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ROAD NETWORK STUDY IN CENTRAL AND SOUTHEAST SULAWESI IN THE REPUBLIC OF INDONESIA

FINAL REPORT

VOLUME II:
MASTER PLAN AND PRE-FEASIBILITY STUDY

DECEMBER 1998

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IN
CENTRAL AND SOUTHEAST SULAWESI
IN
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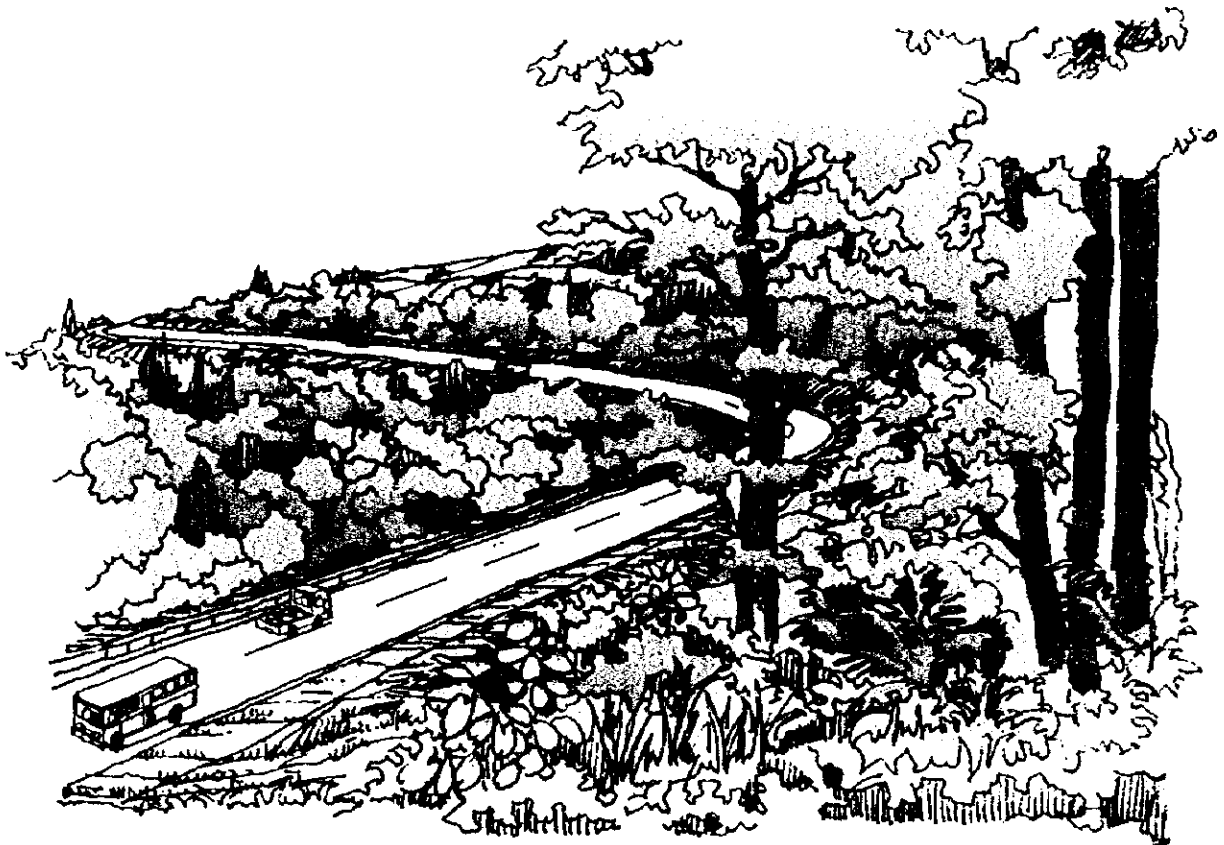
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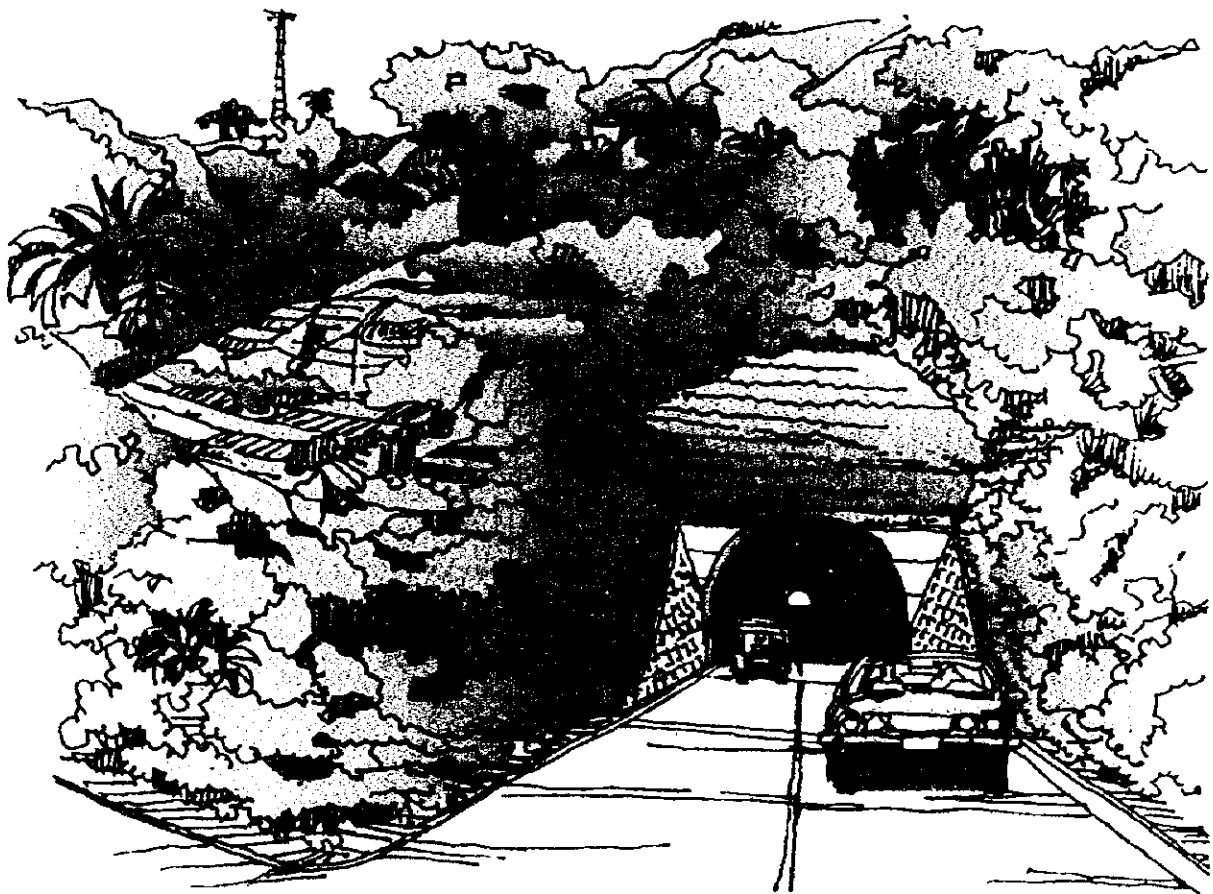
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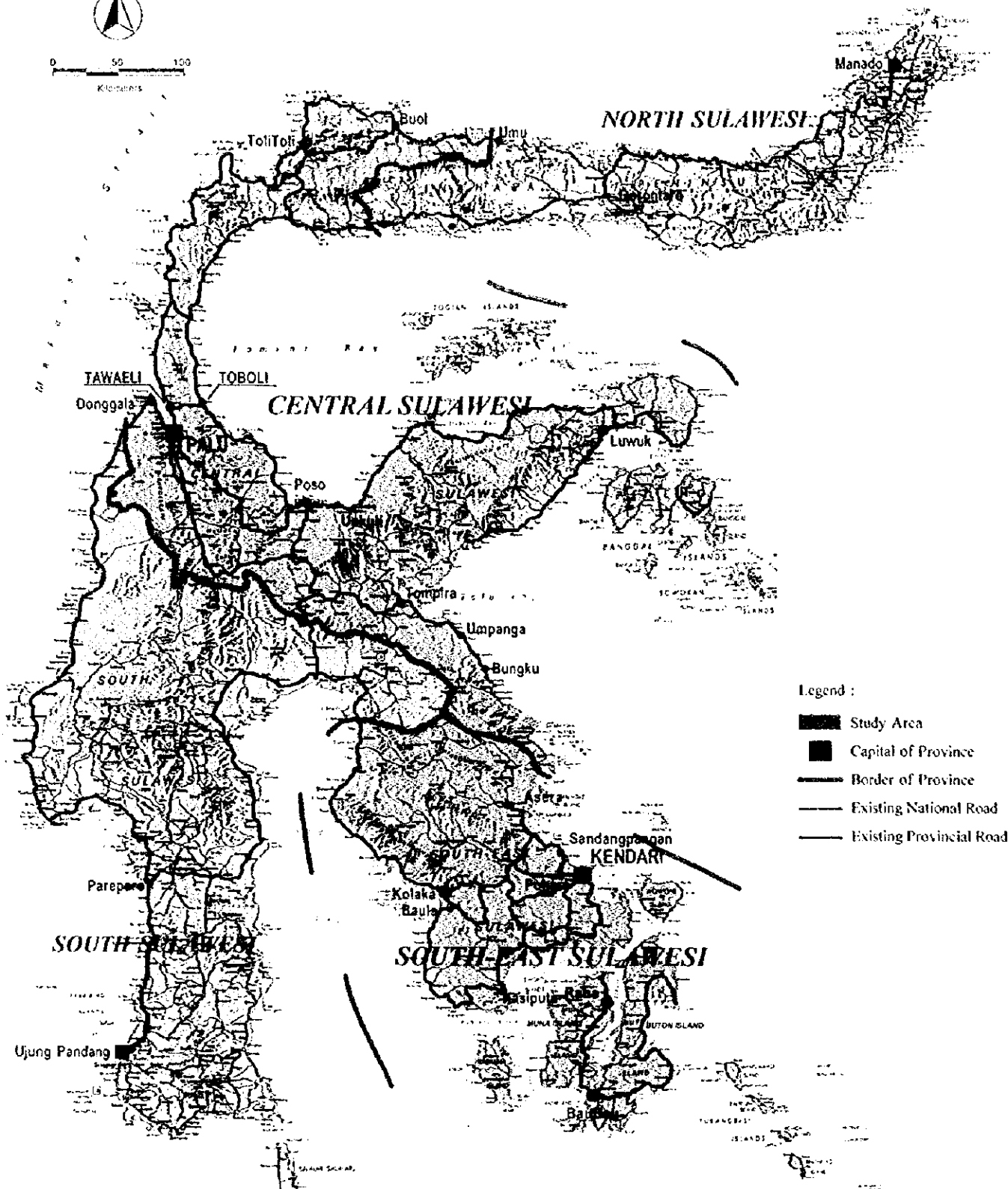
BYPASS FOR TAWAELI-TOBOLI ROAD








TUNNEL FOR TAWAELI-TOBOLI ROAD



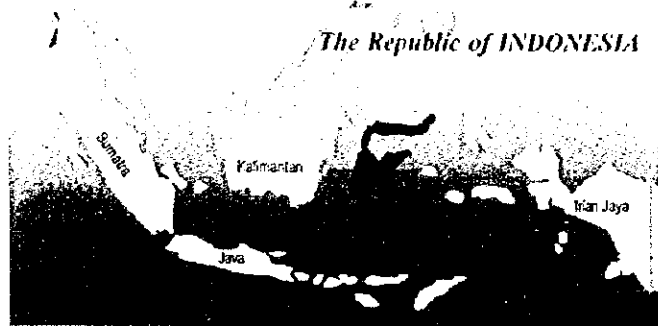
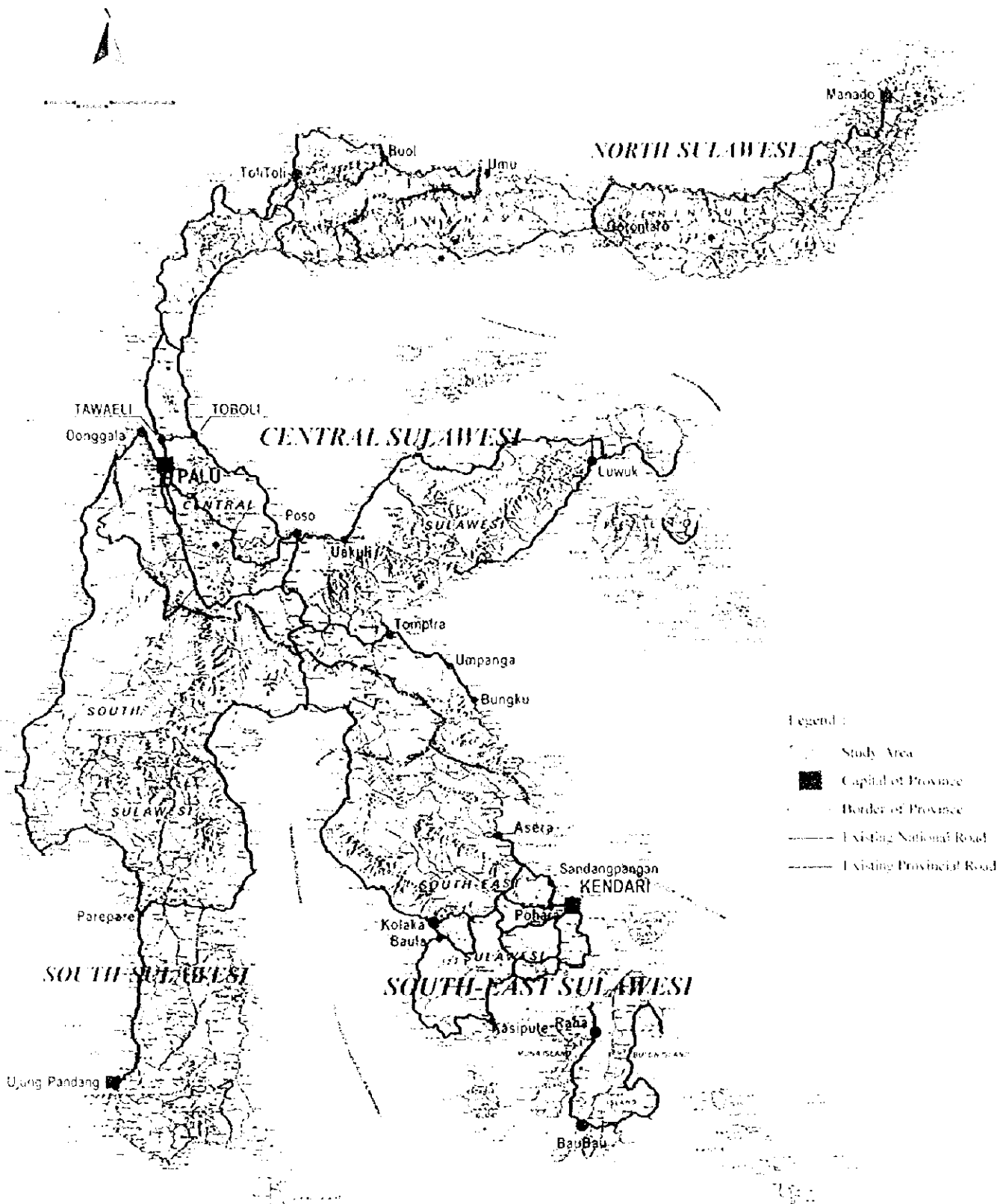
0 50 100
Kilometers



- Legend :
-  Study Area
 -  Capital of Province
 -  Border of Province
 -  Existing National Road
 -  Existing Provincial Road



PROJECT LOCATION MAP



PROJECT LOCATION MAP

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**ROAD NETWORK STUDY
IN CENTRAL AND SOUTHEAST SULAWESI
IN THE REPUBLIC OF INDONESIA**

Final Report - Volume I: Master Plan and Pre-Feasibility Study

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ABBREVIATION AND GLOSSARY

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ADB	Asian Development Bank
ADT	Average Daily Traffic
AMDAL	Environmental Impact Assessment
ANDAL	Environmental Impact Statement
APBD	Anggaran Pendapatan dan Belanja Daerah, (Provincial or District Budget)
APBN	Anggaran Pendapatan dan Belanja Negara (National Budget)
APPKD	Anggaran Penerimaan dan Pengeluaran Kas desa (Village Budget)
ASTM	American Society for Testing and Materials
B/C	Benefit Cost ratio
BPR	Bureau of Public Road, USA
BPS	Biro Pusat Statistik (Central Bureau of Statistics, Indonesia)
Bappeda	Badan Perencanaan Pembangunan Daerah (Regional Development Planning Agency)
Bappenas	Badan Perencanaan Pembangunan Nasional (National Development Planning Agency, Indonesia)
Bina Marga	Directorate General of Highways
Binkot	Directorate of Urban Roads
Bintec	Directorate of Technical Support
Bipran	Directorate of Planning
CBR	California Bearing Ratio
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DPUK	Road Department of Regency or Prefecture
DPUP	Road Department of Province
Desa	Administrative village
Dinas PU	Department of Public Works, Office of Provincial Government
EIA	Environmental Impact Analysis
EIRR and FIRR	Economic and Financial Internal Rate of Return
F/S	Feasibility Study
F/C	Foreign Currency
FG	Finished Grade
G/A	Generation/Attraction
GDP	Gross Domestic Product
GNP	Gross National Product
GRDP	Gross Regional Domestic Product
IEE	Initial Environmental Examination
JICA	Japan International Co-operation Agency
KA-ANDAL	Terms of Reference of Environmental Impact Assessment
KEL	Knife-Edge Load
Kabupaten	Regency or Prefecture Administrative Unit below the Province
Kanwil	Kantor Wilayah (Regional Office, Ministry of Public Works)

Kecamatan	Sub-regency, Administrative Unit below the Regency (Kabupaten)
Kotamadya	Municipality
I/C	Local Currency
LIPI	National Institute of Sciences
NPV	Net Present Value
OD	Origin and Destination
PC	Prestressed Concrete
PCC	Portland Cement Concrete
PCU	Passenger Car Unit
PJP II	Pembangunan Jangka Panjang II (Second Long-Term Development, 1994-2018)
Pre-F/S	Pre-feasibility Study
PU	Pekerjaan Umum (Public Works)
RC	Reinforced Concrete
RKL	Environmental Management Plan
ROW	Right-Of-Way
RPL	Environmental Monitoring Plan
Rp.	Rupiah
Sta.	Station
Sulawesi Tengah	Central Sulawesi
Sulawesi Tenggara	Southeast Sulawesi
UDL	Uniformly Distributed Load
UKL	Environmental Management
UPL	Environmental Monitoring
VOC	Vehicle Operating Cost
Dia. or ϕ	Diameter
Hr	Hour
Km	Kilometer
Km/h or KPH	Kilometer per Hour
cm, cm ² , cm ³	Centimeter, Square Centimeter, Cubic Centimeter
veh./h	Vehicle per Hour

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PART-I MASTER PLAN

Chapter 1
Introduction

Chapter 1 INTRODUCTION

1.1 Background

Sustainable economic growth of the Republic of Indonesia has been attained through the effect of the First 25-Year Long Term Plan, which was inaugurated in 1969. In particular, the market-oriented economy policy initiated in the mid-1980's has facilitated economic activities in the private sector and has been successful in improving socio-economic development.

The island of Java, among certain others, has enjoyed rapid economic development, but eastern Indonesia, including Sulawesi, has benefited comparatively little from this development due to the insufficiency of the socio-economic infrastructure.

The Sixth 5-Year Development Plan (1994-1998), in reflection of the previous 5-years plans, aims to eradicate poverty, rectify regional economic imbalance and facilitate activities of the private sector relating to economic development,.

Based on the above background, a study for a new road network master plan has been launched to boost the economy of the provinces of Central and Southeast Sulawesi. These provinces were selected from the eastern portion of Indonesia due to their high potential in the agriculture, mining & quarrying sectors.

Indonesia has been affected by the Asian economic recession which started in August 1997. The Indonesian economic growth rate has been slowed considerably since then, which is considered in this Study.

1.2 Objective of the Study

The objectives of the Study are:

- To propose a master plan (target year: 2018) for the road network system consisting of primary, arterial and collector roads including candidate routes in the provinces of Central and Southeast Sulawesi and a part of South Sulawesi Province adjacent to the two provinces.
- To select priority road links and to carry out pre-feasibility studies (target year: 2008) and feasibility studies (target year: 2003) on the selected road links.

1.3 Study Area and Related Area

The study covers Central and Southeast Sulawesi Provinces and an adjacent part of South Sulawesi Province as well as related areas in North and South Sulawesi which are shown in Figure 1-3-1.

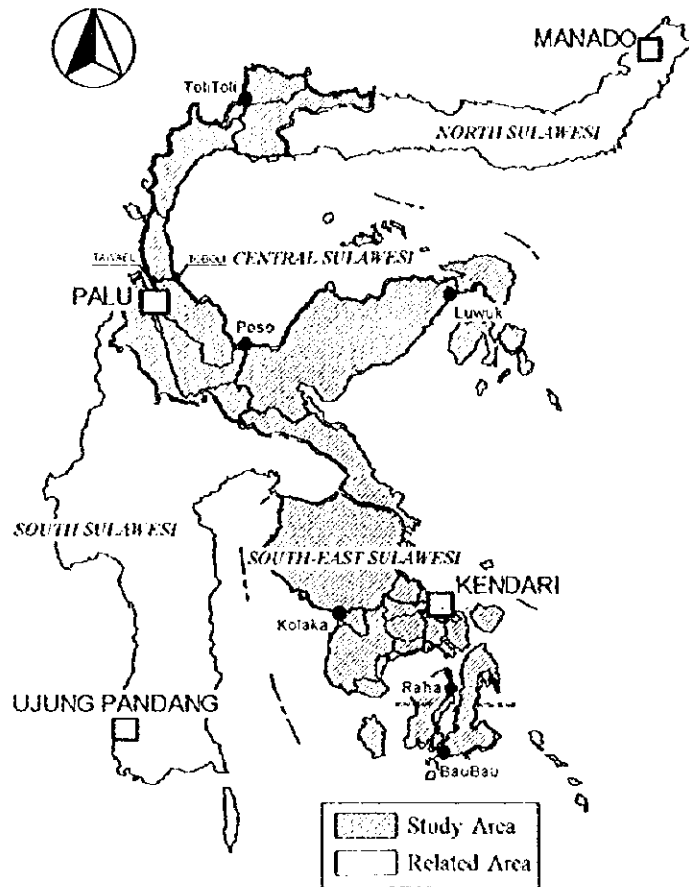


Figure 1-3-1 Study and Related Areas

1.4 Scope of the Study and Work Flow

In order to achieve the objectives mentioned above, the scope of the Study covered:

(1) Phase I

Master plan of the road network system (Target year 2018)

- 1) Review of relevant studies and project reports on the study area
- 2) Socio-economic studies
 - Collection and analysis of existing socio-economic data and information
 - Analysis of existing land-use patterns and review of regional development plans in the study area
 - Forecast of the future socio-economic framework
- 3) Supplementary surveys and analyses
 - Collection and analysis of basic engineering data and information
 - Road inventory survey
 - Supplementary traffic survey
- 4) Forecast of future traffic demand
- 5) Formulation of future road network development plan
- 6) Initial Environmental Examination
- 7) Selection of high-priority links for pre-feasibility studies for the period up to the year 2008

(2) Phase II

Pre-feasibility study (Target Year 2008)

- 1) Rough engineering design
- 2) Rough cost estimates for land acquisition, construction and maintenance
- 3) Simplified economic analysis
- 4) Selection for feasibility study links for the period up to the year 2003

(3) Phase III

Feasibility Study (Target Year 2003)

- 1) Engineering surveys for the selected links
 - Topographic survey (aerial photography, route survey, etc.)
 - Geological survey
- 2) Preliminary engineering design
- 3) Cost estimates for land acquisition, construction and maintenance (also operation, if necessary)
- 4) Economic analysis
- 5) Environmental Impact Assessment (EIA)
- 6) Formulation of project implementation plan
- 7) Preparation of summary and recommendations

The Study was carried out based on the scope of work which was agreed upon between the Directorate General of Highways and JICA Preparatory Study Team in October 1996.

A Work Flow Chart for Phases I, II and III was prepared as shown in Figure 1-4-1.

1.5 Final Report

This Final Report contains summarized findings and recommendations following the descriptions of all the works carried out in the Study.

This Final Report consists of the volumes as listed below:

- Volume I: Summary
- Volume II: Master Plan and Pre-Feasibility Study
- Volume III: Feasibility Study for Tawacli-Toboli Road
- Volume IV: Feasibility Study for Trans Sulawesi East Road
- Volume V: Drawings for Tawacli-Toboli Road
- Volume VI: Drawings for Trans Sulawesi East Road

1.6 The Study Members and Steering Committee

The study members and steering committee were as follows:

Indonesian Steering Committee

- | | |
|-------------------------------|--|
| 1. Mr. Gandhi Harahap, M Eng. | Director of Planning, Bina Marga |
| 2. Mr. Hendrianto N. | Director of Planning, Bina Marga |
| 3. Mr. Mohammad Irian Ir. | Chief of Sub-Directorate of General Planning,
Directorate of Planning, Bina Marga |
| 4. Mr. Imron Bulkin Ir. | Chief of Bureau of Transportation, BAPPENAS |
| 5. Mr. Suharyono Ir. | Chief of Implementation East Region,
Bina Marga |
| 6. Mr. Osman Mungkasa Ir. | Head of Public Works Regional Office / KANWIL,
Central Sulawesi |
| 7. Mr. J. Ainuddin Kadir Ir. | Head of Public Works Regional Office / KANWIL,
Southeast Sulawesi |
| 8. Mr. Yahya Ponulete | Chief of Central Sulawesi Provincial Planning Bureau,
BAPEDA |
| 9. Mr. H. La Ode Abdul Rauf | Chief of Southeast Sulawesi Provincial Planning
Bureau, BAPEDA |

- | | |
|---------------------------|--|
| 10. Mr. H. Sockarjoso Ir. | Chief of Dinas PU of Southeast Sulawesi Province |
| 11. Mr. Mulyoto | Chief of Dinas PU of Central Sulawesi Province |

Bina Marga Counterparts

- | | |
|---------------------------------|---|
| 1. Mr. Sumaryanto Widayantin | Chief of Sub-Directorate of General Planning,
Directorate of Planning |
| 2. Dr. Syafruddin A. Temenggung | Chief of Sub-Directorate of General Planning,
Directorate of Planning |
| 3. Mr. Mohammad Irian | Chief of Sub-Directorate of General Planning
Directorate of Planning, Bina Marga |
| 4. Mr. Muchsin Assegaf | Chief of Feasibility Study Section
Sub-Directorate of General Planning |
| 5. Mr. Singgih K. | Section Chief of Feasibility Study Section
Sub-Directorate of General Planning, Bina Marga |
| 6. Mr. Arif Nugroho | Section Chief of Traffic and Transport Section
Sub-Directorate of General Planning, Bina Marga |
| 7. Mr. Yaya Supriatna Ir. | Section Chief of AMDAL Section,
Sub-Directorate of General Planning |
| 8. Mr. Sudibya W. | Staff of Sub-Directorate of General Planning
Bina Marga |

JICA Advisory Committee

- | | |
|------------------------|--|
| 1. Mr. Masaru Sasaki | Chairman
Japan Highway Public Corporation |
| 2. Mr. Satoshi Iseda | Ministry of Construction |
| 3. Mr. Hitoshi Yoshida | Overseas Economic Cooperation Fund |

JICA Study Team

- | | |
|--------------------------|------------------------------|
| 1. Mr. Haruo Sakashita | Team Leader |
| 2. Mr. Tetsuo Kawamura | Transport Planner |
| 3. Mr. Nobuwaka Yamakawa | Regional Planner |
| 4. Mr. Nobuhiro Kuboya | Disaster Prevention Engineer |
| 5. Mr. Koichi Kuroyanagi | Traffic Engineer |
| 6. Mr. Toshihiro Hotta | Highway Planner |
| 7. Mr. Tatsuhiko Kono | Highway Engineer |
| 8. Mr. Shunji Yoshihara | Structure / Highway Engineer |
| 9. Mr. Akihiko Nakamura | Tunnel Specialist |
| 10. Mr. Shoji Nagaoka | Geodetic Engineer |
| 11. Mr. Hiroshi Nakamura | Geological Engineer |
| 12. Mr. Hisashi Yamauchi | Environment Specialist |
| 13. Mr. Masatoshi Kaneko | Economist |
| 14. Mr. Masashi Bessho | Construction Planner |

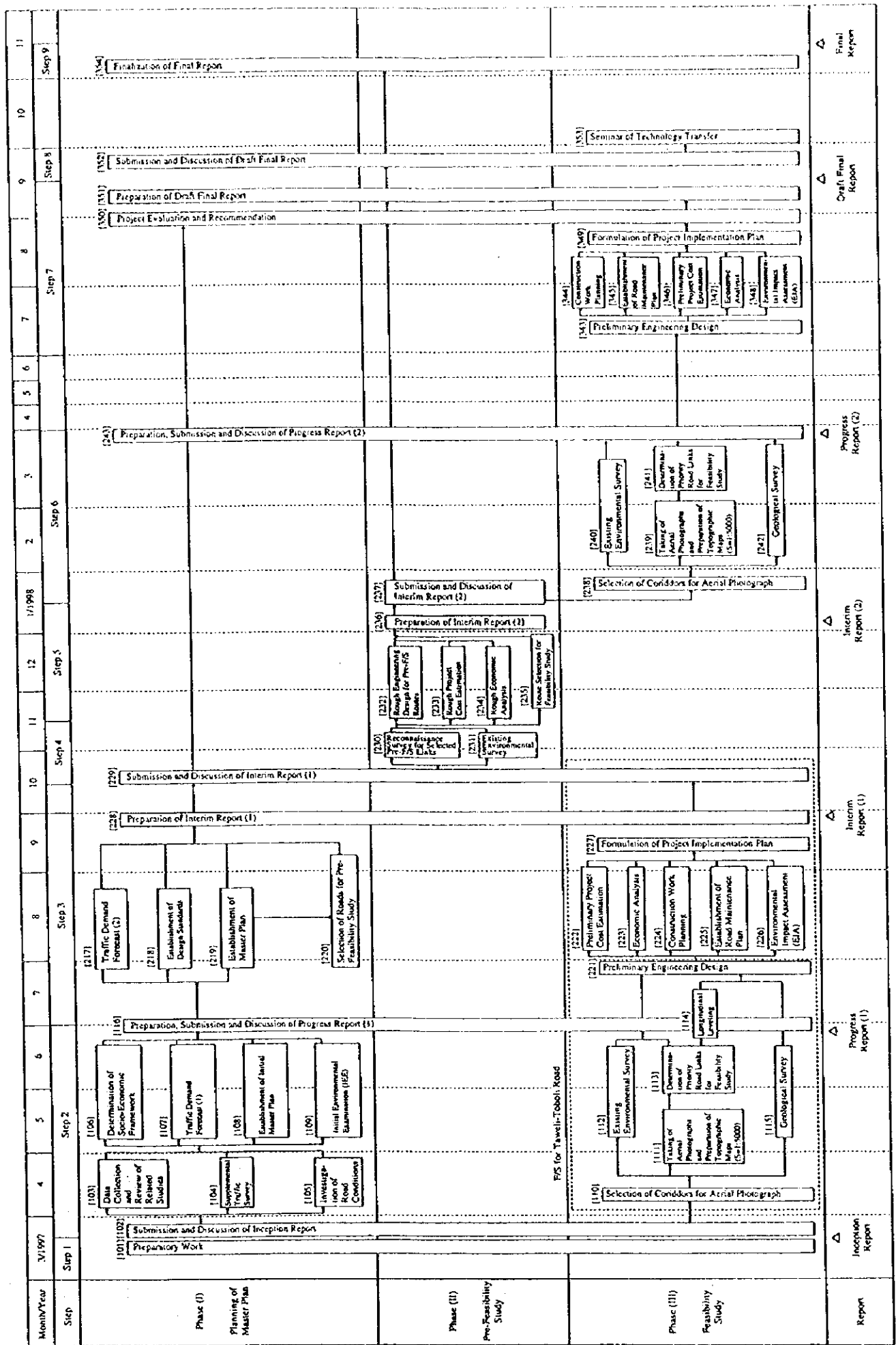


Figure 1-4-1 Work Flow Chart

Legend:
 Step Work in INDONESIA
 Step Work in JAPAN

Chapter 2

Present Road Situation, Obstacles and Issues

Chapter 2 PRESENT ROAD SITUATION, OBSTACLES AND ISSUES

2.1 Overview

Sulawesi Island consists of four peninsulas connecting in the form of a “K”, with mountains in the 2,000m range mountains located along the middle of the peninsulas. The terrain of the island includes ridges originating in the mountains and reaching the coastal area in several locations, and wet land formed by rivers running down from these mountains. Figure 2-1-1 shows the distribution of mountains with peaks of more than 1,000m above sea level in the study area.

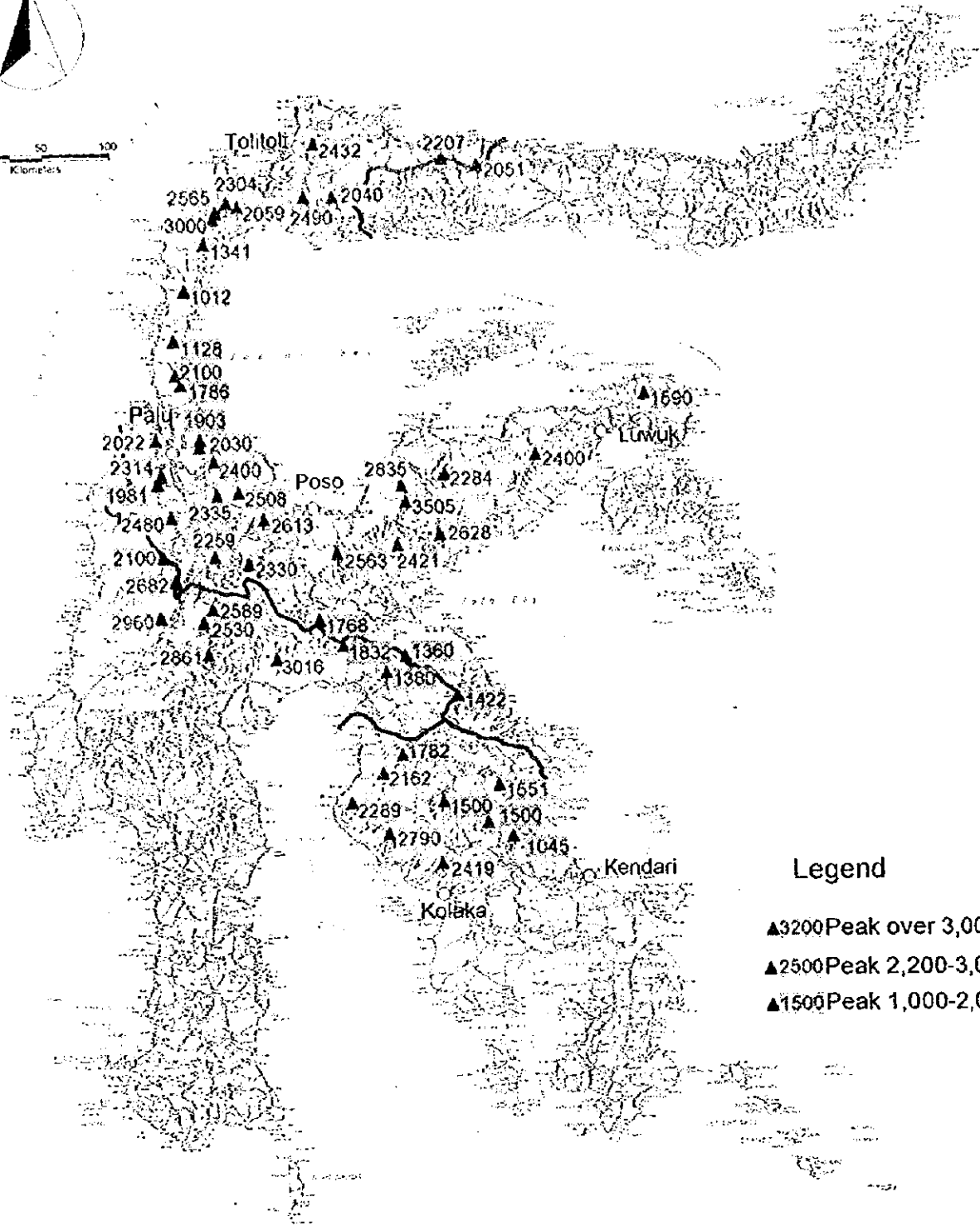
Provincial and regency (Kabupaten) boundaries mostly run along steep terrain. National and provincial roads in these boundary areas are poorly maintained and administered, including certain sections where vehicles are exposed to dangers and obstacles. Some sections are totally impassible.

Generally, the road network of Sulawesi Island connects areas on river terraces in mountain valleys with areas developed or diluvial formations nearer to the coast. The network therefore consists of the flat section crossing the soft diluvial formation and the mountain road section crossing ridges originating in the mountains along the coast. The road along the coast crosses many rivers, with bridges at provincial and kabupaten boundaries being mostly of temporary and/or wooden construction. Certain sections are not serviced and are without bridges. On the other hand, the mountain roads running parallel to the coast in provincial and kabupaten boundaries encounter severe terrain at many points. Road sections in these severe surroundings are unsatisfactory both in terms of vertical and horizontal alignment, with the width ranging between 2.5 - 3.0m. Many sections are not paved at all.

Most of the inland roads cross ridges of over 800m in altitude. These roads are unsatisfactory both in terms of horizontal and vertical alignment, with a width of 3.0m or less in most sections. Besides this, the routes encounter precipitous terrain and most suffer from collapse of slopes due to rainfall, cave-ins in the road due to erosion, washout of pavement, and frequent accidents in which vehicles fall off the road. There are places also where roads have become impassable.



0 50 100
Kilometers



Legend

- ▲3200 Peak over 3,000m
- ▲2500 Peak 2,200-3,000m
- ▲1500 Peak 1,000-2,000m

Figure 2-1-1 Location of Mountains with Peaks of over 1000m High

Source: Bina Marga

2.2 Transportation System

The principal transportation facilities in Sulawesi are marine ports for sea transport, airports for air transport, and roads for overland transport.

Marine port facilities are located in all parts of North, Central, South, and Southeast provinces. Principal ports support shipment of specialty goods among their respective areas around Sulawesi Island. In addition to these ports, secondary ports have also been developed for transport of passengers and cargo to surrounding islands.

The Ujung Pandang Airport is the principal island airport and connected to Jakarta and other major cities by scheduled flights. There are also connecting flights to other capital cities of Sulawesi such as Manado, Palu, etc. These secondary airports are further connected to improved tertiary airports in capital cities of province.

Trunk roads on Sulawesi Island are currently improved and expanded along the slender isthmus area of this island, but they are not built for long-distance transport. The Trans-Sulawesi Road, which is the sole road running through Sulawesi Island from south to north, has a minimum pavement width of 4.5m, but includes the temporary bridges in certain sections, and thus is not appropriate as a large scale truck, long-distance transport system. Figure 2-2-1 shows the location of each port, airport and trunk road network in the study area.

(1) Marine ports

Principal ports of Sulawesi Island are Manado, Palu, Kolaka, Mamuju, Parepare, Ujung Pandang, which function as bases for shipment of regional specialty goods. Ujung Pandang Port is also a center of foreign trade and domestic cargo transport in Sulawesi. Due to delays in establishing the road network on the island, the ports, including secondary ones, are used mainly for domestic cargo transport. In particular, this island is connected to surrounding islands by sea transport. In the study area, marine ports form the nodes of a sea transport network including the ports of Buol, Toli Toli, Ogamas, Pantaloan, Prigi, Poso, Ampana, Luwuk, Kolonadare, Kundari, Kolaka, etc.

(2) Airports

Ujung Pandang and Manado airports are connected with Jakarta and other cities by direct flights, while secondary airports such as Palu and Kendari are connected to major cities via Ujung Pandang and Kalimantan. Tertiary airports, such as Tolitoli, Baubau and Luwuk are connected to primary and secondary airports and have become major bases for long-distance passenger transport.

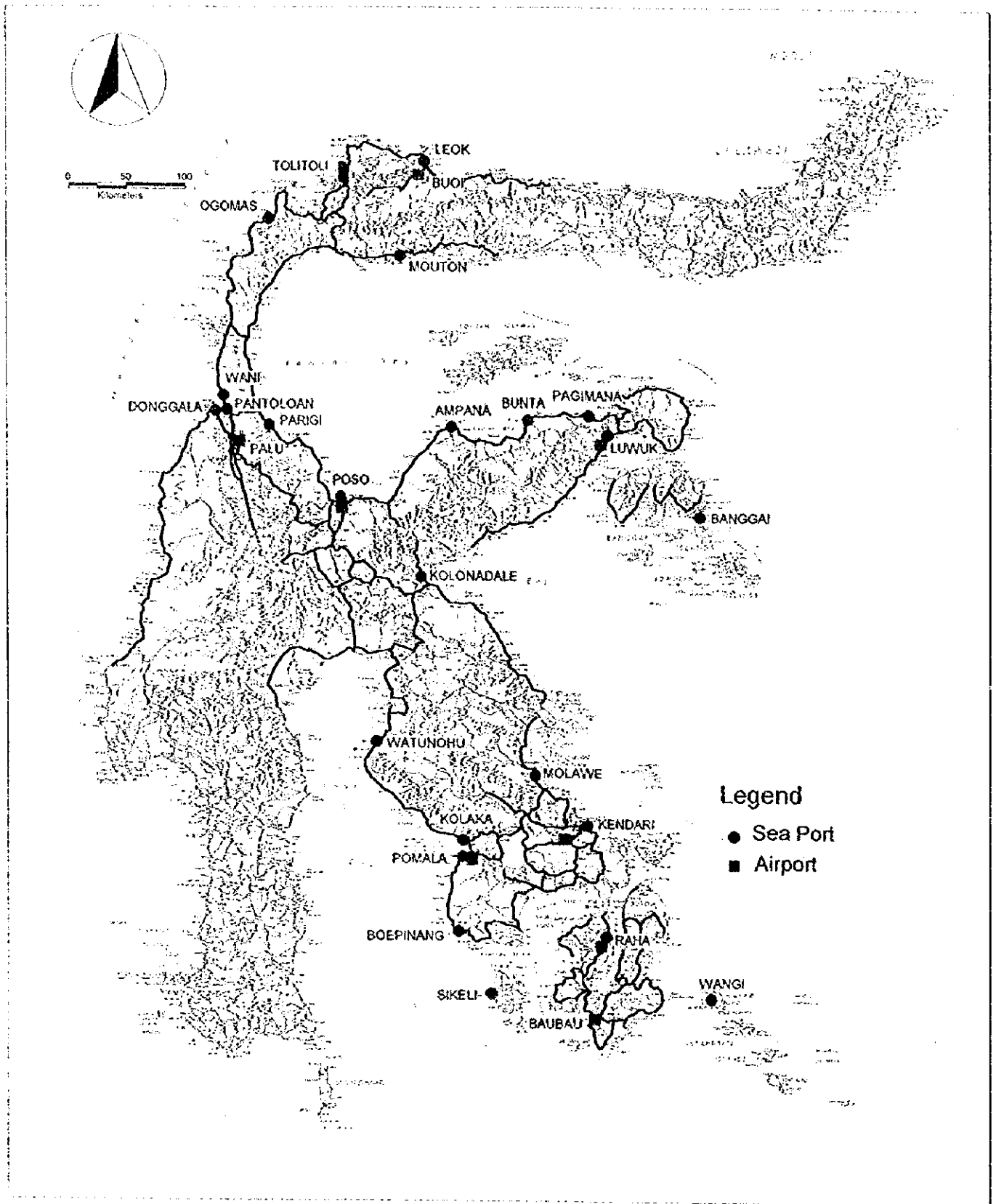


Figure 2-2-1 Location of Transportation Facilities in Study Area *Source: Bina Marga*

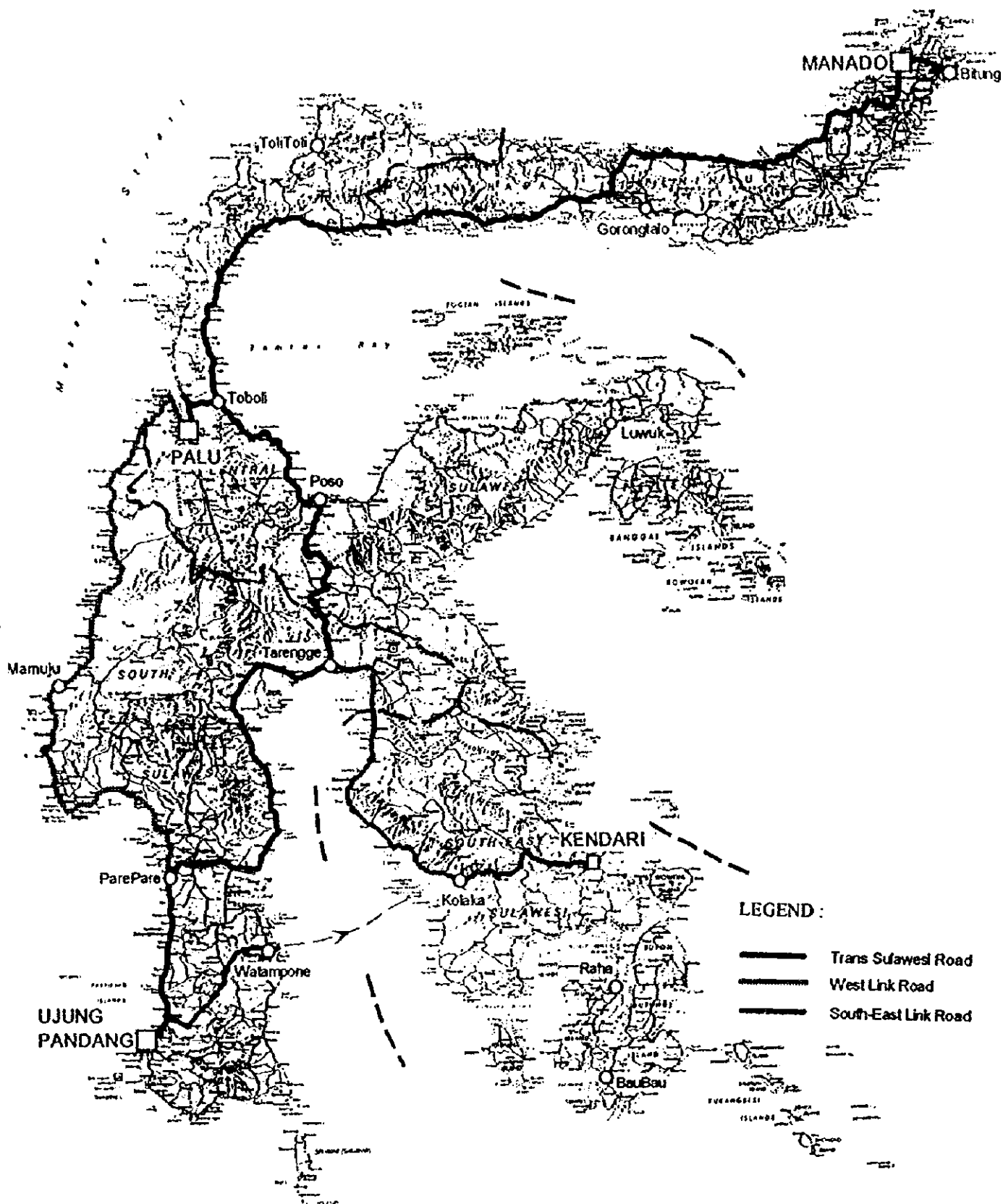
(3) Trunk road system

The Directorate General of Highways of Indonesia (Bina Marga) designated three routes around Ujung Pandang as trunk roads in Sulawesi. They are the Trans-Sulawesi Road, Trans-West Sulawesi Road, and Trans-Southeast Sulawesi Road. Figure 2-2-2 shows the location of routes designated as critical trunk roads.

The Trans-Sulawesi Road runs from Ujung Pandang along the east coast of South Sulawesi, through Central Sulawesi to Manado in the northern end of North Sulawesi. Except for certain bridge sections, the minimum pavement width is 4.5m or more.

The Trans-West Sulawesi Road runs from Ujung Pandang, via Mamuju and other cities along the west coast of South Sulawesi, to Palu in Central Sulawesi. This route crosses many rivers originating in the mountains and is being extended. Construction of this route has involved financial difficulties dealing with bridges, soft ground, flood control measures, etc.

The Trans-Southeast Sulawesi Road branches from the Trans-Sulawesi Road at the northern end of South Sulawesi Province and connects to Kendari of Southeast Sulawesi Province. River-crossing bridges are under construction on the east coast of Southeast Sulawesi, but bridges in a 250 Km section of provincial boundary have not been improved or expanded.



Source: Bina Marga

Figure 2-2-2 Designated Trunk Road in Sulawesi by Bina Marga

2.3 Road Network System

2.3.1 Road Administration System

Indonesian roads are classified according to their function and administrator. In terms of function, roads are roughly classified into two categories; Type 1, inter-regional road, and Type 2, intra-city road. Both Type 1 and 2 roads are subdivided into arterial, collector, and local roads.

The inter-regional road is classified by administrator into national, provincial, kabupaten, and toll roads. Actually, the administration and operation of national and provincial roads are contracted to the Provincial Road Department (DPUP) or performed by Bina Marga with funds provided by the central government.

Kabupaten roads are maintained and operated by the respective kabupaten road departments (DPUK) on the basis of local finance. Construction and maintenance of national and provincial roads are supported fully or partially by subsidies from the central government. A kabupaten road designated as vital by the central government is incorporated into the provincial road and can receive government subsidies. Table 2-3-1 shows administration system of each road.

Table 2-3-1 Road Administration System

Road Classification	New Construction	Improvement	Maintenance
National Road	BINA MARGA	RBO, DPUP	DPUP
Provincial Road	BINA MARGA	DPUP	DPUP
Kabupaten Road	DPUK	DPUK	DPUK
Municipal Road	PU Kotamadya	PU Kotamadya	PU Kotamadya

RBO: (Regional Betterment Office)

DPUP: Road Department of Provincial

DPUK: Road department of Prefecture

PU Kotamadya: Road Department of Municipal

Source: Bina Marga

2.3.2 Nationwide Road Network

National and provincial roads of Indonesia are administered and operated by the Bina Marga, and their total length is 66,599 km. The length of national and provincial roads in Sulawesi as a whole is 9,876 km, and their share of the nationwide road length is 14.8 %. In Central Sulawesi and Southeast Sulawesi, the two provinces concerned in the Study, the length is 4,884 km, or 7.3 %.

$$I_1 = \frac{\text{Road Length (km)}}{\text{Area (km}^2\text{)}} \quad I_2 = \frac{\text{Road Length (km)}}{\sqrt{\frac{\text{Population}}{1,000} \times \text{Area (km}^2\text{)}}}$$

The index of road length per unit area (I_1) is 0.05 km/km², which is higher than the nationwide average value of 0.03 km/km², but only half of the index for Java.

The index of road length per square root of population multiplied by area (I_2) is high at 0.26 which is 2.36 times higher than the national average of 0.11.

The regional road network in the study area totals 13,778 km, which includes 1,910 km of national roads, 2,975 km of provincial roads and 8,895 km of Kabupaten (Regency) roads as shown in Table 2-3-2. National and provincial road networks include links not accessible by vehicles. The national and provincial road network in the study area is shown on the project location map at the front page.

Table 2-3-2 National and Provincial Road Length by Region

Province	Population (1,000)	Area (km ²)	Length (km)	Index 1 (1)	Index 2 (2)
Sumatra	40831	473481	22276.76	0.05	0.16
Jawa	114733	132186	12871.46	0.10	0.10
Nusa Tenggara	10959	88488	8207.89	0.09	0.26
Kalimantan	10470	539460	8360.98	0.02	0.11
Maluku & Irian Jaya	4030	496486	5015.09	0.01	0.11
Sulawesi	13732	189216	9867.00	0.05	0.19
North Sulawesi	2649	19023	1926.48	0.10	0.27
Central Sulawesi	1938	69726	3128.58	0.04	0.27
South Sulawesi	7558	72781	3055.66	0.04	0.13
Southeast Sulawesi	1587	27686	1756.28	0.06	0.26
Study Area	3525	97412	4884.86	0.05	0.26
Total/Average	194755	1919317	66599.18	0.03	0.11

Note: (1) Length/Area

(2) Length/sqr (Population x Area)

Source: Bina Marga

2.3.3 Road development

National and provincial road development in Indonesia can be classified into the following four schemes, with development in progress for each scheme:

(1) New road development

Planning, design, and construction of new roads

(2) Road improvement

Improvement of road conditions from the critically unstable to less unstable or stable. Improvement of road alignment, new construction of bridges and widening of roads.

(3) Road rehabilitation (periodic maintenance)

Periodic maintenance and administration to maintain stable road conditions and refurbishment of shoulders, improvement and installation of drainage facilities, replacement of pavement, overlay.

(4) Routine maintenance

Daily and small road works which include patching of road surfaces, cleaning of gutters, and general maintenance.

2.3.4 Roads in the study area

The regional road network in the study area consists of a total of 13,778 km, which includes 1,910 km of national roads, 2,975 km of provincial road and 8,895 km of kabupaten(regency) roads. National and provincial road networks include links not accessible by vehicles. Figure 2-3-1 shows the national and provincial road network in the study area.

Table 2-3-3 Regional Road Length

Central Sulawesi		Southeast Sulawesi		Total
National Road	1,606		304	1,910
Provincial Road	1,523		1,452	2,975
Kabupaten Road				
Donggala	1,297	Kendari	1,060	2,357
Poso	1,354	Kolaka	1,016	2,370
Bangai	1,708	Muna	745	2,453
Tolitoli	664	Buton	1,049	1,713
Total	8,152		5,626	13,778

Source: Bina Marga

National and provincial roads are classified into four categories according to the Bina Marga: Arterial roads, collector roads 1, collector roads 2, and collector roads 3. Figure 2-3-2 shows the road network of national and provincial roads respectively in the study area according to the function.

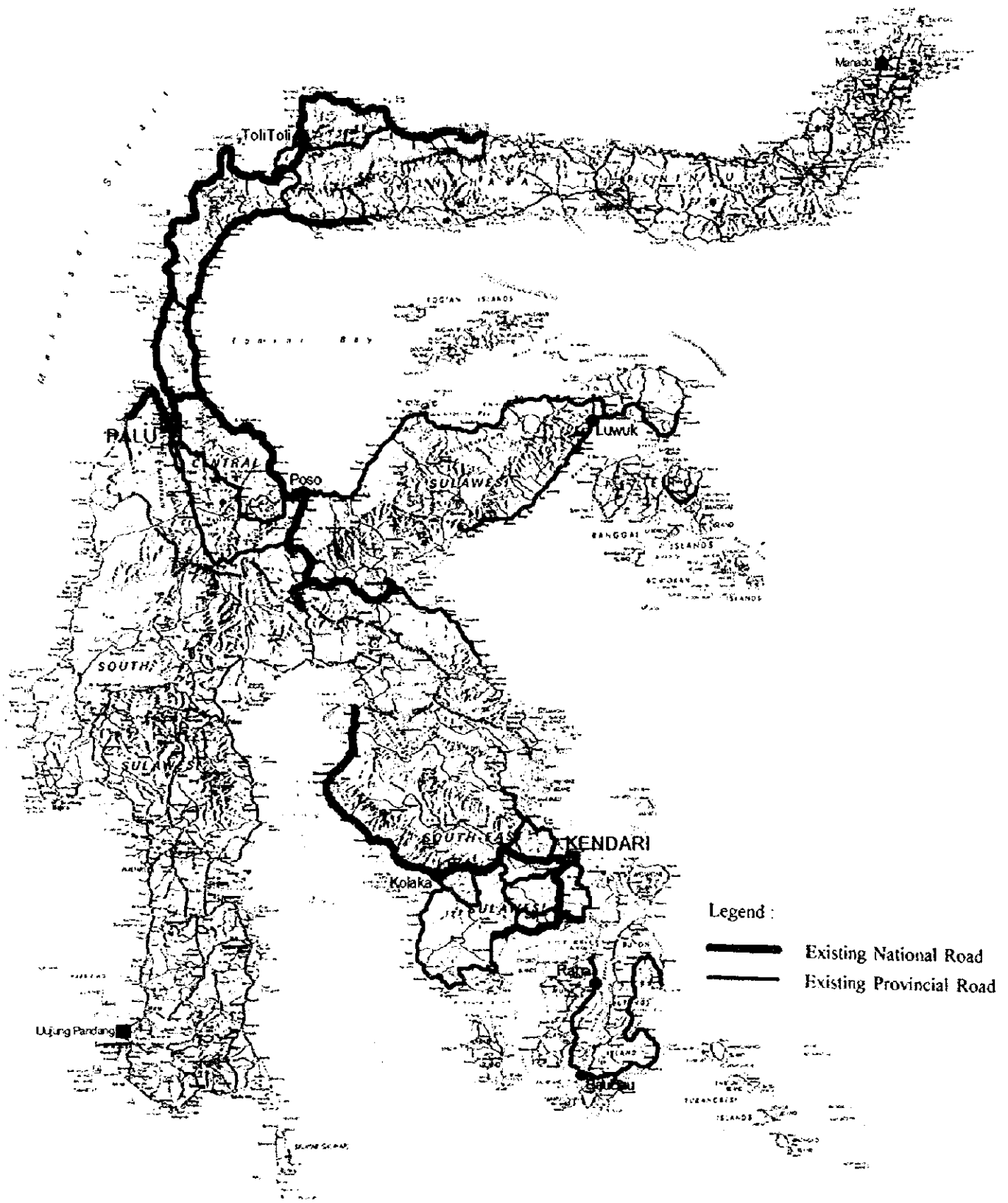
The functions of roads according to the four classifications are designated as follows:

- Arterial road: National roads connecting the provincial capital cities, serving primary transportation requiring long distance routes, high average speed.
- Collector Road 1: National roads connecting the arterial road, requiring medium-distance route with medium average speed.
- Collector Road 2: Provincial roads connecting kabupaten, requiring medium-distance route with medium average speed.
- Collector Road 3: Provincial roads to be connected to arterial roads and other collector road, requiring relatively short distance trip, medium average speed.

Table 2-3-4 National and Provincial Road Length by Function

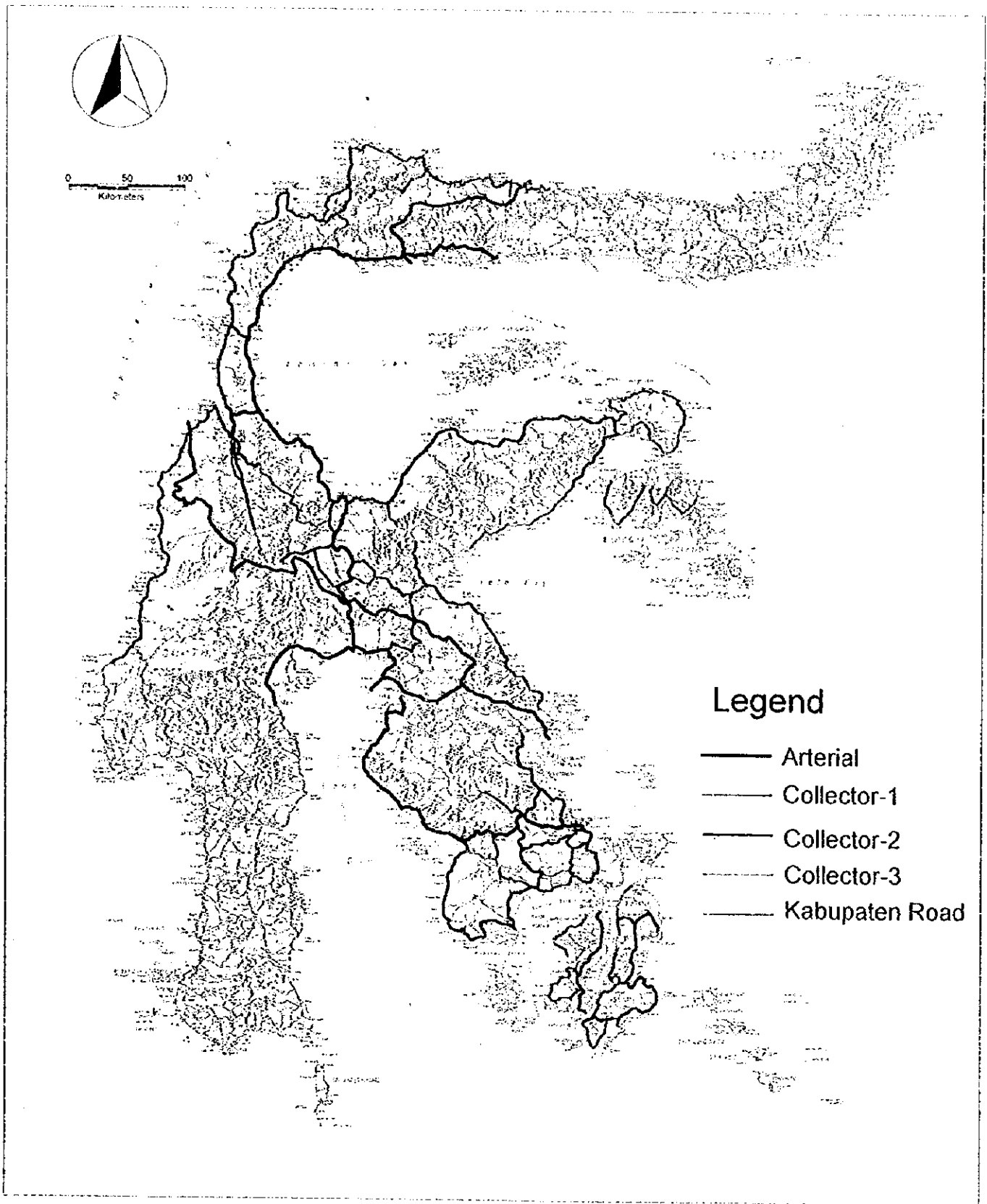
	Central Sulawesi	Southeast Sulawesi	Total
Arterial Road	687	477	1,164
Collector Road 1	906	135	1,041
Collector Road 2	1,340	1,055	2,395
Collector Road 3	196	89	285
Total	3,129	1,756	4,885

Source: Bina Marga



Source: Study Team

Figure 2-3-1 National and Provincial Roads in Study Area



Source: Study Team

Figure 2-3-2 National and Provincial Roads by Function

2.3.5 Bridges in the Study Area

Table 2-3-5 shows the number and length of bridges along the national and provincial roads in the Central and Southeast Sulawesi.

Table 2-3-5 Existing bridge along the National and Provincial roads in the Central and Southeast Sulawesi

Province	Central Sulawesi		Southeast Sulawesi	
	National Road	Provincial Road	National Road	Provincial Road
Number of Bridges	708	1026	238	501
	1734		739	
Total Length	11904	14984	3057	6686
	26888		9743	
Width (m)	3.0 – 9.9	3.0 – 9.0	3.0 – 12.0	3.0 – 7.5
Road Length (km)	1606	1523	304	1452
	3129		1756	
$\frac{BridgeLength}{RoadLength}$ (%)	0.74	0.98	1.01	0.46
	0.86		0.55	

Source: Bina Marga

2.4 Organization and Budget

2.4.1 Organization

The Ministry of Public Works (PU) consists of six (6) assistants to the Minister, the Secretary General, the Inspector General three (3) Director Generals, the Institute of Research and Development, four (4) centers, 27 regency office of Ministry of Public Works (Kanwil) provinces and state enterprises (18 companies). The overall organization of PU is shown in Figure 2-4-1 together. Road administration remains within the jurisdiction of Bina Marga.

Bina Marga has the following divisions:

- Secretariat to the Director General
- Planning and Programming
- Technical Support
- Urban Roads
- West Region Implementation
- Central Region Implementation
- East Region Implementation
- 27 Regional Offices of Ministry of Public Works (Kanwil offices)

Figure 2-4-2 shows the organization of Bina Marga.

2.4.2 Budget

Bina Marga administrates the maintenance, rehabilitation, betterment, new construction, procurement of materials and equipment, planning, design and management of the following roads:

- National and Provincial Roads;

Most major road projects are either national or provincial roads. National road programs are prepared by Bina Marga, with construction usually managed under the jurisdiction of Provincial Government Public Works (Dinas PU).

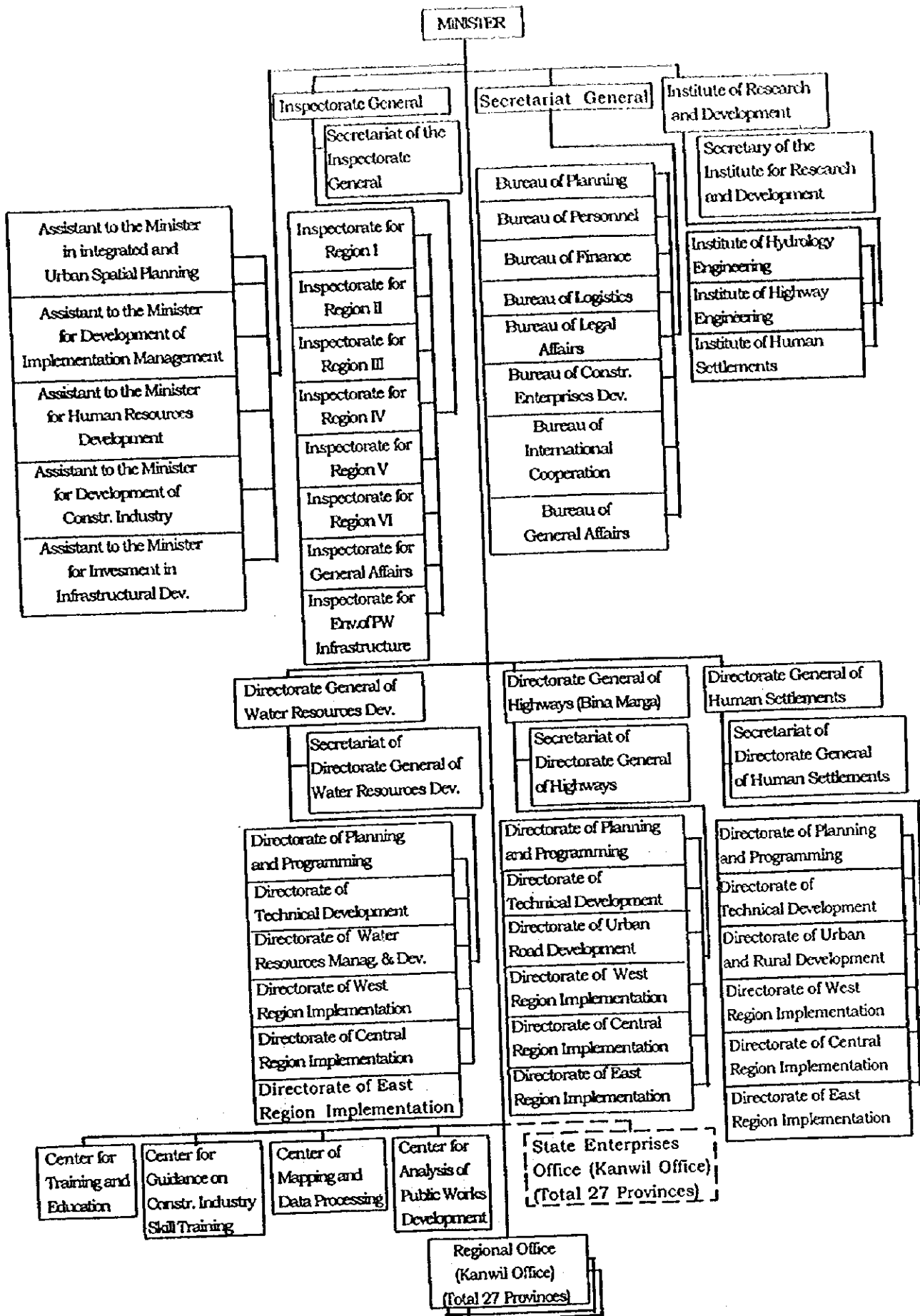
- Kabupaten/Kechamatan

Kabupaten or Kechamatan roads are administrated through the Regional Office (Kanwil). Planning is carried out by Bappeda and Regional Office (Kanwil). Construction is managed by Regional Office (Kanwil).

- Toll Roads

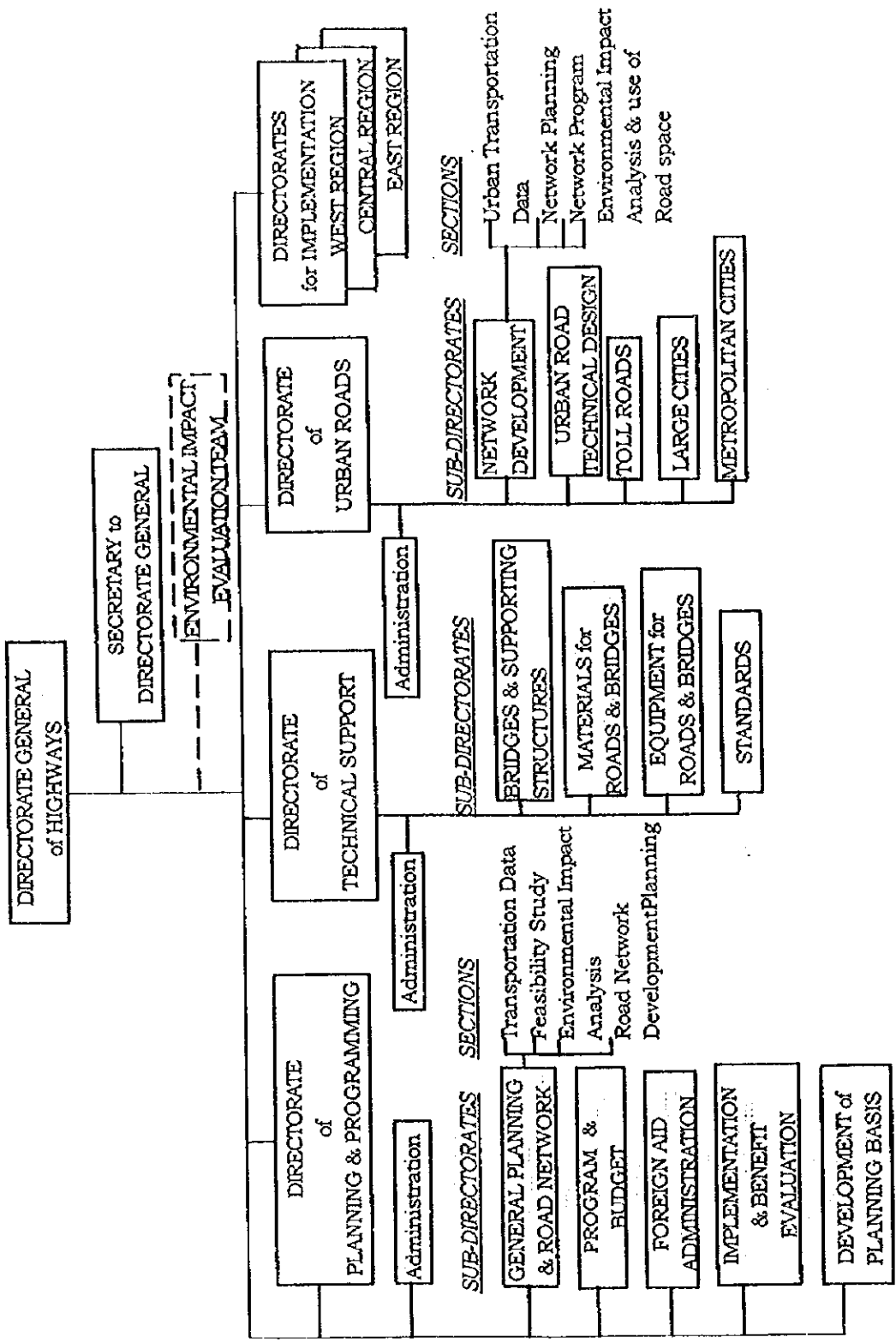
Planning of all toll roads is under the Toll Sub-Directorate of Urban Roads, Bina Marga, although design and development of toll roads is usually by PT Jasa Marga (State owned company for operating all toll roads).

Table 2-4-1 shows the Bina Marga's budget for maintenance, rehabilitation, betterment, new construction, procurement, planning, design and management of the roads in the Central and South-east Sulawesi Provinces within Bina Marga jurisdictions.



Source: Bina Marga

Figure 2-4-1 Organization Chart of Ministry of Public Works (PU)



Source: Bina Marga

Figure 2-4-2 Organization Chart of Directorate General of Highways (Bina Marga)

Table 2-4-1 Annual Budget of Bina Marga Road Projects

Unit: Billion Rp.

FISCAL YEARS	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	98/99
1. Local Portion									
(1) National and Provincial Roads									
Total Indonesia	338.84	704.93	1,122.78	1,373.75	1,529.78	1,559.82	1,670.02	1,618.13	1,178.17
Total Sulawesi	41.26	79.94	107.61	136.18	169.80	134.26	174.74	179.27	145.75
Central	10.29	16.60	29.13	36.51	46.31	36.52	45.29	51.54	39.97
Southeast	9.05	17.36	18.07	25.66	30.85	28.16	40.91	38.57	41.77
(2) Local Roads									
Total Indonesia	206.89	152.99	677.13	818.36	818.05	967.62	997.65	1,097.38	1,147.06
Total Sulawesi	27.49	54.80	87.89	111.29	137.79	122.93	129.99	152.00	123.83
Central	5.09	9.03	15.87	18.66	20.56	22.97	26.00	30.50	24.23
Southeast	6.20	10.24	16.94	18.99	20.27	19.33	21.00	24.50	20.08
2. Foreign Loan									
(1) National and Provincial Roads									
Total Indonesia	758.87	871.46	921.76	565.44	515.36	628.42	549.90	454.14	1,258.32
Total Sulawesi	70.92	92.95	59.35	45.33	71.16	51.98	50.59	66.50	113.58
Central	13.33	27.32	25.91	26.28	33.74	17.29	17.82	22.87	62.58
Southeast	13.72	10.96	8.52	1.83	7.04	6.59	9.75	10.00	78.69
(2) Local Roads									
Total Indonesia	83.06	43.15	89.55	12.67	104.97	264.05	164.84	145.96	242.11
Total Sulawesi	11.41	12.60	21.31	6.93	-	29.24	31.06	26.50	84.60
Central	1.81	-	-	-	-	6.39	7.88	6.26	10.94
Southeast	1.71	0.82	3.6	1.39	-	3.39	4.16	3.46	11.28
3. Grand Total									
Total Indonesia	1,387.66	2,072.53	2,811.42	2,770.22	2,968.16	3,419.91	3,382.44	3,315.61	3,825.66
Total Sulawesi	151.08	240.29	276.16	229.73	378.75	338.41	386.70	424.27	467.76
Central	30.52	52.95	70.91	81.45	100.61	83.17	96.99	111.17	137.82
Southeast	30.15	39.38	47.13	47.87	58.61	58.47	75.82	76.53	151.82
Central and Southeast	60.67	92.33	118.04	129.32	158.77	141.64	172.81	187.70	289.54

Notes:

1. The Budget consists of the cost of the maintenance, rehabilitation, betterment, new construction, procurement of materials and equipment, planning, design and management of road projects under Bina Marga administration together with the allowance cost (about 10 % of the Budget) of the Bina Marga staff.
2. The Budget does not include the toll roads nor the routine budget such as the salaries of Bina Marga staff.

Source: Directorate of Planning, Bina Marga

2.5 Present Road Conditions

2.5.1 Existing road conditions

When existing Kabupaten roads are added to the present national and provincial road network to supplement the inter-regional road network from the viewpoints of the population distribution for each Kecamatan (an administrative unit below kabupaten), access roads to the neighboring provinces, and access road to the port facilities, the total network length becomes 6,405 Km. However, this road network includes roads with a width of less than 2.5m, most of which are registered as Kabupaten roads. Figure 2-5-1 shows inter-regional road network of 6,076km (passable sections by four-wheeled vehicles).

Table 2-5-1 Inter Region Road Length

Unit: Km

Central Sulawesi		South-East Sulawesi		Total
National Road	1,606		304	1,910
Provincial Road	1,523		1,452	2,975
Kabupaten Road				
Donggala	0	Kundari	200	200
Poso	402	Kolaka	29	431
Banggai	302	Muna	225	527
Tolitoli	136	Buton	226	362
Total	3,969		2,436	6,405

Source: Bina Marga

Table 2-5-2 Existing Road Inventory (1)

Link	Unpaved Road by Width (Km)					Paved Road by Width (Km)					Total by Width (Km)					
	-2.5	2.5-4.5	4.5-5.5	5.5-6.0	6.0+	-2.5	2.5-4.5	4.5-5.5	5.5-6.0	6.0+	-2.5	2.5-4.5	4.5-5.5	5.5-6.0	6.0+	
	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	
Central Sulawesi																
National/Provincial Road																
52001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.61	0.00	3.92	0.00	0.00	29.61	0.00	33.53	
52002	0.00	0.00	0.00	0.00	0.00	0.00	28.68	34.76	0.00	4.56	0.00	28.68	34.76	0.00	68.00	
52003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.98	0.00	15.82	0.00	0.00	8.98	0.00	24.80	
52004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.60	0.00	0.00	0.00	0.00	46.60	0.00	46.60	
52005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.51	0.00	0.00	0.00	0.00	15.51	0.00	15.51	
52006	0.00	13.87	0.00	0.00	0.00	0.00	13.87	0.00	0.00	0.00	0.00	13.87	0.00	0.00	23.95	
52007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	80.34	0.00	4.78	0.00	0.00	80.34	0.00	85.12	
52008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.67	0.00	0.00	0.00	0.00	29.67	0.00	29.67	
52009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	171.63	0.00	0.00	0.00	0.00	171.63	0.00	171.63	
52010	0.00	0.00	0.00	0.00	0.00	0.00	89.73	29.50	0.00	0.00	0.00	89.73	29.50	0.00	119.23	
52011	0.00	0.00	0.00	0.00	0.00	0.00	38.59	12.07	0.00	0.00	0.00	38.59	12.07	0.00	50.66	
52012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	140.22	0.00	0.00	0.00	0.00	140.22	0.00	140.22	
52013	0.00	33.94	0.00	0.00	0.00	0.00	33.94	29.90	0.00	0.00	0.00	33.94	29.90	0.00	122.84	
52014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.26	0.00	0.00	0.00	0.00	10.26	0.00	10.26	
52015	0.00	0.00	0.00	0.00	0.00	0.00	40.90	0.00	0.00	13.08	0.00	40.90	0.00	0.00	53.98	
52016	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.90	0.00	13.90	0.00	0.00	15.90	0.00	29.80	
52017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.42	0.00	0.00	0.00	0.00	28.42	0.00	28.42	
52018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.47	0.00	0.00	0.00	0.00	21.47	
52019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.63	0.00	-0.00	0.00	0.00	51.63	0.00	51.63	
52020	0.00	0.00	0.00	0.00	0.00	0.00	11.45	20.65	0.00	0.00	0.00	11.45	20.65	0.00	32.10	
52021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.25	0.00	0.00	0.00	0.00	86.25	0.00	86.25	
52022	0.00	0.00	0.00	0.00	0.00	0.00	25.28	6.16	0.00	0.00	0.00	25.28	6.16	0.00	31.44	
52023	0.00	0.93	0.00	0.00	0.00	0.00	46.41	24.50	0.00	0.00	0.00	46.41	24.50	0.00	103.87	
52024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	87.90	0.00	0.00	0.00	0.00	87.90	0.00	87.90	
52025	0.00	36.25	0.00	0.00	0.00	0.00	28.13	34.23	0.00	0.00	0.00	28.13	34.23	0.00	117.60	
52026	0.00	0.00	0.00	0.00	0.00	0.00	46.30	49.18	0.00	0.00	0.00	46.30	49.18	0.00	95.48	
52027	0.00	16.23	0.00	0.00	0.00	0.00	53.98	33.35	0.00	0.00	0.00	53.98	33.35	0.00	123.55	
52028	0.00	38.07	0.00	0.00	0.00	0.00	98.89	4.04	0.00	0.00	0.00	98.89	4.04	0.00	141.00	
52029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.83	0.00	7.62	0.00	0.00	42.83	0.00	50.45	
52030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.86	0.00	0.00	0.00	0.00	27.86	0.00	27.86	
52031	0.00	0.00	0.00	0.00	0.00	0.00	41.35	0.00	0.00	4.13	0.00	41.35	0.00	0.00	45.48	
52032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.96	0.00	0.00	0.00	0.00	41.96	0.00	41.96	
52033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.85	0.00	0.00	0.00	0.00	40.85	0.00	40.85	
52034	0.00	0.00	0.00	0.00	0.00	0.00	66.81	149.91	0.00	0.00	0.00	66.81	149.91	0.00	216.72	
52035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.31	0.00	0.00	0.00	0.00	66.31	0.00	66.31	
52036	0.00	59.02	0.00	0.00	0.00	0.00	0.00	20.03	0.00	20.03	0.00	0.00	20.03	0.00	79.05	
52037	0.00	0.00	3.22	0.00	0.00	0.00	21.49	32.22	0.00	0.00	0.00	21.49	32.22	0.00	56.93	
52038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.45	0.00	0.00	0.00	0.00	29.45	0.00	29.45	
52039	0.00	0.00	0.00	0.00	0.00	0.00	31.62	16.06	0.00	0.00	0.00	31.62	16.06	0.00	47.68	
52040	0.00	0.00	25.46	0.00	0.00	0.00	38.49	46.61	0.00	0.00	0.00	38.49	46.61	0.00	110.56	
52044	0.00	19.80	0.00	0.00	0.00	0.00	10.05	18.17	0.00	0.00	0.00	10.05	18.17	0.00	38.02	
52045	0.00	0.00	3.02	0.00	0.00	0.00	20.33	52.97	0.00	0.00	0.00	20.33	52.97	0.00	76.37	
52046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.67	0.00	0.00	0.00	0.00	3.67	0.00	3.67	

Source: Bina Marga

Table 2-5-2 Existing Road Inventory (2)

Link	Unpaved Road by Width (Km)						Paved Road by Width (Km)						Total by Width (Km)					
	2.5-4.5	4.5-5.5	5.5-6.0	6.0-6.5	Total	2.5-4.5	4.5-5.5	5.5-6.0	6.0-6.5	Total	2.5-4.5	4.5-5.5	5.5-6.0	6.0-6.5	Total			
56013	0.00	0.00	0.00	0.00	32.51	0.00	41.33	93.91	0.00	0.00	135.24	0.00	41.33	126.42	0.00	0.00	167.73	
56014	0.00	0.00	0.00	0.00	0.00	0.00	6.40	54.67	0.00	61.07	61.07	0.00	6.40	54.67	0.00	0.00	61.07	
56016	0.00	0.00	0.00	0.00	0.00	0.00	6.40	67.38	0.00	73.78	73.78	0.00	6.40	67.38	0.00	0.00	73.78	
56017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	0.00	40.96	40.96	0.00	0.00	40.96	0.00	0.00	40.96	
56018	0.00	0.00	0.00	100.45	100.45	0.00	33.55	6.89	16.50	56.94	56.94	0.00	33.55	6.89	116.95	157.39	157.39	
56019	0.00	0.00	0.00	17.13	17.13	0.00	0.00	23.50	0.00	23.50	23.50	0.00	0.00	40.63	0.00	0.00	40.63	
56021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.94	0.00	21.94	21.94	0.00	0.00	21.94	0.00	0.00	21.94	
56022	0.00	0.00	0.00	0.00	0.00	0.00	23.57	12.01	0.00	35.58	35.58	0.00	23.57	12.01	0.00	0.00	35.58	
56023	0.00	8.00	59.00	0.00	67.00	0.00	6.00	111.00	0.00	117.00	117.00	0.00	14.00	170.00	0.00	65.00	249.00	
56024	0.00	25.00	0.00	0.00	25.00	0.00	48.12	14.10	0.00	62.22	62.22	0.00	74.12	14.10	0.00	4.07	92.29	
56025	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	4.00	4.00	0.00	4.00	0.00	0.00	0.00	4.00	
56026	0.00	24.00	0.00	0.00	24.00	0.00	0.00	0.00	0.00	24.00	24.00	0.00	24.00	0.00	0.00	0.00	24.00	
50001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.79	0.00	27.79	27.79	0.00	0.00	27.79	0.00	0.00	27.79	
50033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.67	0.00	102.67	102.67	0.00	0.00	102.67	0.00	0.00	102.67	
50044	0.00	0.00	0.00	0.00	0.00	0.00	56.29	0.00	0.00	56.29	56.29	0.00	56.29	0.00	0.00	0.00	56.29	
Subtotal	0.00	192.00	124.17	0.00	160.45	476.62	261.26	1104.04	17.22	131.18	1513.70	0.00	453.26	1228.21	17.22	291.63	1990.32	
Kabupaten Road																		
BU001	0.00	0.00	0.00	0.00	0.00	0.00	49.30	0.00	0.00	49.30	49.30	0.00	49.30	0.00	0.00	0.00	49.30	
BU002	0.00	0.00	0.00	0.00	0.00	0.00	14.20	0.00	0.00	14.20	14.20	0.00	14.20	0.00	0.00	0.00	14.20	
BU003	0.00	0.00	0.00	0.00	0.00	0.00	48.20	0.00	0.00	48.20	48.20	0.00	48.20	0.00	0.00	0.00	48.20	
BU004	0.00	0.00	0.00	0.00	0.00	0.00	22.90	0.00	0.00	22.90	22.90	0.00	22.90	0.00	0.00	0.00	22.90	
BU037	0.00	0.00	0.00	0.00	0.00	0.00	24.30	5.00	0.00	29.30	29.30	0.00	24.30	5.00	0.00	0.00	29.30	
BU038	0.00	3.70	0.00	0.00	3.70	0.00	0.00	0.00	0.00	3.70	3.70	0.00	3.70	0.00	0.00	0.00	3.70	
BU069	0.00	0.00	0.00	0.00	0.00	0.00	37.50	0.00	0.00	37.50	37.50	0.00	37.50	0.00	0.00	0.00	37.50	
BU070	0.00	8.00	0.00	0.00	8.00	0.00	0.00	0.00	0.00	8.00	8.00	0.00	8.00	0.00	0.00	0.00	8.00	
BU071	0.00	3.50	0.00	0.00	3.50	0.00	4.00	0.00	0.00	7.50	7.50	0.00	7.50	0.00	0.00	0.00	7.50	
KE001	0.00	0.00	0.00	0.00	0.00	0.00	13.30	0.00	0.00	13.30	13.30	0.00	13.30	0.00	0.00	0.00	13.30	
KE017	0.00	23.60	0.00	0.00	23.60	0.00	0.00	0.00	0.00	23.60	23.60	0.00	23.60	0.00	0.00	0.00	23.60	
KE018	0.00	10.20	0.00	0.00	10.20	0.00	0.00	0.00	0.00	10.20	10.20	0.00	10.20	0.00	0.00	0.00	10.20	
K0032	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	6.00	6.00	0.00	6.00	0.00	0.00	0.00	6.00	
K0083	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	6.00	6.00	0.00	6.00	0.00	0.00	0.00	6.00	
K0086	0.00	13.40	0.00	0.00	13.40	0.00	0.00	0.00	0.00	13.40	13.40	0.00	13.40	0.00	0.00	0.00	13.40	
MU021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	7.00	7.00	0.00	7.00	0.00	0.00	0.00	7.00	
MU024	0.00	17.00	0.00	0.00	17.00	0.00	0.00	0.00	0.00	17.00	17.00	0.00	17.00	0.00	0.00	0.00	17.00	
MU025	0.00	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	17.00	17.00	0.00	17.00	0.00	0.00	0.00	17.00	
MU028	0.00	0.00	0.00	0.00	0.00	0.00	3.80	0.00	0.00	3.80	3.80	0.00	3.80	0.00	0.00	0.00	3.80	
MU032	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	12.00	12.00	0.00	12.00	0.00	0.00	0.00	12.00	
MU034	0.00	0.00	0.00	0.00	0.00	0.00	13.00	0.00	0.00	13.00	13.00	0.00	13.00	0.00	0.00	0.00	13.00	
MU037	0.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	0.00	7.00	7.00	0.00	7.00	0.00	0.00	0.00	7.00	
MU038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MU048	0.00	3.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	3.00	3.00	0.00	3.00	0.00	0.00	0.00	3.00	
MU049	0.00	1.50	0.00	0.00	1.50	0.00	0.00	0.00	0.00	1.50	1.50	0.00	1.50	0.00	0.00	0.00	1.50	
MU050	0.00	3.50	0.00	0.00	3.50	0.00	0.00	0.00	0.00	3.50	3.50	0.00	3.50	0.00	0.00	0.00	3.50	
MU051	0.00	14.00	0.00	0.00	14.00	0.00	0.00	0.00	0.00	14.00	14.00	0.00	14.00	0.00	0.00	0.00	14.00	
MU052	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Source: Bina Marga

Table 2-5-2 Existing Road Inventory (\$)

Link	Unpaved Road by Width (km)					Paved Road by Width (km)					Total by Width (km)					Total
	-2.5	2.5-4.5	4.5-5.5	5.5-6.0	6.0-	-2.5	2.5-4.5	4.5-5.5	5.5-6.0	6.0-	-2.5	2.5-4.5	4.5-5.5	5.5-6.0	6.0-	
Subtotal	0.00	30.93	0.00	0.00	0.00	0.00	31.02	0.00	0.00	109.31	31.02	0.00	61.95	0.00	61.95	
Kabupaten Road	0.00	249.09	84.64	7.98	0.00	38.96	838.63	1650.13	0.00	109.31	2598.07	0.00	1087.72	1734.77	7.98 148.26 2978.73	
BA001	0.00	0.00	0.00	0.00	0.00	0.00	17.90	0.00	0.00	0.00	17.90	0.00	0.00	0.00	17.90	
BA003	0.00	0.00	0.00	0.00	0.00	0.00	30.90	0.00	0.00	0.00	30.90	0.00	0.00	0.00	30.90	
BA004	0.00	45.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.10	0.00	0.00	0.00	45.10	
BA005	0.00	0.00	0.00	0.00	0.00	0.00	22.60	0.00	0.00	0.00	22.60	0.00	0.00	0.00	22.60	
BA006	0.00	0.00	0.00	0.00	0.00	0.00	12.50	0.00	0.00	0.00	12.50	0.00	0.00	0.00	12.50	
BA007	0.00	0.00	0.00	0.00	0.00	0.00	34.80	0.00	0.00	0.00	34.80	0.00	0.00	0.00	34.80	
BA022	0.00	16.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.20	0.00	0.00	0.00	16.20	
BA023	16.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	28.00	
BA024	0.00	19.50	0.00	0.00	0.00	0.00	2.10	0.00	0.00	0.00	21.60	0.00	0.00	0.00	21.60	
BA025	0.00	16.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.00	0.00	0.00	0.00	16.00	
BA026	0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	6.00	
BA027	0.00	17.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	0.00	17.00	
BA029	0.00	9.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00	9.00	
BA030	0.00	0.00	14.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.70	0.00	0.00	0.00	14.70	
BA030	0.00	0.00	43.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.90	0.00	0.00	0.00	43.90	
P0004	0.00	51.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.10	0.00	0.00	0.00	51.10	
P0005	0.00	17.00	0.00	0.00	0.00	0.00	5.30	0.00	0.00	0.00	22.30	0.00	0.00	0.00	22.30	
P0013	0.00	0.00	0.00	0.00	0.00	0.00	58.20	0.00	0.00	0.00	58.20	0.00	0.00	0.00	58.20	
P0017	0.00	0.00	0.00	0.00	0.00	0.00	26.40	0.00	0.00	0.00	26.40	0.00	0.00	0.00	26.40	
P0018	0.00	0.00	0.00	0.00	0.00	0.00	16.40	0.00	0.00	0.00	16.40	0.00	0.00	0.00	16.40	
P0028	0.00	0.00	0.00	0.00	0.00	0.00	18.20	0.00	0.00	0.00	18.20	0.00	0.00	0.00	18.20	
T0001	0.00	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	0.00	0.00	7.00	
T0002	0.00	44.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.50	0.00	0.00	0.00	44.50	
T0008	0.00	0.00	0.00	0.00	0.00	0.00	18.20	0.00	0.00	0.00	18.20	0.00	0.00	0.00	18.20	
T0009	0.00	0.00	0.00	0.00	0.00	0.00	6.80	0.00	0.00	0.00	6.80	0.00	0.00	0.00	6.80	
T0010	0.00	13.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.20	0.00	0.00	0.00	13.20	
Subtotal	16.00	273.00	14.70	101.50	0.00	38.96	1108.93	1650.13	0.00	109.31	2888.37	16.00	1631.02	1470.10	675.50	
Total	16.00	522.09	99.34	109.48	0.00	38.95	1108.93	1650.13	0.00	109.31	2888.37	16.00	1749.47	109.48	3654.23	
South-East Sulawesi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
National/Provincial Road	0.00	0.00	0.00	0.00	0.00	0.00	145.75	0.00	0.00	0.00	145.75	0.00	0.00	0.00	145.75	
56001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
56002	0.00	0.00	0.00	0.00	0.00	0.00	14.66	0.00	0.00	0.00	14.66	0.00	0.00	0.00	14.66	
56003	0.00	0.00	0.00	0.00	0.00	0.00	65.97	0.00	0.00	0.00	65.97	0.00	0.00	0.00	65.97	
56004	0.00	0.00	0.00	0.00	0.00	0.00	32.59	0.00	0.00	0.00	32.59	0.00	0.00	0.00	32.59	
56005	0.00	0.00	0.00	0.00	0.00	0.00	40.58	0.00	0.00	0.00	40.58	0.00	0.00	0.00	40.58	
56006	0.00	0.00	0.00	0.00	0.00	0.00	103.61	0.00	0.00	0.00	103.61	0.00	0.00	0.00	103.61	
56007	0.00	135.00	8.64	0.00	0.00	0.00	2.11	124.37	0.00	0.00	177.00	0.00	0.00	0.00	268.01	
56008	0.00	0.00	0.00	0.00	0.00	0.00	31.19	0.00	0.00	0.00	31.19	0.00	0.00	0.00	31.19	
56009	0.00	0.00	6.89	0.00	0.00	0.00	38.33	0.00	0.00	0.00	45.22	0.00	0.00	0.00	45.22	
56010	0.00	0.00	0.00	0.00	0.00	0.00	16.09	0.00	0.00	0.00	16.09	0.00	0.00	0.00	16.09	
56011	0.00	0.00	0.00	0.00	0.00	0.00	64.55	0.00	0.00	0.00	64.55	0.00	0.00	0.00	64.55	
56012	0.00	0.00	0.00	0.00	0.00	0.00	20.23	0.00	0.00	0.00	20.23	0.00	0.00	0.00	20.23	

Source: Bina Karya

Table 2-5-2 Existing Road Inventory (4)

Link	Unpaved Road by Width (Km)						Paved Road by Width (km)						Total by Width (Km)						Total	
	-2.5	2.5-4.5	4.5-5.5	5.5-6.0	6.0-	Total	-2.5	2.5-4.5	4.5-5.5	5.5-6.0	6.0-	Total	-2.5	2.5-4.5	4.5-5.5	5.5-6.0	6.0-	Total		
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
MU053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MU054	0.00	0.00	0.00	0.00	6.20	6.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.20
MU071	0.00	0.00	12.10	0.00	0.00	12.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.10	0.00	0.00	0.00	12.10
MU073	0.00	4.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	4.00
MU078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MU094	0.00	0.00	0.00	0.00	6.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00
MU087	0.00	0.00	0.00	0.00	19.20	19.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.20
Subtotal	0.00	105.40	12.10	0.00	19.20	136.70	0.00	235.20	60.20	0.00	295.40	0.00	295.40	10.90	0.00	306.30	0.00	0.00	0.00	306.30
Total	0.00	297.40	136.27	0.00	179.65	613.32	0.00	496.46	1164.24	17.22	131.18	1909.10	0.00	793.86	1300.51	17.22	310.83	2422.42	0.00	432.10
Grand Total	16.00	819.49	235.61	109.48	213.60	1399.18	0.00	1505.39	2814.37	17.22	240.49	4677.47	16.00	2424.88	3049.98	126.70	459.09	6076.66	0.00	6076.66
(%)	0.3	13.5	3.9	1.8	3.6	23.0	0.0	26.4	46.3	0.3	4.9	77.0	0.3	39.9	50.2	2.1	7.6	100.0	0.0	100.0

Source: Dina Marga

Of the 6,405 Km inter-regional road network, 6,076 km or 95%, is accessible by four-wheeled vehicles. The remaining 329 km is 2.5m wide or less. Furthermore, a length of 3,333 km, or 52%, consists of substandard sections with pavement width of less than 4.5 m. Figure 2-5-2 shows the location of existing road width.

The pavement ratio of existing national and provincial roads is 82.7% while that of kabupaten roads is 51.1%. As a whole, the pavement ratio is 77.0%. On the other hand, 60% of national and provincial roads have a pavement width of 4.5m, while that of remaining roads is 3.5m. The pavement ratio of national and provincial roads in Central Sulawesi is as high as 87% compared to 76% in Southeast Sulawesi. Figure 2-5-3 shows the location of existing paved roads.

The poor road development in the study area is due to difficulty in road construction in the steep mountainous terrain. As a result, road development for the inter-regional road network is almost non-existent. Though roads are classified into national, provincial, and kabupaten in Sulawesi, there is almost no difference observed in terms of the current road function. The improvement standard for the pavement width is 4.5 - 3.5m for national roads and 3.5m for provincial and kabupaten roads. Mostly, roads are improved with the pavement width of 3.5m. Since heavy vehicles are mostly 2.5m wide and smaller vehicles are 1.7m wide, passing of either vehicle with a heavy vehicle is difficult within the present pavement width. The horizontal alignment includes about 10m curves in radius in the mountainous area. Since the additional width at small curved sections in consideration of the difference in locus between rear and front wheels has not been secured, large vehicles suffer difficulty in many sections. Besides, in certain sections, the road gradient is steep and road drainage facilities are not established, subjecting the road surface to damage, making hill climbing difficult. In the flat sections in the diluvial soft ground zone, the pavement is quickly damaged, but no appropriate countermeasures are taken. Moreover, many roads have difficult access due to the fact that certain roads have no bridge to cross rivers or that the road is shut off frequently due to collapse of the road surface. It is necessary to improve and develop roads to a standard level enabling inter-regional traffic with a dependable national and provincial road network.

Table 2-5-3 Road Pavement Condition in Study Area

Description	Unpaved			Paved			Total		
	W<4.5	W>4.5	Total	W<4.5	W>4.5	Total	W<4.5	W>4.5	Total
Road Length(Km)									
Central									
National/Provincial	249.09	131.57	380.66	838.63	1759.44	2598.07	1087.72	1891.01	2978.73
Kabupaten	289.09	116.20	405.20	270.30	0.00	270.30	559.30	116.20	675.50
Total	538.09	247.77	785.86	1108.93	1759.44	2868.37	1647.02	2007.21	3654.23
South-East									
National/Provincial	192.00	284.62	476.62	261.26	1252.44	1513.70	453.26	1537.06	1990.32
Kabupaten	105.40	31.30	136.70	235.20	60.20	295.40	340.60	91.50	432.10
Total	297.40	315.92	613.32	496.46	1312.64	1809.10	793.86	1628.56	2422.42
Total									
National/Provincial	441.09	416.19	857.28	1099.89	3011.88	4111.77	1540.98	3428.07	4969.05
Kabupaten	394.40	147.50	541.90	505.50	60.20	565.70	899.90	207.70	1107.60
Total	835.49	563.69	1399.18	1605.39	3072.08	4677.47	2440.88	3635.77	6076.65
Percentage (%)									
Central									
National/Provincial	8.4	4.4	12.8	28.2	59.1	87.2	36.5	63.5	100.0
Kabupaten	42.8	17.2	60.0	40.0	0.0	40.0	82.8	17.2	100.0
Total	14.7	6.8	21.5	30.3	48.1	78.5	45.1	54.9	100.0
South-East									
National/Provincial	9.6	14.3	23.9	13.1	62.9	76.1	22.8	77.2	100.0
Kabupaten	24.4	7.2	31.6	54.4	13.9	68.4	78.8	21.2	100.0
Total	12.3	13.0	25.3	20.5	54.2	74.7	32.8	67.2	100.0
Total									
National/Provincial	8.9	8.4	17.3	22.1	60.6	82.7	31.0	69.0	100.0
Kabupaten	35.6	13.3	48.9	45.6	5.4	51.1	81.2	18.8	100.0
Total	13.7	9.3	23.0	26.4	50.6	77.0	40.2	59.8	100.0

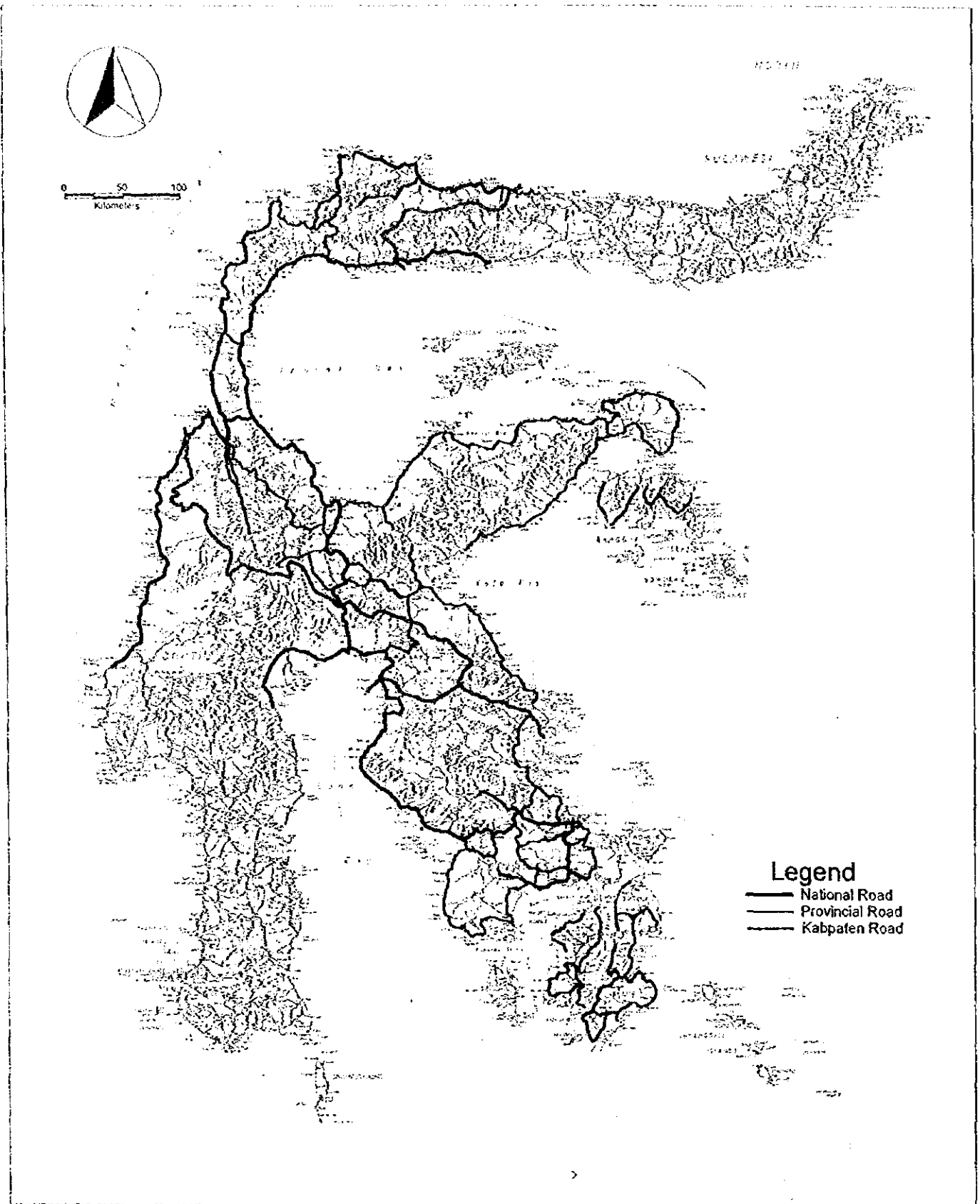


Figure 2-5-1 Existing Inter-Regional Road Network

Source: Bina Marga

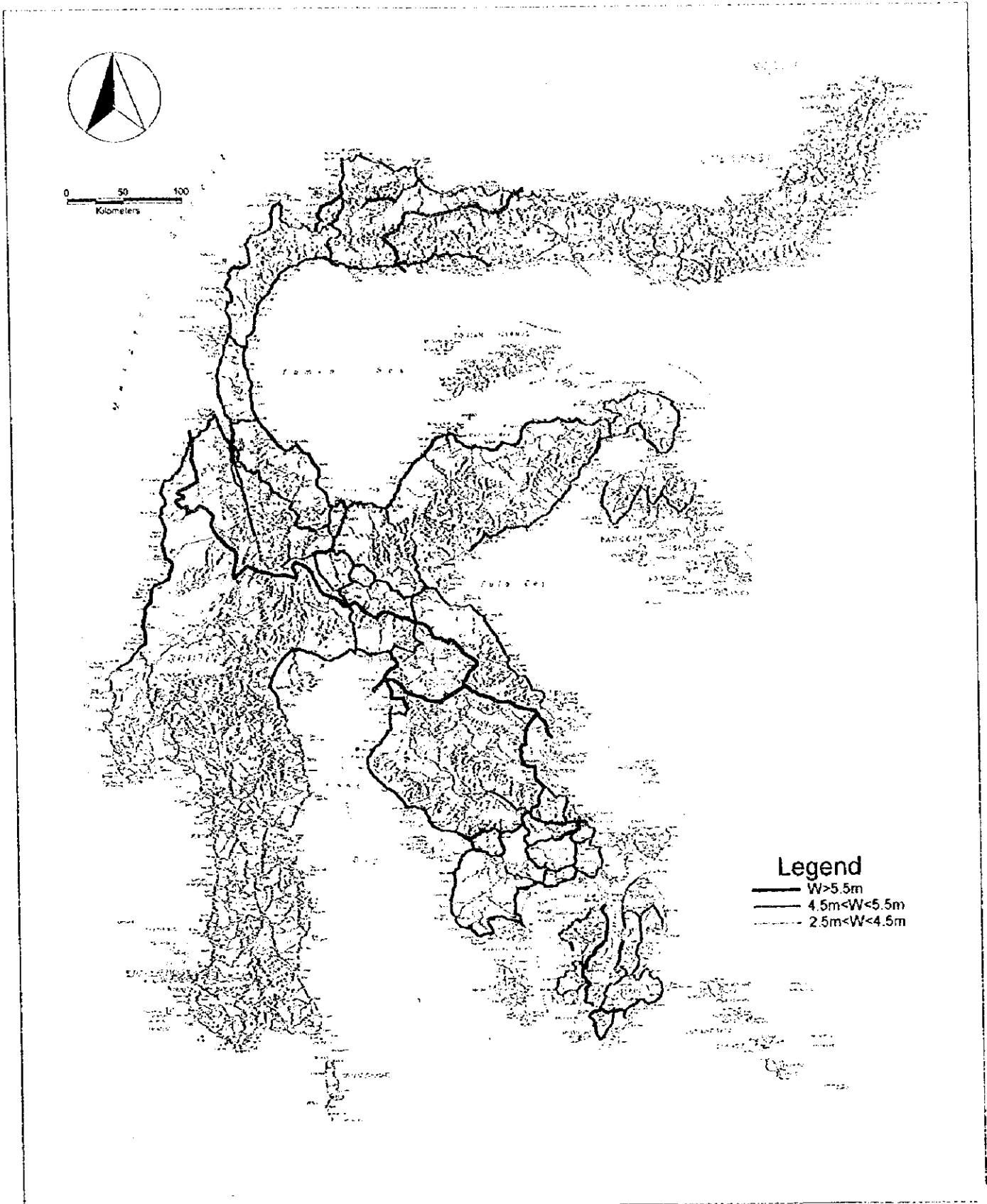


Figure 2-5-2 Present Road Width

Source: Bina Marga

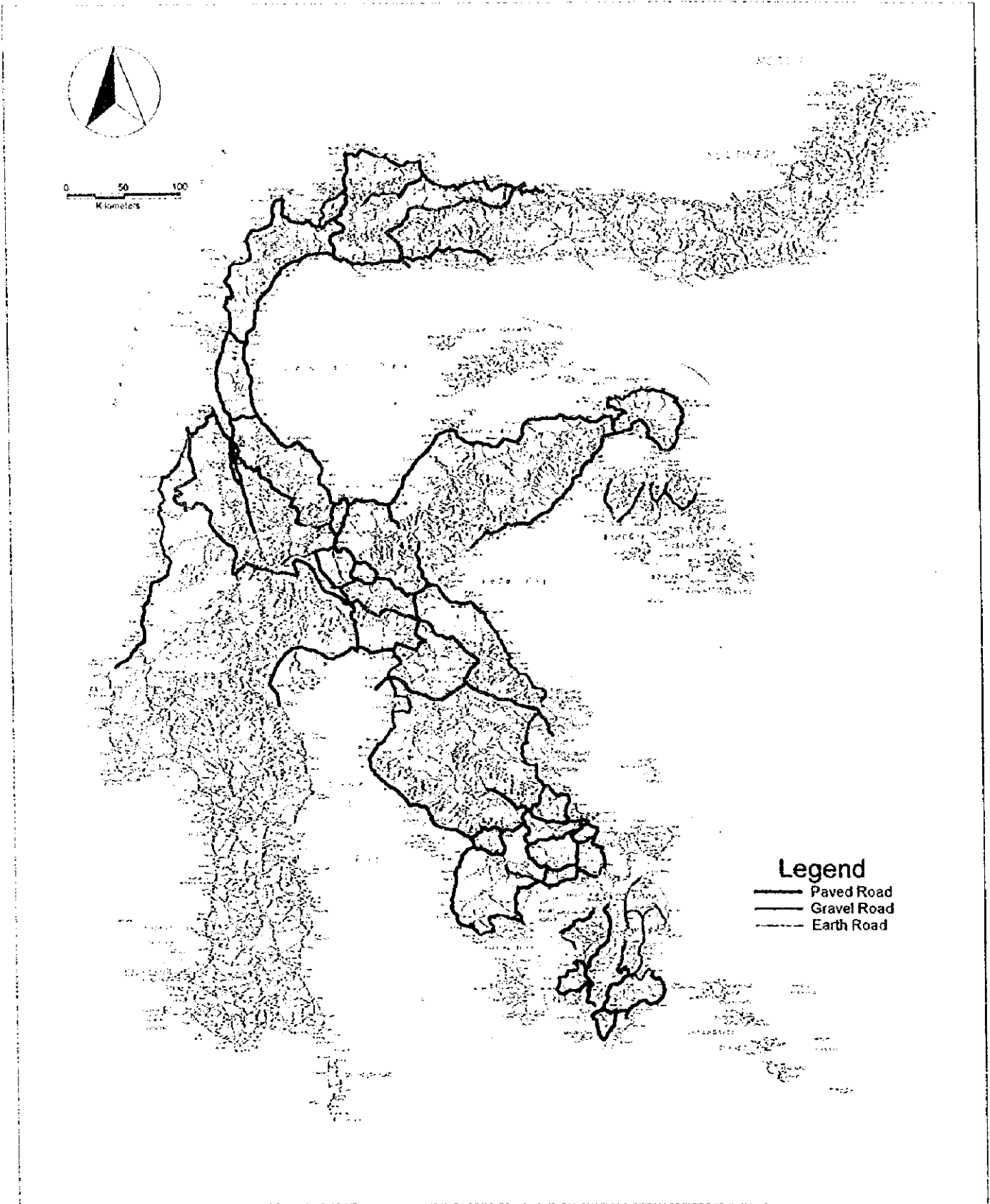


Figure 2-5-3 Existing Paved Roads

Source: Bina Marga