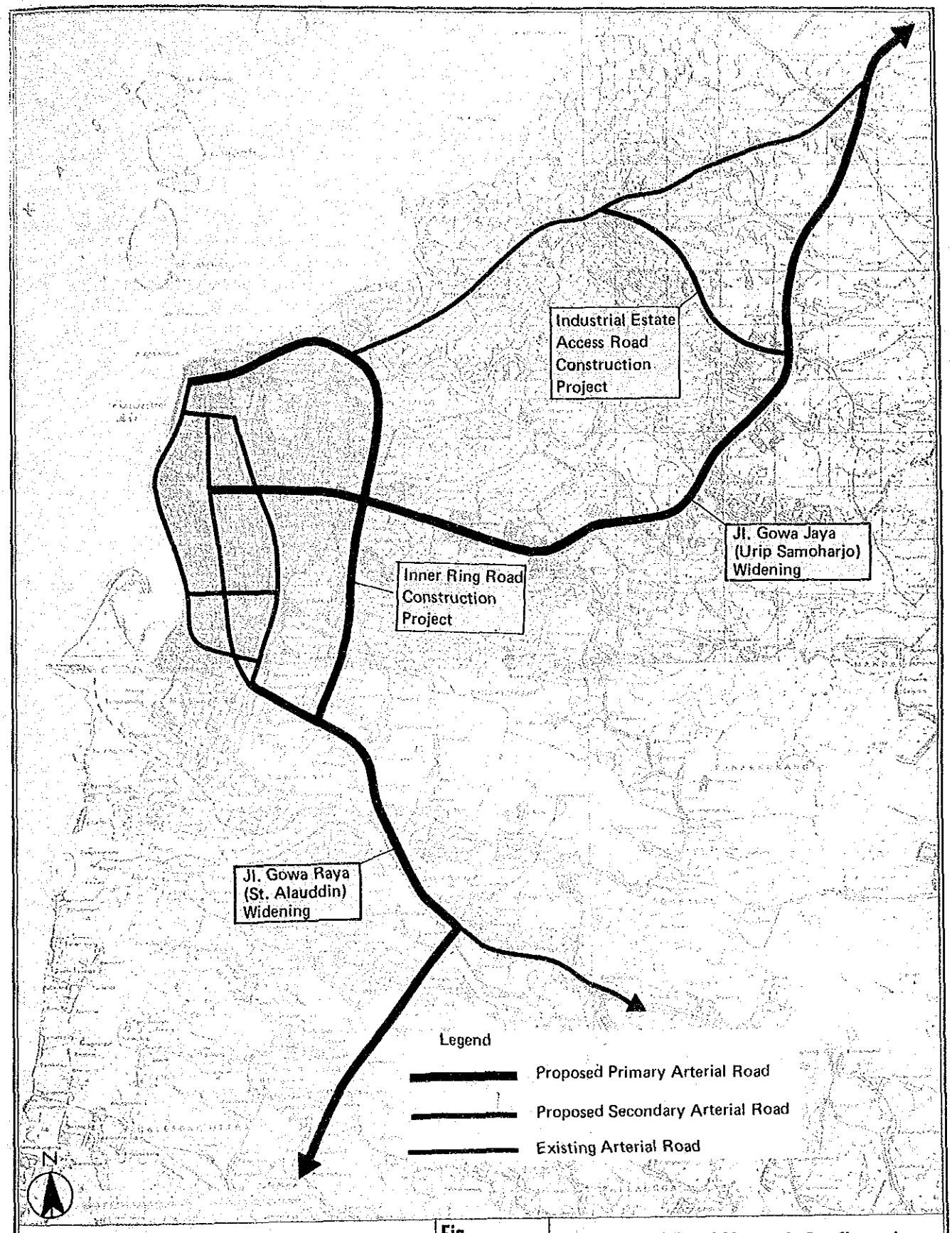
Judging from technical aspects, cases C, D and E proposed for the Long Term Plan (Stage I), have no remarkable difference either on the average congestion degree or on the average travel speed as shown in Fig. 7.2.1. So, the alternative with the least cost for initial investment and operating and maintenance cost shall be regarded as the best one, which is Case C, as shown in Fig. 7.3.1.

Plan	(Project Cost)	Case	Project Location	Evaluation
Short Term Plan	Intersection Improvement (1,146 Mil.Rp)	A		B/C = 3.2 IRR =51.5% A.V =25.62 Q/C = 0.71
	Road Widening (7,915 Mil.Rp)	B		B/C = 4.2 IRR =42.4% A.V =26.01 Q/C = 0.67
Long Term Plan (Stage I) (1994)	Road Construction (39,108 Mil.Rp)	C		B/C = 2.2 IRR =23.3% A.V =27.36 km/h Q/C = 0.58
	Road Construction (50,134 Mil.Rp)	D		B/C = 2.0 IRR =21.4% A.V =27.75 km/h Q/C = 0.50
	Road Construction (61,253 Mil.Rp)	E		B/C = 2.0 IRR =21.4% A.V =28.55 km/h Q/C = 0.52
Long Term Plan (Stage II) (2009)	Road Construction (171,944 Mil.Rp)	F		B/C = 1.7 IRR =18.7% A.V =26.00 km/h Q/C = 0.88

A.V ; Average Speed

Q/C ; Congestion Degree

Fig. 7.2.1 Evaluation Case



UJUNG PANDANG AREA
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Fig. 7.3.1 Proposed Road Network Configuration (1994)

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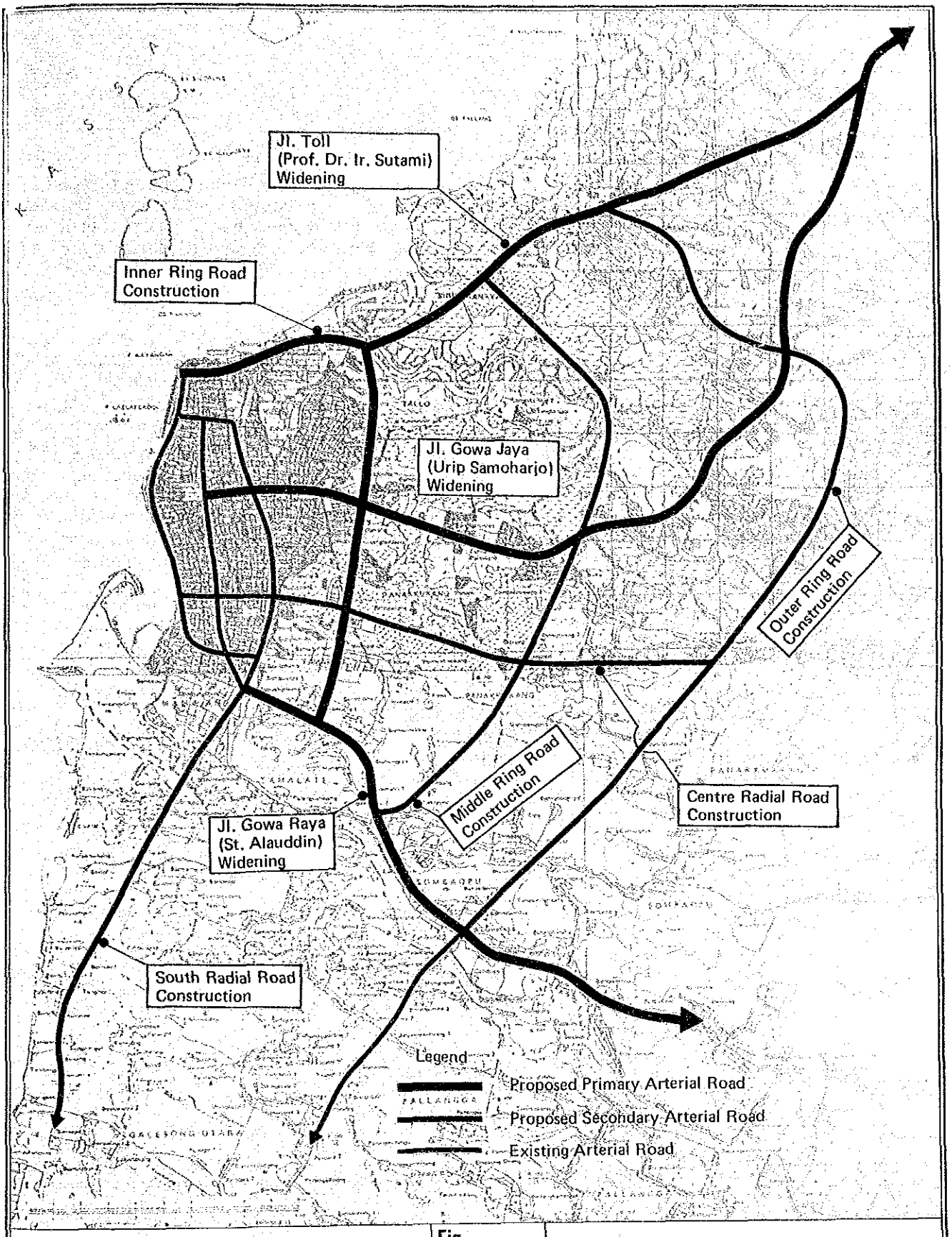
B.7.3.3 Long Term Plan (Stage II)

Case F proposed in Long Term Plan (Stage II) can also yield a fairly good economic return of 32,500 million Rupiah as its net benefit with the B/C ratio of 1.7 and IRR of 18.7 percent.

The technical analysis is also applied to Case F in 2009 when all the projects packed in Case F are implemented and completed. The average congestion degree of this network as shown in Fig. 7.3.2 is estimated to be 0.88 which is much improved from that of the existing network being 1.49. Regarding average travel speed, it is estimated to be 26.0 Km per hour, a substantial improvement in comparison with that of existing network at only 20.8 Km per hour.



UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 7.3.2	Proposed Road Network Configuration (2009)
	JAPAN INTERNATIONAL COOPERATION AGENCY	

B.8 PROJECT LIST

B.8.1 Project List

The highway development projects and traffic management projects are proposed based on technical viewpoints and economical conditions. The proposed projects are divided into three (3) groups that is Short Term Plan, Long Term Plan (Stage I) and Long Term Plan (Stage II) considering the characteristics and function of proposed projects. The Proposed projects are listed in Table 8.1.1.

Table 8.1.1 Project List

Plan	Project Name	Segment	Project Size
Short Term Plan (1994)	1) Road Widening	3,13,15	15,850 m
	2) Intersection Improvement	-	19 locations
	3) Road Rehabilitation	-	14 routes
	4) Pedestrian Facilities Improvement	-	29 routes
	5) Bus Facilities Improvement	-	196 locations
	6) Becak Transport Improvement	-	2 routes
	7) Traffic Regulation Improvement	-	4 locations
Long Term Plan (Stage I) (1994)	1) Inner Ring Road Construction	1,2,3	9,950 m
	2) Jl. Gowa Jaya (Urip Sumoharjo) Widening	13,14	27,000 m
	3) Jl. Gowa Raya (St. Alauddin) Widening	15,16	6,550 m
	4) Jl. Toll Road (Prof. Dr. Ir. Sutami) Widening	17	11,500 m
	5) Industrial Access Road Construction	7	3,250 m
	Total		58,250 m
Long Term Plan (Stage II) (2009)	1) Inner Ring Road Construction	1,2,3	9,950 m
	2) Middle Ring Road Construction	4,5,6	12,920 m
	3) Outer Ring Road Construction	7,8,9	17,100 m
	4) Central Radial Road Construction	10,11	8,750 m
	5) South Radial Road Construction	12	5,710 m
	6) Jl. Gowa Jaya (Urip Sumoharjo) Widening	13,14	27,000 m
	7) Jl. Gowa Raya (St. Alauddin) Widening	15,16	6,550 m
	8) Jl. Toll Road (Prof. Dr. Ir. Sutami) Widening	17	11,500 m
	Total		99,480 m

B.8.2 Project Cost

Based on the segmental project cost, the project costs of Short Term and Long Term Plans are calculated in million Rupiah at 1988 prices as shown in Table 8.2.1.

Table 8.2.1 Project Cost

Unit: Million Rupiah

Plan	Project Name	Project Size	Project Cost
Short Term Plan (1994)	1) Road Widening	15,850 m	7,195
	2) Intersection Improvement	19 locations	1,146
	3) Road Rehabilitation	14 routes	2,043
	4) Pedestrian Facilities Improvement	29 routes	4,960
	5) Bus Facilities Improvement	196 locations	843
	6) Becak Transport Improvement	2 routes	112
	7) Traffic Regulation Improvement	4 locations	2,202
	Total		19,261
Long Term Plan (Stage I) (1994)	1) Inner Ring Road Construction	9,950 m	11,844
	2) Jl. Gowa Jaya (Urip Sumoharjo) Widening	27,000 m	18,770
	3) Jl. Gowa Raya (St. Alauddin) Widening	6,550 m	6,160
	4) Jl. Toll Road (Prof. Dr. Ir. Sutami) Widening	11,500 m	19,287
	5) Industrial Access Road Construction	3,250 m	2,334
	Total	58,250 m	58,395
Long Term Plan (Stage II) (2009)	1) Inner Ring Road Construction	9,950 m	13,817
	2) Middle Ring Road Construction	12,920 m	21,456
	3) Outer Ring Road Construction	17,100 m	23,285
	4) Central Radial Road Construction	8,750 m	18,630
	5) South Radial Road Construction	5,710 m	27,798
	6) Jl. Gowa Jaya (Urip Sumoharjo) Widening	27,000 m	41,511
	7) Jl. Gowa Raya (St. Alauddin) Widening	6,550 m	6,160
	8) Jl. Toll Road (Prof. Dr. Ir. Sutami) Widening	11,500 m	19,287
	Total	99,480 m	171,944

B.8.3 High Priority Project

Taking into account the technical, economical and political aspects, the Long Term Plan (Stage I) for highway projects and Short Term Plan for traffic management project are proposed as the high priority projects in the Study.

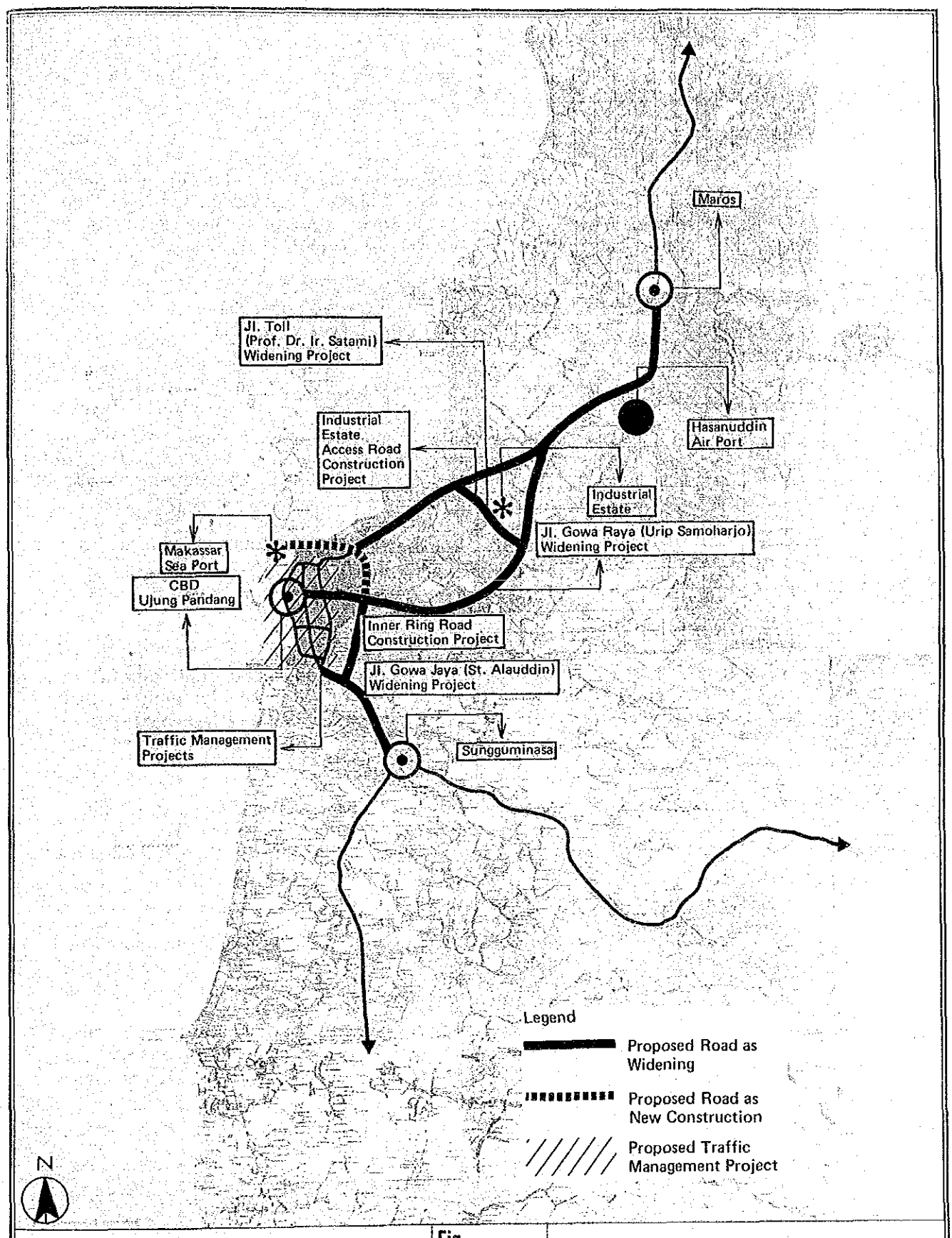
The high priority projects are presented as follows and their locations are illustrated in Fig. 8.3.1.

1) Highway Development Projects

a) Jl. Gowa Jaya (Urip Sumoharjo) Widening Project.
b) Jl. Gowa Raya (St. Alauddin) Widening Project.
c) Jl. Toll Road (Prof. Dr. Ir. Sutami) Widening Project.
d) Inner Ring Road Construction Project.
e) Industrial Estate Access Road Construction Project.

2) Traffic Management Projects

a) Intersection Improvement Project.
b) Road Rehabilitation Project.
c) Bus Facilities Improvement Project.
d) Becak Transport Improvement Project.
f) Traffic Regulation Improvement Project.



UJUNG PANDANG AREA HIGHWAY DEVELOPMENT STUDY	Fig. 8.3.1	High Priority Project
	JAPAN INTERNATIONAL COOPERATION AGENCY	

B.9 IMPLEMENTATION PROGRAM

B.9.1 Introduction

The implementation program is identified based on the recommended Master Plan for Ujung Pandang Area Highway Development with the target year 2009. The recommended Master Plan for highway development consists of following three (3) projects.

a) Short Term Project with the target year 1994.
b) Long Term (Stage I) Project with the target year 1994.
c) Long Term (Stage II) Project with the target year 2009.

B.9.2 Construction Schedule and Investment Requirement

The construction schedule of the recommended Master Plan for highway development is identified considering the balance with the traffic demand, functions and characteristics of the projects and implementation schedule of the related development projects.

The construction schedule and investment requirement of the recommended Master Plan is shown in Table 9.2.1.

B.9.3 Fund Availability

Judging from the overall investment amount required for implementation of the Master Plan for Ujung Pandang Area highway Development against the provincial development budget for transport sector, the Master Plan investment amount accounts between 23.3 to 49.3 percent of provincial budget.

In IUIDP, the investment amount for just the urban roads in South Sulawesi accounts for 168.6 billion Rupiah for the period from 1986 to 2000 in 1984 prices, which is very close to the Master Plan investment amount.

Therefore, it can be said that the Master Plan Investment budget is put fairly well in the financial framework of the development expenditure and also proves that the Master Plan can be within the budgetary framework of IUIDP investment amount.

In addition, it should be noted that the investment amount during the period of the 5th 5 Year Development Plan is rather more than other period, mainly due to the necessity of large amount of initial investment for the plan.

Table 9.2.1 Requisite Fund for Recommended Project

Unit: Million Rupiah
1988 Prices

	Project Name	4th 89	90	91	92	93	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	Total
Highway Development Project (Stage I)	1) Inner ring Rd. Const.		388.4	895.9	3,120.7	3,697.7	3,741.3															11,844
	2) Jl. Gowa Jaya Widening	418	3,130.2	5,007.4	2,918.4	2,918.4	4,377.6															18,770
	3) Jl. Gowa Raya Widening			85.2	1,297.6	2,388.6	2,388.6															1,160
	4) Industrial Estate Access Rd. Const.	233.4	700.2	700.2	700.2																	2,334
	5) Jl. Toll Widening	1,928.7	1,928.7	3,857.4	5,786.1	5,786.1																19,287
Highway Development Project (Stage II)	1) Inner Ring Rd. Widening (2 to 4 lanes)									973	1,000											1,973
	2) Middle Ring Rd. Const.						634.3	1,268.6	2,015.9	4,144.8	5,752.4							764	2,292	2,292	2,292	21,456
	3) Outer Ring Rd. Const.													7,055.4	6,285.3	7,610.3						20,951
	4) Center Radial Rd. Const.						1,102.6	2,205.2	3,307.8	4,410.4	1,901	1,901	3,802									18,630
	5) South Radial Rd. Const.																5,559.6	5,559.6	5,559.6	5,559.6	5,559.6	27,798
	6) Jl. Gowa Jaya Widening (4 to 6 lanes)												1,279.6	5,118.8	6,398				3,315	3,315	3,315	22,741
	Sub - Total	2,580.1	6,147.5	10,546.1	13,823	14,790.8	10,507.5	1,736.9	3,473.8	5,323.7	9,528.2	8,653.4	1,901	5,081.6	12,173.8	12,683.3	7,610.3	5,559.6	6,323.6	11,166.6	11,166.6	11,166.6	171,944
Traffic Management Project	1) Intersection Improvement	472.2	198.3	185.7	193.7	96.1																1,146
	2) Pedestrian facilities Improvement	1,445.6	829	755	885.6	783	251.8															4,960
	3) Road Rehabilitation	602.7	457.6	382	465.8	134.9																2,043
	4) Bus Facility Improvement	155	140.5	128.1	110.2	120.2	189															843
	5) Becak Transport Improvement	112																				112
	6) Traffic Regulation Improvement	32	43			722	1,445															2,242
	Sub - Total	2,819.5	1,678.4	1,450.8	1,655.3	1,856.2	1,885.8															11,346
	Total	5,399.6	7,825.9	11,996.9	15,478.3	16,647.0	12,393.3	1,736.9	3,473.8	5,323.7	9,528.2	8,653.4	1,901	5,081.6	12,173.8	12,683.3	7,610.3	5,559.6	6,323.6	11,166.6	11,166.6	11,166.6	
Five Year Plan Total		5,399.6	64,341.4					28,716					39,450					45,383					
																		Total 183,290					

Highway Development Project (Stage I) : 58,395
Highway Development Project (Stage II): 113,549
Traffic Management Project : 11,346

B.10 REVIEW ON ORGANIZATION AND INSTITUTIONAL IMPROVEMENT

B.10.1 Existing Organization

Main organizations concerned road administration in the Study Area are as follows:

a) Road Betterment Office (RBO), Bina Marga.
b) Provincial Department of Public works (DPUP).
c) Municipal Department of Public Works (DPU, Ujung Pandang).
d) provincial Planning & Development Board (BAPPEDA TK I).
e) Municipal Planning & Development Board (BAPPEDA TK II).

B.10.2 Institutional Requirements

For successful implementation of the Master Plan for Ujung Pandang Area Highway Development, following requirements are deemed necessary to be fulfilled.

a) The national road network development plan has to be translated into regional plans keeping a consistency each other.
b) To assure a successful implementation of the Master Plan, institutions with proper organization and personnel should exist to implement it.
c) A series of financial policies, strategies and procedures for the road development shall be well formulated and particular attention shall be paid for revenue generation and project funding by provincial and municipal governments.
d) A continuous strategic planning and monitorig functions within each agency and among related agencies are required to implement the plan.
e) It is requisite to secure the close cooperation between related agencies for the implementation of the Traffic Management Projects.

B.10.3 Improvement of Administrative Efficiency

Some ideas derived from the review to achieve the administrative efficiency are as follows:

a) Strengthening Planning Capability

   Collection and analysis of traffic data and information shall be rationalized.

b) Emphasis for Closer Coordination

   It is recommended to set up project-wise task force among concerned agencies.

c) Manpower Training and Reinforcement

   Staffs at various agencies related to the Master Plan including qualified engineers shall be given enough opportunities of training.

d) Active Introduction of Office Automation Equipment

It is very effective to fully utilize the computer and other office automation equipments for data processing and analysis.

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