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 13

KABUPATEN PASIR

MARCH 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

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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 Pasir in Kalimantan Timur 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.

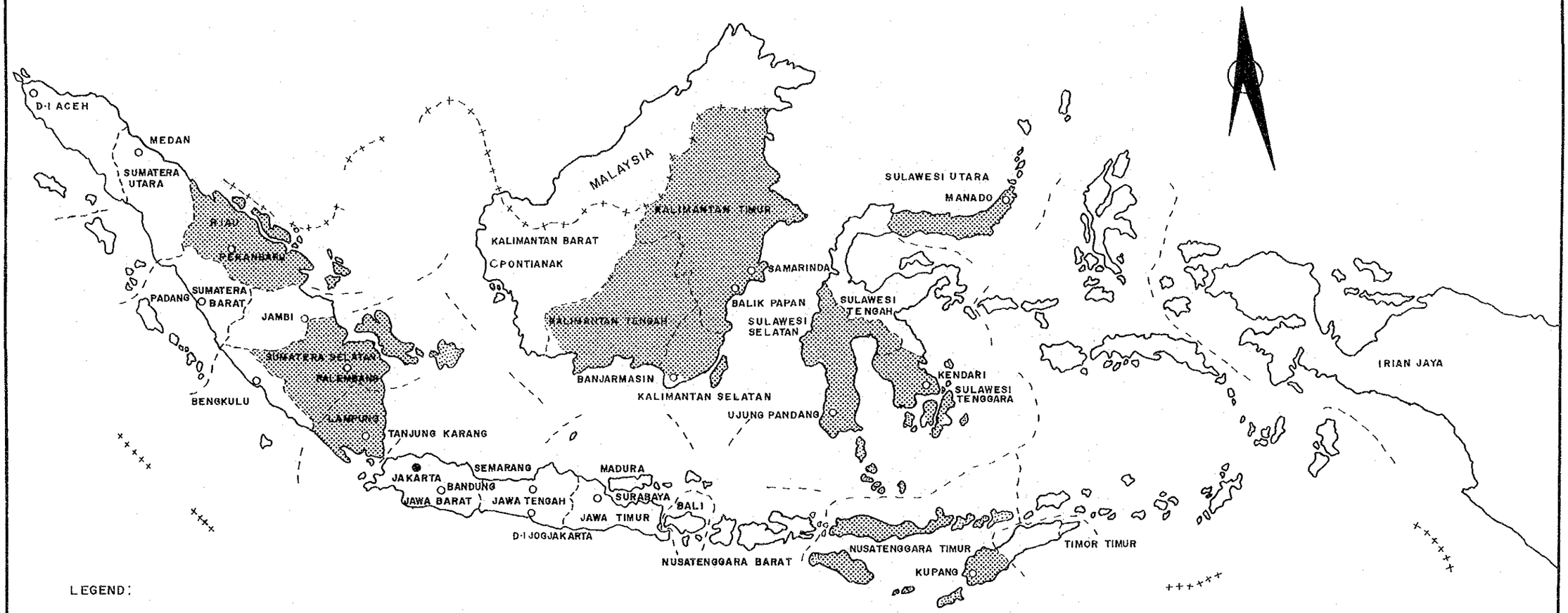
Since the study period was limited, without cooperation of Bina Marga, Bangda and local governments of both province and Kabupaten in collecting the data, the study would not have been completed within the period.

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
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17 · KAB · TANAH LAUT
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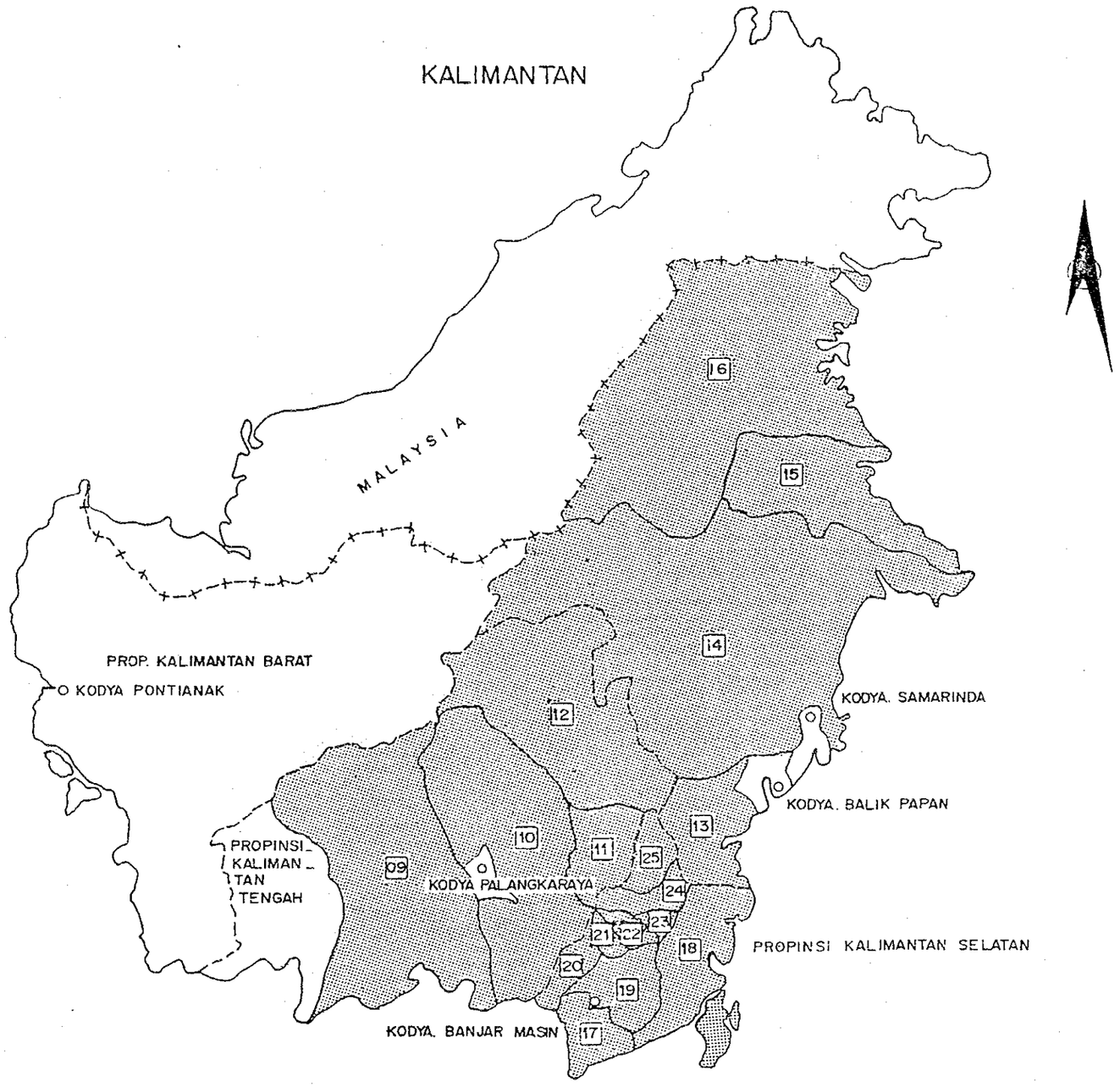
21 · KAB · TAPIN
22 · KAB · HULU SUNGAI SELATAN
23 · KAB · HULU SUNGAI TENGAH
24 · KAB · HULU SUNGAI UTARA
25 : KAB · TABALONG



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– – – – PROVINCIAL BOUNDARY
LOCATION OF THE PROPOSED AREA

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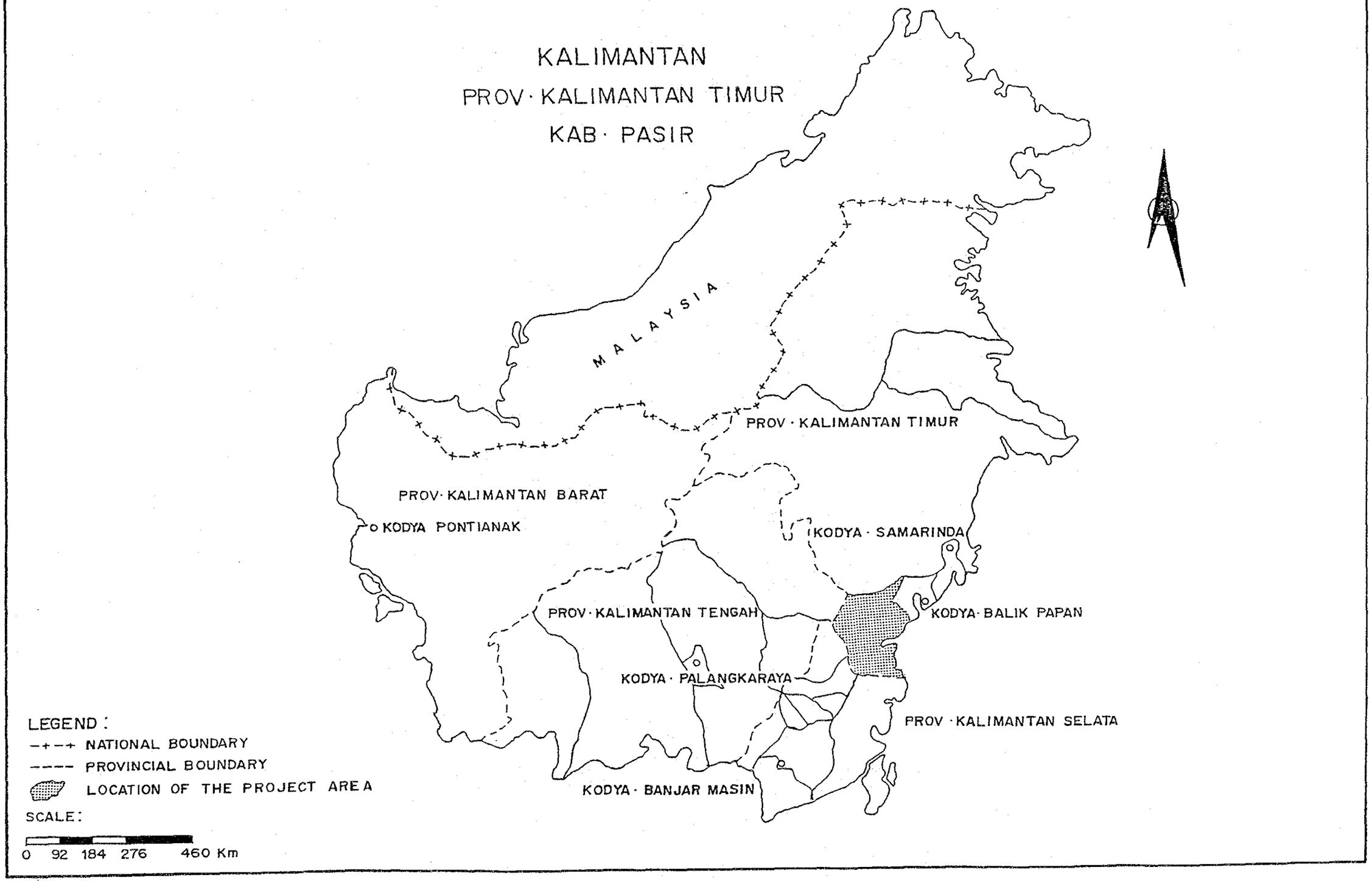
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PROV · KALIMANTAN TIMUR
KAB · PASIR
MALAYSIA
PROV · KALIMANTAN TIMUR
PROV · KALIMANTAN BARAT
KODYA PONTIANAK
KODYA · SAMARINDA
PROV · KALIMANTAN TENGAH
KODYA · BALIK PAPAN
KODYA · PALANGKARAYA
PROV · KALIMANTAN SELATA
KODYA · BANJAR MASIN
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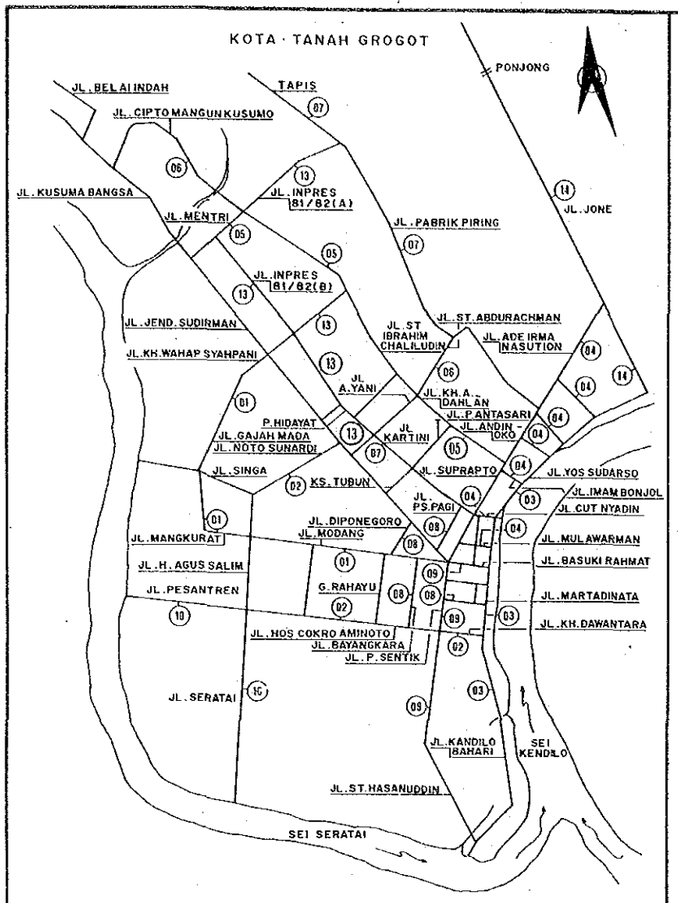
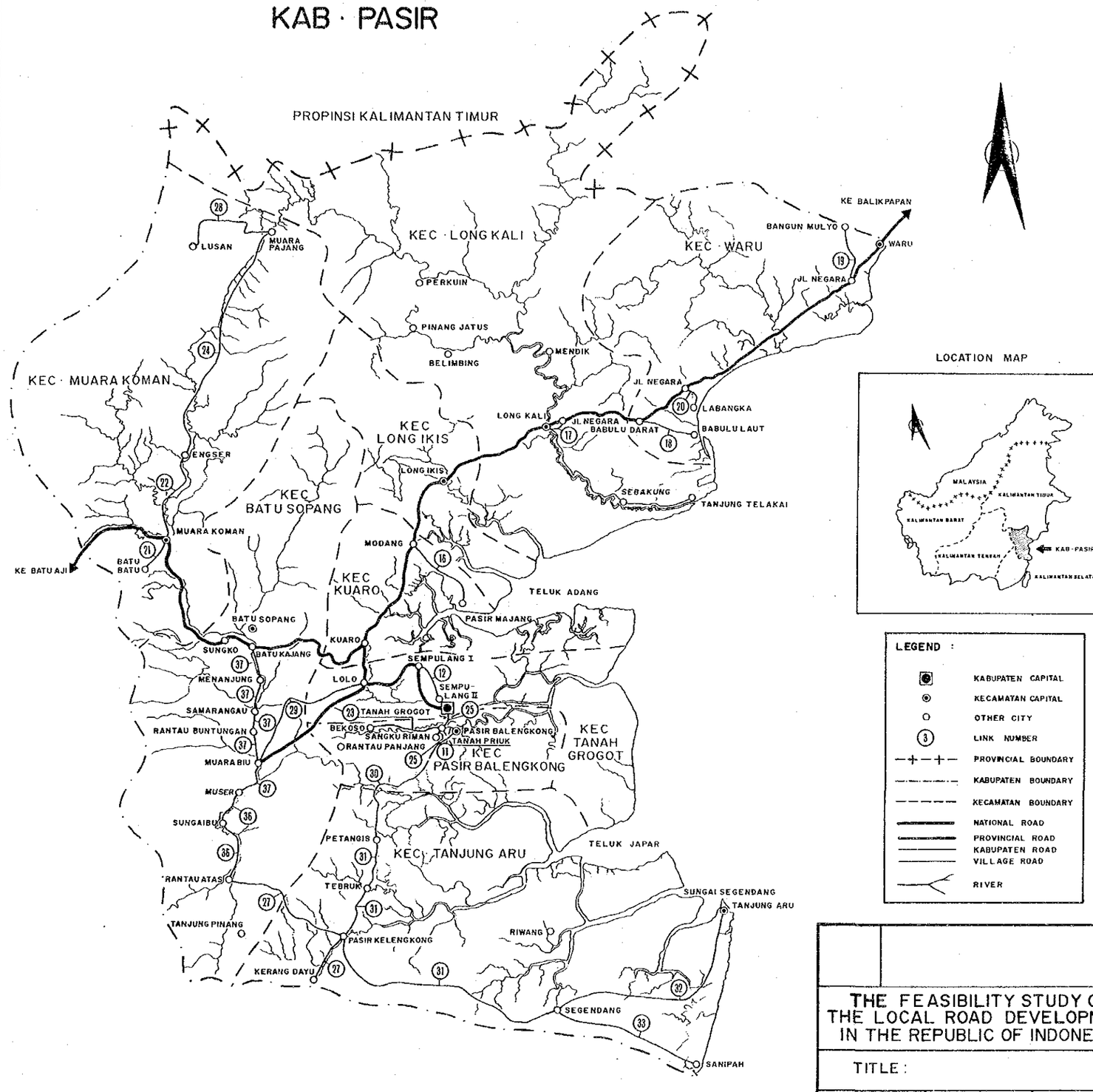
LOCATION OF THE PROJECT AREA
SCALE:
0 92 184 276 460 Km



KAB · PASIR



LOCATION MAP

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- KABUPATEN CAPITAL
- KECAMATAN CAPITAL
- OTHER CITY
- (3) LINK NUMBER
- PROVINCIAL BOUNDARY
- KABUPATEN BOUNDARY
- KECAMATAN BOUNDARY
- NATIONAL ROAD
- PROVINCIAL ROAD
- KABUPATEN ROAD
- VILLAGE ROAD
- RIVER

SCALE :

0 5 10 15 Km

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

TITLE :

SOURCE:	SCALE:	PROVINCE : KALIMANTAN TIMUR
DIREKTORAT JENDERAL CIPTA KARYA	AS SHOWN	KABUPATEN : PASIR

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Chapter 1 BACKGROUN OF KABUPATEN

1.1 Topographic and Meteorological Conditions

1.1.1 Location and Topography

Kabupaten Pasir is the southernmost Kabupaten in Kalimantan Timur Province. Its east coast faces the Makassar Strait. On the west and on the south it is bordered respectively by Kalimantan Tengah and Kalimantan Selatan Province. On the north it is bordered by Kabupaten Kutai and by Kotamadya Balikpapan city.

In the north and the west part of the Kabupaten there are 500 to 1,200 meter high mountain ranges but in the coastal area from the mid eastern part to the southern provincial boundary there is a flat plain. This is formed by a series of river basins from the north such as the Riko, the Tuyuk and the Kandilo Rivers where there are undulating hills in the middle reaches but swamps all over the lower reaches.

The area of the Kabupaten is about 20,040 square kilometers, approximately 10 percent of the total of the Kalimantan Timur Province. It consists administratively of 9 Kecamatans.

1.1.2 Meteorological Conditions

Since there are no meteorological data obtained from the Kabupaten Pasir the data of Kabupaten Kutai shown in Table 1-1-1 are adopted for the Study.

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.

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

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 Timur
KABUPATEN : Kutai STATION : Melak

MONTH	1980		1981		1982		1983		1984	
	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)
January					11	201				
February					16	295				
March					16	215				
April					10	190				
May					6	125				
June					4	95				
July					7	175				
August					8	120				
September					11	185				
October					8	120				
November					17	225				
December					15	190				
Total	-	-	-	-	129	2,136	-	-	-	-

1.2 Socio-Economic Conditions

1.2.1 Population

The population of Kabupaten Pasir in 1984 was 94,620 which was approximately 6.2% of the 1,518,800 total population of Kalimantan Timur Province as shown in Table 1-2-1.

The population density was 0.05 persons per ha which was lower than the provincial density of 0.07 and indicates the underpopulation of the Kabupaten.

The recent annual average growth rate of population of the Kabupaten is 4.5% which is lower than the provincial rate of 5.7% and higher than the national rate of 2.2%. This may be a result of the on-going transmigration programme in the Kabupaten and the province.

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:					
PASIR	94,620	4.5	2,004,000	0.05	1984
KUTAI	440,129	6.3	9,102,700	0.05	1983
BERAU	48,900	4.3	3,270,000	0.01	1984
BULUNGAN	198,570	5.0	6,400,000	0.03	1984
PROVINCE:					
KALIMANTAN TIMUR	1,362,800		20,244,000		1982
	1,438,700	5.7	20,244,000	0.07	1983
	1,518,800		20,244,000		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 TIMUR

KABUPATEN : PASIR

KECAMATAN	POPULATION	PROPORTION (%)
BATU SOPANG	5,780	6.1
TANJUNG ARU	6,501	6.9
PASIR BALENGKONG	12,413	13.1
TANAH GROGOT	20,467	21.6
KUARO	7,272	7.7
LONG IKIS	8,471	9.0
MUARA KOMAN	5,276	5.6
LONG KALI	11,989	12.6
WARU	16,451	17.4
TOTAL	94,620	100

1.2.2 Land Use

In Kabupaten Pasir, 52,308 ha of the current available land use area, which is approximately 2.7% of the 2,004,000 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 49,104 ha of agricultural harvest area and 3,204 ha of residential area which are 93.9% and 6.1% of the current available land use area respectively.

The agricultural harvest area consists of 27,547 ha of paddy field and 21,557 ha of plantation area which are 56.1% and 43.9% 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 TIMUR

(ha)

KABUPATEN	WET PADDY FIELD	UPLAND PADDY FIELD	OTHER GUL-TIVATED AREA	PLANTATION AREA	RESIDENTIAL AREA	USABLE OPEN SPACE	RIVER & LAKE	FORESTRY AREA	OTHERS	TOTAL AREA	SURVEY YEAR
PASIR	7,881 (0.4)	19,666 (1.0)	-	21,557 (1.1)	3,204 (0.2)	-	32,685 (1.6)	1,038,033 (51.8)	880,974 (44.0)	2,004,000 (100)	1984
KUTAI		52,400 (0.6)	94,000 (1.0)	-	25,000 (0.3)	45,300 (0.5)	34,500 (0.4)	8,831,500 (97.0)	20,000 (0.2)	9,102,700 (100)	1982
BERAU	–	–	–	–	–	–	–	–	–	–	–
BULUNGAN	7,203 (0.1)	13,494 (0.2)	6,492 (0.1)	2,785 (0.04)	2,792 (0.04)	-	-	6,732,000 (99.5)	225 (0.003)	6,765,000 (100)	1982

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 Pasir in 1984 was 10,021 ha and 22,099 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 were 7,788 ha and 16,432 ton respectively which are 77.7% and 74.4% of the total food crops. The yield rate of paddy production is 2.11 ton per ha. Thus, paddy is the most predominant agricultural crop of the Kabupaten.

As the Table shows, the paddy production in 1983 had an unexpected fall due to the results of extraordinary weather in 1982. Thus future development of paddy production will be needed to take appropriate measures against such disasters and also to expand the existing wet paddy field in order to promote more intensive productivity through improvement of the irrigation system.

The commodity crops, of which rubber, coconut and coffee are major, are produced in the plantations. The area and production of plantation crops in 1983 were 17,035 ha and 2,100 ton respectively with current growth rates being 18.0% and 15.0% respectively. Thus the plantation crop which is an export product is important agriculturally. Some changes are 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 88% of the total population as shown in Table 1-2-6. Thus it is an agricultural Kabupaten.

Future agricultural development of the Kabupaten depends upon the consolidation of infrastructures required for increasing productivity.

Table 1-2-4 AREA AND PRODUCTION OF FOOD CROPS

KABUPATEN : PASIR

CULTIVATED AREA

(ha)

ITEM	YEAR						AAGR
	1979	1980	1981	1982	1983	1984	(%)
PADDY	9,076	10,341	10,151	13,679	6,144	7,788	
OTHERS	1,570	2,958	1,769	2,351	2,766	2,233	
TOTAL	10,646	13,299	11,920	16,030	8,910	10,021	

PRODUCTION

(ton)

ITEM	YEAR						AAGR
	1979	1980	1981	1982	1983	1984	(%)
PADDY	18,814	17,011	19,639	20,875	14,429	16,432	
OTHERS	4,360	13,781	2,117	8,706	11,934	5,667	
TOTAL	23,174	30,792	21,756	29,581	26,363	22,099	

YIELD RATE

(ton/ha)

ITEM	YEAR						AAGR
	1979	1980	1981	1982	1983	1984	(%)
PADDY	2.07	1.65	1.93	1.53	2.35	2.11	

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 TIMUR

KABUPATEN	AREA (ha)	PRODUCTION (ton)	AAGR (%) AREA	AAGR (%) PRODUCTION
PASIR	10,021	4,645	0.7	0
KUTAI	-	-	-	-
BERAU	6,814	3,771	17.5	28.7
BULUNGAN	2,954	465	17.0	9.5

Table 1-2-6 POPULATION OF AGRICULTURAL SECTOR

PROVINCE : KALIMANTAN TIMUR

KABUPATEN	AGRICULTURAL SECTOR	TOTAL POPULATION	PROPORTION (%)	AAGR (%)	SURVEY YEAR
PASIR	83,000	94,620	87.6	4.5	1984
KUTAI	358,000	440,129	81.4	6.0	1982
BERAU	37,000	48,900	76.1	5.4	1984
BULUNGAN	149,000	198,570	75.2	5.5	1984

Notes :

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

1.2.4 Other Economic Activities

Notable economic activities excluding agriculture in Kabupaten Pasir are fishery, manufacturing and petroleum industries.

Petroleum industry is based upon the foreign investment capital, therefore fishery and manufacturing industries can be referred as follows:

The following table shows the current growth of the fishery production.

	1980	1984	AAGR (%)
Production (ton)	216,042	105,000	- 16.5

Notes : 1. AAGR : Average annual growth rate
2. Source : Kabupaten data

The reason why the recent growth rate is tending to decline is not cleared, however a volume of exporting out the Kabupaten is still in keeping approx. 1,000 tons at present.

Besides the fishery sector, there is a manufacturing industry which use "rotan" (rattan) as its main material. Even though it belongs in a home industry as a category of handcraft, the recent production indicates a high growth tendency as shown in the following table.

	1980	1984	AAGR (%)
Production	16,775	29,782	15.4

Notes : 1. AAGR : Average annual growth rate
2. Source : Kabupaten data

1.3 Present Status of Kabupaten Roads

1.3.1 Outline of Road Networks

In Kabupaten Pasir a national road, which originates at Banjarmasin, runs towards Balikpapan along the eastern coastal areas of the Kabupaten via Kuaro. A provincial road which starts from Kuro at its junction with the national road goes south and is then divided at Lolo, one route running towards Muara Bin and one to Tanah Grogot, the Kabupaten capital.

These national and provincial roads play an important role as regional trunk road in the Kabupaten. However due to the geographical conditions of the Kabupaten the roads seem not to function as they should in terms of development of the Kabupaten road networks.

The northern and western areas of the Kabupaten are mountainous. Since the rivers which mostly rise at the foot of these mountains flow to the Malaka strait, the east coastal areas are low and swampy. Therefore the Kabupaten road networks are consolidated along the rivers at the foot of the western mountains and in the flat areas of the southern boundary which extend to the east coast. These Kabupaten roads provide communication to Tanah Grogot, the Kabupaten capital.

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 Pasir are confirmed as 37 links and 354 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 0.18 m per ha. This is lower than the national density of 0.48 m per ha and distinctly lower 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 lags behind in density of Kabupaten roads.

	Total Length (km)	Area (ha)	Density (m/ha)
Kabupaten : Pasir	354	2,004,000	0.18
Province : Kalimantan Timur	1,340	20,776,700	0.06
Jawa Is.(Excluding DKI Jakarta)	27,715	13,159,700	2.11
Indonesia	92,038	191,944,700	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 EXISTING ROAD LENGTH BY SURFACE TYPE

PROV : KALIMANTAN TIMUR KAB : PASIR

(Km)

NO	ZT	ASP	MIX	BTB	L.L	KRK	TOTAL
LINK	1	2					2
LINK	2	2					2
LINK	3	1	1				2
LINK	4	2					2
LINK	5	1	1				2
LINK	6		1	1			2
LINK	7	3	2		1		6
LINK	8	2	1				3
LINK	9	2					2
LINK	10	1	1				2
LINK	11					3	3
LINK	12	2		2			4
LINK	13	2					2
LINK	14			15	2		17
LINK	15			3			3
LINK	16		16				16
LINK	17			1			1
LINK	18		10				10

(Km)

NO	ZT	ASP	MIX	BTB	L.L	KRK	TOTAL
LINK	19	2	3	1			6
LINK	20		4				4
LINK	21		1	1			2
LINK	22					12	12
LINK	23					15	15
LINK	24					28	28
LINK	25					6	6
LINK	26		17			1	18
LINK	27		30				30
LINK	28					18	18
LINK	29		30				30
LINK	30					30	30
LINK	31		35				35
LINK	32						
LINK	33						
LINK	34		4				4
LINK	35		5				5
LINK	36		18				18
LINK	37		12				12
TOTAL		22	192	24	3	113	354
RATIO		6	54	7	1	32	(%)

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:

	ASP	KRK	TNH/LL
Kabupaten : Pasir	6.2	38.7	55.0
Province : Kalimantan Timur	5.8	37.5	56.7
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 much lower than either that of Indonesia or of Jawa Island. The proportion of low grade roads such as earth roads and others is distinctly high. This means that the road classification as well as the road density is very 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:

	Good	Fair	Poor	Bad
Kabupaten : Pasir	9.0	29.1	39.8	22.5
Province : Kalimantan Timur	38.1	29.7	23.2	9.0
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 EXISTING ROAD CONDITION BY SURFACE TYPE

PROVINCE : KALIMANTAN TIMUR

KABUPATEN : PASIR

(%)

NO	ASP				IRH				BTB				L.L				KRK			
NO	BA	SD	RU	RB	BA	SD	RU	RB	BA	SD	RU	RB	BA	SD	RU	RB	BA	SD	RU	RB
LINK 1	50	30	20																	
LINK 2	68	33																		
LINK 3	50	40	10			10	40	50												
LINK 4	35	55	10																	
LINK 5	60	40			20	50	30													
LINK 6							2	98			2	98								
LINK 7	45	28	26	2		1	1	99					90	10						
LINK 8	58	42			15	30	55													
LINK 9	15	38	48																	
LINK 10	35	65			20	65	10	5												
LINK 11																	20	77	3	
LINK 12	75	25							25	65	10									
LINK 13	30	45	25																	
LINK 14										13	14	73		20	5	75				
LINK 15									60	33	7									
LINK 16						12	12	76												
LINK 17									30	40	30									
LINK 18					1	9	52	39												
LINK 19	25	52	23		17	62	17	5	25	60	10	5								
LINK 20						44	36	20												
LINK 21						20	40	20		40	60									
LINK 22																		52	48	
LINK 23																		44	56	
LINK 24																		32	68	
LINK 25																		30	70	
LINK 26						17	67	16										25	60	15
LINK 27						8	64	29												
LINK 28																	3	37	59	
LINK 29						12	50	38												
LINK 30																	35	49	16	
LINK 31						3	66	31												
LINK 32																				
LINK 33																				
LINK 34							48	52												
LINK 35							59	41												
LINK 36							62	38												
LINK 37							57	43												
AVERAGE	46	41	13	1	4	18	41	37	20	36	19	25	45	15	3	38	7	43	48	2
LENGTH		22 Ka				192 Ka				24 Ka				3 Ka				113 Ka		
(Ka)	10	9	3	0	8	35	79	71	5	9	5	6	1	0	0	1	8	49	54	2

The surface condition levels of the Kabupaten roads in the Kabupaten are lower than both that of Indonesia and of Jawa Island. The proportion in good condition is relatively low. Therefore improvement of Kabupaten roads in poor or bad condition is desirable.

(4) Terrain Conditions of Kabupaten Roads

The difficulty of road improvement is mainly dependent upon the terrain conditions.

The terrain conditions of the Kabupaten roads, classified as flat, hilly, mountainous and swampy which are shown as DT, BK, GN and RW, are summarized in Table 1-3-3.

The proportions of terrain conditions in the Kabupaten are 62.0% flat, 32.0% hilly, 4.0% mountainous and 2.0% swampy. Most of the area is flat and hilly. Road construction is anticipated to be not so difficult because of the small proportion of mountains and swamps.

1.3.3 Bridge Inventory

A bridge inventory showing the existing condition of bridges on the Kabupaten roads in Kabupaten Pasir were prepared by the Kabupaten.

The bridge types are classfied as timber, concrete, steel and others which are shown in the inventory as KY, BT, BJ and LL respectively.

The inventory shown in Table 1-3-4 and Table 1-3-5 indicates a total of 26 bridges with a total length of 288 m of which 25 or 96.2% are timber and 1 or 3.8% is concrete. One bridge of length 4 m is required to be newly constructed.

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

PROV : KALIMANTAN TIMUR KAB : PASIR

(Km)

102	31	DT	RH	GN	BK	TOTAL
LINK	1	2				2
LINK	2	2				2
LINK	3	1	1			2
LINK	4	2				2
LINK	5	2				2
LINK	6	1		1		2
LINK	7	6				6
LINK	8	3				3
LINK	9	2				2
LINK	10		2			2
LINK	11	2	1			3
LINK	12	3		1		4
LINK	13	1	1			2
LINK	14	13	2		2	17
LINK	15	3				3
LINK	16	5		11		16
LINK	17	1				1
LINK	18	10				10
LINK	19	5			1	6
LINK	20	4				4
LINK	21	1			1	2
LINK	22	10			2	12
LINK	23	14			1	15
LINK	24	16			12	28
LINK	25	4			2	6
LINK	26	18				18
LINK	27	23			7	30
LINK	28	13			5	18
LINK	29	19			11	30
LINK	30	11			19	30
LINK	31	4			31	35
LINK	32					
LINK	33					
LINK	34	3			1	4
LINK	35	4			1	5
LINK	36	4			14	18
LINK	37	7			5	12
TOTAL		219	7	13	115	354
RATIO		62	2	4	32	(%)

Table 1-3-4 NUMBER AND LENGTH OF BRIDGES

PROV : KALIMANTAN TIMUR KAB : PASIR

<<<< BRIDGE >>>> (UNIT: m)

	EXISTING		NOT EXIST		TOTAL	
LINK NO	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
1	1	3.00			1	3.00
2	1	5.60			1	5.60
3	1	13.00			1	13.00
6	1	3.60			1	3.60
9	1	5.00			1	5.00
10	1	6.50			1	6.50
11	5	17.43			5	17.43
14	7	60.00			7	60.00
17	1	14.00			1	14.00
18	1	4.00			1	4.00
20			1	4.00	1	4.00
21	1	6.00			1	6.00
22	1	50.00			1	50.00
23	4	40.00			4	40.00
TOTAL	26	228.13	1	4.00	27	232.13

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

PROV : KALIMANTAN TIMUR KAB : PASIR

<<< BRIDGE >>> (No)

103 (18)	KY	BT	TOTAL
LINK 1	1		1
LINK 2	1		1
LINK 3	1		1
LINK 6	1		1
LINK 9	1		1
LINK 10	1		1
LINK 11	5		5
LINK 14	7		7
LINK 17	1		1
LINK 18		1	1
LINK 20			
LINK 21	1		1
LINK 22	1		1
LINK 23	4		4
TOTAL	25	1	26
RATIO	96	4	(%)

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

Bridge Type	⟨3	⟨5	⟨8	⟨10	⟨12	⟨14	⟨16	⟨18	⟨20	⟨99	Total
Timber	15	8	1	-	-	-	-	-	-	1	25
Concrete	-	1	-	-	-	-	-	-	-	-	1
Steel	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-
Total	15	9	1	-	-	-	-	-	-	1	26

Thus, most of the existing bridges on the Kabupaten roads are timber and the majority of spanlengths is less than 3 m.

1.3.4 Traffic

Inventories of the average daily traffic (ADT) on the Kabupaten roads in Kabupaten Pasir 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	940	60	525	1,575	3,100
Proportion (%)	30.32	1.94	16.94	50.80	100.00

Source : Bina Marga Inventory

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

	SEDAN	BUS	TRUCK	MOTOR-CYCLE	TOTAL
Proportion (%)	0.28	0.21	11.39	88.12	100.00

Source : Kabupaten.

Thus, the proportion of motorcyles 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:

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

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 TIMUR KAB : PASIR

A)	Growth Rate of Population	:	4.50 (%)
B)	Growth Rate of Cultivated Area	:	7.00 (%)
C)	Growth Rate of Rice field	:	10.00 (%)
D)	Growth Rate of Rice yield rate	:	3.00 (%)
E)	Growth Rate of GDP / capita	:	3.90 (%)
a)	Geometrical Mean (A x B)	:	5.74 (%)
b)	Geometrical Mean (C x D)	:	6.44 (%)
c)	Geometrical Mean (a x b)	:	6.09 (%)
d)	Geometrical Mean (c x E)	:	4.99 (%)
	TRAFFIC GROWTH RATE	:	4.99 (%)

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 :

$$Tn = Te\ (1 + r)^n$$

Where :

Tn : Future traffic volume n years later
Te : 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 EXISTING AND FUTURE TRAFFIC VOLUME

PROV : KALIMANTAN TIMUR KAB : PASIR

(SPD : 1/2)

	INVENTORY (1985)					RATE	AFTER 13 YEARS (1998)					CLASS
LINK NO	HBL	BUS	TRUK	SPD	TOTAL		HBL	BUS	TRUK	SPD	TOTAL	
1	35	10	30	50	100	5.0%	66	19	56	94	188	IIIB-2
2	60	5	30	50	120	5.0%	113	9	56	94	226	IIIB-1
3	10	0	10	30	35	5.0%	19	0	19	56	66	IIIB-2
4	60	5	45	75	148	5.0%	113	9	85	141	279	IIIB-1
5	60	0	35	30	110	5.0%	113	0	66	56	207	IIIB-1
6	75	5	15	90	140	5.0%	141	9	28	169	264	IIIB-1
7	50	15	30	95	143	5.0%	94	28	56	179	269	IIIB-1
8	60	5	20	125	148	5.0%	113	9	38	235	279	IIIB-1
9	45	5	30	75	118	5.0%	85	9	56	141	222	IIIB-1
10	60	5	20	110	140	5.0%	113	9	38	207	264	IIIB-1
11	10	0	10	30	35	5.0%	19	0	19	56	66	IIIB-2
12	25	0	25	60	80	5.0%	47	0	47	113	151	IIIB-2
13	10	0	10	10	25	5.0%	19	0	19	19	47	IIIC
14	5	0	20	15	33	5.0%	9	0	38	28	62	IIIB-2
15	20	0	10	10	35	5.0%	38	0	19	19	66	IIIB-2
16	15	0	5	25	33	5.0%	28	0	9	47	62	IIIB-2
17	15	0	10	80	65	5.0%	28	0	19	151	122	IIIB-2
18	8	0	7	25	28	5.0%	15	0	13	47	53	IIIB-2
19	180	0	90	300	420	5.0%	339	0	169	565	791	IIIA
20	10	0	5	45	38	5.0%	19	0	9	85	72	IIIB-2
21	20	0	20	35	58	5.0%	38	0	38	66	109	IIIB-2
22	6	0	4	15	18	5.0%	11	0	8	28	34	IIIC
23	15	0	10	35	43	5.0%	28	0	19	66	81	IIIB-2
24	0	0	0	5	3	5.0%	0	0	0	9	6	IIIC
25	3	0	7	25	23	5.0%	6	0	13	47	43	IIIC
26	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
27	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
28	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
29	8	0	7	25	28	5.0%	15	0	13	47	53	IIIB-2
30	0	0	5	15	13	5.0%	0	0	9	28	24	IIIC
31	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
32	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
33	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
34	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
35	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
36	0	0	0	0	0	5.0%	0	0	0	0	0	IIIC
37	75	5	15	90	140	5.0%	141	9	28	169	264	IIIB-1
PERCENT	30.32	1.94	16.94	50.81			30.32	1.94	16.94	50.81		

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

(KM)

SURFACE	CONDITION	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 TIMUR KAB : PASIR

(1998)

LINK NO	CLASS	SURFACE	MOBIL	BUS	TRUCK	SEPEDA	TOTAL
11	IIIB-2	KRK	21	1	12	35	52
14	IIIB-2	KRK	49	3	20	83	122
16	IIIC	KRK	14	1	8	24	35
18	IIIB-1	ASP	99	6	55	165	243
20	IIIB-2	KRK	49	3	20	83	122
21	IIIC	KRK	1	0	0	1	2
22	IIIC	KRK	5	0	3	8	12
23	IIIB-1	ASP	104	7	58	174	256
24	IIIC	KRK	11	1	6	18	27
25	IIIB-2	KRK	37	2	21	62	91
27	IIIB-2	KRK	21	1	12	35	52
28	IIIC	KRK	7	0	4	12	17
29	IIIB-2	KRK	46	3	25	76	112
30	IIIB-2	KRK	21	1	12	35	52
31	IIIC	KRK	4	0	2	6	9
36	IIIC	KRK	12	1	7	21	31

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 : PASIR

(1000Rupiah)

	LINK 11	LINK 12	LINK 14	LINK 16	LINK 17	LINK 18	LINK 19	LINK 20	LINK 21	LINK 22
	3 Km	4 Km	17 Km	16 Km	1 Km	10 Km	6 Km	4 Km	2 Km	12 Km
	IIIB-2	IIIB-2	IIIB-2	IIIC	IIIB-2	IIIB-1	IIIA	IIIB-2	IIIC	IIIC
YEAR	Surplus	VOC	Surplus	Surplus	VOC	Surplus	VOC	Surplus	Surplus	Surplus
1988	0	0	0	0	0	0	0	0	0	0
1989	346	1300	23100	7402	485	41665	56454	5993	0	677
1990	368	1385	25926	7402	495	45262	59363	6536	7	701
1991	415	1430	28741	10120	512	49502	62291	7242	7	701
1992	462	1514	31506	10120	541	54872	65388	8105	7	896
1993	486	1601	34402	13759	572	59813	68656	8798	7	1134
1994	533	1686	37904	13759	591	66367	71941	9698	7	1134
1995	600	1773	42082	16477	621	72441	75549	10579	67	1354
1996	649	1860	46917	19195	664	80276	79497	11810	67	1378
1997	718	1947	51164	21161	696	88148	83293	12860	67	1378
1998	787	2034	56149	21161	728	96563	87429	14116	67	1811
SUM	5364	16530	377891	140556	5885	654909	709861	95737	303	11164
COST	-7735	-4635	153912	20603	-122	319473	387378	40195	-7057	-36911
/Km	-2578	-1159	9054	1288	-122	31947	64563	10049	-3529	-3076

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.

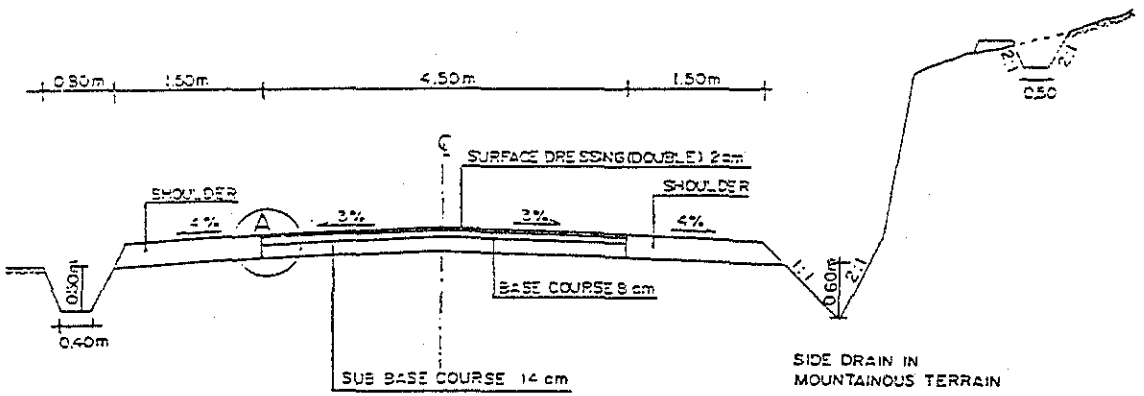
Table 3-1-1

DESIGN CRITERIA FOR KABUPATEN ROADS

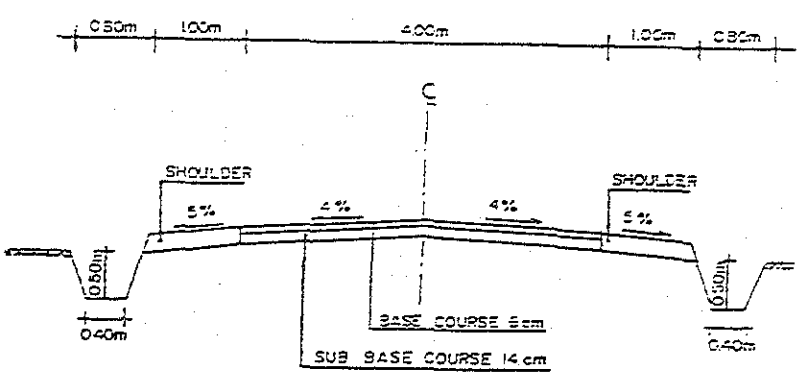
ROAD CLASSIFICATION		CLASS III A			CLASS III B-1			CLASS III B-2			CLASS III C		
SURFACE TYPE		ASPHALT SEAL (DOUBLE)			ASPHALT SEAL (SINGLE)			GRAVEL			GRAVEL		
TRAFFIC VOLUME : ADT (Forecast 10 th year average per day)		3000 - 500			500 - 200			200 - 50			50		
T E R R A I N		FLAT TO ROLLING	HILLY	MOUNT-AINOUS	FLAT TO ROLLING	HILLY	MOUNT-AINOUS	FLAT TO ROLLING	HILLY	MOUNT-AINOUS	FLAT TO ROLLING	HILLY	MOUNT-AINOUS
TRAFFIC LANES		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	50	30	AS PRACTI-CABLE
	MINIMUM	30	30	30	30	30	AS PRACTI-CABLE	30	30	AS PRACTI-CABLE	30	AS PRACTICABLE	
GRADIENT (LIMITING) (%)	DESIRABLE	4	5	8	4	6	8	4	7	8	5	8	12
	MAXIMUM	7	7	10	7	8	10	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	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	3.0	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	1.0	1.0	0.75
	MINIMUM	1.5	1.0	0.75	1.0	1.0	0.75	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	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	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

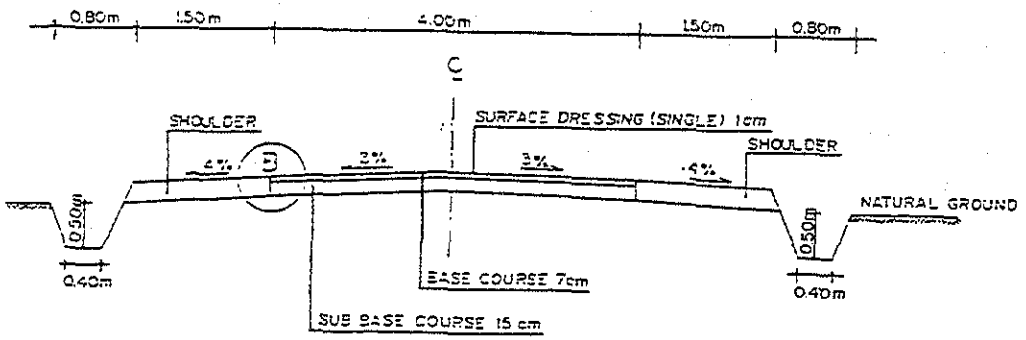
CLASS III A



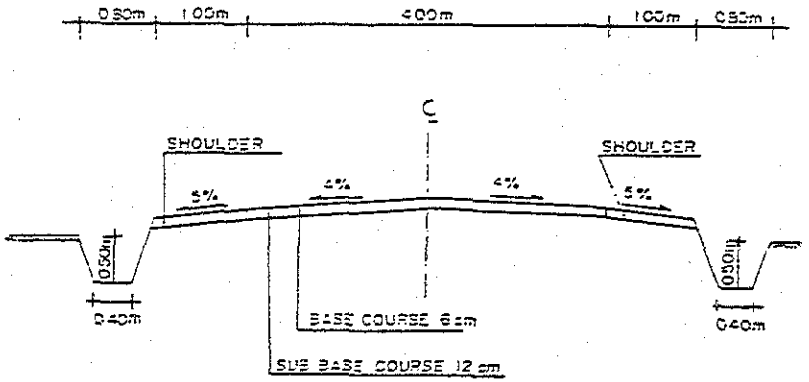
CLASS III B-2



CLASS III B-1



CLASS III C



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:

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

2) Strength of Roadbed

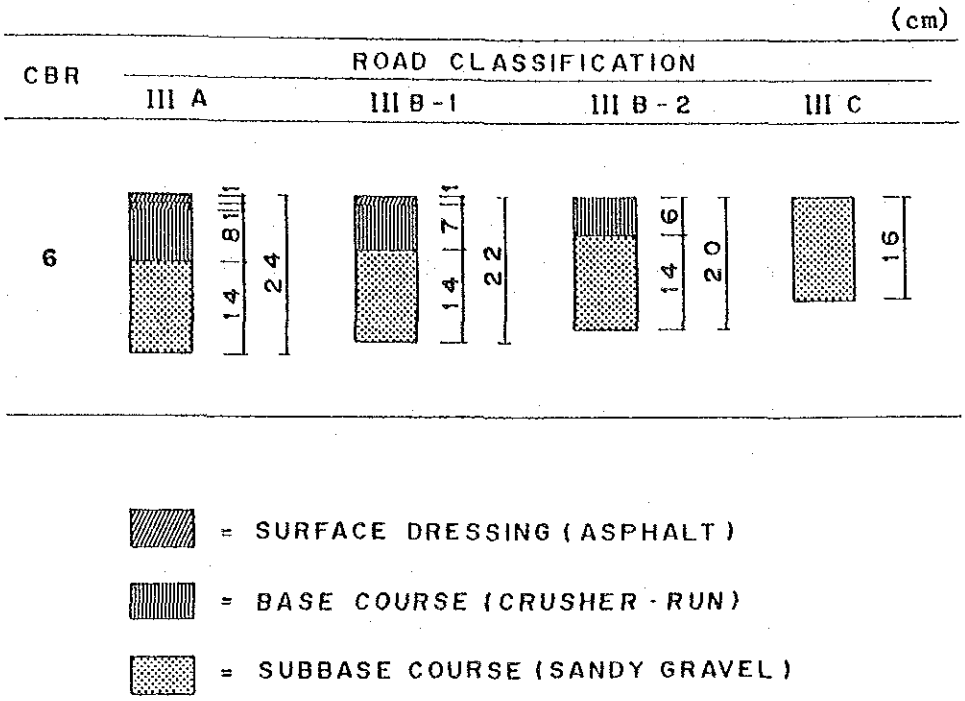
The CBR value of the existing roadbed is a very important factor for the pavement design but no results are available from CBR tests on the Kabupaten roads.

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



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 deseribed 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 rurall 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 diamenter 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.

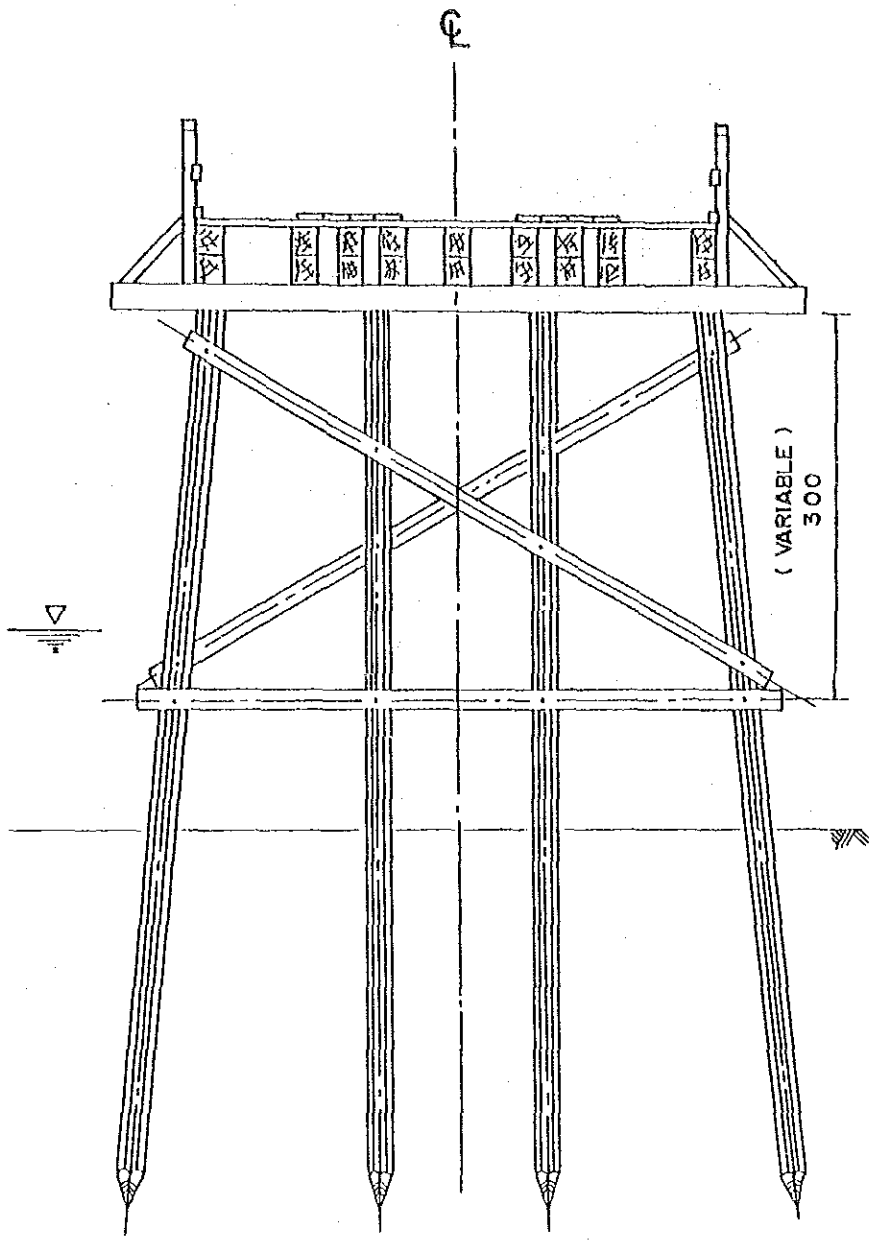
The length and number of piles should be decided in order to be adequate for the condition of the foundation materials.

(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 Ø 80 cm m
b) Rubble in mortar box culvert with RC slab 80 cm X 80 cm

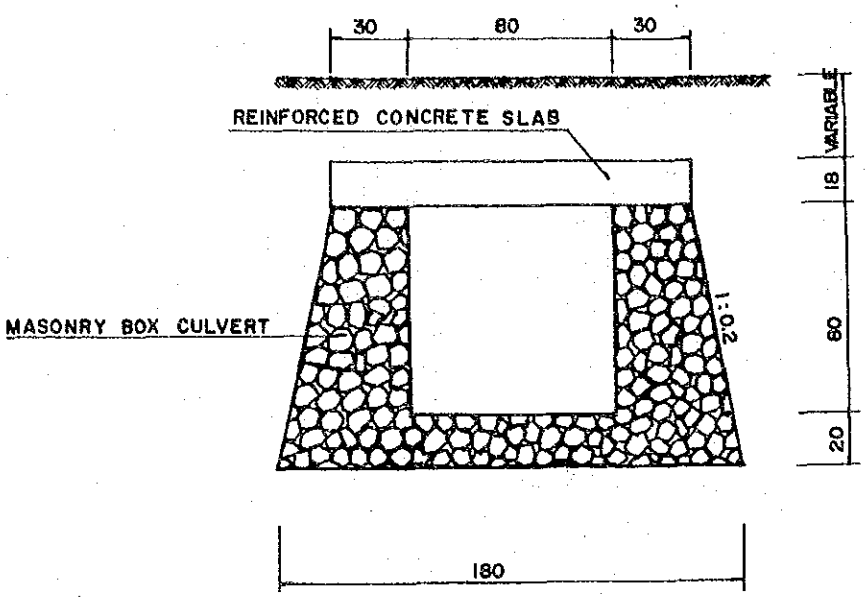
(2) Retaining Wall

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 RENFORCED CONCRETE PIPE CULVERT

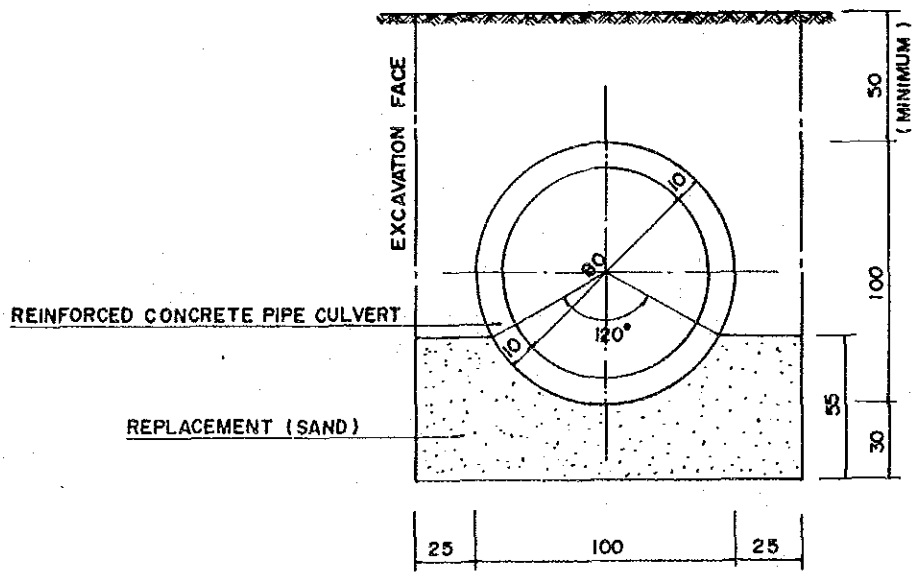
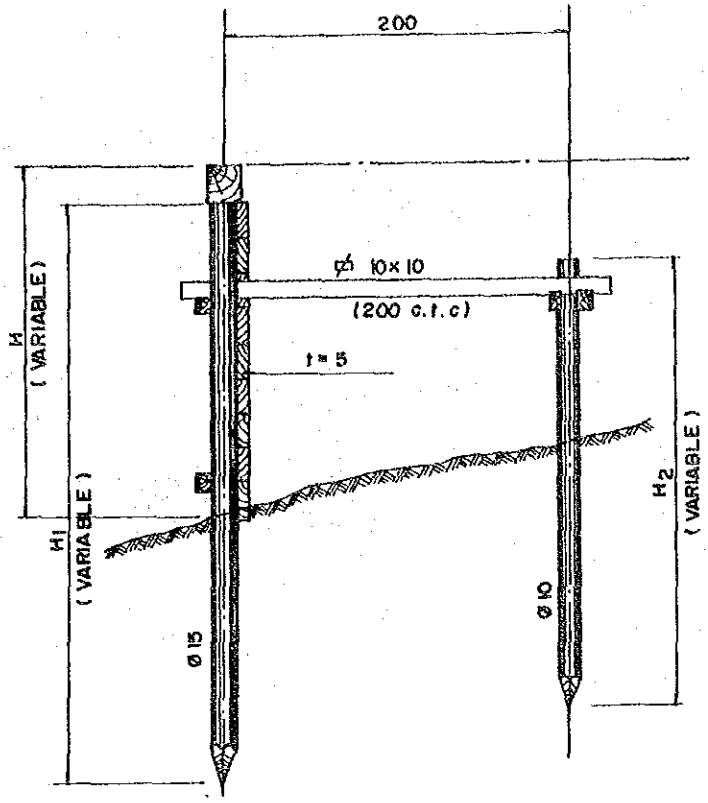
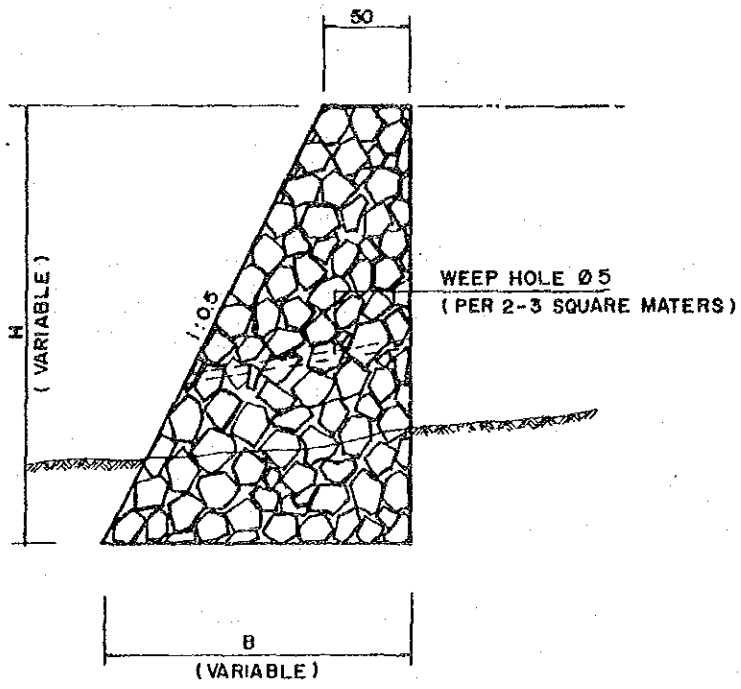


Fig. 3-3-3 STANDARD RETAINING WALLS

TIMBER RETAINING WALL



RUBBLE IN MORTAR WALL



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 Pasir and other Kabupatens in Kalimantan Timur Province are shown in Table 4-1-1.

Table 4-1-1 UNIT LABOUR PRICE

(Rp)

KABUPATEN	MAN	SKL LAB	CAP	MAS	LAB	DRIV	OPE
Pasir	3,500	3,000	4,000	4,000	2,500	3,500	5,000
Kutai	2,500	2,000	2,500	2,500	1,500	3,000	3,500
Berau	2,500	2,000	2,500	2,500	1,500	3,000	3,500
Bulungan	3,000	2,000	2,500	2,500	1,500	2,000	3,500
Average	2,875	2,250	2,875	2,875	1,750	2,875	4,125

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 Pasir together with for other Kabupatens in Kalimantan Timur Province.

Table 4-1-2 UNIT PRICE OF MATERIALS

(Rp)

MATERIAL	UNIT	PASIR	KUTAI	BERAU	BULUNGAN	AVERAGE
Bitumen	L	300	400	400	400	375
Asphalt oil	L	600	600	600	600	600
Gasoline	L	250	250	250	250	250
Sand	M^3	9,000	8,000	4,500	4,500	6,500
Cement	bag	5,000	4,500	6,000	4,500	5,000
River Stone	M^3	13,500	15,000	12,000	15,000	13,875
Steel moulds	Set	8,000	8,000	8,000	8,000	8,000
Timber	M^3	150,000	100,000	100,000	150,000	125,000
Paint	L	3,000	2,000	2,000	2,200	2,250
Reinforcing Steel	Kg	800	1,000	1,000	1,000	950
Tying Wire	Kg	900	1,200	1,200	1,200	1,125
Equivalent Royalty	M^3	250	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 TIMUR
KABUPATEN : PASIR

(UNIT : Rp) (6'85)

CODE NO	EQUIPMENT NAME	CLASS	LOCAL COST OWERSHIP	LOCAL COST OPERATION	LOCAL COST SUB-TOTAL	FOREIGN COST OWERSHIP	FOREIGN COST OPERATION	FOREIGN COST SUB-TOTAL	TOTAL COST
	Bulldozer	120 HP	272	14,408	14,680	7,769	1,029	8,798	23,478
	Bulldozer/Ripper	120 HP	298	15,423	15,721	8,499	1,583	10,082	25,803
	Swamp Bulldozer	120 HP	311	15,667	15,978	8,879	1,654	10,533	26,511
	Bulldozer	90 HP	173	9,854	10,027	4,914	650	5,564	15,591
	Bulldozer/Ripper	90 HP	186	10,446	10,632	5,299	987	6,286	16,918
	Bulldozer	65 HP	123	7,166	7,289	3,499	463	3,962	11,251
	Bulldozer/Ripper	65 HP	134	7,618	7,752	3,819	711	4,530	12,282
	Swamp Bulldozer	90 HP	185	10,437	10,622	5,284	984	6,268	16,890
	Swamp Bulldozer	65 HP	142	7,422	7,564	4,049	754	4,803	12,367
	Motor Grader	110 HP	243	12,426	12,669	6,919	1,289	8,208	20,877
	Motor Grader	75 HP	168	8,511	8,679	4,779	890	5,669	14,348
	Motor Grader	65 HP	151	7,477	7,628	4,299	801	5,100	12,728
	Road Stabilizer	W=1850 mm	301	3,398	3,699	8,594	426	9,020	12,719
	Vibratory Roller	4 ton	102	3,747	3,849	2,899	384	3,283	7,132
	Hand-guide Vib. Roller	1000 Kg	77	666	743	849	29	878	1,621
	Tire Roller	8-15 ton	109	8,572	8,681	3,106	102	3,208	11,889
	Vibratory Roller (D&T)	4 ton	102	3,747	3,849	2,899	384	3,283	7,132
	Hand-guide Vib. Roller	600 Kg	54	454	508	600	20	620	1,128
	Rough Terrain Crane	10 ton	352	14,508	14,860	10,039	748	10,787	25,647
	Hydraulic Excavator; Wheel	0.3 m3	144	8,881	9,025	4,109	544	4,653	13,678
	Wheel Loader	1.2 m3	246	9,310	9,556	7,019	929	7,948	17,504
	Wheel Loader	0.3 m3	80	3,270	3,350	2,269	300	2,569	5,919
	Water Tank Truck	4000 ltr.	79	3,318	3,397	868	120	988	4,385
	Fuel Tank Truck	4000 ltr.	80	3,324	3,404	882	122	1,004	4,408
	Dump Truck	3.0 ton	133	4,078	4,211	1,469	204	1,673	5,884
	Flat Bed Truck with Crane	3.0 ton	61	3,565	3,626	1,716	127	1,843	5,469
	Dump Loader Truck	12 ton	135	22,439	22,574	3,837	127	3,964	26,538
	Dump Truck	5.0 ton	198	6,761	6,959	2,189	305	2,494	9,453
	Flat Bed Truck	3.0 ton	20	3,136	3,156	563	41	604	3,760
	Portable Crusher/Screening	30-40 t/h	658	24,231	24,889	18,800	2,490	21,290	46,179
	Concrete Mixer	0.5 m3	486	2,474	2,960	5,400	423	5,823	8,783
	Water Pump	200 l/min	18	301	319	188	6	194	513
	Concrete Vibrator	3.3 HP	7	265	272	73	2	75	347
	Asphalt Sprayer	850 ltr.	92	824	916	1,019	142	1,161	2,077

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 TIMUR KAB : PASIR

(Rp)

ITEM	UNIT	LOCAL	FOREIGN	TOTAL
Site Clearance in Light Bush	m2	186	91	277
Subgrade Preparation	m2	24	11	35
Normal Fill	m3	1,928	863	2,791
Fill in Swamp	m3	2,849	1,053	3,902
Normal Excavation to Spoil	m3	1,123	523	1,646
Sub Base Course	m3	3,606	1,348	4,954
Base Course	m3	4,956	2,300	7,256
Shoulder	m2	340	146	486
Asphalt Patching	m2	4,491	1,377	5,868
Surface Dressing (Single)	m2	628	595	1,223
Surface Dressing (Double)	m2	792	936	1,728
Earth Drain	m	1,115	119	1,234
Earth Drain in Swamp (by machine)	m3	1,392	474	1,866
Pipe Culvert D80cm	m	54,330	45,010	99,340
Masonry Culvert (80x80cm)	m	80,214	38,624	118,838
Retaining Wall and Wing Wall (Timber)	m2	15,797	246	16,043
Retaining Wall and Wing Wall (Masonry)	m3	59,867	11,872	71,739
Gabion Protection	m3	19,211	120	19,331
Manual routine maintenance of road	Km	183,872	7,248	191,120
Routine maintenance of earth road	Km	110,064	37,924	147,988
Routine maintenance of gravel road	Km	218,907	88,092	306,999
Routine maintenance of asphalt road	Km	449,100	137,700	586,800

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 TIMUR KAB : PASIR

(Rp)

ITEM	UNIT	LOCAL	FOREIGN	TOTAL
Superstructure (Timber;Span 3m;10T)	m2	57,679	4,083	61,762
Superstructure (Timber;Span 5m;10T)	m2	63,888	4,508	68,396
Superstructure (Timber;Span 8m;10T)	m2	84,621	5,920	90,541
Superstructure (Timber;Span 3m;BM50)	m2	71,519	5,048	76,567
Superstructure (Timber;Span 5m;BM50)	m2	78,078	5,469	83,547
Superstructure (Timber;Span 8m;BM50)	m2	99,024	6,922	105,946
Superstructure (Concrete;Span 3m;BM50)	m2	64,259	91,530	155,789
Superstructure (Concrete;Span 5m;BM50)	m2	65,927	102,163	168,090
Superstructure (Concrete;Span 8m;BM50)	m2	67,861	111,206	179,067
Superstructure (Concrete;Span10m;BM50)	m2	74,189	126,183	200,372
Superstructure (Concrete;Span15m;BM50)	m2	79,864	148,488	228,352
Substructure (Pier;for Timber;10T)	NO	502,446	37,984	540,430
Substructure (Abut;for Timber;10T)	NO	1,373,450	171,931	1,545,381
Substructure (Pier;for Timber;BM50)	NO	738,952	56,225	795,177
Substructure (Abut;for Timber;BM50)	NO	1,551,898	192,024	1,743,922
Substructure (Pier;for Concrete;BM50)	NO	2,403,437	477,264	2,880,701
Substructure (Abut;for Concrete;BM50)	NO	4,881,961	999,658	5,881,619
Demolition of Bridge (Timber->Timber)	m2	15,994	1,551	17,545
Demolition of Bridge (Timber->Concrete)	m2	15,994	1,551	17,545
Demolition of Bridge (Concrete)	m2	110,744	71,237	181,981
Maintenance of Timber Bridge (New)	m2	10,376	1,232	11,608
Maintenance of Concrete Bridge (New)	m2	2,332	2,859	5,191
Maintenance of Timber Bridge (Exist)	m2	9,514	2,459	11,973
Maintenance of Concrete Bridge (Exist)	m2	4,792	2,414	7,206

Chapter 5 RESULTS OF ECONOMIC FEASIBILITY EVALUATION

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 Pasir are shown in Table 5-1-1.

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

KABUPATEN : PASIR

CRITERIA NO	ROAD LINK NO
(6)	01,02,03,04,05,06,07,08,09,10,13
(8)	15,26,32,33,34,35

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 TIMUR KABUPATEN : PASIR

LINK NO	LENGTH	CLASS	IRR(%)	REMARK
19	6 Km	IIIA	41.750	VOC
37	12 Km	IIIB-1	37.208	VOC
29	30 Km	IIIB-2	14.910	Surplus
23	15 Km	IIIB-1	13.449	Surplus
14	17 Km	IIIB-2	13.330	Surplus
20	4 Km	IIIB-2	10.767	Surplus
18	10 Km	IIIB-1	5.373	Surplus
16	16 Km	IIIC	0.078	Surplus
21	2 Km	IIIC	0.078	Surplus
22	12 Km	IIIC	0.078	Surplus
17	1 Km	IIIB-2	0.078	VOC
24	28 Km	IIIC	0.078	Surplus
25	6 Km	IIIB-2	0.078	Surplus
27	30 Km	IIIB-2	0.078	Surplus
28	18 Km	IIIC	0.078	Surplus
12	4 Km	IIIB-2	0.078	VOC
30	30 Km	IIIB-2	0.078	Surplus
31	35 Km	IIIC	0.078	Surplus
36	18 Km	IIIC	0.078	Surplus
11	3 Km	IIIB-2	0.078	Surplus

Table 5-2-2 RESULTS OF SECONDARY ANALYSIS

PROVINCE : KALIMANTAN TIMUR KABUPATEN : PASIR

LINK NO	LENGTH	CLASS	IRR(%)	REMARK
18	10 Km	IIIB-2	5.905	Surplus

Table 5-2-3 RANKING OF FEASIBILITY ROAD LINKS

PROVINCE : KALIMANTAN TIMUR KABUPATEN : PASIR

LINK NO	LENGTH	CLASS	NPV (1000Rp)	B/C	IRR (%)	REMARK
37	12 Km	IIIB-1	358626	2.293	37.208	VOC
19	6 Km	IIIA	259518	2.581	41.750	VOC
29	30 Km	IIIB-2	80459	1.214	14.910	Surplus
23	15 Km	IIIB-1	33773	1.133	13.449	Surplus
14	17 Km	IIIB-2	24418	1.126	13.330	Surplus
20	4 Km	IIIB-2	1770	1.032	10.767	Surplus
SUM	84 Km		758564			

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: Pasir

($Rpx10^6$)

COST	FOREIGN CURRENCY	LOCAL CURRENCY	TOTAL
CONSTRUCTION	689	1,555	2,244
MAINTENANCE	65	279	344
SUPPLEMENTATION	470	-	470
WORKSHOP EQUIPMENT & TOOLS	28	-	28
LABORATORY EQUIPMENT	12	-	12
SURVEY EQUIPMENT	5	-	5
TOTAL	1,269	1,834	3,103

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

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

($Rpx10^6$)

COST	FOREIGN CURRENCY	LOCAL CURRENCY	TOTAL
CIVIL WORK	248	1,818	2,066
CONSTRUCTION & MAINTENANCE EQUIPMENT	913	-	913
SPARE PARTS	63	16	79
WORKSHOP/LABORATORY/SURVEY EQUIPMENT	45	-	45
TOTAL	1,269	1,834	3,103

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.

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 12 links with the total length of 206 km which is 58% of the 354 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 : PASIR

REASON FOR SELECTION	ROAD LINK NO
Feasible	
- Primary	14,19,20,23,29,37
- Secondary	-
Engineering Point of View	11,25,27,30,31,36
Basic Human Needs	-

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

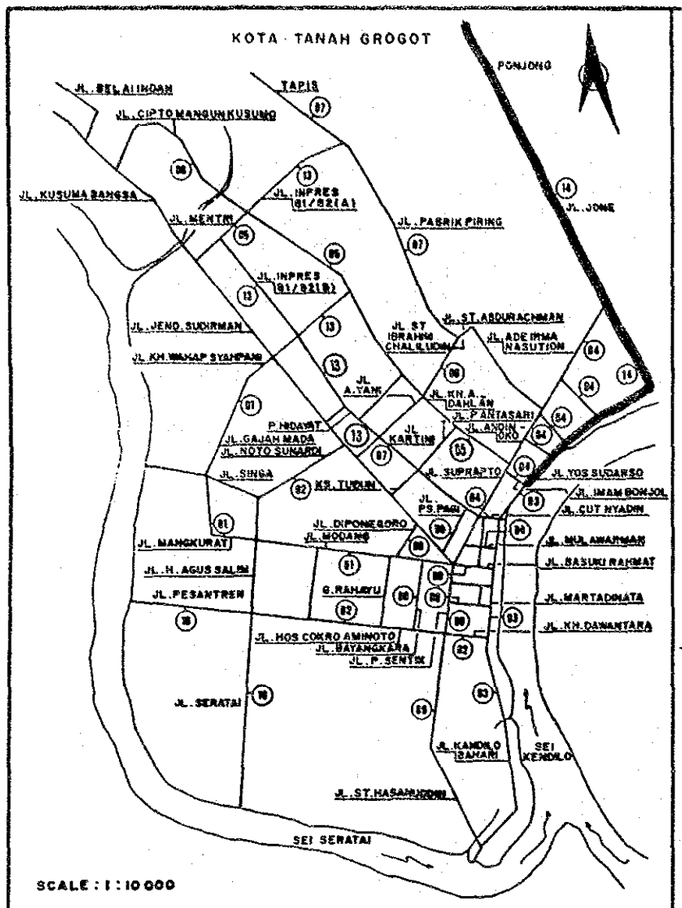
Since Road Links No 27, No 30, No 31 and No 36 are key road links which are located at the strategic point to complete the local road network consisting of feasible road links in the south of the Kabupaten capital, these road links are selected from the engineering points of view.

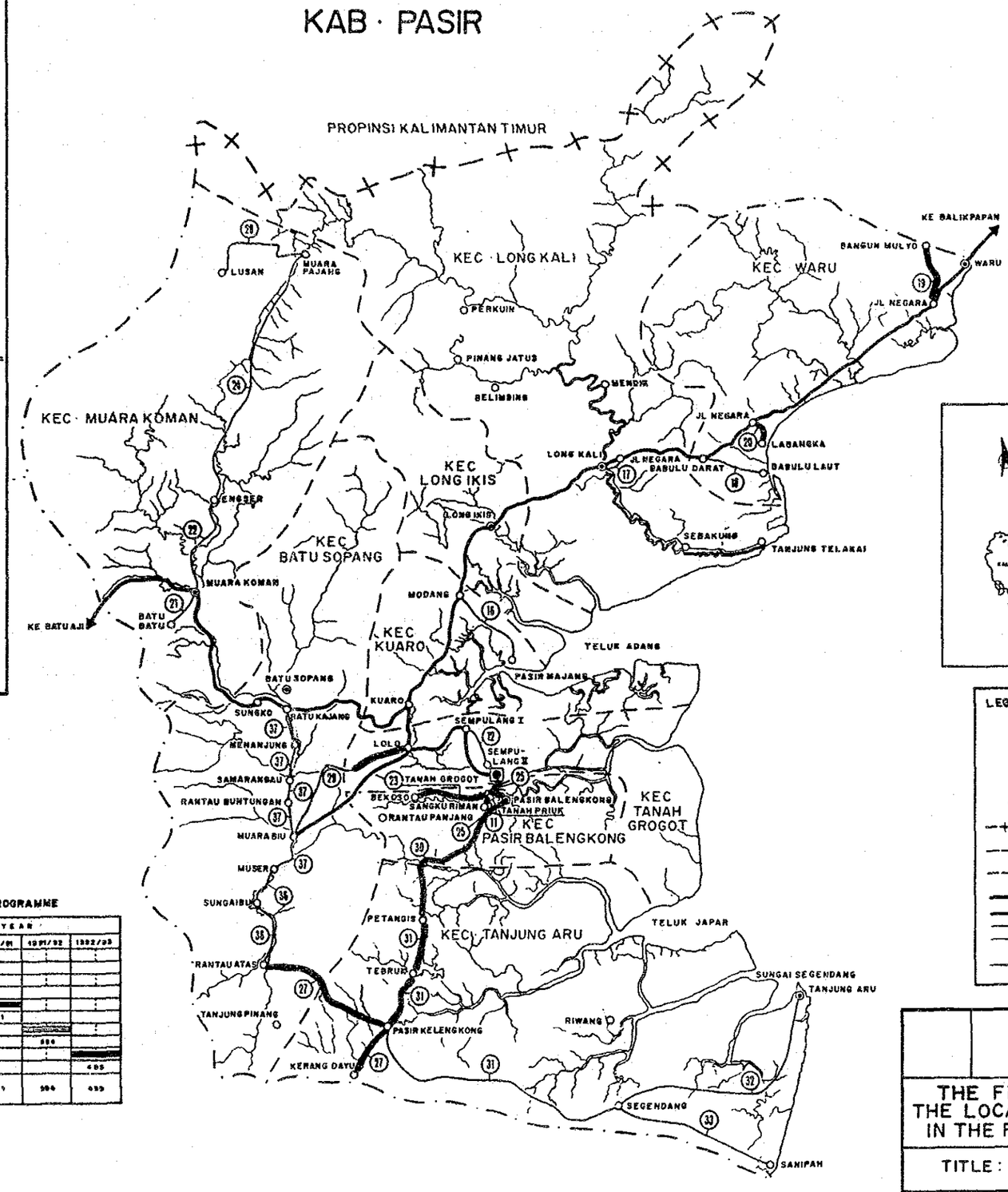
The order of proceeding with the improvement of the proposed road links are decided as shown in Table 6-1-4.

Table 6-1-4 ROAD LINS TO BE IMPROVED BY YEAR

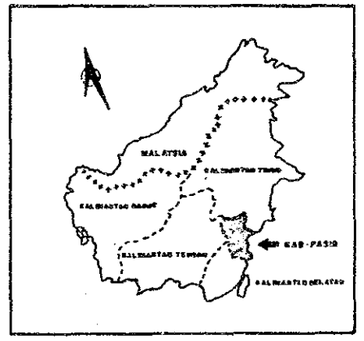
PROV : KALIMANTAN TIMUR KAB : PASIR

YEAR	LINK NO	( ) : rate
1988	11, 14	
1989	30, 31 (60%)	
1990	20, 27, 31 (40%)	
1991	29 (60%), 36, 37	
1992	19, 23, 25, 29 (40%)	





LOCATION MAP



LEGEND :

- KABUPATEN CAPITAL
- KECAMATAN CAPITAL
- OTHER CITY
- (3) LINK NUMBER
- PROVINCIAL BOUNDARY
- KABUPATEN BOUNDARY
- KECAMATAN BOUNDARY
- NATIONAL ROAD
- PROVINCIAL ROAD
- KABUPATEN ROAD
- VILLAGE ROAD
- RIVER

CONSTRUCTION PROGRAMME

ROAD LINK NUMBER	FISCAL YEAR 1988/89	1989/90	1990/91	1991/92	1992/93
11,16	193				
30,31		434			
20,27,34			311		
29,36,37				384	
19,22					485
25,28					
TOTAL COST (10^6 Rp)	193	434	311	384	485

SCALE :

0 5 10 15 Km

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

TITLE : CONSTRUCTION PROGRAMME

SOURCE:	SCALE:	PROVINCE : KALIMANTAN TIMUR
DIREKTORAT JENDERAL CIPTA KARYA	AS SHOWN	KABUPATEN : PASIR

(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 ROAD LINKS TO BE MAINTAINED

PROV : KALIMANTAN TIMUR KAB : PASIR

(1000Rp)

LINK NO	LENGTH (Km)	BA (%)	SD (%)	RU (%)	RB (%)	ASPHAL (Km)	GRAVEL (Km)	EARTH (Km)	TH NO	AREA (m2)	RC NO	AREA (m2)	BRIDGE COST	LOCAL COST	FOREIGN COST	TOTAL COST
1	2	50.0	30.0	20.0	0.0	2	0	0	1	21.60	0	0.00	259	1,471	343	1,814
2	2	67.5	32.5	0.0	0.0	2	0	0	1	22.40	0	0.00	268	1,479	345	1,824
4	2	35.0	55.0	10.0	0.0	2	0	0	0	0.00	0	0.00	0	1,266	290	1,556
5	2	40.0	45.0	15.0	0.0	1	0	1	0	0.00	0	0.00	0	927	190	1,117
8	3	44.0	37.7	18.3	0.0	2	0	1	0	0.00	0	0.00	0	1,560	335	1,895
9	2	15.0	37.5	47.5	0.0	2	0	0	1	25.00	0	0.00	299	1,504	351	1,855
10	2	27.5	65.0	5.0	2.5	1	0	1	1	26.00	0	0.00	311	1,174	254	1,428
12	4	50.0	45.0	5.0	0.0	2	2	0	0	0.00	0	0.00	0	2,072	481	2,553
13	2	30.0	45.0	25.0	0.0	2	0	0	0	0.00	0	0.00	0	1,266	290	1,556
15	3	60.0	33.3	6.7	0.0	0	3	0	0	0.00	0	0.00	0	1,208	286	1,494
19	6	20.8	58.3	17.5	3.3	2	1	3	0	0.00	0	0.00	0	2,551	521	3,072
21	2	0.0	30.0	60.0	10.0	0	1	1	1	15.00	0	0.00	180	839	177	1,016
23	15	0.0	44.0	56.0	0.0	0	15	0	4	139.20	0	0.00	1,667	7,366	1,772	9,138
25	6	0.0	30.0	70.0	0.0	0	6	0	0	0.00	0	0.00	0	2,417	572	2,989
30	30	35.0	48.7	16.3	0.0	0	30	0	0	0.00	0	0.00	0	12,083	2,860	14,943
SUM	83					18	58	7	9	249.20	0	0.00	2,984	39,183	9,067	48,250

6.1.3 Annual Construction and Maintenance Cost

The annual allocation of the total construction and maintenance cost in the five years programme for Kabupaten Pasir 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 2,244 x 10^6 and maintenance cost is Rp 344 x 10^6 which is approximately 13% of the total expenditure.

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

PROV : KALIMANTAN TIMUR KAB : PASIR

(UNIT : 1000Rp)

ITEM	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)	
LOCAL CURRENCY :	141,717	323,791	362,799	413,193	313,588	1,555,088	(69.3%)
Ownership Cost	1,844	4,811	5,450	6,073	4,299	22,477	(1.4%)
Operation Cost	66,377	168,463	189,527	216,007	154,993	795,367	(51.1%)
Material Cost	21,354	16,215	25,427	30,568	51,299	144,863	(9.3%)
Labour Cost	33,657	92,068	95,073	106,650	62,094	389,542	(25.0%)
Contingency	18,485	42,234	47,322	53,895	40,903	202,839	(13.0%)
FOREIGN CURRENCY :	53,605	130,571	149,477	172,417	182,943	689,013	(30.7%)
Ownership Cost	33,448	82,699	91,916	104,563	77,297	389,923	(56.6%)
Operation Cost	4,818	12,087	13,405	15,208	10,798	56,316	(8.2%)
Material Cost	8,347	18,754	24,659	30,157	70,986	152,903	(22.2%)
Labour Cost	0	0	0	0	0	0	(0.0%)
Contingency	6,992	17,031	19,497	22,489	23,862	89,871	(13.0%)
TOTAL COST :	195,322	454,362	512,276	585,610	496,531	2,244,101	
Ownership Cost	35,292	87,510	97,366	110,636	81,596	412,400	(18.4%)
Operation Cost	71,195	180,550	202,932	231,215	165,791	851,683	(38.0%)
Material Cost	29,701	34,969	50,086	60,725	122,285	297,766	(13.3%)
Labour Cost	33,657	92,068	95,073	106,650	62,094	389,542	(17.4%)
Contingency	25,477	59,265	66,819	76,384	64,765	292,710	(13.0%)

(Contingency : 15%)

Table 6-1-6 (2) CONSTRUCTION AND MAINTENANCE COST

(MAINTENANCE)

PROV : KALIMANTAN TIMUR KAB : PASIR

(UNIT : 1000Rp)

ITEM	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)	
LOCAL CURRENCY :	19,574	43,410	50,828	77,246	87,470	278,528	(81.1%)
Ownership Cost	186	410	469	728	826	2,619	(0.9%)
Operation Cost	8,781	19,307	22,477	36,231	39,810	126,606	(45.5%)
Material Cost	720	1,934	2,633	2,406	3,306	10,999	(3.9%)
Labour Cost	9,887	21,759	25,249	37,881	43,528	138,304	(49.7%)
FOREIGN CURRENCY :	4,532	10,088	11,682	18,102	20,311	64,715	(18.9%)
Ownership Cost	3,688	8,146	9,488	15,275	16,775	53,372	(82.5%)
Operation Cost	439	956	1,119	1,841	2,027	6,382	(9.9%)
Material Cost	405	986	1,075	986	1,509	4,961	(7.7%)
Labour Cost	0	0	0	0	0	0	(0.0%)
TOTAL COST :	24,106	53,498	62,510	95,348	107,781	343,243	
Ownership Cost	3,874	8,556	9,957	16,003	17,601	55,991	(16.3%)
Operation Cost	9,220	20,263	23,596	38,072	41,837	132,988	(38.7%)
Material Cost	1,125	2,920	3,708	3,392	4,815	15,960	(4.6%)
Labour Cost	9,887	21,759	25,249	37,881	43,528	138,304	(40.3%)

Table 6-1-6 (3) CONSTRUCTION AND MAINTENANCE COST

(TOTAL)

PROV : KALIMANTAN TIMUR KAB : PASIR

(UNIT : 1000Rp)

ITEM	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)	
LOCAL CURRENCY :	161,291	367,201	413,627	490,439	401,058	1,833,616	(70.9%)
Ownership Cost	2,030	5,221	5,919	6,801	5,125	25,096	(1.4%)
Operation Cost	75,158	187,770	212,004	252,238	194,803	921,973	(50.3%)
Material Cost	22,074	38,149	28,060	32,974	54,605	155,862	(8.5%)
Labour Cost	43,544	113,827	120,322	144,531	105,622	527,846	(28.8%)
Contingency	18,485	42,234	47,322	53,895	40,903	202,839	(11.1%)
FOREIGN CURRENCY :	58,137	140,659	161,159	190,519	203,254	753,728	(29.1%)
Ownership Cost	37,136	90,845	101,404	119,838	94,072	443,295	(58.8%)
Operation Cost	5,257	13,043	14,524	17,049	12,825	62,698	(8.3%)
Material Cost	8,752	19,740	25,734	31,143	72,495	157,864	(20.9%)
Labour Cost	0	0	0	0	0	0	(0.0%)
Contingency	6,992	17,031	19,497	22,489	23,862	89,871	(11.9%)
TOTAL COST :	219,428	507,860	574,786	680,958	604,312	2,587,344	
Ownership Cost	39,166	96,066	107,323	126,639	99,197	468,391	(18.1%)
Operation Cost	80,415	200,813	226,528	269,287	207,628	984,671	(38.1%)
Material Cost	30,826	37,889	53,794	64,117	127,100	313,726	(12.1%)
Labour Cost	43,544	113,827	120,322	144,531	105,622	527,846	(20.4%)
Contingency	25,477	59,265	66,819	76,384	64,765	292,710	(11.3%)

(Contingency : 15%)

6.1.4 Construction and Maintenance Equipment Cost

(1) Required Number of Equipment

The required numbers of construction equipment for Kabupaten Pasir 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.

- Nil

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-Motor Grader 75 HP
- 1-Tire Roller 8-15 Ton
- 1-Dump Truck 3 Ton
- 1-Hand Guided Vibratory Roller 1000 Kg
- 1-Flat Bed Truck 3 Ton

b. Equipment for Bridge Maintenance

- 1-Flat Bed Truck with Grane 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 TIMUR KAB : PASIR

EQUIPMENT NAME	WORKABLE	EXISTING	(1988)	(1989)	(1990)	(1991)	(1992)
Bulldozer/Ripper	240	0	0.38	1.00	0.97	0.98	0.71
Swamp Bulldozer	240	0	0.00	0.00	0.00	0.00	0.00
Motor Grader	250	0	0.65	1.75	2.14	2.24	1.41
Hand-guide Vib. Roller	250	0	0.23	0.40	0.60	0.10	0.37
Tire Roller	240	0	0.07	0.00	0.00	0.28	0.62
Vibratory Roller (D&T)	250	0	0.43	1.25	1.74	1.77	0.99
Hydraulic Excavator; Wheel	240	0	0.00	0.00	0.00	0.00	0.00
Wheel Loader	250	0	0.74	1.67	1.85	2.13	1.57
Water Tank Truck	250	0	0.17	0.49	0.86	0.92	0.46
Dump Truck	250	0	5.22	14.69	16.71	18.77	11.72
Flat Bed Truck with Crane	250	0	0.15	0.32	0.46	0.09	0.27
Flat Bed Truck	250	0	0.16	0.14	0.21	0.36	0.83
Portable Crusher/Screening	250	0	0.13	0.16	0.03	0.22	0.30
Concrete Mixer	240	0	0.00	0.12	0.18	0.03	0.11
Water Pump	240	0	0.00	0.10	0.15	0.03	0.09
Concrete Vibrator	240	0	0.00	0.06	0.08	0.02	0.05
Asphalt Sprayer	240	0	0.07	0.00	0.00	0.28	0.62

NOTE WORKABLE : workable days in a year

EXISTING : number of existing equipment

Table 6-1-8 EQUIPMENT PURCHASE COST

PROV : KALIMANTAN TIMUR KAB : PASIR

(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	1	8,500
Tire Roller	8-15 ton	31,070	1	31,070
Vibratory Roller (D&T)	4 ton	29,000	2	58,000
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	2	140,400
Water Tank Truck	4000 ltr.	12,750	1	12,750
Dump Truck	3.0 ton	14,700	16	235,200
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	1	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	912,860
OWNERSHIP COST (FOREIGN)	443,295
EQUIPMENT COST SUPPLEMENTED	469,565

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 TIMUR KAB : PASIR

ITEM	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
Site Clearance in Light Bush	m2	0.00	0.00	0.00	0.00	0.00	0.00
Subgrade Preparation	m2	0.00	210000.00	480000.00	480000.00	144000.00	1314000.00
Normal Fill	m3	0.00	0.00	0.00	0.00	0.00	0.00
Fill in Swamp	m3	0.00	0.00	0.00	0.00	0.00	0.00
Normal Excavation to Spoil	m3	420.00	3561.60	7856.40	8265.20	2246.80	22350.00
Sub Base Course	m3	4569.00	14294.00	30400.00	28320.00	12080.00	89663.00
Base Course	m3	4920.00	6300.00	960.00	7680.00	9515.00	29375.00
Shoulder	m2	126000.00	321000.00	288000.00	288000.00	229500.00	1252500.00
Asphalt Patching	m2	0.00	0.00	0.00	0.00	147.00	147.00
Surface Dressing (Single)	m2	12000.00	0.00	0.00	48000.00	84500.00	144500.00
Surface Dressing (Double)	m2	0.00	0.00	0.00	0.00	16000.00	16000.00
Earth Drain	m	0.00	40692.00	27128.00	53940.00	1700.00	123460.00
Earth Drain in Swamp (by machine)	m3	0.00	0.00	0.00	0.00	0.00	0.00
Pipe Culvert D80cm	m	0.00	486.20	629.80	144.80	377.20	1638.00
Masonry Culvert (80x80cm)	m	0.00	0.00	0.00	0.00	0.00	0.00
Retaining Wall and Wing Wall (Timber)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Retaining Wall and Wing Wall (Masonry)	m3	0.00	142.08	235.52	28.16	147.84	553.60
Gabion Protection	m3	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber;Span 3m;10T)	m2	85.72	0.00	0.00	0.00	0.00	85.72
Superstructure (Timber;Span 5m;10T)	m2	48.00	0.00	16.00	0.00	0.00	64.00
Superstructure (Timber;Span 8m;10T)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber;Span 3m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber;Span 5m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber;Span 8m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span10m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span15m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Pier;for Timber;10T)	NO	5.00	0.00	0.00	0.00	0.00	5.00
Substructure (Abut;for Timber;10T)	NO	14.00	0.00	2.00	0.00	0.00	16.00
Substructure (Pier;for Timber;BM50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Abut;for Timber;BM50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Pier;for Concrete;BM50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Abut;for Concrete;BM50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Demolition of Bridge (Timber->Timber)	m2	108.44	0.00	0.00	0.00	0.00	108.44
Demolition of Bridge (Timber->Concrete)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Demolition of Bridge (Concrete)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Manual routine maintenance of road	Km	41.50	88.00	103.00	172.00	188.50	593.00
Routine maintenance of earth road	Km	3.50	7.00	7.00	7.00	5.50	30.00
Routine maintenance of gravel road	Km	29.00	60.00	75.00	144.00	151.00	459.00
Routine maintenance of asphalt road	Km	9.00	21.00	21.00	21.00	32.00	104.00
Maintenance of Timber Bridge (New)	m2	0.00	0.00	133.72	0.00	149.72	283.44
Maintenance of Concrete Bridge (New)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance of Timber Bridge (Exist)	m2	124.60	410.40	410.40	410.40	340.80	1696.60
Maintenance of Concrete Bridge (Exist)	m2	0.00	0.00	0.00	0.00	0.00	0.00

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.

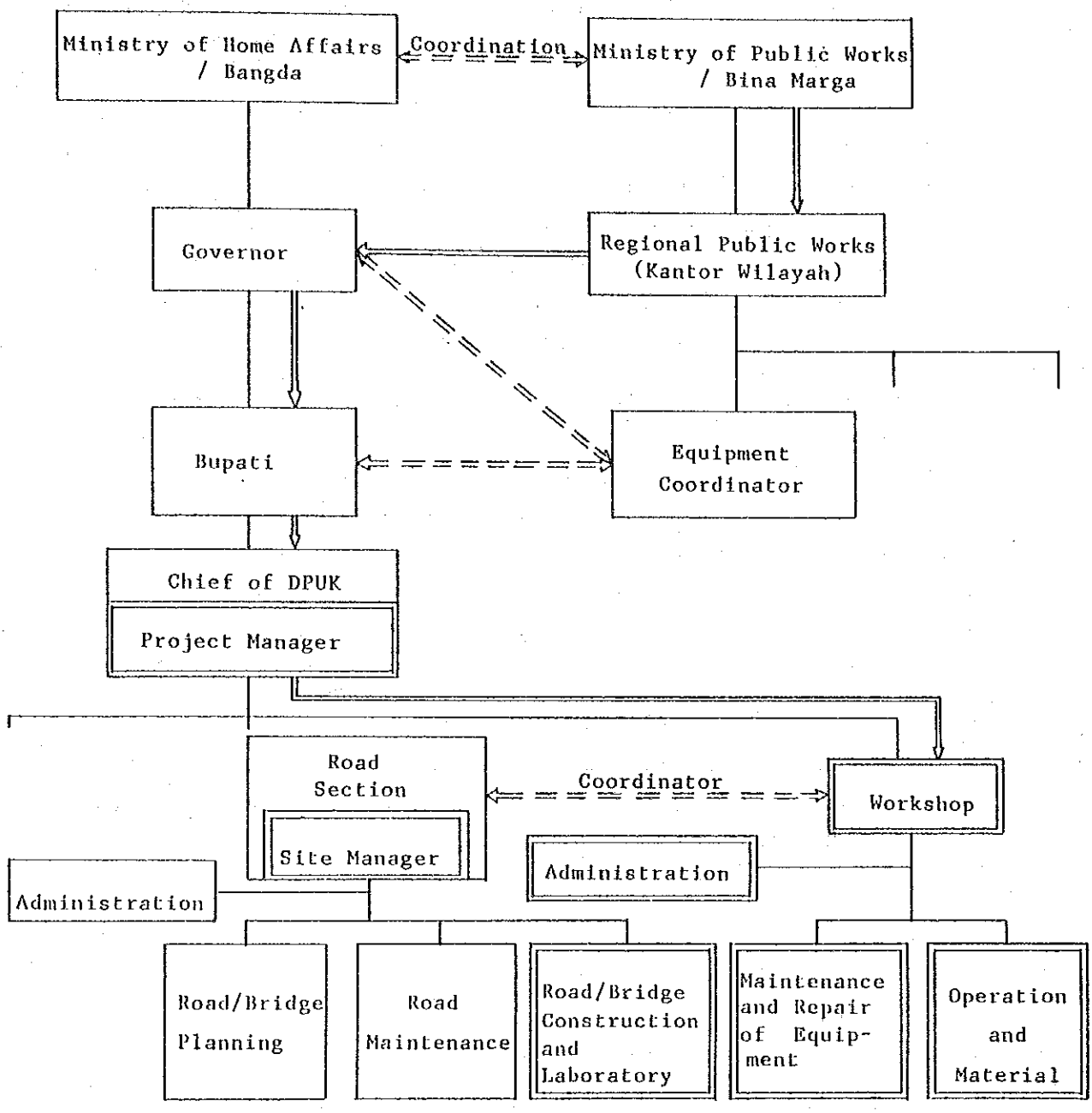
It is recommended that the workshop is newly organized to consist of three sub-sections, i.e. maintenance and repair of equipment, operation and materials, and administration to execute the main tasks described in Clause 3.5.

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

APPENDIX

INPUT DATA

Appendix A-1 FOR ESTIMATION OF THE PRODUCER'S SURPLUS BENEFIT

PRV. : KALIMANTAN TIMUR KAB. : PASIR SURVEY YEAR : 1984

Code No.	KECAMATAN NAME	CULTIVATED AREA : (PA)	YIELD RATE : (Y)	FARMER'S POPULATION : (AP)	CIRCULATED COMMODITY : (PG)
01	BATU SOPANG	904	1.21	1,450	0
02	TANJUNG ARU	264	1.29	1,620	0
03	PASIR BELENGKONG	1,372	2.41	3,100	0
04	TANAH GRODOT	1,504	2.93	5,120	0
05	KUARO	264	1.52	1,810	0
06	LONG IKIS	545	1.56	2,120	0
07	MUARA KOMAN	400	1.32	1,320	0
08	LONG KALI	725	2.30	3,000	0
09	WARU	1,810	2.53	4,150	0

	r_1	r_2	r_3	r_4
ANNUAL AVERAGE GROWTH RATE %	7.0	2.4	4.5	5.0

FARMER'S CONSUMPTION : (Cp)	NON-AGRO REQUIRMENT : (NG)
0.13 Ton/head/year	0.16 Ton/ton

	SEDAN	BUS	TRUCK	MOTOR CYCLE
RATE OF EACH VEHICLE TYPE %	30.32	1.94	16.94	50.80

AVERAGE FREIGHT TONAGE	0.4 Ton/Truck

Appendix A-2 Engineering Data

ROAD LINK DATA

PROVINCE : Kalimantan Timur

KABUPATEN: Pasir

LINK NO.	BEGINNING POINT (DESA NAME)	END POINT (DESA NAME)	LENGTH (KM)	THROUGH THE KEC. NAME & LENGTH		REMARKS
				KEC. NAME	LENGTH (KM)	
01	Jl.Gajah Mada	Jl. Modang	2	Tanah Grogot	2	Dalam Kota
02	Jl. Noto Sunardi	Jl.H.O.S Cokroaminoto	2	Tanah Grogot	2	Dalam Kota
03	Jl.Kandilo Bahari	Jl.Yos Sudarso	2	Tanah Grogot	2	Dalam Kota
04	Jl.Andin oko	Jl.Ade Irma Nasution	2	Tanah Grogot	2	Dalam Kota
05	Jl. KH.Ahmad Dahlan	Jl.Mentri	2	Tanah Grogot	2	Dalam Kota
06	Jl. Dr. Cipto Mangun Kusomo	Jl. Abdul - Rachman	2	Tanah Grogot	2	Dalam Kota
07	Jl.Kartini	Jl. Pabrik Piring	6	Tanah Grogot	6	Dalam Kota
08	Jl.P.Singa	Jl. Yos Sudar -so Ilir	3	Tanah Grogot	3	Dalam Kota
09	Jl.P.Sentik	Jl.Kandilo Bahari	2	Tanah Grogot	2	Dalam Kota
10	Jl.Seratai	Jl.Pesantren	2	Tanah Grogot	2	Dalam Kota
11	Tanah Priuk	Pasir Balengkong	3	Pasir Balengkong	3	
12	Sempulang I	Sempulang II	4	Tanah Grogot	4	
13	Jl.P.Hidayat	Jl. Inpres	2	Tanah Grogot	2	Dalam Kota
14	Jl. Jone	Ponjong	17	Tanah Grogot	17	Dalam Kota
15	Kuaro	Jangkar	3			
16	Modang	Pasir Majang	16	Kuaro	16	
17	Jl.Negara	Longkali	1	Longkali	1	
18	Babulu Darat	Babulu Laut	10	Waru	10	
19	Jl.Negara	Bangun Mulyo	6	Waru	6	
20	Jl.Negara	Labangka	4	Waru	4	
21	Muara Koman	Batu-batu	2	Muara Koman	2	
22	Muara Koman	Engser	12	Muara koman	12	
23	Tanah Priuk	Bekoso	15	Pasir Balengkong	15	
24	Engser	Muara Pajang	28	Muara Koman	28	

Please note the priority No. in the Remarks of this list for each links No. according to the each Kabupaten's development plan.

ROAD LINK DATA

PROVINCE : Kalimantan Timur

KABUPATEN: Pasir

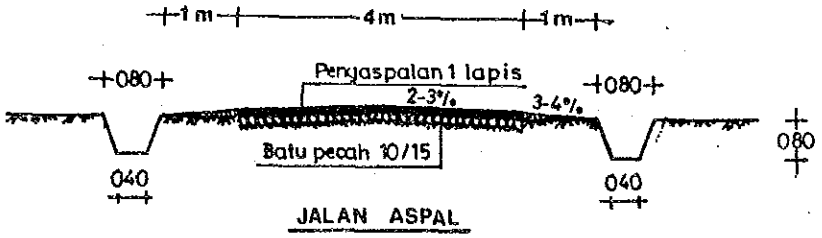
LINK NO.	BEGINNING POINT (DESA NAME)	END POINT (DESA NAME)	LENGTH (KM)	THROUGH THE KEC. NAME & LENGTH		REMARKS
				KEC. NAME	LENGTH (KM)	
25	Tanah Grogot	Sangkuriman	18	Pasir Baleng-kong	18	
26						
27	Kerang Dayu	Rantau Atas	30	Tanjung Aru	15	
				Batu sopong	15	
28	Muara Pajang	Lusan	18	Muara Koman	18	
29	L o l o	Muara Biu	30	Tanah Grogot	15	
				Batu sopang	15	
30	Pasir Baleng-kong	Petangis	30	Ps.Balengkong	23	
				Tanjung Aru	7	
31	Petangis	Segendang	35	Tanjung Aru	35	
32	Segendang	Tanjung Aru	33	Tanjung Aru	33	
33	Segendang	Sanipah	26	Tanjung aru	26	
34			4		4	
35			5		5	
36	Rantau Atas	Muser	18	Batu Sopang	18	
37	Batu Kajang	Muser	12	Batu Sopang	12	

Please note the priority No. in the Remarks of this list for each links No. according to the each Kabupaten's development plan.

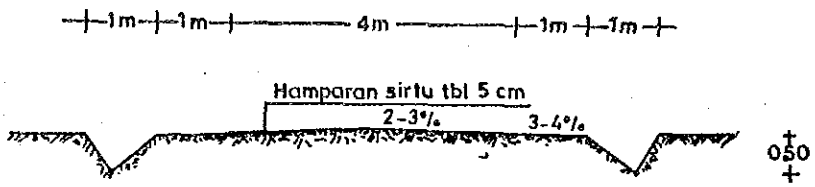
What Kind of Design Criteria has being applied for the new road construction and the improvement for the Kabupaten Road ?
Kriteria Perencanaan yang dipakai pada program penanganan jalan Kabupaten, baik untuk jalan lama maupun pembangunan baru.

Please draw the Typical Cross Section of the Kabupaten Road.
Buat gambar dan penjelasan dari: Typical cross section yang dipakai pada program penanganan jalan selama ini (baik untuk jalan lama, maupun pembangunan baru)

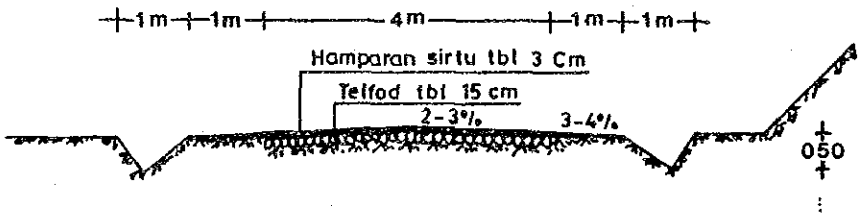
TYPICAL CROSS SECTION.



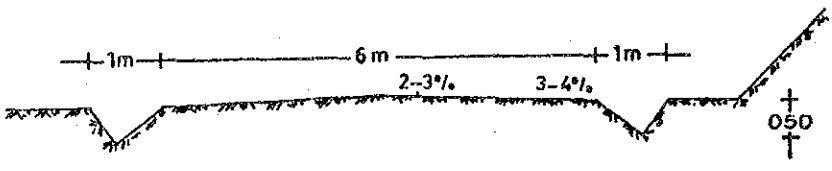
JALAN ASPAL



JALAN KERIKIL / AWCAS



JALAN MACADAM/BATU BELAH



JALAN TANAH

PROPINSI: Kalimantan Timur

KABUPATEN: Pasir

LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1980/1981

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn. 1980/1981

LINK NO : Nomor Ruas	L O C A T I O N From - To (dari - ke)	Lebar perkerasan(m) / Lebar Jembatan	Type perkerasan / Type Jembatan	LENGTH Panjang (KM)	COSTS Harga (Rp 10^6)	REMARKS Keterangan
22	Muara Koman-Mr.Payang	4	Gravel	12	206,868	
		4	Timber	6		

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI: Kalimantan Timur

E-03-(2)

KABUPATEN: Pasir

LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1981/1982

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn. 1981/1982

LINK NO : Nomor Ruas	LOCATION From - To (dari - ke)	Lebar perkerasan(m) / Lebar Jembatan	Type perkerasan / Type Jembatan	LENGTH Panjang (KM)	COSTS Harga (Rp 10^6)	REMARKS Keterangan
23	Pasir Belengkong - Bekoso - Lolo	3.5	Gravel	15	116,133	
		3.5	Timber	5.5 m		
24	Mr.Komam - Mr.Payang	3.5	Gravel	28	212,980	
		3.5	Timber	5.5 m		

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI: Kalimantan Timur

E-03-(3)

KABUPATEN: Pasir

LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1982/1983

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn. 1982/1983

LINK NO. Nomor Ruas	LOCATION From - To (dari - ke)	Lebar perkerasan(m) / Lebar Jembatan	Type perkerasan / Type Jembatan	LENGTH Panjang (KM)	COSTS Harga ($Rp\ 10^6$)	REMARKS Keterangan
30	Tanah Periuk - Pasr Belengkong ke Petangis	3.5	Gravel	30	288,125	
		3.5	Timber	5.5 m		
25	Tanah Grogot-Sangkuriman	3.5	Gravel	6	61,400	
		3.5	Timber	5.5 m		

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI: Kalimantan Timur

E-03-(4)

KABUPATEN: Pasir

LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1983/1984

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn. 1983/1984

LINK NO Nomor Ruas	LOCATION From - To (dari - ke)	Lebar perkerasan(m) Lebar Jembatan	Type perkerasan Type Jembatan	LENGTH Panjang (KM)	COSTS Harga (Rp 10^6)	REMARKS Keterangan
31	Petangis-Lomu-Segendang ke Tanjung Aru	4	Gravel	35		
		4	Timber	7 m	331,550	

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI: Kalimantan Timur E-03-(5)

KABUPATEN: Pasir

LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1984/1985

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn. 1984/1985

LINK NO Nomor Ruas	LOCATION From - To (dari - ke)	Lebar perkerasan(m) Lebar Jembatan	Type perkerasan Type Jembatan	LENGTH Panjang (KM)	COSTS Harga (Rp 10^6)	REMARKS Keterangan
32	Petangis-Lomu-Segendang -Sanipah-ke Tanjung Aru	2 4	Gravel Timber	30 7 m	329,724	
14	Jone - Pondong	2 4	Gravel Timber	3 7 m	34,521	
18	Babulu Darat-Babulu Laut	- 4	Earth Timber	8 5 m	110,755	

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI : Kalimantan Timur E-04

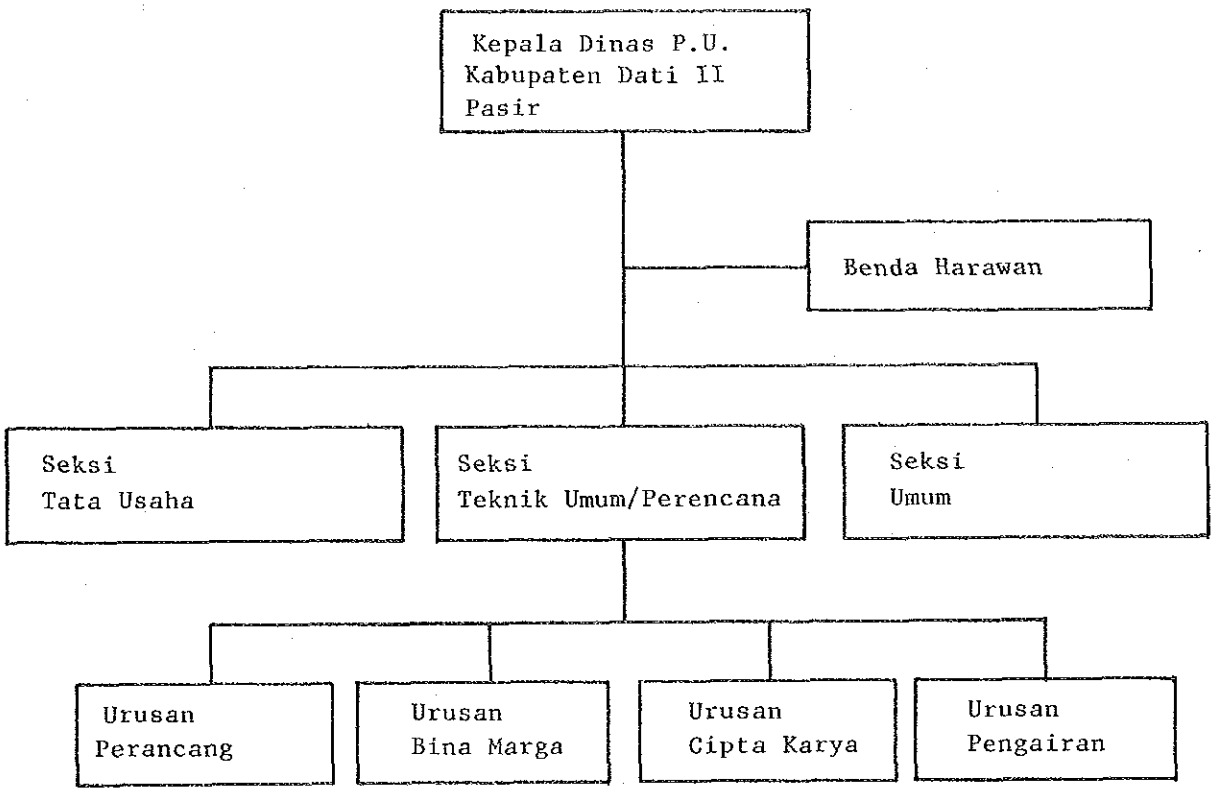
KABUPATEN: Pasir

EXISTING ORGANIZATION IN KABUPATEN

Structur Organisasi yang ada dari P.U Kabupaten

Please draw the Cart of the Existing Organization in the Kabupaten.

Harap digambar bagan organisasi dari DPUK.



EXISTING STAFF RESOURCES OF BINA MARGA OF PU KABUPATEN

Tenaga Dinas PUK yang ada

PROPINSI: Kalimantan Timur

KABUPATEN: Pasir

DESCRIPTION /Uraian	NUMBER / Jumlah	REMARKS Keterangan
CONTROLING STAFF Staff teknis PUK	(11)	
DPUK ENGINEED Sarjana Teknik		
ASSISTANT ENGINEER Sarjana Muda Teknik	2	
TECHNICIAN STAFF Staff Teknik (STM)	9	
ADMINISTRATION Tenaga Administrasi	8	
SUPERVISOR Tenaga Pengawas	7	
WORKING FORCE Tenaga Pelaksana Lapangan	(23)	
OPERATORS Operators	3	
DRIVERS Supir	1	
MECHANICS Mechanic	2	
TRADESMAN Tukang	1	
L A B O U R Buruh / Pekerja	16	
OTHERS Lain-lain		
TOTAL / JUMLAH	49	

Catatan ; Untuk kolom keterangan harap diisi berapa orang yang telah mendapat Training.

LOCATION AND AREA OF DPUK WORKSHOP E-06

Lokasi Workshop DPUK

PROPINSI : Kalimantan Timur

KABUPATEN: Pasir

LOCATION Lokasi	AREA (m2) Luas	NUMBER Jumlah	REMARKS Keterangan
Km 7	50M X 25M	1 buah	Bangunan Ukuran
Tanah Grogot			19M X 7M

PROPINSI: Kalimantan Timur E-07

KABUPATEN: Pasir

LAND ACQUISITION COST

Daftar harga pembebasan tanah

DESCRIPTION Uraian	UNIT Satuan	RATE (RP) Harga	REMARKS Keterangan
CITY/kota	M2	5,000	Industri/Perdagangan
VILLAGE / desa	M2	1,250	Perumahan
RICE FIELD/sawah	M2	1,000	Tanpa Tanam Tumbuh
DRY FIELD/ladang	M2	1,000	"
MIX CROPS/panen	M2	1,000	"
FOREST/hutan	M2	-	Ganti rugi tanam tumbuh
SWAMP / rawa	M2	-	Ganti rugi tanam tumbuh
OTHERS / lain-lain	M2	3,000	Industri/Perdagangan

PROPINSI: Kalimantan Timur

E-08

KABUPATEN: Pasir

Classification of local contractors at Kabupaten level.

Klasifikasi kontraktor di Kabupaten

COMPANY NAME Nama Kontraktor	CLASS Kelas	CAPITAL Modal (Rp)	NUMBER OF EMPLOYEE Jumlah pegawai	REMARKS Keterangan
23	C3	22.605.000	6	

NOTE: DATI II

PROPINSI: Kalimantan Timur

KABUPATEN: Pasir

E-09

LIST OF EXISTING EQUIPMENT OF LOCAL CONTRACTOR

NAME OF EQUIPMENT Jenis peralatan	EXISTING CONDITION/ Kondisi Peralatan						REQUIRE - MENT / Kebutuhan peralatan baru
	TYPE/ Tipe	P.Y	NUMBER / Jumlah			REASON OF BAD CONDITION/Sebab Kerusakan	
			GOOD Baik	BAD Rusak	TOTAL Jumlah		
Bulldozer							1
Motor Grader							1
Tyre Roller							2
Steel Whell Roller							
Vibration Roller							
Wheel Loader							1
Front End Loader and Backhoe							
Mobile Crane							
Concrete Mixer							
Stone Crusher							
Portable Compressor							
Hydraulic Excavator							
Asphalt Paving Machine							
Asphalt Sprayer							
Asphalt Mixing Machine							
Mobile Workshop							
Mechanic Rammer							
Plate Tamper	MP-150	-		1	1	-	2
Pile Driver							
Leg Drill							
Hand Hammer							
Farm Tractor							
Dump Truck							2
Water Tank Truck							
Fuel Tank Truck							
Pick Up							
Jeep							
Motorcycle							
Generator							
Water Pump							
Others							
-							

PROPINSI: Kalimantan Timur

KABUPATEN: Pasir

LIST OF EXISTING EQUIPMENT OF P.U KABUPATEN

NAME OF EQUIPMENT Jenis peralatan	EXISTING CONDITION/ Kondisi Peralatan						REQUIRE - MENT / Kebutuhan peralatan baru
	TYPE/ Tipe	P.Y	NUMBER / Jumlah			REASON OF BAD CONDITION/Sebab Kerusakan	
			GOOD Baik	BAD Rusak	TOTAL Jumlah		
Bulldozer							
Motor Grader							
Tyre Roller							
Steel Whell Roller							
Vibration Roller							
Wheel Loader							
Front End Loader and Backhoe							
Mobile Crane							
Concrete Mixer							
Stone Crusher							
Portable Compressor							
Hydraulic Excavator							
Asphalt Paving Machine							
Asphalt Sprayer							
Asphalt Mixing Machine							
Mobile Workshop							
Mechanic Rammer							
Plate Tamper							
Pile Driver							
Leg Drill							
Hand Hammer							
Farm Tractor							
Dump Truck							
Water Tank Truck							
Fuel Tank Truck							
Pick Up							
Jeep							
Motorcycle							
Generator							
Water Pump							
Others							

Appendix A-3 CONSTRUCTION AND MAINTENANCE COST FOR PROPOSED ROAD LINKS

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 11 (IIIB-1) LENGTH : 3 Km

UPGRADE : 12.0m road bed, 4.0m road with surface Dressing (1)

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	TOTAL >>>>>>
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	0.0	24	11	0	0	0
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	420.0	1,123	523	471,660	219,660	691,320
Sub Base Course	m3	765.0	3,606	1,348	2,758,590	1,031,220	3,789,810
Base Course	m3	840.0	4,956	2,300	4,163,040	1,932,000	6,095,040
Shoulder	m2	24000.0	340	146	8,160,000	3,504,000	11,664,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	12000.0	628	595	7,536,000	7,140,000	14,676,000
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	0.0	1,115	119	0	0	0
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	0.0	54,330	45,010	0	0	0
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	0.0	59,867	11,872	0	0	0
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	19,171,166	2,121,980	21,293,146
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		42,260,456	15,948,860	58,209,316
Overhead (15%)					6,339,068	2,392,329	8,731,397
			TOTAL COST		48,599,524	18,341,189	66,940,713
Manual routine maintenance of road	Km	3.0	183,872	7,248	551,616	21,744	573,360
Routine maintenance of asphalt road	Km	3.0	449,100	137,700	1,347,300	413,100	1,760,400
			Sub Total		1,898,916	434,844	2,333,760
Maintenance of Timber Bridge (New)	m2	69.7	10,376	1,232	723,414	85,895	809,309
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	14,151,199
Timber Bridge	Unit Cost	(Rp/m2)	:	351,221
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	3,871,875
Maintenance Rate without Bridge		(%)	:	5.50
New Bridge Cost Rate		(%)	:	36.58

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 14 (IIIB-2) LENGTH : 17 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Base Cource

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	0.0	24	11	0	0	0
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	0.0	1,123	523	0	0	0
Sub Base Course	m3	3804.0	3,606	1,348	13,717,224	5,127,792	18,845,016
Base Course	m3	4080.0	4,956	2,300	20,220,480	9,384,000	29,604,480
Shoulder	m2	102000.0	340	146	34,680,000	14,892,000	49,572,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	0.0	628	595	0	0	0
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	0.0	1,115	119	0	0	0
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	0.0	54,330	45,010	0	0	0
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	0.0	59,867	11,872	0	0	0
Babion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	12,314,620	1,209,542	13,524,162
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		80,932,324	30,613,334	111,545,658
Overhead (15%)					12,139,848	4,592,000	16,731,848
			TOTAL COST		93,072,172	35,205,334	128,277,506
Manual routine maintenance of road	Km	17.0	183,872	7,248	3,125,824	123,216	3,249,040
Routine maintenance of gravel road	Km	17.0	218,907	88,092	3,721,419	1,497,564	5,218,983
			Sub Total		6,847,243	1,620,780	8,468,023
Maintenance of Timber Bridge (New)	m2	64.0	10,376	1,232	664,064	78,848	742,912
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	161.2	9,514	2,459	1,533,656	396,390	1,930,046
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement		Unit Cost	(Rp/Km)	:	6,630,866
Timber	Bridge	Unit Cost	(Rp/m2)	:	243,012
Concrete	Bridge	Unit Cost	(Rp/m2)	:	
Survived	Value		(Rp)	:	9,422,508
Maintenance	Rate without Bridge		(%)	:	7.51
New Bridge	Cost Rate		(%)	:	12.12

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 37 (IIIB-1) LENGTH : 12 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Dressing (1)

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	120000.0	24	11	2,880,000	1,320,000	4,200,000
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	2128.0	1,123	523	2,389,744	1,112,944	3,502,688
Sub Base Course	m3	6720.0	3,606	1,348	24,232,320	9,058,560	33,290,880
Base Course	m3	3360.0	4,956	2,300	16,652,160	7,728,000	24,380,160
Shoulder	m2	72000.0	340	146	24,480,000	10,512,000	34,992,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	48000.0	628	595	30,144,000	28,560,000	58,704,000
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	22060.0	1,115	119	24,596,900	2,625,140	27,222,040
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	41.0	54,330	45,010	2,227,530	1,845,410	4,072,940
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	12.8	59,867	11,872	766,297	151,961	918,258
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		128,368,951	62,914,015	191,282,966
Overhead (15%)					19,255,342	9,437,102	28,692,444
			TOTAL COST		147,624,293	72,351,117	219,975,410
Manual routine maintenance of road	Km	12.0	183,872	7,248	2,206,464	86,976	2,293,440
Routine maintenance of asphalt road	Km	12.0	449,100	137,700	5,389,200	1,652,400	7,041,600
			Sub Total		7,595,664	1,739,376	9,335,040
Maintenance of Timber Bridge (New)	m2	0.0	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	18,331,284
Timber Bridge	Unit Cost	(Rp/m2)	:	
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	28,179,648
Maintenance Rate without Bridge		(%)	:	4.24
New Bridge Cost Rate		(%)	:	

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 36 (IIIC) LENGTH : 18 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Subbase Cource

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	180000.0	24	11	4,320,000	1,980,000	6,300,000
Normal Fill	m3	0.0	1,920	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	3154.0	1,123	523	3,541,942	1,649,542	5,191,484
Sub Base Course	m3	11520.0	3,606	1,348	41,541,120	15,528,960	57,070,080
Base Course	m3	0.0	4,956	2,300	0	0	0
Shoulder	m2	108000.0	340	146	36,720,000	15,768,000	52,488,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	0.0	620	595	0	0	0
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	31880.0	1,115	119	35,546,200	3,793,720	39,339,920
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	78.0	54,330	45,010	4,237,740	3,510,780	7,748,520
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	9.6	59,867	11,872	574,723	113,971	688,694
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		126,481,725	42,344,973	168,826,698
Overhead (15%)					18,972,258	6,351,745	25,324,003
			TOTAL COST		145,453,983	48,696,718	194,150,701
Manual routine maintenance of road	Km	18.0	183,872	7,248	3,309,696	130,464	3,440,160
Routine maintenance of gravel road	Km	18.0	218,907	88,092	3,940,326	1,585,656	5,525,982
			Sub Total		7,250,022	1,716,120	8,966,142
Maintenance of Timber Bridge (New)	m2	0.0	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	10,786,150
Timber Bridge	Unit Cost	(Rp/m2)	:	
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	22,828,032
Maintenance Rate without Bridge		(%)	:	4.62
New Bridge Cost Rate		(%)	:	

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 31 (111C) LENGTH : 35 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Subbase Cource

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	350000.0	24	11	8,400,000	3,850,000	12,250,000
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	5936.0	1,123	523	6,666,128	3,104,528	9,770,656
Sub Base Course	m3	22400.0	3,606	1,348	80,774,400	30,195,200	110,969,600
Base Course	m3	0.0	4,956	2,300	0	0	0
Shoulder	m2	210000.0	340	146	71,400,000	30,660,000	102,060,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	0.0	628	595	0	0	0
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	67820.0	1,115	119	75,619,300	8,070,580	83,689,880
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	187.0	54,330	45,010	10,159,710	8,416,870	18,576,580
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	44.8	59,867	11,872	2,682,041	531,865	3,213,906
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		255,701,579	84,829,043	340,530,622
Overhead (15%)					38,355,236	12,724,356	51,079,592
			TOTAL COST		294,056,815	97,553,399	391,610,214
Manual routine maintenance of road	Km	35.0	183,872	7,248	6,435,520	253,680	6,689,200
Routine maintenance of gravel road	Km	35.0	218,907	88,092	7,661,745	3,083,220	10,744,965
			Sub Total		14,097,265	3,336,900	17,434,165
Maintenance of Timber Bridge (New)	m2	0.0	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	11,188,863
Timber Bridge	Unit Cost	(Rp/m2)	:	
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	44,387,840
Maintenance Rate without Bridge		(%)	:	4.45
New Bridge Cost Rate		(%)	:	

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 30 (IIIC) LENGTH : 30 Km

UPGRADE : 10.0m road bed, 3.5m road with surface Subbase Cource

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	0.0	24	11	0	0	0
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	0.0	1,123	523	0	0	0
Sub Base Course	m3	854.0	3,606	1,348	3,079,524	1,151,192	4,230,716
Base Course	m3	6300.0	4,956	2,300	31,222,800	14,490,000	45,712,800
Shoulder	m2	195000.0	340	146	66,300,000	28,470,000	94,770,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	0.0	628	595	0	0	0
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	0.0	1,115	119	0	0	0
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	374.0	54,330	45,010	20,319,420	16,833,740	37,153,160
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	115.2	59,867	11,872	6,896,678	1,367,654	8,264,332
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		127,818,422	62,312,586	190,131,008
Overhead (15%)					19,172,763	9,346,887	28,519,650
			TOTAL COST		146,991,185	71,659,473	218,650,658
Manual routine maintenance of road	Km	30.0	183,872	7,248	5,516,160	217,440	5,733,600
Routine maintenance of gravel road	Km	30.0	218,907	88,092	6,567,210	2,642,760	9,209,970
			Sub Total		12,083,370	2,860,200	14,943,570
Maintenance of Timber Bridge (New)	m2	0.0	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	7,288,355
Timber Bridge	Unit Cost	(Rp/m2)	:	
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	1,692,286
Maintenance Rate without Bridge		(%)	:	6.83
New Bridge Cost Rate		(%)	:	

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 29 (IIIB-2) LENGTH : 30 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Base Cource

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	COST TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	300000.0	24	11	7,200,000	3,300,000	10,500,000
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	4972.0	1,123	523	5,583,556	2,600,356	8,183,912
Sub Base Course	m3	16800.0	3,606	1,348	60,580,800	22,646,400	83,227,200
Base Course	m3	7200.0	4,956	2,300	35,683,200	16,560,000	52,243,200
Shoulder	m2	180000.0	340	146	61,200,000	26,280,000	87,480,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	0.0	628	595	0	0	0
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	0.0	1,115	119	0	0	0
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	43.0	54,330	45,010	2,336,190	1,935,430	4,271,620
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	9.6	59,867	11,872	574,723	113,971	688,694
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		173,158,469	73,436,157	246,594,626
Overhead (15%)					25,973,770	11,015,423	36,989,193
			TOTAL COST		199,132,239	84,451,580	283,583,819
Manual routine maintenance of road	Km	30.0	183,872	7,248	5,516,160	217,440	5,733,600
Routine maintenance of gravel road	Km	30.0	218,907	88,092	6,567,210	2,642,760	9,209,970
			Sub Total		12,083,370	2,860,200	14,943,570
Maintenance of Timber Bridge (New)	m2	0.0	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,059	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	9,452,794
Timber Bridge	Unit Cost	(Rp/m2)	:	
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	41,613,600
Maintenance Rate without Bridge		(%)	:	5.27
New Bridge Cost Rate		(%)	:	

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 27 (IIIC) LENGTH : 30 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Subbase Cource

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	300000.0	24	11	7,200,000	3,300,000	10,500,000
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	4950.0	1,123	523	5,558,850	2,588,850	8,147,700
Sub Base Course	m3	19200.0	3,606	1,348	69,235,200	25,881,600	95,116,800
Base Course	m3	0.0	4,956	2,300	0	0	0
Shoulder	m2	180000.0	340	146	61,200,000	26,280,000	87,480,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	0.0	628	595	0	0	0
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	0.0	1,115	119	0	0	0
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	550.0	54,330	45,010	29,881,500	24,755,500	54,637,000
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	217.6	59,867	11,872	13,027,059	2,583,347	15,610,406
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		186,102,609	85,389,297	271,491,906
Overhead (15%)					27,915,391	12,809,394	40,723,785
			TOTAL COST		214,018,000	98,197,691	312,215,691
Manual routine maintenance of road	Km	30.0	183,872	7,248	5,516,160	217,440	5,733,600
Routine maintenance of gravel road	Km	30.0	218,907	88,092	6,567,210	2,642,760	9,209,970
			Sub Total		12,083,370	2,860,200	14,943,570
Maintenance of Timber Bridge (New)	m2	0.0	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,059	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	10,407,190
Timber Bridge	Unit Cost	(Rp/m2)	:	
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	38,046,720
Maintenance Rate without Bridge		(%)	:	4.79
New Bridge Cost Rate		(%)	:	

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 25 (IIIB-1) LENGTH : 6 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Dressing (1)

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	COST TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	0.0	24	11	0	0	0
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	0.0	1,123	523	0	0	0
Sub Base Course	m3	1128.0	3,606	1,348	4,067,568	1,520,544	5,588,112
Base Course	m3	1680.0	4,956	2,300	8,326,080	3,864,000	12,190,080
Shoulder	m2	36000.0	340	146	12,240,000	5,256,000	17,496,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	24000.0	628	595	15,072,000	14,280,000	29,352,000
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	0.0	1,115	119	0	0	0
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	0.0	54,330	45,010	0	0	0
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	0.0	59,867	11,872	0	0	0
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		39,705,648	24,920,544	64,626,192
Overhead (15%)					5,955,847	3,738,081	9,693,928
			TOTAL COST		45,661,495	28,658,625	74,320,120
Manual routine maintenance of road	Km	6.0	183,872	7,248	1,103,232	43,488	1,146,720
Routine maintenance of asphalt road	Km	6.0	449,100	137,700	2,694,600	826,200	3,520,800
			Sub Total		3,797,832	869,688	4,667,520
Maintenance of Timber Bridge (New)	m2	0.0	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement Unit Cost	(Rp/Km)	:	12,386,687
Timber Bridge Unit Cost	(Rp/m2)	:	
Concrete Bridge Unit Cost	(Rp/m2)	:	
Survived Value	(Rp)	:	6,349,694
Maintenance Rate without Bridge	(%)	:	6.28
New Bridge Cost Rate	(%)	:	

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 23 (IIIB-1) LENGTH : 15 Km

UPGRADE : 10.0m road bed, 3.5m road with surface Dressing (1)

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	0.0	24	11	0	0	0
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	0.0	1,123	523	0	0	0
Sub Base Course	m3	2394.0	3,606	1,348	8,632,764	3,227,112	11,859,876
Base Course	m3	3675.0	4,956	2,300	18,213,300	8,452,500	26,665,800
Shoulder	m2	97500.0	340	146	33,150,000	14,235,000	47,385,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	52500.0	628	595	32,970,000	31,237,500	64,207,500
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	0.0	1,115	119	0	0	0
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	0.0	54,330	45,010	0	0	0
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	0.0	59,867	11,872	0	0	0
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		92,966,064	57,152,112	150,118,176
Overhead (15%)					13,944,909	8,572,816	22,517,725
			TOTAL COST		106,910,973	65,724,928	172,635,901
Manual routine maintenance of road	Km	15.0	183,872	7,248	2,758,080	108,720	2,866,800
Routine maintenance of asphalt road	Km	15.0	449,100	137,700	6,736,500	2,065,500	8,802,000
			Sub Total		9,494,580	2,174,220	11,668,800
Maintenance of Timber Bridge (New)	m2	0.0	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	139.2	9,514	2,459	1,324,348	342,292	1,666,640
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	11,509,060
Timber Bridge	Unit Cost	(Rp/m2)	:	
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	13,635,073
Maintenance Rate without Bridge		(%)	:	6.76
New Bridge Cost Rate		(%)	:	

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 19 (IIIA) LENGTH : 6 Km

UPGRADE : 8.0m road bed, 4.0m road with surface Dressing (2)

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	COST TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	24000.0	24	11	576,000	264,000	840,000
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	258.0	1,123	523	289,734	134,934	424,668
Sub Base Course	m3	1838.0	3,606	1,348	6,627,828	2,477,624	9,105,452
Base Course	m3	1280.0	4,956	2,300	6,343,680	2,944,000	9,287,680
Shoulder	m2	24000.0	340	146	8,160,000	3,504,000	11,664,000
Asphalt Patching	m2	147.0	4,491	1,377	660,177	202,419	862,596
Surface Dressing (Single)	m2	8000.0	628	595	5,024,000	4,760,000	9,784,000
Surface Dressing (Double)	m2	16000.0	792	936	12,672,000	14,976,000	27,648,000
Earth Drain	m	1700.0	1,115	119	1,895,500	202,300	2,097,800
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	360.0	54,330	45,010	19,558,800	16,203,600	35,762,400
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	144.0	59,867	11,872	8,620,848	1,709,568	10,330,416
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		70,428,567	47,378,445	117,807,012
Overhead (15%)					10,564,285	7,106,766	17,671,051
			TOTAL COST		80,992,852	54,485,211	135,478,063
Manual routine maintenance of road	Km	6.0	183,872	7,248	1,103,232	43,488	1,146,720
Routine maintenance of asphalt road	Km	6.0	449,100	137,700	2,694,600	826,200	3,520,800
			Sub Total		3,797,832	869,688	4,667,520
Maintenance of Timber Bridge (New)	m2	0.0	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement Unit Cost	(Rp/Km)	:	22,579,677
Timber Bridge Unit Cost	(Rp/m2)	:	
Concrete Bridge Unit Cost	(Rp/m2)	:	
Survived Value	(Rp)	:	9,606,281
Maintenance Rate without Bridge	(%)	:	3.45
New Bridge Cost Rate	(%)	:	

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 20 (IIIB-2) LENGTH : 4 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Base Cource

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	186	91	0	0	0
Subgrade Preparation	m2	40000.0	24	11	960,000	440,000	1,400,000
Normal Fill	m3	0.0	1,928	863	0	0	0
Fill in Swamp	m3	0.0	2,849	1,053	0	0	0
Normal Excavation to Spoil	m3	532.0	1,123	523	597,436	278,236	875,672
Sub Base Course	m3	2240.0	3,606	1,348	8,077,440	3,019,520	11,096,960
Base Course	m3	960.0	4,956	2,300	4,757,760	2,208,000	6,965,760
Shoulder	m2	24000.0	340	146	8,160,000	3,504,000	11,664,000
Asphalt Patching	m2	0.0	4,491	1,377	0	0	0
Surface Dressing (Single)	m2	0.0	628	595	0	0	0
Surface Dressing (Double)	m2	0.0	792	936	0	0	0
Earth Drain	m	0.0	1,115	119	0	0	0
Earth Drain in Swamp (by machine)	m3	0.0	1,392	474	0	0	0
Pipe Culvert D80cm	m	5.0	54,330	45,010	271,650	225,050	496,700
Masonry Culvert (80x80cm)	m	0.0	80,214	38,624	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	15,797	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	0.0	59,867	11,872	0	0	0
Gabion Protection	m3	0.0	19,211	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	3,769,108	415,990	4,185,098
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		26,593,394	10,090,796	36,684,190
Overhead (15%)					3,989,009	1,513,619	5,502,628
			TOTAL COST		30,582,403	11,604,415	42,186,818
Manual routine maintenance of road	Km	4.0	183,872	7,248	735,488	28,992	764,480
Routine maintenance of gravel road	Km	4.0	218,907	88,092	875,628	352,368	1,227,996
			Sub Total		1,611,116	381,360	1,992,476
Maintenance of Timber Bridge (New)	m2	16.0	10,376	1,232	166,016	19,712	185,728
Maintenance of Concrete Bridge (New)	m2	0.0	2,332	2,059	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,792	2,414	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	9,343,489
Timber Bridge	Unit Cost	(Rp/m2)	:	300,804
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	5,548,480
Maintenance Rate without Bridge		(%)	:	5.33
New Bridge Cost Rate		(%)	:	11.41

Appendix A-4 CONSTRUCTION AND MAINTENANCE QUANTITIES
FOR ALL PROPOSED ROAD LINKS
(CONSTRUCTION)

PROV : KALIMANTAN TIMUR KAB : PASIR

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :							
Bulldozer/Ripper	hr	535.5	1426.5	1396.4	1406.6	1012.3	5777.3
Swamp Bulldozer	hr	0.0	0.0	0.0	0.0	0.0	0.0
Motor Grader	hr	972.8	2619.2	3199.7	3359.8	2110.7	12262.2
Hand-guide Vib. Roller	hr	342.4	585.9	895.9	149.6	542.3	2516.1
Tire Roller	hr	100.0	0.0	0.0	399.9	881.8	1381.7
Vibratory Roller (D&T)	hr	634.0	1866.0	2606.8	2648.3	1483.8	9238.9
Hydraulic Excavator; Wheel	hr	0.0	0.0	0.0	0.0	0.0	0.0
Wheel Loader	hr	1103.2	2497.5	2770.6	3181.7	2347.6	11900.6
Water Tank Truck	hr	251.0	729.2	1283.2	1379.8	689.7	4332.9
Dump Truck	hr	7916.1	22027.7	25055.6	28150.4	17572.2	100622.0
Flat Bed Truck with Crane	hr	219.7	477.6	675.4	133.6	393.1	1899.4
Flat Bed Truck	hr	234.1	204.1	303.1	534.3	1233.5	2509.1
Portable Crusher/Screening	hr	184.5	229.8	43.6	316.8	443.4	1218.1
Concrete Mixer	hr	0.0	168.5	249.2	41.6	153.3	612.6
Water Pump	hr	0.0	140.1	202.1	36.0	123.7	501.9
Concrete Vibrator	hr	0.0	83.3	107.9	24.8	64.6	280.6
Asphalt Sprayer	hr	100.0	0.0	0.0	399.9	881.8	1381.7
LABOUR :							
Mandur	man day	723.9	2050.6	2273.3	2229.1	1458.7	8735.6
Skilled Labourer	man day	2028.2	336.5	668.1	340.2	804.8	4177.8
Carpenter	man day	1052.1	27.7	159.7	8.2	21.5	1269.2
Mason	man day	0.0	142.0	235.5	28.1	147.8	553.4
Labourer	man day	4320.9	22839.5	21503.1	26277.7	12166.5	87107.7
Driver	man day	1507.5	3975.7	4579.6	5241.4	3467.2	18771.4
Operator	man day	950.8	2438.4	2749.6	2729.5	2269.4	11137.7
MATERIAL :							
Bitumen	l	20500.0	0.0	0.0	81999.9	187885.8	290385.7
Asphalt Oil	l	4100.0	0.0	0.0	16400.0	34737.4	55237.4
Kerosene	l	4900.0	0.0	0.0	19599.9	43059.4	67559.3
Sand	m3	60.0	454.1	603.6	370.9	869.6	2358.2
Cement	bag	0.0	1269.4	1663.9	372.7	999.1	4305.1
River Stone	m3	0.0	142.0	235.5	28.1	147.8	553.4
Steel Moulds	set	0.0	486.2	629.8	144.8	377.2	1638.0
Timber	m3	95.5	0.0	11.2	0.0	0.0	106.7
Paint	l	732.4	0.0	89.4	0.0	0.0	821.8
Reinforcing Steel	kg	0.0	15509.7	20090.6	4619.1	12032.6	52252.0
Tying Wire	kg	0.0	140.9	182.6	41.9	109.3	474.7
Equivalent Royalty	m3	11217.3	24791.2	39739.8	43668.8	27028.1	146445.2

CONSTRUCTION AND MAINTENANCE QUANTITIES
FOR ALL PROPOSED ROAD LINKS
(MAINTENANCE)

PROV : KALIMANTAN TIMUR KAB : PASIR

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :							
Bulldozer/Ripper	hr	0.0	0.0	0.0	0.0	0.0	0.0
Swamp Bulldozer	hr	0.0	0.0	0.0	0.0	0.0	0.0
Motor Grader	hr	144.5	298.0	365.5	676.0	701.5	2185.5
Hand-guide Vib. Roller	hr	135.0	315.0	315.0	315.0	480.0	1560.0
Tire Roller	hr	144.5	298.0	365.5	676.0	701.5	2185.5
Vibratory Roller (D&T)	hr	0.0	0.0	0.0	0.0	0.0	0.0
Hydraulic Excavator; Wheel	hr	0.0	0.0	0.0	0.0	0.0	0.0
Wheel Loader	hr	56.4	119.6	143.5	253.1	277.1	849.7
Water Tank Truck	hr	0.0	0.0	0.0	0.0	0.0	0.0
Dump Truck	hr	609.0	1348.1	1491.1	2148.6	2622.0	8218.8
Flat Bed Truck with Crane	hr	143.6	473.2	514.1	473.2	438.7	2042.8
Flat Bed Truck	hr	642.5	1354.0	1601.5	2740.0	2963.5	9301.5
Portable Crusher/Screening	hr	28.5	60.4	72.3	127.1	139.4	427.7
Concrete Mixer	hr	0.0	0.0	0.0	0.0	0.0	0.0
Water Pump	hr	0.0	0.0	0.0	0.0	0.0	0.0
Concrete Vibrator	hr	0.0	0.0	0.0	0.0	0.0	0.0
Asphalt Sprayer	hr	0.0	0.0	0.0	0.0	0.0	0.0
LABOUR :							
Mandur	man day	249.8	544.4	631.4	965.7	1105.1	3496.4
Skilled Labourer	man day	129.8	341.3	426.9	341.3	524.8	1764.1
Carpenter	man day	21.4	70.5	116.4	70.5	109.9	388.7
Mason	man day	0.0	0.0	0.0	0.0	0.0	0.0
Labourer	man day	2947.4	6369.7	7298.6	11377.6	12966.9	40960.2
Driver	man day	239.1	551.1	628.7	915.6	1028.3	3362.8
Operator	man day	67.0	139.4	169.9	309.9	326.5	1012.7
MATERIAL :							
Bitumen	l	1215.0	2835.0	2835.0	2835.0	4320.0	14040.0
Asphalt Oil	l	0.0	0.0	0.0	0.0	0.0	0.0
Kerosene	l	135.0	315.0	315.0	315.0	480.0	1560.0
Sand	m3	22.5	52.5	52.5	52.5	80.0	260.0
Cement	bag	0.0	0.0	0.0	0.0	0.0	0.0
River Stone	m3	0.0	0.0	0.0	0.0	0.0	0.0
Steel Moulds	set	0.0	0.0	0.0	0.0	0.0	0.0
Timber	m3	1.9	6.4	10.5	6.4	9.9	35.1
Paint	l	13.8	45.6	75.3	45.6	71.2	251.5
Reinforcing Steel	kg	0.0	0.0	0.0	0.0	0.0	0.0
Tying Wire	kg	0.0	0.0	0.0	0.0	0.0	0.0
Equivalent Royalty	m3	801.0	1696.5	2034.0	3586.5	3925.5	12043.5

CONSTRUCTION AND MAINTENANCE QUANTITIES
FOR ALL PROPOSED ROAD LINKS
(TOTAL)

PROV : KALIMANTAN TIMUR KAB : PASIR

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :							
Bulldozer/Ripper	hr	535.5	1426.5	1396.4	1406.6	1012.3	5777.3
Swamp Bulldozer	hr	0.0	0.0	0.0	0.0	0.0	0.0
Motor Grader	hr	1117.3	2917.2	3565.2	4035.8	2812.2	14447.7
Hand-guide Vib. Roller	hr	477.4	900.9	1210.9	484.6	1022.3	4076.1
Tire Roller	hr	244.5	298.0	365.5	1075.9	1583.3	3567.2
Vibratory Roller (O&F)	hr	634.0	1866.0	2606.8	2648.3	1483.8	9238.9
Hydraulic Excavator; Wheel	hr	0.0	0.0	0.0	0.0	0.0	0.0
Wheel Loader	hr	1159.6	2617.1	2914.1	3434.8	2624.7	12750.3
Water Tank Truck	hr	251.0	729.2	1283.2	1379.8	689.7	4332.9
Dump Truck	hr	8425.1	23375.8	26546.7	30299.0	20194.2	108840.8
Flat Bed Truck with Crane	hr	363.3	950.8	1189.5	606.8	831.8	3942.2
Flat Bed Truck	hr	876.6	1558.1	1904.6	3274.3	4197.0	11810.6
Portable Crusher/Screening	hr	213.0	290.2	115.9	443.9	582.8	1645.8
Concrete Mixer	hr	0.0	168.5	249.2	41.6	153.3	612.6
Water Pump	hr	0.0	140.1	202.1	36.0	123.7	501.9
Concrete Vibrator	hr	0.0	83.3	107.9	24.8	64.6	280.6
Asphalt Sprayer	hr	100.0	0.0	0.0	399.9	881.8	1381.7
LABOUR :							
Mandor	man day	973.7	2595.0	2904.7	3194.8	2563.8	12232.0
Skilled Labourer	man day	2158.0	677.8	1095.0	681.5	1329.6	5941.9
Carpenter	man day	1073.5	98.2	276.1	78.7	131.4	1657.9
Mason	man day	0.0	142.0	235.5	28.1	147.8	553.4
Labourer	man day	7268.3	29209.2	28801.7	37655.3	25133.4	128067.9
Driver	man day	1746.6	4526.8	5208.3	6157.0	4495.5	22134.2
Operator	man day	1017.8	2577.8	2919.5	3039.4	2595.9	12150.4
MATERIAL :							
Bitumen	l	21715.0	2835.0	2835.0	84834.9	192205.8	304425.7
Asphalt Oil	l	4100.0	0.0	0.0	16400.0	34737.4	55237.4
Kerosene	l	5035.0	315.0	315.0	19914.9	43539.4	69119.3
Sand	m3	82.5	506.6	656.1	423.4	949.6	2618.2
Cement	bag	0.0	1269.4	1663.9	372.7	999.1	4305.1
River Stone	m3	0.0	142.0	235.5	28.1	147.8	553.4
Steel Moulds	set	0.0	486.2	629.8	144.8	377.2	1638.0
Timber	m3	97.4	6.4	21.7	6.4	9.9	141.8
Paint	l	746.2	45.6	164.7	45.6	71.2	1073.3
Reinforcing Steel	kg	0.0	15509.7	20090.6	4619.1	12032.6	52252.0
Tying Wire	kg	0.0	140.9	182.6	41.9	109.3	474.7
Equivalent Royalty	m3	12018.3	26487.7	41773.8	47255.3	30953.6	158488.7

Appendix A-5

CONSTRUCTION AND MAINTENANCE COSTS FOR ALL PROPOSED ROAD LINKS (CONSTRUCTION)

PROV : KALIMANTAN TIMUR KAB : PASIR

(1000 Rp)

ITEM	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :		106,487	268,060	300,298	341,851	247,387	1,264,083
Bulldozer/Ripper	16918	9,059	24,133	23,624	23,796	17,126	97,738
Swamp Bulldozer	12367	0	0	0	0	0	0
Motor Grader	14348	13,957	37,580	45,909	48,206	30,284	175,936
Hand-guide Vib. Roller	1621	555	949	1,452	242	879	4,077
Tire Roller	11889	1,188	0	0	4,754	10,483	16,425
Vibratory Roller (D&T)	7132	4,521	13,308	18,591	18,887	10,582	65,889
Hydraulic Excavator; Wheel	13678	0	0	0	0	0	0
Wheel Loader	17504	19,310	43,716	48,496	55,692	41,092	208,306
Water Tank Truck	4385	1,100	3,197	5,626	6,050	3,024	18,997
Dump Truck	5884	45,989	129,610	147,427	165,636	103,394	592,056
Flat Bed Truck with Crane	5469	1,201	2,611	3,693	730	2,149	10,384
Flat Bed Truck	3760	880	767	1,139	2,008	4,637	9,431
Portable Crusher/Screening	46179	8,520	10,611	2,013	14,629	20,475	56,248
Concrete Mixer	8783	0	1,479	2,188	365	1,346	5,378
Water Pump	513	0	71	103	18	63	255
Concrete Vibrator	347	0	28	37	8	22	95
Asphalt Sprayer	2077	207	0	0	830	1,831	2,868
LABOUR :		33,657	92,068	95,073	106,650	62,094	389,542
Mandur	3500	2,533	7,177	7,956	7,801	5,105	30,572
Skilled Labourer	3000	6,084	1,009	2,004	1,020	2,414	12,531
Carpenter	4000	4,208	110	638	32	86	5,074
Mason	4000	0	568	942	112	591	2,213
Labourer	2500	10,802	57,098	53,757	65,694	30,416	217,767
Driver	3500	5,276	13,914	16,028	18,344	12,135	65,697
Operator	5000	4,754	12,192	13,748	13,647	11,347	55,688
MATERIAL :		29,701	34,969	50,086	60,725	122,285	297,766
Bitumen	300	6,150	0	0	24,599	56,365	87,114
Asphalt Oil	600	2,460	0	0	9,840	20,842	33,142
Kerosene	250	1,225	0	0	4,899	10,764	16,888
Sand	9000	540	4,086	5,432	3,338	7,826	21,222
Cement	5000	0	6,347	8,319	1,863	4,995	21,524
River Stone	13500	0	1,917	3,179	379	1,995	7,470
Steel Moulds	8000	0	3,889	5,038	1,158	3,017	13,102
Timber	150000	14,325	0	1,680	0	0	16,005
Paint	3000	2,197	0	268	0	0	2,465
Reinforcing Steel	800	0	12,407	16,072	3,695	9,626	41,800
Tying Wire	900	0	126	164	37	98	425
Equivalent Royalty	250	2,804	6,197	9,934	10,917	6,757	36,609

CONSTRUCTION AND MAINTENANCE COSTS
FOR ALL PROPOSED ROAD LINKS
(MAINTENANCE)

PROV : KALIMANTAN TIMUR KAB : PASIR

(1000 Rp)

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :		13,094	28,819	33,553	54,075	59,438	188,979
Bulldozer/Ripper	16918	0	0	0	0	0	0
Swamp Bulldozer	12367	0	0	0	0	0	0
Motor Grader	14348	2,073	4,275	5,244	9,699	10,065	31,356
Hand-guide Vib. Roller	1621	218	510	510	510	778	2,526
Tire Roller	11889	1,717	3,542	4,345	8,036	8,340	25,980
Vibratory Roller (D&T)	7132	0	0	0	0	0	0
Hydraulic Excavator; Wheel	13678	0	0	0	0	0	0
Wheel Loader	17504	987	2,093	2,511	4,430	4,850	14,871
Water Tank Truck	4385	0	0	0	0	0	0
Dump Truck	5884	3,583	7,932	8,773	12,642	15,427	48,357
Flat Bed Truck with Crane	5469	785	2,587	2,811	2,587	2,399	11,169
Flat Bed Truck	3760	2,415	5,091	6,021	10,302	11,142	34,971
Portable Crusher/Screening	46179	1,318	2,789	3,338	5,869	6,437	19,749
Concrete Mixer	8783	0	0	0	0	0	0
Water Pump	513	0	0	0	0	0	0
Concrete Vibrator	347	0	0	0	0	0	0
Asphalt Sprayer	2077	0	0	0	0	0	0
LABOUR :		9,887	21,759	25,249	37,881	43,528	138,304
Mandur	3500	874	1,905	2,209	3,379	3,867	12,234
Skilled Labourer	3000	389	1,023	1,280	1,023	1,574	5,289
Carpenter	4000	85	282	465	282	439	1,553
Mason	4000	0	0	0	0	0	0
Labourer	2500	7,368	15,924	18,246	28,444	32,417	102,399
Driver	3500	836	1,928	2,200	3,204	3,599	11,767
Operator	5000	335	697	849	1,549	1,632	5,062
MATERIAL :		1,125	2,920	3,708	3,392	4,815	15,960
Bitumen	300	364	850	850	850	1,296	4,210
Asphalt Oil	600	0	0	0	0	0	0
Kerosene	250	33	78	78	78	120	387
Sand	9000	202	472	472	472	720	2,338
Cement	5000	0	0	0	0	0	0
River Stone	13500	0	0	0	0	0	0
Steel Moulds	8000	0	0	0	0	0	0
Timber	150000	285	960	1,575	960	1,485	5,265
Paint	3000	41	136	225	136	213	751
Reinforcing Steel	800	0	0	0	0	0	0
Tying Wire	900	0	0	0	0	0	0
Equivalent Royalty	250	200	424	508	896	981	3,009

CONSTRUCTION AND MAINTENANCE COSTS
FOR ALL PROPOSED ROAD LINKS
(TOTAL)

PROV : KALIMANTAN TIMUR KAB : PASIR

(1000 Rp)

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :		119,581	296,879	333,851	395,926	306,825	1,453,062
Bulldozer/Ripper	16918	9,059	24,133	23,624	23,796	17,126	97,738
Swamp Bulldozer	12367	0	0	0	0	0	0
Motor Grader	14348	16,030	41,855	51,153	57,905	40,349	207,292
Hand-guide Vib. Roller	1621	773	1,459	1,962	752	1,657	6,603
Tire Roller	11889	2,905	3,542	4,345	12,790	18,823	42,405
Vibratory Roller (D&T)	7132	4,521	13,308	18,591	18,887	10,582	65,889
Hydraulic Excavator; Wheel	13678	0	0	0	0	0	0
Wheel Loader	17504	20,297	45,809	51,007	60,122	45,942	223,177
Water Tank Truck	4385	1,100	3,197	5,626	6,050	3,024	18,997
Dump Truck	5884	49,572	137,542	156,200	178,278	118,821	640,413
Flat Bed Truck with Crane	5469	1,986	5,198	6,504	3,317	4,548	21,553
Flat Bed Truck	3760	3,295	5,858	7,160	12,310	15,779	44,402
Portable Crusher/Screening	46179	9,836	13,400	5,351	20,498	26,912	75,997
Concrete Mixer	8783	0	1,479	2,188	365	1,346	5,378
Water Pump	513	0	71	103	18	63	255
Concrete Vibrator	347	0	28	37	8	22	95
Asphalt Sprayer	2077	207	0	0	830	1,831	2,868
LABOUR :		43,544	113,827	120,322	144,531	105,622	527,846
Mandur	3500	3,407	9,082	10,165	11,180	8,972	42,806
Skilled Labourer	3000	6,473	2,032	3,284	2,043	3,988	17,820
Carpenter	4000	4,293	392	1,103	314	525	6,627
Mason	4000	0	568	942	112	591	2,213
Labourer	2500	18,170	73,022	72,003	94,138	62,833	320,166
Driver	3500	6,112	15,842	18,228	21,548	15,734	77,464
Operator	5000	5,089	12,889	14,597	15,196	12,979	60,750
MATERIAL :		30,826	37,889	53,794	64,117	127,100	313,726
Bitumen	300	6,514	850	850	25,449	57,661	91,324
Asphalt Oil	600	2,460	0	0	9,840	20,842	33,142
Kerosene	250	1,258	78	78	4,977	10,884	17,275
Sand	9000	742	4,558	5,904	3,810	8,546	23,560
Cement	5000	0	6,347	8,319	1,863	4,995	21,524
River Stone	13500	0	1,917	3,179	379	1,995	7,470
Steel Moulds	8000	0	3,889	5,038	1,158	3,017	13,102
Timber	150000	14,610	960	3,255	960	1,485	21,270
Paint	3000	2,238	136	493	136	213	3,216
Reinforcing Steel	800	0	12,407	16,072	3,695	9,626	41,800
Tying Wire	900	0	126	164	37	98	425
Equivalent Royalty	250	3,004	6,621	10,442	11,813	7,738	39,618

Appendix A-6 QUANTITIES OF BRIDGE ON PROPOSED ROAD LINKS

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO	BRIDGE NAME	Km	From	<< TYPE >> (EXIST)	(NEW)	DESIGN LOAD	SPAN CLASS	LENGTH (m)	SPAN NO (no)	SPAN LENGTH (m)	WIDTH (m)	AREA (EXIST) (m2)	AREA (NEW) (m2)	PIER (no)	ABUT (no)	ROAD CLASS
11	JMB.GANTUNG	1	TNPR	KK	TM	10T	(A)	1.18	1	1.18	4.00	2.07	4.72	0	2	IIIB-1
	JEMBATAN I	1	TNPR	KK	TM	10T	(B)	4.00	1	4.00	4.00	10.00	16.00	0	2	
	JEMBATAN II	2	TNPR	KK	TM	10T	(B)	4.00	1	4.00	4.00	10.00	16.00	0	2	
	JEMBATAN III	2	TNPR	KK	TM	10T	(B)	4.00	1	4.00	4.00	10.00	16.00	0	2	
	PSR BELENGKONG	3	TNPR	KK	TM	10T	(A)	4.25	2	2.13	4.00	6.38	17.00	1	2	
14	JONE I	1	JONE	KK	TM	10T	(A)	4.00	2	2.00	4.00	10.00	16.00	1	2	IIIB-2
	JEMBATAN I	1	JONE	KK				4.00	2	2.00	3.30	13.20		1	2	
	JONE II	2	JONE	KK				16.00	4	4.00	4.00	64.00		3	2	
	JEMBATAN III	4	JONE	KK				8.00	5	1.60	3.50	28.00		4	2	
	JEMBATAN IV	4	JONE	KK				8.00	5	1.60	3.50	28.00		4	2	
	JEMBATAN V	5	JONE	KK				8.00	5	1.60	3.50	28.00		4	2	
	JEMBATAN VI	11	JONE	KK	TM	10T	(A)	12.00	4	3.00	4.00	60.00	48.00	3	2	
20	JMBTN.DARURAT	3	NGRA	--	TM	10T	(B)	4.00	1	4.00	4.00	0.00	16.00	0	2	IIIB-2
23	JEMBATAN I	6	TNPR	KK				4.00	3	1.33	3.30	13.20		2	2	IIIB-1
	JEMBATAN II	8	TNPR	KK				12.00	7	1.71	3.50	42.00		6	2	
	JEMBATAN III	10	TNPR	KK				12.00	7	1.71	3.50	42.00		6	2	
	JEMBATAN IV	14	TNPR	KK				12.00	7	1.71	3.50	42.00		6	2	

Appendix A-7 CONSTRUCTION AND MAINTENANCE COST OF BRIDGES ON PROPOSED ROAD LINKS

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 11 (IIIB-1) LENGTH : 3 Km

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	TOTAL
Superstructure (Timber;Span 3m;10T)	m2	21.72	57,679	4,083	1,252,787	88,682	1,341,469
Superstructure (Timber;Span 5m;10T)	m2	48.00	63,808	4,508	3,066,624	216,384	3,283,008
Superstructure (Timber;Span 8m;10T)	m2	0.00	84,621	5,920	0	0	0
Superstructure (Timber;Span 3m;BM50)	m2	0.00	71,519	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	78,078	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	99,024	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	64,259	91,530	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	65,927	102,163	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	67,861	111,206	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	74,189	126,183	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	79,864	148,488	0	0	0
Substructure (Pier;for Timber;10T)	NO	1.00	502,446	37,984	502,446	37,984	540,430
Substructure (Abut;for Timber;10T)	NO	10.00	1,373,450	171,931	13,734,500	1,719,310	15,453,810
Substructure (Pier;for Timber;BM50)	NO	0.00	738,952	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,551,898	192,024	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	2,403,437	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	4,881,961	999,658	0	0	0
Deaolition of Bridge (Timber->Timber)	m2	38.44	15,994	1,551	614,809	59,620	674,429
Deaolition of Bridge (Timber->Concrete)	m2	0.00	15,994	1,551	0	0	0
Deaolition of Bridge (Concrete)	m2	0.00	110,744	71,237	0	0	0
Maintenance of Timber Bridge (New)	m2	69.72	10,376	1,232	723,414	85,895	809,309
Maintenance of Concrete Bridge (New)	m2	0.00	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.00	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.00	4,792	2,414	0	0	0
(Without Overhead)	TOTAL COST (Timber Bridge)				19,171,166	2,121,980	21,293,146
	(Concrete Bridge)				0	0	0
	TOTAL COST (Without Maintenance)				19,171,166	2,121,980	21,293,146
(Overhead : 15%)	TOTAL COST (Timber Bridge)				22,046,841	2,440,277	24,487,118
	(Concrete Bridge)				0	0	0
	TOTAL COST (Without Maintenance)				22,046,841	2,440,277	24,487,118

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 14 (IIIB-2) LENGTH : 17 Km

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	TOTAL
Superstructure (Timber;Span 3m;10T)	m2	64.00	57,679	4,083	3,691,456	261,312	3,952,768
Superstructure (Timber;Span 5m;10T)	m2	0.00	63,088	4,508	0	0	0
Superstructure (Timber;Span 8m;10T)	m2	0.00	84,621	5,920	0	0	0
Superstructure (Timber;Span 3m;BM50)	m2	0.00	71,519	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	78,078	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	99,024	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	64,259	91,530	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	65,927	102,163	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	67,861	111,206	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	74,189	126,183	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	79,864	148,488	0	0	0
Substructure (Pier;for Timber;10T)	NO	4.00	502,446	37,984	2,009,784	151,936	2,161,720
Substructure (Abut;for Timber;10T)	NO	4.00	1,373,450	171,931	5,493,800	687,724	6,181,524
Substructure (Pier;for Timber;BM50)	NO	0.00	738,952	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,551,898	192,024	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	2,403,437	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	4,881,961	999,658	0	0	0
Demolition of Bridge (Timber->Timber)	m2	70.00	15,994	1,551	1,119,580	108,570	1,228,150
Demolition of Bridge (Timber->Concrete)	m2	0.00	15,994	1,551	0	0	0
Demolition of Bridge (Concrete)	m2	0.00	110,744	71,237	0	0	0
Maintenance of Timber Bridge (New)	m2	64.00	10,376	1,232	664,064	78,848	742,912
Maintenance of Concrete Bridge (New)	m2	0.00	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	161.20	9,514	2,459	1,533,656	396,390	1,930,046
Maintenance of Concrete Bridge (Exist)	m2	0.00	4,792	2,414	0	0	0
(Without Overhead)	TOTAL COST (Timber Bridge)				12,314,620	1,209,542	13,524,162
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				12,314,620	1,209,542	13,524,162
(Overhead : 15%)	TOTAL COST (Timber Bridge)				14,161,813	1,390,973	15,552,786
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				14,161,813	1,390,973	15,552,786

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 20 (IIIB-2) LENGTH : 4 Km

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Superstructure (Timber;Span 3m;10T)	m2	0.00	57,679	4,083	0	0	0
Superstructure (Timber;Span 5m;10T)	m2	16.00	63,888	4,508	1,022,208	72,128	1,094,336
Superstructure (Timber;Span 8m;10T)	m2	0.00	84,621	5,920	0	0	0
Superstructure (Timber;Span 3m;BM50)	m2	0.00	71,519	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	78,078	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	99,024	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	64,259	91,530	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	65,927	102,163	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	67,861	111,206	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	74,189	126,183	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	79,864	148,488	0	0	0
Substructure (Pier;for Timber;10T)	NO	0.00	502,446	37,984	0	0	0
Substructure (Abut;for Timber;10T)	NO	2.00	1,373,450	171,931	2,746,900	343,862	3,090,762
Substructure (Pier;for Timber;BM50)	NO	0.00	738,952	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,551,898	192,024	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	2,403,437	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	4,881,961	999,658	0	0	0
Demolition of Bridge (Timber->Timber)	m2	0.00	15,994	1,551	0	0	0
Demolition of Bridge (Timber->Concrete)	m2	0.00	15,994	1,551	0	0	0
Demolition of Bridge (Concrete)	m2	0.00	110,744	71,237	0	0	0
Maintenance of Timber Bridge (New)	m2	16.00	10,376	1,232	166,016	19,712	185,728
Maintenance of Concrete Bridge (New)	m2	0.00	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.00	9,514	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.00	4,792	2,414	0	0	0
(Without Overhead)	TOTAL COST (Timber Bridge)				3,769,108	415,990	4,185,098
	(Concrete Bridge)				0	0	0
	TOTAL COST (Without Maintenance)				3,769,108	415,990	4,185,098
(Overhead : 15%)	TOTAL COST (Timber Bridge)				4,334,474	478,389	4,812,863
	(Concrete Bridge)				0	0	0
	TOTAL COST (Without Maintenance)				4,334,474	478,389	4,812,863

PROV : KALIMANTAN TIMUR KAB : PASIR

LINK NO : 23 (IIIB-1) LENGTH : 15 Km

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	TOTAL
Superstructure (Timber;Span 3m;10T)	m2	0.00	57,679	4,083	0	0	0
Superstructure (Timber;Span 5m;10T)	m2	0.00	63,888	4,508	0	0	0
Superstructure (Timber;Span 8m;10T)	m2	0.00	84,621	5,920	0	0	0
Superstructure (Timber;Span 3m;BM50)	m2	0.00	71,519	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	78,078	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	99,024	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	64,259	91,530	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	85,927	102,163	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	67,861	111,206	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	74,189	126,183	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	79,864	148,488	0	0	0
Substructure (Pier;for Timber;10T)	NO	0.00	502,446	37,984	0	0	0
Substructure (Abut;for Timber;10T)	NO	0.00	1,373,450	171,931	0	0	0
Substructure (Pier;for Timber;BM50)	NO	0.00	738,952	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,551,898	192,024	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	2,403,437	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	4,881,961	999,658	0	0	0
Demolition of Bridge (Timber->Timber)	m2	0.00	15,994	1,551	0	0	0
Demolition of Bridge (Timber->Concrete)	m2	0.00	15,994	1,551	0	0	0
Demolition of Bridge (Concrete)	m2	0.00	110,744	71,237	0	0	0
Maintenance of Timber Bridge (New)	m2	0.00	10,376	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.00	2,332	2,859	0	0	0
Maintenance of Timber Bridge (Exist)	m2	139.20	9,514	2,459	1,324,348	342,292	1,666,640
Maintenance of Concrete Bridge (Exist)	m2	0.00	4,792	2,414	0	0	0
(Without Overhead)	TOTAL COST (Timber Bridge)				0	0	0
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				0	0	0
(Overhead : 15%)	TOTAL COST (Timber Bridge)				0	0	0
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				0	0	0