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## CHAPTER 3      PRESENT TRANSPORT SITUATION OF SULAWESI

### 3.1 Existing Transport Development Studies and Projects

#### 3.1.1 Studies

##### (1) National Transport Development Strategies

The national strategy for the transport sector is to support the development goals stipulated in the National Long-Term Development Plan 2005-2025 (BAPPENAS 2007) and National Mid-Term Development Plan 2005-2009 (BAPPENAS 2004). Their focuses are on: (1) accessibility, (2) environmental friendliness, (3) sustainability, (4) multi-modality, (5) consistency with regional development, (6) maintenance, and (7) cooperation among related parties. Other important studies are:

- A. Heavy Loaded Road Improvement Project-II; Master Plan Review Study for National Network of Roads, Ministry of Settlement and Regional Infrastructure, JBIC, 2001
- B. Land Transportation Master Plan (Masterplan Transportasi Darat), Ministry of Communications, 2005

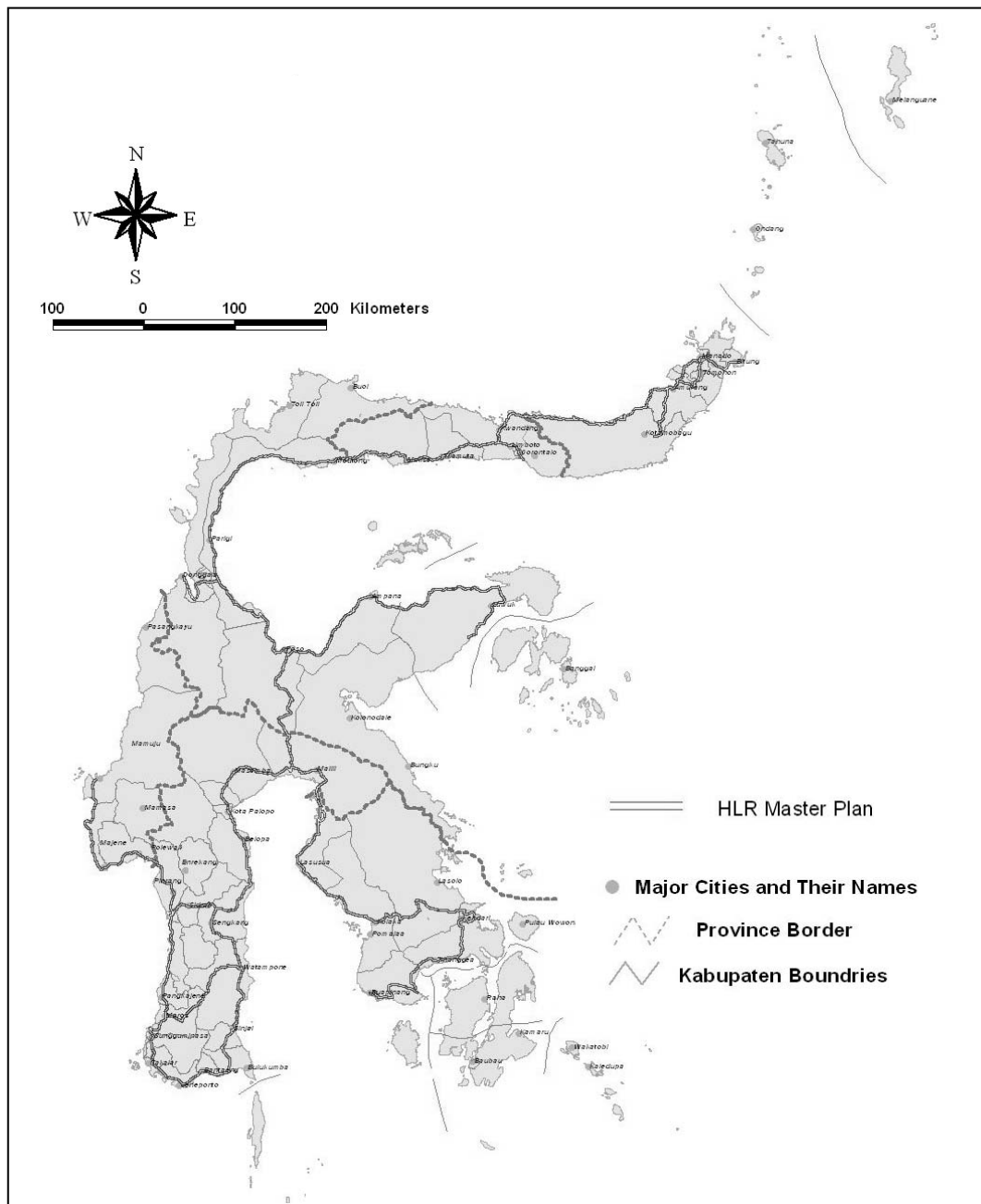
##### 1) Heavy Loaded Road Improvement Project-II; Master Plan Review Study for National Network of Roads

This is an update of the preceding study entitled “The Heavy Loaded Road Improvement Project (HLRIP)” which was undertaken in 1992 by Bina Marga and financed by JBIC. This study aimed to strengthen the national and provincial roads to accommodate increasing heavy traffic, provide more reliable services to road users, and promote socio-economic development. Its target year was set at 2020.

The HLRIP-MP selected its master plan network according to the following criteria:

- Strategic access to main ports, existing container routes and Asian highways.
- Routes connecting PKN-PKN and PKN-PKW.
- Routes connecting PKW-PKW and PKW-PKL.
- Arterial and collector roads of MST-10 ton standard (maximum axle load).
- Arterial and collector roads of MST-8 ton standard that directly support the development of special development areas (kawasan andalan).
- Arterial and collector roads with an estimated heavy traffic volume of 3,000 PCUs per day by 2020.
- Road sections to ensure the continuity of heavy-loaded roads selected above.

The proposed road network is shown in Figure 3.1.1. This is a subset of the road network proposed in the Sulawesi Spatial Plan.



**Figure 3.1.1 Road Network Master Plan Proposed in HLRIP-Master Plan**

2) Land Transportation Master Plan (Masterplan Transportasi Darat)

This study was commissioned in 2005 by the Directorate General of Land Transportation, Ministry of Transportation (Direktorat Jenderal Perhubungan Darat, Departemen Perhubungan). It focused on the interrelationship between road transport and other modes particularly ferry and coastal shipping. Based on various analyses and reviews of past studies and existing plans, this study proposed a road development program and budget allocations needed to implement the plan up to the year 2020. This, however, remains to be a rather macroscopic and policy-oriented study.

**(2) Regional Transport Development Strategies**

There are several existing studies regarding the transport system of Sulawesi. The following three studies were reviewed:

- 1) Sulawesi Island Integrated Transportation Development Study (Studi Pengembangan Keterpaduan Transportasi di Pulau Sulawesi)

This is a recently completed study on multimodal transport commissioned by the Research and Development Agency of the Ministry of Communication. The final report was submitted in November 2006. Its target year is 2022.

This study emphasized the role of ferry and air transportation. Several new ferry/shipping routes (Bitung-Mindanao, Kendari-Ambon, etc.) and new airports (Mamasa, Palopo, Pasangkay, etc.) were proposed, although road planning focused on the improvement and the strengthening of existing roads. Development programs were shown separately for the periods 2007-2012, 2013-2017, and 2018-2022.

- 2) Planning Study of Arterial Road Network in Sulawesi Island (Studi Rencana Umum Jaringan Transportasi Jalan Primer Pulau Sulawesi)

This study, financed by the Ministry of Communication (MOC), was completed in 2003 by a consultant group of the Bandung Institute of Technology. Its target year is 2023. The study aimed to strengthen coordination in planning and implementation of road projects among concerned agencies which were facing difficulties after the decentralization.

The study constructed a road database, estimated future traffic volume, and evaluated the needs of road improvement section by section. Judging from the final report, the emphasis seemed to be placed on the development of an applicable transport model that can be used by various parties. Based on the developed methodology and a set of evaluation criteria, the study listed all road sections together with the level of needed improvement in terms of number of lanes.

- 3) Sulawesi Island Road Network System Development Study (Studi Pengembangan Sistem Jaringan Jalan di Pulau Sulawesi)

This study, commissioned by the Ministry of Settlement and Regional Infrastructure, was completed in 2001. Its target year was set in 2020. This study covered a wide range of related aspects such as regional development policies and existing spatial plans in addition to road network planning. A limited road inventory survey was also carried out.

The methodology used in this study is similar to that of the MOC study mentioned earlier. The study proposed a detailed road improvement plan for 5-year periods between 2001 and 2020. The construction of 3 minor roads with a total length of 130km was also proposed.

- 4) Sulawesi Island Freeway and Toll Road Development Program Compilation (Pekerjaan Penyusunan Program Pengembangan Jaringan Jalan Bebas Hambatan dan Jalan Tol di Pulau Sulawesi)

This report was submitted in December 2006 by an independent unit of Bina Marga. The study covers four (4) provinces of Sulawesi; South Sulawesi, Central Sulawesi, Gorontalo and North Sulawesi. It aimed to propose a development program of freeways and toll roads using the PPP scheme based mainly on technical and economic assessment of selected road sections.

The analyses were conducted for 35 candidate road sections of major transport corridors. The analysis revealed that only five (5) sections were economically feasible if the road would be open for service in 2010. They are:

- \* Manado – Tomohon
- \* Maros – Mandai – Makassar
- \* Makassar – Sungguminasa
- \* Sungguminasa – Takalar
- \* Limboto – Gorontalo

For these priority sections, a rough financial framework was prepared. Note that the Manado – Bitung section was excluded from the analysis as it was ongoing already.

#### 5) Road Network Study in Central and Southeast Sulawesi

This study was conducted to prepare a master plan targeted 2018 for the road network system consisting of primary, arterial, and collector roads in the provinces of Central Sulawesi and Southeast Sulawesi. The study was financed by JICA, and was completed in 1998. The following two road routes were subjected to feasibility study of tunnel construction.

For the road section from Tawaeli to Toboli, a 620m long tunnel was planned. The Study Team reviewed and concluded that:

- The tunnel route will shorten more than 3km from the existing route and it can save 3-5 minutes of the traveling time of the vehicles. The existing route has many small sharp curves but the gradient of the route is relatively gentle. It is not much critical situation because of the low traffic volume on the route. Therefore, the tunnel construction is not urgently required though many unstable slopes and collapse are seen along the existing route.
- However, as this road connects the east and west coasts of the Central Sulawesi, tunnel will be required if the traffic volume of heavy vehicle is increased in the future.

There are 4 planned tunnels which are located between the station of 62 km +380 and 65km +740 on Trans-Sulawesi East Corridor. The Study Team reviewed and concluded that:

- As the traffic volume on this route is very small, tunnel construction would not be cost effective. However, the road alignment is situated along the coastline which tends to generate disaster such as slope failures and scouring of shore. In order to make disaster free road, the

construction of the road tunnel will be one of the options in future.

There are many candidate routes appropriate for the road tunnel construction because the mountainous terrains dominate in Sulawesi and generate difficult and critical condition for the traffic. The Study Team has conducted road survey and identified many routes for which tunnel construction will be necessary for application of the new road standard (PP34/2006) and the heavy loaded road. However, most of them are premature because of low traffic volume. Among those, the most advantageous tunnel would be for the Maros-Watampone road in South Sulawesi Province to meet future traffic volume, ADT of heavy vehicles and road function (Arterial and Heavy Loaded Road). Refer to Appendix 8 in this report as to details.

However, the demand of the tunnel construction will be raised in accordance with the growth of the traffic volume and economy. Besides, the tunnel construction would not be avoided for protection of environment and disaster. Therefore, as other South East Asian countries did or are doing, it is recommended to introduce the tunneling technology and plan the route with tunnels as a long term vision.

### **3.1.2 Projects**

In Sulawesi, a number of proposed and ongoing road projects are mostly improvements of existing roads.

#### **(1) Road Improvement**

At present, road improvement works, including rehabilitation and maintenance, are vigorously pursued in Sulawesi with the assistance of international donors such as the World Bank, Asian Development Bank, and AusAID. Figure 3.1.3 illustrates these recently completed or ongoing road improvement projects. Three ongoing projects are as follows:

- A. Eastern Indonesia Region Transport Project (EIRTP I and II) – World Bank
- B. Road Rehabilitation Sector Project (RRSP) – Asian Development Bank
- C. Eastern Indonesia National Road Improvement Project (EINRIP) – AusAID

Since 2007, however, the ADB project has shifted its focus to Sumatera and Kalimantan. The major task of road improvement in Sulawesi is shouldered mainly by WB and AusAID at present.

EIRTP and EINRIP have improved a number of national road sections in Sulawesi, and the national road network is relatively well maintained.

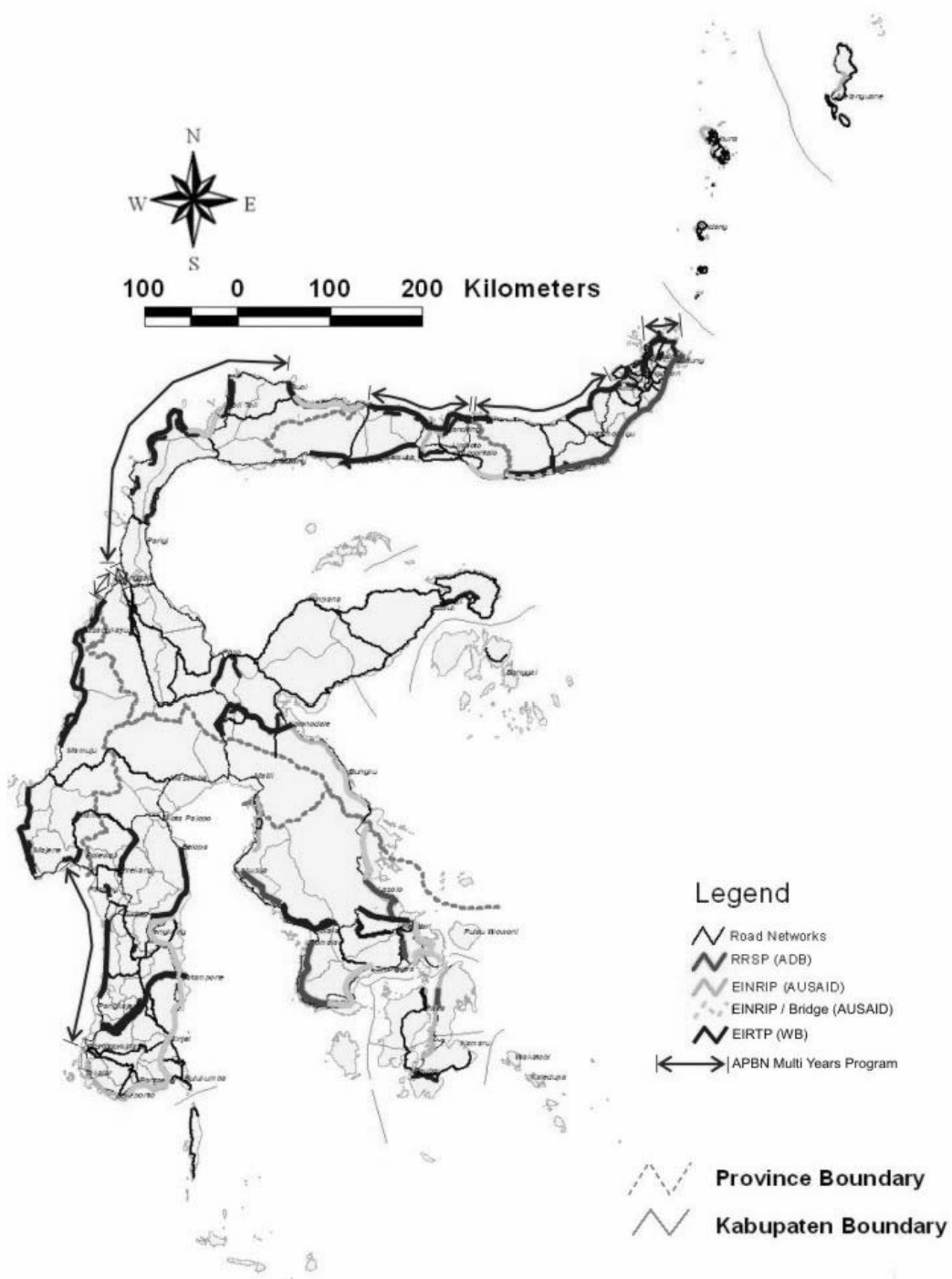


Figure 3.1.2 Current Donor Assistance for Road Network Improvement in Sulawesi

## (2) Road Construction

Proposals for the construction of new roads in Sulawesi are few. This is due to the fact that its coastlines and flat areas are already linked by existing roads, that is if the levels of service are not considered. Of course, there are a small number of new routes proposed by different agencies and local governments as seen in the Sulawesi Island Road Network System Development Study (Studi Pengembangan Sistem Jaringan Jalan di Pulau Sulawesi). Of these, the Manado-Bitung Toll Road Project requires a careful review. This is a new road construction project for which the feasibility study was conducted by the Ministry of Public Works (Penyusunan Feasibility Study & Amdal Pembangunan Jalan Tol Ruas Manado-Bitung, 2006). It is a full access-controlled highway costing about Rp.2 trillion. Peak hour traffic volume by 2010 was estimated at about 1,500 PCUs near Manado. The diversion rate from the existing highway was calculated at about 50% when the toll rate was set at Rp.400/km. The EIRR was reported at 16%. Financial analysis was not conducted.

## 3.2 Road Transport Network

### 3.2.1 Road Planning Framework

#### (1) Functional Classification of Roads

The cities in Indonesia are classified into national activity center (PKN), regional activity center (PKW), local activity center (PKL), and other smaller cities according to the spatial plans (Rencana Tata Ruang Wilayah Nasional).

In January 2006, the Ministry of Public Works, Bina Marga and Bina Program prepared a draft guideline on the functional classification of roads (Klasifikasi Jaringan Jalan Menurut Fungsi/Peranan dan Status [Wewenang Pengaturan]), as shown in tables 3.2.1 and 3.2.2, as well as in Figure 3.2.1.

#### Road Hierarchy vs. Hierarchy of Activity Centers

Table 3.2.1 summarizes the interrelation between road hierarchy and various activity centers. Between national activity centers or between a national activity center and a regional activity center, the connecting road shall be an arterial, and as the connection level lowers the road becomes collector, local, then district.

#### Functional Classification vs. Administrative Classification

Table 3.2.2 presents the interrelationship between the functional and the administrative classifications of roads. Collector roads range from national, provincial to district (kabupaten) roads according to their subfunctional classification of K-1 to K-4.

Example of Primary Road Network

Figure 3.2.1 illustrates schematically the interrelationship of the primary road network system with the hierarchy of activity centers.

**Table 3.2.1 Hierarchy of Roads and Activity Centers**

Activity Center	National Activity Center (PKN)	Regional Activity Center (PKW)	Local Activity Center (PKL)	District Center (PK-Ling)	Sub-District Activity Center (Persil)
National Activity Center (PKN)	<b>Arterial</b>	<b>Arterial</b>	<b>Collector</b>	<b>Local</b>	<b>District/Rural</b>
Regional Activity Center (PKW)	<b>Arterial</b>	<b>Collector</b>	<b>Collector</b>	<b>Local</b>	<b>District/Rural</b>
Local Activity Center (PKL)	<b>Collector</b>	<b>Collector</b>	<b>Local</b>	<b>Local</b>	<b>District/Rural</b>
District Center (PK-Ling)	<b>Local</b>	<b>Local</b>	<b>Local</b>	<b>Local</b>	<b>District/Rural</b>
Subdistrict Activity Center (Persil)	<b>District/Rural</b>	<b>District/Rural</b>	<b>District/Rural</b>	<b>District/Rural</b>	<b>District/Rural</b>

Note: PKN and PKW are designated in RTRWN

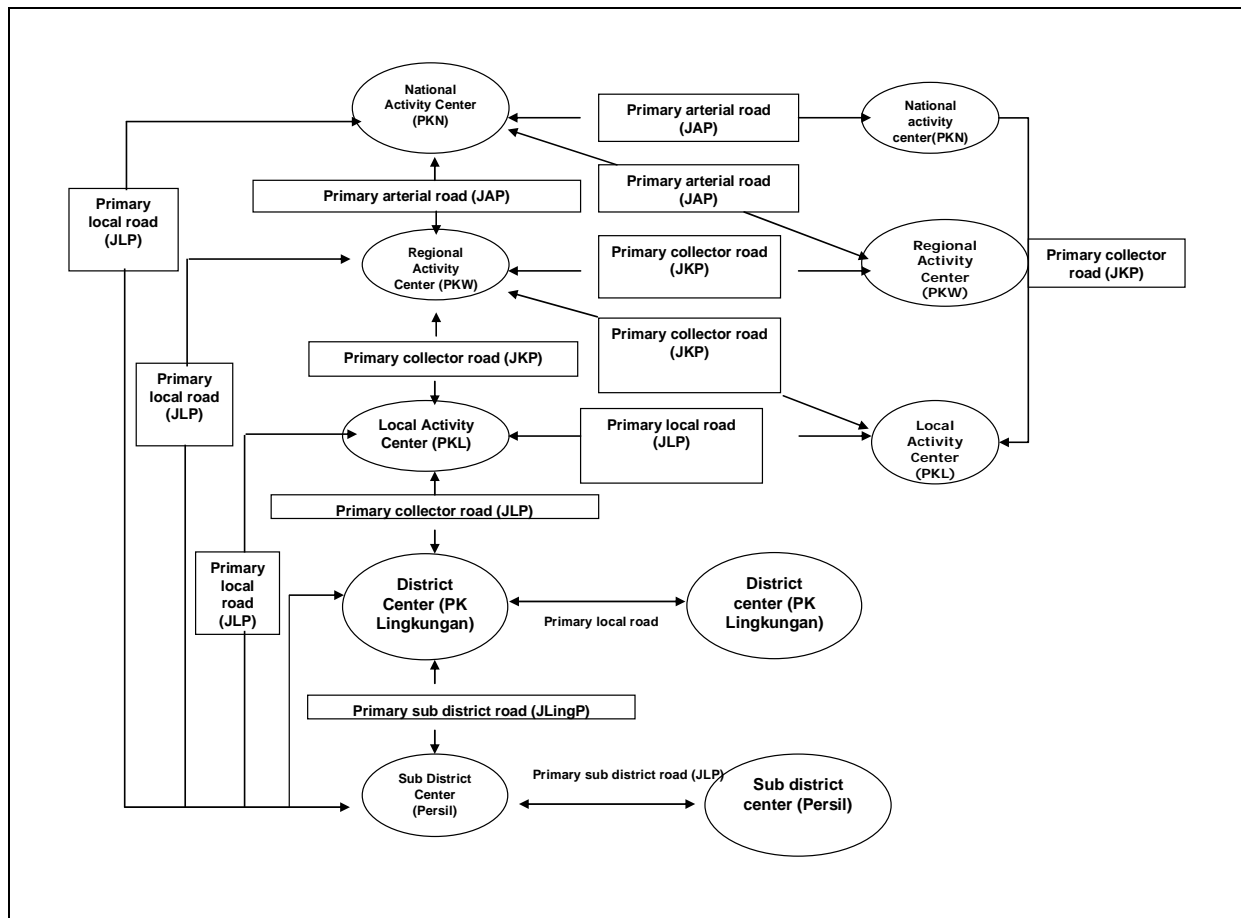
Source: Klasifikasi Jaringan Jalan Menurut Fungsi (Peranan) dan Status (Wewenang Pengaturan), 2006, Ministry of Public Works-Bina Marga- Bina Program

**Table 3.2.2 Functional Classification of Roads**

Function / Role			Status (Road Management Authority)	
<b>Primary Road Network System</b>	<b>Arterial</b>	<b>Decree by Minister of Public Works</b>	<b>Toll Roads</b>	<b>Minister of Public Works</b>
	<b>Collector 1</b>		<b>National Roads</b>	
	<b>Collector 2</b>	<b>Decree by Governor</b>	<b>Provincial Roads</b>	<b>Governor</b>
	<b>Collector 3</b>		<b>District Roads &amp; Rural Roads</b>	
<b>Collector 4</b>	<b>Local</b>	<b>Urban Roads</b>	<b>Chief of Regency and District</b>	
<b>Local</b>				
<b>Secondary Road Network System</b>	<b>Arterial</b>	<b>Local</b>	<b>Urban Roads</b>	<b>Mayor</b>
	<b>Local</b>			

Source: DGH





- Notes: National Activity Center (PKN)  
 Regional Activity Center (PKW)  
 Local Activity Center (PKL)  
 Primary Arterial (AP)  
 Primary Collector (KP)  
 Primary Local (LP)  
 District Activity Center (PK Ling)  
 Subdistrict Center (Persil)

Source: Law No. 38 of 2004 & Governmental Regulation

**Figure 3.2.1 Diagram of the Primary Road Network System**

## (2) Design Standard

### Geometric Design

The Indonesian geometric design standards for highways are established and the standards have been enhanced based on practical examination in Indonesia. Highway classification consisting of highway function, type and class are defined related closely to characteristics of connectivity, traffic condition and land use in Indonesia and selection of the highway classification shall be carefully examined to meet roll of the highways. Following Indonesian geometric standards as well as manual for highway capacity has been applied to planning and design of Indonesian

highways;

- i) Standard Specifications for Geometric Design of Urban Roads, MPW, Indonesia, 1992
- ii) Tata Cara Perencanaan Geometrik Jalan Antar Kota, Direktorat Jenderal Bina Marga, 1997
- iii) Indonesian Highway Capacity Manual, MPW, Indonesia, 1993

The standards are established for inter and intra urban highways and “Standard Specifications for Geometric Design of Urban Roads” provides geometric standard to urban highways in accordance with highway classification as shown in Table 3.2.3.

**Table 3.2.3 Geometric Design Standards (Inter Urban Road Section)**

Road Classification		Type-I		Type-II		
		Class-I	Class-II	Class-I	Class-II	Class-III
Design Speed (km/h)		100 or 80	100 or 60	60	60 or 50	40 or 30
Cross-section	Carriageway Width	3.5m	3.5m	3.5m	3.25m	3.25m, 3.0m
	Median	2.5m	2.0m	2.0m (1.0m)	1.5m (1.0m)	1.5m (1.0m)
	Shoulder Width (Right)	1.0m	0.75m	0.5m	0.5m	0.5m
	Shoulder Width (Left without Side Walk)	2.0m (1.75m)	2.0m (1.75m)	2.0m (1.5m)	2.0m (1.5m)	2.0m (0.5m)
	Sidewalk Width	-	-	3.0m (1.5m)	3.0m (1.5m)	1.5m (1.0m)
Horizontal Alignment	Min. Radius	230m	120m	150m	100m	30m
	Min. Curve Length a; intersection angle (degree)	1,000/a (140m)	700/a (100m)	700/a (100m)	600/a (80m)	350/a (50m)
	Omission of Transition	>1,000m	>600m	>600m	>400m	>150m
Vertical Alignment	Max. Grade	4.0%	5.0%	5.0%	6.0%	8.0%
	Min. Vertical Curve (crest)	3,000m	1,400m	1,400m	800m	250m
	Min. Vertical Curve (sag)	2,000m	1,000m	1,000m	700m	250m

Note: ( ); Exceptional case

“Tata Cara Perencanaan Geometrik Jalan Antar Kota” is established to provide geometric standard to inter urban highways. Geometric design standards for inter urban highways are shown in Table 3.2.4 to Table 3.2.5.

**Table 3.2.4 Geometric Design Standards (Inter Urban Road Section) 1/2**

Road Classification		Arterial			Collector	
		Class-I	Class-II	Class-III A	Class-III A	Class-III B
Max. Axle Load		>10t	10t	8t	8t	<8t
Design Speed (km/h)	Flat	70-120			60-90	
	Rolling	60-80			50-60	
	Mountainous	40-70			30-50	

**Table 3.2.5 Standard Minimum Width (Inter Urban Road Section) 2/2**

ADT	Arterial				Collector			
	Standard		Exceptional		Standard		Exceptional	
	Lane Width(m)	Shoulder Width(m)	Lane Width(m)	Shoulder Width(m)	Lane Width(m)	Shoulder Width(m)	Lane Width(m)	Shoulder Width(m)
<3,000	6.0	1.5	4.5	1.0	6.0	1.5	4.5	1.0
3,000 – 10,000	7.0	2.0	6.0	1.5	7.0	1.5	6.0	1.5
10,001 – 25,000	7.0	2.0	7.0	2.0	7.0	2.0	-	-
>25,000	2n×3.5	2.5	2×7.0	2.0	2n×3.5	2.0	-	-

In 2006, government regulations concerning of roads, PP No. 34 Year 2006 under Act No. 38 Year 2004, was issued by Department of Public Works, Directorate General of Highways and standard minimum width of lane and shoulder of inter urban highway was revised to wider. Directorate General of Highways issued decree No. 42/KPTS/Db/2007 corresponding to the PP No. 34 Year 2006 as shown in Table 3.2.6.

**Table 3.2.6 Standard Minimum Width in 42/KPTS/Db/2007**

Classification	Standard Minimum Width (m)						Remarks
	42/KPTS/Db/2007 Standard			Transition Period			
	Left Shoulder	Lane	Right Shoulder	Left Shoulder	Lane	Right Shoulder	
ARTERIAL	2.0	7.0	2.0	2.5	6.0	2.5	Ongoing projects as well as designing projects may be applied standard width shown in “Transition Period” column in consideration of traffic volume and Tata Cara Perencanaan Geometrik Jalan Antar Kota.
				2.0	6.0	2.0	
COLLECTOR	1.5	6.0	1.5	2.0	5.0	2.0	
				2.5	4.5	2.5	
LOCAL	1.0	5.5	1.0	1.5	4.5	1.5	
				2.0	3.5	2.0	

In comparison with “Tata Cara Perencanaan Geometrik Jalan Antar Kota”, the standard minimum lane width of the arterial and the collector highways are revised from 4.5m to 6.0m, 7.0m. The M/P basically comply with existing geometric design standards for inter and intra urban highways as well as the decree No. 42/KPTS/Db/2007. However, the study team proposes application of

exceptional minimum lane width of 4.5m for a part of provincial collector road because of most of the provincial collector roads are given poor road geometry and huge investment amount in case complying with the decree No. 42/KPTS/Db/2007. Detailed examination results of the exceptional minimum lane application are stated in Appendix 7.

The proposed typical cross sections are shown in Figure 3.2.2 through 3.2.4.

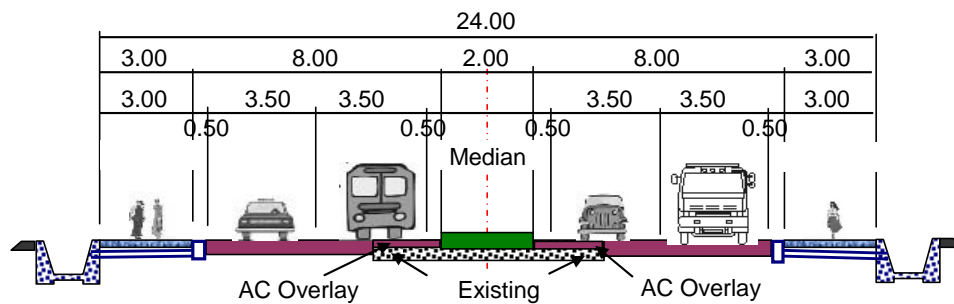


Figure 3.2.2 Typical Cross Sections for Intra Urban Roads

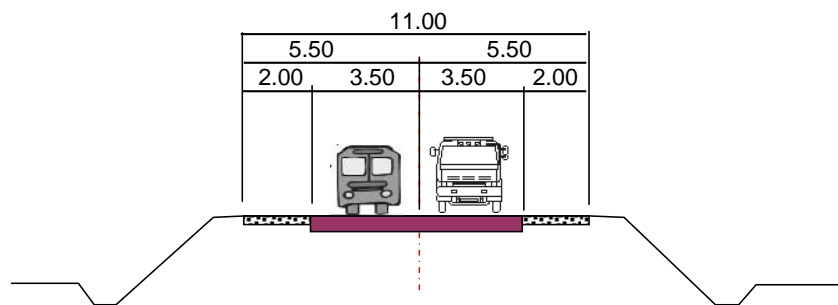


Figure 3.2.3 Typical Cross-sections for Inter-Urban Roads (1)

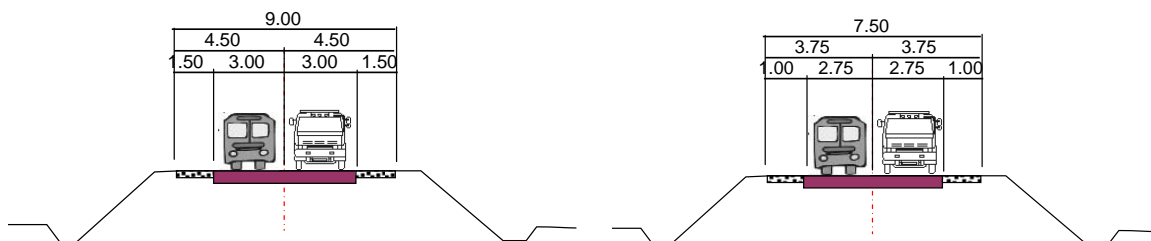


Figure 3.2.4 Typical Cross-sections for Inter-Urban Roads (2)

## Pavement Design

Directorate General of Highways established the Road Design System developed based on the Road Note 31, TRL as follows.

- PtT-01-2002-B (For New Construction)
- PdT-05-2005-B (For Overlay)

Pavement design of the M/P follows the Road Design System.

The summary of pavement design standards is as follows:

<u>Item</u>	<u>Design Criteria</u>
Design Life	10 years
Design Reference	AASHTO Guide for Design of Pavement Structures Manual Pemeriksaan Perkerasan Jalan dengan Alat Benkelman, No. 01/MN/B/1983, Bina Marga (overlay)
Asphalt Concrete Pavement	
Wearing Course	Asphalt Concrete Wearing Course (ACW)
Binder Course	Asphalt Concrete Binder Course (ACB)
Maximum Axle Load	MST 10 ton (Class I, II), MST 8 ton (Class III A, III B)
Design Serviceability Loss	$\Delta \text{PSI} = 4.2 - 2.5 = 1.7$
Reliability Factor (R)	R = 0.90
Standard Deviation (So)	So = 0.35
Vehicle Damage Factor	WIM data
Design CBR	6.0% (If applied, the subgrade strengthens at less than 6%)

## Bridge Design

Following bridge design standards are referred to for examination of bridge type selection in the M/P.

- BMS Bridge Design Code, 1992
- BMS Bridge Design Manual, 1992

### 3.2.2 Existing Road Network System

#### (1) General

Sulawesi's road network is composed of national, provincial, regency roads and other roads. Figure 3.2.5 shows the national and provincial roads, and Table 3.2.7 summarizes their lengths by province. From the standpoint of road function, these roads are differently classified into arterial, collector, local and district roads as presented earlier in Table 3.2.1. National roads cover most of the coastlines except in the eastern peninsula. Until 2004, however, the following routes were classified as provincial roads:

- A. Northwestern coastal route connecting Mamuju and Kwandang (Gorontalo) via Palu.
- B. Southern route in the northern peninsula connecting Gorontalo and Bitung.
- C. Coastline route in the southeastern peninsula connecting Kolaka (Southeast Sulawesi) and Tariqa (Central Sulawesi) via Tinnanggea (Southeast Sulawesi), Kendari, and Kolonadale.
- D. Coastline route in the southern peninsula connecting Makassar and Tarunpaka (South Sulawesi) via Takalar and Bulukumba.
- E. East-west link in Sulawesi Selatan connecting Bangkale and Palopo.
- F. North-south link in Buton Island (Southeast Sulawesi).

**Table 3.2.7 Lengths of National and Provincial Roads by Province, 2005**

Province	Classification				Unit: km
	National Road		Provincial Road		Total
	Arterial	Collector 1	Collector 2	Collector 3	
North Sulawesi	393 19.6%	874 43.5%	734 36.6%	6 0.3%	2,008 100.0%
Gorontalo	312 34.6%	305 33.8%	284 31.6%	0 0.0%	901 100.0%
Central Sulawesi	684 18.1%	1,122 29.7%	1,933 51.1%	44 1.2%	3,783 100.0%
South/West Sulawesi	1,171 32.6%	937 26.1%	1,464 40.7%	22 0.6%	3,594 100.0%
Southeast Sulawesi	434 24.4%	860 48.2%	489 27.4%	0 0.0%	1,783 100.0%
Total	2,994 24.8%	4,097 34.0%	4,904 40.6%	72 0.6%	12,068 100.0%
		7,092 58.8%		4,976 41.2%	12,068

Source: Keputusan Menteri Permukiman Dan Prasarana Wilayah 2005,  
 Number: 375/KPTS/M/2004

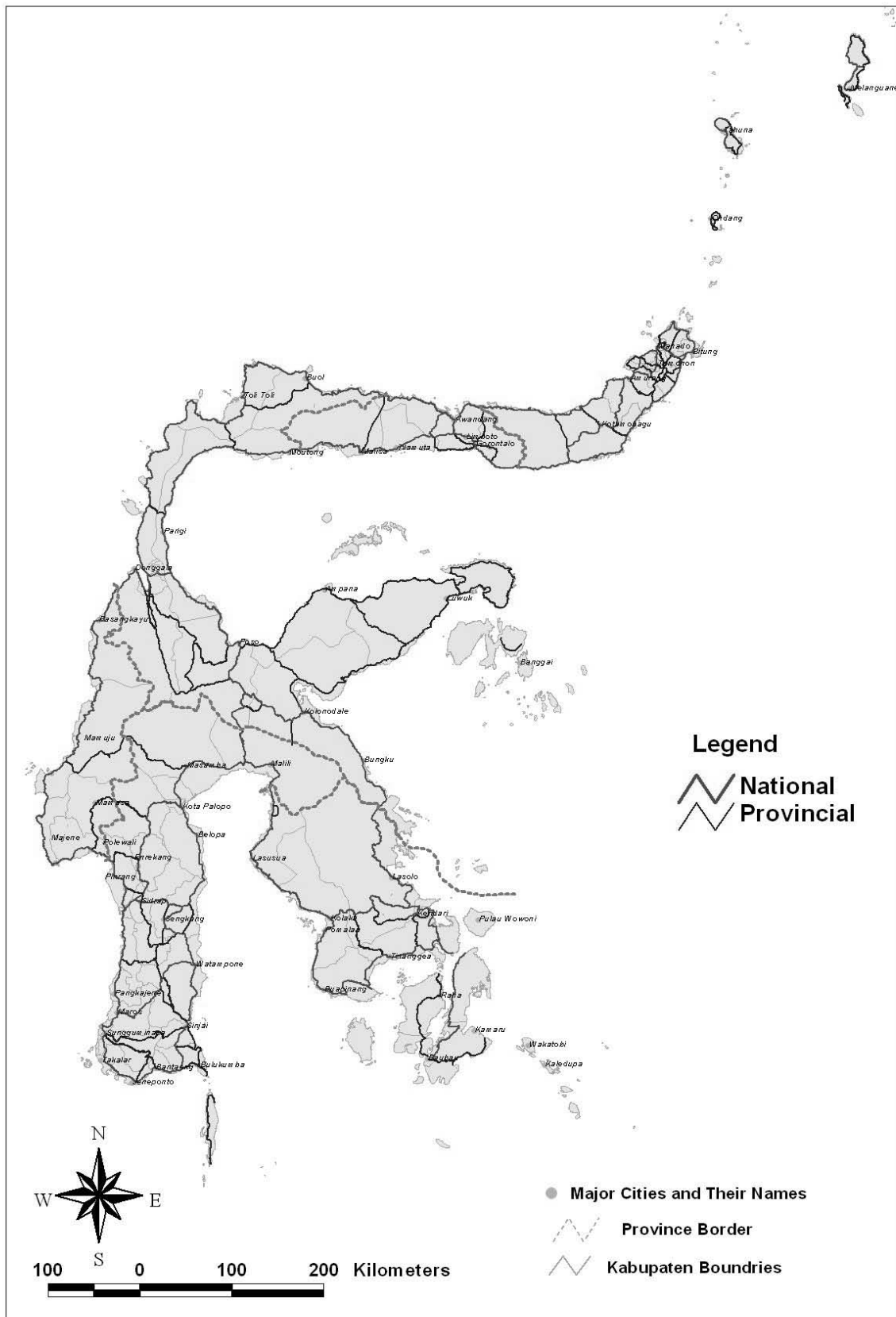


Figure 3.2.5 National and Provincial Road Networks, 2006

**(2) Road Density**

Table 3.2.8 shows the road density in Sulawesi by regency (kabupaten). It includes not only the national and provincial roads but also the regency roads unlike the previous Table 3.2.5. Regency roads, which share about 3/4 of the total roads in terms of length, are mostly farm-to-market roads.

**Table 3.2.8 Road Densities in Sulawesi by Regency, 2003**

No.	Regency Municipality*	Area (km <sup>2</sup> )	Road Length Year 2003 (km)		Road Density Year 2003 (km/km <sup>2</sup> )	
			Total	"Good"	Total	"Good"
<b>SULAWESI TOTAL</b>		<b>191952</b>	<b>37631</b>	<b>19417</b>	<b>0.196</b>	<b>0.101</b>
<b>Sulawesi Utara</b>		<b>15272</b>	<b>3187</b>	<b>1556</b>	<b>0.209</b>	<b>0.102</b>
1	Bolaang Mangondo	8358	1443	445	0.173	0.053
2	Minahasa	4189	773	524	0.185	0.125
3	Sangihe	2264	720	443	0.318	0.196
4	Kota Bitung	304	41	22	0.135	0.072
5	Kota Manado	157	210	122	1.338	0.777
<b>Gorontalo</b>		<b>12215</b>	<b>3974</b>	<b>2282</b>	<b>0.325</b>	<b>0.187</b>
1	Boalemo	6739	1477	749	0.219	0.111
2	Gorontalo	5411	2279	1376	0.421	0.254
3	Kota Gorontalo	65	218	157	3.354	2.415
<b>Sulawesi Tengah</b>		<b>68039</b>	<b>7821</b>	<b>3886</b>	<b>0.115</b>	<b>0.057</b>
1	Banggai	9673	1759	1137	0.182	0.118
2	Banggai Kepulauan	3214	961	605	0.299	0.188
3	Buol	4044	132	27	0.033	0.007
4	Donggala	16704	1166	307	0.070	0.018
5	Morowali	15490	802	172	0.052	0.011
6	Poso	14439	1933	1227	0.134	0.085
7	Toli-toli	4080	638	63	0.156	0.015
8	Kota Palu	395	430	348	1.089	0.881
<b>Sulawesi Selatan</b>		<b>58286</b>	<b>16365</b>	<b>7998</b>	<b>0.281</b>	<b>0.137</b>
1	Bantaeng	396	373	286	0.942	0.722
2	Barru	1175	429	246	0.365	0.209
3	Bone	4559	1213	409	0.266	0.090
4	Bulukumba	1155	495	276	0.429	0.239
5	Enrekang	1786	499	199	0.279	0.111
6	Gowa	1883	892	553	0.474	0.294
7	Jeneponto	738	523	390	0.709	0.528
8	Luwu	3248	2051	728	0.631	0.224
9	Luwu Utara	14448	400	320	0.028	0.022
10	Majene	948	503	218	0.531	0.230
11	Mamuju	11033	307	220	0.028	0.020
12	Maros	1619	773	316	0.477	0.195
13	Pangkajene Kep	1112	640	355	0.576	0.319
14	Pinrang	1962	505	405	0.257	0.206
15	Polewali Mamasa	782	679	110	0.868	0.141
16	Selayar	903	564	222	0.625	0.246
17	Sidenreng Rappang	1883	775	430	0.412	0.228
18	Sinjai	820	631	282	0.770	0.344
19	Soppeng	1359	581	398	0.428	0.293
20	Takalar	567	468	350	0.825	0.617
21	Tana Toraja	3206	1522	591	0.475	0.184
22	Wajo	2506	953	382	0.380	0.152
23	Kota Pare-pare	99	127	67	1.283	0.677
24	Kota Makassar	99	462	245	4.667	2.475
<b>Sulawesi Tenggara</b>		<b>38140</b>	<b>6284</b>	<b>3695</b>	<b>0.165</b>	<b>0.097</b>
1	Buton	6463	997	589	0.154	0.091
2	Kendari	16184	1441	767	0.089	0.047
3	Kolaka	10310	1504	636	0.146	0.062
4	Muna	4887	847	526	0.173	0.108
5	Kota Kendari	296	1495	1177	5.051	3.976

Note: \* Sulawesi Barat was a part of Sulawesi Selatan in 2003.

Source: Studi Rencana Umum Jaringan Transportasi Jalan Purimer Pulau Sulawesi

Sulawesi's road density is generally higher than the national average. However, it varies largely by regency. While all municipalities (or kotas) (Manado, Gorontalo, Palu, Makassar, Parepare, and Kendari) show relatively high road densities, it is very low in most regencies particularly in Central Sulawesi and Southeast Sulawesi. Regencies in South Sulawesi have higher densities due to their flat topography and proximity to Makassar.



### 3.2.3 Existing Road Conditions based on IRMS and other Data

#### (1) Road Widths

Most of the inter-city roads in Sulawesi have 2 lanes with road widths of less than 7 meters. Approximately 5,000 km (71%) of the national roads are less than 5.5 m wide as shown in Table 3.2.9. National roads that were formerly designated as provincial roads and changed to national roads in 2004 have narrow road widths.

**Table 3.2.9 Road Width of National Roads**

Unit: km

Province	Carriageway Width (W)				Total
	<5.5m	5.5m - 8.2m	14.0m	>14.0m	
North Sulawesi	966 76.2%	255 20.1%	32 2.5%	14 1.1%	1,267 100.0%
Gorontalo	546 88.6%	60 9.7%	9 1.5%	1 0.1%	616 100.0%
Central Sulawesi	1,683 93.2%	81 4.5%	40 2.2%	3 0.2%	1,806 100.0%
West Sulawesi	344 62.4%	192 34.9%	15 2.7%	0 0.0%	551 100.0%
South Sulawesi	526 33.8%	927 59.5%	34 2.2%	70 4.5%	1,557 100.0%
Southeast Sulawesi	944 73.0%	325 25.1%	18 1.4%	7 0.5%	1,294 100.0%
Total	5,009 70.6%	1,840 25.9%	148 2.1%	95 1.3%	7,092 100.0%

Source: Balai VI, MPW (Dec,2006)

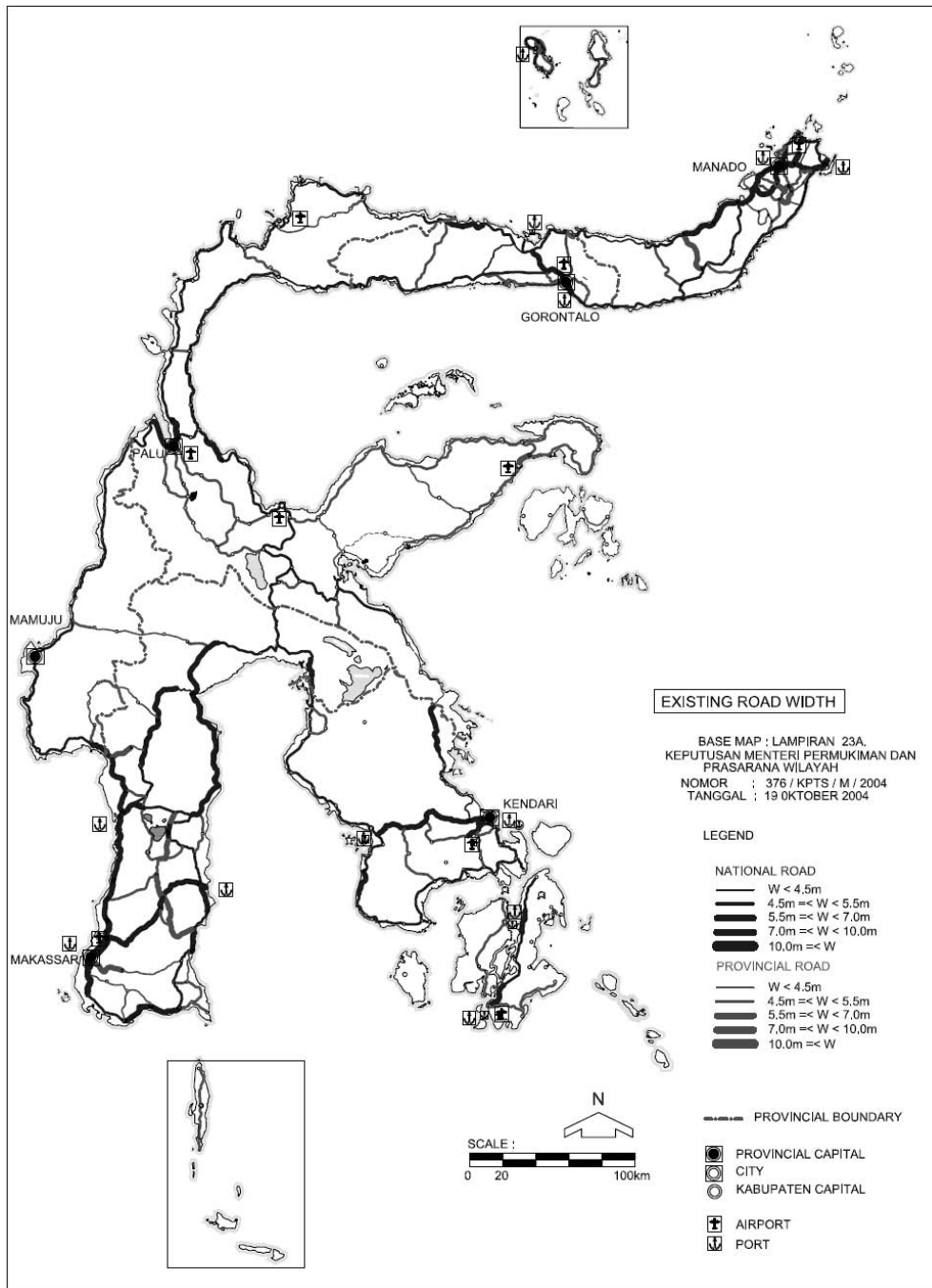
Table 3.2.10 shows estimated road width (carriageway width) for provincial roads. Approximately 76% is less than 4.5 m wide and 16% is 4.6 m–5.4 m wide.

**Table 3.2.10 Road Width of Provincial Roads**

Province	Carriageway Width (W)					Total
	=<4.5m	4.6m-5.4m	5.5m-6.9m	7.0m-9.9m	>=10m	
North Sulawesi	600 81%	37 5%	88 12%	6 1%	10 1%	741 100%
Gorontalo	237 83%	38 14%	8 3%	0 0%	0 0%	284 100%
Central Sulawesi	1,673 85%	259 13%	20 1%	14 1%	9 0%	1,976 100%
South/West Sulawesi	831 56%	416 28%	232 16%	7 0%	0 0%	1,486 100%
Southeast Sulawesi	423 87%	40 8%	24 5%	1 0%	0 0%	489 100%
Total	3,764 76%	791 16%	373 7%	29 1%	19 0%	4,976 100%

Source: JICA Study Team estimated based on IRMS Data (Year 2005)

Figure 3.2.6 shows road width distribution. This figure was made based on the IRMS database provided by Bina Marga and information provided by Balai Besar VI. See Appendix 6 for details by province.



Source: IRMS and Balai

**Figure 3.2.6 Road Width Distribution, 2006**

**(2) Surface Type**

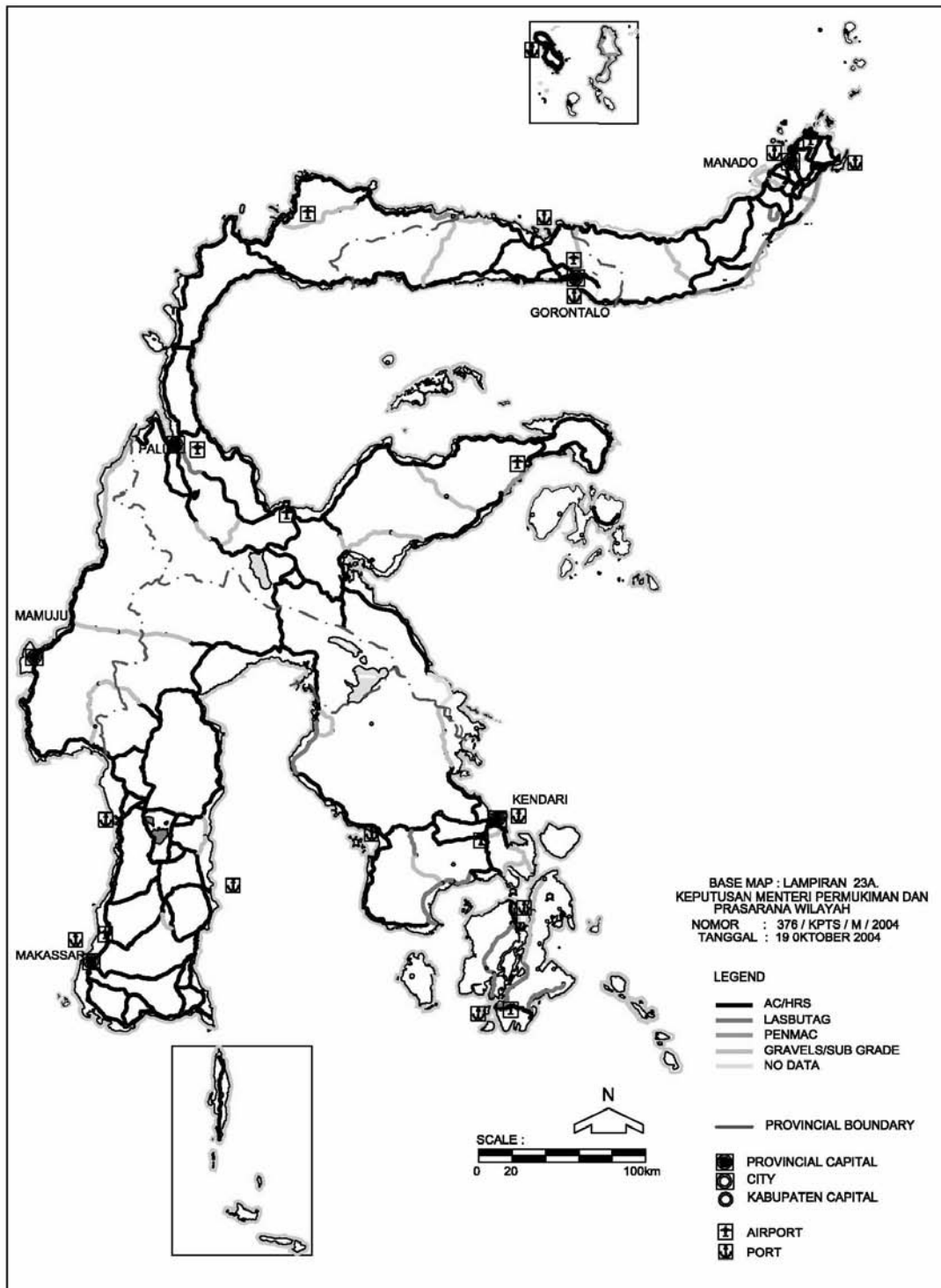
Regarding surface type, 80% of national roads are paved road (AC, HRS and LASBUTAG/BUTAS) and 20% is gravel road. For provincial roads, approximately 70% are paved and 30% are gravel or soil road as shown in Table 3.2.11. See Appendix 6 for details by province.

**Table 3.2.11 Road Surface Type of National and Provincial Roads**

Unit: km

Province	National Road					Provincial Road				
	Asphalt	Gravel	Soil	Others	Total	Asphalt	Gravel	Soil	Others	Total
North Sulawesi	1,260	7	0	0	1,267	600	141	0	0	741
	99.4%	0.6%	0.0%	0.0%	100.0%	81.0%	19.0%	0.0%	0.0%	100.0%
Gorontalo	616	0	0	0	616	272	12	0	0	284
	100.0%	0.0%	0.0%	0.0%	100.0%	95.8%	4.2%	0.0%	0.0%	100.0%
Central Sulawesi	1,614	193	0	0	1,807	1,438	360	174	4	1,976
	89.3%	10.7%	0.0%	0.0%	100.0%	72.8%	18.2%	8.8%	0.2%	100.0%
South/West Sulawesi	1,221	887	0	0	2,108	892	341	244	9	1,486
	57.9%	42.1%	0.0%	0.0%	100.0%	60.0%	22.9%	16.4%	0.6%	100.0%
Southeast Sulawesi	928	366	0	0	1,294	251	198	40	0	489
	71.7%	28.3%	0.0%	0.0%	100.0%	51.3%	40.5%	8.2%	0.0%	100.0%
Total	5,639	1,453	0	0	7,092	3,453	1,052	458	13	4,976
	79.5%	20.5%	0.0%	0.0%	100.0%	69.4%	21.1%	9.2%	0.3%	100.0%
				20.5%		69.4%			30.6%	

Source: Transportation and Communication Statistics 2005, MOC



Source: IRMS and Balai

**Figure 3.2.7 Road Distribution by Surface Type, 2006**

**(3) Road Condition of National and Provincial Roads**

National roads in Sulawesi are relatively well maintained as shown in Table 3.2.12. This is mainly due to the road improvement projects financed by various donor agencies mentioned earlier in Section 3.1.2 and the national budget (APBN). Those previously designated as provincial roads,

however, still have poorly maintained sections. See Appendix 6 for details by province.

**Table 3.2.12 Road Condition of National Roads**

Unit: km

Province	Condition (2005)*					Condition (2007)*					
	Good	Fair	Poor	Bad	Total	Good	Fair	Poor	Bad	Total	
North Sulawesi	486	363	228	190	1,267	886	137	193	51	1,267	
	38.4%	28.7%	18.0%	15.0%	100.0%	69.9%	10.8%	15.2%	4.1%	100.0%	
Gorontalo	373	186	51	6	616	180	358	25	53	616	
	60.6%	30.2%	8.3%	1.0%	100.0%	29.2%	58.1%	4.1%	8.6%	100.0%	
Central Sulawesi	850	630	150	177	1,807	687	589	351	181	1,807	
	47.0%	34.9%	8.3%	9.8%	100.0%	38.0%	32.6%	19.4%	10.0%	100.0%	
West Sulawesi						160	137	64	190	552	
						29.1%	24.9%	11.6%	34.5%	100.0%	
South Sulawesi	1,509	446	84	69	2,108	997	496	42	21	1,556	
	71.6%	21.2%	4.0%	3.3%	100.0%	64.1%	31.9%	2.7%	1.3%	100.0%	
Southeast Sulawesi	482	499	98	215	1,294	380	514	276	124	1,294	
	37.2%	38.6%	7.6%	16.6%	100.0%	29.3%	39.7%	21.4%	9.6%	100.0%	
Total	3,700	2,124	611	657	7,092	3,290	2,230	951	620	7,092	
	52.2%	29.9%	8.6%	9.3%	100.0%	46.4%	31.5%	13.4%	8.7%	100.0%	

Sources: \* Transportation and Communication Statistics 2005, MOC

\*\* Balai VI, MPW (Dec,2006)

Table 3.2.13 shows the road condition of provincial roads in 2005 and 2007. Approximately 60% are in good/fair condition and 40% are in poor/bad condition. The road condition of provincial roads is considerably poor compared with national roads.

**Table 3.2.13 Road Condition of Provincial Roads**

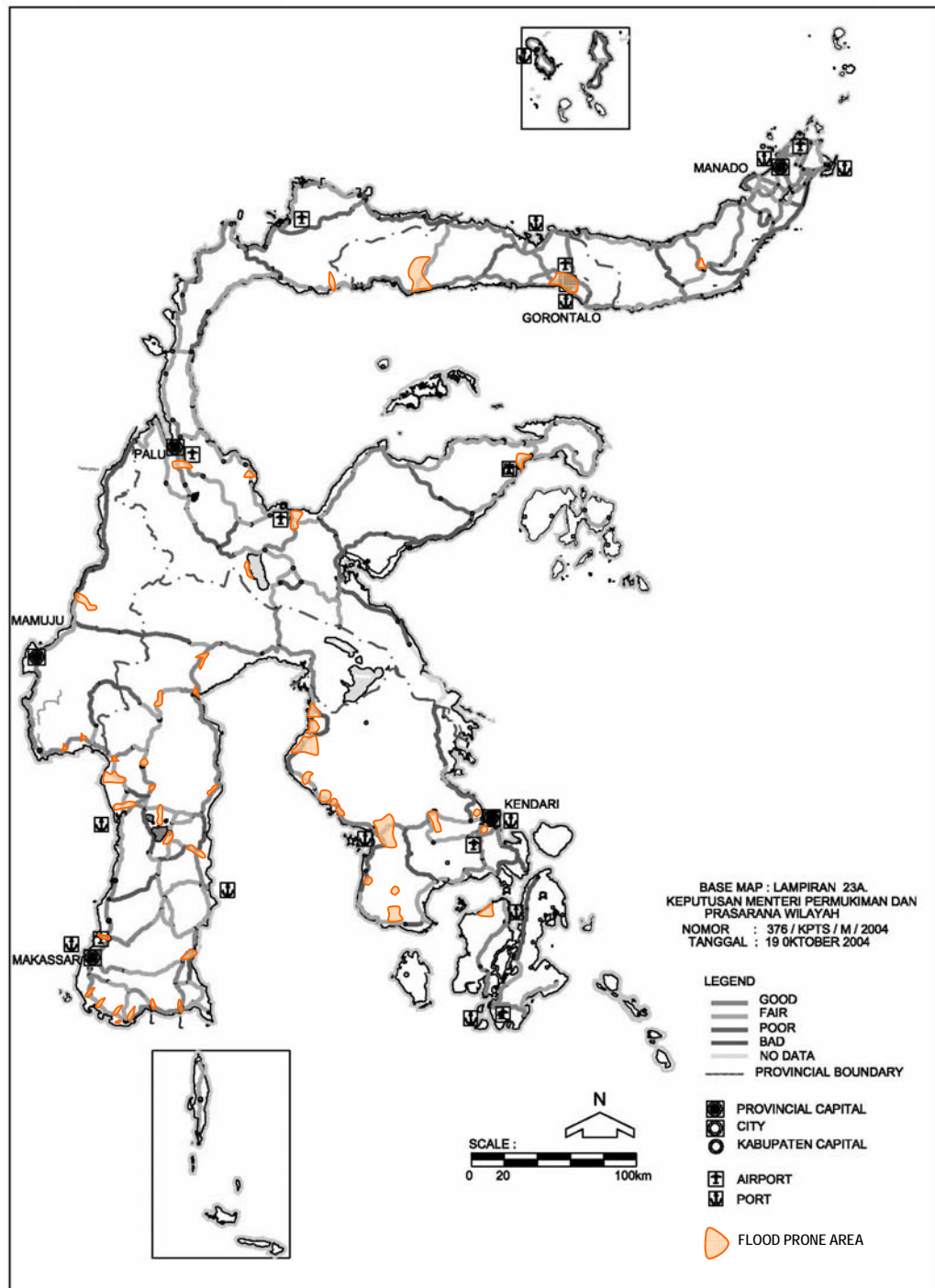
Unit: km

Province	Condition (2005)*					Condition (2007)**					Length Increase		
	Good	Fair	Poor	Bad	Total	Good	Fair	Poor	Bad	Total	km	%	
North Sulawesi	181	275	139	146	741	342	143	223	33	741	0	100%	
	24.4%	37.1%	18.8%	19.7%	100.0%	46.2%	19.3%	30.1%	4.5%	100.0%			
Gorontalo	79	46	24	135	284	72	48	91	104	315	31	111%	
	27.8%	16.2%	8.5%	47.5%	100.0%	22.8%	15.2%	28.9%	33.2%	100.0%			
Central Sulawesi	896	458	380	242	1,976	243	1,044	302	448	2,037	61	103%	
	45.3%	23.2%	19.2%	12.2%	100.0%	11.9%	51.3%	14.8%	22.0%	100.0%			
West Sulawesi						150	126	100	205	581			
						25.7%	21.8%	17.2%	35.3%	100.0%			
South Sulawesi	300	338	175	673	1,486	238	545	238	189	1,209	304	120%	
	20.2%	22.7%	11.8%	45.3%	100.0%	19.6%	45.0%	19.7%	15.6%	100.0%			
Southeast Sulawesi	80	228	75	106	489	136	386	262	159	943	454	193%	
	16.4%	46.6%	15.3%	21.7%	100.0%	14.4%	40.9%	27.8%	16.9%	100.0%			
Total	1,536	1,345	793	1,302	4,976	1,180	2,292	1,216	1,138	5,826	850	117%	
	30.9%	27.0%	15.9%	26.2%	100.0%	20.3%	39.3%	20.9%	19.5%	100.0%			

Sources: \* Transportation and Communication Statistics 2005, MOC

\*\* Dinas PU Province (Sep,2007)

The total length of provincial road as of September 2007 was increased by about 17% compared with that in 2005 since provincial government designated new links or upgraded some regency roads to be provincial roads.



Source: IRMS, Balai and Direktorat Jenderal Perhubungan Darat

**Figure 3.2.8 Road Distribution by Maintenance Condition, 2006**

#### (4) Road Condition of Regency (Kabupaten) Roads

In addition to national and provincial roads, there are also regency (kabupaten) roads used for daily life/activities performed in the regency. The total length of regency road network is 43,864km, and this accounts for about 3.7 times of the total of national and provincial roads.

Table 3.2.14 summarizes the surface type and condition of regency (kabupaten) roads by province

in Sulawesi. According to this data as of 2005, about 59% of roads are not paved by asphalt concrete and about 44% are in poor/bad condition. Since regency roads are essential for the life of local residents, it will become an important issue in the future to improve them.

It is noted that the pavement ratio is low with inferior road condition particularly in West Sulawesi.

**Table 3.2.14 Road Surface Types and Conditions of Regency (Kabupaten) Roads, 2005**

Unit: km

Province	Surface Type					Condition				
	Asphalt	Gravel	Soil	Others	Total	Good	Fair	Poor	Bad	Total
North Sulawesi	2,334 66.9%	1,040 29.8%	116 3.3%	0 0.0%	3,490 100.0%	1,108 31.7%	1,216 34.8%	899 25.8%	267 7.7%	3,490 100.0%
Gorontalo	1,514 61.8%	340 13.9%	470 19.2%	126 5.1%	2,450 100.0%	1,114 45.5%	140 5.7%	448 18.3%	748 30.5%	2,450 100.0%
Central Sulawesi	2,924 36.5%	2,853 35.6%	1,920 24.0%	309 3.9%	8,006 100.0%	3,085 38.5%	1,825 22.8%	1,410 17.6%	1,686 21.1%	8,006 100.0%
West Sulawesi	961 20.0%	1,432 29.8%	2,408 50.2%	0 0.0%	4,801 100.0%	760 15.8%	731 15.2%	2,155 44.9%	1,154 24.0%	4,801 100.0%
South Sulawesi	8,475 45.0%	5,132 27.3%	4,389 23.3%	830 4.4%	18,826 100.0%	5,389 28.6%	5,390 28.6%	3,255 17.3%	4,793 25.5%	18,826 100.0%
Southeast Sulawesi	1,719 27.3%	2,939 46.7%	1,432 22.8%	201 3.2%	6,291 100.0%	1,991 31.6%	1,756 27.9%	1,058 16.8%	1,486 23.6%	6,291 100.0%
Total	17,927 40.9%	13,736 31.3%	10,735 24.5%	1,466 3.3%	43,864 100.0%	13,447 30.7%	11,058 25.2%	9,225 21.0%	10,134 23.1%	43,864 100.0%
				59.1%			55.9%		44.1%	

Source: Transportation and Communication Statistics 2005, MOC

### 3.2.4 Existing Bridge Conditions based on the IBMS and Other Information

In Sulawesi, there are 3,344 bridges on national roads with approximately total length of 55km and 2,523 bridges on provincial roads with approximately total length of 38km at present. Most of them are small, short bridges of less than 30m length. However, 65 bridges or 2% for national roads and 24 bridges or 1% for provincial roads are long with more than 100m length.

**Table 3.2.15 Number of Bridges on National Roads by Province and Length, 2006**

Province	Length												No. of Bridges of Unknown Lengths	Total
	< 10m		10-30m		30-60m		60-100m		100m <		Subtotal			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
North Sulawesi	299	51	186	32	81	14	11	2	9	2	586	100	5	591
Gorontalo	131	46	109	38	36	13	5	2	3	1	284	100	0	284
Central Sulawesi	513	56	287	31	85	9	20	2	20	2	925	100	0	925
West Sulawesi	107	39	102	37	47	17	10	4	11	4	277	100	0	277
South Sulawesi	396	57	172	25	85	12	28	4	13	2	694	100	0	694
Southeast Sulawesi	298	52	218	38	41	7	7	1	9	2	573	100	0	573
<b>Total</b>	<b>1,744</b>	<b>52</b>	<b>1,074</b>	<b>32</b>	<b>375</b>	<b>11</b>	<b>81</b>	<b>2</b>	<b>65</b>	<b>2</b>	<b>3,339</b>	<b>100</b>	<b>5</b>	<b>3,344</b>

Source: IBMS

**Table 3.2.16 Number of Bridges on Provincial Roads by Province and Length, 2006**

Province	Length												No. of Bridges of Unknown Lengths	Total
	< 10m		10-30m		30-60m		60-100m		100m <		Subtotal			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
North Sulawesi	241	63	112	29	25	7	3	1	1	0	382	100	0	382
Gorontalo	16	57	11	39	1	4	0	0	0	0	28	100	26	54
Central Sulawesi	443	57	256	33	56	7	14	2	12	2	781	100	1	782
West Sulawesi	62	70	16	18	9	10	1	1	0	0	88	100	0	88
South Sulawesi	453	66	177	26	36	5	13	2	4	1	683	100	1	684
Southeast Sulawesi	281	53	191	36	45	8	9	2	7	1	533	100	0	533
<b>Total</b>	<b>1,496</b>	<b>60</b>	<b>763</b>	<b>31</b>	<b>172</b>	<b>7</b>	<b>40</b>	<b>2</b>	<b>24</b>	<b>1</b>	<b>2,495</b>	<b>100</b>	<b>28</b>	<b>2,523</b>

Source: IBMS

As for the conditions of the bridges, about 64% for national roads and 71% for provincial roads are no damage/good, and 26% for national roads and 13% for provincial roads are fair/poor. However, these data are only for the bridges that were surveyed. If the unsurveyed bridges were included, these percentages would have changed considerably.

**Table 3.2.17 Number of Bridges on National Roads by Province and Condition, 2006**

Province	No Damage/Good	Fair/Poor	Bad/Very Bad	Wooden/Unknown	Total
North Sulawesi	399 (67.5%)	109 (18.4%)	41 (6.9%)	42 (7.1%)	591 (100%)
Gorontalo	271 (95.4%)	10 (3.5%)	3 (1.1%)	0 (0%)	284 (100%)
Central Sulawesi	496 (53.6%)	381 (41.2%)	40 (4.3%)	8 (0.9%)	925 (100%)
West Sulawesi	178 (64.3%)	43 (15.5%)	20 (7.2%)	36 (13.0%)	277 (100%)
South Sulawesi	489 (70.5%)	194 (28.0%)	11 (1.6%)	0 (0%)	694 (100%)
South East Sulawesi	308 (53.8%)	140 (24.4%)	75 (13.1%)	50 (8.7%)	573 (100%)
<b>Total</b>	<b>2,141 (64.0%)</b>	<b>877 (26.2%)</b>	<b>190 (5.7%)</b>	<b>136 (4.1%)</b>	<b>3,344 (100%)</b>

Source: IBMS

**Table 3.2.18 Number of Bridges on Provincial Roads by Province and Condition, 2006**

Province	No Damage/Good	Fair/Poor	Bad/Very Bad	Wooden/Unknown	Total
North Sulawesi	272 (71.2%)	51 (13.4%)	1 (0.3%)	58 (15.2%)	382 (100%)
Gorontalo	21 (38.9%)	0 (0%)	33 (61.1%)	0 (0%)	54 (100%)
Central Sulawesi	726 (92.8%)	9 (1.2%)	0 (0%)	47 (6.0%)	782 (100%)
West Sulawesi	63 (71.6%)	22 (25.0%)	2 (2.3%)	1 (1.1%)	88 (100%)
South Sulawesi	476 (69.6%)	127 (18.6%)	56 (8.2%)	25 (3.6%)	684 (100%)
South East Sulawesi	242 (45.4%)	117 (22.0%)	69 (12.9%)	105 (19.7%)	533 (100%)
<b>Total</b>	<b>1,800 (71.3%)</b>	<b>326 (12.9%)</b>	<b>161 (6.4%)</b>	<b>236 (9.4%)</b>	<b>2,523 (100%)</b>

Source: IBMS

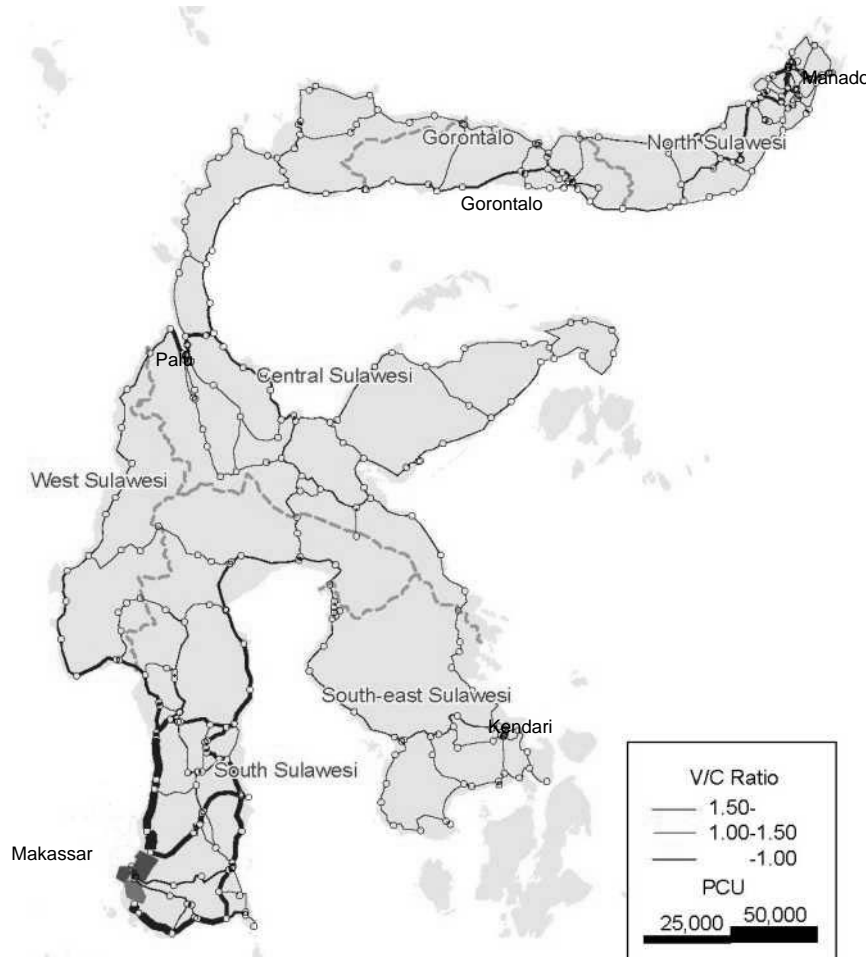


### 3.2.5 Road Traffic based on the IRMS and Study Team's Estimate

Figure 3.2.9 shows the distribution of traffic volumes in terms of PCUs/day. This was compiled from the IRMS 2006 and the estimate of the Study Team.

- A. Most national roads have a traffic volume of less than 3,000 PCUs/day.
- B. In Manado, Makassar, and other municipalities, traffic volumes exceed 5,000 PCUs/day.
- C. Road sections having more than 10,000 PCUs/day are seen only in the urban areas of Manado, Makassar, and Kendari.

In addition, traffic count surveys and roadside interviews were conducted at various stations in Sulawesi. Survey results and analysis are summarized in Chapter 7 of this report.



Source: JICA Study Team

**Figure 3.2.9 Present Traffic Volumes, 2007 (All Vehicles)**

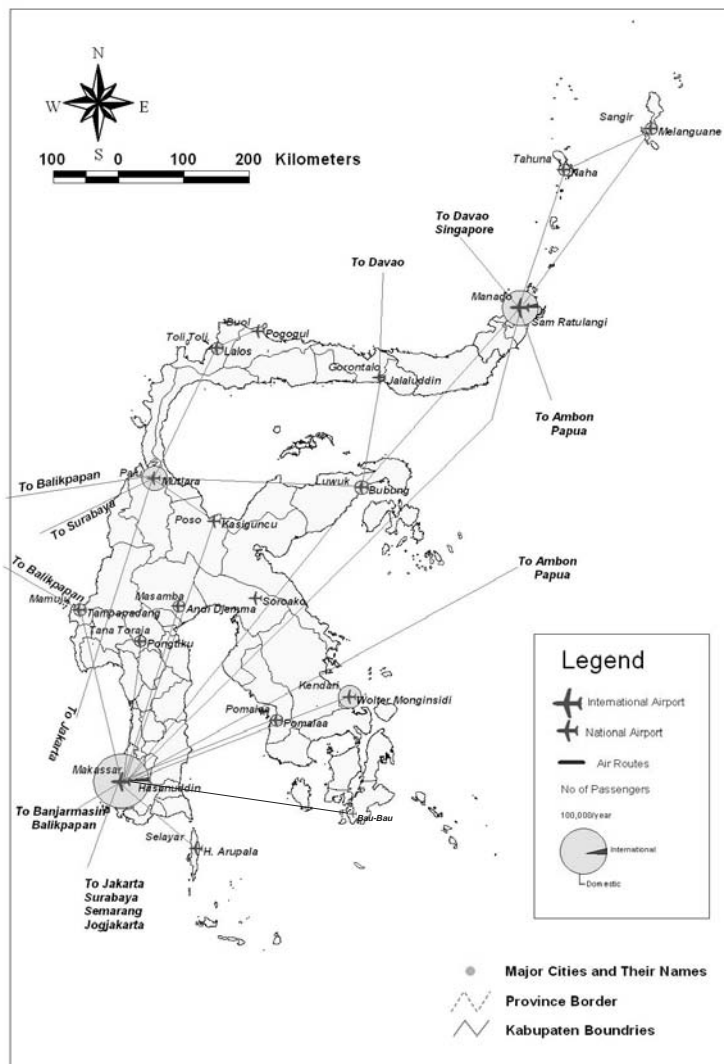
### 3.3 Air and Maritime Transportation

#### 3.3.1 Air

Figure 3.3.1 illustrates the current air routes by airport in Sulawesi.

In Sulawesi, air traffic volume has increased dramatically after 2000. This is mainly due to the open-sky policy adopted in 1999 and the consequent fare reduction. It is said that the maritime industry was seriously affected by the stiff competition from the air transport industry.

In 2005, Hasanuddin Airport in Makassar handled about 2.6 million domestic passengers which is about 60% of Sulawesi's total air traffic volume that year. Sam Ratulangi Airport in Manado handled the second-largest domestic passenger volume, at about 0.9 million (about 20%). Although the handling volume in other airports is still small, they show the same trend of rapid growth. In addition, international flights are now available from Makassar and Manado (and Gorontalo by 2007) to Singapore, Davao, etc.



Source: JICA Study Team

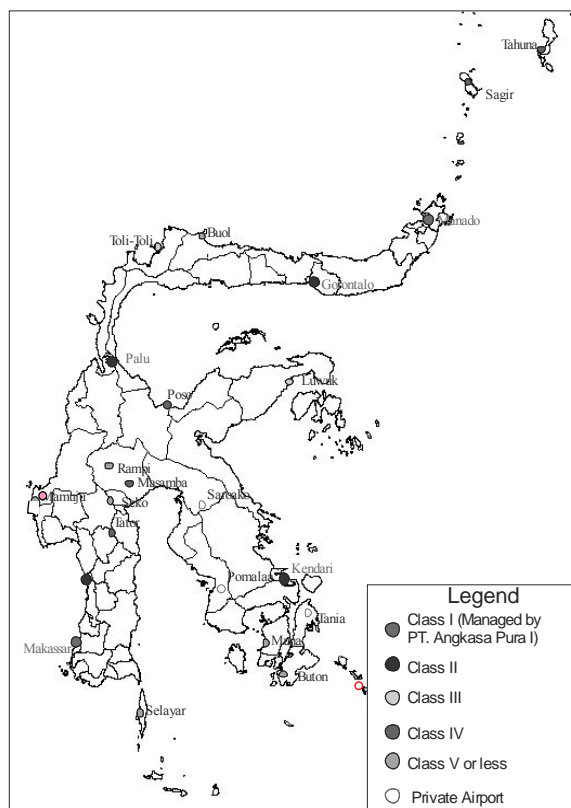
**Figure 3.3.1 Present Air Routes in Sulawesi, 2007**

### **Airport Facility**

Air transportation is essential to Indonesia, a populated archipelago without an effective interisland mode of transport. In 2004, there were 209 domestic routes which connected 99 cities. There are four major international airports in Indonesia, namely Soekarno Hatta as the national gateway, Bali as the international tourism gateway, and Surabaya and Medan, the entry points for secondary commercial centers.

The domestic air transport demand is highly concentrated in Jakarta. It is the center of air travel in Indonesia which reflects the prime status of this metropolis. Surabaya, Medan, Balikpapan, and Makassar have large air transport demands that justify their status as secondary domestic airport hubs.

There are three parties in airport management in Indonesia, namely the Directorate General of Air Communications (DGAC), PT. Angkasa Pura I (AP-I), and PT. Angkasa Pura (AP-II). There are 188 airports, of which 165 airports are managed by DGAC, 13 by AP-I, and 10 by AP-II, as shown in Table 3.3.1.



Source: Direktorat Jenderal Perhubungan Udara

**Figure 3.3.2 Location Map of Airports in Sulawesi, 2006**

**Table 3.3.1 Airports Managed by AP-I and AP-II, 2006**

No.	PT. Angkasa Pura I (AP-I)	PT. Angkasa Pura (AP-II)
1	Bali	Jakarta - Soekarno Hatta
2	Surabaya	Jakarta - Halim Perdana Kusuma
3	Makassar	Palembang
4	Balikpapan	Pontianak
5	Biak	Medan
6	Manado	Padang
7	Yogyakarta	Pekanbaru
8	Solo	Bandung
9	Banjarmasin	Banda Aceh
10	Semarang	Tanjung Pinang
11	Ambon	-
12	Mataram	-
13	Kupang	-

Source: Direktorat Jenderal Perhubungan Udara

In Sulawesi, there are 22 airports. Two airports are managed by AP-I, namely Hasanuddin Airport in Makassar and Sam Ratulangi Airport in Manado. Seventeen airports are managed by DGAC and 3 are owned by private companies, namely PT. Aneka Tambang Pomalaa, PT. Inco in Soroako and PT. Wakatobi Resort. Details on the 22 airports in Sulawesi are summarized in Table 3.3.2.

In terms of function, Sam Ratulangi Airport (Manado) and Hasanuddin Airport (Makassar) are airport hubs, while Jalaluddin-Gorontalo, Mutiara-Palu, Wolter Monginsidi-Kendari, and Bubung-Luwuk are secondary airports in Sulawesi. Airports with class IV and V classification are local routes in Sulawesi.

Hasanuddin Airport (Makassar) has 18 domestic flight routes, Sam Ratulangi Airport (Manado) has 9, and Mutiara Airport (Palu) has 5. While the Sam Ratulangi Airport has 2 international routes, Hasanuddin Airport has 6 local routes serving Tampa Padang Airport-Mamuju, Pongtiku-Tana Toraja, Andi Jemma-Masamba, H. Aeropala-Selayar, Soroako, and Pomalaa.

The detailed description of the major airports in terms of: (1) airport facilities, (2) passenger and cargo traffic, (3) future development plan, (4) airport operation issues, and (5) accessibility are summarized in Appendix 2.

**Table 3.3.2 Airports in Sulawesi, 2006**

No.	Name of Airport	Location	Class	Number of Routes		
				International	Domestic	Pioneer
1	Sam Ratulangi	Manado	I	2	9	2
2	Naha	Tahuna	IV	-	-	2
3	Melanggoaena	Sangir	III	-	-	2
4	Jalaluddin	Gorontalo	II	-	3	-
5	Mutiara	Palu	II	-	4	2
6	Bubung	Luwuk	III	-	3	-
7	Lalos	Tolitoli	IV	-	-	1
8	Pogogul	Buol	-	-	-	1
9	Kasiguncu	Poso	IV	-	-	2
10	Wolter Mongisidi	Kendari	II	-	2	-
11	Beto Ambari	Buton	V	-	-	1
12	Sugi Manuru	Muna	V	-	-	-
13	Pomalaa	Pomalaa	Private	-	1	-
14	Tampa Padang	Mamuju	III	-	1	1
15	Hasanuddin	Makassar	I	1	18	6
16	Pongtiku	Tator	IV	-	-	1
17	Andi Jemma	Masamba	IV	-	-	2
18	H. Aroepala	Selayar	-	-	-	1
19	Seko	Seko	-	-	-	1
20	Rampi	Rampi	-	-	-	-
21	Soroako	Soroako	Private	-	1	-
22	Maranggo	Tania	Private	-	-	1

Source: Direktorat Jenderal Perhubungan Udara

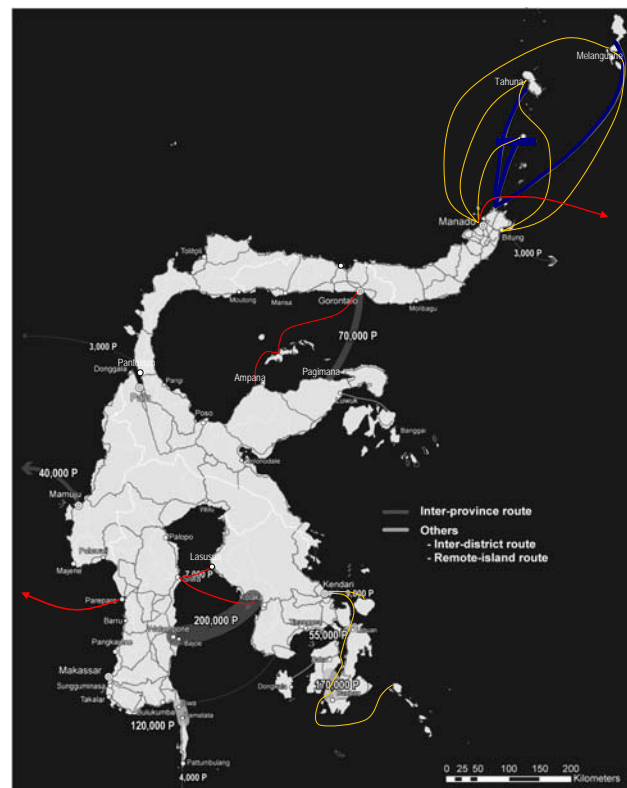
### 3.3.2 Maritime

#### (1) Intra-island Passenger Traffic by Ship

Maritime transportation, which connects islands separated by gulf, straits, and rivers, is one of the most important transportation systems in Indonesia for vehicles, passengers, and cargoes.

The PT. ASDP, a public corporation under the control of the Ministry of Communication (MOC), and the private shipping lines licensed from DGLT or KANWIL are fully in charge of the ferry operations all over Indonesia.

In its initial stage, the ferry transportation service started only in a few ports in Sulawesi particularly in Bajoe (South Sulawesi), Kolaka and Torobulu-Tompo (Southeast Sulawesi), Bitung (North Sulawesi), and Bira-Pamatata (South Sulawesi). Today there are 28 ferry ports consisting of 12 interprovincial ports and 16 interregional ports, as shown in Table 3.3.3. Moreover, there are 19 routes servicing 8 interprovincial routes, 7 intraprovincial routes and 4 interregional routes, as shown in Figure 3.3.4.



Source: PT. ASDP / Site Survey by JICA Study Team

**Figure 3.3.3 Ferry Operation in Sulawesi, 2006**

Today there are 28 ferry ports consisting of 12 interprovincial ports and 16 interregional ports, as shown in Table 3.3.3. Moreover, there are 19 routes servicing 8 interprovincial routes, 7 intraprovincial routes and 4 interregional routes, as shown in Figure 3.3.4.

**Table 3.3.3 List of Ferry Ports in Sulawesi, 2006**

No	Name of Ferry Port	Province of Sulawesi	Route <sup>1)</sup>	No	Name of Ferry Port	Province of Sulawesi	Route <sup>1)</sup>
1	Bajoe	South	I/P	15	Langgara	Southeast	I/R
2	Siwa	South	I/P	16	Torobulu	Southeast	I/R
3	Kolaka	Southeast	I/P	17	Tampo	Southeast	I/R
4	Lasusua	Southeast	I/P	18	Bau-Bau	Southeast	I/R
5	Tondasi	Southeast	I/P	19	Waara	Southeast	I/R
6	Taipa	Central	I/P	20	Mawasangka	Southeast	I/R
7	Pagimana	Central	I/P	21	Dongkala	Southeast	I/R
8	Mamuju	West	I/P	22	Luwuk	Central	I/R
9	Bitung	North	I/P	23	Salakan	Central	I/R
10	Gorontalo	Gorontalo	I/P	24	Banggai	Central	I/R
11	Pattumbulang	South	I/P	25	Pananaru	North	I/R
12	Bira	South	I/P	26	Melonggoane	North	I/R
13	Pamatata	South	I/R	27	Siau	North	I/R
14	Kendari	Southeast	I/R	28	P. Lembeh	North	I/R

Source: PT. ASDP

1) I/P: Interprovincial port, I/R: Interregional port

Table 3.3.4 shows the number of passengers transported by ferry within Sulawesi. In 2005, it was

recorded that around 1.5 million passengers were carried by ferry.

**Table 3.3.4 Passenger Traffic Volume in 12 Interprovincial Ports**

No.	Port	2001	2002	2003	2004	2005
1	Bajoe	414,388	438,950	276,011	265,584	208,976
2	Siwa	-	-	-	-	7,846
3	Kolaka	391,276	415,022	268,977	254,321	289,587
4	Lasusua	-	-	-	-	6,321
5	Tondasi	-	-	-	-	384
6	Taipa	-	2,589	3,746	3,695	2,659
7	Pagimana	114,535	78,231	67,298	70,247	70,623
8	Mamuju	71,271	51,694	53,169	40,867	38,299
9	Bitung	9,997	6,786	10,399	14,964	17,388
10	Gorontalo	114,535	78,231	67,298	70,247	70,623
11	Pattumbukang	-	-	-	-	4,397
12	Bira	102,101	103,287	104,324	105,324	111,912
13	Pamatata	113,452	114,511	123,725	124,129	134,514
14	Kendari	21,381	12,529	13,587	9,436	12,269
15	Langgara	16,682	8,970	10,892	6,986	9,347
16	Torobulu	92,369	85,815	79,269	51,129	58,007
17	Tampo	73,761	67,210	76,184	53,330	53,486
18	Bau-bau	35,153	40,692	78,992	124,997	194,090
19	Waara	36,965	40,692	67,771	127,110	165,960
25	Pananaru	1,580	1,550	1,109	2,010	2,890
26	Melonggoane	-	-	-	-	3,549
27	Siau	-	-	-	-	253
28	P.Lembeh	-	-	5,312	11,895	5,461
Sulawesi Total		1,609,446	1,546,759	1,308,063	1,336,271	1,468,841

Source : Laporan Tahunan Dishub Provinsi, 2005

Table 3.3.5 shows the number of vehicles and cargo volume transported by ferry. In 2005, the total number of vehicles and cargo volume carried by ferry was an estimated 29,000 units and 69,000 tons, respectively.

**Table 3.3.5 Vehicle and Cargo Volumes Carried by Ferry in Sulawesi, 2004-2005**

No.	Ferry Route	Vehicle (no./yr)		Cargo (ton/yr)	
		2004	2005	2004	2005
1	Bajoe-Kolaka	26,748	21,420	80,244	64,260
2	Siwa-Lasusua	-	118	-	354
3	Bira-Tondasi	-	28	-	76
4	Pattumbukang-Labuan	-	34	-	132
5	Mamuju-Balikpapan	1,798	1,436	190	87
6	Taipa-Balikpapan	1,178	1,635	316	272
7	Pagimana-Gorontalo	4,707	3,397	21	58
8	Bitung-Ternate	763	971	9,170	4,476
Sulawesi Total		35,194	29,039	89,941	69,715

Source : Hasil Perhitungan

Tables 3.3.4 and 3.3.5 show a decrease in the number of passengers, vehicles, and volume of cargo in the period 2001-2005. The decline in the number of passengers and vehicle units might be caused by the shift to domestic air transport services among intra-island passengers.

(2) Interisland Passenger Traffic by Ship

Table 3.3.6 shows the total number of passengers of interisland ships in Sulawesi. In 2005, there were 2.8 million outbound passenger trips and 2.1 million inbound passenger trips.

**Table 3.3.6 Number of Passengers in Interisland Trips, 2005**

Area	Port	Embarkation	Disembarkation
Sulawesi Selatan	Makassar	417,335	332,160
	Parepare	292,145	202,904
	Siwa Wajo	103,362	92,768
	Others (5 ports)	22,158	17,908
	Subtotal	835,000	645,740
Southeast Sulawesi	Bau-Bau	368,981	338,230
	Kendari	144,825	146,954
	Kolaka	75,854	91,648
	Raha	39,142	59,477
	Subtotal	628,802	636,309
North Sulawesi	Manado	307,438	217,594
	Bitung	89,881	78,169
	Ulu Siau	35,561	37,150
	Lirung	6,790	16,714
	Subtotal	439,670	349,627
Gorontalo	Gorontalo	575,056	303,805
	Kwandang	7,513	5,444
	Subtotal	582,569	309,249
Sulawesi Tengah	Palu	120,958	11,834
	Tolitoli	86,681	88,425
	Banggai	77,770	53,017
	Buol	38,470	8,956
	Morowali	28,575	22,931
	Poso	7,839	10,808
	Subtotal	360,293	195,971
<b>Sulawesi Total</b>		<b>2,846,334</b>	<b>2,136,896</b>

PT. PELNI is a shipping network that operates nationwide. It organizes long-range loop cruises in 2 or 4-week cycles. It is basically different from the ferry service, which operates shuttle service between two terminals.

PT. PELNI has a number of routes in and around the islands of Sulawesi. These routes connect some cities of Indonesia with Sulawesi Island approximately 2 times a month. The PT. PELNI's vessels call from 17 ports, namely: (1) Makassar, (2) Parepare, (3) Belang Belano, (4) Pantoloan, (5) Tolitoli, (6) Kwandang, (7) Tahuna, (8) Lirung, (9) Bitung, (10) Gorontalo, (11) Luwuk, (12) Banggai, (13) Kolonedale, (14) Kendari, (15) Raha, and (16) Bau-Bau.

Table 3.3.7 shows the recorded numbers of passengers and ships that stopped at Makassar port. According to this data, the number of passengers and ships that visited has decreased. It is thought that most passengers have shifted from shipping transportation to air transportation, since there is no significant difference in fare rates. Moreover, air transportation saves a lot of travel time.

**Table 3.3.7 Number of Passengers and Ship Calls of PT. PELNI Vessels at Makassar Port**

Item	2002	2003	2004	2005	
Number of passenger	Depart	623,608	483,351	396,785	402,603
	Arrive	486,491	363,606	302,640	312,326
	Total	1,110,099	846,957	699,425	714,929
Num. of ship calling	750	701	677	616	

Source: PELNO Makassar

Table 3.3.8 shows the features of the 6 PT. PELNI ships calling at ports in Sulawesi. The capacity of each ship is between 5,700 GT and 13,900 GT with 1,000-2,200 passenger capacity.

**Table 3.3.8 Feature of Ships Calling at Sulawesi Ports, 2005**

Name of Ship	GT	Passenger Capacity (no.)
KM. Umsini	13,900	1,729
KM Tidar	13,900	1,974
KM Dobonsolo	13,900	1,974
KM Sinabung	13,900	1,906
KM. Nggapulu	13,900	2,206
KM. Tilong Kabila	5,700	969

Source: PT. Pelni Makassar



**Figure 3.3.4 Ship Owned by PT. PELINI (KM. Siabung: 13,900 GT)**

### 3.4 Cargo Transport

#### 3.4.1 Port Facility

There are over 700 general ports in Indonesia, 2 of which are international port hubs, 21 are international ports, and 58 national ports.

There are about 150 general ports in Sulawesi. There are three international ports, namely

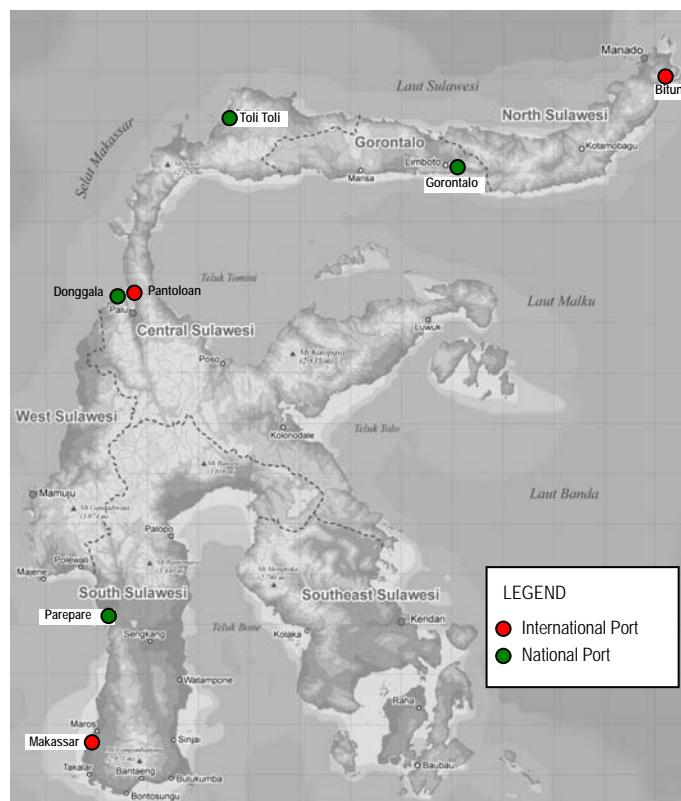


Makassar Port in South Sulawesi, Pantoloan Port in Central Sulawesi and Bitung Port in North Sulawesi. These ports are port hubs not only for Sulawesi Island but also for northeastern Indonesian islands such as Kalimantan, Maluku, and Papua. Table 3.4.1 shows the number of international and national ports, while Figure 3.4.1 shows their location.

**Table 3.4.1 Number of Ports in Sulawesi by Province, 2007**

	International Port	National Port
North Sulawesi	1	0
Gorontalo	0	1
Central Sulawesi	1	2
South Sulawesi	1	1
West Sulawesi	0	0
Southeast Sulawesi	0	0
Total	3	4

Source: National Spatial Plan, 2007



**Figure 3.4.1 Location Map of Ports in Sulawesi**

Generally, a port is classified into two types: one type is operated by the central/regional government and the other is operated by a state-owned enterprise.

International ports hub, international ports, and some national ports are managed by PT. PELINDO. As a port service operator it is expected to be financially independent. It is divided into four: PELINDO I, PELINDO II, PELINDO III, and PELINDO IV.

There are 6 port branches in Sulawesi as follows:

- Makassar Port Branch.

- Bitung Port Branch.
- Parepare Port Branch.
- Kendari Port Branch.
- Gorontalo Port Branch.
- Pantloan Port Branch.

Due to the number of ship calling, cargo handling volume, and port facilities these ports are considered major ports today. The site reconnaissance and data collection were carried out in all ports except for Pantloan Port due to security reasons. The features of port facilities and basic data and information on these 6 major ports are summarized in the Appendix.

### 3.4.2 Cargo Throughput in Major Sea Ports.

The data of cargo throughput in each major port in Sulawesi were collected by visiting the respective ports. Table 3.4.2 shows the data as summarized by province where the major ports are located.

In 2006, the total cargo throughput in the major sea ports was around 12.8 million tons. Of the total cargo, the total international cargo was 2.8 million tons (22%) and the domestic cargo was around 10.0 million tons (78%).

**Table 3.4.2 Summary of Cargo Throughput in Sulawesi, 2006**

(Unit: 000 tons)

	South Sulawesi	Southeast Sulawesi	Central Sulawesi	Gorontalo	North Sulawesi	Total	Share in Total	Share of Int'l Cargo	Share of Domestic Cargo
<b>Outbound</b>									
Export	805	654	119	27	408	2,013	16%	36%	
Domestic Out Subtotal									
Intra-island	620	26	13	9	128	795	6%		22%
Inter-regional	1,360	16	1,215	71	137	2,799	22%		78%
Domestic Out Sub-total	1,980	42	1,228	79	265	3,595	28%	64%	100%
Total Outbound Cargo	2,785	696	1,348	106	673	5,607	44%	100%	
<b>Inbound</b>									
Import	786	0	11	0	0	796	6%	11%	
Domestic In									
Intra-island	47	460	51	156	82	795	6%		12%
Inter-regional	2,732	169	1,384	156	1,162	5,604	44%		88%
Domestic In Sub-total	2,779	629	1,436	311	1,244	6,399	50%	89%	100%
Total Inbound Cargo	3,565	629	1,447	311	1,244	7,196	56%	100%	
<b>Grand Total</b>	<b>6,350</b>	<b>1,325</b>	<b>2,794</b>	<b>417</b>	<b>1,916</b>	<b>12,803</b>	<b>100%</b>		
<b>Total</b>									
International Cargo	1,590	654	130	27	408	2,809	22%		
Domestic Cargo	4,759	671	2,664	391	1,508	9,994	78%		
Total Cargo	6,350	1,325	2,794	417	1,916	12,803	100%		
<b>Share by Province</b>									
International Cargo	57%	23%	5%	1%	15%	100%			
Domestic Cargo	48%	7%	27%	4%	15%	100%			
Total Cargo	50%	10%	22%	3%	15%	100%			

Source: JICA Study Team based on loading and unloading data of cargo handled by major ports prepared by PT. PELINDO

Note:

1. South Sulawesi: Makassar Port (PELINDO), Pare Pare Port (PELINDO), Bringkasi (Private cement and clinker loading jetty), Malili (Private nickel loading port)
2. Southeast Sulawesi: Kendari Port (PELINDO), Pomalaa (Private nickel loading port)
3. Central Sulawesi: Pantloan Port (PELINDO)
4. Gorontalo: Gorontalo Port (PELINDO), Toli Toli Port
5. North Sulawesi: Bitung Port (PELINDO), Manado Port
6. Fuel traffic data of Sulawesi, PERTAMINA

Of the total outbound cargo volume, the shares of export and domestic volumes were 36% and 64%, respectively. Of the total inbound cargo volume, the shares of import and domestic volumes were 12% and 88%, respectively. Of the total domestic outbound cargo, the volume for intra-island destinations was 22% and 78% was for interregional destinations. As such, the cargo volume transported to and from the other islands in Indonesia through Sulawesi (10.0 million tons) in 2006 was much bigger than the international cargo volume (2.8 million tons).

As shown in Table 3.4.3, South Sulawesi registered the largest share in all categories of maritime cargo traffic (51%), followed by Central Sulawesi (26%). Under the total international cargo volume category, Southeast Sulawesi ranked first (23%), followed by South Sulawesi (57%). However, under the total domestic cargo volume, Central Sulawesi got the largest share (26%), followed by South Sulawesi (49%). It should be noted that the major commodities exported by Southeast Sulawesi are nickel ore and nickel alloy, while Central Sulawesi transports rocks and sand mostly from Pantloan Port to Kalimantan Port.

**Table 3.4.3 Share of Cargo Throughput in Major Ports by Province and Cargo Category, 2006** (%)

	South Sulawesi	Southeast Sulawesi	Central Sulawesi	Gorontalo	North Sulawesi	Total
International Cargo Volume	57	23	5	1	14	100
Domestic Cargo Volume	49	7	26	5	13	100
Total	51	9	26	3	17	100

Source: JICA Study Team's estimate based on data from PT. PELINDO

### 3.4.3 Cargo Traffic through International Ports

Table 3.4.4 shows the volume of cargo obtained from the PT. PELINDO throughout its major ports. However, the data showing the volume of cargo handled by international ports located in Sulawesi is limited.

Tables 3.4.5 and 3.4.6 show the major commodities produced and exported from Sulawesi and products imported from abroad. These are as follows:

- Exported Products: Cocoa, coconut oil, wheat flour, animal feed, wood, processed wood, preserved fish, coffee, nickel ore, nickel alloy, etc.
- Imported Products: Wheat, sugar, vegetable oil, petroleum products, fertilizer, steel products, consumer goods, etc.
- Transferred Productst: Wheat is imported mainly from Australia in bulk and its flour after processing is exported to Asian countries at around 1.0 million tons per year in bulk.

As such, the major exported and imported commodities are agricultural and mineral products. At present, the exportation and importation of industrial products for the manufacturing sector are not significant.

Table 3.4.5 shows the destinations of major commodities exported from international ports. Table 3.4.6 shows the source countries of each major commodity.

In 2006, the total volume of international cargo was around 2.8 million tons.

**Table 3.4.4 Estimated Cargo Volume Handled by Each Port, 2006**

(Unit: 000 tons)

Province	South Sulawesi			North Sulawesi		
Port	Makassar		Parepare		Bitung	
Export	Cocoa	232			Vegetable Oil	240
	Wheat	126			Copra Meal	160
	Wheat Flour	85				
	Processed Wood	55				
	Cassava	32				
	Clinker	263				
	Cement	11				
	Subtotal	805		0		400
Import	Wheat	730				
	Fertilizer	23				
	Sugar	11				
	Asphalt	19				
	Steel	2				
	Others	1				
	Subtotal	786		0		0
	Total	1,591		0		400
Province	Gorontalo		Central Sulawesi		Southeast Sulawesi	
Port	Gorontalo		Pantloan		Kendari	
Export	Corn	22	Cacao	119	Nickel	543
	Molasses	5			Ferro Alloy	33
					Processed Wood	6
					Coal	72
				Others	10	
	Subtotal	27		119		654
Import			Sugar	5		
		0		5		0
	Subtotal	0		5		0
	Total	27		124		654

Notes:

1. Vegetable oils refer to edible oil made from coconut or crude coconut oil (CNO).
2. The petroleum products imported are mostly high-speed diesel (HSD) and gasoline fuels for vehicles.
3. The port handling the export of nickel ore and nickel alloy in Southeast Sulawesi is a private specialized jetty owned and operated by the mining companies.
4. Export of Kendari includes that of Malili and Kolaka.

**Table 3.4.5 Destinations of Export Cargo from Sulawesi**

Province	South Sulawesi	North Sulawesi	Gorontalo	Central Sulawesi	Southeast Sulawesi
Port	Makassar	Bitung	Gorontalo	Pantloan	Private Ports
Nickel Ore					Canada, Japan, China
Cacao	Malaysia Brazil USA Singapore			Malaysia USA Singapore China	
Vegetable Oil	USA, EU	USA, EU	USA		
Nickel Alloy					Canada, Japan, China
Preserved Fish		Singapore, Hong Kong, Japan			

Source: Trade Statistics, Ministry of Trade, 2003

**Table 3.4.6 Origins of Major Commodities Imported into Sulawesi**

Province	South Sulawesi	North Sulawesi	Gorontalo	Central Sulawesi	Southeast Sulawesi
Port	Makassar	Bitung	Gorontalo	Pantloan	Private Ports
Wheat	Australia Canada USA				
Sugar	Australia South Africa Thailand		Philippines		
Rice	Vietnam Thailand		Vietnam Thailand	Vietnam	
Edible Oil			Malaysia		
Petroleum Products	Singapore				
Coal					Australia

Source: Trade Statistics, Ministry of Trade, 2003

### 3.4.4 Cargo Traffic through National and Regional Ports

#### (1) Intra-island Maritime Cargo Traffic

Table 3.4.7 shows the origin-destination (OD) table of intra-island cargo movements through the ports by commodity. Figure 3.4.2 illustrates the OD of these maritime cargoes by each major port and by each commodity. In 2006, the total cargo volume transported among the major ports in Sulawesi was around 1.6 million tons. This accounts for around 12% of the total cargo volume transported through the major ports.

#### (2) Interregional Maritime Cargo Traffic

Table 3.4.8 shows the number of ports in Indonesia linked to the major ports of Sulawesi. Movement of interregional maritime cargo to and from Sulawesi is illustrated in Figure 3.4.3. The total cargo volume transported to and from the major ports located in Sulawesi and the other ports by ship and ferry in Indonesia is estimated at around 8.4 million tons. This accounts for around 65% of the total cargo volume transported through the ports of Sulawesi.

**Table 3.4.7 Intra-island Maritime Cargo Movement in Sulawesi, 2006**

(Unit: tons)

Cargo Origin	Total Outbound Volume	Destination							Share
		South Sulawesi		Southeast Sulawesi	West Sulawesi		Gorontalo	North Sulawesi	
		Makassar	Pare Pare	Kendari	Pantoloan	Toli Toli	Gorontalo	Bitung	
<b>Makassar</b>	590,209		300	460,071	24,919	0	54,965	49,954	74.1%
Cement	198,686		300	105,007	16,429		50,950	26,000	
Wheat Flour	36,802			4,614	7,000		3,015	22,173	
Fertilizer	5,614			4,614			1,000		
Rice	7,651			5,870				1,781	
Fuel	149,802			149,802					
Container	191,654			190,164	1,490				
<b>Parepare</b>	29,787			2,750	6,492	0	7,411	13,134	3.7%
Rice	28,016			2,750	5,500		7,411	12,355	

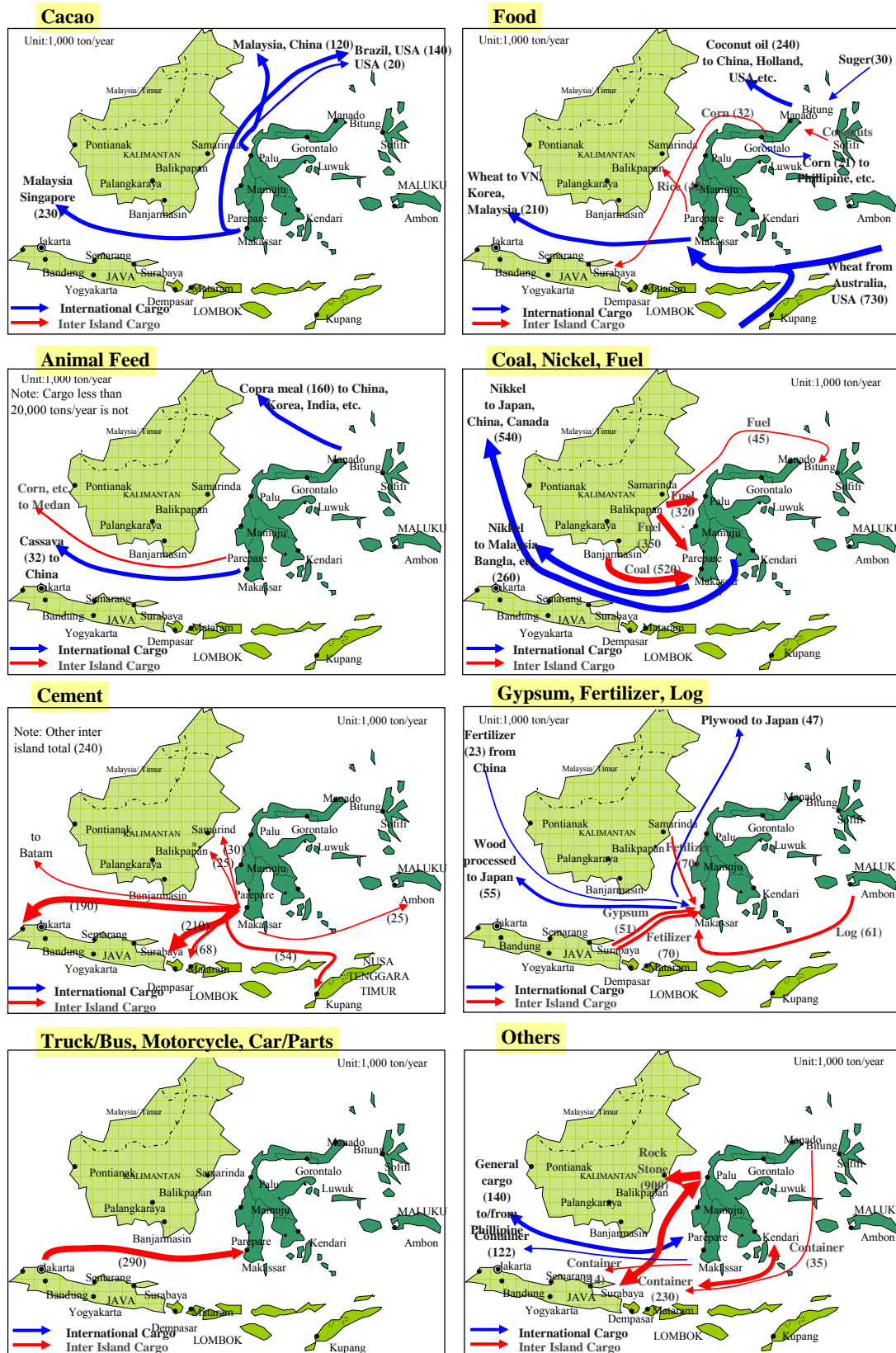
Cargo Origin	Total Outbound Volume	Destination							Share
		South Sulawesi		Southeast Sulawesi	West Sulawesi		Gorontalo	North Sulawesi	
		Makassar	Pare Pare	Kendari	Pantoloan	Toli Toli	Gorontalo	Bitung	
Asphalt	992				992				
Vegetables	779							779	
<b>Kendari</b>	25,747	25,747							3.2%
Copra	4,502	4,502							
Ratan	21,245	21,245							
<b>Pantoloan</b>	13,889	4,397				9,492			1.7%
Rice	1,705					1,705			
Rock, Stone	7,787					7,787			
Log	4,397	4,397							
<b>Toli Toli</b>	757				757				0.1%
Wood	757				757				
<b>Gorontalo</b>	8,573	8,573							1.1%
Molasses	4,060	4,060							
Sugar Silop	4,513	4,513							
<b>Bitung</b>	128,031			7,700	19,070	4,000	97,261		16.1%
Rice	11,000					4,000	7,000		
Vegetable Oil	7,700			7,700					
Fertilizer	388						388		
Fruits	58						58		
Container	19,070				19,070				
Fuel	89,815						89,815		
<b>Total</b>	796,993	38,717	300	470,521	51,238	13,492	159,637	63,088	100.0%

Source: Cargo loading and unloading data of major ports in Sulawesi were analyzed and compiled by the Study Team.

**Table 3.4.8 List of Ports Linked with Major Ports of Sulawesi**

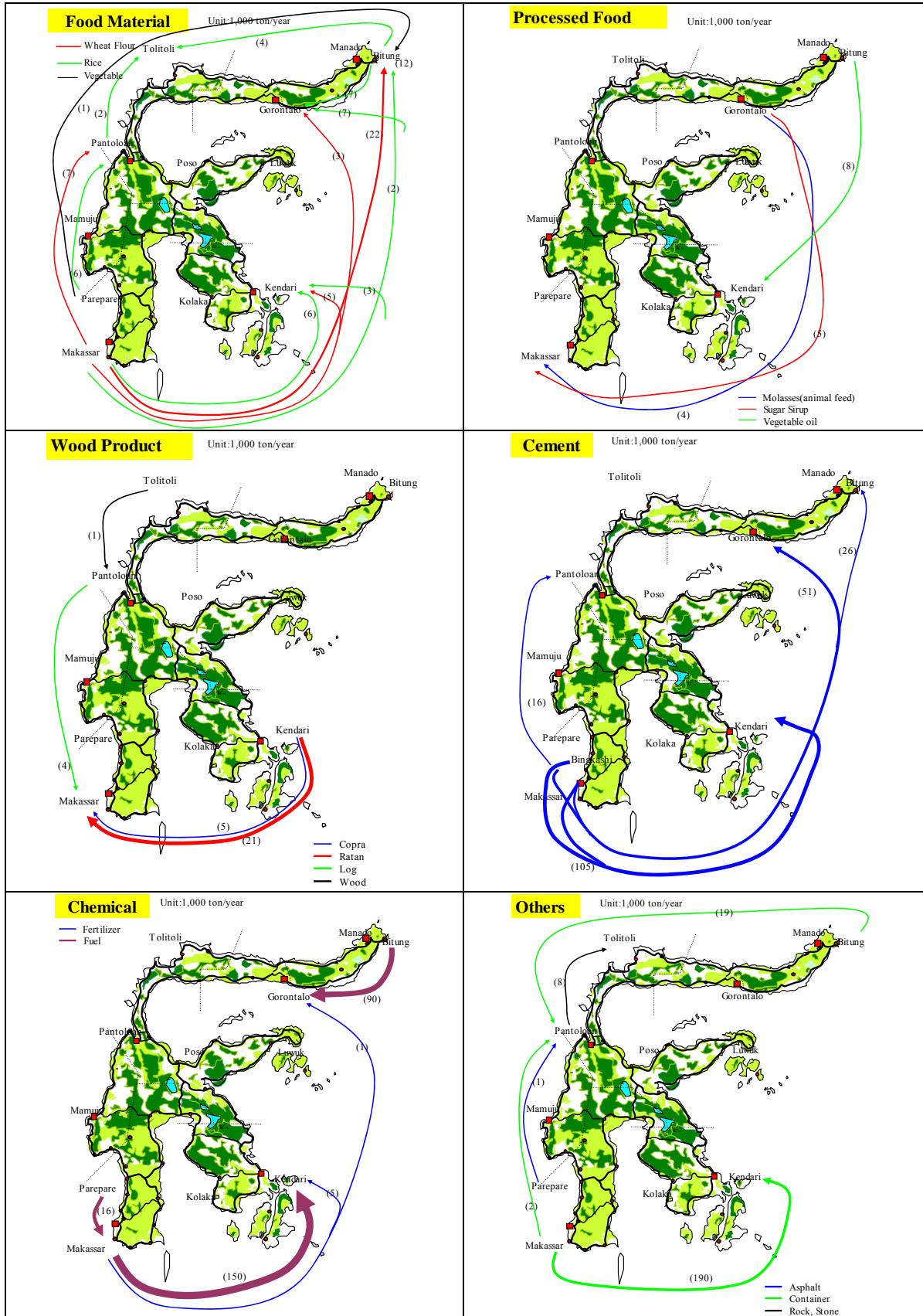
Location of Major Ports		Sulawesi South		Sulawesi Southeast	Sulawesi Center	Gorontalo	Sulawesi North
Port		Makassar	Pare Pare	Kendari	Pantloan	Gorontalo	Bitung
Nos. of Links	Number	46	23	2	9	3	36
Outbound	'000 tons	1,100	255	16	1,540	71	138
Inbound	'000 tons	1,340	495	22	1,190	56	618
Total	'000 tons	2,440	750	38	2,730	127	756

Source: JICA Study Team



Note: Cargo of less than 20,000 tons/year is not presented.  
 Source: O/D table prepared based on data provided by PT. PELINDO, 2006

**Figure 3.4.2 International and Interisland Cargo Movements, 2005**



Source: O/D table prepared based on data provided by PT. PELINDO, 2006

**Figure 3.4.3 Intra-island Port Cargo Movement, 2005**



### (3) Character of Cargo Transported to and from Sulawesi

#### 1) General

In Sulawesi, the agricultural, fishery, and mining sectors dominate the economy. The manufacturing or processing industry has not significantly developed yet. Most of the maritime cargo to and from Sulawesi is transported in bulk, break-bulk, or liquid form. The major agricultural products are transported in sacks, liquid bulk for edible oil, and bulk carrier for mineral products such as cement and nickel ore. The share of containerized cargo seems to be increasing but not significant yet. Major commodities, such as cement in South Sulawesi and nickel in Southeastern Sulawesi which are produced very close to the sea port, are transported in bulk. A description of the production of cement and nickel ore is as follows:

**Cement:** South Sulawesi is endowed with considerable lime stone mountains and these are located around 40km north of Makassar along the western coast. There exists a large-scale lime stone quarry to produce cement. The annual production volume of cement is around 1.2 million tons. This huge volume is shipped mostly to all islands located in northeastern Indonesia, Kalimantan, and Papua. Some volume is shipped to Java through a special jetty owned by cement producers, in Bringkasi in the northern part of Makassar. In 2006, the recorded volume of cement shipped out from Sulawesi to the other islands was around 1.0 million tons, while the volume transported to other ports in Sulawesi in bulk cargo was about 200,000 tons.

**Nickel Ore and Ferro-nickel:** Southeast Sulawesi is endowed with considerable deposits of nickel ore. Nickel mines in the area have been developed by an international company. Nickel ore and ferro-nickel are shipped through a privately operated special jetty close to the mines located near Pomalaa in Southeastern Sulawesi and Soloako in South Sulawesi. In 2006, the registered volume of nickel ore shipped out from Sulawesi in 2006 was around 0.5 million tons.

Although the combined volume of cement and nickel ore shipped out from Sulawesi is quite large and its share in the total cargo volume traffic is substantial, they are shipped out through privately operated special jetties without much use of land transportation. If the cargo traffic volume of cement and nickel ore are excluded from the total cargo volume of Sulawesi, the shares of other commodities change. The shares of exported and imported cargoes in the total cargo volume, excluding the volume of cement and nickel ore, are 9% and 6%, respectively. The volume of domestic outbound and inbound cargoes was 2.4 million tons and 6.4 million tons, respectively.

The major international and domestic ports in Sulawesi are Makassar Port in South Sulawesi and Bitung Port in North Sulawesi. The Makassar Port handles 42% of the total maritime cargo volume and the Bitung Port handles 10%. The remaining 48% are handled by Parepare Port in South Sulawesi, Pantloan Port in Central Sulawesi, Gorontalo Port in Gorontalo, and Kendari Port together with the nickel loading port, in Southeast Sulawesi.

The conditions of maritime transport for each major commodity produced in or imported to Sulawesi are outlined as follows:

**Wheat:** Makassar Port is considered as the wheat distribution center in the region and a port hub for wheat distribution in Eastern Indonesia. Wheat is imported from Australia to Makassar Port and then processed into wheat flour for export to Singapore, Malaysia, and other southeast Asian countries. Around half of the volume of unprocessed imported wheat is distributed locally and the rest is processed into wheat flour in wheat mills located in the northern end of the Makassar Port. Wheat flour is distributed in Sulawesi by land transportation and domestic shipping and to the other islands in the region by domestic shipping as well.

**Clinker/Cement:** The cement produced in South Sulawesi, 40-60km north of Makassar, is distributed through either Makassar Port in sack form or a private cement jetty located in the north of Makassar to Bangladesh, Malaysia, Vietnam, and other southeast Asian countries in bulk form. The clinker is also exported to these countries in bulk form for further processing into cement at these destinations. A major portion of cement transported through domestic shipping is in bulk form as well. The cement transported to the local or regional seaports are unloaded to the cement silo then sacked for distribution through land transportation. The cement processed in South Sulawesi is distributed to the islands in eastern Indonesia by maritime transportation either in sack or bulk form.

**Coal:** Coal is an energy source for the production of cement. It is brought to Makassar from Kalimantan (Banjarmasin) through domestic shipping.

**Cacao:** Indonesia is the world's third-largest producer of cacao. About 90% is grown in South Sulawesi which accounts for almost 14% of the world's total production. Cacao is exported in sacks to Malaysia and in containers to Brazil, USA, and Singapore. The volume of cacao processed in Sulawesi is limited to 10% of the total volume of production. The volume of cacao transported to Jakarta through domestic shipping for further processing is limited compared with the volume of cacao exported to the international market.

**Table 3.4.9 Cacao Production in the World, 2005**

Rank	Country	Volume (000 tons)	Share (%)	Estimated Value (US\$ mil.)
1	Cote d'Ivoire	1,330	35	
2	Ghana	736	19	
<b>3</b>	<b>Indonesia</b>	610	16	890
4	Nigeria	366	10	
5	Brazil	213	6	

Source: FAO Statistics

The major ports which handle the exportation of cacao are Makassar Port (232,000 tons or 66%) and Pantoloan Port (119,000 tons or 34%).

**Rice:** Rice produced in South Sulawesi is distributed to the other islands in eastern Indonesia. The

major ports which handle rice distribution are Parepare Port (207,000 tons or 80%), Makassar Port (30,000 tons or 11%), and Bitung Port (19,000 tons or 9%). To meet the increasing demand in eastern Indonesia and in Sulawesi, rice is imported from other southeast Asian countries such as Vietnam and Thailand.

**Fertilizer:** The fertilizer needed for the production of rice, corn, cacao, coffee, and other major agricultural products is brought from Surabaya, East Java to South Sulawesi through Makassar Port

**Petroleum Products:** There is no oil refinery in Sulawesi. From the nearest refinery of PERTAMINA located in Balikpapan in South Kalimantan, petroleum products are brought to Sulawesi through the ports of Makassar, Parepare, Palu, and Bitung. Fuel is further distributed by tankers from Makassar Port to Palopo and Kolaka, and from Bitung Port to Tolitoli, Gorontalo, Poso, Luwuk, and Kolonedale. The fuel is then distributed from the nearest fuel depots to different fuel service stations by around 1,000 lorries. In 2006, a total volume of about 2.8 million kiloliters or 2.4 million tons of fuel was supplied and consumed in Sulawesi. Of the total volume, 1.0 million tons is diesel fuel and 900,000 tons is gasoline. Diesel fuel, which is used for land and marine transportation, accounts for 43% of the total fuel consumed in Sulawesi. The need for asphalt to repair and construct roads in Sulawesi is met by importing asphalt from Singapore..

### 3.4.5 Major Commodities Traded and Processed

#### (1) Current Trading and Distribution of Goods

##### 1) Volume and Value of Commodities Exported from Sulawesi

Trading in Sulawesi is composed of six types, namely: (1) domestic distribution within Sulawesi, (2) regional export, (3) international export, (4) regional import, (5) international import and, (6) international transfer trade. Tables 3.4.10 and 3.4.11 respectively show the volume and value of mining and agricultural products produced in Sulawesi and exported to other countries. As revealed in these tables, Sulawesi's economy largely depends on agriculture and mining.

**Table 3.4.10 Export Volume and Value of Sulawesi's Mining Products, 2006**

(Unit: '000 tons)

Commodity	Total Output	Distributed Volume	Domestic Distribution	Regional Export	International Export	
	Volume	Volume	Volume	Volume	Volume	Value
Unit	'000 tons	'000 tons	'000 tons	'000 tons	'000 tons	US\$ Mill.
Mining Products						
Nickel						
Nickel Ore	600	543	0	0	543	6,516.0
Ferro-nickel		33	0	0	33	1,145.0
Cement						
Clinker	300	263	0	0	263	21.0
Cement	2,000	2,000	837	1,152	11	8.3
Total	2,900	2,839	837	1,152	850	.7,690.3

Source: JICA Study Team

Note:

- 1) Nickel ore price per ton in average of 2006 was US\$12,000. (In 2007 the same is US\$14,680)
- 2) Nickel ferro-alloy price in 2006 was US\$34,700 in 2006. (In 2007 the same is US\$ 28,470)

**Table 3.4.11 Export Volume and Value of Sulawesi's Agricultural Products, 2006**

(Unit: 000 tons)

Commodity	Total Output (000 tons)	Distributed Volume (000 tons)	Domestic Distribution (000 tons)	Regional Export (000 tons)	International Export	
					000 tons	US\$ mil.
Agricultural Products						
Cocoa	350	350	0	0	350	560.0
Wheat Flour	603	362	231	46	85	51.0
Wheat	730	127			127	26.7
Animal Feed		170	0	0	170	13.6
Cassava	940	940	910	0	30	11.7
Coffee	57	57	52	0	5	8.6
Corn	1,300	1,130	1,060	50	20	2.0
Rice	5,300	4,240	4,030	210	0	0
Sweet Potato	160	130	130	0	0	0
Peanut	70	60	60	0	0	0
Soybean	27	27	27	0	0	0
Forestry Products						
Wood Processed	n.a.	60	0	0	60	55.2
Log	5	5	5	0	0	0
Rattan	21	21	12	9	0	0
Fishery Products						
Crustacean		11	0	0	11	75.0
Marine Fish	347	332	309	0	23	66.0
Inland Fish	125	100	100	0	0	0
Livestock Products						
Cow	89	71	71	0	0	0
Goat	19	19	19	0	0	0
Broiler	113	100	100	0	0	0
Total	10,256	8,312	7,116	315	881	977.6

Source: Cargo throughput data obtained from PELINDO, data of economic statistics prepared by each province, trade statistics prepared by the Ministry of Trade are compiled and summarized by the JICA Study Team

Notes:

1. The unit price of the major products was estimated based on the relevant trade statistics of 2003.
2. Distributed volume refers to the volume of product either processed or unprocessed but distributed in Sulawesi and its external markets in the region and abroad.
3. Whole volume of wheat is imported from Australia.

South Sulawesi Province is endowed with long lime stone mountain ranges along the eastern sea coast. This resource makes Sulawesi an important cement supplier in eastern Indonesia. Although the volume of cement export is limited, the potential supply of cement in the region is high.

Sulawesi is also endowed with a considerable size of nickel mine in Southeast Sulawesi. The nickel mines are developed and exploited by international mining companies.

As for international transfer trade, Sulawesi imports 730,000 tons of wheat from Australia and unloads it at Makassar. It is then exported as unprocessed wheat or as wheat flour at about 127,000 tons to other Asian countries. The remaining volume of wheat which is processed into wheat flour is distributed in Sulawesi (230,000 tons) and to other regions of Indonesia, especially in the east (46,000 tons). Therefore, Sulawesi can be regarded as a hub for wheat transfer in southeast Asia and wheat distribution in Indonesia.

## 2) Volume and Value of Commodities Imported by Sulawesi

Sulawesi is geographically located as a gateway to eastern Indonesia in general and to northeastern Indonesia in particular. Sulawesi imports wheat, sugar, and fertilizer and exports them to other regions of Indonesia. Sulawesi imports other products from northeastern Indonesia and in other regions of eastern Indonesia then processes those into final products for consumption in Sulawesi or for export to other regions or abroad. For example, imported log from the region is processed into wood or plywood or the imported copra into coconut oil.

Table 3.4.12 shows the value and volume of agricultural products imported into Sulawesi.

**Table 3.4.12 Agricultural Products Imported into Sulawesi, 2006**

Commodity	Total Output (000 tons)	Distributed Volume (000 tons)	Domestic Distribution (000 tons)	Regional Import (000 tons)	International Import	
					000 tons	US\$ mil.
Agricultural Products						
Sugar	0	17	17	0	17	4.0
Tapioca Flour	0	11	11	11	0	0
Cooking oil	0	148	148	148	0	0
Coconut oil	0	34	34	34	0	0
Copra	0	60	60	60	0	0
Forestry Product						
Log	0	106	106	106	0	0
Wood	0	10	10	10	0	0
Plywood	0	8	8	8	0	0
Fertilizer	0	257	257	234	23	97.0
Total	0	651	651	611	40	101.0

Source: JICA Study Team

Table 3.4.13 shows the value and volume of mining products imported to Sulawesi.

**Table 3.4.13 Mining and Nonagricultural Products Imported into Sulawesi, 2006**

Commodity	Total Output (000 tons)	Distributed Volume (000 tons)	Domestic Distribution (000 tons)	Regional Import (000 tons)	International Import	
					000 tons	US\$ mil.
Fuel	0	2,450	2,450	2,450	0	0
Coal	0	520	520	520	0	0
Gypsum	0	51	51	51	0	0
Asphalt	0	44	44	26	18	2.6
Total	0	3,065	3,065	3,047	18	2.6

Source: PEMASARAN VII, ERTAMINA Fuel Supply Record 2007 for fuel. Port cargo traffic data of PELINDO IV is used for other item.

Note: Fuel and coal is imported from Balikpapan, East Kalimantan

Table 3.4.14 shows the value and volume of industrial products imported into Sulawesi.

**Table 3.4.14 Industrial and Consumable Products Imported into Sulawesi, 2006**

Commodity	Total Output (000 tons)	Distributed Volume (000 tons)	Domestic Distribution (000 tons)	Regional Import (000 tons)	International Import	
					000 tons	US\$ mil.
Steel Product	0	50	50	50	0	0
Automobiles		300	300	300	0	0
General goods	0	398	398	392	6	n.a.
Total	0	2,005	2,005	1,981	24	0

Source: Cargo traffic data obtained from PELINDO IV.

Table 3.4.15 summarizes the outline of the products traded in Sulawesi.

**Table 3.4.15 Summary of Volume and Value of Products Traded in Sulawesi**

Commodity	Distributed Volume (000 tons)	Domestic Distribution (000 tons)	Regional Distribution (000 tons)	International Trade	
				000 tons	US\$ mil.
Exported Agricultural Products	8,312	7,116	315	881	977.6
Exported Mining Products	2,839	837	1,152	850	278.0
Subtotal of Exports	11,151	7,953	1,467	1,731	1,255.6
Imported Agricultural Products	651	651	611	40	101.0
Imported Mining Products	3,065	3,065	3,047	18	2.6
Industrial and Consumables	2,005	2,005	1,981	24	0
Subtotal of Imports	5,721	5,721	5,639	82	103.6
Total	16,872	13,674	7,106	1,819	1,359.2

Source: JICA Study Team

As shown in the preceding tables, in 2006 the total volume of commodities produced was around 15.5 million tons. It is processed into commercial products, of which the total volume is around 12.3 million tons. The type of processing of agricultural products is limited to drying, de-husking, and polishing, etc. and not processing into final products which can be directly marketed to the consuming countries.

Agricultural products account for 78% of the total volume of production. Of the total 12.3 million tons, around 8.0 million (76%) is consumed within Sulawesi and 5.7 million tons (24%) is distributed to the region surrounding Sulawesi. The total export volume of products is 3.2 million tons and 45% of it is distributed mostly in eastern Indonesia and 55% is exported to overseas markets. The total export value of Sulawesi products was about US\$ 1.3 billion. Of the total export value, 78% and 22% account for agricultural products and mining products, respectively.

The volume of agricultural products exported to other regions accounts for 4.6% of the total domestic consumption volume. The volume of mining products or cement exported to other regions is more than the volume consumed in Sulawesi.

The total volume of imported products is 4.4 million tons of which 45% accounts for industrial and consumable products. Sulawesi imports most of its industrial products such as steel, machinery, and all consumable products from other regions of Indonesia or abroad.

### 3.4.6 Containerization of International Cargo

#### (1) Dominant Container

The ratio of containerization was analyzed based on the data available from Makassar Port. Of the total volume of cargo handled at Makassar Port, the volume of container cargo was only 135,000 tons in 20006 as shown in Table 3.4.16. Therefore, the containerization ratio is quite low in Sulawesi. This is attributed to the characteristics of major commodities produced and handled by the international ports in Sulawesi.

The major cargoes are wheat and cement which are transported mostly by bulk carriers. In addition to this, most of the containerized cargo is carried by 20-foot containers because of the restrictions in land transportation in Sulawesi. Most of the roads in agricultural areas are of the 1 lane-1 way type. Multiple-lane highways are limited only in and around the surrounding areas of Makassar Port and Bitung Port where cargo traffic is concentrated.

In Sulawesi, most of the roads are of the 2 lane-2 way type and their widths are rather narrow because most of the land is covered by rugged mountains and hills. Therefore, 20-foot containers dominate the container traffic. Its share is probably more than 90%.

**Table 3.4.16 Container Traffic in Makassar Port, 2006**

	Loaded Container (TEU)	No. of Empty Containers	Total Container Traffic (no.)	Loaded Container (ton)	Containerized Ratio (%)
Export	12,283	614	12,897	122,830	15
Import	1,262	11,635	12,897	12,620	1
Total	13,545	12,249	25,794	135,450	

Source: JICA Study Team

#### (2) Container Transport Cost

##### Landside Container Transport Cost and Lead Time

The competitiveness of the port or container terminal is an important factor in promoting any investment in the area. Tables 3.4.17 and 3.4.18 summarize the present conditions of the international ports in Sulawesi in terms of speed of handling (landside time) and cost of container transport excluding container handling charges (landside cost).

**Table 3.4.17 Landside Time in Days**

Process	FCL 20' container		LCL 20' container	
	Export	Import	Export	Import
Trucking	0.5	0.5	0.5	0.5
Cargo Clearance	1.0	0.2	0.0	0.0
Customs Clearance	0.0	0.0	1.0	4.0
Total Landside Time	1.5	0.7	1.5	4.5

**Table 3.4.18 Landside Cost per Container**

(Unit: US\$)

Cost Item	20' FCL	20' LCL
Loading Charge to Truck	36	36
Trucking Charge to Port	95	95
Unloading Charge from Truck	36	36
Stevedoring	0	66
Stuffing	0	53
Total Cost for Export	167	286

Note: Trucking distance is assumed at 50 km as an average distance.

As shown in Table 3.4.17, the landside time in Sulawesi is relatively short except for the export of LCLs as customs clearance for imported goods takes a long time. The relatively short distance from the stocking area of goods and the international port, combined with the relatively smooth cargo handling operation, makes a relatively shorter landside time for container cargo handling possible. However, it may also be attributed to the smooth flow of cargo traffic in the international container handling terminal.

Table 3.4.18 shows the landside cost. The landside cost in Sulawesi for container transport is quite high compared to other major ports in Indonesia and in Asia. For instance, the trucking charge for 20-foot containers per kilometer is US\$ 3.3, US\$ 2.0, US\$ 2.2, US\$ 2.7, and US\$ 1.5 in Sulawesi, Jakarta, Port Klang in Malaysia, Manila in the Philippines, and Ho Chi Minh in Vietnam, respectively. The loading and unloading charges of container to and from trucks are also quite high. This relatively higher landside cost for container handling might be attributed to a relatively small volume of container handling business in Sulawesi compared with other ports handling much larger volumes of container in Indonesia and in Asia.

#### **Container Handling Charges in the Port**

The container handling charges on the basis of tariffs of international ports in Sulawesi are summarized in Table 3.4.19.

**Table 3.4.19 Container Handling Charges in Sulawesi**

(Unit: US\$)

	Makassar	Bitung	Pantoloan	Average
Loading				
20' Loaded Container	278	333	333	315
20' Empty Container	222	167	111	167
<b>40' Loaded Container</b>	<b>556</b>	<b>533</b>	<b>667</b>	<b>585</b>
40' Empty Container	278	222	167	333
Unloading				
20' Loaded Container	278	333	367	326
20' Empty Container	222	167	111	167
40' Loaded Container	722	533	722	660
40' Empty Container	278	222	167	222

Source: JICA Study Team



The above container handling charges are all very high when compared with some of the major international container terminals in Asia and in Africa where cargo volume is not much like in Sulawesi. Table 3.4.20 shows the container cargo handling charges of major international container terminals in Asia, Middle East, and Africa.

**Table 3.4.20 Container Handling Charges in Asia and Africa**

(Unit: US\$)

<b>Country</b>	<b>Singapore</b>	<b>Korea</b>	<b>Indonesia</b>	<b>U.A.E.</b>	<b>Tanzania</b>
<b>Port</b>	<b>Singapore</b>	<b>Pusan</b>	<b>Tanjung Perak</b>	<b>Dubai</b>	<b>Dar Es Salaam</b>
40' Loaded Container	98	100	105	170	225
40' Empty Container				60	80
Difference	6.0	5.8	5.6	3.4	2.6

Source: JICA Study Team

As shown in Table 3.4.20 the container cargo handling (40' container) charge prevailing in Sulawesi is very high, higher even than the average container handling charge in Asia by 3.9 times while the difference from the average container handling charge of 20' container in Asia is around 3 times.

### 3.5 Administration Framework and Financial Situation in Road Sector

#### 3.5.1 System of Highway Administration

Based on the decentralization policy, the majority of local offices of the central government at provincial governments and Kabupaten/Kota governments were once abolished and many of their staff and functions were integrated into each local government. However the local autonomy laws were revised by the Law No. 32/2004 and the Law No. 33/2004, coinciding with the selection of President Yudhoyono, which included a set of new policies such as the public selection of governors of local governments and centralization of once decentralized functions of the central government. The new laws also strengthened the control of the central government on its budget allocation and on the borrowing of local governments.

With regard to the highway administration, the once abolished Department of Highway (PU) has been restored from the Department of Settlement and Regional Infrastructure and the regional offices of PU (Balai Besar) have been re-established<sup>1</sup> in January 2007 to coordinate the activities of PU at the regional level and conduct the procurement and implementation of the development of the national road network. **Table 3.5.1** summarizes the responsibilities for activities in the highway administration at different government levels.

**Table 3.5.1 Responsibilities of Highway Administrations**

Road Classification/Task	Responsibility	Funding	Implementation
<b>I. National Road</b>			
1. Planning	Bina Marga	APBN	Bina Marga
2. Construction/ Betterment	Bina Marga	APBN	Bina Marga Balai Besar
3. Land Acquisition/ Resettlement	Bina Marga Local Governments	APBN/(and APBDI/APBDII)	Bina Marga Local Governments
4. Periodic Maintenance	Bina Marga	APBN	Balai Besar
5. Routine Maintenance	Bina Marga	APBN	PRASWIL/Balai Besar
<b>II. Provincial Road</b>			
1. Planning	PRASWIL	APBDI	PRASWIL
2. Construction/ Betterment	PRASWIL	APBDI(PAD/DAU/DAK/ External Grant/Loan)	PRASWIL
3. Land Acquisition/ Resettlement	PRASWIL	APBDI, APBDII	PRASWIL. Local Governments
4. Periodic Maintenance	PRASWIL	APBDI(PAD/DAU/DAK/ External Grant/Loan)	PRASWIL
5. Routine Maintenance	PRASWIL	APDBI	PRASWIL
<b>III. Kabupaten/Kota Road</b>			
1. Planning	Dinas PU	APBDII	Dinas PU
2. Construction/ Betterment	Dinas PU	APBDII , APBN (PAD/DAU/DAK/External Grant/Loan)	Dinas PU
3. Land Acquisition/ Resettlement	Dinas PU	APBDII	SKPD (Dinas PU)
4. Periodic Maintenance	Dinas PU	APBDII (PAD/DAU/DAK/External Grant/Loan)	Dinas PU
5. Routine Maintenance	Dinas PU	APBDII	Dinas PU

Source: JICA Study Team

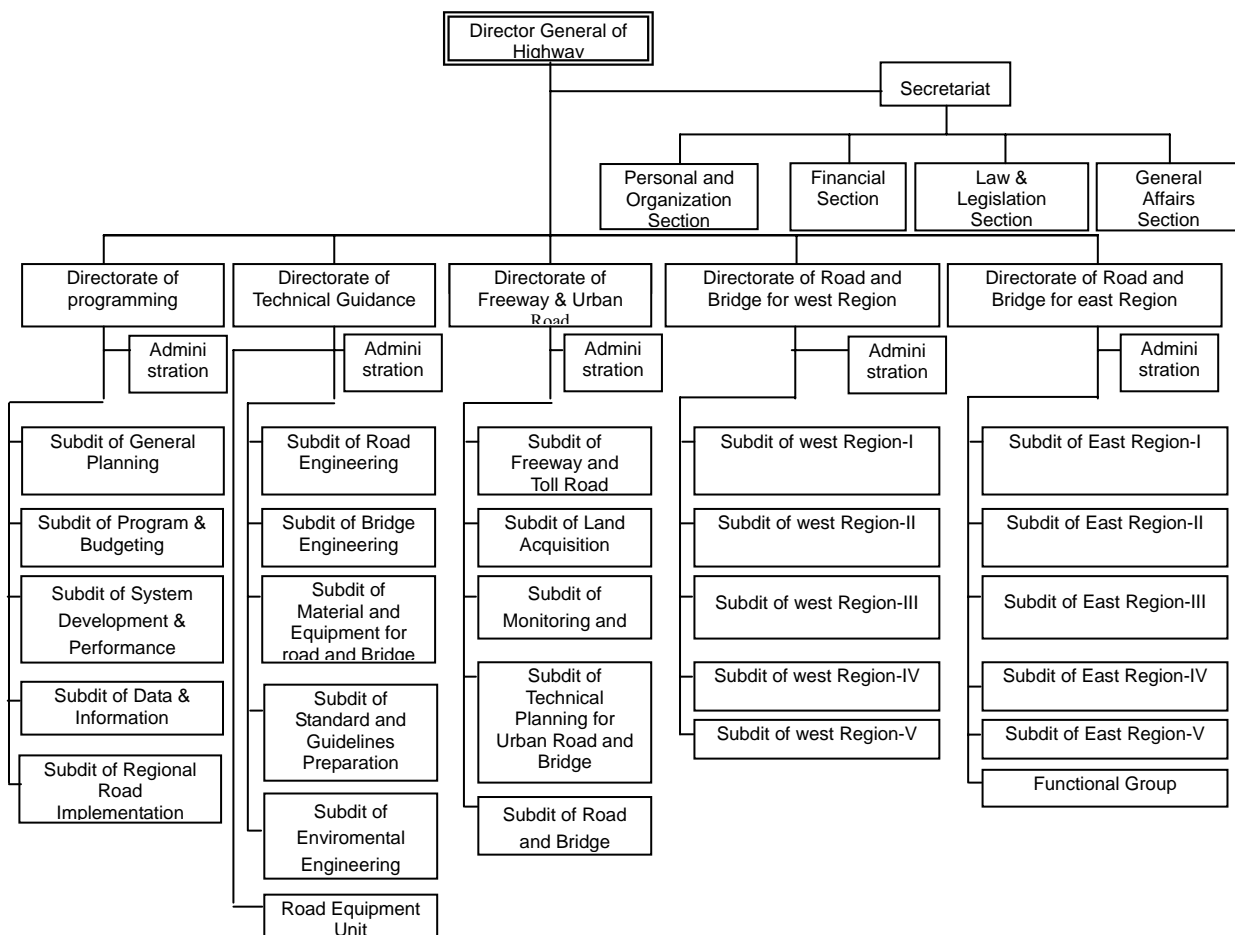
<sup>1</sup> Based on the Decree of Ministry of Public Works No.14/PRT/M 2006 and No.15/PRT/M/2006

The New Road Law No. 38 of 2004 stipulates clearly the responsibilities of each government body for the corresponding road categories (Chapter IV Public Road, Articles 13, 14, 15 and 16 of the Law No. 38, stipulated in the same manner as the old Road Law No. 13/1980), which include regulation, cultivation, development and supervision activities of each government body, namely the central government for national roads, provincial government for provincial roads, kabupaten government for kabupaten roads and city government for city roads.

### 3.5.2 Road Administration Framework for National Road

#### (1) The Directorate General of Highway (DGH), Ministry of Public Works

The Directorate General of Highways (DGH), Ministry of Public Works is the responsible organization for national roads in entire Indonesia. The Directorate General of Highways consists of Directorate of Programming, Directorate of Technical Guidance, Directorate of Freeways & Urban Roads, Directorate of Roads and Bridges for West Region, and Directorate of Roads and Bridges for East Region. The organization chart of DGH is shown in **Figure 3.5.1**.



**Figure 3.5.1 Organization Chart of Directorate General of Highways**

## (2) Organization of Balai Besar, the Regional Representative of DGH

As a regional representative of DGH for implementation of National Highway development in the technical matters, 7 Balai Besar (**Table 3.5.2**) and 3 Balai (covering Bali, Maluku, Papua and other areas) have been established throughout the country on the basis of the Decree of Ministry of Public Works No.14/PRT/M 2006 and No.15/PRT/M/2006, and started functioning from January 2007.

The main duty and the function of Balai Besar are as follows:

**MAIN DUTY:** 1) Conduct planning and technical guidance; 2) Construction, operational and maintenance monitoring, quality assurance, procurement of equipment and material, as well as organizational management.

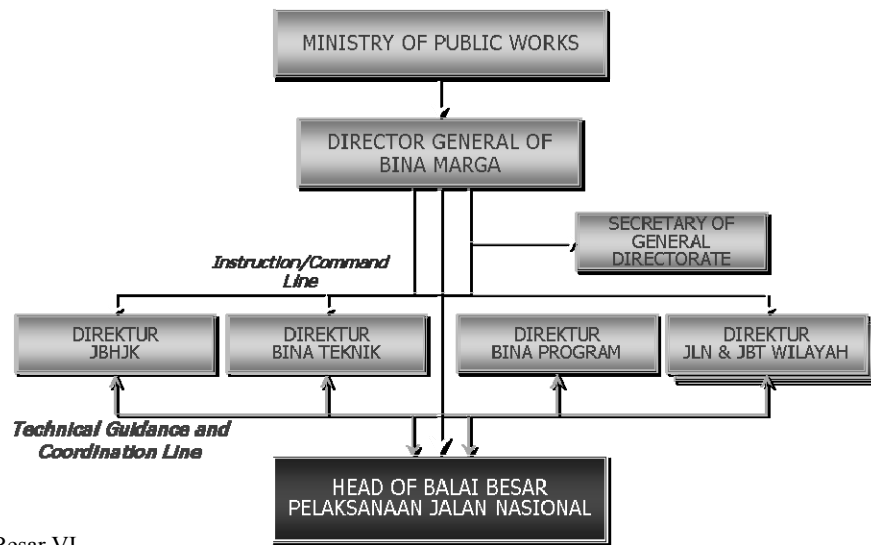
**FUNCTION :** 1) Data and Information preparation as the material for program compilation of national road management as well as the implementation of planning and technical guidance of road and bridge construction; 2) Construct, operational and maintenance monitoring of road and bridge; 3) Implementation of quality management system in road and bridge construction; 4) Provision, utilization, storing and maintenance of road and bridge materials and equipments, as well as construction quality assurance; 5) Staffing management, work organization, financial, state treasury, as well as coordination with related institutions.

**Table 3.5.2 Jurisdiction of Balai Besar**

No	Name of Technical Implementation Unit	Location	Work Area
<b>I</b>	<b>Type A</b>		
1	Balai Besar Pelaksana Jalan Nasional I	Medan (North Sumatra)	Aceh, North Sumatra, Riau and Riau Islands (Kepulauan Riau)
2	Balai Besar Pelaksana Jalan Nasional III	Palembang (South Sumatra)	Jambi, South Sumatra and Bangka Belitung
3	Balai Besar Pelaksana Jalan Nasional IV	Jakarta	Banten, Jakarta and West Java
4	Balai Besar Pelaksana Jalan Nasional V	Surabaya	Central Java, East Java and Jogjakarta
<b>II</b>	<b>Type B</b>		
5	Balai Besar Pelaksana Jalan Nasional II	Padang	West Sumatra, Bengkulu and Lampung
6	Balai Besar Pelaksana Jalan Nasional VI	Makassar	South Sulawesi, West Sulawesi, Central, North, South East and Gorontalo
7	Balai Besar Pelaksana Jalan Nasional VII	Banjarmasin	West Kalimantan, South Kalimantan and East Kalimantan

Source: Bina Marga

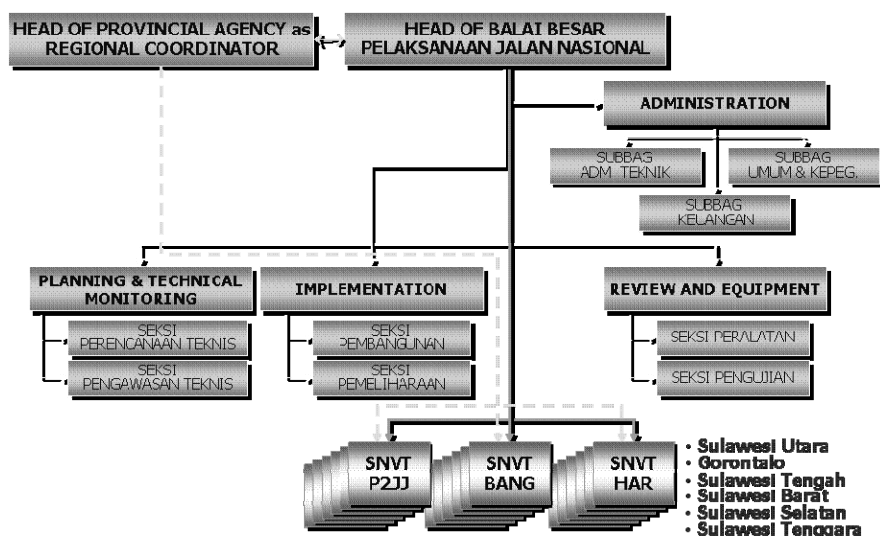
As illustrated in **Figure 3.5.2** Balai Besar is independent from the sub-directorates of Bina Marga, but should coordinate with all the sub-directorates in the technical matters.



Source: Balai Besar VI

**Figure 3.5.2 Status of Balai Besar**

Under the chief of Balai Besar, there are task forces (Batuan Kerja) for design and supervision (P2JJ), road betterment and maintenance. In the case of the South Sulawesi Province, there are two P2JJs, two road betterment task forces, and one maintenance task force. The periodic maintenance of national roads is directly undertaken by this maintenance task force that owns necessary equipment and staff and procures required materials for road maintenance. Each province has this kind of set-up for the development and maintenance of the national road network. Routine maintenance of the national roads is mostly contacted out to the concerned province using the APBN budget. In case of Sulawesi, a part of the national roads in the South Sulawesi Province (Pare-Pare – Sidrap – Enrekang – Toraja – Palopo to the borders of South Sulawesi and Central Sulawesi) is directly conducted by the Balai Besar.



Source: Balai Besar VI

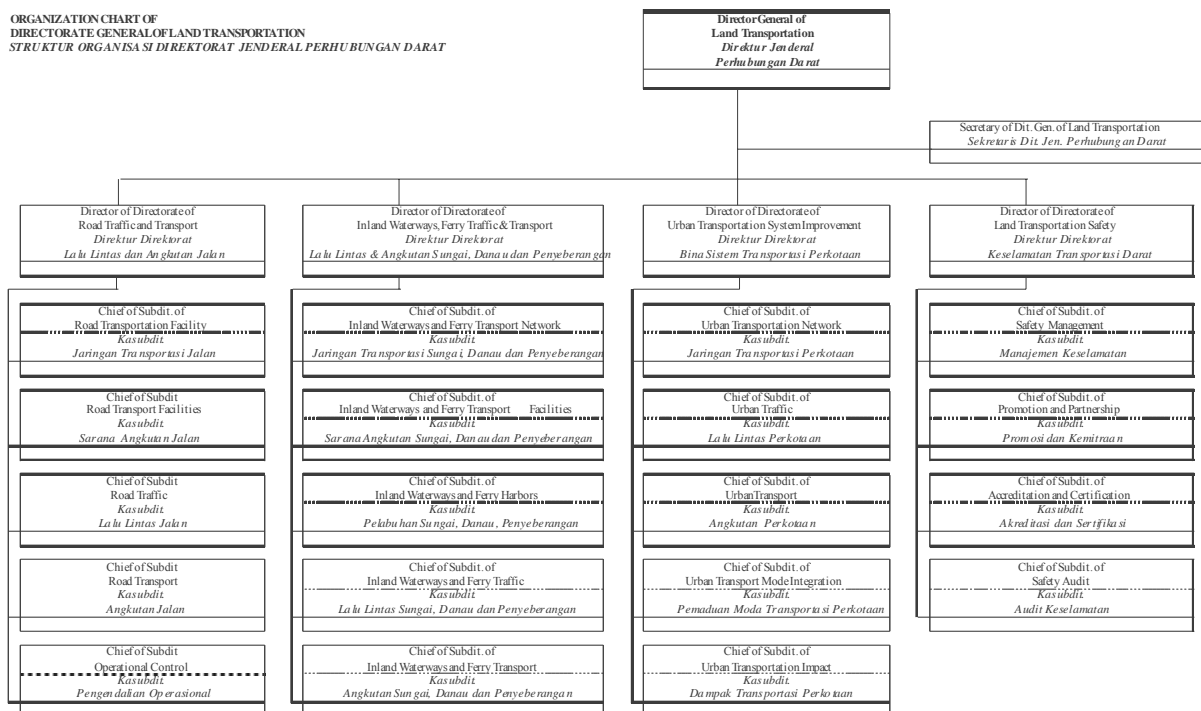
**Figure 3.5.3 Organization of Balai Besar**

**(3) Directorate General of Land Transportation, Ministry of Transportation**

The Directorate General of Land Transportation (DGLT) has a role in formulating and implementing policies and technical standardization in land transport sector. DGLT is to carry out the following functions in entire Indonesia:

- i) Preparing materials for formulation of Ministry of Transportation’s policies on road transport, inland waterways and ferry services, urban transportation, and land transport safety;
- ii) Implementing the formulated policies on road transport, inland waterways and ferry services, urban transportation, and land transport safety;
- iii) Formulating standards, norms, manuals, criteria, procedures on road transport safety;
- iv) Providing technical guidance and evaluation;
- v) Executing administrative matters of Directorate General of Land Transportation.

Figure 3.5.4 illustrates the organization of DGLT.



**Figure 3.5.4 Organization of Directorate General of Land Transportation (DGLT)**

### 3.5.3 Road Administration Framework for Provincial Road

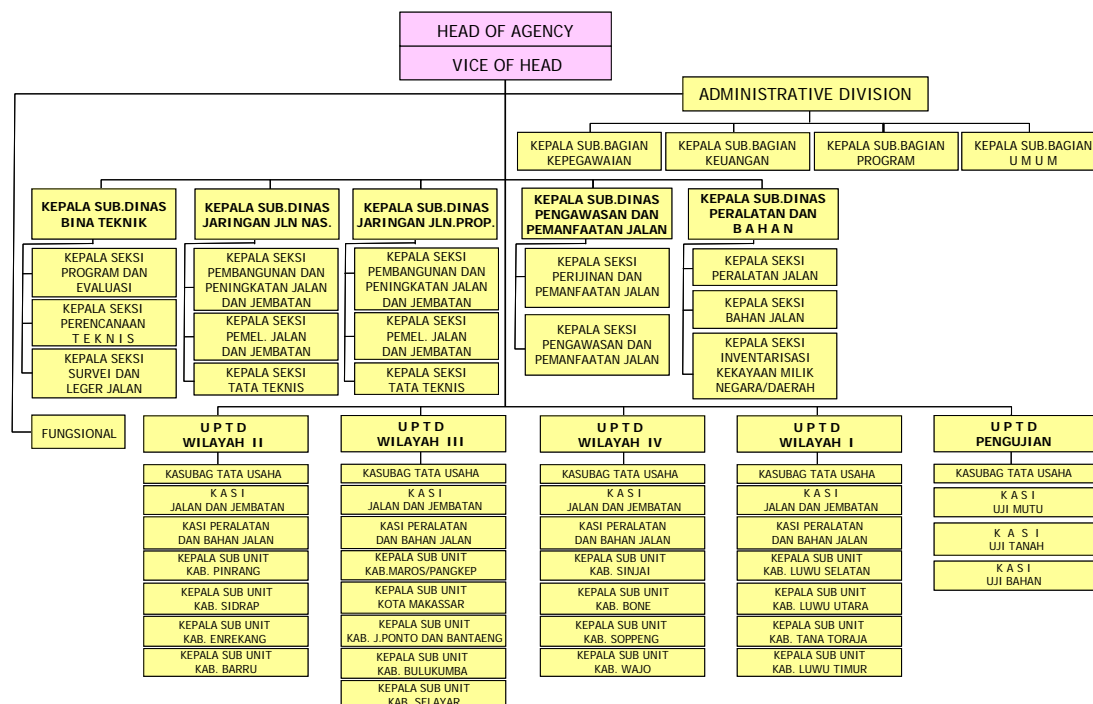
There are 6 provinces on the Island of Sulawesi: North Sulawesi, Gorontalo, Central Sulawesi, South Sulawesi, West Sulawesi and South East Sulawesi. Gorontalo was established from 2002 and West Sulawesi from 2006.

#### (1) South Sulawesi Province

Dinas Praswil (Dinas Prasarana Wilayah of South Sulawesi Provincial Government) is responsible for provincial roads in the South Sulawesi Province. Responsibilities of Dinas Praswil for the road sector include planning, design, construction and maintenance of provincial roads as well as maintenance of part of national roads. The organization chart of Dinas Praswil (Dinas Prasarana Wilayah) is shown in **Figure 3.5.5**.

There are corresponding maintenance divisions (Kepala seksi Pemeliharaan) in the Dinas Praswil for national road and provincial road. There are three to four officers in each division for the administrative works for the maintenance. Actual implementation of the maintenance work is conducted at each UPTD (Unit Pelaksana Teknis Dinas: Unit for Technical Implementation of Agency) established at Kabupaten/Kota level. The UPTDs conduct the routine maintenance by procuring freelance labors and the periodic maintenance by outsourcing sub-contractors.

The UPTDs may sometimes function as a project implementation unit (“Officers for Technical Activities Implementation”) for the development of Provincial Road and as a “Working Unit” for the development of National Road.



Source: Dinas Praswil of South Sulawesi Province

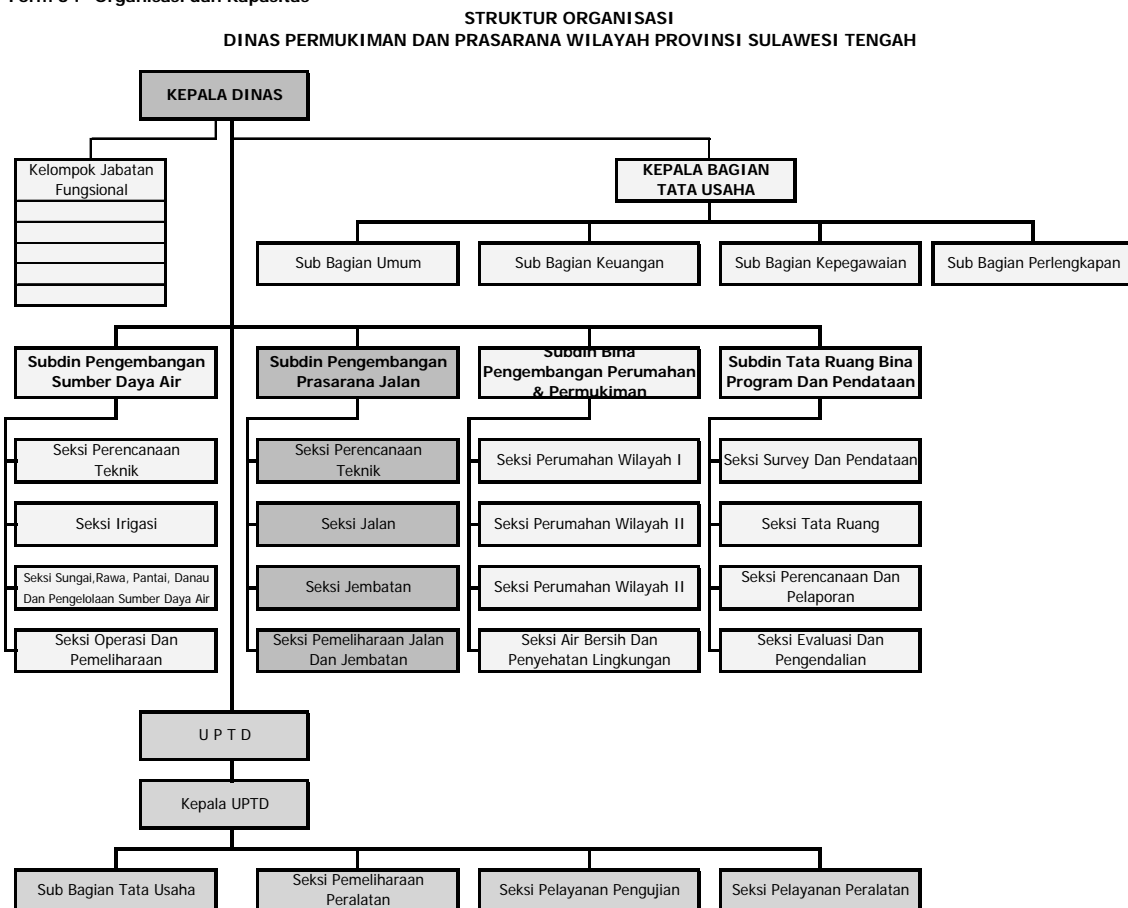
**Figure 3.5.5 Organization Chart of Dinas Prasarana Wilayah South Sulawesi Province**

(2) Other Five Provinces

Other five provinces have Dinas PU under which the divisions of Water Resource Development, Road Infrastructure Development and Settlement and Housing as illustrated in **Figure 3.5.6** as the case of Central Sulawesi Province. The division of Road Infrastructure Development is responsible for planning, design, construction and maintenance of provincial roads as well as maintenance of part of national roads.

There are corresponding maintenance divisions (Kepala seksi Pemeliharaan) in the Dinas Prasarail for national road and provincial road. There are three to four officers in each division for the administrative works for the maintenance. Actual implementation of the maintenance work is conducted at each UPTD (Unit Pelaksana Teknis Dinas: Unit for Technical Implementation of Agency) established at Kabupaten/Kota level. The UPTDs conduct the routine maintenance by procuring freelance labors and the periodic maintenance by outsourcing sub-contractors.

Form 3 : Organisasi dan Kapasitas



Source: Central Sulawesi Province

**Figure 3.5.6 Organization Chart of Dinas PU of Central Sulawesi Province**



### (3) Road Maintenance Forces of Each Province

The road maintenance of the provincial roads for each Province and Balai Besar VI is conducted as follows:

**Table 3.5.3 Maintenance Force of Province/ Balai Besar**

	No. of Maintenance Force (person)	Routine Maintenance	Periodic Maintenance
<b>1. North Sulawesi</b>	34	Fully Direct	Fully Sub Contract
<b>2. Gorontalo</b>	27	Fully Direct	Fully Sub Contract
<b>3. Central Sulawesi</b>	36	Fully Direct	Fully Sub Contract
<b>4. South Sulawesi</b>	22	Fully Direct	Fully Sub Contract
<b>5. West Sulawesi</b>	26	50% Direct:50%Sub Contract	Fully Sub Contract
<b>6. South East Sulawesi</b>	34	Mostly Direct	Fully Sub Contract
<b>7. Balai Besar VI</b>	36	Mostly Contract out to Provinces	Fully Direct but actual works by sub contractors

Source: JICA Study Team

### 3.5.4 Mechanism of Revenue and Budget Allocation in Indonesia

#### (1) Revenue Sources for Regional Government

The laws of regional autonomy established in 1999 (Law No. 22 concerning the Regional Administration and Law No. 25 concerning Financial Equilibrium of Central and Regional Governments) have changed the mechanism of revenue and budget allocation in Indonesia in terms of balance between the local and central governments.

The following illustrates the basic policy of the laws. Based on this policy, decentralization of authority and funding from the central government towards Provincial, Kabupaten and Kota governments<sup>2</sup> has taken place.

- i) Reduction of Central Government Functions and Delegation of its authorities to Kabupaten and Kota Governments
- ii) Equalization of Province, Kabupaten and Kota
- iii) Effective Monitoring Function by Strengthening Authority of Local Councils

**Table 3.5.4** summarizes the sources of revenue that the local governments have obtained after the decentralization. There are two major revenue sources for a local government, namely its own revenue from local tax and levies and the revenue allocation from the central government. The majority of tax revenues from automobiles and gasoline are collected at the provincial level and allocated to Kabupaten/Kota within the province concerned.

<sup>2</sup> The offices of the Central Government such as foreign relations, defense, national security, judicial courts, monetary and fiscal matter, and religion were maintained at local government level.

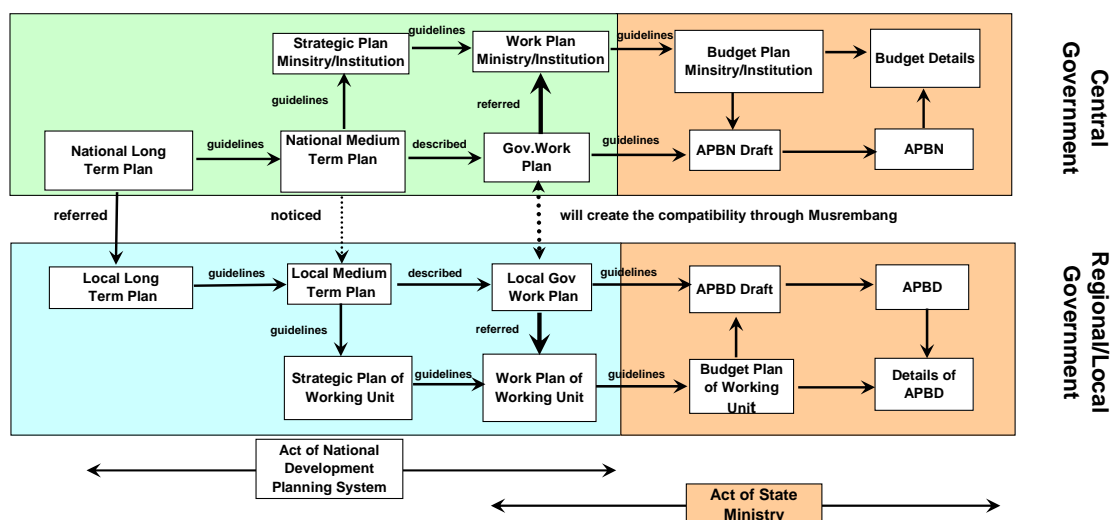
**Table 3.5.4 Sources of Revenue for Local Government**

Classification/Sources	Item
<b>1. Own Revenue</b>	
(1) Local Tax	Revised by the Law No. 34/2000
1) Province	Automobile Tax, Automobile Transfer Tax, Gasoline Tax, Water Surface Usage Tax, Underground water Tax, Water Transport Tax (less than 7 gt)
2) Kota/kabupaten	Hotel & Restaurant Tax, Entertainment Tax, Advertisement Tax, Street Light Tax. (Kota/Kabupaten have right to tax on items other than above)
(2) Local Levy	Parking Fee, Bus Terminal Levies, etc
(3) Revenue from Local SOEs	
(4) Other Own Fund	Donation from other local governments, etc.
<b>2. Balancing Fund (To Province/Kabupaten/Kota from the Central Government)</b>	
(1) Revenue Sharing	Land & Building Tax, Land & Building Acquisition Tax, Personal Income Tax, Sharing of the revenue from natural resources
(2) General Allocation Fund (DAU)	Minimum 25% of Revenue of CG. 90% to Kota/Kabupaten, 10% to Province based on determined formula. Its usage can be determined by each local government.
(3) Special Allocation Fund (DAK)	Allocated according to special needs. Local government must allocate a minimum of 10% of allocation from own APBD. DAK includes donor support projects. Allocated on the basis of request of local government.
<b>3. Borrowing of Local Government</b>	
(1) Domestic Borrowing	Central government, Banks, Financial Institutions other than Banks, Issuance of Local Government Bond, Other (Borrowing from other local government)
(2) Foreign Borrowing	Bilateral and Multi-lateral. Local government cannot borrow directly. It must borrow on lending scheme (Law No.25/1999, MOF Regulation No.53/PMK.010/2006), There is also on granting scheme (MOF Regulation No.52/PMK.010/2006)
<b>4. Other Revenue based on the Law</b> : Urgent fund for disaster, charity fund	

Source: JICA Study Team

**(2) Planning and Budget Flow of Central Government**

**Figure 3.5.7** illustrates the planning and budgeting flow of the Central Government. The planning process proceeds from left to right as the Five Year Strategic Plan based on the Medium Term Plan gives the guideline to the Annual Work Plan of each Ministry based on which the Annual Budget Plan of each Ministry is prepared and eventually develops into the Annual Budget of the Central Government with BAPPENAS as the coordinator of the planning process and Ministry of Finance as the implementer of the budgeting process with the consultation and the approval of the Parliament. The same procedure exists at the regional level and the compatibility of the two processes will be secured through the Coordination Meetings (Musrebang).



Source: BAPPENAS

**Figure 3.5.7 Planning and Budgeting Flow**

### 3.5.5 Road Sector Budget Allocation of Central Government

After the enforcement of the Local Autonomy Policy, the ratio of capital expenditure of the Central Government against GDP has been decreasing due to the fiscal reform program of IMF and the decentralization of fiscal resources towards local governments. Before that the ratio remained at the level of about 6% to 9%, but it immediately went down to 3% after the Policy has been enforced for the years 2002, 2003 and 2004, then lowered further recently to 1.9% for the years 2005 and 2006 as shown in **Table 3.5.5**.

The revenue of the Central Government has been constantly increasing for the last five years and about 34% to 35% of the revenue has been transferred to the local governments as transfer fund.

**Table 3.5.5 Expenditures of Central Government**

	Item	Expenditure (% of GDP)				
Before Local Autonomy Policy	Recurrent Expenditure	Actual 11-15%				
	Capital Expenditure	Actual 6-9%				
After Local Autonomy Policy	Central Government	2002 Budget	2003 Budget	2004 Budget	2005 Budget	2006 Budget
	- Recurrent (CG)	11.2%	9.2%	8.1%	7.7%	10.9%
	- Capital (CG)	3.0%	3.2%	3.1%	1.9%	1.9%
	- CG Total	14.2%	12.4%	11.2%	9.6%	12.8%
	Local Government	5.6%	5.7%	5.2%	4.7%	6.6%
	Total	19.8%	18.1%	16.5%	14.3%	19.4%

Source: BPS, Ministry of Finance

The budget allocated to the road sector accounted for 1.2% to 1.3% of the Government Expenditure recently and its tendency has been fairly stable. About 4.0 to 7.0 trillion Rupiahs have been allocated to the road sector for the last five years.

**Table 3.5.6 Share of Road Sector Budget**

Share of Road Sector Budget	2002	2003	2004	2005	2006
1. % of GDP	0.21%	0.38%	0.20%	0.18%	0.22%
2. % of Central Government Revenue	1.33%	2.32%	1.28%	1.30%	1.17%
3. % of Central Government Expenditure	1.23%	2.10%	1.19%	1.24%	1.13%
4. % of Central Government Dev't Expenditure	NA	11.80%	6.30%	6.30%	11.62%

Source: BPS, Bina Marga

**Table 3.5.7** shows the breakdown of the road budget of the Central Government for the last five years. The maintenance budget has been from Rp 0.9 trillion to Rp 1.5 trillion and has not been increasing. The budget for betterment and new construction has been fluctuating from Rp 2.2 trillion to Rp 5.9 trillion depending on the years. The budget for the year 2007 was set as Rp 9.8 trillion with its maintenance budget increasing about 30% from the year 2006. However, as the funding size required to raise 90% of the national roads above the “poor” status has been estimated to be Rp 15 to 20 trillion every year, the total budget allocated for the year 2007 is still far below the requirement.

**Table 3.5.7 Road Sector Budget of Central Government**

(Rp trillion)

Road Sector Budget of Central Government	2002		2003		2004		2005		2006		2007	
1.Maintenance	1.3	33%	0.9	12%	1.0	22%	1.1	22%	1.5	21%	2.6	27%
2.Betterment and New Construction	2.3	58%	5.9	76%	2.2	49%	3.4	69%	5.0	68%	7.0	71%
3.Design and Monitoring	0.2	5%	0.1	1%	0.2	4%	0.2	4%	0.3	4%	0.0	0%
4.PUSAT (Central DGH: Software)	0.2	5%	1.0	13%	1.1	24%	0.3	6%	0.5	7%	0.0	0%
5.Others		0%		0%		0%	0.04	1%	0.02	0%	0.24	2%
Total	4.0	100%	7.8	100%	4.5	100%	4.9	100%	7.3	100%	9.8	100%

Source: Bina Marga

Table 3.5.8 Revenue and Expenditure of Central Government (Budget)

Budget Item	2002			2003			2004			2005			2006		
	Rp. Trillion	GDP Ratio	Ratio	Rp. Trillion	GDP Ratio	Ratio	Rp. Trillion	GDP Ratio	Ratio	Rp. Trillion	GDP Ratio	Ratio	Rp. Trillion	GDP Ratio	Ratio
<b>A. Revenue</b>	298.6	16.0%	100.0%	336.2	16.4%	100.0%	349.9	15.4%	100.0%	380.4	13.7%	100.0%	625.2	18.7%	100.0%
1. Tax Revenue	210.1	11.3%	70.4%	254.1	12.4%	75.6%	272.2	12.0%	77.8%	297.8	10.7%	78.3%	416.3	12.5%	66.6%
(Income Tax)		0.0%	0.0%	120.9	5.9%	36.0%	134	5.9%	38.3%	142.2	5.1%	37.4%	210.7	6.3%	33.7%
(VAT)		0.0%	0.0%	80.8	3.9%	24.0%	86.3	3.8%	24.7%	98.8	3.5%	26.0%	128.3	3.8%	20.5%
2. Non-tax Revenue	88.5	4.7%	29.6%	82	4.0%	24.4%	77.1	3.4%	22.0%	81.7	2.9%	21.5%	205.3	6.2%	32.8%
<b>B. Expenditure</b>	322.2	17.3%	107.9%	370.6	18.1%	110.2%	374.4	16.5%	107.0%	397.8	14.3%	104.6%	647.7	19.4%	103.6%
1. Central Gov. Expenditure	224.0	12.0%	75.0%	253.7	12.4%	75.5%	255.3	11.2%	73.0%	266.2	9.6%	70.0%	427.6	12.8%	68.4%
a. Recurrent expenditure		0.0%	0.0%	188.6	9.2%	56.1%	184.4	8.1%	52.7%	212.6	7.6%	55.9%	364.7	10.9%	58.3%
(Personnel expenditure)		0.0%	0.0%	50.4	2.5%	15.0%	56.7	2.5%	16.2%	-	-	-	-	-	-
b. Development expenditure		0.0%	0.0%	66.1	3.2%	19.7%	70.9	3.1%	20.3%	53.6	1.9%	14.1%	62.9	1.9%	10.1%
(Road Sector)	4.0	0.2%	1.3%	7.8	0.4%	2.3%	4.5	0.2%	1.3%	4.9	0.2%	1.3%	7.3	0.2%	1.2%
maintenance	1.3	0.1%	0.4%	0.9	0.0%	0.3%	1.0	0.0%	0.3%	1.1	0.0%	0.3%	1.5	0.0%	0.2%
Betterment and New Construction	2.3	0.1%	0.8%	5.9	0.3%	1.8%	2.2	0.1%	0.6%	3.4	0.1%	0.9%	5.0	0.1%	0.8%
Design and Monitoring	0.2	0.0%	0.1%	0.1	0.0%	0.0%	0.2	0.0%	0.0%	0.2	0.0%	0.0%	0.3	0.0%	0.0%
PUSAT (Central DGH: software)	0.2	0.0%	0.1%	1.0	0.0%	0.3%	1.1	0.1%	0.3%	0.3	0.0%	0.1%	0.5	0.0%	0.1%
Others		0.0%	0.0%		0.0%	0.0%		0.0%	0.0%	0.04	0.0%	0.0%	0.02	0.0%	0.0%
2. Transfer Fund	98.2	5.3%	32.9%	116.9	5.7%	34.8%	119	5.2%	34.0%	131.5	4.7%	34.6%	220.1	6.6%	35.2%
a. Revenue Sharing Fund		0.0%	0.0%	27.9	1.4%	8.3%	26.9	1.2%	7.7%	31.2	1.1%	8.2%	59.3	1.8%	9.5%
b. General Allocation Fund	69.2	3.7%	23.2%	77	3.8%	22.9%	82.1	3.6%	23.5%	88.8	3.2%	23.3%	145.7	4.4%	23.3%
c. Special Allocation Fund		0.0%	0.0%	2.6	0.1%	0.8%	3.1	0.1%	0.9%	4.3	0.2%	1.1%	11.6	0.3%	1.9%
d. Specific Autonomy Balance Fund	3.5	0.2%	1.2%	9.4	0.5%	2.8%	6.8	0.3%	1.9%	7.2	0.3%	1.9%	3.5	0.1%	0.6%
<b>C. Fiscal Balance (A-B)</b>	-23.6	-1.3%	-7.9%	-34.4	-1.7%	-10.2%	-24.4	-1.1%	-7.0%	-17.4	-0.6%	-4.6%	-22.4	-0.7%	-3.6%
<b>D. Deficit Financing</b>	23.6			34.4			24.4			17.4			22.4		
1. Domestic Finance	16.9			31.5			40.5			37.6			50.9		
2. Foreign Finance	6.6			2.9			-16.1			-20.2			-28.5		

Note: 1) Since 2005 is using unified budget, that included of the budgeted current expenditures and budgeted development expenditure

Source: MOF Budget Statistics

### 3.5.6 Road Sector Budget Allocation of Provincial Government

#### (1) Budget Allocation for National Road Development and Maintenance from Central Government

**Table 3.5.8** illustrates the historical trend of the budget of Bina Marga allocated to the provinces from 2001 to 2007 mainly for the development and maintenance of the national road network. The total amount of the budget allocated to all provinces was Rp 9.8 trillion for the year of 2007. The annual average growth rate of the budget for the period has been about 28%. The shares among the regions for the year of 2007 are as follows:

Sumatera	24.2%
Jawa	29.6%
Kalimantan	19.6%
Bali dan Nusa Tenggara	6.4%
Sulawesi	11.7%
Maluku da Papua	8.5%

The Sulawesi Region has a 12 % share of the whole country for the year 2007. Its average share for the period from 2001 to 2007 has been 11.4%. The share of the Sulawesi Region in the country has been fairly stable for the last 3 years ranging between 11% and 12%. The share of the Sulawesi in the national road sector budget allocation may be considered relatively high as compared to that of GRDP being only 4.2% (2004) and that of population being 7.3%.

The breakdown of budget category for the average of the period of 2001-2007 for the whole country is as follows:

Road Maintenance	22.1%
Road Betterment and New Construction	67.2%
Design and Monitoring	2.3%
PUSAT (Central DGH)	7.6%
Others	0.7%

The total amount allocated to all the Sulawesi provinces for 2007 is 1,054 Rp billion. Among the provinces of the Sulawesi Region the share of the South Sulawesi Province has been about one fourth of the total Sulawesi budget allocated from Bina Marga (**Table 3.5.9**) growing in recent years..

**Table 3.5.9 Budget Allocation of Bina Marga to Provinces (2001-2007)**

		(Rp Million)							
No	Province/Project	Budget Allocation							
		2001	2002	2003	2004	2005	2006	2007	Total
1	Nanggroe Aceh Darussalam	114,037	160,851	3,785,852	67,780	271,221	273,855	298,855	4,972,451
2	Sumatera Utara	85,525	147,617	204,976	164,989	204,405	340,869	360,869	1,509,250
3	Sumatera Barat	146,804	79,449	79,758	97,520	97,231	130,189	184,253	815,204
4	Riau	141,421	146,259	148,654	163,701	162,105	181,622	183,122	1,126,884
5	Kepulauan Riau					15,951	39,980	65,568	121,499
6	Jambi	69,260	128,391	133,644	103,495	162,737	163,565	209,565	970,657
7	Bengkulu	36,558	95,704	89,305	91,192	91,299	105,760	147,361	657,179
8	Sumatera Selatan	59,893	138,351	54,813	62,783	128,189	254,501	343,009	1,041,539
9	Kepulauan Bangka Belitung		36,570	68,535	61,425	63,682	69,121	89,121	388,454
10	Lampung	52,101	177,626	41,469	48,300	249,005	238,446	294,153	1,101,100
11	DKI Jakarta						132,858	292,594	425,452
12	Banten	947	59,782	68,952	60,409	66,909	94,466	107,606	459,071
13	Jawa Barat	85,579	205,822	82,980	103,740	362,084	518,995	548,368	1,907,568
14	Jawa Tengah	146,916	251,592	134,823	141,399	165,770	324,516	354,016	1,519,032
15	DI Yogyakarta	45,592	36,725	55,479	68,169	75,570	88,420	104,979	474,934
16	Jawa Timur	57,907	173,295	141,448	165,857	326,649	709,519	1,258,418	2,833,093
17	Kalimantan Barat	54,208	88,185	80,384	113,732	173,993	218,218	233,218	961,938
18	Kalimantan Tengah	71,512	119,546	72,764	106,245	146,352	288,142	690,000	1,494,561
19	Kalimantan Timur	360,636	353,907	446,676	467,612	529,129	521,135	545,635	3,224,730
20	Kalimantan Selatan	57,595	95,868	96,733	98,849	98,742	185,499	294,000	927,286
21	Bali	32,586	82,441	40,603	45,793	52,513	104,338	154,338	512,612
22	Nusa Tenggara Barat	33,695	76,855	55,538	44,230	50,384	83,318	104,518	448,538
23	Nusa Tenggara Timur	64,465	140,869	115,965	130,594	177,198	231,390	316,390	1,176,871
24	Sulawesi Utara	83,883	167,922	112,095	99,112	98,948	159,691	229,691	951,342
25	Gorontalo		48,257	52,966	50,849	78,076	88,030	90,030	408,208
26	Sulawesi Tengah	58,683	101,349	98,925	115,977	117,723	127,951	132,201	752,809
27	Sulawesi Selatan	62,375	152,621	90,734	117,609	118,113	227,628	340,768	1,109,848
28	Sulawesi Barat						79,910	109,910	189,820
29	Sulawesi Tenggara	45,692	106,341	80,419	104,197	104,527	150,420	151,420	743,016
30	Maluku	44,706	99,677	84,113	95,047	95,901	173,259	195,395	788,098
31	Maluku Utara	22,418	59,212	53,497	49,446	50,310	87,345	109,202	431,430
32	Papua	183,718	235,299	277,262	288,268	210,819	235,971	294,371	1,725,708
33	Irian Jaya Barat					107,806	141,865	166,865	416,536
	<b>Total</b>	<b>2,218,712</b>	<b>3,766,383</b>	<b>6,849,362</b>	<b>3,328,319</b>	<b>4,653,341</b>	<b>6,770,792</b>	<b>8,999,809</b>	<b>36,586,718</b>
	PUSAT (Central Directorate General of Highways/DGH) incl. Others	38,219	190,377	950,570	1,139,396	296,169	538,522	806,272	3,959,525
	<b>Grand Total</b>	<b>2,256,931</b>	<b>3,956,760</b>	<b>7,799,932</b>	<b>4,467,715</b>	<b>4,949,510</b>	<b>7,309,314</b>	<b>9,806,081</b>	<b>40,546,243</b>

Region	2001	2002	2003	2004	2005	2006	2007	Total
Sumatera	705,599	1,110,818	4,607,006	861,185	1,445,825	1,797,908	2,175,876	12,704,217
Jawa	336,941	727,216	483,682	539,574	996,982	1,868,774	2,665,981	7,619,150
Kalimantan	543,951	657,506	696,557	786,438	948,216	1,212,994	1,762,853	6,608,515
Bali dan Nusa Tenggara	130,746	300,165	212,106	220,617	280,095	419,046	575,246	2,138,021
Sulawesi	250,633	576,490	435,139	487,744	517,387	833,630	1,054,020	4,155,043
Maluku dan Papua	250,842	394,188	414,872	432,761	464,836	638,440	765,833	3,361,772
<b>Total</b>	<b>2,218,712</b>	<b>3,766,383</b>	<b>6,849,362</b>	<b>3,328,319</b>	<b>4,653,341</b>	<b>6,770,792</b>	<b>8,999,809</b>	<b>36,586,718</b>

Note: PUSAT and Others are excluded.

Budget Category	2001	2002	2003	2004	2005	2006	2007	Total
Road Maintenance	640,455	1,279,571	879,154	979,311	1,126,480	1,480,582	2,617,619	9,003,172
Road Betterment and New Construction	1,655,560	2,318,816	5,886,180	2,195,950	3,372,758	5,006,372	6,951,489	27,387,125
Design and Monitoring	108,945	167,995	84,026	153,057	154,105	266,650		934,778
PUSAT (Central DGH)	38,219	190,377	950,570	1,139,396	254,068	538,522		3,111,152
Others					42,101	17,187	237,150	296,438
<b>Total</b>	<b>2,443,179</b>	<b>3,956,759</b>	<b>7,799,930</b>	<b>4,467,714</b>	<b>4,949,512</b>	<b>7,309,313</b>	<b>9,806,258</b>	<b>40,732,665</b>
Share of Budget Category	2001	2002	2003	2004	2005	2006	2007	Average
Road Maintenance	26.2%	32.3%	11.3%	21.9%	22.8%	20.3%	26.7%	22.1%
Road Betterment and New Construction	67.8%	58.6%	75.5%	49.2%	68.1%	68.5%	70.9%	67.2%
Design and Monitoring	4.5%	4.2%	1.1%	3.4%	3.1%	3.6%	0.0%	2.3%
PUSAT (Central DGH)	1.6%	4.8%	12.2%	25.5%	5.1%	7.4%	0.0%	7.6%
Others	0.0%	0.0%	0.0%	0.0%	0.9%	0.2%	2.4%	0.7%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Share of Sulawesi	2001	2002	2003	2004	2005	2006	2007	Average
Indonesia	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Sulawesi Total	11.3%	15.3%	6.4%	14.7%	11.1%	12.3%	11.7%	11.4%
Sulawesi Utara (North)	3.8%	4.5%	1.6%	3.0%	2.1%	2.4%	2.6%	2.6%
Gorontalo		1.3%	0.8%	1.5%	1.7%	1.3%	1.0%	1.3%
Sulawesi Tengah (Central)	2.6%	2.7%	1.4%	3.5%	2.5%	1.9%	1.5%	2.1%
Sulawesi Selatan	2.8%	4.1%	1.3%	3.5%	2.5%	3.4%	3.8%	3.0%
Sulawesi Barat (West)						1.2%	1.2%	1.2%
Sulawesi Tenggara (South East)	2.1%	2.8%	1.2%	3.1%	2.2%	2.2%	1.7%	2.0%
Sulawesi Selatan/Sulawesi Total	24.9%	26.5%	20.9%	24.1%	22.8%	27.3%	32.3%	26.7%

Source: Bina Marga

Table 3.5.10 shows the breakdown of the budget categories of the Bina Marga Budget allocated

to the Sulawesi Provinces. The maintenance budget for 2007 is 33% of the total budget whereas that of the construction/betterment is 63% with the balancing 4% for the planning and control (P2JJ). The amount of the budget allocated in the recent years has increased considerably from 517 Rp billion in 2005 to 1,054 Rp billion in 2007, doubled in 2 years. Both the construction and maintenance have increased at the same time. The growth of budget allocation for North Sulawesi and South Sulawesi has been considerable in the last two years.

**Table 3.5.10 Details of the Budget Allocated for the Sulawesi Provinces (2001-2007)**

	2001			2002			2003			2004			2005			2006			2007			
	Rupiah	Foreign Loan	Total	Rupiah	Foreign Loan	Total	Rupiah	Foreign Loan	Total	Rupiah	Foreign Loan	Total	Rupiah	Foreign Loan	Total	Rupiah	Foreign Loan	Total	Rupiah	Foreign Loan	Total	
<b>NORTH SULAWESI</b>																						
Maintenance	0	0	0	0	0	0	64,489	47,606	112,095	57,177	41,935	99,112	55,596	43,352	98,948	137,719	21,972	159,691	229,691	0	229,691	
Development	0	0	0	0	0	0	19,288	6,663	25,951	21,798	9,036	30,834	22,733	32,683	45,839	0	45,839	102,869	0	102,869		
Planning and Control	0	0	0	0	0	0	45,201	40,943	86,145	32,581	31,023	63,604	30,893	30,719	61,612	86,474	19,272	105,746	119,752	0	119,752	
							0	0	0	2,796	1,676	4,674	1,970	2,683	4,653	5,406	2,700	8,106	7,070	0	7,070	
<b>GORONTALO</b>																						
Maintenance	0	0	0	31,467	16,790	48,257	38,477	14,489	52,966	38,678	12,171	50,849	65,241	12,835	78,076	83,210	4,820	88,030	90,030	0	90,030	
Development	0	0	0	20,297	8,877	29,174	11,528	8,139	19,667	13,379	4,364	17,743	13,883	5,000	18,883	24,592	0	24,592	42,368	0	42,368	
Planning and Control	0	0	0	10,061	6,297	16,358	26,948	6,250	33,289	22,844	6,706	29,550	48,972	7,700	56,572	54,552	4,820	59,372	43,316	0	43,316	
				1,109	1,616	2,725	0	0	0	2,455	1,101	3,556	2,487	135	2,622	4,067	0	4,067	4,346	0	4,346	
<b>CENTRAL SULAWESI</b>																						
Maintenance	28,329	30,354	58,683	62,320	39,029	101,349	58,134	40,791	98,925	59,173	56,804	115,977	62,310	55,413	117,723	109,521	18,430	127,951	112,200	20,001	132,201	
Development	11,808	9,385	21,193	34,304	18,378	52,682	23,162	21,691	44,853	23,940	18,227	42,167	26,255	25,359	51,613	45,000	0	45,000	61,528	0	61,528	
Planning and Control	15,851	17,860	33,711	25,928	17,350	43,278	34,972	19,100	54,072	32,550	38,577	71,127	33,906	27,940	61,845	59,756	16,680	76,436	45,546	20,001	65,546	
	670	3,109	3,779	2,088	3,301	5,389	0	0	0	2,683	0	2,683	2,149	2,115	4,264	5,765	1,750	7,515	5,127	0	5,127	
<b>SOUTH SULAWESI</b>																						
Maintenance	26,800	35,575	62,375	57,101	95,521	152,621	67,547	23,186	90,734	86,623	30,988	117,609	85,611	32,503	118,113	199,428	28,200	227,628	294,481	46,287	340,768	
Development	12,236	8,257	20,493	26,111	14,419	40,530	25,982	6,032	31,115	35,693	5,257	40,950	35,977	5,000	40,977	47,373	0	47,373	55,365	8,328	63,693	
Planning and Control	13,904	24,707	38,611	28,435	76,600	105,036	42,465	17,154	59,619	47,797	24,729	72,526	46,714	25,948	72,663	141,797	23,200	164,997	224,534	37,959	262,493	
	660	2,611	3,271	2,554	4,501	7,055	0	0	0	3,133	1,000	4,133	2,919	1,554	4,474	10,259	5,000	15,259	14,582	0	14,582	
<b>WEST SULAWESI</b>																						
Maintenance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43,830	36,080	79,910	72,868	37,043	109,910	
Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,925	0	10,925	18,265	0	18,265	
Planning and Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,376	36,000	66,376	50,562	37,043	87,605	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,530	80	2,610	4,041	0	4,041	
<b>SOUTH EAST SULAWESI</b>																						
Maintenance	15,736	29,956	45,692	31,694	74,647	106,341	65,884	14,635	80,419	62,959	41,238	104,197	63,799	40,728	104,527	32,651	150,420	102,219	49,200	151,420		
Development	9,659	14,101	23,760	17,904	68,375	86,279	23,955	2,177	26,133	22,487	10,500	32,987	23,436	14,955	38,391	37,020	9,995	47,014	50,073	4,580	54,653	
Planning and Control	5,600	13,623	19,223	12,316	2,510	14,827	41,929	12,357	54,286	37,337	28,712	66,049	37,967	23,977	61,944	75,890	21,256	97,146	47,515	43,673	91,188	
	477	2,232	2,709	1,474	3,762	5,236	0	0	0	3,135	2,026	5,161	2,366	1,797	4,193	4,859	1,400	6,259	4,631	947	5,576	
<b>TOTAL</b>																						
Maintenance	70,865	95,885	166,750	182,582	225,987	408,568	294,531	140,607	435,138	304,610	183,134	487,744	332,556	184,831	517,388	691,478	142,153	833,630	901,490	152,530	1,054,020	
Development	33,703	31,743	65,446	55,446	110,049	208,665	103,015	44,703	147,718	117,297	47,394	164,681	122,283	60,263	182,546	210,748	9,995	200,742	330,469	12,908	343,377	
Planning and Control	25,355	56,190	81,543	76,740	102,758	179,499	191,516	95,905	287,421	173,109	129,747	302,856	169,352	116,284	214,638	447,943	121,228	569,071	531,225	136,675	669,900	
	1,807	7,952	9,759	7,225	13,180	20,405	0	0	0	14,204	6,003	20,207	11,921	8,284	20,205	32,887	10,930	43,817	39,796	947	40,743	

Source: BINAMARGA

**(2) Budget Allocation for Provincial Road Development and Maintenance by Provincial Government**

Table 3.5.11 illustrates the breakdown of road sector budget of the 6 Sulawesi Provinces. The annual budget levels for the betterment /construction of the provincial roads for the recent two years are as follows:

	Betterment/Construction	Maintenance
North Sulawesi	Rp 8-14 billion	Rp 18-22 billion
Gorontalo	Rp 27-40 billion	Rp 5-19 billion
Central Sulawesi	Rp 37-85 billion	Rp 76-92 billion
South Sulawesi	Rp 24-55 billion	Rp 17-36 billion
West Sulawesi	Rp 3-11 billion	Rp 0.6- 1.7 billion
South East Sulawesi	Rp 25-29 billion	Rp 8- 10 billion

The total betterment/construction budget allocated for the provincial road development in the 6 Sulawesi provinces has about 171 - 187 Rp billion while the total maintenance budget has been about 140 - 167 Rp billion in recent years.



**Table 3.5.11 Road Sector Budget of 6 Provinces of Sulawesi Region**

	(Mil. Rp)					
	2002	2003	2004	2005	2006	2007
<b>NORTH SULAWESI</b>						
Maintenance	3,132	12,591	7,818	7,068	18,643	22,489
Development	11,058	9,843	0	3,425	8,172	13,953
<b>Total</b>	<b>14,190</b>	<b>22,434</b>	<b>7,818</b>	<b>10,493</b>	<b>26,815</b>	<b>36,442</b>
<b>GORONTALO</b>						
Maintenance	65,000	13,949	3,475	9,614	19,370	5,396
Development	17,637	5,630	4,086	23,887	27,166	40,987
<b>Total</b>	<b>82,637</b>	<b>19,579</b>	<b>7,561</b>	<b>33,501</b>	<b>46,536</b>	<b>46,383</b>
<b>CENTRAL SULAWESI</b>						
Maintenance	5,332	8,670	7,928	12,221	25,196	16,508
Development	3,071	6,556	9,576	9,582	13,698	21,147
<b>Total</b>	<b>8,403</b>	<b>15,226</b>	<b>17,504</b>	<b>21,803</b>	<b>38,894</b>	<b>37,655</b>
<b>SOUTH SULAWESI</b>						
Maintenance	17,965	22,293	31,501	15,217	17,214	36,350
Development	13,098	8,724	9,341	13,341	23,739	55,030
<b>Total</b>	<b>31,064</b>	<b>31,018</b>	<b>40,842</b>	<b>28,559</b>	<b>40,953</b>	<b>91,380</b>
<b>WEST SULAWESI</b>						
Maintenance					1,700	600
Development					2,600	10,537
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,300</b>	<b>11,137</b>
<b>SOUTH EAST SULAWESI</b>						
Maintenance	16,980	13,970	3,640	2,325	7,552	10,250
Development	11,320	11,430	1,560	1,712	24,751	29,140
<b>Total</b>	<b>28,300</b>	<b>25,400</b>	<b>5,200</b>	<b>4,037</b>	<b>32,303</b>	<b>39,390</b>
<b>TOTAL</b>						
Maintenance	108,410	71,473	54,362	46,446	89,675	91,593
Development	56,185	42,184	24,563	51,948	100,127	170,794
<b>Total</b>	<b>164,594</b>	<b>113,657</b>	<b>78,925</b>	<b>98,394</b>	<b>189,802</b>	<b>262,387</b>

Source: Sulawesi Provinces

**Table 3.5.12** shows the revenue and expenditure of 6 Sulawesi provinces with the road sector expenditure of corresponding year. The total revenue of the 6 provinces has been growing at the average annual growth rate of 17% to 20%. On the other hand the road sector expenditure has not been growing as rapidly as the revenue with its average share being about 10% of the total revenue.

**Table 3.5.12 Revenue and Expenditure of 6 Provinces of Sulawesi Region**

Budget Item	2002		2003		2004		2005		2006		2007	
	Rp. Billion	Ratio	Rp. Billion	Ratio	Rp. Billion	Ratio	Rp. Billion	Ratio	Rp. Billion	Ratio	Rp. Billion	Ratio
<b>A. Revenue</b>	1,930.8	100%	2,222.4	100%	2,339.9	100%	2,842.2	100%	4,041.4	100%	4,384.3	100%
1. Local Own Revenue (PAD)	780.4	40%	804.1	36%	899.9	38%	1,199.5	42%	1,295.8	32%	1,406.2	32%
Carry on from Previous Year	226.2	12%	60.3	3%	30.1	1%	48.4	2%	619.3	15%	0.0	0%
Local Taxes	434.5	23%	551.6	25%	680.8	29%	930.4	33%	501.6	12%	1,202.1	27%
Local User Charges	49.2	3%	72.9	3%	76.7	3%	83.8	3%	80.1	2%	93.7	2%
Local Gov. Owned Company Profit	25.9	1%	65.8	3%	48.6	2%	81.9	3%	45.5	1%	51.8	1%
Others	44.6	2%	53.5	2%	63.7	3%	54.9	2%	49.3	1%	58.6	1%
2. Intergovernmental Transfer	1,150.3	60%	1,418.3	64%	1,440.1	62%	1,642.7	58%	2,745.5	68%	2,978.1	68%
Tax Revenue Sharing	105.6	5%	166.8	8%	163.7	7%	204.3	7%	237.6	6%	297.5	7%
Non Tax Revenue Sharing	18.5	1%	1.3	0%	1.5	0%	78.4	3%	0.8	0%	0.5	0%
General Allocation Fund (DAU)	1,023.2	53%	1,168.1	53%	1,225.4	52%	1,317.5	46%	2,488.5	62%	2,484.3	57%
Special Allocation Fund (DAK)	0.0	0%	50.3	2%	0.0	0%	0.1	0%	0.2	0%	97.4	2%
Others	3.0	0%	31.7	1%	49.5	2%	42.4	1%	18.5	0%	98.4	2%
<b>B. Expenditure</b>	1,842.8	100%	2,164.1	100%	2,398.2	100%	2,421.2	100%	3,453.3	100%	3,629.5	100%
1. Recurrent Expenditure	1,123.8	61%	1,064.4	49%	1,636.6	68%	1,534.8	63%	2,124.1	62%	1,946.1	54%
2. Development/Capital Expenditure(1)	719.0	39%	1,099.6	51%	761.6	32%	886.4	37%	1,329.2	38%	1,683.4	46%
(1) Road Sector Expenditure	164.6	9%	113.7	5%	78.9	3%	98.4	4%	189.8	5%	262.4	7%
a. Betterment and Construction	56.2	3%	42.2	2%	24.6	1%	51.9	2%	100.1	3%	170.8	5%
b. Routine and Periodic Maintenance	108.4	6%	71.5	3%	54.4	2%	46.4	2%	89.7	3%	91.6	3%
<b>C. Fiscal Balance (A-B)</b>												
<b>D. Deficit Financing</b>												
1. Loan, etc												
2. Repayment, etc												

Source: Provincial Statistics

Note (1): There has been the change of statistical format during 2002 - 2004 for all of the 6 provinces

### **3.6 Transport Problems and Issues in Sulawesi**

#### **3.6.1 Transport Sector and Road Subsector**

##### **(1) Dominance of Road Transport**

Indonesia's transport sector is generally dominated by road transport. Road transport accounts for more than 80% for passengers and 90% for freight. This is closely related to the concentrated population in Java Island particularly in Jakarta. It has been a national strategy to disperse population from Java to less populated regions to attain a balanced development. If this strategy is materialized, air transportation will take a more important role in interisland passenger transport, rail transport in intra-Java passenger transport, and coastal shipping in inter-island freight transport.

In Sulawesi, this issue seems less significant because it is located in eastern Indonesia which is assumed to be one of the densely populated areas and considered a center of economic activities. Nevertheless, it is essential for Sulawesi to realize more balanced modal shares. At present, the modal share of road transport in Sulawesi for freight is estimated at 64% (HLRIP-II), which is considerably lower than the national average of 92%.

##### **(2) Transport Sector Management**

The decentralization process in the management of the transport sector is ongoing. Since Law No. 22 and No. 25 were enacted in 1999, the responsibilities over sector management and project implementation have been transferred from the central government to local governments. Although the efficiency and capacity of the sector have been partially improved by deregulation (such as the open-sky policy in the air transport subsector), the quality of sector management has not improved. For instance, the responsibility for the development and maintenance of national roads previously shouldered by Bina Marga were transferred to the Ministry of Settlement and Regional Infrastructure (MSRI or Kimpraswil). In 1999 it was returned to Bina Marga again. The process of decentralization is not moving forward as seen in this example. It even caused some confusion in the road transport sector coupled with other reasons such as lack of capacity of local officials to shoulder the transferred responsibilities and to coordinate among central/local government agencies.

In Sulawesi, national roads are planned, developed, and managed by the National Road Implementation Executive Unit VI (Kepala Balai Besar Pelaksanaan Jalan Nasional–VI) which is under Bina Marga. Since its establishment in January 2007, it has not fully functioned yet. West Sulawesi is a new province, separated in 2004 from South Sulawesi, and has yet to prepare for provincial road management. As such, many things have to be reorganized and rectified in Sulawesi in relation to the management of the road transport sector. The road information system, including the IRMS which is the basis for planning and monitoring, should be reconstructed in accordance with the changes in administration and classification.

#### **3.6.2 Road Infrastructure**

### **(1) Inadequacy of Road Infrastructure**

Sulawesi's road infrastructure is underdeveloped. Although its road density is slightly higher than the national average, the level is still far from satisfactory. Most of the arterial roads have 2 narrow lanes, while road conditions tend to be bad in remote places. Alignment is generally poor and winding in hilly/mountainous areas. The long rugged coastline of Sulawesi also makes road alignment long and winding with frequent rises and falls. Table 3.5.1 reveals how extreme detours should be made when traveling between provincial capital cities through existing roads that are winding due to a steep topography and complex coastlines. When the ratio "A/B" is 2.0, it means that road users have to run twice the distance of a straight route. This problem can be solved by improving the alignment of existing roads and developing new roads. However, its effect is only to a certain extent as the severe topographic constraints cannot be easily overcome. The more realistic solution would be a more positive usage of ferries and the realignment of extremely curved sections of existing arterial roads. Particularly for Kendari, the capital city of Southeast Sulawesi, a nautical highway system could be proposed using interpeninsular ferries to improve its accessibility to other provinces.

**Table 3.6.1 Actual Road Distances and Crow-Fly Distances between Provincial Capital Cities**

	Actual Distance (km) - A	Crow-fly Distance (km) - B	Ratio A/B
Manado - Gorontalo	416	226	1.84
Manado - Palu	963	619	1.56
Manado - Mamuju	1356	801	1.69
Manado - Makassar	1800	949	1.90
Manado - Kendari	1872	685	2.73
Gorontalo - Palu	617	395	1.56
Gorontalo - Mamuju	1010	582	1.74
Gorontalo - Makassar	1454	746	1.95
Gorontalo - Kendari	1421	504	2.82
Palu - Mamuju	393	218	1.80
Palu - Makassar	837	468	1.79
Palu - Kendari	1007	445	2.26
Mamuju - Makassar	444	276	1.61
Mamuju - kendari	1009	419	2.41
Makassar - Kendari	1057	361	2.93

Source: JICA Study Team's estimate based on IRMS.

Another important fact in Sulawesi is that the poorer the area, the scarcer the road becomes.. This does not necessarily mean, however, that underdevelopment of roads is the cause of poverty. Since roads have been historically developed along with the expansion of economic activities, the fact is that economic activities require roads and road development enables economic growth. Thus road development should be implemented in close coordination with regional development plans.

Sulawesi needs to develop its economy to be the center of eastern Indonesia and road infrastructure should be provided to comply with the economic, social, and industrial development plans.

## (2) Toll Road and Private Sector Participation

The central government seems to be taking on the task of sector management more than directly involving itself in planning, implementation, and daily operation of roads due probably to lack of budget and other underlying reasons. For roads where significant traffic is foreseen, private sector participation naturally should be pursued. Even if traffic demand is not so large as to produce profits sufficient to the private sector, PPP (public-private partnership) may be applied with a government subsidy shouldering part of the project cost.

In the current legal/institutional framework, the central government conducts an open bidding and selects a private proponent for a toll road project where the proponent forms a joint venture company with PT. Jasa Marga. Since PPP projects are hardly implemented recently in Indonesia, current discussions are held regarding the legal/institutional scheme of PFI/PPP project and the status/role of PT. Jasa Marga.

In Sulawesi, some toll road projects are proposed using PFI/PPP scheme, such as the Manado-Bitung Toll Road Project. Financial feasibility has not been tested yet, and the project may require considerable government subsidy. Hence, this should be a PPP project which needs scrutiny

under the current legal/institutional system. Generally speaking, 100% privately financed road projects would be possible only in and near the city area such as Makassar and Manado. PPP schemes could be applied more widely depending on the ongoing institutional reform.

### **3.6.3 Environment and Traffic Safety**

#### **(1) Environmental Issues**

Regional development and environmental protection generally conflict with each other. This problem is also true in the road transport subsector. Fortunately, however, most road projects likely to be proposed will be on the improvement of existing roads, such as minor upgrading (partial widening and realignment), rehabilitation, and maintenance. Their environmental and social impacts, particularly of resident relocation and resettlement would be minimal.

However, there should certainly be negative impacts attributed to road projects. These impacts should be minimized through better planning, design, implementation, and maintenance. The cost needed to carry out the measures on environmental protection should be reflected in the project evaluation.

#### **(2) Traffic Safety**

Table 3.5.2 summarizes the traffic accident statistics of southeast countries. In terms of the number of deaths per 1,000 population, Indonesia received an average ranking, while Malaysia, Thailand, and Vietnam showed higher death rates. However, Singapore's rate is nearly a third of Indonesia, and if high vehicle ownership in Singapore is taken into account, Indonesia is far more dangerous than Singapore. Moreover the number of accidents is quickly increasing in Indonesia according to Direktorat Jenderal Perhubungan Darat (2006).

Although accident statistics are only partially available in Sulawesi, records show that South Sulawesi registered 676 deaths due to traffic accidents in 2005. This is equivalent to 0.09 deaths per 1,000 population, which is significantly lower than the national average of 0.141. But this is not good news for Sulawesi, because accident statistics may have been underreported as revealed in national police statistics.

**Table 3.6.2 Road Accident Deaths and Injuries in Southeast Asia, 2003**

Country	Population (000)	Police Reported		Estimated		No. of Deaths (estimated) per 1000 Pop.
		Deaths	Injuries	Deaths	Injuries	
Brunei Darussalam	358	28	645	28	1273	0.078
Cambodia	13,531	824	6329	1017	20340	0.075
Indonesia	214,674	8781	13941	30464	2550000	0.141
Lao People's Democratic Republic	5,661	415	6231	581	18690	0.102
Malaysia	24,437	6282	46420	6282	46420	0.257
Myanmar	49,463	1308	9299	1308	45780	0.026
Philippines	80,166	995	6790	9000	493970	0.112
Singapore	4,185	211	7975	211	9072	0.05
Thailand	63,145	13116	69313	13116	1529034	0.207
Vietnam	81,314	11319	20400	13186	30999	0.162
Total Asean	536,934	43259	187343	75193	4745578	0.14

Source : Asean

In the future, when traffic volume will be larger, there is a strong possibility that the number of accidents will dramatically increase. Long-distance vehicles run quite fast on inter-city arteries paying no attention to local residents and villages located along the roads particularly in Sulawesi. This problem should be taken seriously and proper countermeasures should be proposed.

## CHAPTER 4 IDENTIFICATION OF REGIONAL DEVELOPMENT NEEDS AND POTENTIALS

### 4.1 Social and Economic Needs and Potentials

#### 4.1.1 Spearhead of Development in East Indonesia

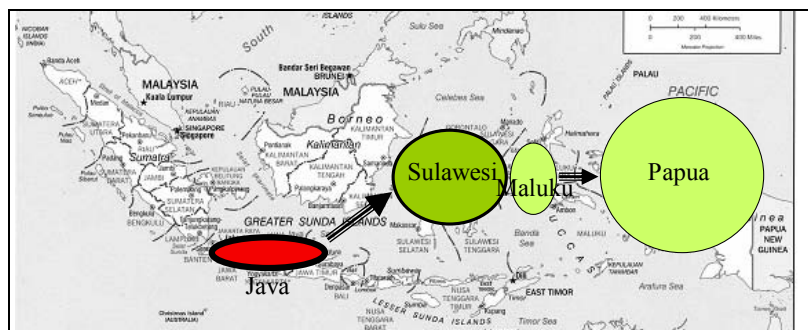
The development of Sulawesi is expected to contribute to the total prosperity of Indonesia, especially since a balanced economic development throughout Indonesia as well as the urgent development of eastern Indonesia, specifically Maluku and Papua, is dependent on the success of Sulawesi’s development.

Northeastern Indonesia, which covers Sulawesi and Maluku is characterized by natural and cultural diversity. The land territory of the islands approximately occupy 15% of Indonesia’s entire land area. Their population, however, only accounts for 8% of the national total, as shown in Table 4.1.1. It is a common agreement that the development of this naturally blessed and culturally rich islands will help in the greater development of the Eastern Indonesian economy and society in the first half of the 21<sup>st</sup> century.

**Table 4.1.1 Scale of Northeastern Indonesia**

	Area		Population (2005)	
	(1,000 km <sup>2</sup> )	(%)	(million)	(%)
Indonesia	1,937.2		219.0	
Northeastern Indonesia	280.0	14.5%	17.8	8.1%
Sulawesi	174.6	9.0%	16.0	7.3%
Maluku	74.5	3.8%	1.2	0.5%
Maluku North	30.9	1.6%	0.7	0.3%

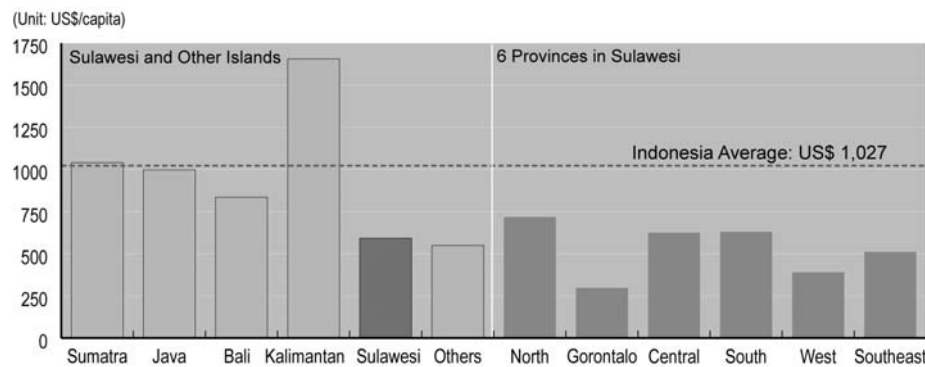
Source: BPS



**Figure 4.1.1 Sulawesi as Spearhead of Eastern Indonesia Development**

#### 4.1.2 Development of Sulawesi Economy

With a population of 16 million (in 2005) or 7.3% of the country’s total population, Sulawesi Island contributes only 4.2% to the national GDP, as reviewed in Chapter 2. The average per-capita GRDP in Sulawesi was about US\$ 600 in 2005, or 60% of the national average of more than US\$ 1,000.



**Figure 4.1.2 Per-capita GRDP, 2005**

Based on the JICA Study Team's review, the probable reasons for Sulawesi's stagnant economy can be explained by the characteristic of its major economic sectors, as follows:

- i) The primary sector (with the lowest productivity among primary, secondary, and tertiary sectors) is still predominant in the GRDP at the range of 22% to 53% per province, which is higher than the national average of 15%.
- ii) The primary sector is still predominant in the labor force through absorptions of 45% to 75% per province, which is higher than the national average of around 50%, except for North Sulawesi.
- iii) The secondary sector is growing at a higher rate than the national average, while its labor productivity is still lower compared with the national average except for the Southeast areas where nickel production is remarkable.
- iv) The tertiary sector is growing at a higher rate than the national average, while its labor productivity is still lower than the national.

It is further summarized that the primary sector should remain important for the Sulawesi economy even in the future, while the secondary and tertiary sector should improve in their productivity while keeping attention to social environment aspects such as the creation of employment.

#### **4.1.3 Enhancement of Productivity**

To some extent, agricultural productivity has been improved in the last two decades, partly due to improvements in irrigation and other farming practices. Combined with the cultivation of other cash crops (e.g. coconuts, cacao, pepper, vanilla) mostly in small backyard farms, per-capita GRDP has increased to about US\$ 600. However, further enhancement of GRDP would not be attainable unless productivity is further improved in the primary economic sector. Sizable expansion of production areas cannot be expected from the viewpoint of environmental conservation.

An example is coconut production. Indonesia is the world's largest coconut producer (about 32% of the world production), and Sulawesi accounts for 18% of the Indonesian output. Traditionally, the



major coconut production centers in Sulawesi are North Sulawesi and Central Sulawesi. However, the coconut trees in these provinces are already old, tall, and less productive. The coconut processing industries in North Sulawesi collect raw materials from other provinces and the Maluku islands. Likewise, cacao is primarily based on household cultivation and most cacao trees are overaged with reduced productivity. Cultivation of these cash crops has not been well maintained enough to keep their productivity high and to expand their production in a sustainable manner. The competitiveness of these traditional products has diminished in recent years.

#### **4.1.4 Improvement of Quality and Value**

In addition to decreasing productivity, the quality of major cash crops has degraded or has become uneven due to improper cultivation practices. For instance, cacao production has primarily become dependent on household production which gives less attention to the control of diseases and fermentation before they are marketed.

Good practices can be learned from the excellent coffee cultivation in Toraja, South Sulawesi. The investor (TOARCO) has operated its own coffee plantation, extending guidance services to the independent coffee growers near its estate in order to improve and maintain the quality of the products for marketing, thereby establishing a reputable brand name. Although strenuous efforts are required, such a production process should better be replicated in other products to improve product quality and gain more income.

Most Sulawesi products in the primary and secondary sectors are transported and marketed in Java, or exported as raw materials with minimal processing in Sulawesi, resulting in low levels of value added in the region. For instance, since most cacao is exported as beans, their processing into cacao butter and powder has not increased in Sulawesi. Corns are also exported without local processing along with marine products such as fishes, seaweeds, sea cucumber, etc., which are also marketed without local processing.

Since the expansion of cultivation areas in Sulawesi is less expected and employment opportunities must be expanded in view of growing urbanization, Sulawesi products should be processed to the maximum extent in order to help attain sustainable development.

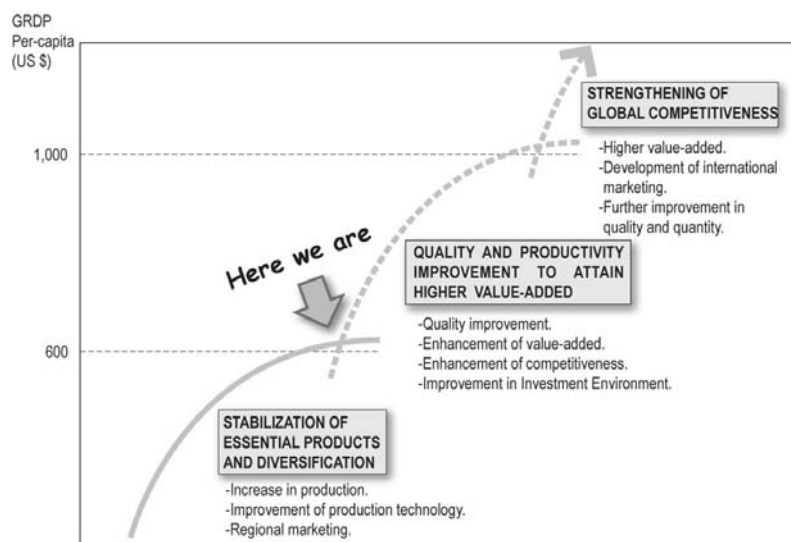
Some of the key issues that need to be addressed therefore are: (1) attracting investors into the processing industry, (2) initiating programs that would attract Java-based firms to expand or shift operations to Sulawesi, and (3) encouraging foreign-based investors to jointly invest in local processing of Sulawesi products. In this context, improvements in the investment environment in Sulawesi will play a vital role.

#### **4.1.5 Paradigm Shift to Sustainable Development**

As mentioned above, the per-capita Sulawesi GRDP is currently at the US\$ 600 level, or 60% of the national average. To catch up with the national average of more than US\$ 1,000, conventional approaches in production and processing would not be sufficient., thus requiring a paradigm shift. This paradigm shift can be made possible through the improvement of productivity and the

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quality of Sulawesi's products, resulting in enhanced product competitiveness in the domestic and international markets. An example is a shift from household cultivation of cash crops to the combination of household and plantation cultivation as in the case of Toraja TOARCO coffee. To this end, the investment environment for domestic and international investors in Sulawesi should be improved. Otherwise, such a paradigm shift could be hardly attainable.



**Figure 4.1.3 Growth Target of Per-capita GRDP**

#### 4.1.6 Environmental Protection and Conservation

To a certain extent, Sulawesi's natural environment has degraded through accelerated deforestation, urbanization, and other economic activities. Further deterioration of the environment should be prevented to the maximum extent.

In order to balance environmental protection and economic development, the principal issue is creating a cycle-oriented region/society in Sulawesi, lowering the environmental loads in every activity, including improvements in the transportation network. Instead of degrading limited natural resources, efforts should be made to promote renewable energy sources, renewal of products, and maximum utilization of unused materials. It may be that GRDP growth rates would not be high enough under a cycle-oriented economy compared with a resource-depriving economy. However, it will be more beneficial to the people of Sulawesi if they accept that their living environment would be more comfortable for generations to come should they follow a cycle-oriented economy.

#### 4.1.7 Development Plan by Province

The JICA Study Team visited each province to consult and discuss existing provincial plans with the BAPPEDA and other provincial authorities. Through interviews with the BAPPEDA and a review of these plans, the focal points of the development strategies are identified and summarized, as follows:

**Table 4.1.2 Summary Results of Interviews with BAPPEDA**

Province	Major Product/Industry	Regional Development Plan	Priority Road & Infrastructure Development
South Sulawesi	Nickel, Cacao, Palm Oil, Coffee, Vegetable, Vanilla Processing, Manufacture of Cement, Food, Etc.	Mamminasata Regional devt.  Parepare KAPET	- Roads improvement/ development in Mamminasata - Maros-Parepare-West Sulawesi Province road - Makassar- Maros- Watampone road - Makassar- Bulukumba- Plau Selayar road via ferry - Parepare- Palopo- Malili road
North Sulawesi	International Tourism Destination, Gold, Pearls, Coconut, Vanilla, Fish Meal, Coconut Oil/Coir, Vanilla Processing	- Manado-Bitung-Likpang Triangle zone dev. - Amurang new port FEZ - Bitung KAPET	- Manado – Bitung toll road Note: Southern coastal road is under construction by ADB & AusAID - Shortage of power supply despite of Tanggari hydro power & geo-thermal plant (20MW) near Tondano
Gorontalo	Corn, Coconut, Fish	-Great Gorontalo Development Plan - Kwandang Area Development Plan	- Gorontalo city bypass - Northern coastal road - Bologtio- Limgato North-South road (Long term) - Improvement of Anggrek port (Kwandang) - Expansion of existing coal power plant (40 MW) + new coal power plant (20MW)
Southeast Sulawesi	Nickel, Sand/Rock, Asphalt, Cacao, Cashew Nuts, Fish Products (tuna, canned fish in Buton Island)	Kendari-Kolaka KAPET	- Kolaka- Malili national road - North-bound coastal road from Kendari to Central Sulawesi - Baubau – Labuan road in Buton Island - Lasolo River basin development (electricity, irrigation)
West Sulawesi	Palm Oil, Cacao, Coconut, Coffee, Orange	Cyber water front city (new Provincial Capital in Mamuju)	- West Coast Trans Sulawesi Highway up to Palu - Connection road from Mamuju to Sabbang/Traja area in South Sulawesi Province - Connection road from Mamuju to Kab. Mamasa - Port expansion for shipping to Kalimantan (Vegetable, rice, pepper, cow) - Expansion of the airport near Mamuju (1,200m→2,100m, long term) - Hydro power development to supplement power shortage
Central Sulawesi	Coconut, Cacao, Coffee, Clove, Wood, Construction Materials	Luwuk KAPET	-Kolonodale-Tokala near Morowali reserve forest

#### 4.1.8 Potential Resources

Based on a review of the existing plans and available information, the JICA Study Team came up with a distribution of the islands potential resources in agriculture, fishery and mining, as illustrated in Figure 4.1.4.

In addition to conventional resource development, some technologies have to be mobilized to create innovative approaches to development (e.g. biological technologies) so that development plans are cycle-oriented and their environmental loads are minimized.

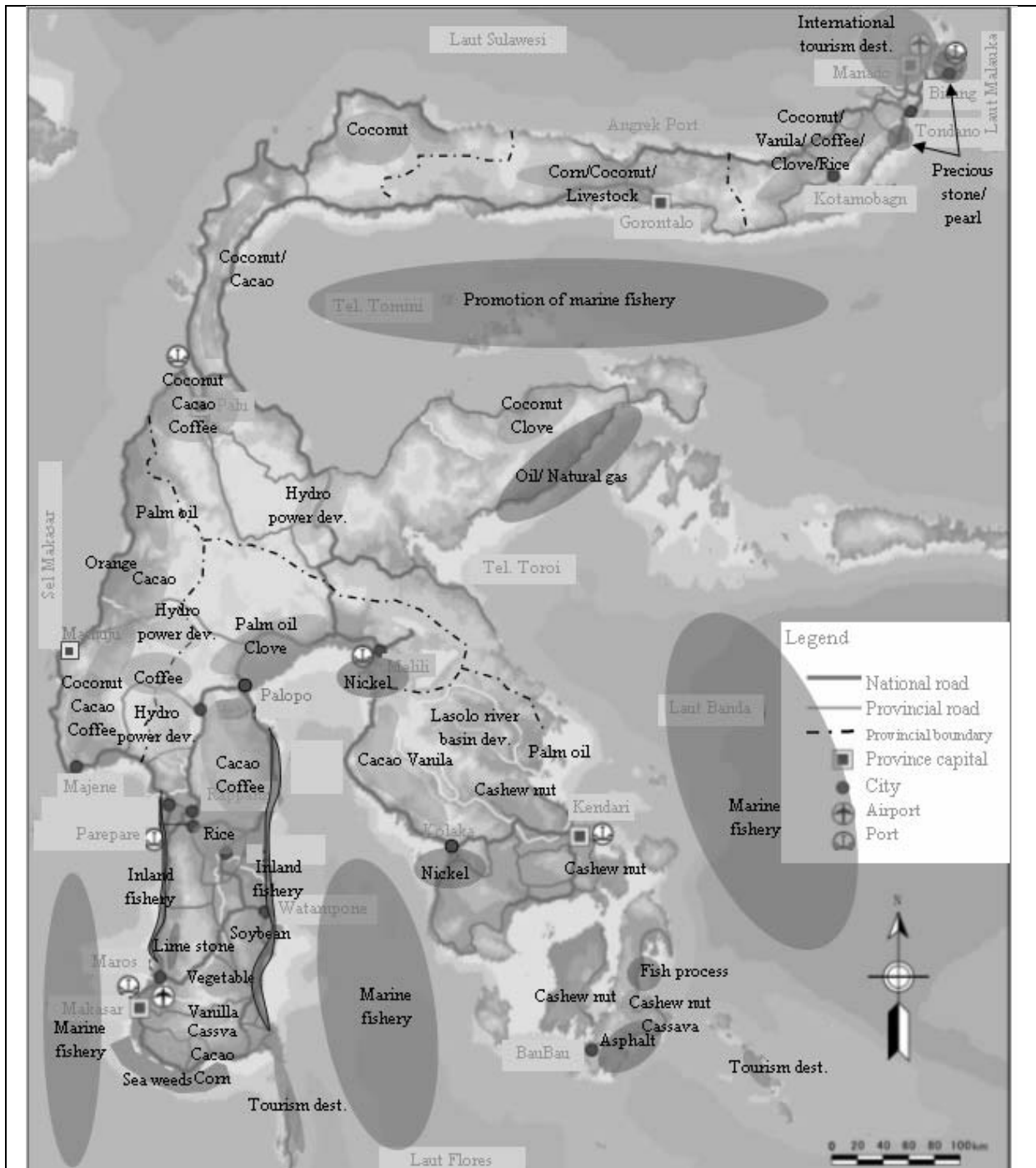


Figure 4.1.4 Prospective Resources/Industries

#### 4.2 Industrial Development Needs and Potentialities in Sulawesi

As discussed in Chapter 3, the major commodities traded in and exported from Sulawesi are cocoa, coconut oil, fishery products, animal feeds, processed wood, nickel, cement, and others.

The major agricultural commodities, such as cocoa and coconut oil, are typical Sulawesi industries. These commodities have been exported to the international markets without high value-added activities, or in other words, without industrial processing except for traditional preliminary

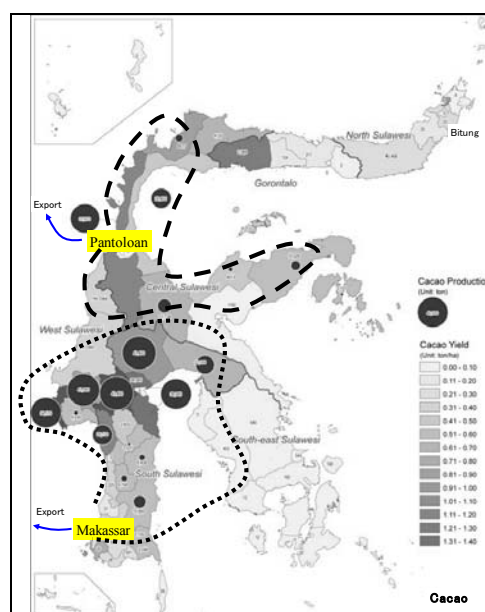
treatments such as sun drying. However, these products are traded in bulk and in big quantities per shipment. Trade volumes of these international commodities account for a considerable portion of the total world trade volume.

The following are the prospects of major commodities of Sulawesi in view of potentialities in realizing more added values.

#### 4.2.1 Cocoa

##### (1) Production

The total cocoa production of the world at present is around 3.9 million tons. This has continuously increased from 2.9 million tons in 1995 at an average annual growth rate of 3.3%. During the same period, the total cocoa production of Indonesia also increased, from 278,000 tons in 1995 to 610,000 tons in 2005 at an average annual growth rate of 9.6%. Indonesia accounted for 19% of the world's total production in 2005, ranked to the third in the world after Ivory Coast and Ghana. The total cocoa production in Sulawesi in 2005 was 573,000 tons, or 94% of the Indonesia total (refer to Table 4.2.1). Cacao from Sulawesi is exported mainly from the Makassar port and Pantoloan port in Palu (refer to Figure 4.2.1).



**Figure 4.2.1 Cocoa Export from Makassar and Pantoloan Ports**

**Table 4.2.1 Production and Export of Cocoa in Sulawesi, 2005**

	Total Volume (000 tons)	South Sulawesi (000 tons)	West Sulawesi (000 tons)	Southeast Sulawesi (000 tons)	Central Sulawesi (000 tons)	Gorontalo (000 tons)	North Sulawesi (000 tons)
Production	573	260	88	108	113	1	3
Export	351	232			119		

Source: JICA Study Team

##### (2) Market

The world market for cocoa is composed of USA (32.9%), Germany (11.1%), France (10.4%), United Kingdom (9.3%), Russia (7.7%), Japan (6.4%), Italy (4.6%), Spain (3.8%), Brazil (3.7%), Canada (2.7%), Poland (2.6%), Mexico (2.5%), Belgium (2.2%), and others.

The average annual growth of cocoa exports in the world is around 3.3%. In addition to the conventional market countries, the markets of Brazil, Russia, India, and China (BRIC) have been expanding rapidly, especially that of China at an annual average growth rate of around 8%.

As such, the BRIC market will grow rapidly and form a big consumer market that will include the consumption of cocoa-based products. It is presumed that a considerable portion of finished products are destined for Japan and China. The average chocolate consumption per person in these typical chocolate-consuming countries is around 3.8 kg or around 4.8 kg per person in terms of cocoa beans weight. Since the volume of cocoa beans exported from Sulawesi is around 350,000 tons. Therefore, the number of people that purchased chocolate from Sulawesi's cocoa is estimated at around 73 million people per year. This means that even if the cocoa production of Sulawesi is doubled from its present level it can easily be consumed by the emerging markets especially that of China. It should be noted that the distance from Sulawesi to China is the shortest among the major destinations of Sulawesi's cocoa.

### **(3) Potentialities for Industrialization in Sulawesi**

At present, a number of cocoa processing factory are in operation. They process cocoa into cocoa butter, liquor, and powder at KIMA (*Kawasan Industri Makassar*), north of the Port of Makassar, although their capacity is small and limited. The major processing operation is undertaken by EFFEM (a local company of Mars of USA).

Added value on cocoa beans produced in Sulawesi can be realized by introducing larger-scale processing of cocoa beans into cocoa butter and cocoa powder at the preliminary levels in Sulawesi, including taking into consideration that the cocoa beans grown in Sulawesi cannot be regarded as high-quality beans due to its low flavor. However, such an investment can only be feasible with the introduction of foreign direct investments (FDI) with strong market linkages.

Without such a linkage closely connected to international markets it will not be feasible to run such processing operation in Sulawesi. It will also be risky for an investor as conformity with various international standards needs to be assured for such processed products for the international markets.

The improvement of cocoa bean production in terms of quality and yield can be made through proper technical assistance provided by investing multinational firms, as the quality of raw material is a determinant in the success of their investments and expected returns.

To promote FDIs in cacao processing, legal/tax incentives specific to Sulawesi are inevitable. Moreover, infrastructure, such as power supply and waste treatment plants, should be necessary even in the KIMA area, where cocoa processing factories exist at present. Palu in Central Sulawesi can also be a target area considering that the cacao produced in there and in West Sulawesi is for export.

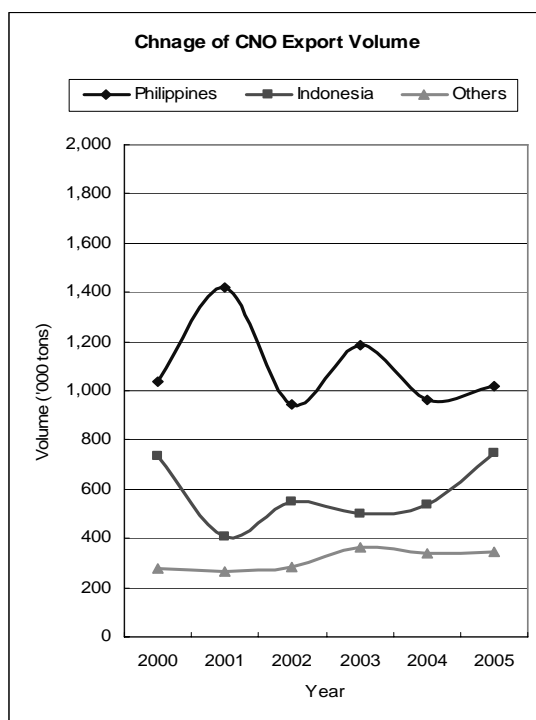
## 4.2.2 Coconut Oil

### (1) Production

The total crude coconut oil (CNO) production in the world was 3.18 million tons in 2005, down from 3.26 million tons in 2000. Palm oil, palm kernel oil, and rapeseed, on the other hand, expanded their production volumes by 8.9 % per annum. Sunflower, groundnut, and olive had declining production volumes for the same period, while the decline of coconut oil was most significant in both volume and share in the world total.

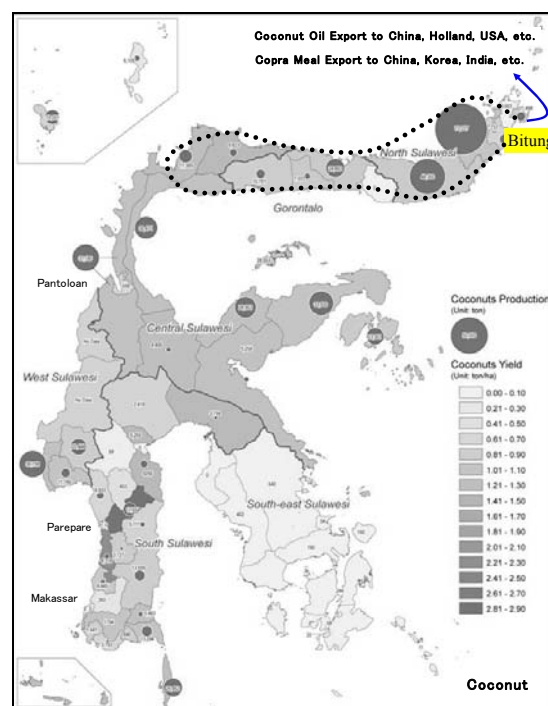
Indonesia is the second-largest producer of CNO after the Philippines. Indonesia produced CNO at around 848,000 tons in 2005 accounting for 26% of the world total CNO production. Of the total CNO produced, 750,000 tons or 88% is exported. As shown in Figure 4.2.2, the production of CNO in Indonesia is stable, while the Philippines shows a decreasing volume.

CNO production volume in Sulawesi is 290,000 tons/year, or 34% of the Indonesia total, as shown in Table 4.2.2. CNO exports are mainly done through the Bitung port as shown in Figure 4.2.3.



Source: Based on data obtained from APCC

**Figure 4.2.2 Changes of Export Volumes of CNO in the World**



Source: JST

**Figure 4.2.3 CNO Export from Bitung Port**

**Table 4.2.2 Production and Export Volumes of CNO in Sulawesi**

	Total Volume ('000 tons)	South Sulawesi ('000 tons)	West Sulawesi ('000 tons)	Southeast Sulawesi ('000 tons)	Central Sulawesi ('000 tons)	Gorontalo ('000 tons)	North Sulawesi ('000 tons)
Production	290	31		3	2	16	238
Export	290	31					259

Source: JICA Study Team

## **(2) Market**

Changes in the people's eating habits in the industrialized countries might have caused the decline in coconut oil consumption. The preference for reportedly lighter and less fatty substances, therefore, might further affect CNO consumption and the shift to palm oil.

## **(3) Potentialities for Industrialization in Sulawesi**

In the past 10 years, the production and consumption of bio-diesel has increased sharply at an average growth rate of more than 30% in Europe. The annual total consumption of bio-diesel in the EU has already reached 4 million kiloliters. In 1995, the use of bio-diesel in the EU was almost insignificant, but the experiment of using bio-diesel in commercial sizes has just commenced. Bio-diesel is made of vegetable oil. In the case of the EU market, most of the raw materials used to produce bio-diesel are rapeseed and sunflower oil.

It is possible to produce bio-diesel from coconut oil as well as palm oil. The production of these two vegetable oils has been dominated by Asian countries. As in the case of coconut oil, the major producing countries are the Philippines and Indonesia.

Sulawesi has been known as a coconut island. Sulawesi has around 700,000 hectares planted to coconuts, accounting for around 20% of the total coconut cultivation areas of Indonesia. The northern part of Sulawesi, such as North Sulawesi and Gorontalo, are the areas where intensive cultivation of coconuts has been practiced for a considerably long period.

The following advantages are cited for the production of bio-diesel from coconut oil in Sulawesi.

**Change of Dynamics on Governance in the Market for Coconut-based Products:** Around 88% of the CNO produced in Sulawesi is destined for the international market which has been dominated by a few multinational players, such as Procter and Gamble, Unilever, Henkel, etc., which govern market dynamics. However, in the case of the trade in bio-diesel, the market is dominated by numerous automobile owners and commercial land transport operators. The dynamics governing the market of bio-diesel is totally different and cuts off international relations in the trade of coconut oil which has traditionally been maintained over the centuries.

**Bio-diesel Development Leads Value-added Activities:** The potentialities for a coconut-based industrialization in Sulawesi is quite high due to the existence of intensive coconut farming in huge areas without value-added activities and wherein demand and purchase prices of copra from the farmers have fluctuated. Thus, stable incomes for farmers have yet to be realized. However, with the introduction of bio-diesel production, constant purchases of copra can be possible. This will in turn further encourage the processing of coconut-based products. The more value added to Sulawesi's coconut products the more income the farmers will get. Thus, the potentialities for coconut-based industrialization are thought to be quite high.



**Balance between Food and Energy Security:** A large-scale bio-diesel production based on coconuts should be planned in conjunction with increased production of staple or food crops. Otherwise the cultivation of “energy plants” will reduce the areas suitable for food crop cultivation. In the case of coconut-based bio-diesel production, a balance between food crop cultivation and energy crop cultivation can be assured because coconut cultivation allows intercropping. Coconut trees are recommended for planting at 10 m grid intervals to provide space for the cultivation of other crops such as corn, soybeans, vegetables, fruits (banana, pineapple, cacao, etc.). Where the precipitation is limited and the land is not suitable for cultivation of food crops other than coconut, *Jatropha* trees are recommended to be planted as a supplementary feed stock for the production of bio-diesel. The minimum requirement of precipitation per year for *Jatropha* cultivation is 600 mm in general<sup>1</sup>.

#### 4.2.3 Coffee

##### (1) Production

Total coffee production in Indonesia increased to 762,000 tons in 2005 from 457,000 tons in 1995 at an average annual growth rate of 5.9%. The coffee export volume of Indonesia is ranked second and accounts for around 12% of the total world production. The volume of production of coffee in Sulawesi in 2005 was 57,000 tons, or only 7% of the total coffee exported by Indonesia.

Despite this production increase, Indonesia’s export earnings from coffee did not change from its US\$ 170 million earnings in 1995 to its US\$ 173 million counterpart in 2005.

Meanwhile, the price of Sulawesi coffee is much higher than those of other coffee produced in other areas of Indonesia. The Sulawesi coffee known as Toraja is grown in the mountainous area near the center of the island. It is commonly found today in specialty stores.

##### (2) Market

Total volume of coffee traded in the world in 2005 was around 6.6 million tons, an increase from 4.5 million tons in 1995, or an average annual growth rate of 4.4%. However, in the past 10 years, market prices of coffee fluctuated so much and the value of coffee marketed throughout the world did not change much. This implies an oversupply wherein the more coffee produced, the further market prices decline. However, since 2004 the international market prices of coffee have seen an upward trend, as shown in Table 4.2.3. This could be attributed to changes in the marketing system represented by a rapid business expansion of Starbucks or similar types of marketing operations throughout the world, coupled with the increased consumption of coffee in China.

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<sup>1</sup> In the case of Indonesia, the experimental production and distribution of bio-diesel are ongoing, but the raw material selected for such bio-diesel is palm oil. In parallel with the planning of bio-diesel based on palm oil, the cultivation of *Jatropha* has progressed as well especially in areas in Indonesia where there is limited precipitation, a condition suitable for growing *Jatropha* which does not require much water .

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**Table 4.2.3 Changes in Annual Average Prices of Coffee**

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Ave. Price	371	216	258	377	272	258	139	104	143	152	227	238
(+%)	-	-	19%	46%	-	- 5%	-	-	38%	6%	49%	5%
(-%)		42%			28%		46%	25%				

### (3) Potentialities for Industrialization in Sulawesi

Sulawesi's coffee has not prospered under intense worldwide competition in the coffee industry. However, the following can be proposed so that the industry can gain more export earnings for Sulawesi.

**Quality Control of Beans:** The quality of coffee grown in South Sulawesi is basically good as it is Arabica. However, the quality and peculiar character of Arabica, such as its good aroma and depth of taste, can only be attained when they are grown correctly with utmost care. It requires a certain management and control to continuously attain its ultimate reputation and price. Experiences gained from the Japanese investment and management practices in the production of TOARCO Toraja coffee in a 1,300-hectare land should be replicated. The Japanese coffee producer (Key Coffee) has also managed the production and quality control of coffee grown on small landholdings surrounding their estate (as their outgrowers) by extending technical assistance aimed at increasing coffee production from nuclear farming.

**Marketing of Sorted Green Beans:** Processed green beans should be marketed through the marketing efforts of appointed traders or directly by the coffee processing company. In such a way, prices will not be determined simply through auctions. The way of purchasing coffee beans has changed these days as started by Starbucks and other firms. Therefore, direct business negotiations with potential buyers or traders would be needed to ultimately add value to the coffee grown in Sulawesi.

## 4.2.4 Animal Feeds

### (1) Production

Sulawesi produces soybeans, maize, and copra in considerable volumes, as shown in Table 4.2.3.

The volume of animal feeds exported, mainly from North Sulawesi through Bitung port, was around 170,000 tons and its export value is estimated at around US\$ 17 million, assuming that the unit price of animal feed is US\$10 cents per kilogram which is nominal in the world. The details of the animal feeds exported from Sulawesi, such as materials, grade, usage, etc., are not known yet. However, it is assumed that the major portion is a by-product from CNO processing and unmilled maize grown widely in North Sulawesi and Gorontalo.

**Table 4.2.4 Production Volume of Typical Crops for Animal Feed Production in Sulawesi**

(Unit: 000 tons)

Item	Prod. Vol. (000 tons)	Remark
Copra	363	Sulawesi exported around 230,000 tons of CNO. 55% of copra weight equals CNO in weight.
Maize	1,305	South Sulawesi accounts for around 55% while North Sulawesi and Gorontalo account for around 34% of the total output of Sulawesi.
Cassava	936	South Sulawesi accounts for around 50% and Southeast Sulawesi accounts for 27% of the total output of Sulawesi
Soybean	38	South Sulawesi accounts for almost 70% of the total output of Sulawesi.

Source: Combined data available from Statistics of Each Province of Sulawesi

## (2) Market

A range of crops can be used in animal feeds, the most common of which are maize, soybeans, copra, seed wastes after oil extraction, etc. Ninety percent of the world's soybeans are used to feed animals and vast quantities are exported around the world. The EU alone imported some 24 million tons of soybeans in 2005. The description of major animal feeds is as follows:

**Soybeans:** Soybeans are a major source of protein for cows, sheep, poultry, and pigs. Sixty percent of soybeans used for animal feeds are fed to poultry.

**Maize:** Maize is used as animal feeds in several ways. "Fodder" maize is fed directly to cattle without processing.

**Copra cake:** Coconut oil is produced by extracting oil from copra, which is dried coconut endosperm. When the oil is expelled mechanically the residue is called copra cake, and if the solvent is extracted to increase the yield of oil, the product is called copra meal. These copra by-products are valuable protein sources in animal feeds especially for dairy feed. Copra is usually an expensive animal feed, though it has been fed to poultry and pigs with good results. As the fat in copra contains only small amounts of unsaturated fatty acids its consumption leads to firm body fat and good flavor.

**Fish meal:** Fish meal is made from the waste of fish after processing of fish such as bones, heads, tails, and guts. Fish meal is good as animal feed especially for broiler raising, duck farming, aquaculture, etc. Most of the fish that are caught in Sulawesi are directly consumed in local markets or consumed without processing, thus no significant amount of waste is left to produce fish meal.

## (3) Potentialities for Industrialization in Sulawesi

The world demand for livestock has steadily increased, especially in China and India. This trend could continue with steady economic growth. However, a more important market for Sulawesi's animal feeds is its own domestic market. If livestock raising is properly done in Sulawesi, the province could find a more valuable market in and out of Sulawesi than just exporting animal feed

directly to the overseas markets. If the product flow of the animal feed processing industry is linked with that of the livestock industry, the effect of the value-added activities can be optimized.

The points described below should be discussed in the animal feed production in Sulawesi.

**Halal Meat for Export:** Demand for halal meat (meat processed or prepared under Muslim procedures) is expected to increase especially in the Middle East where local supply has traditionally been unable to meet the growing demand. Although Sulawesi has produced a considerable volume of livestock its market is currently confined to the domestic market. In order to meet export potentialities of halal meat for overseas markets, a systematic certification system as well as a complete refrigeration system has to be established since the products need to be vacuum-packed and frozen prior to shipment.

**Recycling System based on Locally Available Resources:** Even as some local animal feeds are exported overseas, there should be some portion to develop local livestock raising in Sulawesi, aimed at exporting processed livestock products which have much higher value than those sold in local markets. A considerable value can be added on livestock products processed by home and food industries, especially when exported to industrialized and mass-consumption countries.

**Premixed Animal Feed:** High-value animal feeds are those that are premixed with various kinds of materials such as milled maize, copra meal, fish meal, bone powder, etc. At the moment, these materials are treated separately and are not mixed in order to get the highest prices. Leftovers are considered wastes and not utilized at all. If these materials can be collected and consolidated, a premixed animal feed or organic fertilizer can be produced, thereby eliminating wastes and optimizing incomes.

**Animal Feed as Bio-diesel Production's By-products:** The production volume of copra meal and maize can be effectively and surely increased when the cultivated areas for coconut are expanded with the aim of primarily producing raw materials for bio-diesel production as discussed in the preceding section.

#### 4.2.5 Livestock

##### (1) Production

The volume of livestock production is estimated by multiplying the number of heads of each livestock with the assumed yield of each product after their processing for consumption. Table 4.2.4 summarizes the estimated approximate volume of livestock production and consumption in Sulawesi at present.

**Table 4.2.5 Estimated Production Volume of Livestock Products**

	Total Volume (000 tons)	South Sulawesi (000 tons)	West Sulawesi (000 tons)	Southeast Sulawesi (000 tons)	Central Sulawesi (000 tons)	Gorontalo (000 tons)	North Sulawesi (000 tons)
Cow	89	39	5	13	12	13	8
Goat	19	8	3	2	4	2	1
Pig	12	5	2	0	2	0	3
Broiler	113	43	2	9	25	4	30
Total	233	95	12	24	43	19	42

Source: JICA Study Team

**(2) Market**

Currently, the livestock market in Sulawesi is solely local. No livestock products are exported to international markets because of the absence of such facilities as: abattoirs, meat processing plants, ice plants, cold storage units, and refrigerated transport systems.

**(3) Potentialities for Industrialization in Sulawesi**

Most of the livestock raised in Sulawesi is processed in compliance with the rules and regulations of the Muslim culture. Such meat processed under Muslim culture is called “halal” meat. Muslims are allowed to eat halal meat (except pork). The overseas market of halal meat has been expanding especially in the Middle East where meat consumption has increased but livestock production has been stagnant due to climatic conditions and geological features. Although local consumption of halal meat has been expanding and its export potentialities are quite large for Sulawesi’s livestock producers, these potentialities cannot be realized unless livestock, such as cow, goat, broilers, etc., are processed properly and preserved for transportation. The following are the necessary recommendations in order to realize this.

**Modern Slaughter House:** There is a need for slaughter houses and meat processing plants with combined proper waste treatment units that meet environmental protection standards as well as facilities for preservation (freezers, cold storages units, chillers, vacuum packers, etc.). These facilities, however, will require a considerable amount of capital.

**Promotion of Halal Meat for Export:** If such facilities were provided and the production of halal meats would be available in Sulawesi, then the overseas markets, such as the Middle East countries in general and Malaysia and Singapore in particular, where more households can afford good quality halal meat, would continuously import such products from Sulawesi.

**Exporting to Kalimantan:** Kalimantan, a neighboring island of Sulawesi, has been considered as an energy-resource island where the local economy actively absorbs the local labor force. However, due to its geographical characteristics, the province’s food supply has a limit in supporting its exploding population. Sulawesi has the sole potential of supplying food to its neighbor. In the west coast of Sulawesi are the cities of Mamuju, Palu, and Parepare, which have prospered due to their linkages with the developing cities in the east coast of Kalimantan.

## 4.2.6 Fishery and Marine Product

### (1) Production

Total production volume of marine and inland fishery products in Sulawesi and the volume of export by province are shown in Table 4.2.5.

**Table 4.2.6 Production and Export Volume of Fishery Products in Sulawesi, 2005**

	<b>Total Volume (000 tons)</b>	South Sulawesi (000 tons)	West Sulawesi (000 tons)	Southeast Sulawesi (000 tons)	Central Sulawesi (000 tons)	Gorontalo (000 tons)	North Sulawesi (000 tons)
Marine	845	347	38	189	37	35	199
Inland	155	125	6	4	6	1	13
Export	25	4	0	3	0	1	17

Source: JICA Study Team

Fish processing activities are limited to traditional products using traditional methods, such as sun-dried fish, etc. Fish processing requires the provision of a cold chain system in and out of the island. However, currently there is no such product distribution system throughout Sulawesi. A limited cold chain system for the fishery industry has been developed in North and Southeast Sulawesi.

### (2) Market

The main market for both marine and inland fishery products is the domestic market in Sulawesi. However, the volume of exports accounts for a mere 3% of total landed marine products, while none of the production of inland fishery are exported.

### (3) Potentialities for Industrialization in Sulawesi

The fishery and marine products sector in Sulawesi has not been developed or fully industrialized. Some fishery products such as frozen bonito, tuna, etc. which have a high value are exported to international markets in the form of frozen or canned products. However, the volume is still limited. These processing activities are concentrated in and around Bitung in North and Southeast Sulawesi. Generally, fish distributed widely in Sulawesi are traded through the traditional method, using ice blocks to preserve their quality. They are solely used for the local market.

**Inland Fishery:** Inland fishing has long been a practice and it developed gradually especially along and near coastlines and areas located close to the cities where constant demand exists. However, traditionally inland fish are not processed and are simply sold using ice. This product holds a potential for processing into more value-added products. But this will be subject to the acceptance of local markets and tastes and, subsequently, the international markets.

Fish or marine product processing requires considerable manpower. Therefore, a considerable volume of job opportunities will be generated especially for the rural areas where coastal and inland fishery activities have already existed for so long.

Furthermore, if the fish processing industry take places in a wholistic manner in tandem with the food processing industry their added value could be maximized. For example, animal feeds can be produced by mixing the offal from fish processing with other materials that would be generated from processing livestock and major cash crops.

**High-priced Marine Products:** Among marine and aquaculture products, the high-value pearls are followed by crustacean products (e.g. sea cucumber). Pearl culture in Sulawesi is concentrated in Gorontalo and parts of North Sulawesi, where sea waters are crystal clear. Highly specialized techniques are required in the production of world-class pearls. Often, such techniques are transferred from private Japanese pearl companies.

#### **4.2.7 Mining Products (Cement)**

##### **(1) Production**

Cement is the major mining product in Sulawesi. The marketing and production of cement produced in Indonesia, including Sulawesi, is mainly for domestic consumption. Total cement volume produced in 2005 in Indonesia was around 32.2 million tons, 1.9 million tons or 6% of which came from Sulawesi. Of this volume around 0.9 million tons were distributed in Sulawesi and around 1.0 million tons were distributed to the eastern Indonesian region.

Cement from Sulawesi, which is produced by PT Semen Tonasa and PT Semen Bosowa is shipped widely to the islands in the eastern Indonesia including Maluku and Nusa Tenggara, and to Java and Kalimantan. The volume of cement shipped out from Sulawesi to these islands in 2006 was around 1.0 million tons. The volume transported by ship to other ports in Sulawesi was around 200,000 tons in 2006. Some volumes are shipped to Java through a special jetty owned by cement producers which is located at Bringkasi in the north of Makassar.

##### **(2) Market**

Parallel to the recovering economy of Indonesia, cement consumption has slowly been improving. Government officials are expecting that cement production will increase from the current 32 million tons a year to around 46 million tons a year by 2010.

##### **(3) Potentialities of Industrialization in Sulawesi**

The total installation capacity of the cement production facilities in Sulawesi is estimated at around 5.3 million tons. (PT Semen Bosowa Maros, Kabupaten Maros, South Sulawesi, 1.8 million tons; and PT Semen Tonasa, Pangkep, South Sulawesi, 3.5 million tons). Total cement produced in 2006 in Sulawesi was 1.9 million tons. This data implies that there is huge capacity for increased production.

Two other new companies have already obtained government permission to commence cement production in Sulawesi, namely PT Balocci Makmur and PT Lebak Harapan Makmur. These two companies also plan to operate in South Sulawesi. With this, it could be said that the promotion of

investments in cement production is not necessary in the coming years.

Also, the existence of quite a huge limestone mountain along the Maros shore in South Sulawesi will enhance cement production activities in this area.

#### **4.2.8 Mineral Products (Nickel)**

##### **(1) Production**

Indonesia produces around 140,000 tons of nickel-based alloys, ranking it fourth in the world after Russia, (315,000 tons), Australia (210,000 tons), Canada (196,000 tons). Nickel in Indonesia is mined at the PT Antam sites in Pomalaa, Southeast Sulawesi, Soroako in South Sulawesi and in Gebe, Gees, and Tanjung Buli in North Maluku. Southeast Sulawesi is endowed with a considerable deposit of nickel ore and its mines have been developed by international companies. Nickel ore and ferro-nickel are shipped through a special private jetty located close to the mine fields along the sea near Pomalaa in Southeast Sulawesi as well as in Soloako in South Sulawesi. The volume of nickel shipped out from Sulawesi in 2006 was around 500,000 tons.

PT Inco plans to develop two nickel deposits, Bahodopi in Central Sulawesi and Plomalaa in Southeast Sulawesi, as well. Because of the growing prices of nickel in the international market, which is mainly pushed up by China, the development of nickel mining in Sulawesi through more investments should be enhanced in the coming years.

##### **(2) Market**

Owing to the strong demand for primary nickel in China, market prices of nickel have been rising at an annual average of around 26% since 2001. That year, prices were around US\$6,000 per ton and currently they have reached the US\$ 15,000 per ton level.

Markets for primary nickel, which is used mainly for the production of stainless steel and nickel-based rechargeable batteries, have continuously increased since 2000. In 2004, world demand for primary nickel registered at an all-time high, resulting in most nickel producers to operate at full capacity. Primary nickel demand in 2006 was around 1.2 million tons. This demand will be buoyed by spiraling consumption in China, a consumption which has risen from 43,400 tons in 1999 to 160,000 tons in 2006.

China consumes more stainless steel than any other country. It consumed 4.7 million tons of stainless steel in 2004, with state-owned mills producing 1.32 million tons. Chinese imports of stainless steel totaled 2.90 million tons and are showing a steady increase in the future.



### (3) Potentialities for Industrialization in Sulawesi

The further development of nickel mining will continue in Sulawesi as returns-on-investments on the expansion of mining operation, as well as the production of nickel ferro-alloy becomes lucrative. Likewise crude oil prices, which are undoubtedly considerably high in the international market, are predicted to continue in the future although it will also be dependent on the Chinese economy.

Because of its proven reserves or deposits of nickel in Sulawesi, the development of nickel mining in Sulawesi will continue especially in Southeast Sulawesi.

#### 4.2.9 Oil and Gas Industries (Crude oil and LNG)

##### (1) Production

**Crude Oil:** The production of crude oil in Indonesia, which is a member country of OPEC, was 1.09 mb/d in 2006. This accounted for approximately 1.4% of the world's daily production, ranking the country number 20<sup>th</sup> among the world's oil-producing countries. Export revenue from crude oil was US\$ 6.2 billion which accounts for around 6% of the total foreign exchange trade earnings of Indonesia. The country's oil reserves are approximately 8.6 million barrels.

**LNG:** Indonesia has some of the largest known pools of natural gas in the world, with total estimated reserves of 187 trillion standard cubic feet (SCF). Indonesia produced 8.16 trillion cubic feet (TCF) of gas in 2006, ranking eighth among the world's gas-producing countries. Of this, 46% was dedicated to domestic demand for power generation, fertilizer production, and other industries, while the rest was exported mainly as liquefied natural gas (LNG). The major markets of Indonesia's LNG are Japan (71%), South Korea (20%), and Taiwan (9%).

**Fuel Supply in Sulawesi:** Sulawesi's fuel consumption has totally been dependent on imported petroleum products coming from the nearest refinery operating in Balikpapan, East Kalimantan through PERTAMINA. The total fuel imported in 2006 by Sulawesi was 3.3 million KL (gasoline 1.2 million KL, heavy fuel 0.6 million KL, and diesel 1.5 million KL) and distributed through 19 fuel depots by liquid carriers and around 800 units of tank lorry throughout Sulawesi.

##### (2) Exploitation Projects for Oil and Gas

**Oil and Gas Development Projects in Sulawesi:** Since April 2002, the exploration for oil and gas has continued in Central Sulawesi mainly by PERTAMINA. The offshore Tiaka oil field is one of five oil fields explored in the Banggai Basin and it has started production of crude oil at a rate of 6,500 bpd. The oil loading facility was constructed and put into operation off Batui, Central Sulawesi which is around 100km southwest from Luwuk and around 15km offshore. Luwuk has served as a supply base for the oil and gas field developments.

Four oil and gas fields, out of five explored in the Banggai Basin, have been certified as gas deposits with huge volumes of reserves. Tiaka, one of the five fields, has an oil deposit and is

around 15 km offshore. It is expected that exploitation will last around 27 years. Shipments of crude oil already started in 2006.

Two big oil and gas projects have been studied then started in 2006. One is the building of a refinery in Parepare, South Sulawesi and the other is the production of LNG in Central Sulawesi. They are outlined below.

**Refinery Project in South Sulawesi:** Parepare is an ideal unloading port for crude oil because of its deep water and relatively calm bay protected by several islands off Parepare's shore. The plan to build a big-scale petroleum refinery was studied in the past. Its construction is expected to commence in 2007 and complete by 2011. Target production capacity of the refinery is 300,000 bbl/d with investments coming from one of the leading oil companies in the Middle East through a joint venture with PERTAMINA. The first phase of the project is designed to produce around 150,000 bbl/d and supply the products to East Indonesia (Sulawesi's total consumption may account for around 50% of the total volume produced by this refinery.). The second phase is designed to produce around 150,000 bbl/d for export overseas. Capital investments in order to build such a refinery are estimated to be around US\$ 1.2 - 1.5 billion.

**LNG Project in Central Sulawesi:** Central Sulawesi is considered as Indonesia's next big gas-producing area after Aceh. PT Medco Energi Internasional Tbk (Medco), together with PERTAMINA, plans to build a new LNG facility in Central Sulawesi underpinned by proven gas reserves of 28 TCF. If this is realized, it will be the fourth LNG plant in Indonesia. Once this project goes on stream, the Dongin, Senoro and Toili area in Central Sulawesi, could easily become Indonesia's current biggest natural gas-producing field because of its big gas reserves, which are twice as large as the gas reserves operated by Exxon Mobile in Arun, Aceh, which has been in operation since the late 1970s. The expected amount of capital investment for this LNG project would be in the US\$ 1.5 - 2.0 billion range.

**Change in Regional Autonomy:** On 1 January 2001, the Regional Autonomy Law 22/1999 and the Fiscal Decentralization Law 25/1999 came into effect. Law 25/1999 contains formulas for revenue sharing between the central government and various regional authorities. On 15 October 2004, the Government of Indonesia amended these laws with Regional Autonomy Law 32/2004 and Fiscal Decentralization Law 32/2004, clarifying further the roles of the central and regional authorities. These two new laws also changed the revenue sharing between the central government and the regional authorities. According to these new laws, the revenue from natural-gas-based investment projects can be split among the central government, provincial government, and the regency at a rate of 70%, 6%, and 24%, respectively. Before this law was implemented, the entire revenue generated from such projects went to the central government.

Therefore, once the LNG project becomes operative the provincial and local governments can expect huge and steady revenue that can be used to stimulate the economy of Sulawesi.

#### 4.2.10 Manufactured Products

##### (1) Production

The total value and volume of export of non-agriculture-based manufactured goods from Sulawesi in 2003 was around US\$ 100 million and 61,000 tons, respectively. Manufactured goods in Sulawesi accounted for 8.7% of the total export value and 3.8% of the total export volume. Currently, the major manufactured products produced in and exported from Sulawesi are processed wood including plywood, textile products, and garment. Table 4.2.6 shows the value and volume of manufactured goods by province.

**Table 4.2.7 Value and Volume of Manufactured Goods Exported by Sulawesi, 2003**

Total	South Sulawesi	Southeast Sulawesi	Central Sulawesi	North Sulawesi
Export Value (US\$ million)	64 (64.5)	9 (9.3)	24 (23.6)	3 (2.6)
Export Volume (000 tons)	31 (51.1)	12 (20.0)	15 (23.8)	3 (5.0)

Source: JICA Study Team, based on trade statistics of the Ministry of Trade, 2005

Note: Figures in parentheses refer to percentage in total by province.

The major manufactured products in Sulawesi by province are as shown in Table 4.2.7

**Table 4.2.8 Major Non-agriculture-based Manufactured Products by Province**

Unit: US\$ Million

Major Product	Total Export Amount	South Sulawesi	Southeast Sulawesi	Central Sulawesi	North Sulawesi
Processed Wood	26	12	5	9	0
Garment	17	17	0	0	0
Furniture	4	3	0	1	0
Fabricated Steel	2	0	0	0	2
Others	51	33	4	14	0
Total	100	65	9	24	2
Share	100%	65%	9%	24%	2%

Source: JICA Study Team

Most manufacturing activities take place in the industrial estate managed and operated by PT. Kawasan Industry Makassar or KIMA in South Sulawesi. This industrial estate is located 15km from the Port of Makassar and a 10-minute drive from Hassanudin International Airport. The present area is 203 hectares and is planned to be expanded to 700 hectares. At present, it has around 150 establishments, most of which are based on agribusiness or agro-industry or hold their production or storage facilities in KIMA.

##### (2) Potentialities for Industrialization in Sulawesi

The comparative advantage of Sulawesi in developing its manufacturing sector and in attracting FDIs into manufacturing activities lies on its geographical location as well as cheap labor especially in and around the major cities of Sulawesi, namely Makassar in South Sulawesi and Manado or Bitung in North Sulawesi. Whether FDIs in the manufacturing sector, especially those export-oriented, will either be based on locally available materials or just on the availability of

skilled or acceptable skill levels of labor, will be totally dependent on the attractiveness of Sulawesi.

FDIs in the manufacturing sector in Sulawesi cannot be realized in a short period of time. It will require coordination for the promotion of Sulawesi as a competitive destination for FDIs among all concerned agencies and the central government of Indonesia as well as the private sector, not only in Sulawesi but outside. Coordination efforts for the promotion of industrial development in Sulawesi can be optimized when all the provinces in Sulawesi are governed by a single development policy, even though the nature of industrialization differs for each province.