

**REPUBLIC OF INDONESIA
MINISTRY OF PUBLIC WORKS
DIRECTORATE GENERAL OF HIGHWAYS**

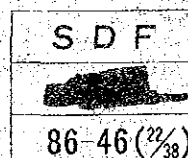
**THE FEASIBILITY STUDY
OF
THE LOCAL ROAD DEVELOPMENT
IN THE REPUBLIC OF INDONESIA**

KABUPATEN REPORT 22

KABUPATEN HULU SUNGAI SELATAN

MARCH 1986

JAPAN INTERNATIONAL COOPERATION AGENCY



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国際協力事業団		
受入 月日	'87. 5. 21	108
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PREFACE

This is the Kabupaten Report of the Feasibility Study of the Local Road Development in the Republic of Indonesia for Kabupaten Hulu Sungai Selatan in Kalimantan Selatan Province. The report has been prepared by the Study Team of the Japan International Cooperation Agency (hereinafter called JICA).

Based upon a request from the Government of Indonesia, the Government of Japan arranged for JICA to conduct the Study and JICA accordingly organized a Study Team. The study was carried out using data which were generally prepared by the Kabupaten, routed through the province under the instructions of Bina Marga of the Ministry of Public Works and Bangda of the Ministry of Home Affairs.

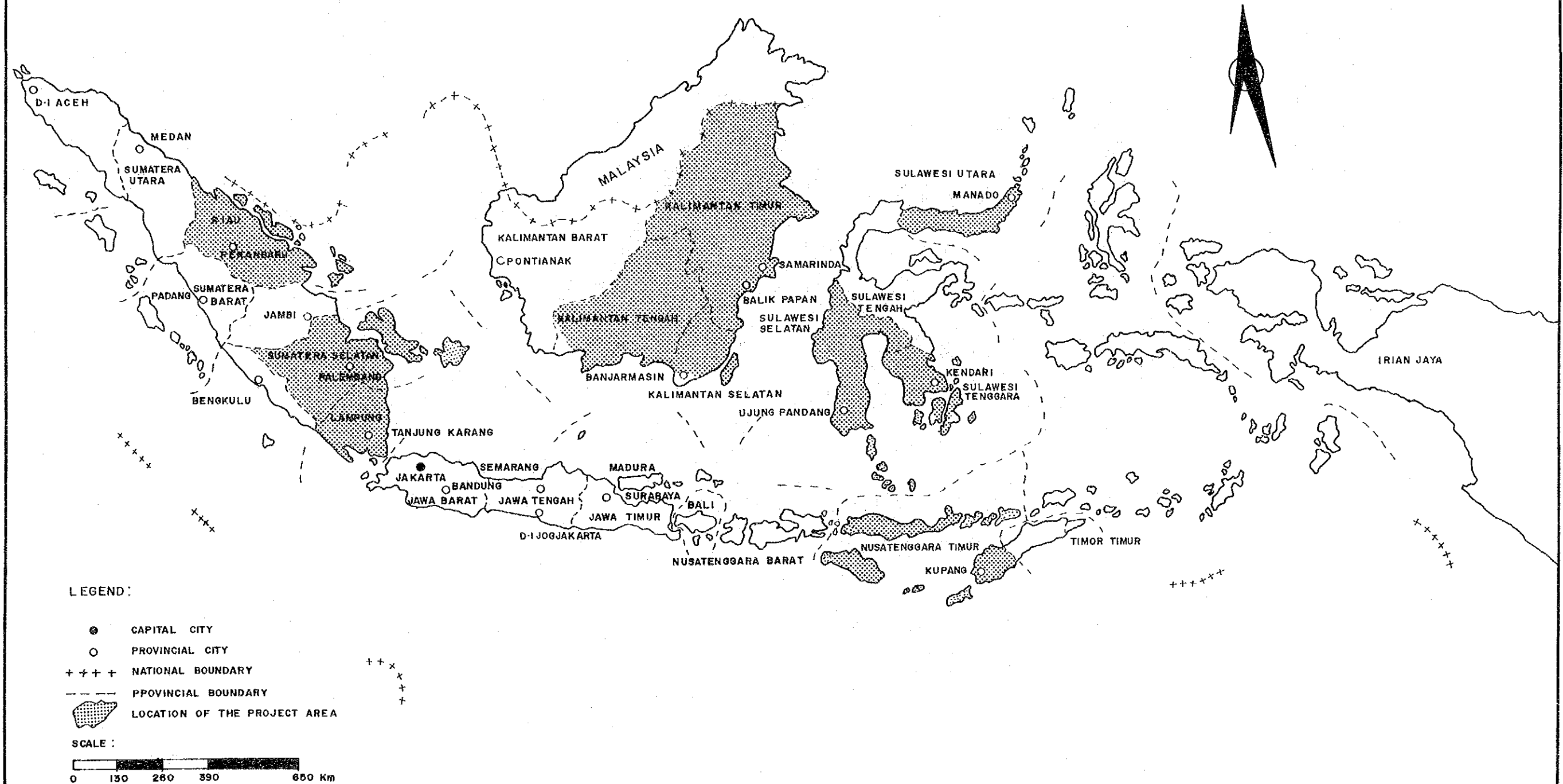
Since the study period was limited, without cooperation of Bina Marga, Bangda and local governments of both province and Kabupaten in collecting the data, the study would not have been completed within the period.

The report consists of the results of the feasibility study and proposed implementation programme of the local road development in the Kabupaten.

The simplified economic feasibility evaluation methodology utilized for the study was established by the Study Team in Phase I Study through a pilot study of seven (7) model Kabupatens, and is described in the Main Report.

The purpose of the study for the Kabupaten is mainly to estimate the total Project Cost for the local road development but only limited data is available for study base. Therefore a detailed survey and design for the improvement of the Kabupaten roads should be carried out before commencing the Project together with a review of this report.

LOCATION MAP OF THE PROJECT AREAS



IV · PROPINSI KALIMANTAN TENGAH

- 09 · KAB · KOTA WARINGIN TIMUR
- 10 · KAB · KAPUAS
- 11 · KAB · BARITO SELATAN
- 12 · KAB · BARITO UTARA

V · PROPINSI KALIMANTAN TIMUR

- 13 · KAB · PASIR
- 14 · KAB · KUTAI
- 15 · KAB · BERAU
- 16 · KAB · BULUNGAN

VI · PROPINSI KALIMANTAN SELATAN

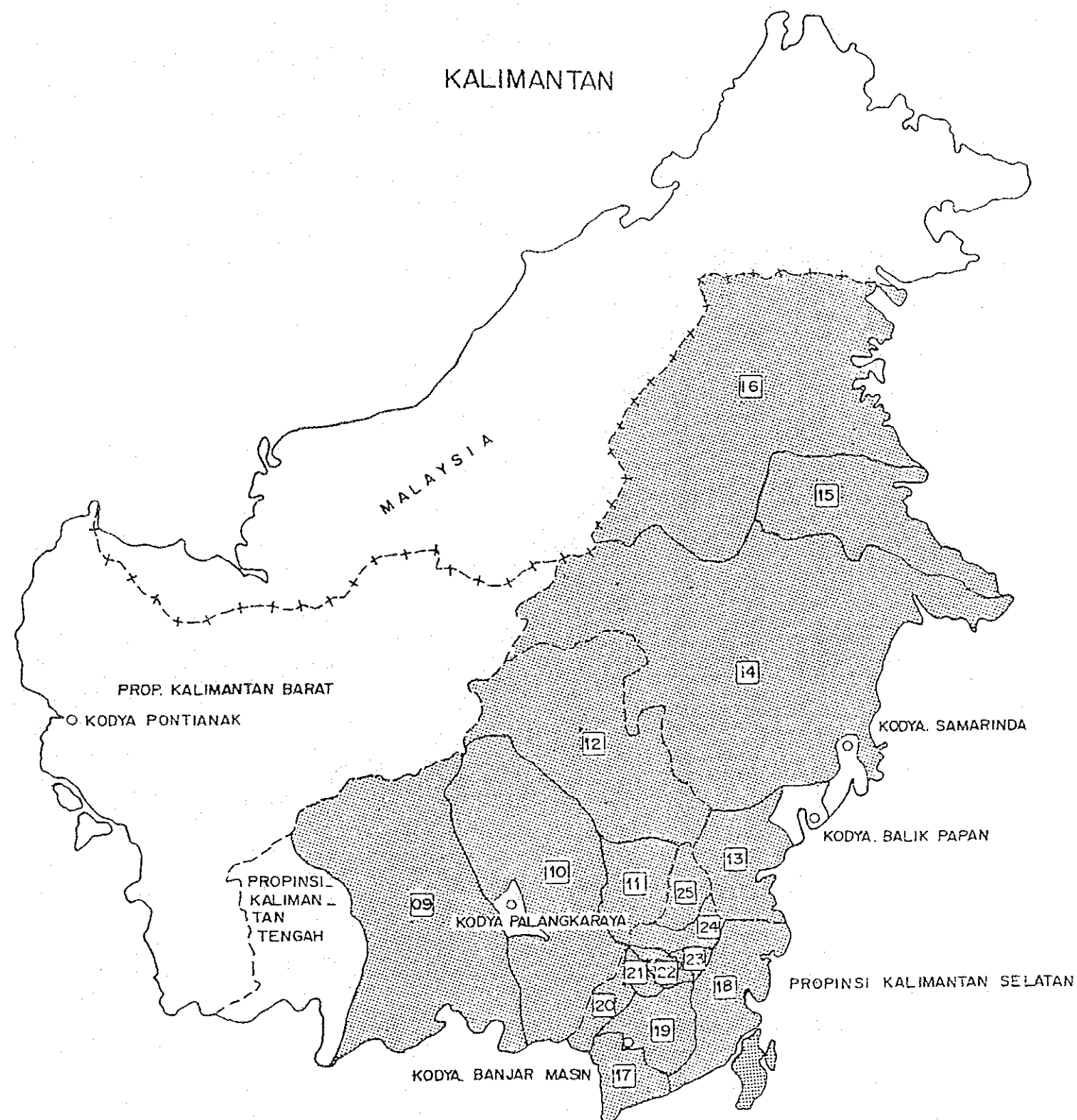
- 17 · KAB · TANAH LAUT
- 18 · KAB · KOTA BARU
- 19 · KAB · BANJAR
- 20 · KAB · BARITO KUALA
- 21 · KAB · TAPIN
- 22 · KAB · HULU SUNGAI SELATAN
- 23 · KAB · HULU SUNGAI TENGAH
- 24 · KAB · HULU SUNGAI UTARA
- 25 · KAB · TABALONG

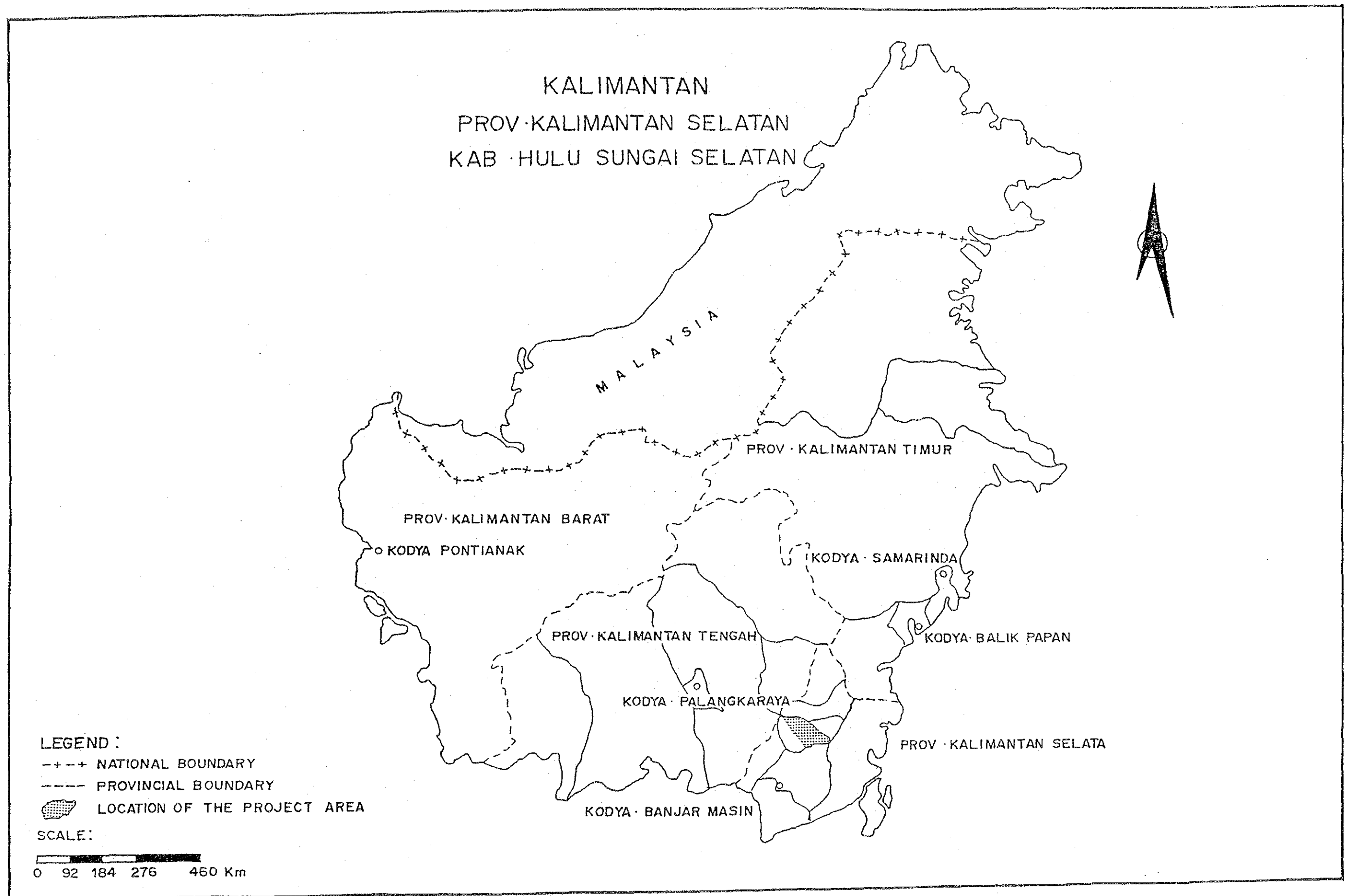
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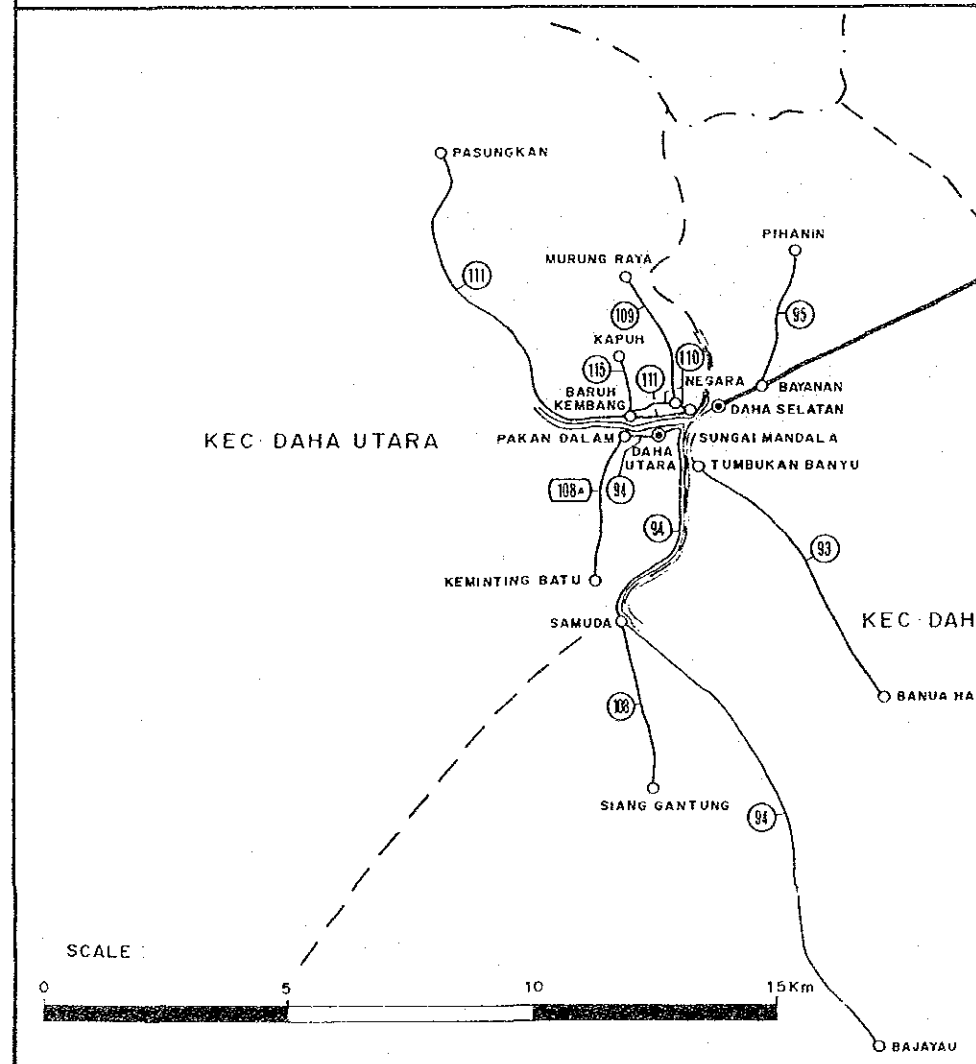
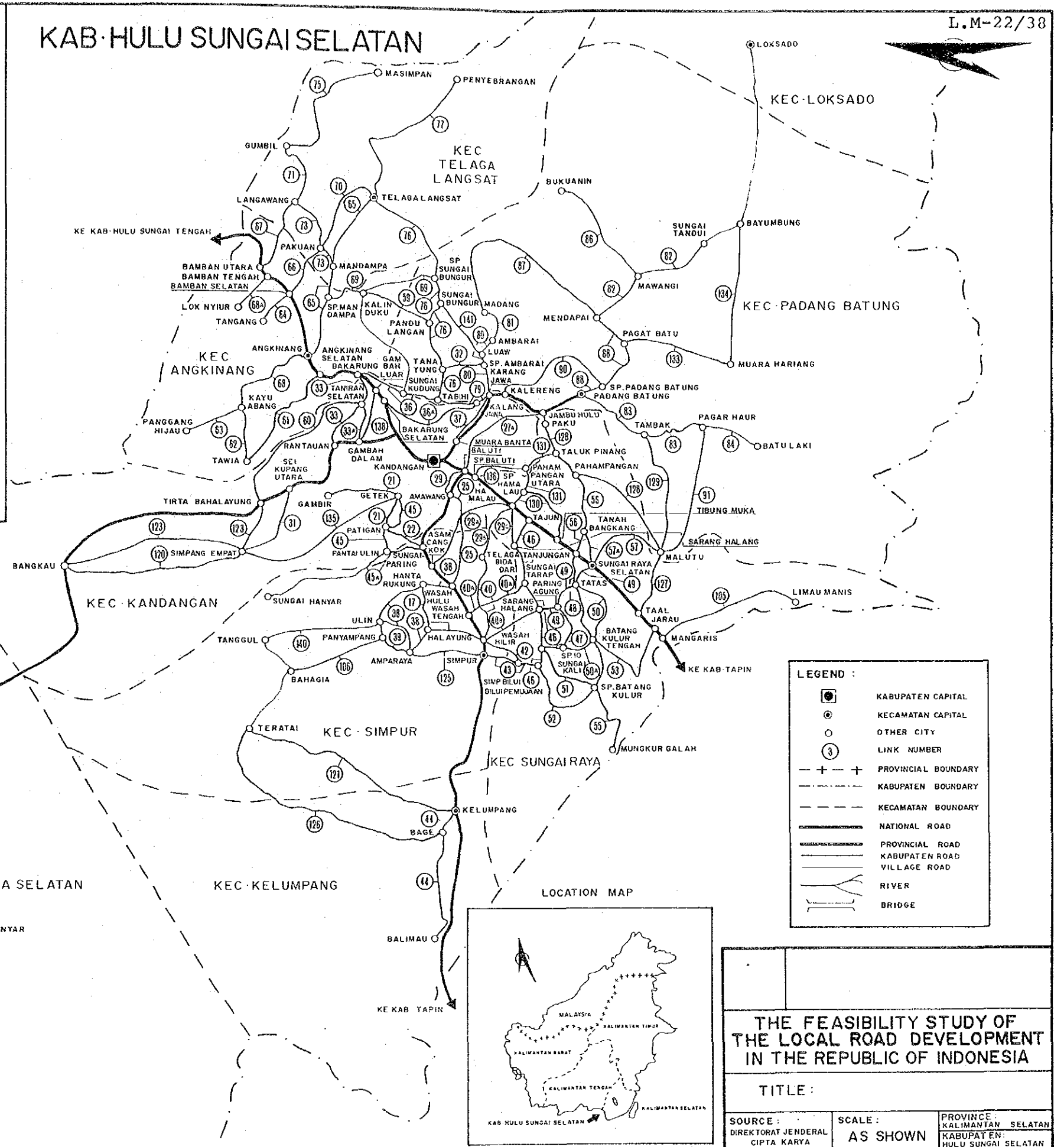
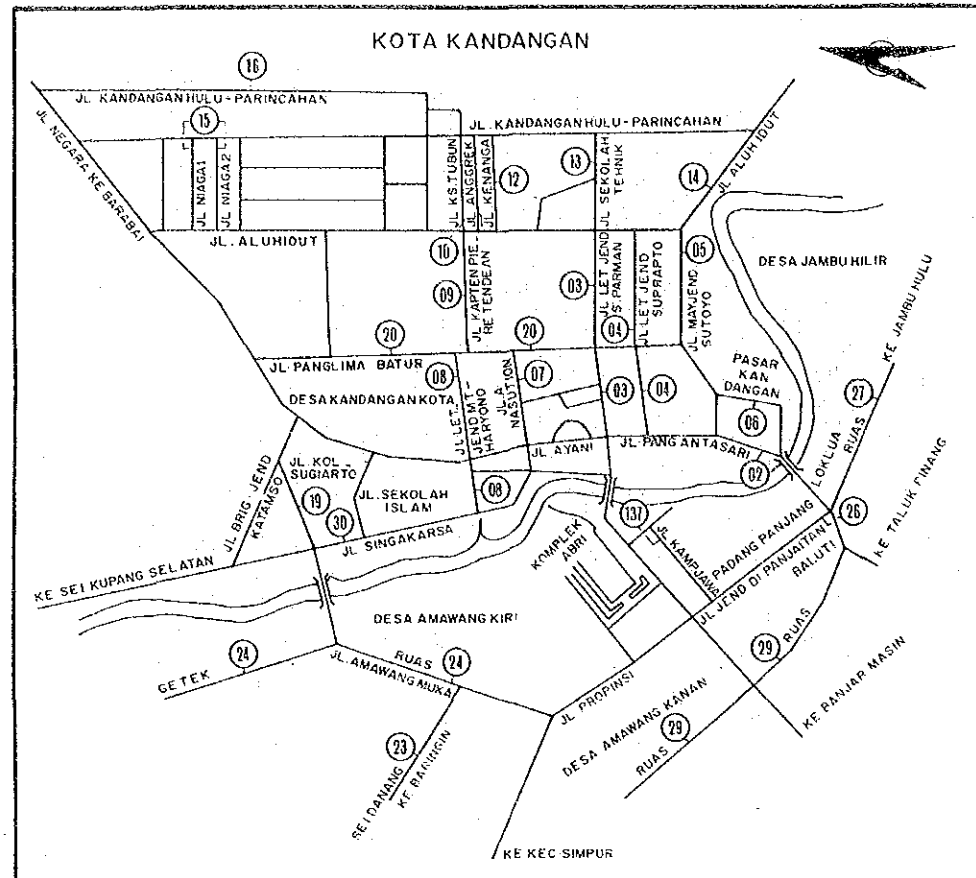
- +--+ NATIONAL BOUNDARY
- PROVINCIAL BOUNDARY
-  LOCATION OF THE PROPOSED AREA

SCALE :

0 92 184 276 460 Km.







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Chapter 1 BACKGROUND OF THE KABUPATEN

1.1 Topographic and Meteorological Conditions

1.1.1 Location and Topography

Kabupaten Hulu Sungai Selatan is located mid course of the Negara River, one of the Barito's tributaries, and stands on the west side of the Meratus mountains. It is bordered on the west by Kabupaten Tapin, on the north by Kabupaten Hulu Sungai Utara, on the east by Kabupaten Hulu Sungai Tengah and on the south by Kabupaten Kota Baru and the Meratus mountains.

The geographical features of the Kabupaten can be divided broadly into three regions i.e the Negara's swampy basin in the northwest, flatland in the middle region where the capital of the Kabupaten, Kandangan, is located and the mountainous district in the east which lies on the west side of the Meratus mountains.

The area of the Kabupaten is about 1,893 square kilometers, approximately 5 percent of the total of the province. It consists administratively of 10 Kecamatans.

1.1.2 Meteorological Conditions

The average number of rainy days and the average amount of yearly rainfall in Kabupaten Hulu Sungai Selatan are 134 days and 2,285 mm respectively.

One year in the Kabupaten consists of a rainy season and a dry season. The dry season is from June through September in general. However this is variable as Table 1-1-1 shows.

The number of working days which is necessary for planning the construction schedule in chapter 6, is estimated at 240 days using the following formula based upon the data shown in the table referred to above.

$$\text{Working Days} = 365 - \text{Holidays} - \text{Rainy Days} + (\text{Rainy Days} \times \frac{\text{Holiday}}{365}) + (0.10 \times \text{Rainy Days})$$

Where :

- Holidays consist of 52 Sundays and 13 national holidays; and
- 10% of rainy days are assumed to be workable days.

Table 1-1-1

METEOROLOGICAL CONDITIONS

PROVINCE : Kalimantan Selatan
KABUPATEN : Hulu Sungai Selatan

STATION : N.I

	1 9 8 0		1 9 8 1		1 9 8 2		1 9 8 3		1 9 8 4	
MONTH	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)
January	-	-	16	152	27	308	9	251	12	453
February	-	-	20	259	18	110	6	273	12	176
March	-	-	12	133	21	269	4	415	12	255
April	-	-	-	-	16	272	8	68	10	272
May	-	-	17	168	15	241	11	88	9	603
June	-	-	13	76	5	63	-	-	5	159
July	14	51	16	213	2	45	-	-	5	227
August	19	119	3	21	1	1	-	-	2	31
September	5	39	15	114	3	61	-	-	9	331
October	17	101	14	185	5	93	-	-	6	144
November	20	181	24	365	12	124	-	-	7	184
December	24	335	22	347	11	128	-	-	11	272
Total	99	826	172	2,033	130	1,715	38	1,095	100	3,107

1.2 Socio-Economic Conditions

1.2.1 Population

The population of Kabupaten Hulu Sungai Selatan in 1984 was 187,161 which was approximately 8.3% of the 2,241,600 total population of Kalimantan Selatan Province as shown in Table 1-2-1.

The population density was 0.99 persons per ha which was higher than the provincial density of 0.58.

The recent annual average growth rate of population of the Kabupaten is 3.5% which is higher than both the provincial rate of 2.1% and the national rate of 2.2%. This may be a result of the natural increase of population since there is no transmigration programme in the Kabupaten.

The population of each Kecamatan and its proportion to the Kabupaten population is shown in Table 1-2-2.

Table 1-2-1

POPULATION BY KABUPATEN

DESCRIPTION	POPULATION	AAGR (%)	AREA (ha)	POPULATION DENSITY (persons/ha)	SURVEY YEAR
KABUPATEN:					
TANAH LAUT	148,708	3.5	347,682	0.43	1984
KOTA BARU	253,400	5.6	1,426,432	0.18	1984
BANJAR	355,078	3.0	503,980	0.70	1982
BARITO KUALA	198,282	4.0	299,696	0.66	1984
TAPIN	115,752	3.0	270,062	0.42	1983
HULU SUNGAI SELATAN	187,161	3.5	189,261	0.99	1984
HULU SUNGAI TENGAH	205,266	0.5	147,200	1.39	1983
HULU SUNGAI UTARA	248,860	1.5	359,178	0.69	1984
TABALONG	130,218	2.0	394,600	0.33	1984
PROVINCE:					
KALIMANTAN SELATAN	2,155,700		3,766,000		1982
	2,198,400	2.1	3,766,000	0.58	1983
	2,241,600		3,766,000		1984
JAWA IS. (Excluding DKI JAKARTA)	91,126,900	1.7	13,159,700	6.92	-
INDONESIA	161,579,500	2.2	191,944,300	0.84	-

Notes :

1. Sources:

Kabupaten; Kabupaten concerned with the study

Province ; Jawa and Indonesia:

Statistical yearbook of Indonesia 1984, published by
the Central statistics Bureau.

2. AAGR ; Average Annual Growth Rate.

Table 1-2-2

POPULATION BY KECAMATAN

Year : 1984

PROVINCE : KALIMANTAN SELATAN

KABUPATEN : HULU SUNGAI SELATAN

KECAMATAN	POPULATION	PROPORTION (%)
SUNGAI RAYA	16,009	8.6
PADANG BATUNG	16,676	8.9
TELAGA LANGSAT	9,570	5.2
ANGKINANG	14,924	8.0
KANDANGAN	39,103	20.9
SIMPUR	15,591	8.3
DAHA SELATAN	34,541	18.4
DAHA UTARA	26,135	14.0
KELUMPANG	8,075	4.3
LOKSADO	6,487	3.4
TOTAL	187,161	100

1.2.2 Land Use

In Kabupaten Hulu Sungai Selatan, 100,518 ha of the current available land use area, which is approximately 53.2% of the 789,261 ha total area of the Kabupaten, is used for living purposes and for industrial activity of the inhabitants of the Kabupaten. It is the total value of columns (1) through (6) in Table 1-2-3.

The current available land use area consists of 56,334 ha of agricultural harvest area, 6,733 ha of residential area and 37,451 ha of usable open space which are 56.0%, 6.7% and 37.3% of the current available land use area respectively.

The agricultural harvest area consists of 30,139 ha of paddy field, 21,544 ha of plantation and 4,651 ha of other cultivated area which are 53.5%, 38.2% and 8.3% of the agricultural harvest area respectively.

It can be realized from the land use that the main industrial production in the Kabupaten is food crops, especially paddy.

Table 1-2-3

LAND USE

PROVINCE : KALIMANTAN SELATAN

KABUPATEN	WET PADDY FIELD		UPLAND PADDY FIELD	OTHER CUL- TIVATED AREA	PLANTATION AREA	RESIDENTIAL AREA	USABLE OPEN SPACE	RIVER & FORESTRY		OTHERS	TOTAL AREA	SURVEY YEAR
	AREA	LAKE						AREA				
TANAH LAUT	53,787 (15.5)	9,266 (2.7)	6,890 (2.0)	30,350 (8.7)	13,839 (4.0)	15,000* (4.3)	300 (0.1)	173,539 (49.9)	44,712 (12.9)	347,683 (100)	1984	
KOTA BARU	14,997 (1.1)	37,331 (2.6)	73,244 (5.1)	27,050 (1.9)	14,184 (1.0)	92,450 (6.5)	-	1,108,967 (77.7)	58,524 (4.1)	1,425,432 (100)	1984	
BANJAR	52,360 (10.4)	17,590 (3.5)	22,850 (4.5)	18,274 (6.1)	6,006 (2.0)	3,678 (1.2)	12,500 (2.5)	248,340 (49.3)	134,340 (26.6)	503,980 (100)	1982	
BARITO KUALA	76,493 (25.5)	-	49,616 (18.4)	20,694 (7.7)	6,120 (2.3)	4,525 (1.7)	16,366 (6.1)	63,819 (23.6)	57,910 (21.4)	270,082 (100)	1983	
TAPIN	33,647 (12.5)	17,385 (6.4)	4,651 (2.5)	21,544 (11.4)	6,733 (0.9)	37,451 (19.8)	38,681 (20.4)	47,956 (25.3)	1,053 (0.6)	189,261 (100)	1984	
HULU SUNGAI SELATAN	29,725 (15.7)	414 (0.2)	-	16,425 (11.2)	1,329 (0.9)	1,930 (1.3)	11,060 (7.5)	40,846 (27.7)	49,733 (33.8)	147,168 (100)	1984	
HULU SUNGAI TENGAH	23,764 (16.1)	2,100 (1.4)	48,032 (13.4)	66,068 (18.4)	11,586 (3.2)	15,000 (4.2)	69,866 (19.4)	33,482 (9.3)	10,055 (2.8)	359,178 (100)	1984	
HULU SUNGAI UTARA	99,035 (27.6)	7,828 (2.2)	7,676 (1.9)	19,980 (5.1)	7,300 (1.8)	25,000 (6.3)	12,215 (3.1)	258,867 (65.7)	44,759 (11.4)	394,600 (100)	1984	
TABALONG	13,085 (3.3)	5,720 (1.4)										

Notes :

1. The value in () denotes the proportion
2. Source : Kabupaten concerned with the study

1.2.3 Agriculture

The cultivated area and food crop production in Kabupaten Hulu Sungai Selatan in 1984 were 23,096 ha and 91,606 ton respectively as shown in Table 1-2-4. Of food crops, the area and production of paddy, which consists of wet paddy and upland paddy, was 22,027 ha and 87,864 ton respectively which are 95.4% and 95.9% of the total food crops. The yield rate of paddy production is 4.00 ton per ha. Thus, paddy is the most predominant agricultural crop of the Kabupaten.

As the table shows, average annual growth rates of area and production of paddy in 1979 through 1984 were 5.0% and 13.0% respectively which indicate favorable development of the paddy production. A fall in production in 1983 is considered as having been effected by irregular weather and this has been taken into account for the estimation of growth rates. It is desirable that productivity of paddy increases and this depends upon the future development of irrigation.

The commodity crops, of which rubber is major, are produced in the plantations. The area and production of plantation crops in 1983 were 12,603 ha and 6,165 ton respectively with current growth rates of 11.3% and 10.0% as shown in Table 1-2-5. Thus the plantation crop which is exported is an important agricultural product. Some changes as expected considering the international balance of supply and demand.

The population of the agricultural sector which is assumed from the employment in the Kabupaten is 61% of the total population as shown in Table 1-2-6. Thus this is an agricultural Kabupaten.

It is suggested that the Kabupaten does not depend excessively on paddy production and it is essential that crops other than paddy are developed leading to multiple agricultural production.

Table 1-2-4

AREA AND PRODUCTION OF FOOD CROPS

KABUPATEN : HULU SUNGAI SELATAN

CULTIVATED AREA

ITEM	YEAR						(ha)
	1979	1980	1981	1982	1983	1984	AAGR (%)
PADDY	18,705	21,713	25,126	20,045	22,105	22,027	5.0
OTHERS	1,062	920	1,042	1,302	1,324	1,069	3.8
TOTAL	19,767	22,633	26,168	21,347	23,429	23,096	5.8

PRODUCTION

ITEM	YEAR						(ton)
	1979	1980	1981	1982	1983	1984	AAGR (%)
PADDY	42,025	80,184	93,250	87,647	84,449	87,864	4.0
OTHERS	3,064	3,592	1,981	3,762	1,762	1,235	4.1
TOTAL	45,089	83,776	95,231	91,409	85,684	91,606	13.3

YIELD RATE

ITEM	YEAR						(ton/ha)
	1979	1980	1981	1982	1983	1984	AAGR (%)
PADDY	2.25	3.69	3.71	4.37	3.82	4.00	4.0

Notes :

1. AAGR : Average annual growth rate
2. Source : Kabupaten concerned with the study

Table 1-2-5

AREA AND PRODUCTION OF PLANTATION CROPS

Year : 1983

PROVINCE : KALIMANTAN SELATAN

KABUPATEN	AREA (ha)	PRODUCTION (ton)	AREA	AAGR (%) PRODUCTION
TANAH LAUT	9,095	1,500	6.3	18.0
KOTA BARU	9,517	703	3.4	0
BANJAR	-	-	-	-
BARITO KUALA	13,021	9,013	4.0	11.0
TAPIN	-	-	-	-
HULU SUNGAI SELATAN	12,603	6,165	11.3	10.0
HULU SUNGAI TENGAH	18,000	6,400	1.9	11.7
HULU SUNGAI UTARA	19,721	7,176	3.5	0
TABALONG	27,107	10,073	5.0	12.6

Table 1-2-6

POPULATION OF AGRICULTURAL SECTOR

PROVINCE : KALIMANTAN SELATAN

KABUPATEN	AGRICULTURAL SECTOR	TOTAL POPULATION	PROPORTION (%)	AAGR (%)	SURVEY YEAR
TANAH LAUT	122,000	148,708	82.3	3.5	1984
KOTA BARU	161,000	253,400	63.7	4.0	1984
BANJAR	312,000	355,078	88.0	3.0	1982
BARITO KUALA	156,000	198,282	78.6	5.0	1984
TAPIN	71,000	115,752	61.5	3.0	1983
HULU SUNGAI SELATAN	114,000	187,161	61.0	3.0	1984
HULU SUNGAI TENGAH	125,000	202,370	61.9	0.3	1984
HULU SUNGAI UTARA	192,000	248,860	77.0	1.5	1984
TABALONG	106,000	130,218	81.5	3.0	1984

Notes :

1. AAGR : Average annual growth rate
2. Kabupaten concerned with the Study

1.2.4 Other Economic Activities

Notable economic activities excluding agriculture in Kabupaten Hulu Sungai Selatan are forestry and livestock sector. There is no notable industrial activity besides these two sectors which respectively recorded 1,688 m³ and 10 tons in 1984. And the productions volume of these sectors are just enough to supply for the consumption of the Kabupaten itself.

1.3 Present Status of Kabupaten Roads

1.3.1 Outline of Road Networks

In Kabupaten Hulu Sungai Selatan there is one national road which runs across the Kabupaten from northeast to southwest via Kandungan, the Kabupaten capital. Besides the said national road there are three provincial roads which lead from the Kabupaten capital to the north, west and south, the destination of these roads being Daha Selatan, Baliman and Padang Batung respectively. These national and provincial roads play the role of regional trunk roads except in the north region of the Kabupaten.

Since the area within the range of ± 10 Km along the national road is flat the Kabupaten road networks which are formed in that area seem to be high density networks.

In the area around Negara and Daha Utara in the north part of the Kabupaten the Kabupaten roads are developed based upon the Negara river. However, in the eastern mountainous area and western swampy area there is no developed of high density networks.

1.3.2 Road Inventory

From the road inventory data prepared by the Kabupaten, the number and total length of Kabupaten roads to be studied in Kabupaten Hulu Sungai Selatan are confirmed as 156 links and 431 Km respectively. These figures exclude Kabupaten roads with no data.

According to the data the present status of the Kabupaten roads is as follows:

(1) Density of Kabupaten Roads

The density of the Kabupaten roads is 2.28 m per ha. This is distinctly higher than the national density of 0.48 m per ha and also higher than 2.11 m per ha which is the density in Jawa Island, excluding DKI Jakarta, as shown in the following table. Thus, the Kabupaten is progressive in density of Kabupaten roads.

	<u>Total Length</u> <u>(km)</u>	<u>Area</u> <u>(ha)</u>	<u>Density</u> <u>(m/ha)</u>
Kabupaten : Hulu sungai Selatan	431	189,261	2.28
Province : Kalimantan Selatan	3,029	3,938,091	0.77
Jawa Is.(Excluding DKI Jakarta)	27,715	13,159,700	2.11
Indonesia	92,038	191,944,300	0.48

Notes : 1. The value for the province is the total value for the Kabupatens included in the study.

2. The sources of data are as follows:

Kabupaten and Province : Bina Marga Inventory

Jawa and Indonesia : Statistical Yearbook of
Indonesia 1984, published
by the Central Statistics
Bureau

(2) Kabupaten Road Surface Type

The type of surface on the Kabupaten roads in the Kabupaten is shown in Table 1-3-1.

The legend used in the table is as follows:

ASP : Asphalt

Table 1-3-1 (1) EXISTING ROAD LENGTH BY SURFACE TYPE

PROV : KALIHANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(Km)							(Km)						
102 (7)	ASP	KRK	BTB	TNH	TOTAL		102 (7)	ASP	KRK	BTB	TNH	TOTAL	
LINK 1	1	1	1	1	1	1	LINK 55	1	1	1	3	3	
LINK 2	1	1	1	1	1	1	LINK 56	1	3	1	1	3	
LINK 3	1	1	1	1	1	1	LINK 57	1	7	1	1	7	
LINK 4	1	1	1	1	1	1	LINK 58	1	1	1	1	1	
LINK 5	1	1	1	1	1	1	LINK 59	1	4	1	1	4	
LINK 6	1	1	1	1	1	1	LINK 60	1	2	1	5	7	
LINK 7	1	1	1	1	1	1	LINK 61	1	1	1	5	5	
LINK 8	1	1	1	1	1	1	LINK 62	1	2	1	1	2	
LINK 9	1	1	1	1	1	1	LINK 63	1	1	1	2	2	
LINK 10	1	1	1	1	1	1	LINK 64	1	1	1	1	1	
LINK 11	1	1	1	1	1	1	LINK 65	1	6	1	1	6	
LINK 12	1	1	1	1	1	1	LINK 66	1	3	1	1	3	
LINK 13	1	1	1	1	1	1	LINK 67	1	2	1	1	2	
LINK 14	1	1	1	1	1	1	LINK 68	1	4	1	1	4	
LINK 15	1	1	1	1	1	1	LINK 69	1	5	1	1	5	
LINK 16	1	4	1	1	4	4	LINK 70	1	3	1	1	3	
LINK 17	1	2	1	1	2	2	LINK 71	1	2	1	1	2	
LINK 18	1	1	1	1	1	1	LINK 72	1	1	1	1	1	
LINK 19	1	1	1	1	1	1	LINK 73	1	3	1	1	3	
LINK 20	1	1	1	1	1	1	LINK 74	1	1	1	1	1	
LINK 21	1	1	4	2	6	6	LINK 75	1	5	1	1	5	
LINK 22	1	4	1	1	4	4	LINK 76	1	1	8	1	9	
LINK 23	1	3	1	1	3	3	LINK 77	1	4	1	2	6	
LINK 24	1	2	1	1	2	2	LINK 78	1	1	1	1	1	
LINK 25	1	1	1	4	4	4	LINK 79	1	1	1	1	1	
LINK 26	1	1	1	1	1	1	LINK 80	1	1	1	1	1	
LINK 27	1	10	1	1	10	10	LINK 81	1	2	1	1	2	
LINK 28	1	1	1	1	1	1	LINK 82	2	1	1	3	5	
LINK 29	2	1	1	1	2	2	LINK 83	1	5	1	1	5	
LINK 30	1	1	1	1	1	1	LINK 84	1	2	1	1	2	
LINK 31	2	4	1	1	6	6	LINK 85	1	1	1	1	1	
LINK 32	1	2	1	1	2	2	LINK 86	1	1	6	1	6	
LINK 33	1	3	1	1	3	3	LINK 87	1	8	1	1	8	
LINK 34	1	1	1	1	1	1	LINK 88	4	1	1	1	4	
LINK 35	1	1	1	1	1	1	LINK 89	1	1	1	1	1	
LINK 36	1	3	1	1	3	3	LINK 90	1	1	1	6	6	
LINK 37	1	2	1	1	2	2	LINK 91	1	5	1	1	5	
LINK 38	1	7	1	1	7	7	LINK 92	1	1	1	1	1	
LINK 39	1	3	1	1	3	3	LINK 93	1	6	1	1	6	
LINK 40	1	5	1	1	5	5	LINK 94	1	12	1	1	12	
LINK 41	1	1	1	1	1	1	LINK 95	1	3	1	1	3	
LINK 42	1	1	1	1	1	1	LINK 96	1	1	1	1	1	
LINK 43	2	1	1	1	2	2	LINK 97	1	1	1	1	1	
LINK 44	1	5	1	1	5	5	LINK 98	1	1	1	1	1	
LINK 45	1	1	1	2	2	2	LINK 99	1	1	1	1	1	
LINK 46	1	6	1	1	6	6	LINK 100	1	1	1	1	1	
LINK 47	1	2	1	1	2	2	LINK 101	1	2	1	1	2	
LINK 48	1	1	1	2	3	3	LINK 102	1	3	1	1	3	
LINK 49	1	3	1	1	3	3	LINK 103	1	2	1	3	5	
LINK 50	1	3	1	1	3	3	LINK 104	1	2	1	1	2	
LINK 51	1	2	1	1	2	2	LINK 105	1	5	1	1	5	
LINK 52	1	5	1	1	5	5	LINK 106	1	6	1	1	6	
LINK 53	1	4	1	1	4	4	LINK 107	1	1	1	1	1	
LINK 54	1	1	1	1	1	1	LINK 108	1	3	1	1	3	

Table 1-3-1(2) EXISTING ROAD LENGTH BY SURFACE TYPE

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(Km)						(Km)					
NO	ASP	KRK	BID	YHH	TOTAL	NO	ASP	KRK	BID	YHH	TOTAL
LINK 109	1	1	1	3	3	LINK 133	1	4	1	1	4
LINK 110	1	1	1	1	1	LINK 134	1	1	1	5	5
LINK 111	1	10	1	1	10	LINK 135	1	9	1	1	8
LINK 112	1	1	1	1	1	LINK 136	1	2	1	1	2
LINK 113	1	1	1	1	1	LINK 137	1	1	1	1	1
LINK 114	1	1	1	1	1	LINK 138	1	2	1	1	2
LINK 115	1	1	1	1	1	LINK 139	1	1	1	1	1
LINK 116	1	1	1	1	1	LINK 140	1	1	5	1	5
LINK 117	1	1	1	1	1	LINK 141	1	3	1	1	3
LINK 118	1	1	1	1	1	LINK 142	2	2	1	1	4
LINK 119	1	1	1	1	1	LINK 143	1	4	1	1	4
LINK 120	1	1	1	6	6	LINK 144	1	2	1	1	2
LINK 121	1	1	1	8	8	LINK 145	1	1	1	1	1
LINK 122	1	1	1	1	1	LINK 146	1	1	3	1	3
LINK 123	1	1	1	7	7	LINK 147	1	1	1	1	1
LINK 124	1	1	1	1	1	LINK 148	4	1	1	1	4
LINK 125	1	1	1	1	1	LINK 149	1	3	1	1	3
LINK 126	1	2	1	5	7	LINK 150	1	1	1	2	2
LINK 127	1	2	1	1	2	LINK 151	1	8	1	1	8
LINK 128	1	2	1	3	5	LINK 152	1	3	1	1	3
LINK 129	1	4	1	1	4	LINK 153	1	2	1	1	2
LINK 130	1	2	1	1	3	LINK 154	1	1	1	2	2
LINK 131	1	2	1	1	2	LINK 155	1	2	1	4	6
LINK 132	3	1	1	1	3	LINK 156	1	3	1	1	3
TOTAL						TOTAL					
RATIO						RATIO					

KRK : Gravel/Stone/Telford/Water Bound Macadam

TNH : Earth

LL : Others

Comparison of the proportion of surface type in the Kabupaten with other regions is as follows:

	<u>ASP</u>	<u>KRK</u>	<u>TNH/LL</u>
Kabupaten : Hulu Sungai Selatan	6.3	72.2	21.6
Province : Kalimantan Selatan	10.5	41.1	48.4
Jawa Is.(Excluding DKI Jakarta)	56.2	25.0	18.8
Indonesia	26.0	26.6	47.4

Thus, in the Kabupaten the proportion of Kabupaten roads with asphalt surface is lower than either that of Indonesia or of Jawa Island. The proportion of low grade roads such as earth roads and others is fairly high. This means that the road classification in the Kabupaten is still low.

(3) Surface Condition of Kabupaten Roads

The surface condition of the Kabupaten roads classified as good, fair, poor and bad which are shown as BA, SD, RU and RB respectively, are summarized in Table 1-3-2.

Comparison of the proportions of the various surface conditions of the Kabupaten roads in the Kabupaten with other regions is as follows:

	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	<u>Bad</u>
Kabupaten : Hulu Sungai Selatan	27.4	40.6	29.5	2.5
Province : Kalimantan Selatan	26.4	34.2	31.4	8.0
Jawa Is.(Excluding DKI Jakarta)	45.6	29.8	19.6	5.0
Indonesia	43.5	21.8	21.1	13.6

Table 1-3-2 (1) EXISTING ROAD CONDITION BY SURFACE TYPE

PROVINCE : KALIMANTAN SELATAN

KABUPATEN : HULU SUNGAI SELATAN

(11)

102	ASP				PAK				DIB				DRI			
	PA	SB	RU	RD	PA	SB	RU	RD	PA	SB	RU	RD	PA	SB	RU	RD
101																
102	20	60														
103																
104																
105																
106	99	1														
107																
108																
109																
110																
111																
112																
113																
114	20	60	20													
115		99	1													
116					63	33	5									
117					55	30	15									
118																
119																
120	30	30	40													
121									25	65	10		20	35	15	
122					92	33	25									
123					3	75	22									
124					25	75										
125													10	20	40	3
126																
127						99	1									
128																
129	90	10														
130																
131	75		25		33	67										
132						90	10									
133					40	60	20									
134																
135						99	1									
136					40	10	20									
137						99	1									
138					10	90	10									
139					10	10										
140					12	30	46	12								
141																
142															99	1
143	90	10														
144					99	1										
145															99	10
146					20	57	23									
147						75	25									
148					40	30	30						30	30	35	5
149						70	22									
150					12	27	27									

Table 1-3-2 (2) EXISTING ROAD CONDITION BY SURFACE TYPE

PROVINCE : KALIMANTAN SELATAN

KABUPATEN : HULU SUNGAI SELATAN

III

No	Km	ASP				KAK				BID				TMI			
		BA	SB	RU	RD	BA	SB	RU	RD	BA	SB	RU	RD	BA	SB	RU	RD
1	101																
2	102																
3	103																
4	104																
5	105																
6	106																
7	107																
8	108																
9	109																
10	110																
11	111																
12	112																
13	113																
14	114																
15	115																
16	116																
17	117																
18	118																
19	119																
20	120																
21	121																
22	122																
23	123																
24	124																
25	125																
26	126																
27	127																
28	128																
29	129																
30	130																
31	131																
32	132																
33	133																
34	134																
35	135																
36	136																
37	137																
38	138																
39	139																
40	140																
41	141																
42	142																
43	143																
44	144																
45	145																
46	146																
47	147																
48	148																
49	149																
50	150																
51	151																
52	152																
53	153																
54	154																
55	155																
56	156																
57	157																
58	158																
59	159																
60	160																
61	161																
62	162																
63	163																
64	164																
65	165																
66	166																
67	167																
68	168																
69	169																
70	170																
71	171																
72	172																
73	173																
74	174																
75	175																
76	176																
77	177																
78	178																
79	179																
80	180																
81	181																
82	182																
83	183																
84	184																
85	185																
86	186																
87	187																
88	188																
89	189																
90	190																
91	191																
92	192																
93	193																
94	194																
95	195																
96	196																
97	197																
98	198																
99	199																
100	200																

Table 1-3-2 (3) EXISTING ROAD CONDITION BY SURFACE TYPE

PROVINCE : KALIMANTAN SELATAN

KABUPATEN : HULU SUNGAI SELATAN

113

107	ASP				KAK				DIB				SHI			
	BA	SD	RU	AD	BA	SD	RU	AD	BA	SD	RU	AD	BA	SD	RU	AD
107 03					11	32	42	12								
107 04					5	5	40	30								
107 05																
107 06									23	30	30					
107 07					21	33	46									
107 08	43	55														
107 09																
107 10													7	40	53	
107 11					19	44	15									
107 12																
107 13					20	43	20									
107 14					21	40	39									
107 15					10	43	47									
107 16																
107 17																
107 18																
107 19																
107 20																
107 21					15	45	40									
107 22					37	40	3									
107 23							99							2	93	
107 24					10	45	5									
107 25					49	31										
107 26						50	50	1								
107 27																
107 28					3	30	57	10								
107 29													20	22	53	
107 30					50	20	30									
107 31					29	32	40									
107 32																
107 33																
107 34																
107 35					10	10										
107 36													40	40	20	
107 37															10	
107 38													30	40	30	
107 39																
107 40													20	30	33	
107 41														21	70	9
107 42																
107 43													33	49	19	
107 44																
107 45					10	10										

Table 1-3-5

NUMBER OF EXISTING BRIDGES BY BRIDGE TYPE

PROV : KALIMANTAN SELATAN

KAB : TAPIN

<<< BRIDGE >>>						(No)
I 103 (18) I	KY I	LL I	BT I	BJ I	TOTAL I	
I LINK 1 I	5 I	I	I	I	5 I	
I LINK 2 I	3 I	I	I	I	3 I	
I LINK 3 I	2 I	I I	I	I	3 I	
I LINK 5 I	2 I	I	I	I	2 I	
I LINK 6 I	2 I	I	I	I	2 I	
I LINK 7 I	1 I	I	I	I	1 I	
I LINK 8 I	2 I	I	I	I	2 I	
I LINK 10 I	1 I	I	I	I	1 I	
I LINK 12 I	2 I	I	I	I	2 I	
I LINK 14 I	2 I	I	I	I	2 I	
I LINK 15 I	1 I	I	I	I	1 I	
I LINK 16 I	2 I	I	I	I	2 I	
I LINK 18 I	3 I	I	I	I	3 I	
I LINK 20 I	17 I	I	I	I	17 I	
I LINK 21 I	2 I	I	I	I	2 I	
I LINK 22 I	2 I	I	I	I	2 I	
I LINK 23 I	1 I	I	I	I	1 I	
I LINK 24 I	8 I	I	I I	I I	10 I	
I LINK 25 I	2 I	I	I	I	2 I	
I LINK 26 I	2 I	I	I	I	2 I	
I LINK 27 I	4 I	I	I	I	4 I	
I LINK 28 I	1 I	I	I	I	1 I	
I LINK 29 I	2 I	I	I	I	2 I	
I LINK 30 I	14 I	I	I	I	14 I	
I LINK 31 I	2 I	I I	I	I	3 I	
I LINK 32 I	1 I	I	I	I	1 I	
I LINK 33 I	7 I	I	I	I	7 I	
I LINK 35 I	3 I	I	I	I	3 I	
I LINK 36 I	4 I	I	I	I	4 I	
I LINK 37 I	4 I	I	I	I	4 I	
I LINK 38 I	3 I	I	I	I	3 I	
I LINK 40 I	2 I	I	I	I	2 I	
I LINK 41 I	4 I	I	I	I	4 I	
I LINK 44 I	1 I	I	I	I	1 I	
I LINK 46 I	6 I	I	I	I	6 I	
I LINK 50 I	1 I	I	I	I	1 I	
I LINK 53 I	I	I I	I	I	1 I	
I LINK 54 I	3 I	I	I	I	3 I	
I TOTAL I	124 I	3 I	1 I	1 I	129 I	
I RATIO I	96 I	2 I	1 I	1 I	(%) I	

The number of existing bridges by span length is as follows:

<u>Bridge Type</u>	<u>Span Length (m)</u>										<u>Total</u>
	<u><3</u>	<u><5</u>	<u><8</u>	<u><10</u>	<u><12</u>	<u><14</u>	<u><16</u>	<u><18</u>	<u><20</u>	<u><99</u>	
Timber	43	60	8	2	6	1	1	-	1	2	124
Concrete	-	1	-	-	-	-	-	-	-	-	1
Steel	-	-	-	-	-	1	-	-	-	-	1
Others	1	1	-	-	-	-	-	-	-	1	3
Total	44	62	8	2	6	2	1	-	1	3	129

Thus, most of the existing bridges on the Kabupaten roads are timber and the majority of spanlengths is within the range of 3 m to 5 m.

Table 1-3-3(1) EXISTING ROAD LENGTH BY TERRAIN CONDITION

PROV : KALIMANTAN SELATAN

KAB : KULU SUNGAI SELATAN

(Km)						(Km)					
102	3)	DT	DK	RW	TOTAL	102	3)	DT	DK	RW	TOTAL
LINK	1	1			1	LINK	46	6	1		6
LINK	2	1			1	LINK	47	2			2
LINK	3					LINK	48	3			3
LINK	4					LINK	49	3			3
LINK	5					LINK	50	3			3
LINK	6	1			1	LINK	51	2			2
LINK	7					LINK	52	5			5
LINK	8					LINK	53	4			4
LINK	9					LINK	54				
LINK	10					LINK	55	3			3
LINK	11					LINK	56	3			3
LINK	12					LINK	57		7		7
LINK	13					LINK	58				
LINK	14	1			1	LINK	59	4			4
LINK	15	1			1	LINK	60	7			7
LINK	16	4			4	LINK	61	5			5
LINK	17	2			2	LINK	62	2			2
LINK	18					LINK	63	2			2
LINK	19					LINK	64			1	1
LINK	20	1			1	LINK	65	6			6
LINK	21	6			6	LINK	66	3			3
LINK	22	4			4	LINK	67	2			2
LINK	23	3			3	LINK	68	4			4
LINK	24	2			2	LINK	69	5			5
LINK	25	4			4	LINK	70	3			3
LINK	26					LINK	71	2			2
LINK	27	10			10	LINK	72				
LINK	28					LINK	73	3			3
LINK	29	2			2	LINK	74				
LINK	30					LINK	75	5			5
LINK	31	6			6	LINK	76	9			9
LINK	32	2			2	LINK	77		6		6
LINK	33	3			3	LINK	78				
LINK	34					LINK	79	1			1
LINK	35	1			1	LINK	80	1			1
LINK	36	3			3	LINK	81	2			2
LINK	37	2			2	LINK	82		5		5
LINK	38	7			7	LINK	83	3	2		5
LINK	39	3			3	LINK	84		2		2
LINK	40	5			5	LINK	85				
LINK	41					LINK	86		6		6
LINK	42	1			1	LINK	87		8		8
LINK	43	2			2	LINK	88		4		4
LINK	44	5			5	LINK	89				
LINK	45	2			2	LINK	90	6			6

Table 1-3-3 (2) EXISTING ROAD LENGTH BY TERRAIN CONDITION

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(Km)						(Km)					
102 (3)	DT	BK	RW	TOTAL		102 (3)	DT	BK	RW	TOTAL	
LINK 91		5		5		LINK 126			7	7	
LINK 92						LINK 127		2		2	
LINK 93	6			6		LINK 128	5			5	
LINK 94	12			12		LINK 129	4			4	
LINK 95	2		1	3		LINK 130	3			3	
LINK 96						LINK 131	2			2	
LINK 97						LINK 132	3			3	
LINK 98						LINK 133	1	3		4	
LINK 99						LINK 134		5		5	
LINK 100	1			1		LINK 135	8			8	
LINK 101	2			2		LINK 136	2			2	
LINK 102	3			3		LINK 137					
LINK 103	5			5		LINK 138	2			2	
LINK 104	2			2		LINK 139	1			1	
LINK 105	1	4		5		LINK 140			5	5	
LINK 106	6			6		LINK 141	3			3	
LINK 107						LINK 142	4			4	
LINK 108	2		1	3		LINK 143	4			4	
LINK 109	3			3		LINK 144	2			2	
LINK 110	1			1		LINK 145	1			1	
LINK 111	10			10		LINK 146	3			3	
LINK 112						LINK 147	1			1	
LINK 113						LINK 148	4			4	
LINK 114						LINK 149	3			3	
LINK 115	1			1		LINK 150	2			2	
LINK 116	1			1		LINK 151	5		3	8	
LINK 117			1	1		LINK 152	3			3	
LINK 118			1	1		LINK 153	2			2	
LINK 119						LINK 154	2			2	
LINK 120	6			6		LINK 155			6	6	
LINK 121			8	8		LINK 156			3	3	
LINK 122											
LINK 123	7			7		TOTAL	335	59	37	431	
LINK 124											
LINK 125	1			1		RATIO	78	14	9	(%)	

Table 1-3-4 NUMBER AND LENGTH OF BRIDGES

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(((BRIDGE)))						(((BRIDGE)))											
(UNIT : m)						(UNIT : m)											
EXISTING			NOT EXIST			TOTAL			EXISTING			NOT EXIST			TOTAL		
LINK NO	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	LINK NO	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH		
16	2	16.00			2	16.00	86	5	41.50			5	41.50				
17	2	8.00			2	8.00	87	3	30.50			3	30.50				
21	3	11.00			3	11.00	88	4	31.00			4	31.00				
22	2	10.25			2	10.25	90	1	4.00			1	4.00				
25	1	3.50			1	3.50	91	2	15.00			2	15.00				
27	5	22.75			5	22.75	93	15	107.50			15	107.50				
31	2	10.00			2	10.00	94	27	265.50		4.00	28	269.50				
33	1	4.00			1	4.00	95	12	168.00			12	168.00				
35	1	3.00			1	3.00	100	2	12.00			2	12.00				
38	3	11.80			3	11.80	101	2	12.00			2	12.00				
40	3	12.00			3	12.00	102	2	8.00			2	8.00				
42	2	17.00			2	17.00	103	5	40.00			5	40.00				
43	2	18.00			2	18.00	104	2	6.00			2	6.00				
44	9	70.50			9	70.50	106	3	31.00			3	31.00				
45	1	4.00		4.00	2	8.00	108	12	109.75			12	109.75				
46	8	41.10			8	41.10	109	12	170.00			12	170.00				
47	2	10.00			2	10.00	110	4	58.00			4	58.00				
48	1	10.00			1	10.00	111	13	117.00			13	117.00				
50	2	14.00			2	14.00	120	1	6.00			1	6.00				
51	1	4.00			1	4.00	121	6	24.00			6	24.00				
52	3	12.00			3	12.00	123	4	16.00			4	16.00				
53	2	14.50			2	14.50	126	4	32.00			4	32.00				
55	1	4.00			1	4.00	127	1	4.00			1	4.00				
56	2	10.00			2	10.00	129	3	16.00			3	16.00				
57	1	3.00			1	3.00	132	1	3.00			1	3.00				
59	2	17.50			2	17.50	133	7	48.00			7	48.00				
60	2	24.50			2	24.50	136	1	4.00			1	4.00				
62	2	14.50			2	14.50	139	1	6.00			1	6.00				
64	2	8.00			2	8.00	140	1	20.00			1	20.00				
65	1	22.00			1	22.00	141	2	20.00			2	20.00				
66	2	7.00			2	7.00	142	1	3.00			1	3.00				
68	2	6.00			2	6.00	143	1	8.00			1	8.00				
69	11	88.00			11	88.00	144	1	3.00			1	3.00				
70	3	9.00			3	9.00	145	1	15.00			1	15.00				
71	3	22.50			3	22.50	146	3	28.50			3	28.50				
73	3	16.00			3	16.00	147	1	14.00			1	14.00				
75	2	20.00			2	20.00	149	2	25.00			2	25.00				
76	8	75.00			8	75.00	150	2	20.00			2	20.00				
77	7	60.50			7	60.50	151	2	16.00			2	16.00				
81	1	4.00			1	4.00	152	3	12.00			3	12.00				
82	6	36.50			6	36.50	154	1	21.00			1	21.00				
83	5	38.00			5	38.00	155	6	45.50			6	45.50				
84	2	15.00			2	15.00	156	10	65.50			10	65.50				
TOTAL						318	2530.65	2	8.00	320						2530.65	

Table 1-3-5. NUMBER OF EXISTING BRIDGES BY BRIDGE TYPE

PROV : KALIMANTAN SELATAN

KAD : HULU SUNGAI SELATAN

<<< BRIDGE >>>							(No)	<<< BRIDGE >>>							(No)								
1	103 (18)	1	KY	1	LL	1	BJ	1	BT	1	TOTAL	1	103 (18)	1	KY	1	LL	1	BJ	1	BT	1	TOTAL
1	LINK 16	1	2	1							2	1	LINK 86	1	5	1							5
1	LINK 17	1	2	1							2	1	LINK 87	1	3	1							3
1	LINK 21	1	3	1							3	1	LINK 88	1	4	1							4
1	LINK 22	1	2	1							2	1	LINK 90	1	1	1							1
1	LINK 25	1		1							1	1	LINK 91	1	2	1							2
1	LINK 27	1	5	1							5	1	LINK 93	1	14	1							15
1	LINK 31	1	2	1							2	1	LINK 94	1	26	1							27
1	LINK 33	1	1	1							1	1	LINK 95	1	12	1							12
1	LINK 35	1	1	1							1	1	LINK 100	1	2	1							2
1	LINK 38	1	3	1							3	1	LINK 101	1	2	1							2
1	LINK 40	1	3	1							3	1	LINK 102	1	2	1							2
1	LINK 42	1	2	1							2	1	LINK 103	1	5	1							5
1	LINK 43	1	2	1							2	1	LINK 104	1	2	1							2
1	LINK 44	1	9	1							9	1	LINK 106	1	3	1							3
1	LINK 45	1	1	1							1	1	LINK 108	1	12	1							12
1	LINK 46	1	8	1							8	1	LINK 109	1	12	1							12
1	LINK 47	1	2	1							2	1	LINK 110	1	4	1							4
1	LINK 48	1	1	1							1	1	LINK 111	1	13	1							13
1	LINK 50	1	2	1							2	1	LINK 120	1	1	1							1
1	LINK 51	1	1	1							1	1	LINK 121	1	6	1							6
1	LINK 52	1	3	1							3	1	LINK 123	1	4	1							4
1	LINK 53	1	2	1							2	1	LINK 126	1	4	1							4
1	LINK 55	1	1	1							1	1	LINK 127	1	1	1							1
1	LINK 56	1	2	1							2	1	LINK 129	1	3	1							3
1	LINK 57	1	1	1							1	1	LINK 132	1	1	1							1
1	LINK 59	1	2	1							2	1	LINK 133	1	7	1							7
1	LINK 60	1	2	1							2	1	LINK 136	1	1	1							1
1	LINK 62	1	2	1							2	1	LINK 139	1	1	1							1
1	LINK 64	1	2	1							2	1	LINK 140	1	1	1							1
1	LINK 65	1		1			1				1	1	LINK 141	1	2	1							2
1	LINK 66	1	2	1							2	1	LINK 142	1	1	1							1
1	LINK 68	1	2	1							2	1	LINK 143	1	1	1							1
1	LINK 69	1	1	1							1	1	LINK 144	1	1	1							1
1	LINK 70	1	3	1							3	1	LINK 145	1	1	1							1
1	LINK 71	1	3	1							3	1	LINK 146	1	3	1							3
1	LINK 73	1	3	1							3	1	LINK 147	1	1	1							1
1	LINK 75	1	2	1							2	1	LINK 149	1	2	1							2
1	LINK 76	1	7	1							7	1	LINK 150	1	1	1							2
1	LINK 77	1	7	1							7	1	LINK 151	1	2	1							2
1	LINK 81	1	1	1							1	1	LINK 152	1	2	1							3
1	LINK 82	1	5	1			1				6	1	LINK 154	1	1	1							1
1	LINK 83	1	5	1							5	1	LINK 155	1	6	1							6
1	LINK 84	1	2	1							2	1	LINK 156	1	10	1							10
												1	TOTAL	1	310	1	4	1	2	1	2	1	318
												1	RA110	1	97	1	1	1	1	1	1	1	121

The number of existing bridges by span length is as follows:

<u>Bridge Type</u>	<u>Span Length (m)</u>										<u>Total</u>
	<u><3</u>	<u><5</u>	<u><8</u>	<u><10</u>	<u><12</u>	<u><14</u>	<u><16</u>	<u><18</u>	<u><20</u>	<u><99</u>	
Timber	78	211	21	-	-	-	-	-	-	-	310
Concrete	-	2	-	-	-	-	-	-	-	-	2
Steel	-	1	1	-	-	-	-	-	-	-	2
Others	-	4	-	-	-	-	-	-	-	-	4
Total	78	218	22	-	-	-	-	-	-	-	318

Thus, most of the existing bridges on the Kabupaten roads are timber and the majority of spanlengths is within the range of 3 m to 5 m.

1.3.4 Traffic

Inventories of the average daily traffic (ADT) on the Kabupaten roads in Kabupaten Hulu Sungai Selatan were prepared by the Kabupaten and are shown in Chapter 2.

From the inventories, total value of average daily trips by vehicle type and their proportions in the Kabupaten in 1985 are summarized as follows:

	SEDAN	BUS	TRUCK	MOTOR- CYCLE	TOTAL
Total Trips	2,409	115	1,817	7,571	11,912
Proportion (%)	20.22	0.97	15.25	63.56	100.00

Source : Bina Marga Inventory

The proportions of registered vehicles by vehicle type are as follows:

	SEDAN	BUS	TRUCK	MOTOR- CYCLE	TOTAL
Proportion (%)	0.44	0.01	0.00	99.55	100.00

Source : Kabupaten.

Thus, the proportion of motorcycles in the Kabupaten is by far the highest.

From the above tables the following can be observed:

- Number of total trips might be underestimated
- Proportions are probably reasonable.

Essentially, for estimation of future traffic volumes past and present traffic data together with the trend in the number of registered vehicles are important basic data. However the data obtained for the study was traffic count data for each road link in 1985 and of low reliability.

Therefore the future traffic volumes are estimated by the calculation process recommended in chapter 3 of the Main Report.

Chapter 2 ESTIMATIONS OF FUTURE TRAFFIC VOLUME AND BENEFIT

2.1 Future Traffic Volume

2.1.1 Traffic Growth Rate

The traffic growth rate used for estimation of the future traffic volume on the Kabupaten roads was estimated by the following calculation process.

Growth of Production Basis "A":

$$\sqrt{\text{Annual Population Growth of the Kabupaten} \times \text{Growth of the Total Cultivated Area}}$$

Growth of Productivity "B" :

$$\sqrt{\text{Growth of the Total Paddy Field Area} \times \text{Growth of the Paddy Production per ha}}$$

Traffic Growth Rate: Initial estimated figure:

$$GR' = \sqrt{A \times B}$$

Traffic Growth Rate GR = Final adjusted figure:

$$\sqrt{GR' \times \text{Trend of GDP/Capita of the Province Concerned}}$$

Results of the estimation are shown in Table 2-1-1.

Table 2-1-1 TRAFFIC GROWTH RATE ESTIMATION

PROV : KALIMANTAN SELATAN KAB : HULU BUNGA SELATAN

A)	Growth Rate of Population	:	3.50 (%)
B)	Growth Rate of Cultivated Area	:	1.00 (%)
C)	Growth Rate of Rice field	:	5.00 (%)
D)	Growth Rate of Rice yield rate	:	4.00 (%)
E)	Growth Rate of GDP / capita	:	6.60 (%)
a)	Geometrical Mean (A x B)	:	2.24 (%)
b)	Geometrical Mean (C x D)	:	4.50 (%)
c)	Geometrical Mean (a x b)	:	3.36 (%)
d)	Geometrical Mean (c x E)	:	4.97 (%)

TRAFFIC GROWTH RATE : 4.97 (%)

2.1.2 Present and Future Traffic Volume

The future traffic volumes on the Kabupaten roads in 1998 for the Project life time of ten years were estimated by the following formula :

$$T_n = T_e (1 + r)^n$$

Where :

T_n : Future traffic volume n years later

T_e : Traffic volume in 1985

r : Traffic growth rate

The results are shown in Table 2-1-2 together with the traffic volume in 1985.

Table 2-1-2 (1) EXISTING AND FUTURE TRAFFIC VOLUME

PROV : KALIMANTAN SELATAN KAB : HULU SUNGAI SELATAN

< SPD : 1/2 >

LINK NO	INVENTORY (1985)					RATE	AFTER 13 YEARS (1998)					CLASS
	MBL	BUS	TRUK	SPD	TOTAL		MBL	BUS	TRUK	SPD	TOTAL	
1	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
2	300	30	260	480	830	5.0%	564	56	488	902	1559	IIIA
3	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
4	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
5	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
6	100	6	50	500	406	5.0%	188	11	94	939	763	IIIA
7	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
8	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
9	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
10	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
11	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
12	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
13	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
14	60	0	40	300	250	5.0%	113	0	75	564	470	IIIB-1
15	38	0	22	110	115	5.0%	71	0	41	207	216	IIIB-1
16	5	0	3	30	23	5.0%	9	0	6	56	43	IIIC
17	15	0	10	50	50	5.0%	28	0	19	94	94	IIIB-2
18	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
19	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
20	20	0	30	120	110	5.0%	38	0	56	225	207	IIIB-1
21	10	0	20	80	70	5.0%	19	0	38	150	132	IIIB-2
22	15	0	5	20	30	5.0%	28	0	9	38	56	IIIB-2
23	10	0	20	30	45	5.0%	19	0	38	56	85	IIIB-2
24	10	0	20	80	70	5.0%	19	0	38	150	132	IIIB-2
25	20	0	20	40	60	5.0%	38	0	38	75	113	IIIB-2
26	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
27	3	0	42	26	58	5.0%	6	0	79	49	109	IIIB-2
28	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
29	5	0	5	50	35	5.0%	9	0	9	94	66	IIIB-2
30	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
31	52	2	24	125	141	5.0%	98	4	45	235	265	IIIB-1
32	0	0	5	24	17	5.0%	0	0	9	45	32	IIIC
33	10	0	10	60	50	5.0%	19	0	19	113	94	IIIB-2
34	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
35	0	0	2	25	15	5.0%	0	0	4	47	28	IIIC
36	34	2	12	94	95	5.0%	64	4	23	177	178	IIIB-2
37	5	0	5	25	23	5.0%	9	0	9	47	43	IIIC
38	20	0	10	150	105	5.0%	38	0	19	282	197	IIIB-2
39	20	2	16	92	84	5.0%	38	4	30	173	158	IIIB-2
40	20	0	10	40	50	5.0%	38	0	19	75	94	IIIB-2
41	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
42	0	0	3	6	6	5.0%	0	0	6	11	11	IIIC
43	95	8	54	140	227	5.0%	178	15	101	263	426	IIIB-1
44	20	0	10	25	43	5.0%	38	0	19	47	81	IIIB-2
45	1	0	4	25	18	5.0%	2	0	8	47	34	IIIC
46	4	0	6	40	30	5.0%	8	0	11	75	56	IIIB-2
47	2	0	3	30	20	5.0%	4	0	6	56	38	IIIC
48	35	2	16	72	89	5.0%	66	4	30	135	167	IIIB-2
49	16	0	9	55	53	5.0%	30	0	17	103	100	IIIB-2
50	105	4	72	250	306	5.0%	197	8	135	470	575	IIIA

Table 2-1-2 (2)

EXISTING AND FUTURE TRAFFIC VOLUME

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

< SPD : 1/2 >

LINK NO	INVENTORY (1985)					RATE	AFTER 13 YEARS (1998)					CLASS
	MBL	BUS	TRUK	SPD	TOTAL		MBL	BUS	TRUK	SPD	TOTAL	
51	4	0	6	15	18	5.0%	8	0	11	28	34	IIIC
52	40	1	14	94	102	5.0%	75	2	26	177	192	IIIB-2
53	10	0	5	100	65	5.0%	19	0	9	188	122	IIIB-2
54	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
55	3	0	3	20	16	5.0%	6	0	6	38	30	IIIC
56	10	0	20	40	50	5.0%	19	0	38	75	94	IIIB-2
57	10	0	5	25	28	5.0%	19	0	9	47	53	IIIB-2
58	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
59	10	0	5	50	40	5.0%	19	0	9	94	75	IIIB-2
60	74	4	38	86	159	5.0%	139	8	71	162	299	IIIB-1
61	3	0	3	15	14	5.0%	6	0	6	28	26	IIIC
62	10	0	3	50	38	5.0%	19	0	6	94	71	IIIB-2
63	0	0	0	30	15	5.0%	0	0	0	56	28	IIIC
64	3	0	3	25	19	5.0%	6	0	6	47	36	IIIC
65	35	4	26	88	109	5.0%	66	8	49	165	205	IIIB-1
66	10	0	10	40	40	5.0%	19	0	19	75	75	IIIB-2
67	5	0	10	15	23	5.0%	9	0	19	28	43	IIIC
68	4	0	8	23	24	5.0%	8	0	15	43	45	IIIC
69	15	0	10	100	75	5.0%	28	0	19	188	141	IIIB-2
70	2	0	4	10	11	5.0%	4	0	8	19	21	IIIC
71	10	0	4	50	39	5.0%	19	0	8	94	73	IIIB-2
72	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
73	10	0	10	40	40	5.0%	19	0	19	75	75	IIIB-2
74	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
75	0	0	0	25	13	5.0%	0	0	0	47	24	IIIC
76	10	0	10	20	30	5.0%	19	0	19	38	56	IIIB-2
77	0	0	4	10	9	5.0%	0	0	8	19	17	IIIC
78	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
79	96	4	78	142	249	5.0%	180	8	147	267	468	IIIB-1
80	10	0	20	50	55	5.0%	19	0	38	94	103	IIIB-2
81	10	0	5	35	33	5.0%	19	0	9	66	62	IIIB-2
82	44	0	26	162	151	5.0%	83	0	49	304	284	IIIB-1
83	30	0	50	100	130	5.0%	56	0	94	188	244	IIIB-1
84	10	0	20	50	55	5.0%	19	0	38	94	103	IIIB-2
85	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
86	0	0	10	20	20	5.0%	0	0	19	38	38	IIIC
87	106	0	4	20	120	5.0%	199	0	8	38	225	IIIB-1
88	155	8	110	350	448	5.0%	291	15	207	658	842	IIIA
89	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
90	0	0	0	20	10	5.0%	0	0	0	38	19	IIIC
91	25	10	15	50	75	5.0%	47	19	28	94	141	IIIB-2
92	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
93	50	0	20	200	170	5.0%	94	0	38	376	319	IIIB-1
94	20	0	10	80	70	5.0%	38	0	19	150	132	IIIB-2
95	0	0	0	20	10	5.0%	0	0	0	38	19	IIIC
96	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
97	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
98	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
99	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
100	0	0	0	40	20	5.0%	0	0	0	75	38	IIIC

Table 2-1-2 (3)

EXISTING AND FUTURE TRAFFIC VOLUME

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

< SPD : 1/2 >

LINK NO	INVENTORY (1985)					AFTER 13 YEARS (1998)					CLASS	
	MBL	BUS	TRUK	SPD	TOTAL	MBL	BUS	TRUK	SPD	TOTAL		
101	0	0	0	25	13	0	0	0	47	24	IIIC	
102	10	0	20	100	80	19	0	38	188	150	IIIB-2	
103	0	0	0	46	23	0	0	0	86	43	IIIC	
104	10	0	10	20	30	19	0	19	38	56	IIIB-2	
105	2	0	10	14	19	4	0	19	26	36	IIIC	
106	0	0	0	10	5	0	0	0	19	9	IIIC	
107	0	0	0	0	0	0	0	0	0	0	IIIC	
108	0	0	0	20	10	0	0	0	38	19	IIIC	
109	0	0	0	10	5	0	0	0	19	9	IIIC	
110	0	0	0	5	3	0	0	0	9	6	IIIC	
111	0	0	0	50	25	0	0	0	94	47	IIIC	
112	0	0	0	0	0	0	0	0	0	0	IIIC	
113	0	0	0	0	0	0	0	0	0	0	IIIC	
114	0	0	0	0	0	0	0	0	0	0	IIIC	
115	0	0	0	10	5	0	0	0	19	9	IIIC	
116	0	0	0	40	20	0	0	0	75	38	IIIC	
117	0	0	0	10	5	0	0	0	19	9	IIIC	
118	0	0	0	30	15	0	0	0	56	28	IIIC	
119	0	0	0	0	0	0	0	0	0	0	IIIC	
120	0	0	0	20	10	0	0	0	38	19	IIIC	
121	0	0	0	0	0	0	0	0	0	0	IIIC	
122	0	0	0	0	0	0	0	0	0	0	IIIC	
123	25	2	18	75	83	47	4	34	141	156	IIIB-2	
124	0	0	0	0	0	0	0	0	0	0	IIIC	
125	25	2	14	48	65	47	4	26	90	122	IIIB-2	
126	26	2	8	79	76	49	4	15	148	143	IIIB-2	
127	0	0	20	40	40	0	0	38	75	75	IIIB-2	
128	1	0	9	10	15	2	0	17	19	28	IIIC	
129	0	0	6	10	11	0	0	11	19	21	IIIC	
130	6	0	9	90	60	11	0	17	169	113	IIIB-2	
131	5	0	15	45	43	9	0	28	85	81	IIIB-2	
132	65	4	30	220	209	122	8	56	413	393	IIIB-1	
133	0	0	0	30	15	0	0	0	56	28	IIIC	
134	0	0	0	0	0	0	0	0	0	0	IIIC	
135	10	0	30	60	70	19	0	56	113	132	IIIB-2	
136	5	0	10	20	25	9	0	19	38	47	IIIC	
137	0	0	0	0	0	0	0	0	0	0	IIIC	
138	0	0	10	20	20	0	0	19	38	38	IIIC	
139	0	0	0	10	5	0	0	0	19	9	IIIC	
140	125	8	65	135	266	235	15	122	254	500	IIIB-1	
141	2	0	8	15	18	4	0	15	28	34	IIIC	
142	45	2	15	75	100	85	4	28	141	188	IIIB-2	
143	0	0	0	25	13	0	0	0	47	24	IIIC	
144	0	0	0	15	8	0	0	0	28	15	IIIC	
145	0	0	0	60	30	0	0	0	113	56	IIIB-2	
146	0	0	0	80	40	0	0	0	150	75	IIIB-2	
147	2	0	3	10	10	4	0	6	19	19	IIIC	
148	95	8	70	250	298	178	15	132	470	560	IIIA	
149	6	0	10	50	41	11	0	19	94	77	IIIB-2	
150	0	0	0	15	8	0	0	0	28	15	IIIC	

Table 2-1-2 (4) EXISTING AND FUTURE TRAFFIC VOLUME

PROV : KALIHANTAN SELATAN KAB : HULU SUNGAI SELATAN

< SPD : 1/2 >

		INVENTORY (1985)					RATE		AFTER 13 YEARS (1998)					CLASS	
LINK NO		MBL	BUS	TRUK	SPD	TOTAL			MBL	BUS	TRUK	SPD	TOTAL		
151		16	0	4	20	30	5.0%		30	0	8	38	56	111B-2	
152		30	0	20	60	80	5.0%		56	0	38	113	150	111B-2	
153		10	0	10	30	35	5.0%		19	0	19	56	66	111B-2	
154		0	0	0	20	10	5.0%		0	0	0	38	19	111C	
155		4	0	6	20	20	5.0%		8	0	11	38	38	111C	
156		0	0	0	20	10	5.0%		0	0	0	38	19	111C	
PERCENT		20.22	0.97	15.25	63.56				20.22	0.97	15.25	63.56			

2.2 Benefit

2.2.1 Benefit Estimation Method

Generally, estimation of the benefit on each Kabupaten road due to the Project was made by analyzing the direct benefit i.e. the VOC reduction benefit, which was estimated by comparing "with project" and "without project" based upon the future traffic volume on the road. However for the following road links it was decided to estimate the indirect benefit through the producer's surplus benefit.

a) Road links with present traffic volume (ADT) less than 60 equivalent 4-wheel vehicles.

b) Road links with no 4-wheel vehicle operation at present.

The indirect benefit was changed into the future traffic volume and the VOC reduction benefit was estimated.

The VOC adopted for the estimation is shown in Table 2-2-1.

Table 2-2-1 VEHICLE OPERATION COST ON KABUPATEN ROADS

SURFACE	CONDITION	(KM)			
		SEDAN	BUS	TRUCK	MOTORCYCLE
ASPHALT	GOOD	104.7	86.2	85.4	15.9
	Fair	125.5	101.0	98.0	18.2
	Poor	164.1	135.2	138.5	22.8
	Bad	222.1	202.0	205.0	29.1
GRAVEL	Good	125.7	101.4	102.5	18.5
	Fair	145.0	124.6	127.1	21.1
	Poor	198.6	172.6	178.4	27.1
	Bad	242.7	228.9	231.2	31.8
EARTH	Fair	201.8	180.0	185.1	28.0
	Poor	240.7	218.2	225.8	31.8
	Bad	264.9	278.0	281.7	35.5

Source : Bina Marga

Table 2-2-2

FUTURE TRAFFIC VOLUME ESTIMATED
BY THE PRODUCER'S SURPLUS

PROV : KALIMANTAN SELATAN KAB : HULU SUNGAI SELATAN

(1998)

LINK NO	CLASS	SURFACE	MOBIL	BUS	TRUCK	SEPEDA	TOTAL
84	111C	KRK	2	0	2	7	8
86	111C	KRK	5	0	4	19	19
90	111C	KRK	4	0	4	18	17
95	111C	KRK	10	0	9	39	39
105	111B-2	KRK	13	0	11	51	50
106	111C	KRK	7	0	6	27	27
108	111C	KRK	13	0	11	49	49
109	111C	KRK	0	0	0	0	0
110	111C	KRK	0	0	0	0	0
111	111C	KRK	0	0	0	0	0
115	111C	KRK	0	0	0	0	0
120	111C	KRK	7	0	6	28	27
121	111B-2	KRK	51	2	44	199	197
127	111C	KRK	5	0	5	21	21
128	111C	KRK	11	0	10	45	44
129	111C	KRK	4	0	3	14	14
131	111C	KRK	4	0	4	18	17
133	111C	KRK	4	0	3	14	14
134	111C	KRK	4	0	4	18	17
136	111C	KRK	2	0	2	9	9
138	111C	KRK	2	0	2	9	9
141	111C	KRK	2	0	2	9	9
143	111C	KRK	8	0	7	30	30
144	111C	KRK	5	0	4	19	19
145	111C	KRK	3	0	3	11	12
147	111C	KRK	1	0	1	6	5
149	111C	KRK	6	0	5	23	23
150	111C	KRK	5	0	5	21	21
151	111B-2	KRK	13	0	12	53	52
153	111C	KRK	3	0	3	13	13
154	111C	KRK	11	0	10	43	43
156	111C	KRK	0	0	0	0	0

2.2.2 Benefit

The benefit estimation was carried out for each Kabupaten road. Table 2-2-3 shows a sample of the result of benefit estimation. In the table "surplus" and "VOC" show the estimation method utilized and III A, III B-1, III B-2 and III C show the road classification.

Table 2-2-3

RESULTS OF BENEFIT ESTIMATION

KABUPATEN : HULU SUNGAI SELATAN

(1000Rupiah)

	LINK 17	LINK 21	LINK 22	LINK 25	LINK 31	LINK 32	LINK 33	LINK 36	LINK 37	LINK 38
	2 Km	6 Km	4 Km	4 Km	6 Km	2 Km	3 Km	3 Km	2 Km	7 Km
	IIIC	IIIB-2	IIIC	IIIB-2	IIIB-1	IIIC	IIIC	IIIB-2	IIIC	IIIB-2
YEAR	Surplus	VOC	Surplus	VOC	VOC	Surplus	Surplus	VOC	Surplus	VOC
1988	0	0	0	0	0	0	0	0	0	0
1989	64	4917	142	8230	6808	49	125	1808	43	6438
1990	65	5182	181	8573	7216	49	125	1901	43	6784
1991	79	5457	185	9240	7579	51	128	1995	44	7134
1992	81	5722	190	9582	7948	51	131	2114	59	7494
1993	94	5999	190	9941	8311	51	134	2211	79	7853
1994	96	6287	230	10608	8680	51	158	2330	79	8216
1995	97	6564	234	10968	9118	54	189	2403	81	8602
1996	111	6948	278	11635	9616	72	192	2525	83	9097
1997	113	7345	282	12319	10115	74	195	2676	83	9591
1998	129	7742	322	12986	10621	96	222	2831	100	10113
SUM	929	62163	2234	104082	86012	598	1599	22794	694	81322
COST	-6663	15140	-13114	47099	18294	-6853	-9872	2681	-6806	22871
/Km	-3332	2523	-3279	11775	3049	-3427	-3291	894	-3403	3267

Chapter 3 ENGINEERING

3.1 Design Criteria and Specification

3.1.1 Geometric Design Criteria

Currently a technical standard for improvement of Kabupaten roads i.e. PETUNJUK TEKNIS INPRES PENUNJANGAN JALAN KABUPATEN, TAHUN 1984-1985 is established by Bina Marga.

The geometric design criteria in the above standard are recommended to be adopted in general for the Project. Following discussions with Bina Marga, exceptions to this are allowed for Pavement width and pavement type to minimize the construction cost of the Kabupaten road improvement, if necessary. The geometric design criteria adopted for the Project are shown in Table 3-1-1. The typical cross sections of Kabupaten roads are shown in Fig. 3-1-1.

3.1.2 Loading Specification

The LOADING SPECIFICATIONS FOR HIGHWAY BRIDGES BY DIRECTORATE GENERAL BINA MARGA is used in principle as the basic specification of loading and the TECHNICAL STANDARD FOR KABUPATEN ROADS compiled by Bina Marga shows that the design live load for bridges on Kabupaten roads is 70% of the Bina Marga live road. However, after discussions with Bina Marga the following loads were decided as the design live loads for the standard bridges of Kabupaten roads:

- a. 50% of Bina Marga live load (hereinafter BM 50) is applied for concrete and timber bridges on roads of III A classification.
- b. 10-ton truck load is applied for timber bridges on roads of III B-1, III B-2 and III C classification.

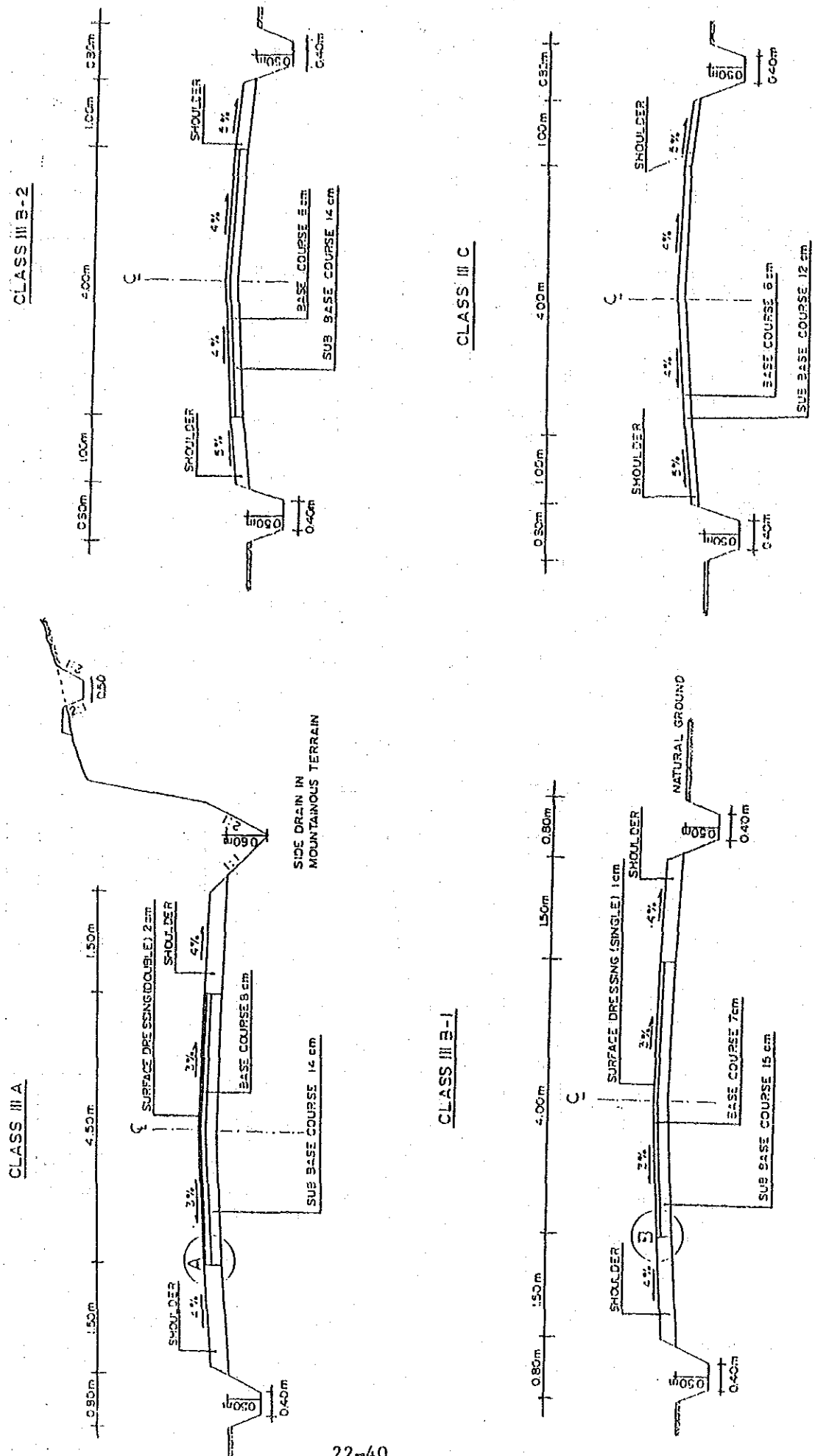
Table 3-1-1

DESIGN CRITERIA FOR KABUPATEN ROADS

ROAD CLASSIFICATION		CLASS III A				CLASS III B-1				CLASS III B-2				CLASS III C			
SURFACE TYPE		ASPHALT SEAL (DOUBLE)				ASPHALT SEAL (SINGLE)				GRAVEL				GRAVEL			
TRAFFIC VOLUME : ADT (Forecast 10 th year average per day)		3000 - 500				500 - 200				200 - 50				50			
T E R R A I N		FLAT TO ROLLING	HILLY	MOUNT- AINOUS	FLAT TO ROLLING	HILLY	MOUNT- AINOUS	FLAT TO ROLLING	HILLY	MOUNT- AINOUS	FLAT TO ROLLING	HILLY	MOUNT- AINOUS	FLAT TO ROLLING	HILLY	MOUNT- AINOUS	
TRAFFIC LANES		1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	1	1	1	
DESIGN SPEED (Km/hr)	DESIRABLE	70	60	40	70	40	30	60	40	30	60	40	30	50	30	30	AS PRACTI- CABLE
	MINIMUM	30	30	30	30	30	AS PRACTI- CABLE	30	30	AS PRACTI- CABLE	30	30	AS PRACTI- CABLE	30	AS PRACTI- CABLE	AS PRACTI- CABLE	
GRADIENT (LIMITING)	DESIRABLE	4	5	8	4	6	8	4	7	8	4	7	8	5	8	12	
	MAXIMUM	7	7	10	7	8	10	7	9	12	7	9	12	7	12	16	
PAVEMENT WIDTH (M)	DESIRABLE	6.0	6.0	6.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	3.5	3.5	3.5	
	MINIMUM	4.5	4.5	4.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	
SHOULDER WIDTH (M)	DESIRABLE	2.0	1.5	1.5	1.5	1.5	1.0	1.5	1.0	1.0	1.5	1.0	1.0	1.0	1.0	0.75	
	MINIMUM	1.5	1.0	0.75	1.0	1.0	0.75	1.0	0.75	0.5	1.0	0.75	0.5	0.75	0.5	0.5	
ROAD BED WIDTH (M)	DESIRABLE	10.0	9.0	9.0	8.0	7.5	6.5	7.5	6.5	6.5	7.5	6.5	6.5	5.5	5.5	5.0	
	MINIMUM	6.0	6.0	6.0	5.5	5.5	5.0	5.5	5.0	4.5	5.5	5.0	4.5	4.5	4.0	4.0	
RIGHT OF WAY (M)	DESIRABLE	16				12				12				12			
	MINIMUM	12				10				10				8			
ROAD CAMBER (%)	PAVEMENT	3				3				4				4			
	SHOULDER	4				4				5				5			

Fig. 3-1-1

STANDARD ROAD CROSS SECTIONS



3.2 Pavement Design

3.2.1 Design Conditions

From the engineering data prepared by the Kabupaten it is noted that the pavement structure of the Kabupaten roads seems to have been determined without adequate designs, therefore the Kabupaten roads generally have insufficient capacity. The standards generally used for highway pavement design such as Road Note 29, Road Note 31 and AASHTO are not suitable for Kabupaten roads with small traffic volumes and loads.

Therefore formulae suitable for the pavement design of Kabupaten roads are recommended as described in Chapter 5 of the Main Report.

The following are important factors for the design of pavement thickness.

1) Design Traffic Volume

As the pavement thickness is designed for each road classification the design traffic volume of which the target year is 1998, is adopted for each classification as follows:

<u>Road Classification</u>	<u>Design Traffic Volume (vpd)</u>
III A	1,000
III B-1	500
III B-2	200
III C	50

2) Strength of Roadbed

The CBR value of the existing roadbed is a very important factor for the pavement design but no results are available from CBR tests on the Kabupaten roads.

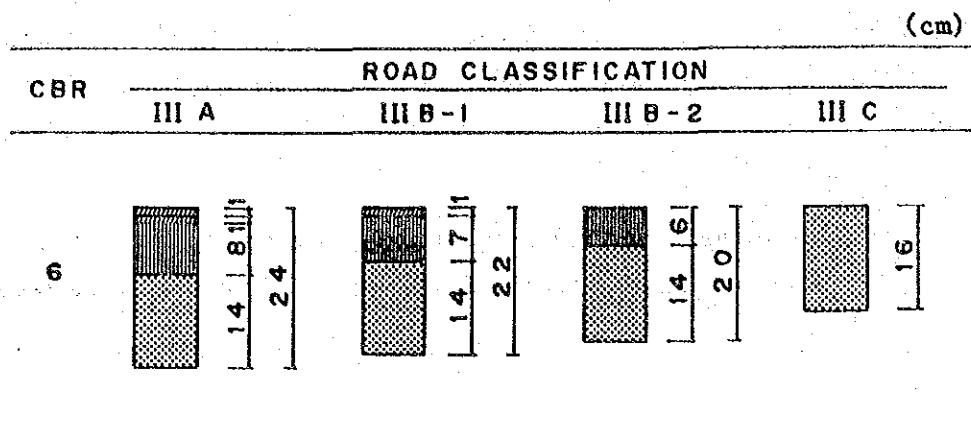
CBR of the laterite is generally in the range of CBR 4 to 10. However site CBR tests should be conducted before construction to finally decide the pavement thickness.

3.2.2 Pavement Structure

Fig. 3-2-1 shows the standard pavement structure adopted for the Kabupaten roads.

Fig. 3-2-1

PAVEMENT STRUCTURE



-  = SURFACE DRESSING (ASPHALT)
-  = BASE COURSE (CRUSHER-RUN)
-  = SUBBASE COURSE (SANDY GRAVEL)

3.3 Design of Bridges and Other Structures

3.3.1 Standard Bridge

There are so many bridges to be improved or to be newly constructed on the Kabupaten roads in the Project Area that it is very difficult to prepare an individual design for each bridge. Therefore, standardization is recommended as being necessary for the bridge design with conclusions as described below.

(1) Bridge Type

1) Superstructure

A timber beam bridge (hereinafter timber bridge has been finally selected regardless of road classification by the agreement of Bina Marga after studying the actual rural condition of bridge construction. Fig. 3-3-1 shows the cross section of the standard type.

2) Substructure

Taking account of the actual combinations of super and substructure types noted from the field survey, timber pile barts are recommended as standard because of ease of construction and economy.

3) Foundation

There is no information of subsoil conditions in the inventory data. However, timber piles of 20 cm diameter are generally recommended as piles of this type are in common use.

The pile length is suggested to be a minimum of 3 meters under the bottom of the foundation or river bed.

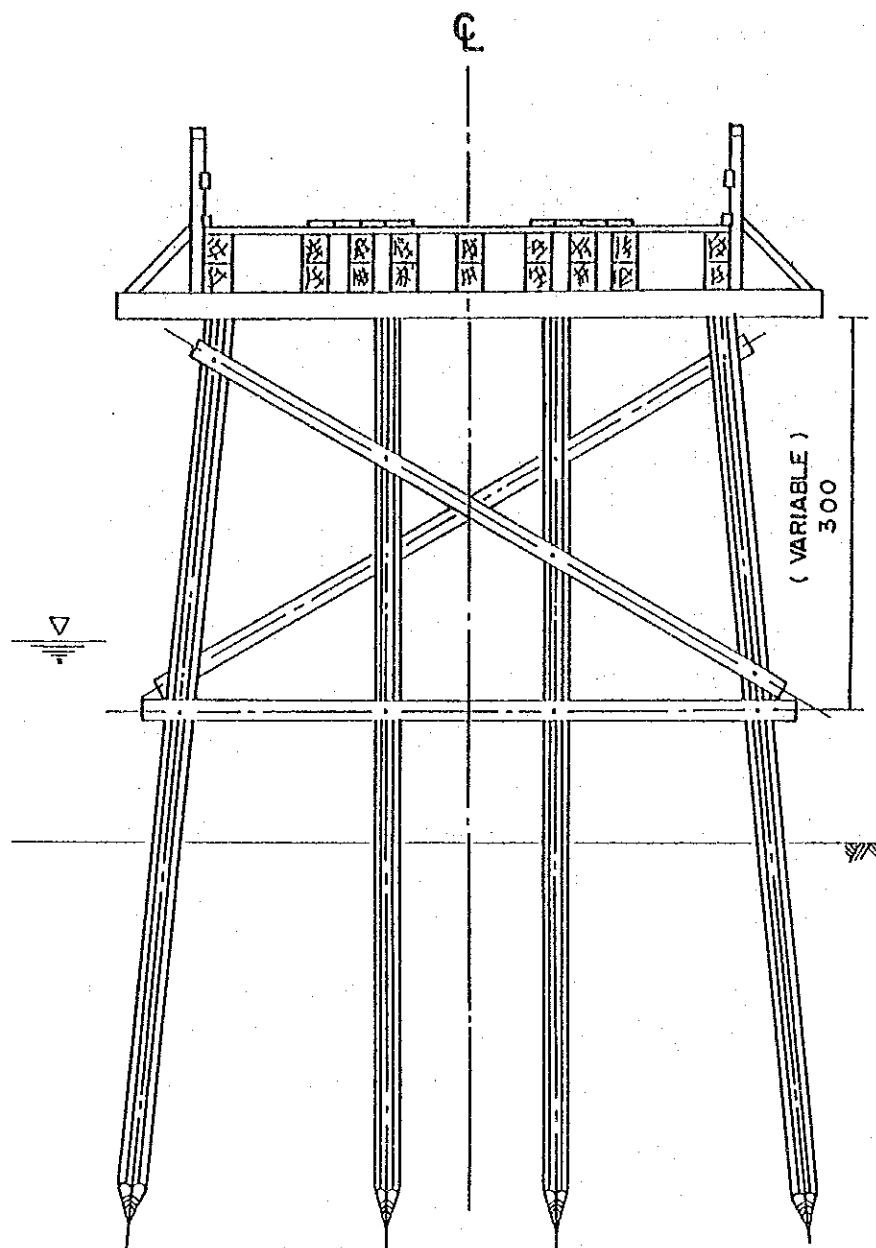
The length and number of piles should be decided in order to be adequate for the condition of the foundation materials.

(2) Bridge Width

The effective bridge width for the standard bridge has been generally decided as 4.0 m through discussions with Bina Marga and considering the actual width of Kabupaten roads.

Fig. 3-3-1

CROSS SECTION OF STANDARD BRIDGE
TIMBER BRIDGE



(3) Span Length

The range of span lengths are determined as:

Timber bridge: 3.0, 5.0 and 8.0 m

3.3.2 Other Structures

Culverts and retaining walls shown in Fig. 3-3-2 and Fig. 3-3-3 are recommended as standard structures.

(1) Culvert

The following two culvert types have been adopted for the tranverse drainage.

- a) Reinforced concrete pipe culvert $\varnothing$ 80 cm m
- b) Rubble in mortar box culvert with RC slab 80 cm X 80 cm

(2) Retaining Wall

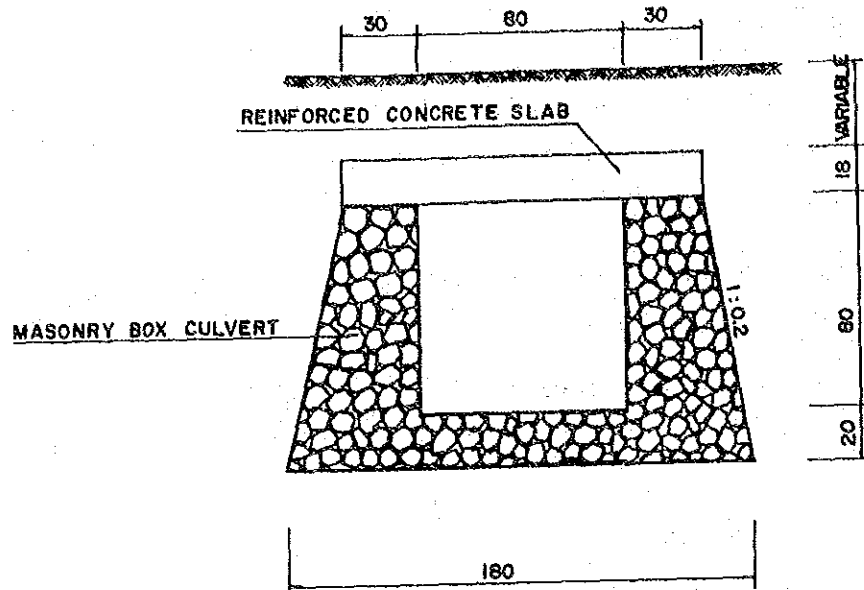
The following two types of retaining walls have been adopted because of ease of construction, economy and familiarity in Indonesia.

- a) Rubble in mortar retaining wall
- b) Timber retaining wall

Fig. 3-3-2

STANDARD CULVERTS

80 x 80 RUBBLE IN MORTAR BOX CULVERTS



Ø 80 REINFORCED CONCRETE PIPE CULVERT

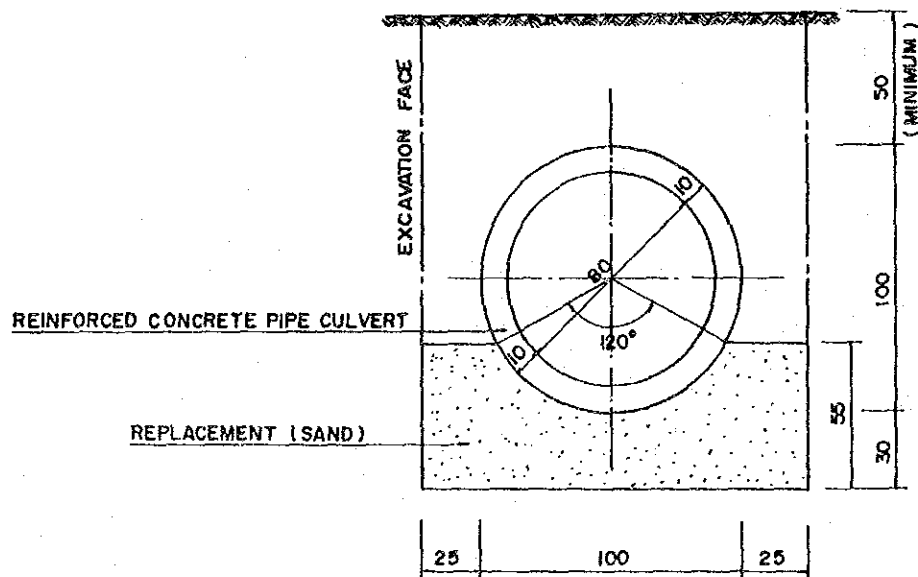
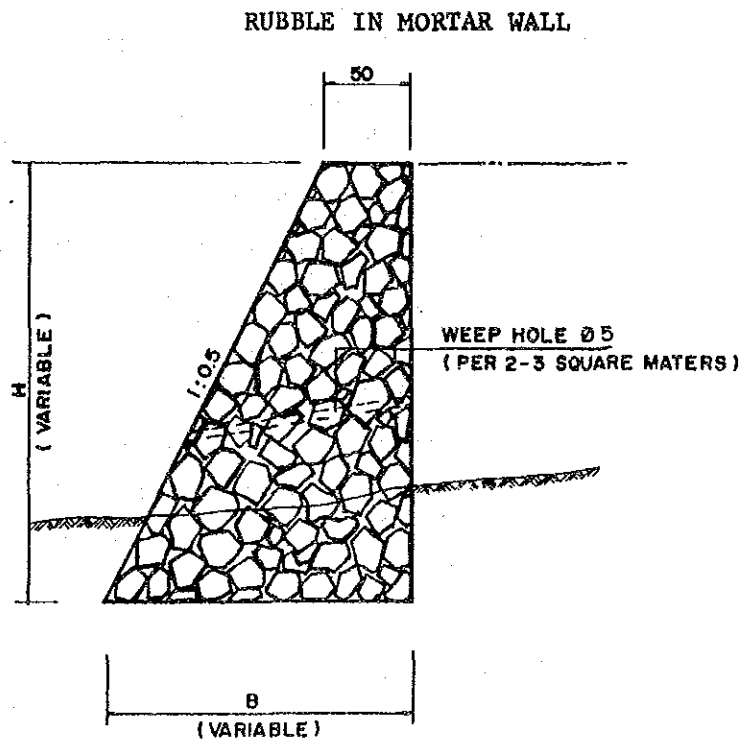
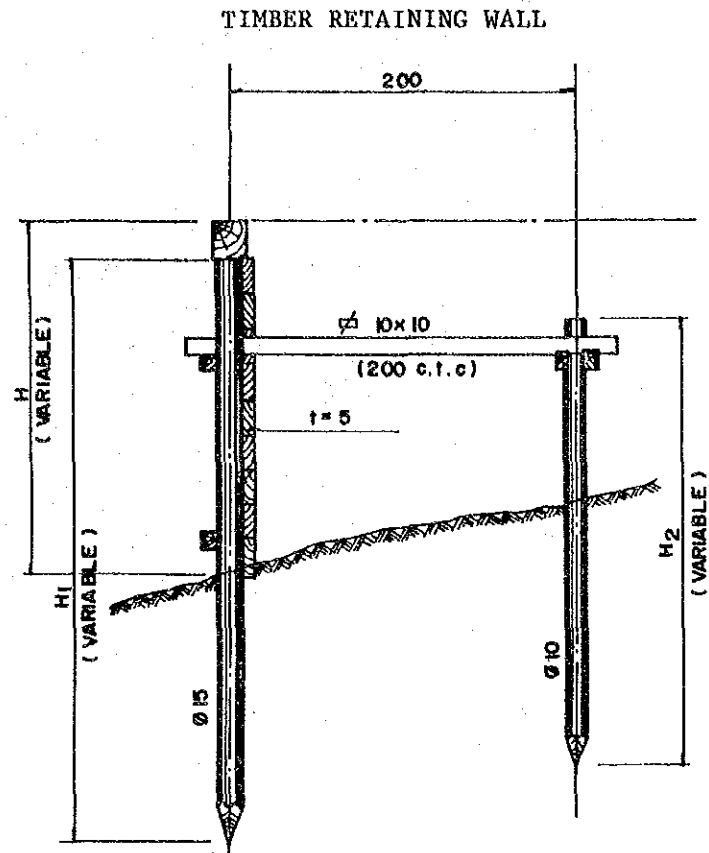


Fig. 3-3-3

STANDARD RETAINING WALLS



3.4 Selection of Equipment Types

From the results of comparison of two types of Kabupaten road construction methods, i.e. equipment intensive method and labour intensive method construction methods for major works were basically decided as shown in Table 3-4-1.

Table 3-4-1 CONSTRUCTION METHODS FOR
MAJOR WORKS

METHOD	WORK TYPE
Equipment Intensive	Earthwork, Base Course and Subbase Course
Labour Intensive	Surface Dressing, Drainage, Bridge and Other Structures.

3.4.1 Points to be Considered for the Selection

Full consideration was given to the following points in studying the selection of equipment type.

- a. Most of the construction in the Project is pavement works for road improvement.
- b. The pavement width adopted is equal to or less than 4.5 m and therefore large sized equipment is omitted from the selection process.
- c. Equipment should be capable of with standing the heavy rainfall and poor soil quality. Equipment for construction in swampy areas is considered if necessary.
- d. Uniformity of equipment types with existing equipment is considered to facilitate repair of the equipment in the provincial work shop.
- e. Since the scale of the construction is small and transportation of equipment will frequently be necessary, wheel type equipment has been selected as much as possible as this can move by itself or by being towed.
- f. The road like to be improved are scattered all over the Kabupatens and therefore a low bed truck or equivalent is necessary for transportation of crawler type equipment. It is desirable to protect the existing pavement from damage caused by the movement of crawler type equipment on the existing roads.
- g. The capacity of the equipment has been decided taking into consideration the construction volume and the combination of equipment in the main work.

3.4.2 Combinations of Equipment for Major Works and Maintenance

The combinations of equipment for major works and maintenance are listed in Table 3-4-2 and 3-4-3 respectively.

Table 3-4-2

EQUIPMENT OF ONE WORK GANG FOR MAJOR
TYPES OF WORK

TYPE OF WORK	EQUIPMENT REQUIRED	
1. Site Clearing in Light Bush	1- Bulldozer 90 HP 2- Dump Truck 3.0 Ton	1- Wheel Loader 1.2 m ³
2. Excavation & Embankment		
i) Normal Fill	1- Bulldozer 90 HP 1- Vibratory Roller 4.0 Ton (D&T)	1- Water Tank Truck 4,000 Ltr
ii) Fill by Borrow Material	1- Bulldozer 90 HP 3- Dump Truck 3.0 Ton	1- Wheel Loader 1.2 m ³
iii) Fill in Swamp	1- Swamp Bulldozer 90 HP 1- Water Tank Truck 4,000 Ltr	1- Vibratory Roller 4.0 Ton (D&T)
iv) Excavation to Spoil	1- Bulldozer 90 HP 1- Wheel Loader 1.2 m ³	4- Dump Truck 3.0 Ton
3. Subgrade Preparation	1- Motor Grader 75 HP 1- Vibratory Roller 4.0 Ton (D&T)	1- Water Tank Truck 4,000 Ltr
4. Subbase Course	1- Motor Grader 75 HP 1- Vibratory Roller 4.0 Ton (D&T)	1- Water Tank Truck 4,000 Ltr
5. Base Course	1- Motor Grader 75 HP 1- Vibratory Roller 4.0 Ton 1- Portable Crusher/Screens 30-40 Ton/H	1- Water Tank Truck 4,000 Ltr
6. Cement Stabilizing	1- Motor Grader 70 HP 1- Bulldozer 90 HP 1- Wheel Loader 1.2 m ³ 1- Flat Bed Truck 3.0 Ton	1- Vibratory Roller 4.0 Ton (D&T) 1- Road Stabilizer 1- Water Tank Truck 4,000 Ltr
7. Surface Course	1- Asphalt Sprayer 850 Ltr 1- Tyre Roller 8-15 Ton 1- Portable Crusher/Screens 30-40 Ton/H	1- Flat Bed Truck 3.0 Ton
8. Concrete	1- Concrete Mixer 0.5 m ³ 1- Water Pump 200 Ltr/Min 1- Concrete Vibrator 3.3 HP	1- Flat Bed Truck 3.0 Ton 1- Hand-Guided Vibratory Roller 1000 Kg

Table 3-4-3

EQUIPMENT OF ONE WORK GANG FOR MAINTENANCE

TYPE OF WORK	EQUIPMENT REQUIRED
Road	1- Motor Grader 1- Tyre Roller 8-15 Ton 1- Hand-Guided Vibratory Roller 1000 Kg 1- Flat Bed Truck 3.0 Ton 1- Dump Truck 3.0 Ton
Bridge and Other Structure	1- Flat Bed Truck With Crane 3.0 Ton

3.5 Workshop and Laboratory

3.5.1 Policy of the Kabupaten Workshop

A workshop will be provided for each Kabupaten. The function of the workshop is to cope with requests from the construction site. The main service will be routine maintenance while the secondary service will be light repairs which can be carried out by changing parts. Dismantling and assembling of units which need setting or adjustment using special equipment or facilities will not be carried out in the Kabupaten workshop. Such repairs are planned to be carried out by the provincial workshop or the regional Workshop of Bina Marga.

Accordingly the main tasks of the Kabupaten workshop are as follows:

- 1) Administration for and storage of equipment
- 2) Routine maintenance and light repair of equipment
- 3) Storage and supply of spare parts
- 4) Operation of equipment including crushing plant.

3.5.2 Workshop Equipment and Tools

Equipment and tools for the workshop are recommended as shown in Table 3-5-1.

Table 3-5-1 WORKSHOP EQUIPMENT AND TOOLS

DESCRIPTION	QUANTITY
Upright Drilling Machine	1 Set
Electric Hand Drill	1
Electric Portable Grinder	1
Disc Grinder	1
Bench Electric Grinder	1
Engineer's Vice	1
DC Electric Welder with Engine	1 Set
Portable Hydraulic Jack, Screw Head	1
Hydraulic Jack	1
Grease Gun	2
Suction Pump for Oil Recovery	2
High Pressure Grease Pump	1

continued

DESCRIPTION	QUANTITY
Drum Opening Spanner	1
Silicon Normal Charger	1
Tyre Changer Air Operated	1
Tyre Service Tool Set	1
Tyre Pressure Gauge	1
Automatic Tyre Inflator	1
Plug Cleaner and Tester	1
Mechanics Tool Set, Heavy Equipment	1
Mechanics Tool Set, Large Vehicle	1
Portable Air Compressor	1
Electric Cord Reel, 15 A, 50 m	1
Oil Measure, Polyethylene	1
Funnel 200 mm, Steel	3
Hand Truck (Cart), 4-Wheel	1
Nylon Sling, 10 ton	2
Chain Block, 1 ton	2
Wire Rope (for sling), 1.8 ton	2
Wire Rope (for sling) 3.2 ton	2
Generator	1

3.5.3 Laboratory

For quality control of construction in the Project it is recommended that a laboratory is provided for each Kabupaten. For each laboratory, provision of laboratory test equipment for the following tests is recommended:

- Physical characteristic, compaction and strength tests for the road bed and pavement materials.
- Slump and strength tests for the bridge concrete.

In the laboratory a fixed water tank should be provided for CBR tests and curing of concrete specimens.

The proposed laboratory equipment is listed in Table 3-5-2.

Table 3-5-2 LABORATORY TEST EQUIPMENT

DESCRIPTION	QUANTITY
Soil Moisture Test Set (JIS A1203)	1
Liquid Limit Set (JIS A1205)	1
Plastic Limit Set (JIS A1206)	1
Compaction Set (JIS A1210)	1
CBR Laboratory Set, Mechanical (JIS A1211)	1
Sand Density Apparatus (JIS A1214)	1
Aggregate Test Sieve Set	1
Portable Cone Penetrometer	1
Compression & Bending Test Machine	1
Cylinder Mould (JIS A1132, 1108)	9
Slump Test Apparatus (JIS A1101)	2

To conduct the surveys necessary for road and structure construction such as centering, profile leveling, cross section leveling etc., the surveying equipment listed in Table 3-5-3 recommended.

Table 3-5-3 SURVEYING EQUIPMENT

DESCRIPTION	QUANTITY
Transit	1
Level	1
Staff	3

Chapter 4 CONSTRUCTION AND MAINTENANCE COST ESTIMATIONS

4.1 Unit Price

With regard to the unit prices of materials and labor, the data were collected from each Kabupaten through Bina Marga. The collected data were compared with those of Jakarta using BAHAN BANGUNAN DKI-JAKARTA MAY & JUNE 1985 compiled by PUSAT INFORMASI TEHNIK PEMBANGUNAN, and then finalized.

4.1.1 Unit Labour Price

The unit labour prices of Kabupaten Hulu Sungai Selatan and other Kabupatens in Kalimantan Selatan Province are shown in Table 4-1-1.

Table 4-1-1 UNIT LABOUR PRICE

KABUPATEN	(Rp)						
	MAN	SKL LAB	CAP	MAS	LAB	DRIV	OPE
Tanah Laut	2,500	2,250	2,500	2,500	1,750	2,500	4,000
Kota Baru	2,750	2,750	3,500	3,500	2,500	2,500	4,000
Banjar	2,750	2,200	2,750	2,750	1,750	2,750	3,850
Barito Kuala	3,000	3,000	3,000	3,000	2,000	3,000	3,500
Tapin	3,000	2,500	3,250	3,250	2,000	3,000	4,000
Hulu Sungai Selatan	2,000	2,250	2,500	1,500	1,750	2,500	3,000
Hulu Sungai Tengah	2,000	1,750	2,500	1,500	1,250	2,500	3,000
Hulu Sungai Utara	3,500	2,500	3,000	3,000	2,000	3,000	2,000
Tabalong	2,500	2,500	3,000	3,000	2,000	3,000	3,500
Average	2,333	2,078	2,556	2,444	1,667	2,417	3,039

Notes :

- MAN : Mandur
- SKL LAB : Skilled Labour
- CAP : Carpenter
- MAS : Mason
- LAB : Labourer
- DRIV : Driver
- OPE : Operater

4.1.2 Unit Price of Materials

Table 4-1-2 shows the unit price of materials for Kabupaten Hulu Sungai Selatan together with for other Kabupatens in Kalimantan Selatan Province.

Table 4-1-2 (1) UNIT PRICE OF MATERIALS

MATERIAL	UNIT					
		TANAH LAUT	KOTA BARU	BANJAR KUALA	BARITO	(Rp) TAPIN
Bitumen	L	275	375	300	300	275
Asphalt oil	L	700	750	700	750	700
Gasoline	L	250	250	250	250	250
Sand	M ³	5,000	12,500	6,000	12,500	4,500
Cement	bag	4,000	5,300	4,500	5,000	5,000
River Stone	M ³	5,000	12,500	7,000	17,500	10,000
Steel moulds	Set	8,000	8,000	8,000	8,000	8,000
Timber	M ³	60,000	150,000	80,000	200,000	80,000
Paint	L	4,000	3,500	3,000	2,000	2,500
Reinforcing Steel	Kg	750	1,000	750	1,000	1,000
Tying Wire	Kg	1,000	1,200	1,000	1,200	1,200
Equivalent Royalty	M ³	250	250	250	250	250

Table 4-1-2 (2) UNIT PRICE OF MATERIALS

MATERIAL	UNIT					(Rp)
		HULU SUNGAI SELATAN	HULU SUNGAI TENGAH	SUNGAI UTARA	TABALONG	AVERAGE
Bitumen	L	450	300	300	300	385
asphalt oil	L	800	700	700	700	925
Gasoline	L	250	250	250	250	250
Sand	M ³	5,000	5,000	5,000	6,000	5,745
Cement	bag	4,350	5,000	5,000	5,000	4,687
River Stone	M ³	7,750	7,000	9,000	7,500	11,165
Steel moulds	Set	8,000	8,000	8,000	8,000	7,865
Timber	M ³	75,000	75,000	80,000	90,000	132,758
Paint	L	2,100	2,000	2,750	2,500	2,573
Reinforcing Steel	Kg	1,000	1,000	750	1,000	940
Tying Wire	Kg	1,200	1,200	1,100	1,200	1,897
Equivalent Royalty	M ³	250	250	250	250	-

4.1.3 Hourly Equipment Cost

The hourly equipment cost for Kabupaten is shown in Table 4-1-3.

Table 4-1-3

HOURLY EQUIPMENT COST

PROVINCE : KALIMANTAN SELATAN
KABUPATEN : HULU SUNGAI SELATAN

(UNIT : Rp)

< 6'85 >

CODE NO	EQUIPMENT NAME	CLASS	<<<< LOCAL COST >>>>			<<<< FOREIGN COST >>>>			TOTAL COST
			OWNERSHIP	OPERATION	SUB-TOTAL	OWNERSHIP	OPERATION	SUB-TOTAL	
	Bulldozer	120 HP	234	13,531	13,765	7,769	1,024	8,793	22,558
	Bulldozer/Ripper	120 HP	255	14,542	14,797	8,500	1,575	10,075	24,872
	Swamp Bulldozer	120 HP	267	14,784	15,051	8,879	1,646	10,525	25,576
	Bulldozer	90 HP	148	9,192	9,340	4,914	647	5,561	14,901
	Bulldozer/Ripper	90 HP	159	9,783	9,942	5,300	982	6,282	16,224
	Bulldozer	65 HP	105	6,682	6,787	3,500	461	3,961	10,748
	Bulldozer/Ripper	65 HP	115	7,131	7,246	3,819	708	4,527	11,773
	Swamp Bulldozer	90 HP	159	9,773	9,932	5,284	979	6,263	16,195
	Swamp Bulldozer	65 HP	122	6,996	7,118	4,049	750	4,799	11,917
	Motor Grader	110 HP	208	11,679	11,887	6,919	1,282	8,201	20,088
	Motor Grader	75 HP	144	8,002	8,146	4,779	885	5,664	13,810
	Motor Grader	65 HP	129	7,035	7,164	4,300	797	5,097	12,261
	Road Stabilizer	M=1850 mm	258	3,381	3,639	8,594	424	9,018	12,657
	Vibratory Roller	4 ton	87	3,510	3,597	2,900	382	3,282	6,879
	Hand-guide Vib. Roller	1000 Kg	68	627	695	850	29	879	1,574
	Tire Roller	8-15 ton	94	7,906	8,000	3,106	102	3,208	11,208
	Vibratory Roller (D&T)	4 ton	87	3,510	3,597	2,900	382	3,282	6,879
	Hand-guide Vib. Roller	600 Kg	48	428	476	600	20	620	1,096
	Rough Terrain Crane	10 ton	302	13,626	13,928	10,039	744	10,783	24,711
	Hydraulic Excavator; Wheel	0.3 m3	124	8,277	8,401	4,109	541	4,650	13,051
	Wheel Loader	1.2 m3	211	8,809	9,020	7,019	925	7,944	16,964
	Wheel Loader	0.3 m3	69	3,084	3,153	2,269	299	2,568	5,721
	Water Tank Truck	4000 ltr.	70	3,048	3,118	868	120	988	4,106
	Fuel Tank Truck	4000 ltr.	71	3,055	3,126	882	121	1,003	4,129
	Dump Truck	3.0 ton	118	3,780	3,898	1,469	202	1,671	5,569
	Flat Bed Truck with Crane	3.0 ton	52	3,294	3,346	1,717	127	1,844	5,190
	Dump Loader Truck	12 ton	116	20,498	20,614	3,837	126	3,963	24,577
	Dump Truck	5.0 ton	176	6,256	6,432	2,189	302	2,491	8,923
	Flat Bed Truck	3.0 ton	17	2,870	2,887	563	41	604	3,491
	Portable Crusher/Screening	30-40 t/h	564	22,800	23,364	18,800	2,478	21,278	44,642
	Concrete Mixer	0.5 m3	432	2,424	2,856	5,400	419	5,819	8,675
	Water Pump	200 l/min	16	279	295	188	6	194	489
	Concrete Vibrator	3.3 HP	6	243	249	73	2	75	324
	Asphalt Sprayer	850 ltr.	82	790	872	1,019	140	1,159	2,031

4.2 Unit Construction Cost by Work Type

4.2.1 All Works Except Bridges

The unit construction costs by work type, excluding bridge construction costs, have been estimated using the combination of equipment described in Clause 3.4 and the unit prices already listed. The results are summarized in Table 4-2-1.

Table 4-2-1 UNIT COST BY WORK TYPE EXCEPT BRIDGE WORK

PROV : KALIMANTAN SELATAN KAB : HULU SUNGAI SELATAN

(Rp)				
ITEM	UNIT	LOCAL	FOREIGN	TOTAL
Site Clearance in Light Bush	m ²	165	91	256
Subgrade Preparation	m ²	21	11	32
Normal Fill	m ³	1,700	863	2,563
Fill in Swamp	m ³	2,515	1,052	3,567
Normal Excavation to Spoil	m ³	997	522	1,519
Sub Base Course	m ³	3,205	1,347	4,552
Base Course	m ³	4,401	2,299	6,700
Shoulder	m ²	294	146	442
Asphalt Patching	m ²	3,568	1,579	5,147
Surface Dressing (Single)	m ²	633	851	1,484
Surface Dressing (Double)	m ²	785	1,342	2,127
Earth Drain	m	842	119	961
Earth Drain in Swamp (by machine)	m ³	1,191	474	1,665
Pipe Culvert 980cm	m	42,079	49,761	91,840
Masonry Culvert (80x80cm)	m	57,789	39,894	97,683
Retaining Wall and Wing Wall (Timber)	m ²	9,178	246	9,424
Retaining Wall and Wing Wall (Masonry)	m ³	42,447	11,621	54,068
Gabion Protection	m ³	13,027	120	13,147
Manual routine maintenance of road	Km	135,144	7,248	142,392
Routine maintenance of earth road	Km	94,798	37,904	132,702
Routine maintenance of gravel road	Km	192,036	88,047	280,083
Routine maintenance of asphalt road	Km	356,800	157,900	514,700

4.2.2 Bridges

The unit construction costs by bridge type including the cost of demolition of existing bridges are shown in Table 4-2-2.

Table 4-2-2

BRIDGE COST

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(Rp)

ITEM	UNIT	LOCAL	FOREIGN	TOTAL
Superstructure (Timber; Span 3m; 10T)	m2	34,583	3,107	37,690
Superstructure (Timber; Span 5m; 10T)	m2	38,306	3,431	41,737
Superstructure (Timber; Span 8m; 10T)	m2	50,736	4,509	55,245
Superstructure (Timber; Span 3m; BN50)	m2	42,882	3,842	46,724
Superstructure (Timber; Span 5m; BN50)	m2	46,813	4,165	50,978
Superstructure (Timber; Span 8m; BN50)	m2	59,371	5,273	64,644
Superstructure (Concrete; Span 3m; BN50)	m2	41,322	105,105	146,427
Superstructure (Concrete; Span 5m; BN50)	m2	42,593	117,578	160,171
Superstructure (Concrete; Span 8m; BN50)	m2	43,993	128,145	172,138
Superstructure (Concrete; Span 10m; BN50)	m2	48,214	145,655	193,869
Superstructure (Concrete; Span 15m; BN50)	m2	52,212	171,719	223,931
Substructure (Pier; for Timber; 10T)	NO	301,321	28,755	330,076
Substructure (Abut; for Timber; 10T)	NO	865,439	140,298	1,005,737
Substructure (Pier; for Timber; BN50)	NO	443,165	42,543	485,708
Substructure (Abut; for Timber; BN50)	NO	972,620	155,128	1,127,748
Substructure (Pier; for Concrete; BN50)	NO	1,617,523	464,086	2,081,609
Substructure (Abut; for Concrete; BN50)	NO	3,382,742	977,597	4,360,339
Demolition of Bridge (Timber->Timber)	m2	9,818	1,231	11,049
Demolition of Bridge (Timber->Concrete)	m2	9,818	1,231	11,049
Demolition of Bridge (Concrete)	m2	74,919	79,345	154,264
Maintenance of Timber Bridge (New)	m2	6,531	1,032	7,563
Maintenance of Concrete Bridge (New)	m2	1,663	2,961	4,624
Maintenance of Timber Bridge (Exist)	m2	7,111	2,360	9,471
Maintenance of Concrete Bridge (Exist)	m2	4,178	2,436	6,614

5.1 Preliminary Screening

The road links to be improved should be effective for development of the Project Area. The road links where improvements were assumed to be inefficient for development of the Project Area were generally screened out using the following cut-off criteria.

- (1) Very short roads, less than 2 Km long, which have no connection with the trunk road network.
- (2) Roads not connected to the network at any point
- (3) Unpreferred roads, due to poor suitability for transportation compared to other existing alternative roads serving the same purpose.
- (4) Road in good condition according to the Bina Marga road inventory which lists improvement projects carried out in the last two or three years
- (5) Roads with asphalt surface in good condition
- (6) Urban roads, except those forming part of a longer route
- (7) Roads serving single large organizations rather than the general public
- (8) Roads with no inventory data
- (9) Kabupaten roads also assigned as provincial roads

The road links to be screened out in Kabupaten Hulu Sungai Selatan are shown in Table 5-1-1.

Table 5-1-1 ROAD LINKS TO BE SCREENED OUT

KABUPATEN : HULU SUNGAI SELATAN

CRITERIA NO	ROAD LINK NO
(6)	02,06,14,15,16,20,23,24,27,29,137
(8)	01,03,04,05,07,08,09,10,11,12,13,18,19,26,28,30, 34,35,41,54,58,72,74,78,85,89,92,96,97,98,99,100, 101,102,103,104,107,112,113,114,116,117,118,119, 122,124,132,139,146,155

5.2 Evaluation

5.2.1 Primary Analysis

The Kabupaten roads were classified by using the future traffic volume on the road links in 1998. The primary analysis of the IRR was carried out using the construction and maintenance costs. Road links where IRRs were more than 10% were defined as feasible links.

Results of primary analysis are shown in Table 5-2-1.

5.2.2 Secondary Analysis

From the infeasible road links evaluated by the primary analysis, road links where the IRRs were between 1% and 10%, i.e. road links which could become feasible if down graded by one rank, in classification were down graded and the costs re-estimated. Using these costs, a secondary analysis of IRR was carried out. Road links where these IRRs were then more than 10% were also defined as feasible links. This reflected that even though the road classification was rather low the road link should be improved.

Results of secondary analysis are shown in Table 5-2-2.

5.2.3 Ranking of Feasible Road Links

From the results of the primary and secondary analysis, road links where the IRRs were more than 10% were selected and their NPVs and B/Cs were estimated. The ranking of feasible road links from the economic evaluation are decided in the order of the NPVs, i.e. the larger the NPV the higher the road link priority as shown in Table 5-2-3.

Table 5-2-1

RESULTS OF PRIMARY ANALYSIS

PROVINCE : KALIMANTAN SELATAN KABUPATEN : HULU SUNGAI SELATAN

LINK NO	LENGTH	CLASS	IRR(%)	REMARK
60	7 Km	IIIB-1	42.481	VDC
121	8 Km	IIIB-2	39.317	Surplus
123	7 Km	IIIB-2	25.847	VDC
25	4 Km	IIIB-2	21.897	VDC
48	3 Km	IIIB-2	21.710	VDC
83	5 Km	IIIB-1	19.426	VDC
50	3 Km	IIIA	17.723	VDC
140	5 Km	IIIA	17.163	VDC
87	8 Km	IIIB-1	16.165	VDC
61	5 Km	IIIB-2	11.987	Surplus
126	7 Km	IIIB-2	11.389	VDC
82	5 Km	IIIB-1	10.848	VDC
77	6 Km	IIIB-2	7.184	Surplus
142	4 Km	IIIB-2	6.210	VDC
38	7 Km	IIIB-2	5.853	VDC
93	6 Km	IIIB-1	1.029	VDC
21	6 Km	IIIB-2	0.990	VDC
47	2 Km	IIIC	0.078	Surplus
17	2 Km	IIIC	0.078	Surplus
49	3 Km	IIIC	0.078	Surplus
31	6 Km	IIIB-1	0.078	VDC
51	2 Km	IIIC	0.078	Surplus
52	5 Km	IIIB-2	0.078	VDC
53	4 Km	IIIB-2	0.078	VDC
55	3 Km	IIIC	0.078	Surplus
56	3 Km	IIIC	0.078	Surplus
57	7 Km	IIIC	0.078	Surplus
59	4 Km	IIIB-2	0.078	Surplus
32	2 Km	IIIC	0.078	Surplus
33	3 Km	IIIC	0.078	Surplus
62	2 Km	IIIB-2	0.078	Surplus
63	2 Km	IIIB-2	0.078	Surplus
64	1 Km	IIIC	0.078	Surplus
65	6 Km	IIIB-1	0.078	VDC
66	3 Km	IIIB-2	0.078	Surplus
67	2 Km	IIIB-2	0.078	Surplus
68	4 Km	IIIB-2	0.078	Surplus
69	5 Km	IIIB-2	0.078	VDC
70	3 Km	IIIB-2	0.078	Surplus
71	2 Km	IIIB-2	0.078	Surplus
73	3 Km	IIIB-2	0.078	Surplus
75	5 Km	IIIB-2	0.078	Surplus
76	9 Km	IIIB-2	0.078	Surplus
36	3 Km	IIIB-2	0.078	VDC
79	1 Km	IIIB-1	0.078	VDC
80	1 Km	IIIC	0.078	Surplus
81	2 Km	IIIC	0.078	Surplus
37	2 Km	IIIC	0.078	Surplus
22	4 Km	IIIC	0.078	Surplus
84	2 Km	IIIC	0.078	Surplus

Table 5-2-2

RESULTS OF SECONDARY ANALYSIS

PROVINCE : KALIMANTAN SELATAN KABUPATEN : HULU SUNGAI SELATAN

LINK NO	LENGTH	CLASS	IRR (%)	REMARK
77	6 Km	IIIC	7.057	Surplus
142	4 Km	IIIC	7.185	VOC
38	7 Km	IIIC	7.688	VOC
21	6 Km	IIIC	3.835	VOC
93	6 Km	IIIB-2	0.078	VOC

Table 5-2-3

RANKING OF FEASIBILITY ROAD LINKS

PROVINCE : KALIMANTAN SELATAN KABUPATEN : HULU SUNGAI SELATAN

LINK NO	LENGTH	CLASS	NPV (1000Rp)	B/C	IRR (%)	REMARK
60	7 Km	IIIB-1	191927	2.482	42.481	VOC
121	8 Km	IIIB-2	97048	2.285	39.317	Surplus
123	7 Km	IIIB-2	49472	1.655	25.847	VOC
87	8 Km	IIIB-1	35529	1.239	16.165	VOC
140	5 Km	IIIA	32642	1.294	17.163	VOC
83	5 Km	IIIB-1	27811	1.336	19.426	VOC
50	3 Km	IIIA	23509	1.324	17.723	VOC
25	4 Km	IIIB-2	20884	1.490	21.897	VOC
48	3 Km	IIIB-2	14146	1.449	21.710	VOC
61	5 Km	IIIB-2	5311	1.082	11.987	Surplus
126	7 Km	IIIB-2	3238	1.046	11.389	VOC
82	5 Km	IIIB-1	2600	1.030	10.848	VOC
SUM	67 Km		504117			

Chapter 6 IMPLEMENTATION PROGRAMME

6.1 Implementation Schedule

6.1.1 Project Cost

The total Project Cost for the Kabupaten is composed of the cost of construction and maintenance, supplementation as described later, and workshop, laboratory and survey equipment. The total Project Cost for the Kabupaten is summarized in Table 6-1-1.

Table 6-1-1 TOTAL PROJECT COST (1)

KABUPATEN: Hulu Sungai Selatan

(Rp $\times 10^6$)

COST	FOREIGN CURRENCY	LOCAL CURRENCY	TOTAL
CONSTRUCTION	396	627	1,023
MAINTENANCE	130	425	555
SUPPLEMENTATION	393	-	393
WORKSHOP EQUIPMENT & TOOLS	28	-	28
LABORATORY EQUIPMENT	12	-	12
SURVEY EQUIPMENT	5	-	5
TOTAL	964	1,052	2,016

The total Project Cost can be divided into costs as shown in Table 6-1-2.

Table 6-1-2 TOTAL PROJECT COST (2)

(Rp $\times 10^6$)

COST	FOREIGN CURRENCY	LOCAL CURRENCY	TOTAL
CIVIL WORK	251	1,043	1,294
CONSTRUCTION & MAINTENANCE EQUIPMENT	633	-	633
SPARE PARTS	35	9	44
WORKSHOP/LABORATORY/SURVEY EQUIPMENT	45	-	45
TOTAL	964	1,052	2,016

The cost for civil work is composed of the cost of labour and materials, operation cost excluding spare parts, indirect cost and transportation cost of equipment, and ownership cost for existing equipment.

6.1.2 Proposed Road Links

(1) Road Link to be Improved

The road links to be improved were generally selected taking into consideration the following criteria:

- (1) Feasible road links
 - Feasible road links from the primary evaluation
 - Feasible road links from the secondary evaluation
- (2) Road links selected from the engineering points of view
- (3) Road links selected because of basic human needs.

The road links finally proposed to be improved in the Kabupaten are the 21 links with the total length of 100 km which is 23% of the 431 km total length of Kabupaten roads studied. The proposed road links are shown in Table 6-1-3.

Table 6-1-3 ROAD LINKS TO BE IMPROVED

KABUPATEN : HULU SUNGAI SELATAN

REASON FOR SELECTION	ROAD LINK NO
Feasible	
- Primary	25,48,50,60,61,82,83,87,121,123,126,140,
- Secondary	-
Engineering Point of View	39,50a,52,57,65,80,81,91,125
Basic Human Needs	-

As the table shows all feasible road links are proposed to be improved.

Fourteen key road links which are located at the strategic point to complete the local road network consisting of feasible road links are selected from the engineering points of view.

The order of proceeding with the improvement of the proposed road links are decided as shown in Table 6-1-4.

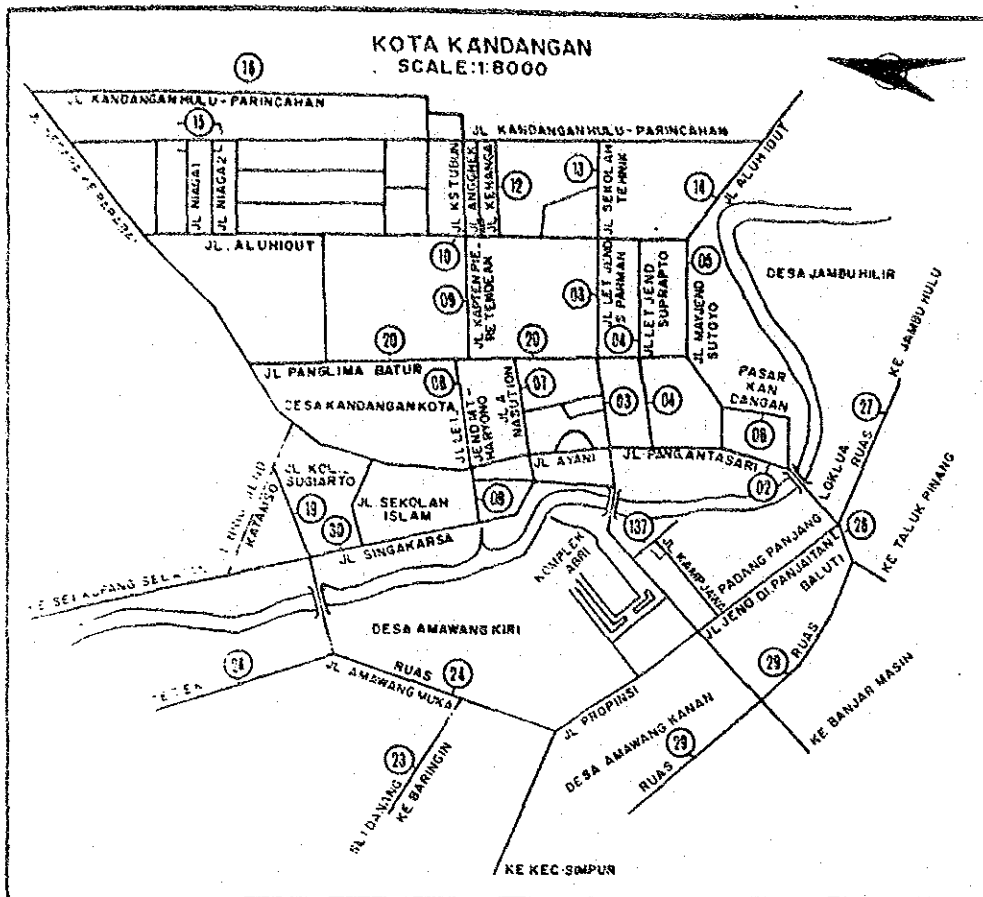
Table 6-1-4

ROAD LINKS TO BE IMPROVED BY YEAR

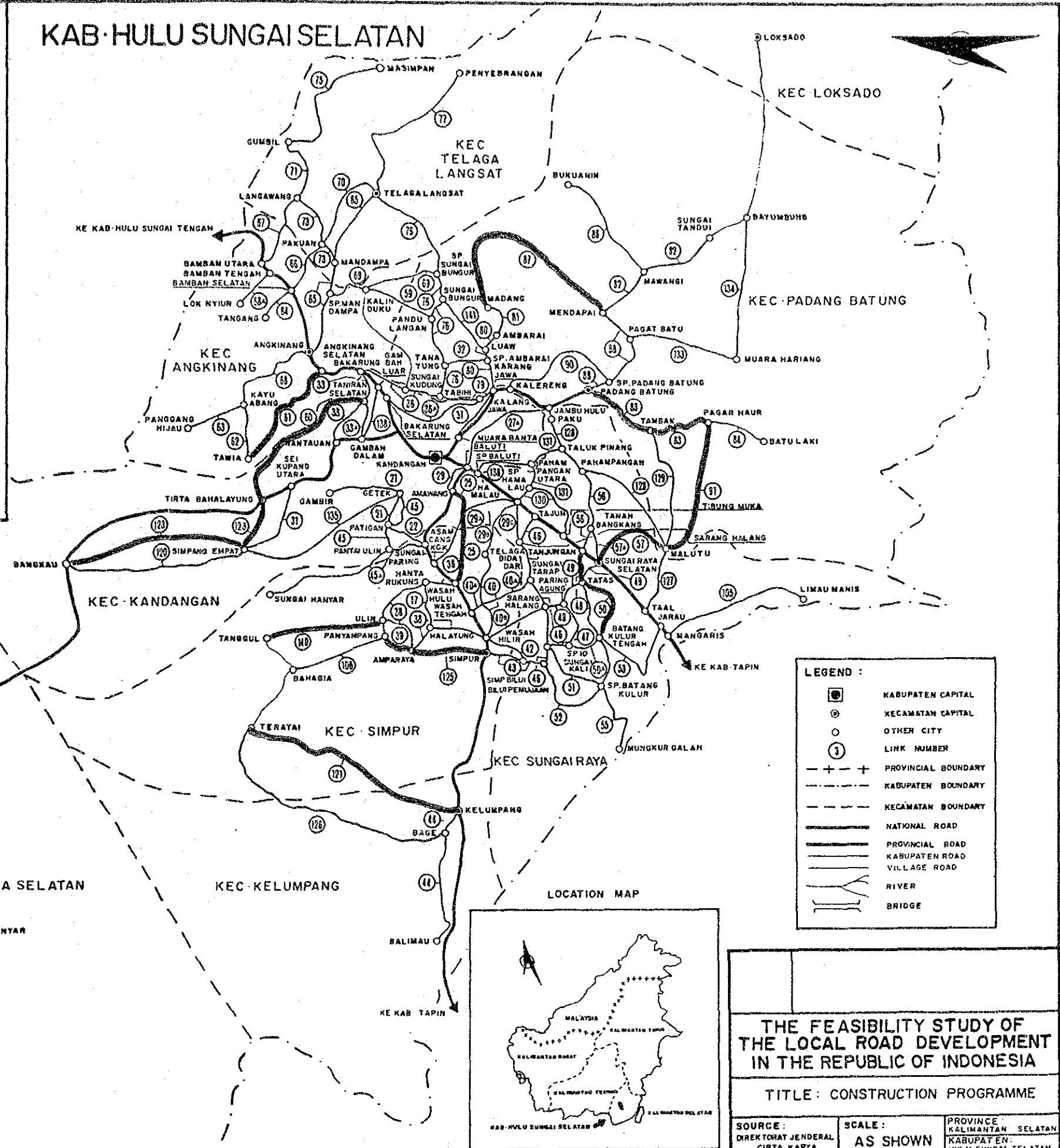
PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

YEAR	LINK NO	() : rate
1988	: 83, 121, 125	
1989	: 39, 60, 87, 91	
1990	: 25, 48, 50, 57, 61, 123, 140, 152	
1991	: 52, 65, 80, 81, 82, 126	
1992	:	



KAB. HULU SUNGAI SELATAN

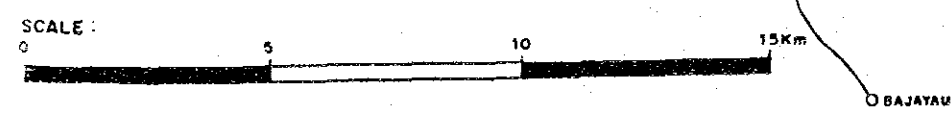


LEGEND :

- KABUPATEN CAPITAL
- KECAMATAN CAPITAL
- OTHER CITY
- LINK NUMBER
- PROVINCIAL BOUNDARY
- KABUPATEN BOUNDARY
- KECAMATAN BOUNDARY
- NATIONAL ROAD
- PROVINCIAL ROAD
- KABUPATEN ROAD
- VILLAGE ROAD
- RIVER
- BRIDGE

CONSTRUCTION PROGRAMME

ROAD LINE NUMBER	FISCAL YEAR				
	1988/89	1989/90	1990/91	1991/92	1992/93
83					
121.125	117				
79.50					
87.91		208			
25.65.5057					
81.23.5408			368		
52.43.80					
81.82.128				203	
TOTAL COST	117	208	368	203	



THE FEASIBILITY STUDY OF THE LOCAL ROAD DEVELOPMENT IN THE REPUBLIC OF INDONESIA

TITLE: CONSTRUCTION PROGRAMME

SOURCE: DIREKTORAT JENDERAL CIPTA KARYA

SCALE: AS SHOWN

PROVINCE: KALIMANTAN SELATAN
KABUPATEN: HULU SUNGAI SELATAN

(2) Road Links to Be Maintained

It is desirable that all Kabupaten roads are maintained. However, because of the limited budget it is inevitable that some road links in the Kabupatens will be left without maintenance for the time being. The budget should be used for those which are effective in producing more useful development of the Kabupaten through the road development project. The road links to be maintained are finally proposed as shown in Table 6-1-5.

Table 6-1-5 (1)

ROAD LINKS TO BE MAINTAINED

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(1000Rp)

LINK NO	LENGTH (Km)	BA (I)	SD (I)	RU (I)	RB (I)	ASPHAL (Km)	GRAVEL (Km)	EARTH (Km)	IN NO	AREA (a2)	RC NO	AREA (a2)	BRIDGE COST	LOCAL COST	FOREIGN COST	TOTAL COST
2	1	20.0	80.0	0.0	0.0	1	0	0	0	0.00	0	0.00	0	492	165	657
6	1	99.0	1.0	0.0	0.0	1	0	0	0	0.00	0	0.00	0	492	165	657
14	1	20.0	60.0	20.0	0.0	1	0	0	0	0.00	0	0.00	0	492	165	657
15	1	0.0	99.0	1.0	0.0	1	0	0	0	0.00	0	0.00	0	492	165	657
16	4	62.5	32.5	5.0	0.0	0	4	0	2	57.60	0	0.00	546	1,718	517	2,235
17	2	55.0	30.0	15.0	0.0	0	2	0	2	28.80	0	0.00	273	859	259	1,118
20	1	30.0	30.0	40.0	0.0	1	0	0	0	0.00	0	0.00	0	492	165	657
21	6	23.3	55.0	21.7	0.0	0	4	2	3	30.00	0	0.00	284	1,982	542	2,524
22	4	42.5	32.5	25.0	0.0	0	4	0	2	41.00	0	0.00	388	1,600	478	2,078
23	3	3.3	75.0	21.7	0.0	0	3	0	0	0.00	0	0.00	0	982	286	1,268
24	2	25.0	75.0	0.0	0.0	0	2	0	0	0.00	0	0.00	0	654	191	845
27	10	0.0	99.0	1.0	0.0	0	10	0	5	81.90	0	0.00	776	3,854	1,146	5,000
29	2	90.0	10.0	0.0	0.0	2	0	0	0	0.00	0	0.00	0	984	330	1,314
31	6	46.7	44.8	8.5	0.0	2	4	0	2	36.00	0	0.00	341	2,549	796	3,345
32	2	0.0	70.0	10.0	0.0	0	2	0	0	0.00	0	0.00	0	654	191	845
33	3	40.0	40.0	20.0	0.0	0	3	0	1	14.40	0	0.00	136	1,084	320	1,404
36	3	40.0	40.0	20.0	0.0	0	3	0	0	0.00	0	0.00	0	982	286	1,268
37	2	0.0	99.0	1.0	0.0	0	2	0	0	0.00	0	0.00	0	654	191	845
38	7	10.0	42.9	47.1	0.0	0	7	0	3	42.48	0	0.00	402	2,592	767	3,359
39	3	90.0	10.0	0.0	0.0	0	3	0	0	0.00	0	0.00	0	982	286	1,268
43	2	90.0	10.0	0.0	0.0	2	0	0	2	64.80	0	0.00	614	1,445	403	1,928
44	5	99.0	1.0	0.0	0.0	0	5	0	9	253.80	0	0.00	2,404	3,441	1,075	4,516
46	6	20.0	56.7	23.3	0.0	0	6	0	8	146.10	0	0.00	1,384	3,002	917	3,919
47	2	0.0	74.5	25.5	0.0	0	2	0	2	46.00	0	0.00	436	981	299	1,280
48	3	33.3	30.0	33.3	3.3	0	1	2	1	36.00	0	0.00	341	1,043	271	1,314
49	3	0.0	78.3	21.7	0.0	0	3	0	0	0.00	0	0.00	0	982	286	1,268
51	2	0.0	67.5	22.5	10.0	0	2	0	1	14.40	0	0.00	136	757	225	982
52	5	38.0	38.0	24.0	0.0	0	5	0	3	43.20	0	0.00	409	1,943	578	2,521
53	4	47.5	40.0	12.5	0.0	0	4	0	2	52.20	0	0.00	494	1,680	504	2,184
56	3	33.3	43.3	23.3	0.0	0	3	0	2	36.00	0	0.00	341	1,238	371	1,609
57	7	44.3	32.9	22.9	0.0	0	7	0	1	10.80	0	0.00	102	2,367	693	3,060
59	4	17.5	37.5	37.5	7.5	0	4	0	2	63.00	0	0.00	597	1,757	530	2,287
62	2	70.0	10.0	0.0	0.0	0	2	0	2	52.20	0	0.00	494	1,026	314	1,340
64	1	40.0	20.0	40.0	0.0	0	1	0	2	28.80	0	0.00	273	532	163	695
65	6	28.3	71.7	0.0	0.0	0	6	0	0	0.00	1	79.20	524	2,294	765	3,059
67	2	0.0	70.0	10.0	0.0	0	2	0	0	0.00	0	0.00	0	654	191	845
68	4	0.0	74.5	5.5	0.0	0	4	0	2	21.60	0	0.00	205	1,462	432	1,894

Table 6-1-5 (2)

ROAD LINKS TO BE MAINTAINED

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(1000Rp)

LINK NO	LENGTH (Km)	DA (X)	SD (X)	RU (X)	RB (X)	ASPHAL (Km)	GRAVEL (Km)	EARTH (Km)	TH NO	AREA (m2)	RC NO	AREA (m2)	BRIDGE COST	LOCAL COST	FOREIGN COST	TOTAL COST
69	5	52.0	22.0	26.0	0.0	0	5	0	11	316.80	0	0.00	3,000	3,889	1,224	5,113
71	2	5.0	65.0	30.0	0.0	0	2	0	3	81.00	0	0.00	767	1,230	382	1,612
73	3	26.7	46.7	26.7	0.0	0	3	0	3	57.60	0	0.00	546	1,391	422	1,813
76	7	34.4	32.2	33.3	0.0	0	8	1	8	270.00	0	0.00	2,557	4,767	1,445	6,212
79	1	70.0	30.0	0.0	0.0	1	0	0	0	0.00	0	0.00	0	492	165	657
80	1	30.0	30.0	40.0	0.0	0	1	0	0	0.00	0	0.00	0	327	95	422
82	5	39.6	59.8	0.6	0.0	2	0	3	2	59.40	4	72.00	1,039	2,397	781	3,178
86	6	23.3	38.3	38.3	0.0	0	6	0	5	112.60	0	0.00	1,066	2,764	838	3,602
87	8	21.3	32.5	46.3	0.0	0	8	0	3	104.40	0	0.00	989	3,360	1,009	4,369
88	4	45.0	55.0	0.0	0.0	1	0	0	4	101.70	0	0.00	963	2,691	901	3,592
91	5	19.0	66.0	15.0	0.0	0	5	0	2	54.00	0	0.00	511	2,020	604	2,674
102	3	36.7	60.0	3.3	0.0	0	3	0	2	28.80	0	0.00	273	1,186	354	1,510
104	2	10.0	85.0	5.0	0.0	0	2	0	2	21.60	0	0.00	205	800	242	1,050
105	5	69.0	30.8	0.2	0.0	0	5	0	0	0.00	0	0.00	0	1,636	476	2,112
111	10	28.5	31.5	40.0	0.0	0	10	0	13	417.00	0	0.00	3,949	6,237	1,937	8,174
116	1	40.0	40.0	20.0	0.0	0	0	1	0	0.00	0	0.00	0	230	45	275
123	7	32.9	18.6	48.6	0.0	0	0	7	4	48.00	0	0.00	455	1,951	429	2,380
125	1	10.0	90.0	0.0	0.0	0	1	0	0	0.00	0	0.00	0	327	95	422
126	7	0.0	87.9	12.1	0.0	0	2	5	4	113.40	0	0.00	1,074	2,610	684	3,294
127	2	35.0	35.0	30.0	0.0	0	2	0	1	14.40	0	0.00	136	757	225	982
130	3	36.7	16.7	46.7	0.0	0	2	1	0	0.00	0	0.00	0	884	236	1,120
131	2	99.0	1.0	0.0	0.0	0	2	0	0	0.00	0	0.00	0	654	191	845
132	3	93.0	7.0	0.0	0.0	3	0	0	1	10.80	0	0.00	102	1,553	521	2,074
135	8	30.0	33.8	36.3	0.0	0	8	0	0	0.00	0	0.00	0	2,617	762	3,379
136	2	99.0	1.0	0.0	0.0	0	2	0	1	14.40	0	0.00	136	757	225	982
140	5	30.0	60.0	10.0	0.0	0	5	0	1	72.00	0	0.00	682	2,148	646	2,794
141	3	99.0	1.0	0.0	0.0	0	3	0	2	72.00	0	0.00	682	1,494	456	1,950
142	4	21.3	60.0	18.8	0.0	2	2	0	1	10.80	0	0.00	102	1,715	546	2,261
146	3	46.7	20.0	26.7	6.7	0	3	0	3	96.90	0	0.00	918	1,671	515	2,106
148	4	25.0	75.0	0.0	0.0	4	0	0	0	0.00	0	0.00	0	1,968	661	2,629
149	3	0.0	96.3	3.7	0.0	0	3	0	2	50.00	0	0.00	474	1,337	404	1,741
152	3	36.7	40.0	23.3	0.0	0	3	0	3	43.20	0	0.00	409	1,289	388	1,677
153	2	30.0	30.0	35.0	5.0	0	2	0	0	0.00	0	0.00	0	654	191	845
155	6	9.2	57.5	33.3	0.0	0	2	4	6	163.80	0	0.00	1,551	2,739	758	3,477
SUM	263					27	210	26	146	3535.68	5	151.20	34,486	113,744	34,361	148,105

6.1.3 Annual Construction and Maintenance Cost

The annual allocation of the total construction and maintenance cost in the four years programme for Kabupaten Hulu Sungai Selatan is finally recommended as shown in Tables 6-1-6 (1), (2) and (3) for the construction, maintenance and total respectively.

The proposed construction cost is Rp 1,023 x 10⁶ and maintenance cost is Rp 555 x 10⁶ which is approximately 35% of the total expenditure.

Table 6-1-6 (1) CONSTRUCTION AND MAINTENANCE COST
(CONSTRUCTION)

PROV : KALIMANTAN SELATAN KAB : HULU SUNGAI SELATAN

(UNIT : 1000Rp)

ITEM	< 1988 >	< 1989 >	< 1990 >	< 1991 >	< 1992 >	< TOTAL >	
LOCAL CURRENCY :	70,028	145,024	216,895	163,336	0	595,283	(58.2%)
Ownership Cost	1,032	1,800	3,267	1,988	0	8,087	(1.4%)
Operation Cost	39,551	70,353	127,418	77,055	0	314,377	(52.8%)
Material Cost	11,260	31,819	28,376	36,265	0	107,720	(18.1%)
Labour Cost	9,051	22,136	29,543	26,723	0	87,453	(14.7%)
Contingency	9,134	18,916	28,291	21,305	0	77,646	(13.0%)
FOREIGN CURRENCY :	46,653	111,099	150,905	119,645	0	428,302	(41.8%)
Ownership Cost	21,076	37,096	68,007	40,445	0	166,624	(38.9%)
Operation Cost	2,964	5,103	9,604	5,542	0	23,213	(5.4%)
Material Cost	16,528	54,409	53,611	58,052	0	182,600	(42.6%)
Labour Cost	0	0	0	0	0	0	(0.0%)
Contingency	6,085	14,491	19,683	15,606	0	55,865	(13.0%)
TOTAL COST :	116,681	256,123	367,800	282,981	0	1,023,585	
Ownership Cost	22,108	38,896	71,274	42,433	0	174,711	(17.1%)
Operation Cost	42,515	75,456	137,022	82,597	0	337,590	(33.0%)
Material Cost	27,788	86,228	81,987	94,317	0	290,320	(28.4%)
Labour Cost	9,051	22,136	29,543	26,723	0	87,453	(8.5%)
Contingency	15,219	33,407	47,974	36,911	0	133,511	(13.0%)

< Contingency : 15% >

Table 6-1-6 (2)

CONSTRUCTION AND MAINTENANCE COST

(MAINTENANCE)

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(UNIT : 1000Rp)

ITEM	< 1988 >	< 1989 >	< 1990 >	< 1991 >	< 1992 >	< TOTAL >	
LOCAL CURRENCY :	56,773	117,377	122,051	128,733	0	424,934	(76.6%)
Ownership Cost	550	1,145	1,219	1,306	0	4,220	(1.0%)
Operation Cost	30,786	63,283	64,712	67,886	0	226,667	(53.3%)
Material Cost	2,933	6,154	6,535	6,873	0	22,495	(5.3%)
Labour Cost	22,504	46,795	49,585	52,668	0	171,552	(40.4%)
FOREIGN CURRENCY :	17,151	35,594	37,464	39,737	0	129,946	(23.4%)
Ownership Cost	14,308	29,423	30,113	31,620	0	105,464	(81.2%)
Operation Cost	1,573	3,231	3,303	3,487	0	11,594	(8.9%)
Material Cost	1,270	2,940	4,048	4,630	0	12,888	(9.9%)
Labour Cost	0	0	0	0	0	0	(0.0%)
TOTAL COST :	73,924	152,971	159,515	168,470	0	554,880	
Ownership Cost	14,858	30,568	31,332	32,926	0	109,684	(19.8%)
Operation Cost	32,359	66,514	68,015	71,373	0	238,261	(42.9%)
Material Cost	4,203	9,094	10,583	11,503	0	35,383	(6.4%)
Labour Cost	22,504	46,795	49,585	52,668	0	171,552	(30.9%)

Table 6-1-6 (3)

CONSTRUCTION AND MAINTENANCE COST
(TOTAL)

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(UNIT : 1000Rp)

ITEM	< 1988 >	< 1989 >	< 1990 >	< 1991 >	< 1992 >	< TOTAL >	
LOCAL CURRENCY :	126,801	262,401	338,946	292,069	0	1,020,217	(64.6%)
Ownership Cost	1,582	2,945	4,486	3,294	0	12,307	(1.2%)
Operation Cost	70,337	133,636	192,130	144,941	0	541,044	(53.0%)
Material Cost	14,193	37,973	34,911	43,138	0	130,215	(12.8%)
Labour Cost	31,555	68,931	79,128	79,391	0	259,005	(25.4%)
Contingency	9,134	18,916	28,291	21,305	0	77,646	(7.6%)
FOREIGN CURRENCY :	63,804	146,693	188,369	159,382	0	558,248	(35.4%)
Ownership Cost	35,384	66,519	98,120	72,065	0	272,088	(48.7%)
Operation Cost	4,537	8,334	12,907	9,029	0	34,807	(6.2%)
Material Cost	17,798	57,349	57,659	62,682	0	195,488	(35.0%)
Labour Cost	0	0	0	0	0	0	(0.0%)
Contingency	6,085	14,491	19,683	15,606	0	55,865	(10.0%)
TOTAL COST :	190,605	409,094	527,315	451,451	0	1,578,465	
Ownership Cost	36,966	69,464	102,606	75,359	0	284,395	(18.0%)
Operation Cost	74,874	141,970	205,037	153,970	0	575,851	(36.5%)
Material Cost	31,991	95,322	92,570	105,820	0	325,703	(20.6%)
Labour Cost	31,555	68,931	79,128	79,391	0	259,005	(16.4%)
Contingency	15,219	33,407	47,974	36,911	0	133,511	(8.5%)

< Contingency : 15% >

6.1.4 Construction and Maintenance Equipment Cost

(1) Required Number of Equipment

The required numbers of construction equipment for Kabupaten Hulu Sungai Selatan are estimated from the annual proposed construction quantities as shown in Table 6-1-7.

The proposed numbers of equipment to be purchased are finally decided considering the following number of existing equipment in the Kabupaten which are available for the Project.

- 1-Hand-guided Vibratory Roller
- 3-Dump Truck
- 1-Asphalt Sprayer

The proposed numbers of maintenance equipment have been decided as shown below from the proposed annual maintenance volume taking into account the capacity of the proposed maintenance gangs.

a. Equipment for Road Maintenance

- 1-Flat Bed Truck 3 Ton

b. Equipment for Bridge Maintenance

- 1-Flat Bed Truck with Crane 3 Ton

(2) Equipment Cost

The proposed construction and maintenance equipment and their purchase costs are shown in Table 6-1-8. In the Project the supplementation cost or equipment cost supplemented is the difference between the purchase cost for newly supplied equipment and the depreciated value.

This comes about because full depreciation of the supplied equipment would not be completed within the Project Period of 5 years.

Table 6-1-7

REQUIRED NUMBER OF EQUIPMENT

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

EQUIPMENT NAME	WORKABLE	EXISTING	< 1988 >	< 1989 >	< 1990 >	< 1991 >	< 1992 >
Bulldozer/Ripper	240	0	0.14	0.29	0.60	0.25	0.00
Swamp Bulldozer	240	0	0.01	0.00	0.01	0.00	0.00
Motor Grader	250	0	0.39	0.60	1.13	0.65	0.00
Hand-guide Vib. Roller	250	2	0.00	0.01	0.01	0.02	0.00
Tire Roller	240	0	0.13	0.41	0.35	0.44	0.00
Vibratory Roller (D&T)	250	0	0.30	0.42	0.85	0.47	0.00
Hydraulic Excavator; Wheel	240	0	0.01	0.00	0.32	0.00	0.00
Wheel Loader	250	0	0.46	0.76	1.50	0.82	0.00
Water Tank Truck	250	0	0.19	0.23	0.51	0.29	0.00
Dump Truck	250	0	3.40	5.79	10.50	6.50	0.00
Flat Bed Truck with Crane	250	0	0.00	0.01	0.01	0.03	0.00
Flat Bed Truck	250	0	0.15	0.48	0.41	0.51	0.00
Portable Crusher/Screening	250	0	0.10	0.18	0.28	0.20	0.00
Concrete Mixer	250	0	0.00	0.01	0.01	0.00	0.00
Water Pump	250	0	0.00	0.01	0.01	0.00	0.00
Concrete Vibrator	250	0	0.00	0.01	0.01	0.00	0.00
Asphalt Sprayer	250	1	0.12	0.40	0.34	0.42	0.00

NOTE WORKABLE : workable days in a year

EXISTING : number of existing equipment

Table 6-1-8

EQUIPMENT PURCHASE COST

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

(1000 Rp)

EQUIPMENT NAME	CLASS	CIF (JAKARTA)	PURCHASE NO.	PURCHASE COST
Bulldozer	90 HP	49,150	-	-
Bulldozer/Ripper	90 HP	53,000	1	53,000
Swamp Bulldozer	90 HP	52,850	-	-
Swamp Bulldozer	65 HP	40,500	-	-
Motor Grader	75 HP	47,800	2	95,600
Road Stabilizer	W=1850 mm	85,950	-	-
Hand-guide Vib. Roller	1000 Kg	8,500	-	-
Tire Roller	8-15 ton	31,070	1	31,070
Vibratory Roller (D&T)	4 ton	29,000	1	29,000
Vibratory Roller	4 ton	29,000	-	-
Rough Terrain Crane	10 ton	100,400	-	-
Hydraulic Excavator; Wheel	0.3 m3	41,100	-	-
Wheel Loader	1.2 m3	70,200	1	70,200
Water Tank Truck	4000 ltr.	12,750	1	12,750
Dump Truck	3.0 ton	14,700	5	73,500
Dump Loader Truck	12 ton	56,300	-	-
Flat Bed Truck with Crane	3.0 ton	25,190	1	25,190
Flat Bed Truck	3.0 ton	11,275	2	22,550
Portable Crusher/Screening	30-40 t/h	188,000	1	188,000
Concrete Mixer	0.5 m3	18,000	-	-
Water Pump	200 l/min	630	-	-
Concrete Vibrator	3.3 HP	740	-	-
Asphalt Sprayer	850 ltr.	10,200	-	-
Service Car	3 ton	11,600	1	11,600
4 Wheel Drive Vehicle	70 HP	17,500	1	17,500
Motorcycle	100 cc	1,100	3	3,300

PURCHASE COST	TOTAL	633,260
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OWNERSHIP COST (FOREIGN)	239,851
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EQUIPMENT COST SUPPLEMENTED	393,409
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NOTE : OWNERSHIP COST (FOREIGN) for Existing Equipment

Hand-guide Vib. Roller	2,051
Dump Truck	28,255
Asphalt Sprayer	1,931

TOTAL	32,237
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6.1.5 Other Costs

Cost other items includes the costs of workshop equipment and tools, laboratory test equipment and survey equipment which are recommended in Sub-Clause 3.5. These total costs are summarized in Table 6-1-1.

6.1.6 Quantities by Work Type

The annual construction and maintenance quantities for all proposed road links are shown in Table 6-1-9.

Table 6-1-9

CONSTRUCTION QUANTITIES FOR ALL

PROPOSED LINKS

PROV : KALIMANTAN SELATAN

KAB : HULU SUNGAI SELATAN

ITEM	UNIT	< 1988 >	< 1989 >	< 1990 >	< 1991 >	< 1992 >	< TOTAL >
Site Clearance in Light Bush	m ²	0.00	2000.00	43500.00	0.00	0.00	45500.00
Subgrade Preparation	m ²	48000.00	40000.00	139000.00	59000.00	0.00	286000.00
Normal Fill	m ³	0.00	0.00	0.00	0.00	0.00	0.00
Fill in Swamp	m ³	7.20	0.00	420.00	0.00	0.00	427.20
Normal Excavation to Spoil	m ³	1019.00	1740.00	3865.00	1699.00	0.00	8323.00
Sub Base Course	m ³	5528.00	5753.50	13814.00	7770.50	0.00	32066.00
Base Course	m ³	3425.00	5835.00	9960.00	6405.00	0.00	25625.00
Shoulder	m ²	39000.00	84000.00	131500.00	76000.00	0.00	330500.00
Asphalt Patching	m ²	0.00	0.00	0.00	20.00	0.00	20.00
Surface Dressing (Single)	m ²	21500.00	70500.00	12000.00	75500.00	0.00	179500.00
Surface Dressing (Double)	m ²	0.00	0.00	36000.00	0.00	0.00	36000.00
Earth Drain	m	1000.00	11000.00	3400.00	14500.00	0.00	29900.00
Earth Drain in Swamp (by machine)	m ³	18.00	0.00	6000.00	0.00	0.00	6018.00
Pipe Culvert Ø80cm	m	0.00	5.00	12.00	0.00	0.00	17.00
Masonry Culvert (80x80cm)	m	0.00	0.00	0.00	0.00	0.00	0.00
Retaining Wall and Wing Wall (Timber)	m ²	0.00	0.00	0.00	360.00	0.00	360.00
Retaining Wall and Wing Wall (Masonry)	m ³	0.00	0.00	0.00	0.00	0.00	0.00
Gabion Protection	m ³	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber; Span 3m; 10T)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber; Span 5m; 10T)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber; Span 8m; 10T)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber; Span 3m; ØH50)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber; Span 5m; ØH50)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber; Span 8m; ØH50)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete; Span 3m; ØH50)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete; Span 5m; ØH50)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete; Span 8m; ØH50)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete; Span 10m; ØH50)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete; Span 15m; ØH50)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Pier; for Timber; 10T)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Abut; for Timber; 10T)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Pier; for Timber; ØH50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Abut; for Timber; ØH50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Pier; for Concrete; ØH50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Abut; for Concrete; ØH50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Demolition of Bridge (Timber->Timber)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Demolition of Bridge (Timber->Concrete)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Demolition of Bridge (Concrete)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Manual routine maintenance of road	Km	131.25	268.00	270.50	283.00	0.00	952.75
Routine maintenance of earth road	Km	13.00	26.00	21.50	13.00	0.00	73.50
Routine maintenance of gravel road	Km	104.75	209.00	198.00	209.00	0.00	720.75
Routine maintenance of asphalt road	Km	13.50	33.00	51.00	61.00	0.00	158.50
Maintenance of Timber Bridge (New)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance of Concrete Bridge (New)	m ²	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance of Timber Bridge (Exist)	m ²	1767.84	3679.68	3742.08	3802.08	0.00	12991.68
Maintenance of Concrete Bridge (Exist)	m ²	75.60	151.20	151.20	75.60	0.00	453.60

6.2 Organization and Construction System

6.2.1 Organization

The Bupati as head of the Kabupaten has been authorized by Law No. 13, 1980 as an official responsible for the Local Road Development Project implementation. This means that the DPUK is considered as a responsible agency for the actual execution of the Project.

According to instruction letter dated June 24, 1982 Ref. No. 620/975-/BANGDA, the Project Manager appointed by the Bupati will be responsible for the operation and maintenance of the equipment. Accordingly the Equipment Coordinator appointed from the staff of the Regional Public Works (Kantor Wilayah) by Bina Marga as a coordinator between the Governor and the Bupati will be responsible for delivery, effectual utilization and maintenance of the equipment.

The standard organization of DPUK consists of a minimum of four sections, i.e. Road Section, Housing and City Planning Section, Irrigation Section and Administration Section. For execution of the Project it is strongly recommended that the structural organization of DPUK is established. It will be necessary not only to organize new sections but also to reorganize the current structure through a review of the roles and responsibilities of each inter-related section.

It is recommended that the workshop is newly organized to consist of three sub-sections, i.e. maintenance and repair of equipment, operation and materials, and administration to execute the main tasks described in Clause 3.5.

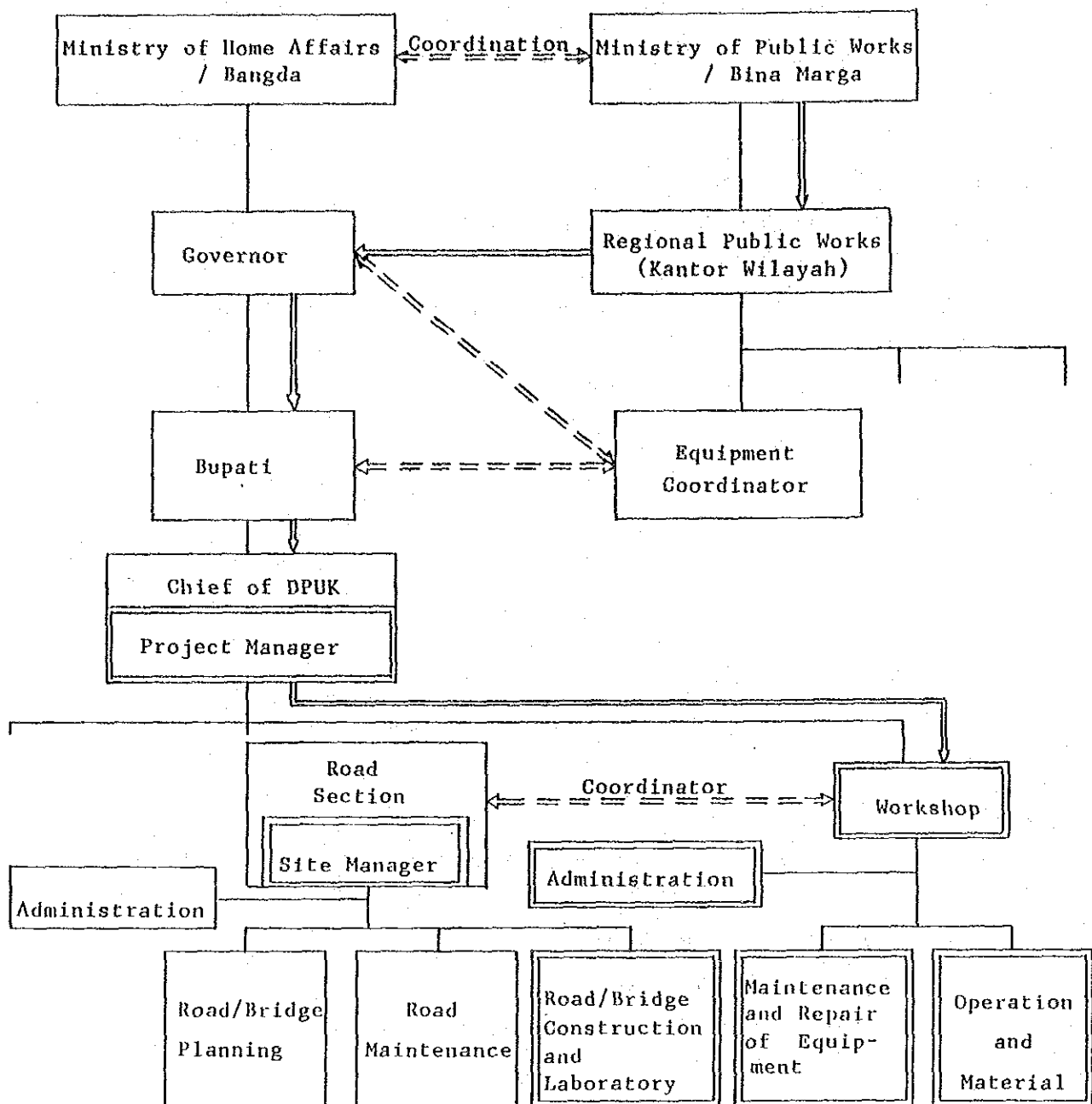
The sub-section of laboratory would be under the relevant Road Section. The proposed organization is shown in Fig. 6-2-1.

6.2.2 Construction System

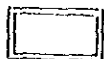
For the construction of Kabupaten roads with a ten year effective design life, it has been recommended in Clause 3.4 that the equipment intensive method should be adopted for earth work and pavement work with the exception of surface dressing.

Fig. 6-2-1

PROPOSED ORGANIZATION



: Equipment delivery flow



: New position/subsection

Current road construction in the Kabupatens is obliged to rely upon the traditional labour intensive method. It is therefore assumed that both the DPUK and the local contractors in the Kabupatens do not have sufficient experience and technique for the equipment intensive method of road construction.

For realization of the Local Road Development Project the GOI has ensured availability of the required human resources of DPUK and intends to conduct training programmes for those human resources as described in Clause 8.3 of the Main Report. This means that the GOI intends the Kabupatens to have the ability to execute the Project by force account (Swakelola).

It should be recognized from the experiences in the first local road project, which was assisted by OECF, ADB and IBRD, that because of their poor construction management and traditional labour intensive methods most of the road construction by local contractors could not be completed within the contract periods. Therefore execution of the road improvement by force account is desirable as recommended from their experience by the consultants for the first local road project.

It is strongly recommended that except for labourers the staff of the force account team should not be hired by the day as it would then not be able to consolidate the foundations for development of self reliability.

However, it will be very difficult to execute all the Projects by force account because of the need for many Kabupaten staff. The GOI has emphasized the need to promote the employment of local weak contractors in order to up-grade their capability in the road project schemes within the Fourth Five-Year Plan (REPELITA)

Taking into consideration the conditions mentioned above it is strongly recommended that the DPUK is obliged to lend some equipment with skilled operators to the local contractors in the Kabupatens for the execution of a part of the road improvement works.

The types of work executed only by force account are recommended as follows:

- Routine maintenance work for the Kabupaten roads
- Laboratory tests
- Production of crushed stone
- Technical service for the equipment