No. 7

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 26

## KABUPATEN SUMBA BARAT

MARCH 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

SDF
86-46(26/38)

REPUBLIC OF INDONESIA
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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 Sumba Barat in Nusa Tenggara 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


LEGEND:

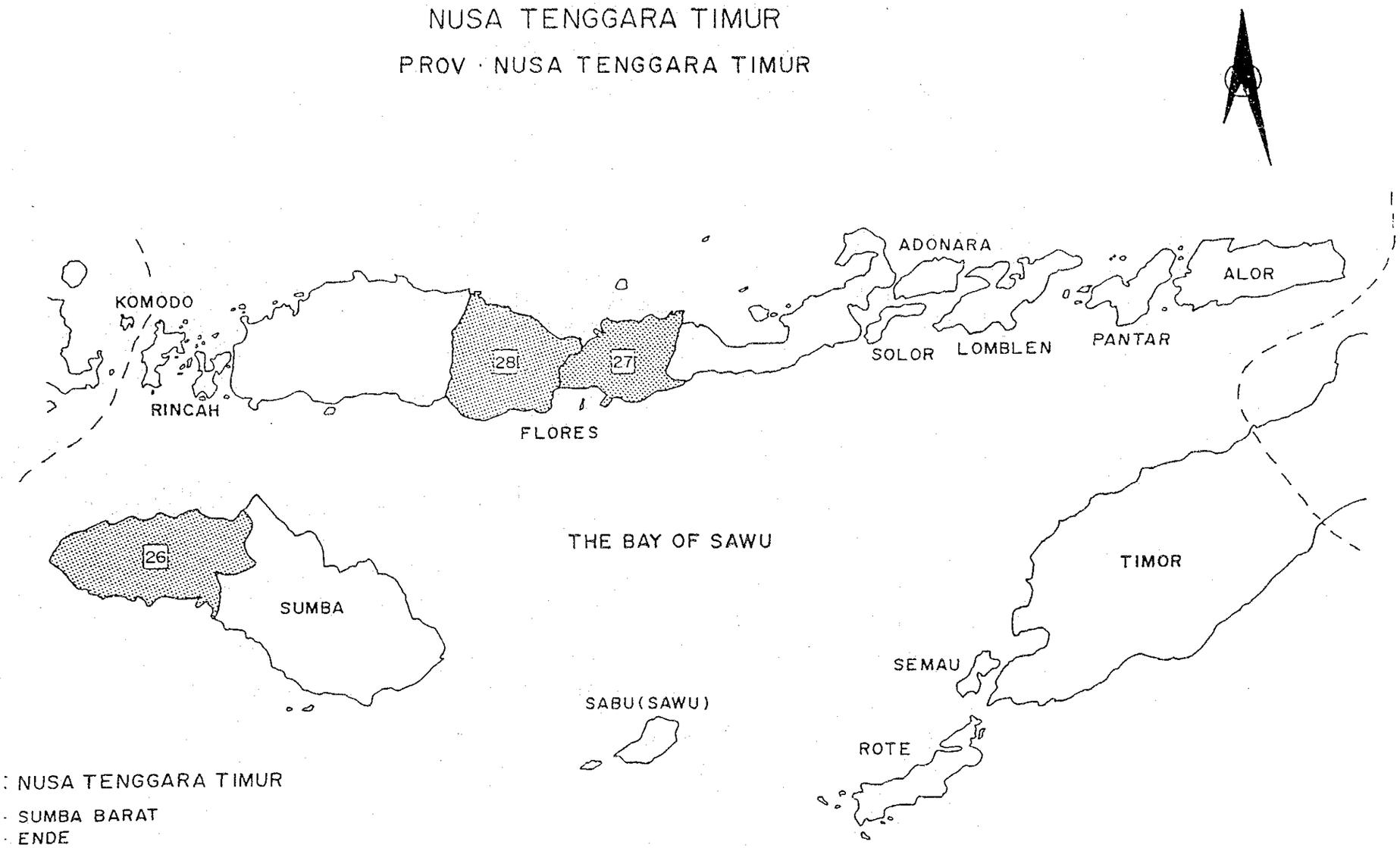
- CAPITAL CITY
- PROVINCIAL CITY
- NATIONAL BOUNDARY
- PPOVINCIAL BOUNDARY
- LOCATION OF THE PROJECT AREA

SCALE :

0 130 260 390 650 Km

# NUSA TENGGARA TIMUR

PROV · NUSA TENGGARA TIMUR




PROVINCE : NUSA TENGGARA TIMUR

26 · KAB · SUMBA BARAT
27 · KAB · ENDE
28 · KAB · NGADA

LEGEND :

---- PROVINCIAL BOUDER

LOCATION OF THE PROPOSED AREA

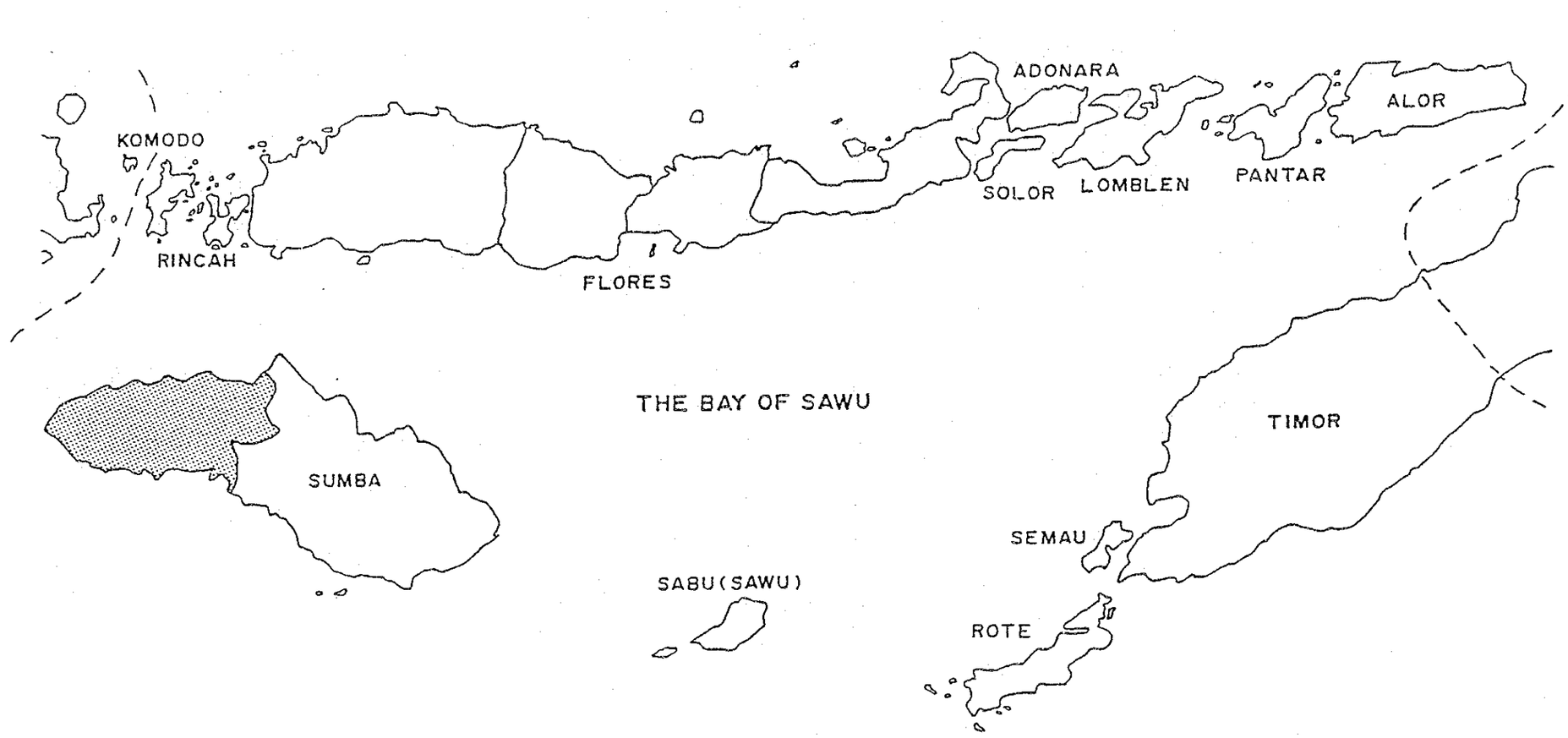
SCALE :

0 25 50 75 100 Km

# NUSA TENGGARA TIMUR

PROV · NUSA TENGGARA TIMUR

KAB · SUMBA BARAT




LEGEND :

---- PROVINCIAL BOUNDARY

LOCATION OF THE PROJECT AREA

SCALE :

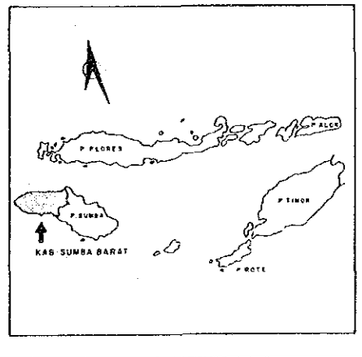
0 25 50 75 100 Km

# KAB·SUMBA BARAT


LEGEND :

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

LOCATION MAP




SCALE :

0 5 10 15 Km

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

TITLE :

| SOURCE : | SCALE : | PROVINCE : NUSATENGGARA TIMUR |
|---|---|---|
| DIREKTORAT JENDERAL CIPTA KARYA | AS SHOWN | KABUPATEN : SUMBA BARAT |

C O N T E N T S

# Chapter 1 BACKGROUND OF THE KABUPATEN

## 1.1 Topographic and Meteorological Conditions

### 1.1.1 Location and Topography

Kabupaten Sumba Barat is located on the west of Sumba Island taking up approximately one third of the island area. Its north coast faces Flores and Sumba Islands, the main islands of Nusa Tenggara Barat Province, on the opposite shore across the Sumba Strait, and its south coast faces the Indian Ocean. In the island it is bordered by Kabupaten Sumba Timur.

The island is almost wholly covered with volcanic mountians which present a high undulating apprearance, and on the south coast steep slopes fall directly into the sea. However on the other side of the island the north coast is composed of easy slopes which form a few flat lands in places. Along the seashore of the north coast there are coral reefs. In the centre of the island the tableland is considered to be a crater basin surrounded by crater walls and extends to where the capital of the Kabupaten, Waikabubak, is located in the centre.

### 1.1.2 Meteorological Conditions

The average number of rainy days and the average amount of yearly rainfall in Kabupaten Sumba Barat are 97 days and 1,888 mm respectively.

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

The number of working days which is necessary for planning the construction schedule in chapter 6, is estimated at 250 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 : Nusa Tenggara Timur
KABUPATEN : Sumba Barat STATION : Waikabubak

| 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 | 14 | 311 | 20 | 475 | 14 | 389 | 8 | 190 | 20 | 460 |
| February | 11 | 212 | 14 | 210 | 10 | 220 | 13 | 309 | 21 | 430 |
| March | 8 | 132 | 11 | 221 | 9 | 200 | 12 | 260 | 19 | 407 |
| April | 9 | 246 | 10 | 222 | 12 | 145 | 8 | 163 | 15 | 342 |
| May | 2 | 31 | 9 | 212 | 2 | 37 | 8 | 117 | 9 | 157 |
| June | 1 | 2 | 19 | 101 | 3 | 34 | 2 | 23 | 4 | 41 |
| July | 1 | 8 | 7 | 81 | 1 | 3 | 1 | 11 | 2 | 16 |
| August | 1 | 29 | 2 | 30 | 1 | 6 | 1 | 6 | 2 | 17 |
| September | 1 | 3 | 5 | 103 | 1 | 4 | 3 | 20 | 8 | 127 |
| October | 3 | 56 | 4 | 56 | 1 | 10 | 8 | 238 | 5 | 91 |
| November | 10 | 248 | 13 | 269 | 5 | 75 | 8 | 131 | 11 | 186 |
| December | 16 | 394 | 15 | 251 | 10 | 164 | 5 | 127 | 18 | 382 |
| Total | 76 | 1,671 | 129 | 2,231 | 69 | 1,287 | 77 | 1,595 | 134 | 2,656 |

NOTES : Data show the mean value of 10 stations.

## 1.2 Socio-Economic Conditions

### 1.2.1 Population

The population of Kabupaten Sumba Barat in 1984 was 261,721 which was approximately 8.9% of the 2,947,900 total population of Nusa Tenggara Timur Province as shown in Table 1-2-1.

The population density was 0.57 persons per ha which was almost the same as the provincial density of 0.61.

The recent annual average growth rate of population of the Kabupaten is 3.0% which is higher than both the provincial rate of 2.3% and the national rate of 2.2%. This may be a result of the natural increase of population.

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: | | | | | |
| SUMBA BARAT | 261,721 | 3.0 | 458,700 | 0.57 | 1984 |
| ENDE | 214,627 | 2.0 | 204,650 | 1.05 | 1984 |
| NGADA | 183,532 | 2.0 | 303,788 | 0.60 | 1984 |
| PROVINCE: | | | | | |
| NUSA TENGGARA TIMUR | 2,846,400 | 2.3 | 4,787,600 | 0.61 | 1982 |
| | 2,917,900 | | 4,787,600 | | 1983 |
| | 2,947,900 | | 4,787,600 | | 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 : NUSA TENGGARA TIMUR

KABUPATEN : SUMBA BARAT

| KECAMATAN | POPULATION | PROPORTION (%) |
|---|---|---|
| WALAKAKA | 24,195 | 9.2 |
| KODI | 62,023 | 23.8 |
| WAIWEWA BARAT | 37,677 | 14.4 |
| WAIWEWA TIMUR | 42,187 | 16.1 |
| LOLI | 19,503 | 7.5 |
| LARATAMA | 35,378 | 13.5 |
| KATIKUTANA | 30,860 | 11.7 |
| KOPETA WAIKABUBAK | 9,898 | 3.8 |
| TOTAL | 261,721 | 100 |

### 1.2.2 Land Use

In Kabupaten Sumba Barat, 166,919 ha of the current available land use area, which is approximately 37.1% of the 450,700 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 143,448 ha of agricultural harvest area, 10,371 ha of residential area and 13,100 ha of usable open space which are 85.9%, 6.2% and 7.9% of the current available land use area respectively.

The agricultural harvest area consists of 75,359 ha of paddy field, 59,819 ha of plantation and 8,270 ha of other cultivated area which are 52.5%, 41.7% and 5.8% 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 : NUSA TENGGARA TIMUR

(ha)

| KABUPATEN | WET PADDY FIELD | UPLAND PADDY FIELD | OTHER CULTIVATED AREA | PLANTATION AREA | RESIDENTIAL AREA | USABLE OPEN SPACE | RIVER & LAKE | FORESTRY AREA | OTHERS | TOTAL AREA | SURVEY YEAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SUMBA BARAT | 13,298 | 62,061 | 8,270 | 59,819 | 10,371 | 13,100 | 42,805 | 56,043 | 192,133 | 450,700 | 1984 |
| | (3.0) | (13.8) | (1.8) | (13.3) | (2.3) | (2.9) | (9.5) | (12.4) | (41.0) | (100) | |
| ENDE | 1,401 | 7,954 | 14,970 | 16,300 | 9,987 | 100,000 | 19,485 | 33,878 | 675 | 204,650 | 1984 |
| | (0.7) | (3.9) | (7.3) | (8.0) | (4.9) | (48.8) | (9.5) | (16.6) | (0.3) | (100) | |
| NGADA | 7,250 | 38,095 | 43,839 | 12,864 | 3,175 | 43,832 | 32 | 110,865 | 43,837 | 303,788 | 1984 |
| | (2.4) | (12.5) | (14.4) | (4.2) | (1.0) | (14.4) | (0) | (36.5) | (14.4) | (100) | |

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 Sumba Barat in 1984 were 45,763 ha and 119,070 ton respectively as shown in Table 1-2-4. Of food crops, the area and production of paddy, which consists of wet paddy and upland paddy, was 18,327 ha and 40,258 ton respectively which are 40.0% and 33.8% of the total food crops. The yield rate of paddy production is 2.20 ton per ha.

Production of maize, cassava and other food crops amounts to 78,812 ton and accounts for 66.2% of the total food crops. Thus, in this Kabupaten paddy is not so predominant compared with other Kabupatens.

As the table shows, average annual growth rates of area and production of paddy in 1980 through 1984 were 13.0% and 21.1% respectively which indicate a very favorable development of paddy production. Wet and upland paddy both contribute to the production. It is important for future agricultural improvement in the Kabupaten to reclaim new paddy fields in the coastal area and in the river basins in addition to improvement of productivity.

The commodity crops are produced in the plantations. The area and production of plantation crops in 1983 were 38,564 ha and 2,646 ton respectively with current growth rates of 0.4% and 1.3% as shown in Table 1-2-5. Thus the plantation crop which is exported is an important agricultural product. However current growth of production is stagnant. 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 71.5% of the total population as shown in Table 1-2-6. Thus this is an agricultural Kabupaten.

It is suggested that the Kabupaten takes measures to develop paddy production by appropriation of plant or facilities investment.

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

KABUPATEN : SUMBA BARAT

CULTIVATED AREA

| ITEM | YEAR 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | AAGR (%) |
|---|---|---|---|---|---|---|---|
| PADDY | 7,402 | 8,014 | 19,498 | 13,286 | 14,826 | 18,327 | 13.0 |
| OTHERS | 26,709 | 26,246 | 31,385 | 26,512 | 22,969 | 27,436 | 0.5 |
| TOTAL | 34,111 | 34,260 | 50,883 | 39,798 | 37,795 | 45,763 | 6.1 |

PRODUCTION

| ITEM | YEAR 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | AAGR (%) |
|---|---|---|---|---|---|---|---|
| PADDY | 10,114 | 18,744 | 38,094 | 34,321 | 39,422 | 40,258 | 21.1 |
| OTHERS | 16,823 | 122,888 | 66,253 | 97,651 | 77,433 | 78,812 | 36.2 |
| TOTAL | 26,937 | 141,632 | 104,347 | 131,972 | 116,855 | 119,070 | 34.6 |

YIELD RATE

| ITEM | YEAR 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | AGGR (%) |
|---|---|---|---|---|---|---|---|
| PADDY | 1.37 | 2.34 | 1.95 | 2.58 | 2.66 | 2.20 | 5.0 |

Notes :

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

Table 1-2-5 AREA AND PRODUCTION OF PLANTATION CROPS
Year : 1983

PROVINCE : NUSA TENGGARA TIMUR

| KABUPATEN | AREA (ha) | PRODUCTION (ton) | AAGR (%) AREA | AAGR (%) PRODUCTION |
|---|---|---|---|---|
| SUMBA BARAT | 38,564 | 2,646 | 0.4 | 1.3 |
| ENDE | 15,309 | 3,106 | 5.1 | 0 |
| NGADA | 40,183 | 10,891 | 16.5 | 16.5 |

Table 1-2-6 POPULATION OF AGRICULTURAL SECTOR

PROVINCE : NUSA TENGGARA TIMUR

| KABUPATEN | AGRICULTURAL SECTOR | TOTAL POPULATION | PROPORTION (%) | AAGR (%) | SURVEY YEAR |
|---|---|---|---|---|---|
| SUMBA BARAT | 187,000 | 261,721 | 71.5 | 2.5 | 1984 |
| ENDE | 178,000 | 214,627 | 83.0 | 5.0 | 1984 |
| NGADA | 160,000 | 183,532 | 84.2 | 5.0 | 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 Sumba Barat are forestry, fishery and livestock sectors. However those industies have just enough production volume to supply for the consumption of the Kabupaten itself.

The following table shows the current growth rates of the above mentioned sectors.

| | 1980 | 1984 | AAGR (%) |
|---|---|---|---|
| Timber production ($m^3$) | 2,685 | 3,013 | 3.0 |
| Fishery production (ton) | 38 | 50 | 7.0 |
| Livestock production (ton) | 64 | 69 | 2·0 |

## 1.3 Present Status of Kabupaten Roads

### 1.3.1 Outline of Road Networks

In Kabupaten Sumba Barat there is one national road which runs across the Kabupaten from east to west. It leads to Waikelo from Lende Wacu via Waikabubak, the Kabupaten capital. One provincial road crosses the national road at Waikabubak from north to south. It leads to Patiala and Wanakaka from Memboro via Waikabubak. The other provincial road runs from Ketewer to Tossi and Leteloko in the west region of the Kabupaten and crosses the national road at Waitabula.

These national and provincial roads play an important role as the regional trunk roads of the Kabupaten. The Kabupaten roads are developed along the regional trunk roads as access roads.

The area near the east boundary of the Kabupaten and the south coastal area are mostly covered by steep slopes and hills due to the geographical conditions peculiar to a volcanic island. Therefore Kabupaten roads are not yet developed in these areas. However relative high density Kabupaten road networks are formed in the north and west areas in and around Wonoroto, Waikapoda and Waibakul and also in the southwest region of the Kabupaten because these areas are flat plateaus.

Some Kabupatens in the north area are also developed to link with the regional trunk roads.

### 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 Sumba Barat are confirmed as 35 links and 466 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 Kabupaten roads is 1.02 m per ha. This is higher than the national density of 0.48 m per ha but 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 is situated on the way of road developing.

| | Total Length ( km ) | Area (ha) | Density (m/ha) |
|---|---|---|---|
| Kabupaten : Sumba Barat | 466 | 458,700 | 1.02 |
| Province : Nusa Tenggara Timur | 1,882 | 967,138 | 1.95 |
| Jawa Is.(Excluding DKI Jakarta) | 27,715 | 13,159,700 | 2.11 |
| Indonesia | 92,038 | 191,944,300 | 0 48 |

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

2. The source 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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

(Km)

| NO | ?) | THN | BTN | KRK | ASP | L.L | TOTAL |
|---|---|---|---|---|---|---|---|
| LINK | 1 | 8 | | | | | 8 |
| LINK | 2 | | 17 | | | | 17 |
| LINK | 3 | | 13 | | | | 13 |
| LINK | 4 | 6 | | | | | 7 |
| LINK | 5 | 2 | 20 | | | | 22 |
| LINK | 6 | 15 | 4 | | | | 20 |
| LINK | 7 | | 15 | | | | 15 |
| LINK | 8 | | 16 | | | | 16 |
| LINK | 9 | 6 | | | | | 6 |
| LINK | 10 | | 3 | | | | 3 |
| LINK | 11 | 6 | | | | | 6 |
| LINK | 12 | | 15 | | | | 15 |
| LINK | 13 | 24 | | | | | 24 |
| LINK | 14 | | 4 | | | | 4 |
| LINK | 15 | | 13 | | | | 13 |
| LINK | 16 | 2 | | | 2 | | 4 |
| LINK | 17 | 2 | 10 | | | | 12 |
| LINK | 18 | 32 | | | | | 32 |
| LINK | 19 | 2 | 9 | | | | 11 |
| LINK | 20 | | 18 | | | | 18 |
| LINK | 21 | 7 | | | | | 7 |
| LINK | 22 | | 25 | | | | 25 |
| LINK | 23 | 13 | | | | | 14 |
| LINK | 24 | | 6 | | | | 6 |
| LINK | 25 | | 12 | | | | 12 |
| LINK | 26 | | 20 | | | | 20 |
| LINK | 27 | | 9 | | | | 9 |
| LINK | 28 | 2 | 4 | | | | 6 |
| LINK | 29 | | 6 | | | | 6 |
| LINK | 30 | 2 | 13 | | | | 15 |
| LINK | 31 | | 9 | | | | 9 |
| LINK | 32 | | 5 | | | | 5 |
| LINK | 33 | 27 | | | | | 27 |
| LINK | 34 | 11 | | | | | 11 |
| LINK | 35 | | 9 | | 19 | | 28 |
| TOTAL | | 167 | 275 | | 22 | | 466 |
| RATIO | | 36 | 59 | 0 | 5 | 0 | (%) |

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 : Sumba Barat | 4.7 | 59.2 | 36.0 |
| Province : Nusa Tenggara Timur | 1.6 | 26.5 | 71.9 |
| 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 either than that of Indonesia and of Jawa Island. The proportion of low grade roads such as earth roads and others is comparatively high. This means that the road classification in the Kabupaten is 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 : Sumba Barat | 18.0 | 7.1 | 18.9 | 6.0 |
| Province : Nusa Tenggara Timur | 13.8 | 29.5 | 30.7 | 26.0 |
| 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 CODITION BY SURFACE TYPE

PROVINCE : NUSA TENGGARA TIMUR

KABUPATEN : SUMBA BARAT

(%)

| NO | TANAH | | | | BATU | | | | KRIKIL | | | | ASPAL | | | | T.L | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BA | SD | RU | RB | BA | SD | RU | RB | BA | SD | RU | RB | BA | SD | RU | RB | BA | SD | RU | RB |
| LINK 1 | | 83 | 18 | 19 | | | | | | | | | | | | | | | | |
| LINK 2 | | | | | | 71 | 12 | 17 | | | | | | | | | | | | |
| LINK 3 | | | | | | 82 | 11 | 7 | | | | | | | | | | | | |
| LINK 4 | | 68 | 19 | 13 | | | | | | 60 | 25 | 15 | | | | | | | | |
| LINK 5 | | 40 | 18 | 43 | | 79 | 9 | 12 | | | | | | | | | | | | |
| LINK 6 | | 63 | 14 | 23 | | 70 | 10 | 20 | | | | | 80 | 10 | 10 | | | | | |
| LINK 7 | | | | | 36 | 52 | 25 | 2 | | | | | | | | | | | | |
| LINK 8 | | | | | 8 | 41 | 51 | | | | | | | | | | | | | |
| LINK 9 | | 58 | 30 | 12 | | | | | | | | | | | | | | | | |
| LINK 10 | | | | | | 82 | 18 | | | | | | | | | | | | | |
| LINK 11 | | 44 | 56 | | | | | | | | | | | | | | | | | |
| LINK 12 | | | | | | 83 | 17 | | | | | | | | | | | | | |
| LINK 13 | | 50 | 50 | | | | | | | | | | | | | | | | | |
| LINK 14 | | | | | | 85 | 16 | | | | | | | | | | | | | |
| LINK 15 | | | | | 66 | 30 | 5 | | | | | | | | | | | | | |
| LINK 16 | | 88 | 13 | | | | | | | | | | 45 | 30 | | 25 | | | | |
| LINK 17 | | 40 | 60 | | 44 | 39 | 18 | | | | | | | | | | | | | |
| LINK 18 | | 78 | 22 | | | | | | | | | | | | | | | | | |
| LINK 19 | | 75 | 25 | | | 75 | 25 | | | | | | | | | | | | | |
| LINK 20 | | | | | 25 | 48 | 28 | | | | | | | | | | | | | |
| LINK 21 | | 78 | 12 | 10 | | | | | | | | | | | | | | | | |
| LINK 22 | | | | | | 93 | 6 | | | | | | | | | | | | | |
| LINK 23 | | 43 | 57 | | | | | | | | | | | | | | | 20 | 80 | |
| LINK 24 | | | | | | 81 | 15 | 4 | | | | | | | | | | | | |
| LINK 25 | | | | | | 94 | 6 | | | | | | | | | | | | | |
| LINK 26 | | | | | 91 | 9 | | | | | | | | | | | | | | |
| LINK 27 | | | | | 21 | 49 | 30 | | | | | | | | | | | | | |
| LINK 28 | 83 | 55 | 13 | 20 | 79 | 10 | 10 | 1 | | | | | | | | | | | | |
| LINK 29 | | | | | 88 | 9 | 3 | | | | | | | | | | | | | |
| LINK 30 | | 50 | 18 | 33 | | 80 | 10 | 10 | | | | | | | | | | | | |
| LINK 31 | | | | | | 74 | 20 | 6 | | | | | | | | | | | | |
| LINK 32 | | | | | 82 | 18 | | | | | | | | | | | | | | |
| LINK 33 | | 78 | 11 | 12 | | | | | | | | | | | | | | | | |
| LINK 34 | | 70 | 30 | | | | | | | | | | | | | | | | | |
| LINK 35 | | | | | 64 | 26 | 10 | | | | | | 96 | 4 | | | | | | |
| AVERAGE | 1 | 61 | 23 | 11 | 24 | 58 | 15 | 3 | 0 | 60 | 25 | 15 | 74 | 15 | 3 | 8 | 0 | 20 | 80 | 0 |
| LENGTH | 167 Ke | | | | 275 Ke | | | | 1 Ke | | | | 22 Ke | | | | 1 Ke | | | |
| (Ke) | 2 | 102 | 45 | 18 | 66 | 160 | 41 | 8 | 0 | 1 | 0 | 0 | 16 | 3 | 1 | 2 | 0 | 0 | 1 | 0 |

The surface condition level of the Kabupaten roads in the Kabupaten is similar to that of Indonesia and Jawa Island. The propotion in good condition is relatively high.

(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 88.0% flat, 11.0% hilly, 1.0% mountainous. There is no swampy area in the Kabupaten.

1.3.3 Bridge Inventory

A bridge inventory showing the existing condition of bridges on the Kabupaten roads in Kabupaten Sumba Barat was 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 32 bridges with a total length of 209 m of which 6 or 18.7% are timber, 9 or 9.4% are concrete and 15 or 46.9% are others. Steel bridges account for 8 or 25% of the total. On the other hand, 46 bridges with a total length of 776 m are required to be newly constructed.

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

(Ka)

| 102 ( 3) | DT | BK | GN | TOTAL |
|---|---|---|---|---|
| LINK 1 | 8 | | | 8 |
| LINK 2 | 16 | 1 | | 17 |
| LINK 3 | 13 | | | 13 |
| LINK 4 | 7 | | | 7 |
| LINK 5 | 19 | 3 | | 22 |
| LINK 6 | 19 | | 1 | 20 |
| LINK 7 | 11 | 4 | | 15 |
| LINK 8 | 15 | 1 | | 16 |
| LINK 9 | 6 | | | 6 |
| LINK 10 | 3 | | | 3 |
| LINK 11 | 6 | | | 6 |
| LINK 12 | 15 | | | 15 |
| LINK 13 | 24 | | | 24 |
| LINK 14 | 2 | 2 | | 4 |
| LINK 15 | 12 | 1 | | 13 |
| LINK 16 | 2 | 2 | | 4 |
| LINK 17 | 11 | 1 | | 12 |
| LINK 18 | 19 | 13 | | 32 |
| LINK 19 | 11 | | | 11 |
| LINK 20 | 16 | 2 | | 18 |
| LINK 21 | 7 | | | 7 |
| LINK 22 | 20 | 5 | | 25 |
| LINK 23 | 14 | | | 14 |
| LINK 24 | 6 | | | 6 |
| LINK 25 | 12 | | | 12 |
| LINK 26 | 17 | 3 | | 20 |
| LINK 27 | 2 | 7 | | 9 |
| LINK 28 | 6 | | | 6 |
| LINK 29 | 6 | | | 6 |
| LINK 30 | 13 | 2 | | 15 |
| LINK 31 | 9 | | | 9 |
| LINK 32 | 5 | | | 5 |
| LINK 33 | 26 | 1 | | 27 |
| LINK 34 | 9 | 2 | | 11 |
| LINK 35 | 25 | 3 | | 28 |
| TOTAL | 412 | 53 | 1 | 466 |
| RATIO | 88 | 11 | 0 | (%) |

Table 1-3-4 NUMBER AND LENGTH OF BRIDGES

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

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

| | EXISTING | | NOT EXIST | | TOTAL | |
|---|---|---|---|---|---|---|
| LINK NO | NO. | LENGTH | NO. | LENGTH | NO. | LENGTH |
| 2 | 2 | 9.00 | | | 2 | 9.00 |
| 3 | 3 | 10.00 | | | 3 | 10.00 |
| 4 | 2 | 19.00 | | | 2 | 19.00 |
| 5 | 3 | 13.00 | | | 3 | 13.00 |
| 6 | 1 | 24.00 | | | 1 | 24.00 |
| 7 | 1 | 4.00 | | | 1 | 4.00 |
| 13 | 2 | 7.00 | 2 | 305.00 | 4 | 312.00 |
| 14 | | | 1 | 5.00 | 1 | 5.00 |
| 15 | 2 | 13.00 | | | 2 | 13.00 |
| 17 | | | 1 | 9.00 | 1 | 9.00 |
| 18 | | | 18 | 146.00 | 18 | 146.00 |
| 20 | 7 | 48.00 | 4 | 25.00 | 11 | 73.00 |
| 22 | 3 | 22.00 | 6 | 56.00 | 9 | 78.00 |
| 24 | | | 1 | 30.00 | 1 | 30.00 |
| 26 | | | 1 | 24.00 | 1 | 24.00 |
| 33 | | | 12 | 176.00 | 12 | 176.00 |
| 35 | 6 | 39.50 | | | 6 | 39.50 |
| TOTAL | 32 | 208.50 | 46 | 776.00 | 78 | 984.50 |

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

<<< BRIDGE >>> (No)

| I03 (18) | LL | BT | BJ | KY | TOTAL |
|---|---|---|---|---|---|
| LINK 2 | 2 | | | | 2 |
| LINK 3 | 1 | 2 | | | 3 |
| LINK 4 | 1 | | 1 | | 2 |
| LINK 5 | 1 | 1 | 1 | | 3 |
| LINK 6 | 1 | 1 | 1 | | 1 |
| LINK 7 | 1 | | | | 1 |
| LINK 13 | 2 | | | | 2 |
| LINK 14 | | | | | |
| LINK 15 | 1 | | 1 | | 2 |
| LINK 17 | | | | | |
| LINK 18 | | | | | |
| LINK 20 | | | 1 | 6 | 7 |
| LINK 22 | 1 | 1 | 2 | | 3 |
| LINK 24 | | | | | |
| LINK 26 | | | | | |
| LINK 33 | | | | | |
| LINK 35 | 5 | | 1 | | 6 |
| TOTAL | 15 | 3 | 8 | 6 | 32 |
| RATIO | 47 | 9 | 25 | 19 | (%) |

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

| Bridge Type | Span Length (m) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 〈3 | 〈5 | 〈8 | 〈10 | 〈12 | 〈14 | 〈16 | 〈18 | 〈20 | 〈99 | Total |
| Timber | 4 | 2 | - | - | - | - | - | - | - | - | 6 |
| Concrete | 2 | 1 | - | - | - | - | - | - | - | - | 3 |
| Steel | - | - | 3 | 2 | 3 | - | - | - | - | - | 8 |
| Others | 8 | 7 | - | - | - | - | - | - | - | - | 15 |
| Total | 14 | 10 | 3 | 2 | 3 | - | - | - | - | - | 32 |

Existing bridges are various types but steel bridge is prevailing. 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 Sumba Barat 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 | 179 | 16 | 376 | 645 | 1,216 |
| Proportion (%) | 14.72 | 1.32 | 30.92 | 53.04 | 100.00 |

Source : Bina Marga Inventory

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

| | SEDAN | BUS | TRUCK | MOTOR-CYCLE | TOTAL |
|---|---|---|---|---|---|
| Proportion (%) | 0.00 | 1.23 | 83.42 | 15.35 | 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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

| | | |
|---|---|---|
| A) | Growth Rate of Population : | 3.00 (%) |
| B) | Growth Rate of Cultivated Area : | 5.00 (%) |
| C) | Growth Rate of Rice field : | 13.00 (%) |
| D) | Growth Rate of Rice yield rate : | 5.00 (%) |
| E) | Growth Rate of GDP / capita : | 7.70 (%) |
| a) | Geometrical Mean ( A x B ) : | 4.00 (%) |
| b) | Geometrical Mean ( C x D ) : | 8.93 (%) |
| c) | Geometrical Mean ( a x b ) : | 6.43 (%) |
| d) | Geometrical Mean ( c x E ) : | 7.06 (%) |
| | TRAFFIC GROWTH RATE : | 7.06 (%) |

### 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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( SPD : 1/2 )

| | INVENTORY (1985) | | | | | RATE | AFTER 13 YEARS (1998) | | | | | CLASS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LINK NO | HBL | BUS | TRUK | SPD | TOTAL | | HBL | BUS | TRUK | SPD | TOTAL | |
| 1 | 3 | 0 | 7 | 5 | 13 | 7.1% | 7 | 0 | 17 | 12 | 32 | IIIC |
| 2 | 6 | 2 | 7 | 20 | 25 | 7.1% | 15 | 5 | 17 | 49 | 61 | IIIB-2 |
| 3 | 4 | 1 | 5 | 15 | 18 | 7.1% | 10 | 2 | 12 | 36 | 44 | IIIC |
| 4 | 8 | 0 | 12 | 15 | 28 | 7.1% | 19 | 0 | 29 | 36 | 68 | IIIB-2 |
| 5 | 4 | 1 | 15 | 20 | 30 | 7.1% | 10 | 2 | 36 | 49 | 73 | IIIB-2 |
| 6 | 4 | 0 | 10 | 10 | 19 | 7.1% | 10 | 0 | 24 | 24 | 46 | IIIC |
| 7 | 6 | 0 | 8 | 15 | 22 | 7.1% | 15 | 0 | 19 | 36 | 53 | IIIB-2 |
| 8 | 2 | 0 | 8 | 10 | 15 | 7.1% | 5 | 0 | 19 | 24 | 36 | IIIC |
| 9 | 0 | 0 | 15 | 20 | 25 | 7.1% | 0 | 0 | 36 | 49 | 61 | IIIB-2 |
| 10 | 4 | 0 | 2 | 10 | 11 | 7.1% | 10 | 0 | 5 | 24 | 27 | IIIC |
| 11 | 50 | 0 | 30 | 75 | 118 | 7.1% | 121 | 0 | 73 | 182 | 286 | IIIB-1 |
| 12 | 6 | 2 | 7 | 20 | 25 | 7.1% | 15 | 5 | 17 | 49 | 61 | IIIB-2 |
| 13 | 0 | 0 | 25 | 50 | 50 | 7.1% | 0 | 0 | 61 | 121 | 121 | IIIB-2 |
| 14 | 2 | 0 | 8 | 8 | 14 | 7.1% | 5 | 0 | 19 | 19 | 34 | IIIC |
| 15 | 4 | 0 | 11 | 15 | 23 | 7.1% | 10 | 0 | 27 | 36 | 56 | IIIB-2 |
| 16 | 10 | 1 | 4 | 20 | 25 | 7.1% | 24 | 2 | 10 | 49 | 61 | IIIB-2 |
| 17 | 0 | 0 | 2 | 4 | 4 | 7.1% | 0 | 0 | 5 | 10 | 10 | IIIC |
| 18 | 0 | 0 | 0 | 0 | 0 | 7.1% | 0 | 0 | 0 | 0 | 0 | IIIC |
| 19 | 1 | 0 | 4 | 10 | 10 | 7.1% | 2 | 0 | 10 | 24 | 24 | IIIC |
| 20 | 2 | 0 | 10 | 11 | 18 | 7.1% | 5 | 0 | 24 | 27 | 44 | IIIC |
| 21 | 0 | 0 | 6 | 4 | 8 | 7.1% | 0 | 0 | 15 | 10 | 19 | IIIC |
| 22 | 0 | 0 | 6 | 4 | 8 | 7.1% | 0 | 0 | 15 | 10 | 19 | IIIC |
| 23 | 0 | 0 | 10 | 15 | 18 | 7.1% | 0 | 0 | 24 | 36 | 44 | IIIC |
| 24 | 4 | 0 | 8 | 10 | 17 | 7.1% | 10 | 0 | 19 | 24 | 41 | IIIC |
| 25 | 4 | 1 | 3 | 15 | 16 | 7.1% | 10 | 2 | 7 | 36 | 39 | IIIC |
| 26 | 0 | 0 | 60 | 20 | 70 | 7.1% | 0 | 0 | 146 | 49 | 170 | IIIB-2 |
| 27 | 0 | 0 | 5 | 10 | 10 | 7.1% | 0 | 0 | 12 | 24 | 24 | IIIC |
| 28 | 2 | 0 | 8 | 15 | 18 | 7.1% | 5 | 0 | 19 | 36 | 44 | IIIC |
| 29 | 2 | 0 | 18 | 19 | 30 | 7.1% | 5 | 0 | 44 | 46 | 73 | IIIB-2 |
| 30 | 0 | 0 | 6 | 10 | 11 | 7.1% | 0 | 0 | 15 | 24 | 27 | IIIC |
| 31 | 0 | 0 | 6 | 10 | 11 | 7.1% | 0 | 0 | 15 | 24 | 27 | IIIC |
| 32 | 0 | 0 | 4 | 5 | 7 | 7.1% | 0 | 0 | 10 | 12 | 17 | IIIC |
| 33 | 0 | 0 | 2 | 3 | 4 | 7.1% | 0 | 0 | 5 | 7 | 10 | IIIC |
| 34 | 1 | 0 | 4 | 3 | 7 | 7.1% | 2 | 0 | 10 | 7 | 17 | IIIC |
| 35 | 50 | 8 | 40 | 149 | 173 | 7.1% | 121 | 19 | 97 | 362 | 420 | IIIB-1 |
| PERCENT | 14.72 | 1.32 | 30.92 | 53.04 | | | 14.72 | 1.32 | 30.92 | 53.04 | | |

## 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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( 1998 )

| LINK NO | CLASS | SURFACE | MOBIL | BUS | TRUCK | SEPEDA | TOTAL |
|---|---|---|---|---|---|---|---|
| 1 | IIIB-2 | KRK | 15 | 1 | 31 | 53 | 74 |
| 2 | IIIB-2 | KRK | 22 | 2 | 46 | 79 | 110 |
| 3 | IIIB-2 | KRK | 24 | 2 | 50 | 85 | 119 |
| 4 | IIIB-2 | KRK | 10 | 1 | 22 | 38 | 52 |
| 5 | IIIB-2 | KRK | 30 | 3 | 63 | 108 | 150 |
| 6 | IIIB-1 | ASP | 42 | 4 | 88 | 151 | 210 |
| 7 | IIIB-2 | KRK | 32 | 3 | 66 | 114 | 158 |
| 8 | IIIB-2 | KRK | 25 | 2 | 52 | 89 | 124 |
| 9 | IIIC | KRK | 3 | 0 | 7 | 12 | 16 |
| 10 | IIIC | KRK | 4 | 0 | 9 | 15 | 21 |
| 12 | IIIC | KRK | 9 | 1 | 18 | 31 | 44 |
| 13 | IIIB-2 | KRK | 11 | 1 | 23 | 40 | 55 |
| 14 | IIIC | KRK | 7 | 1 | 14 | 24 | 34 |
| 15 | IIIC | KRK | 9 | 1 | 18 | 31 | 44 |
| 16 | IIIC | KRK | 5 | 0 | 11 | 18 | 25 |
| 17 | IIIC | KRK | 7 | 1 | 15 | 25 | 36 |
| 18 | IIIB-2 | KRK | 15 | 1 | 32 | 56 | 76 |
| 19 | IIIC | KRK | 6 | 1 | 12 | 21 | 30 |
| 20 | IIIB-1 | ASP | 40 | 4 | 85 | 146 | 202 |
| 21 | IIIB-2 | KRK | 13 | 1 | 26 | 45 | 63 |
| 22 | IIIB-1 | ASP | 42 | 4 | 89 | 152 | 211 |
| 23 | IIIB-2 | KRK | 17 | 2 | 36 | 62 | 86 |
| 24 | IIIC | KRK | 3 | 0 | 7 | 12 | 16 |
| 25 | IIIC | KRK | 7 | 1 | 15 | 25 | 36 |
| 27 | IIIB-2 | KRK | 19 | 2 | 41 | 70 | 97 |
| 28 | IIIB-2 | KRK | 12 | 1 | 25 | 43 | 60 |
| 29 | IIIC | KRK | 8 | 1 | 17 | 30 | 41 |
| 30 | IIIB-2 | KRK | 21 | 2 | 45 | 77 | 107 |
| 31 | IIIB-2 | KRK | 17 | 1 | 35 | 60 | 83 |
| 32 | IIIC | KRK | 2 | 0 | 5 | 8 | 11 |
| 33 | IIIB-2 | KRK | 14 | 1 | 29 | 50 | 69 |
| 34 | IIIB-2 | KRK | 15 | 1 | 31 | 54 | 74 |

## 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 : SUMBA BARAT

( 1000Rupiah )

| | LINK 1 | LINK 2 | LINK 3 | LINK 4 | LINK 5 | LINK 6 | LINK 7 | LINK 8 | LINK 9 | LINK 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 8 Km | 17 Km | 13 Km | 7 Km | 22 Km | 20 Km | 15 Km | 16 Km | 6 Km | 3 Km |
| | IIIB-2 | IIIB-2 | IIIB-2 | IIIB-2 | IIIB-2 | IIIB-1 | IIIB-2 | IIIB-2 | IIIC | IIIC |
| YEAR | Surplus | Surplus | Surplus | Surplus | Surplus | Surplus | Surplus | Surplus | Surplus | Surplus |
| 1988 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1989 | 7899 | 11650 | 7245 | 4274 | 21460 | 58077 | 9250 | 13793 | 1265 | 356 |
| 1990 | 8563 | 12275 | 7632 | 4761 | 22773 | 61755 | 10087 | 14688 | 1497 | 360 |
| 1991 | 8949 | 13230 | 8046 | 5021 | 24472 | 66880 | 10751 | 15068 | 1522 | 360 |
| 1992 | 9930 | 14217 | 8630 | 5316 | 26186 | 71447 | 12177 | 16028 | 1522 | 364 |
| 1993 | 10628 | 15173 | 9544 | 5833 | 27942 | 76753 | 13227 | 17254 | 1780 | 364 |
| 1994 | 11364 | 16459 | 10317 | 6373 | 30083 | 84447 | 14492 | 18761 | 1805 | 405 |
| 1995 | 12380 | 17766 | 11099 | 6888 | 32625 | 90733 | 15950 | 19721 | 2014 | 405 |
| 1996 | 13395 | 19346 | 12210 | 7429 | 35209 | 98646 | 17236 | 20996 | 2271 | 478 |
| 1997 | 14444 | 20995 | 13182 | 8187 | 37835 | 106741 | 19305 | 22852 | 2529 | 482 |
| 1998 | 16123 | 22607 | 14510 | 8781 | 41248 | 118023 | 21213 | 24739 | 2554 | 523 |
| SUM | 113675 | 163718 | 102415 | 62865 | 299833 | 833502 | 143688 | 183900 | 18759 | 4097 |
| COST | 49548 | 60493 | 32879 | 22151 | 129573 | 404506 | 51801 | 75049 | -1285 | -3633 |
| /Km | 6194 | 3558 | 2529 | 3164 | 5890 | 20225 | 3453 | 4691 | -214 | -1211 |

# 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

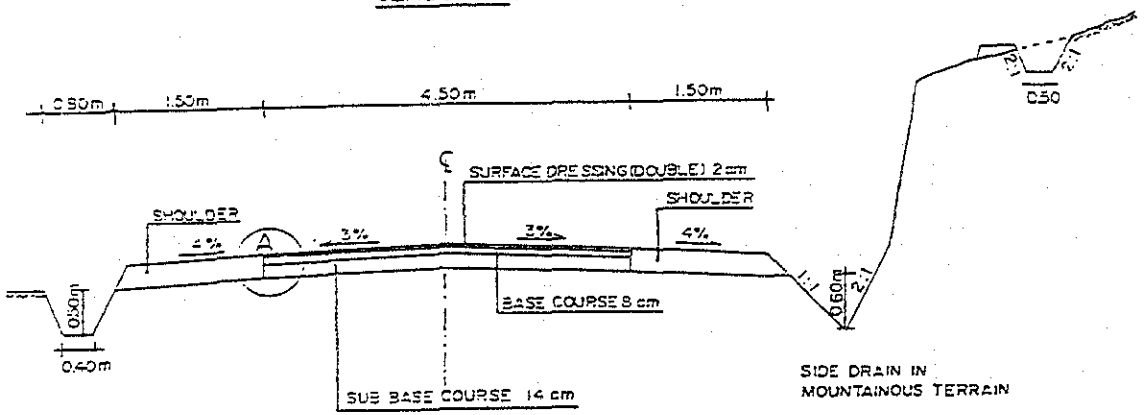
DESIGN CRITERIA FOR KABUPATEN ROADS

| 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 | | |

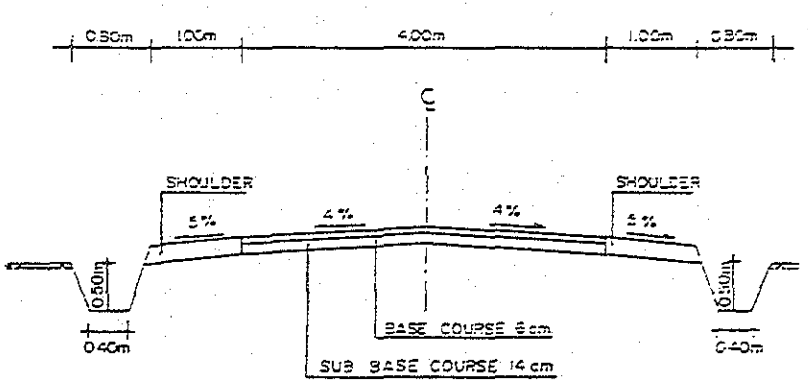
Fig. 3-1-1

# STANDARD ROAD CROSS SECTIONS

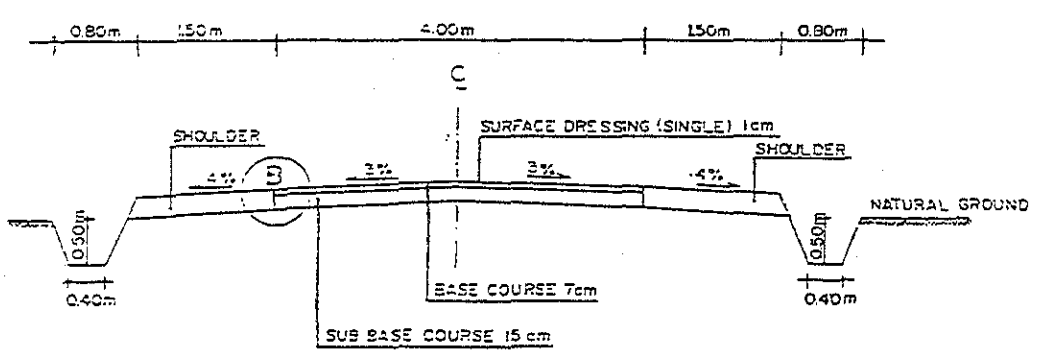
## CLASS III A



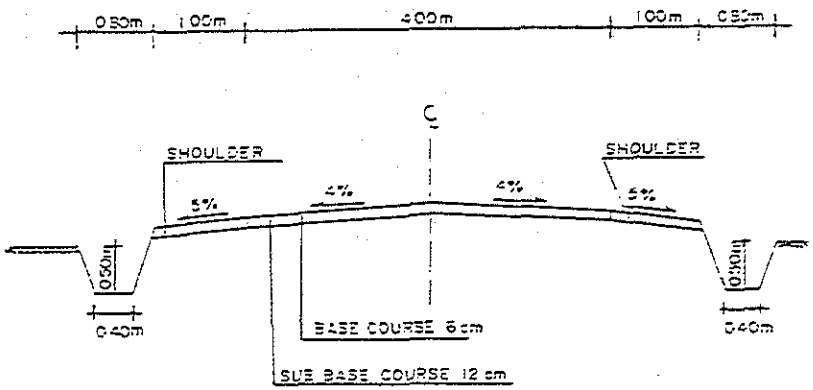

## CLASS III B-2




## 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.

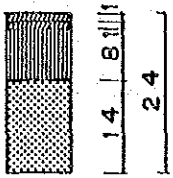
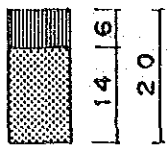
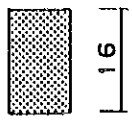
CBR of the laterite is generally in the range of CBR 4 to 10. However site CBR tests should be conducted before construction to finally decide the pavement thickness.

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

(cm)

| CBR | ROAD CLASSIFICATION | | | |
|---|---|---|---|---|
| | III A | III B-1 | III B-2 | III C |
| 6 |  |  |  |  |



= SURFACE DRESSING (ASPHALT)

= BASE COURSE (CRUSHER-RUN)

= SUBBASE COURSE (SANDY GRAVEL)

## 3.3 Design of Bridges and Other Structures

### 3.3.1 Standard Bridge

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

(1) Bridge Type

1) Superstructure

The following two types have been finally selected with the agreement of Bina Marga after studying the actual rural conditions of bridge construction. Fig. 3-3-1 shows the cross sections of standard types.

a. Timber beam bridge (hereinafter timber bridge) for roads class III B-1, III B-2 and III C.

b. Reinforced concrete T-girder bridge (hereinafter RC-bridge) for roads class III A.

2) Substructure

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

a) Timber pile bents for timber bridge
b) Rubble in Mortar masonry for RC bridge

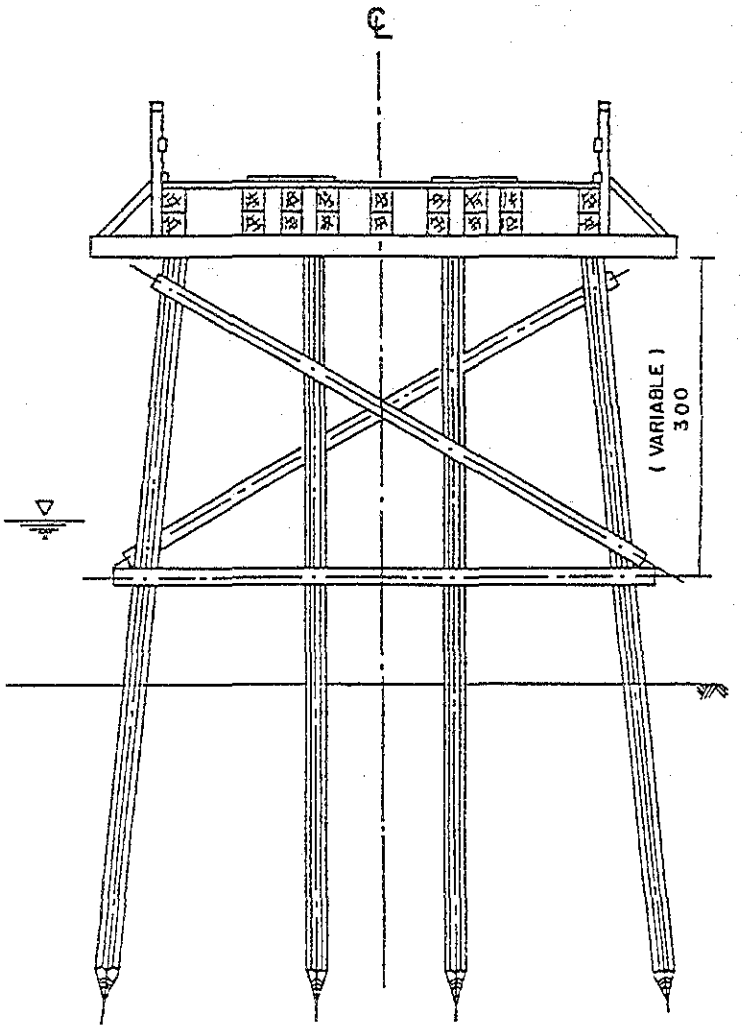
3) Foundation

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

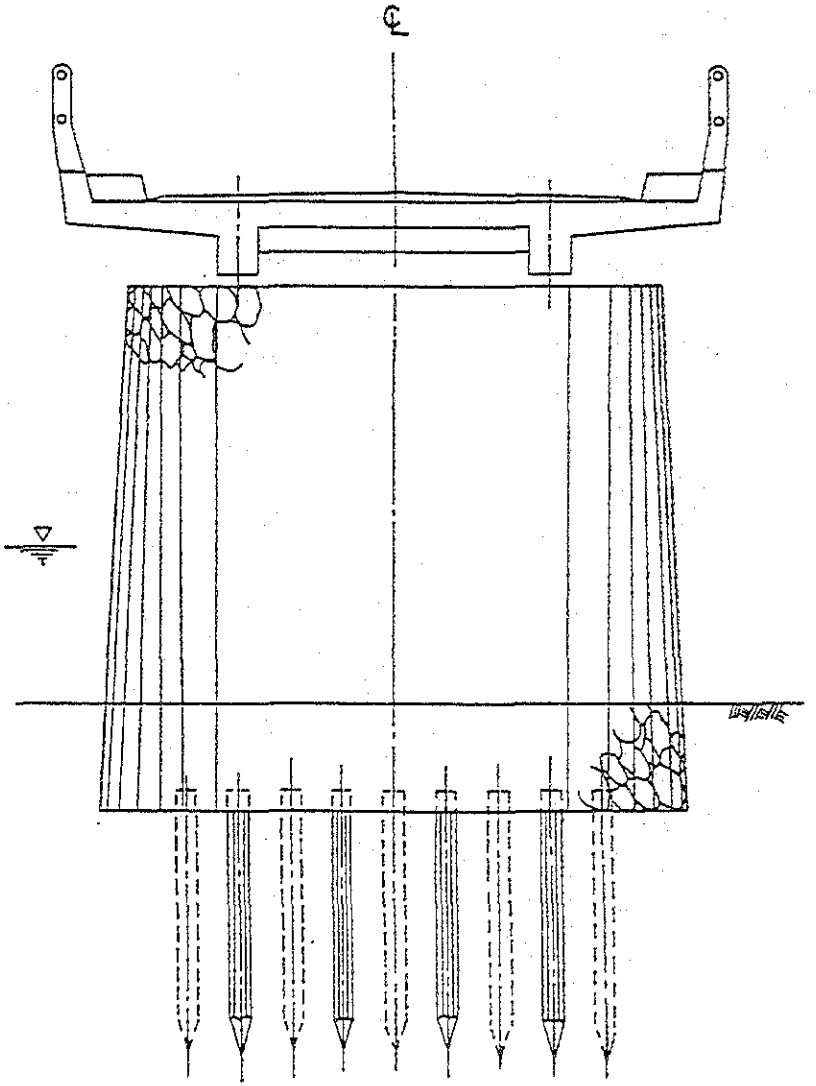
The pile length is suggested to be a minimum of 3 meters under the bottom of the foundation. The length and number of piles should be decided in order to be adequate for the condition of the foundation materials.

Fig. 3-3-1 CROSS SECTIONS OF STANDARD BRIDGES

TIMBER BRIDGE




REINFORCED CONCRETE BRIDGE



(2) Bridge Width

The effective bridge widths for the standard bridges have been decided as follows through discussions with Bina Marga considering the actual width of Kabupaten roads:

a) Timber bridge: 4.0 m in general
b) RC bridge : 4.5 m in general

(3) Span Length

The range of span lengths are determined as:

a) Timber bridge: 3.0, 5.0 and 8.0 m
b) RC bridge : 3.0, 5.0, 10.0 and 15.0 m

3.3.2 Other Structure

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 transverse drainage.

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

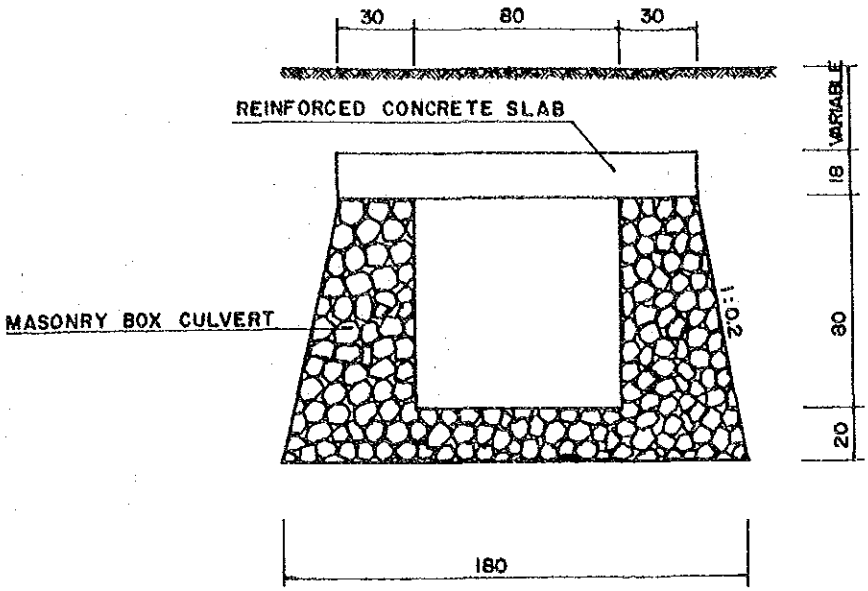
(2) Retaining Wall

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

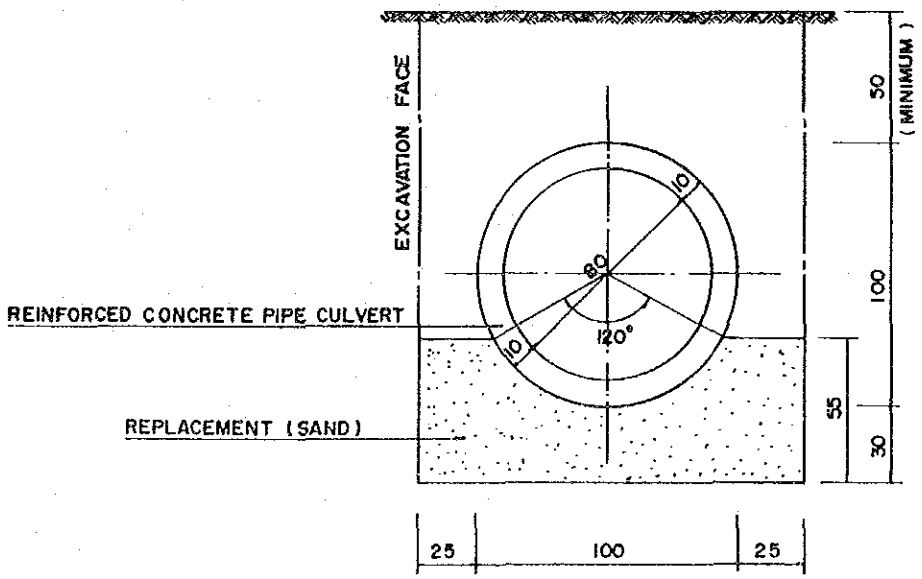
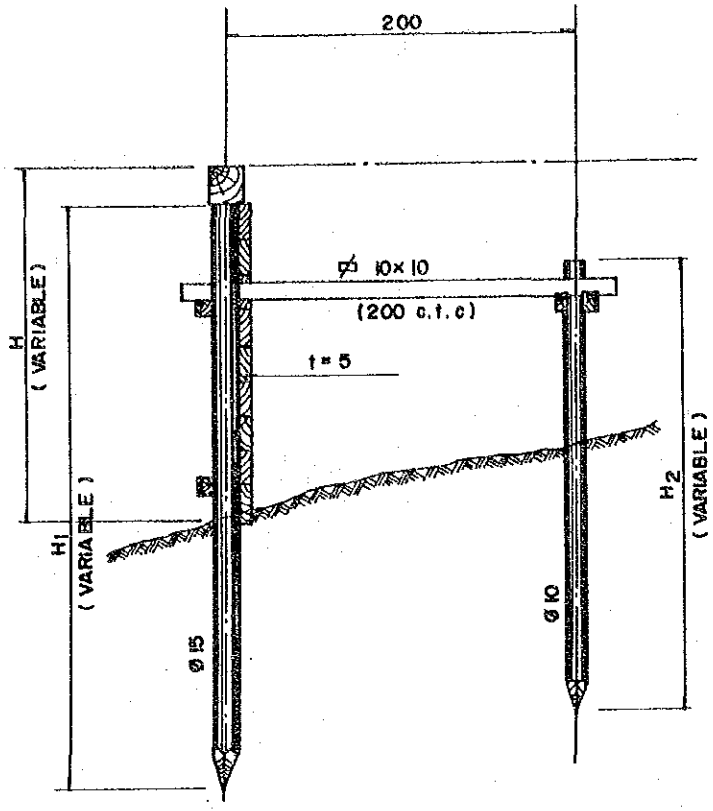
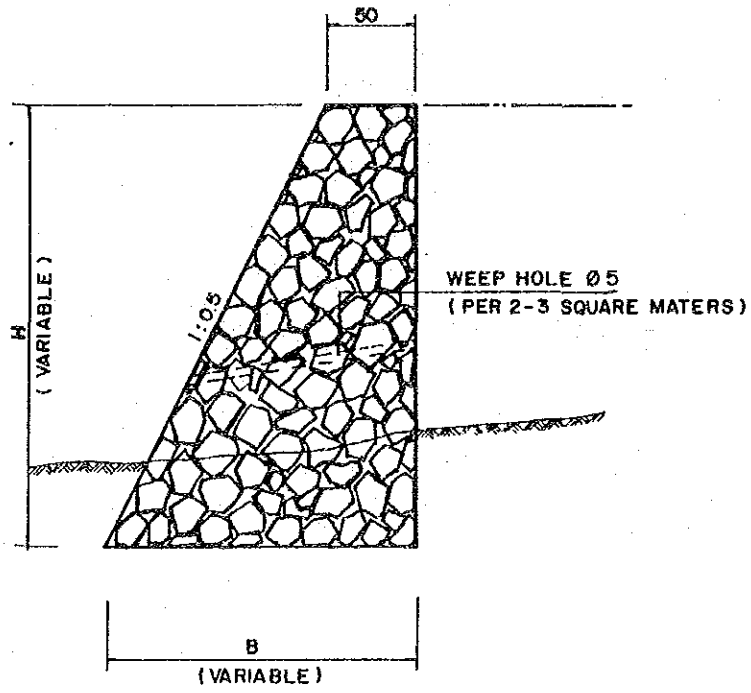


Fig. 3-3-3 STANDARD RETAINING WALLS

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<br>2- Dump Truck 3.0 Ton | 1- Wheel Loader 1.2 $m^3$ |
| 2. Excavation & Embankment | | |
| i) Normal Fill | 1- Bulldozer 90 HP<br>1- Vibratory Roller 4.0 Ton (D&T) | 1- Water Tank Truck 4,000 Ltr |
| ii) Fill by Borrow Material | 1- Bulldozer 90 HP<br>3- Dump Truck 3.0 Ton | 1- Wheel Loader 1.2 $m^3$ |
| iii) Fill in Swamp | 1- Swamp Bulldozer 90 HP<br>1- Water Tank Truck 4,000 Ltr | 1- Vibratory Roller 4.0 Ton (D&T) |
| iv) Excavation to Spoil | 1- Bulldozer 90 HP<br>1- Wheel Loader 1.2 $m^3$ | 4- Dump Truck 3.0 Ton |
| 3. Subgrade Preparation | 1- Motor Grader 75 HP<br>1- Vibratory Roller 4.0 Ton (D&T) | 1- Water Tank Truck 4,000 Ltr |
| 4. Subbase Course | 1- Motor Grader 75 HP<br>1- Vibratory Roller 4.0 Ton (D&T) | 1- Water Tank Truck 4,000 Ltr |
| 5. Base Course | 1- Motor Grader 75 HP<br>1- Vibratory Roller 4.0 Ton<br>1- Portable Crusher/Screens 30-40 Ton/H | 1- Water Tank Truck 4,000 Ltr |
| 6. Cement Stabilizing | 1- Motor Grader 70 HP<br>1- Bulldozer 90 HP<br>1- Wheel Loader 1.2 $m^3$<br>1- Flat Bed Truck 3.0 Ton | 1- Vibratory Roller 4.0 Ton (D&T)<br>1- Road Stabilizer<br>1- Water Tank Truck 4,000 Ltr |
| 7. Surface Course | 1- Asphalt Sprayer 850 Ltr<br>1- Tyre Roller 8-15 Ton<br>1- Portable Crusher/Screens 30-40 Ton/H | 1- Flat Bed Truck 3.0 Ton |
| 8. Concrete | 1- Concrete Mixer 0.5 $m^3$<br>1- Water Pump 200 Ltr/Min<br>1- Concrete Vibrator 3.3 HP | 1- Flat Bed Truck 3.0 Ton<br>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 Sumba Barat and other Kabupatens in Nusa Tenggara 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 |
|---|---|---|---|---|---|---|---|
| Sumba Barat | 2,000 | 2,000 | 2,000 | 2,000 | 1,500 | 2,500 | 2,750 |
| Ende | 2,500 | 1,600 | 1,750 | 1,750 | 1,100 | 2,500 | 2,500 |
| Ngada | 1,500 | 1,300 | 2,000 | 2,000 | 1,100 | 2,000 | 3,000 |
| Average | 2,000 | 1,300 | 1,917 | 1,917 | 1,233 | 2,333 | 2,750 |

Note :

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 Sumba Barat together with for other Kabupatens in Nusa Tenggara Timur Province.

Table 4-1-2 UNIT PRICE OF MATERIALS

(Rp)

| MATERIAL | UNIT | SUMBA BARAT | ENDE | NGADA | AVERAGE |
|---|---|---|---|---|---|
| Bitumen | L | 500 | 400 | 400 | 433 |
| Asphalt oil | L | 1,500 | 1,500 | 1,500 | 1,500 |
| Gasoline | L | 300 | 250 | 250 | 267 |
| Sand | $M^3$ | 9,000 | 8,000 | 5,000 | 7,333 |
| Cement | bag | 6,000 | 6,000 | 5,500 | 5,833 |
| River Stone | $M^3$ | 8,000 | 6,000 | 4,000 | 6,000 |
| Steel moulds | Set | 8,500 | 8,500 | 8,500 | 8,500 |
| Timber | $M^3$ | 200,000 | 200,000 | 200,000 | 200,000 |
| Paint | L | 4,000 | 2,500 | 1,750 | 2,750 |
| Reinforcing Steel | Kg | 1,500 | 800 | 1,750 | 1,350 |
| Tying Wire | Kg | 1,250 | 1,250 | 2,500 | 1,667 |
| Equivalent Royalty | $M^3$ | 250 | 250 | 250 | 250 |

### 4.1.3 Hourly Equipment Cost

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

Table 4-1-3

HOURLY EQUIPMENT COST

PROVINCE : NUSA TENGGARA TIMUR
KABUPATEN : SUMBA BARAT

( UNIT : Rp ) ( 6'85 )

| CODE NO | EQUIPMENT NAME | CLASS | LOCAL COST OWNERSHIP | LOCAL COST OPERATION | LOCAL COST SUB-TOTAL | FOREIGN COST OWNERSHIP | FOREIGN COST OPERATION | FOREIGN COST SUB-TOTAL | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|
| | Bulldozer | 120 HP | 389 | 14,324 | 14,713 | 7,769 | 1,044 | 8,813 | 23,526 |
| | Bulldozer/Ripper | 120 HP | 425 | 15,354 | 15,779 | 8,500 | 1,606 | 10,106 | 25,885 |
| | Swamp Bulldozer | 120 HP | 444 | 15,602 | 16,046 | 8,880 | 1,678 | 10,558 | 26,604 |
| | Bulldozer | 90 HP | 246 | 9,706 | 9,952 | 4,914 | 660 | 5,574 | 15,526 |
| | Bulldozer/Ripper | 90 HP | 265 | 10,308 | 10,573 | 5,300 | 1,001 | 6,301 | 16,874 |
| | Bulldozer | 65 HP | 175 | 7,058 | 7,233 | 3,500 | 470 | 3,970 | 11,203 |
| | Bulldozer/Ripper | 65 HP | 191 | 7,516 | 7,707 | 3,820 | 721 | 4,541 | 12,248 |
| | Swamp Bulldozer | 90 HP | 265 | 10,298 | 10,563 | 5,284 | 998 | 6,282 | 16,845 |
| | Swamp Bulldozer | 65 HP | 203 | 7,388 | 7,591 | 4,049 | 765 | 4,814 | 12,405 |
| | Motor Grader | 110 HP | 346 | 12,293 | 12,639 | 6,920 | 1,307 | 8,227 | 20,866 |
| | Motor Grader | 75 HP | 239 | 8,421 | 8,660 | 4,780 | 903 | 5,683 | 14,343 |
| | Motor Grader | 65 HP | 215 | 7,401 | 7,616 | 4,300 | 812 | 5,112 | 12,728 |
| | Road Stabilizer | W=1850 mm | 430 | 3,447 | 3,877 | 8,594 | 433 | 9,027 | 12,904 |
| | Vibratory Roller | 4 ton | 145 | 3,699 | 3,844 | 2,900 | 389 | 3,289 | 7,133 |
| | Hand-guide Vib. Roller | 1000 Kg | 119 | 668 | 787 | 850 | 30 | 880 | 1,667 |
| | Tire Roller | 8-15 ton | 156 | 8,410 | 8,566 | 3,106 | 104 | 3,210 | 11,776 |
| | Vibratory Roller (D&T) | 4 ton | 145 | 3,699 | 3,844 | 2,900 | 389 | 3,289 | 7,133 |
| | Hand-guide Vib. Roller | 600 Kg | 84 | 456 | 540 | 600 | 21 | 621 | 1,161 |
| | Rough Terrain Crane | 10 ton | 502 | 14,348 | 14,850 | 10,040 | 758 | 10,798 | 25,648 |
| | Hydraulic Excavator; Wheel | 0.3 m3 | 206 | 8,754 | 8,960 | 4,109 | 552 | 4,661 | 13,621 |
| | Wheel Loader | 1.2 m3 | 351 | 9,237 | 9,588 | 7,020 | 943 | 7,963 | 17,551 |
| | Wheel Loader | 0.3 m3 | 114 | 3,241 | 3,355 | 2,269 | 304 | 2,573 | 5,928 |
| | Water Tank Truck | 4000 ltr. | 122 | 3,264 | 3,386 | 869 | 126 | 995 | 4,381 |
| | Fuel Tank Truck | 4000 ltr. | 124 | 3,270 | 3,394 | 882 | 128 | 1,010 | 4,404 |
| | Dump Truck | 3.0 ton | 206 | 4,040 | 4,246 | 1,469 | 214 | 1,683 | 5,929 |
| | Flat Bed Truck with Crane | 3.0 ton | 86 | 3,500 | 3,586 | 1,717 | 129 | 1,846 | 5,432 |
| | Dump Loader Truck | 12 ton | 192 | 21,929 | 22,121 | 3,838 | 128 | 3,966 | 26,087 |
| | Dump Truck | 5.0 ton | 307 | 6,687 | 6,994 | 2,189 | 319 | 2,508 | 9,502 |
| | Flat Bed Truck | 3.0 ton | 29 | 3,067 | 3,096 | 562 | 42 | 604 | 3,700 |
| | Portable Crusher/Screening | 30-40 t/h | 940 | 24,105 | 25,045 | 18,800 | 2,526 | 21,326 | 46,371 |
| | Concrete Mixer | 0.5 m3 | 756 | 2,565 | 3,321 | 5,400 | 443 | 5,843 | 9,164 |
| | Water Pump | 200 l/min | 27 | 301 | 328 | 188 | 6 | 194 | 522 |
| | Concrete Vibrator | 3.3 HP | 11 | 262 | 273 | 73 | 2 | 75 | 348 |
| | Asphalt Sprayer | 850 ltr. | 143 | 840 | 983 | 1,019 | 148 | 1,167 | 2,150 |

## 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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

(Rp)

| ITEM | UNIT | LOCAL | FOREIGN | TOTAL |
|---|---|---|---|---|
| Site Clearance in Light Bush | m2 | 173 | 91 | 264 |
| Subgrade Preparation | m2 | 21 | 11 | 32 |
| Normal Fill | m3 | 1,791 | 866 | 2,657 |
| Fill in Swamp | m3 | 2,629 | 1,057 | 3,686 |
| Normal Excavation to Spoil | m3 | 1,051 | 524 | 1,575 |
| Sub Base Course | m3 | 3,371 | 1,354 | 4,725 |
| Base Course | m3 | 4,629 | 2,308 | 6,937 |
| Shoulder | m2 | 310 | 146 | 456 |
| Asphalt Patching | m2 | 3,656 | 1,652 | 5,308 |
| Surface Dressing (Single) | m2 | 918 | 937 | 1,855 |
| Surface Dressing (Double) | m2 | 1,097 | 1,478 | 2,575 |
| Earth Drain | m | 796 | 120 | 916 |
| Earth Drain in Swamp (by machine) | m3 | 1,231 | 475 | 1,706 |
| Pipe Culvert D80cm | m | 45,108 | 69,866 | 114,974 |
| Masonry Culvert (80x80cm) | m | 60,016 | 51,497 | 111,513 |
| Retaining Wall and Wing Wall (Timber) | m2 | 16,634 | 246 | 16,880 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 42,886 | 12,288 | 55,174 |
| Gabion Protection | m3 | 13,159 | 120 | 13,279 |
| Manual routine maintenance of road | Km | 125,152 | 7,248 | 132,400 |
| Routine maintenance of earth road | Km | 97,954 | 37,988 | 135,942 |
| Routine maintenance of gravel road | Km | 200,491 | 88,321 | 288,812 |
| Routine maintenance of asphalt road | Km | 365,600 | 165,200 | 530,800 |

### 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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

(Rp)

| ITEM | UNIT | LOCAL | FOREIGN | TOTAL |
|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 56,640 | 5,169 | 61,809 |
| Superstructure (Timber;Span 5m;10T) | m2 | 62,738 | 5,706 | 68,444 |
| Superstructure (Timber;Span 8m;10T) | m2 | 83,101 | 7,490 | 90,591 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 70,232 | 6,390 | 76,622 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 76,675 | 6,920 | 83,595 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 97,245 | 8,758 | 106,003 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 58,730 | 153,470 | 212,200 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 60,004 | 171,836 | 231,840 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 61,573 | 187,373 | 248,946 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 67,094 | 213,107 | 280,201 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 71,830 | 251,428 | 323,258 |
| Substructure (Pier;for Timber;10T) | NO | 493,269 | 48,256 | 541,525 |
| Substructure (Abut;for Timber;10T) | NO | 1,305,608 | 207,275 | 1,512,883 |
| Substructure (Pier;for Timber;BM50) | NO | 725,437 | 71,452 | 796,889 |
| Substructure (Abut;for Timber;BM50) | NO | 1,480,446 | 233,222 | 1,713,668 |
| Substructure (Pier;for Concrete;BM50) | NO | 1,828,515 | 498,467 | 2,326,982 |
| Substructure (Abut;for Concrete;BM50) | NO | 3,772,574 | 1,035,886 | 4,808,460 |
| Demolition of Bridge (Timber->Timber) | m2 | 15,471 | 1,908 | 17,379 |
| Demolition of Bridge (Timber->Concrete) | m2 | 15,471 | 1,908 | 17,379 |
| Demolition of Bridge (Concrete) | m2 | 89,963 | 109,912 | 199,875 |
| Maintenance of Timber Bridge (New) | m2 | 10,114 | 1,455 | 11,569 |
| Maintenance of Concrete Bridge (New) | m2 | 2,107 | 4,093 | 6,200 |
| Maintenance of Timber Bridge (Exist) | m2 | 9,143 | 2,573 | 11,716 |
| Maintenance of Concrete Bridge (Exist) | m2 | 4,507 | 2,664 | 7,171 |

## 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 Sumba Barat are shown in Table 5-1-1.

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

KABUPATEN : SUMBA BARAT

| CRITERIA NO | ROAD LINK NO |
|---|---|
| (6) | 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 : NUSA TENGGARA TIMUR KABUPATEN : SUMBA BARAT

| LINK NO | LENGTH | CLASS | IRR(%) | REMARK |
|---|---|---|---|---|
| 11 | 6 Km | IIIB-1 | 28.599 | VOC |
| 6 | 20 Km | IIIB-1 | 11.722 | Surplus |
| 5 | 22 Km | IIIB-2 | 9.121 | Surplus |
| 8 | 16 Km | IIIB-2 | 8.846 | Surplus |
| 7 | 15 Km | IIIB-2 | 2.816 | Surplus |
| 1 | 8 Km | IIIB-2 | 1.854 | Surplus |
| 23 | 14 Km | IIIB-2 | 0.498 | Surplus |
| 2 | 17 Km | IIIB-2 | 0.078 | Surplus |
| 9 | 6 Km | IIIC | 0.078 | Surplus |
| 10 | 3 Km | IIIC | 0.078 | Surplus |
| 3 | 13 Km | IIIB-2 | 0.078 | Surplus |
| 12 | 15 Km | IIIC | 0.078 | Surplus |
| 13 | 24 Km | IIIB-2 | 0.078 | Surplus |
| 14 | 4 Km | IIIC | 0.078 | Surplus |
| 15 | 13 Km | IIIC | 0.078 | Surplus |
| 16 | 4 Km | IIIC | 0.078 | Surplus |
| 17 | 12 Km | IIIC | 0.078 | Surplus |
| 18 | 32 Km | IIIB-2 | 0.078 | Surplus |
| 19 | 11 Km | IIIC | 0.078 | Surplus |
| 20 | 18 Km | IIIB-1 | 0.078 | Surplus |
| 21 | 7 Km | IIIB-2 | 0.078 | Surplus |
| 22 | 25 Km | IIIB-1 | 0.078 | Surplus |
| 4 | 7 Km | IIIB-2 | 0.078 | Surplus |
| 24 | 6 Km | IIIC | 0.078 | Surplus |
| 25 | 12 Km | IIIC | 0.078 | Surplus |
| 26 | 20 Km | IIIB-2 | 0.078 | VOC |
| 27 | 9 Km | IIIB-2 | 0.078 | Surplus |
| 28 | 6 Km | IIIB-2 | 0.078 | Surplus |
| 29 | 6 Km | IIIC | 0.078 | Surplus |
| 30 | 15 Km | IIIB-2 | 0.078 | Surplus |
| 31 | 9 Km | IIIB-2 | 0.078 | Surplus |
| 32 | 5 Km | IIIC | 0.078 | Surplus |
| 33 | 27 Km | IIIB-2 | 0.078 | Surplus |
| 34 | 11 Km | IIIB-2 | 0.078 | Surplus |

Table 5-2-2 RESULTS OF SECONDARY ANALYSIS

PROVINCE : NUSA TENGGARA TIMUR KABUPATEN : SUMBA BARAT

| LINK NO | LENGTH | CLASS | IRR(%) | REMARK |
|---|---|---|---|---|
| 0 | 16 Km | IIIC | 11.294 | Surplus |
| 5 | 22 Km | IIIC | 11.078 | Surplus |
| 1 | 8 Km | IIIC | 4.224 | Surplus |
| 7 | 15 Km | IIIC | 4.208 | Surplus |

Table 5-2-3 RANKING OF FEASIBILITY ROAD LINKS

PROVINCE : NUSA TENGGARA TIMUR KABUPATEN : SUMBA BARAT

| LINK NO | LENGTH | CLASS | NPV (1000Rp) | B/C | IRR (%) | REMARK |
|---|---|---|---|---|---|---|
| 11 | 6 Km | IIIB-1 | 120454 | 1.910 | 28.599 | VOC |
| 6 | 20 Km | IIIB-1 | 34050 | 1.074 | 11.722 | Surplus |
| 5 | 22 Km | IIIC | 6216 | 1.037 | 11.078 | Surplus |
| 8 | 16 Km | IIIC | 4202 | 1.040 | 11.294 | Surplus |
| SUM | 64 Km | | 164922 | | | |

# 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: Sumba Barat

(Rpx$10^6$)

| COST | FOREIGN CURRENCY | LOCAL CURRENCY | TOTAL |
|---|---|---|---|
| CONSTRUCTION | 512 | 1,081 | 1,593 |
| MAINTENANCE | 102 | 338 | 440 |
| SUPPLEMENTATION | 486 | - | 486 |
| WORKSHOP EQUIPMENT & TOOLS | 28 | - | 28 |
| LABORATORY EQUIPMENT | 12 | - | 12 |
| SURVEY EQUIPMENT | 5 | - | 5 |
| TOTAL | 1,145 | 1,419 | 2,564 |

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

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

(Rpx$10^6$)

| COST | FOREIGN CURRENCY | LOCAL CURRENCY | TOTAL |
|---|---|---|---|
| CIVIL WORK | 267 | 1,408 | 1,675 |
| CONSTRUCTION & MAINTENANCE EQUIPMENT | 789 | - | 789 |
| SPARE PARTS | 44 | 11 | 55 |
| WORKSHOP/LABORATORY/SURVEY EQUIPMENT | 45 | - | 45 |
| TOTAL | 1,145 | 1,419 | 2,564 |

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

### 6.1.2 Proposed Road Links

(1) Road Link to be Improved

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

(1) Feasible road links
- Feasible road links from the primary evaluation
- Feasible road links from the secondary evaluation

(2) Road links selected from the engineering points of view

(3) Road links selected because of basic human needs.

The road links finally proposed to be improved in the Kabupaten are the 11 links with the total length of 181 km which is 39% of the 466 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 : SUMBA BARAT

| REASON FOR SELECTION | ROAD LINK NO |
|---|---|
| Feasible | |
| - Primary | 6,11, |
| - Secondary | 5,8 |
| Engineering Point of View | 2,3,4,7,15,18,26 |
| Basic Human Needs | - |

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

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

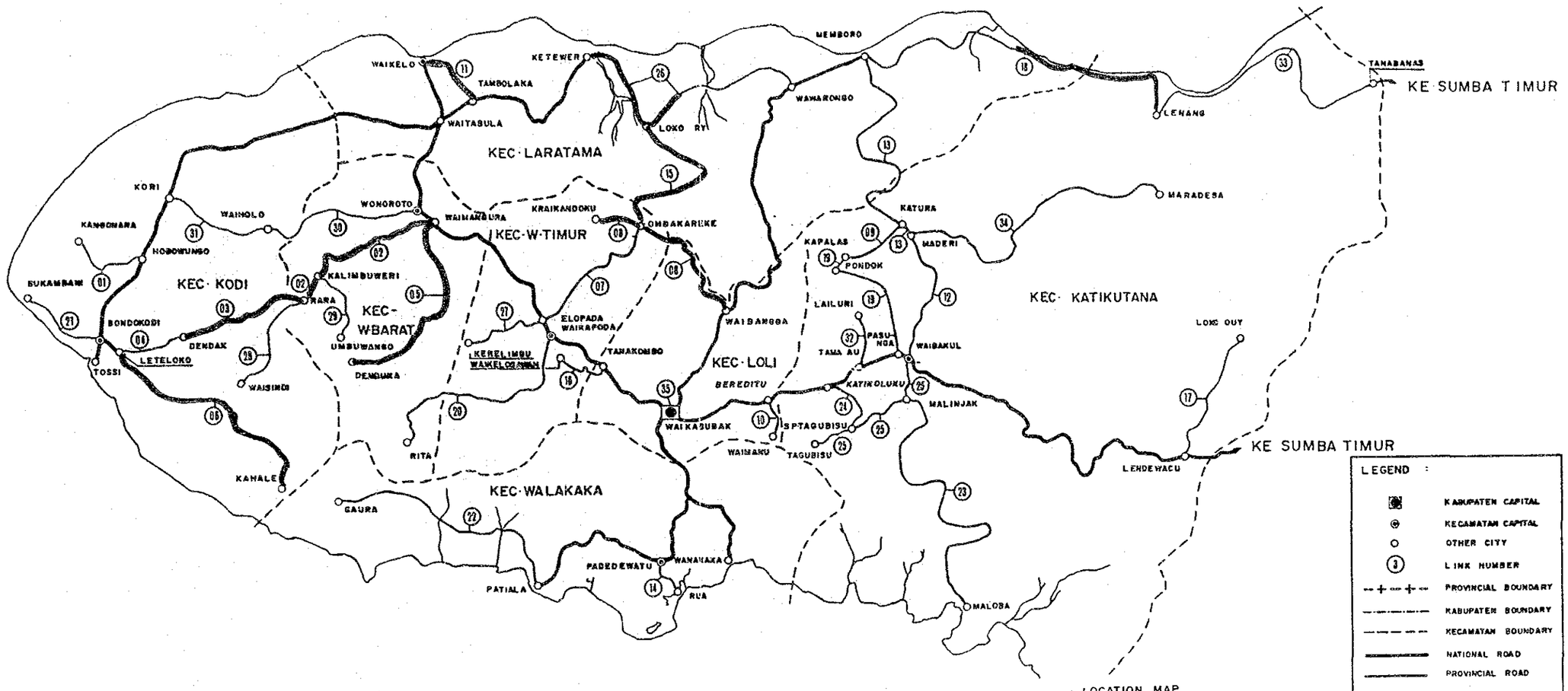
The order of proceeding with the improvement of the proposed road links are decided as shown in Table 6-1-4.

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

| YEAR | LINK NO ( ) : rate |
|---|---|
| 1988 : | 2 (50%), 11 |
| 1989 : | 2 (50%), 5 (50%), 6 (60%) |
| 1990 : | 3, 5 (50%), 6 (40%), 8, 24 (50%) |
| 1991 : | 4, 7, 18 (45%), 26 (50%) |
| 1992 : | 15, 18 (55%) |

# KAB. SUMBA BARAT




SCALE :
0 5 10 15 Km

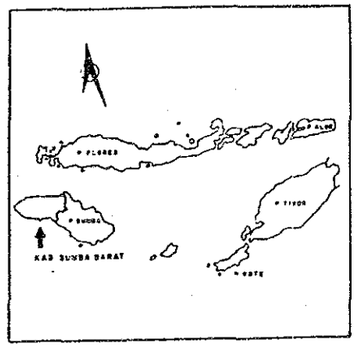
LEGEND :

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

CONSTRUCTION PROGRAMME

| ROAD LINK NUMBER | FISCAL YEAR 1988/89 | 1989/90 | 1990/91 | 1991/92 | 1992/93 |
|---|---|---|---|---|---|
| 02, 11 | 152 | | | | |
| 02,05,06 | | 324 | | | |
| 03,05,06 | | | | | |
| 08, 26 | | | 367 | | |
| 04, 07 | | | | | |
| 18, 26 | | | | 401 | |
| 15, 18 | | | | | 346 |
| TOTAL COST $10^6$ Rp. | 152 | 324 | 367 | 401 | 346 |

LOCATION MAP




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

TITLE : CONSTRUCTION PROGRAMME

| SOURCE: | SCALE: | PROVINCE: NUSATENGGARA TIMUR |
|---|---|---|
| DIREKTORAT JENDERAL CIPTA KARYA | AS SHOWN | KABUPATEN: SUMBA BARAT |

(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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( 1000Rp )

| LINK NO | LENGTH (Km) | BA (%) | SD (%) | RU (%) | RB (%) | ASPHAL (Km) | GRAVEL (Km) | EARTH (Km) | TH NO | AREA (m2) | BC NO | AREA (m2) | BRIDGE COST | LOCAL COST | FOREIGN COST | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 0.0 | 62.5 | 18.1 | 19.4 | 0 | 0 | 8 | 0 | 0.00 | 0 | 0.00 | 0 | 1,785 | 362 | 2,147 |
| 2 | 17 | 0.0 | 71.2 | 12.1 | 16.8 | 0 | 17 | 0 | 0 | 0.00 | 2 | 36.00 | 258 | 5,698 | 1,721 | 7,419 |
| 3 | 13 | 0.0 | 81.9 | 11.2 | 6.9 | 0 | 13 | 0 | 0 | 0.00 | 3 | 40.00 | 287 | 4,414 | 1,349 | 5,763 |
| 4 | 7 | 0.0 | 67.1 | 20.0 | 12.9 | 0 | 1 | 6 | 1 | 64.00 | 1 | 9.00 | 814 | 2,290 | 556 | 2,846 |
| 5 | 22 | 0.0 | 75.2 | 10.0 | 14.8 | 0 | 20 | 2 | 0 | 0.00 | 3 | 52.00 | 373 | 7,193 | 2,140 | 9,333 |
| 6 | 20 | 4.0 | 61.8 | 13.3 | 21.0 | 1 | 4 | 15 | 0 | 0.00 | 1 | 120.00 | 861 | 5,681 | 1,553 | 7,234 |
| 7 | 15 | 16.3 | 57.0 | 24.7 | 2.0 | 0 | 15 | 0 | 0 | 0.00 | 1 | 16.00 | 115 | 4,957 | 1,476 | 6,433 |
| 9 | 6 | 0.0 | 58.3 | 30.0 | 11.7 | 0 | 0 | 6 | 0 | 0.00 | 0 | 0.00 | 0 | 1,339 | 271 | 1,610 |
| 12 | 15 | 0.0 | 83.0 | 17.0 | 0.0 | 0 | 15 | 0 | 0 | 0.00 | 0 | 0.00 | 0 | 4,885 | 1,434 | 6,319 |
| 13 | 24 | 0.0 | 49.6 | 50.4 | 0.0 | 0 | 0 | 24 | 0 | 0.00 | 2 | 28.00 | 201 | 5,481 | 1,160 | 6,641 |
| 15 | 13 | 65.8 | 29.6 | 4.6 | 0.0 | 0 | 13 | 0 | 0 | 0.00 | 2 | 52.00 | 373 | 4,468 | 1,381 | 5,849 |
| 16 | 4 | 22.5 | 58.8 | 6.3 | 12.5 | 2 | 0 | 2 | 0 | 0.00 | 0 | 0.00 | 0 | 1,428 | 435 | 1,863 |
| 25 | 12 | 0.0 | 94.3 | 5.7 | 0.0 | 0 | 12 | 0 | 0 | 0.00 | 0 | 0.00 | 0 | 3,908 | 1,147 | 5,055 |
| 28 | 6 | 56.7 | 25.0 | 10.8 | 7.5 | 0 | 4 | 2 | 0 | 0.00 | 0 | 0.00 | 0 | 1,749 | 473 | 2,222 |
| 29 | 6 | 87.5 | 9.2 | 3.3 | 0.0 | 0 | 6 | 0 | 0 | 0.00 | 0 | 0.00 | 0 | 1,954 | 573 | 2,527 |
| 35 | 28 | 85.6 | 11.0 | 3.4 | 0.0 | 19 | 9 | 0 | 0 | 0.00 | 6 | 158.00 | 1,133 | 12,967 | 4,558 | 17,525 |
| SUM | 216 | | | | | 22 | 129 | 65 | 1 | 64.00 | 21 | 511.00 | 4,414 | 70,197 | 20,589 | 90,786 |

### 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 Sumba Barat is finally recommended as shown in Tables 6-1-6 (1), (2) and (3) for the construction, maintenance and total respectively.

The proposed construction cost is Rp 1,593 x $10^6$ and maintenance cost is Rp 440 x $10^6$ which is approximately 22% of the total expenditure.

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( UNIT : 1000Rp )

| ITEM | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) | ( TOTAL ) | |
|---|---|---|---|---|---|---|---|
| LOCAL CURRENCY : | 91,962 | 202,464 | 242,865 | 281,697 | 239,536 | 1,058,524 | (66.5%) |
| Ownership Cost | 1,897 | 4,149 | 5,524 | 5,869 | 4,610 | 22,049 | ( 2.1%) |
| Operation Cost | 43,149 | 91,193 | 124,481 | 124,797 | 97,906 | 481,526 | (45.5%) |
| Material Cost | 21,545 | 43,249 | 35,729 | 53,683 | 54,186 | 208,392 | (19.7%) |
| Labour Cost | 13,376 | 37,465 | 45,453 | 60,605 | 51,590 | 208,489 | (19.7%) |
| Contingency | 11,995 | 26,408 | 31,678 | 36,743 | 31,244 | 138,068 | (13.0%) |
| FOREIGN CURRENCY : | 60,295 | 122,185 | 125,787 | 119,989 | 106,123 | 534,379 | (33.5%) |
| Ownership Cost | 21,955 | 46,227 | 63,640 | 63,922 | 49,917 | 245,661 | (46.0%) |
| Operation Cost | 3,087 | 6,406 | 9,108 | 8,972 | 6,927 | 34,500 | ( 6.5%) |
| Material Cost | 27,388 | 53,615 | 36,632 | 31,444 | 35,437 | 184,516 | (34.5%) |
| Labour Cost | 0 | 0 | 0 | 0 | 0 | 0 | ( 0.0%) |
| Contingency | 7,865 | 15,937 | 16,407 | 15,651 | 13,842 | 69,702 | (13.0%) |
| TOTAL COST : | 152,257 | 324,650 | 368,652 | 401,686 | 345,659 | 1,592,904 | |
| Ownership Cost | 23,852 | 50,376 | 69,164 | 69,791 | 54,527 | 267,710 | (16.8%) |
| Operation Cost | 46,236 | 97,599 | 133,589 | 133,769 | 104,833 | 516,026 | (32.4%) |
| Material Cost | 48,933 | 96,864 | 72,361 | 85,127 | 89,623 | 392,908 | (24.7%) |
| Labour Cost | 13,376 | 37,465 | 45,453 | 60,605 | 51,590 | 208,489 | (13.1%) |
| Contingency | 19,860 | 42,346 | 48,085 | 52,394 | 45,086 | 207,771 | (13.0%) |

( Contingency : 15% )

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

(MAINTENANCE)

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( UNIT : 1000Rp )

| ITEM | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) | ( TOTAL ) | |
|---|---|---|---|---|---|---|---|
| LOCAL CURRENCY : | 34,360 | 68,180 | 67,967 | 79,596 | 88,114 | 338,217 | (76.9%) |
| Ownership Cost | 555 | 1,121 | 1,115 | 1,391 | 1,538 | 5,720 | ( 1.7%) |
| Operation Cost | 19,644 | 38,565 | 38,397 | 44,405 | 49,598 | 190,609 | (56.4%) |
| Material Cost | 820 | 1,783 | 1,776 | 2,399 | 2,652 | 9,430 | ( 2.8%) |
| Labour Cost | 13,341 | 26,711 | 26,679 | 31,401 | 34,326 | 132,458 | (39.2%) |
| FOREIGN CURRENCY : | 10,075 | 20,187 | 20,097 | 24,454 | 26,990 | 101,803 | (23.1%) |
| Ownership Cost | 8,146 | 16,012 | 15,925 | 18,625 | 20,870 | 79,578 | (78.2%) |
| Operation Cost | 990 | 1,946 | 1,936 | 2,277 | 2,564 | 9,713 | ( 9.5%) |
| Material Cost | 939 | 2,229 | 2,236 | 3,552 | 3,556 | 12,512 | (12.3%) |
| Labour Cost | 0 | 0 | 0 | 0 | 0 | 0 | ( 0.0%) |
| TOTAL COST : | 44,435 | 88,367 | 88,064 | 104,050 | 115,104 | 440,020 | |
| Ownership Cost | 8,701 | 17,133 | 17,040 | 20,016 | 22,408 | 85,298 | (19.4%) |
| Operation Cost | 20,634 | 40,511 | 40,333 | 46,682 | 52,162 | 200,322 | (45.5%) |
| Material Cost | 1,759 | 4,012 | 4,012 | 5,951 | 6,208 | 21,942 | ( 5.0%) |
| Labour Cost | 13,341 | 26,711 | 26,679 | 31,401 | 34,326 | 132,458 | (30.1%) |

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

(TOTAL)

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( UNIT : 1000Rp )

| ITEM | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) | ( TOTAL ) | |
|---|---|---|---|---|---|---|---|
| LOCAL CURRENCY : | 126,322 | 270,644 | 310,832 | 361,293 | 327,650 | 1,396,741 | (68.7%) |
| Ownership Cost | 2,452 | 5,270 | 6,639 | 7,260 | 6,148 | 27,769 | ( 2.0%) |
| Operation Cost | 62,793 | 129,758 | 162,878 | 169,202 | 147,504 | 672,135 | (48.1%) |
| Material Cost | 22,365 | 45,032 | 37,505 | 56,082 | 56,838 | 217,822 | (15.6%) |
| Labour Cost | 26,717 | 64,176 | 72,132 | 92,006 | 85,916 | 340,947 | (24.4%) |
| Contingency | 11,995 | 26,408 | 31,678 | 36,743 | 31,244 | 138,068 | ( 9.9%) |
| FOREIGN CURRENCY : | 70,370 | 142,372 | 145,884 | 144,443 | 133,113 | 636,182 | (31.3%) |
| Ownership Cost | 30,101 | 62,239 | 79,565 | 82,547 | 70,787 | 325,239 | (51.1%) |
| Operation Cost | 4,077 | 8,352 | 11,044 | 11,249 | 9,491 | 44,213 | ( 6.9%) |
| Material Cost | 28,327 | 55,844 | 38,868 | 34,996 | 38,993 | 197,028 | (31.0%) |
| Labour Cost | 0 | 0 | 0 | 0 | 0 | 0 | ( 0.0%) |
| Contingency | 7,865 | 15,937 | 16,407 | 15,651 | 13,842 | 69,702 | (11.0%) |
| TOTAL COST : | 196,692 | 413,017 | 456,716 | 505,736 | 460,763 | 2,032,924 | |
| Ownership Cost | 32,553 | 67,509 | 86,204 | 89,807 | 76,935 | 353,008 | (17.4%) |
| Operation Cost | 66,870 | 138,110 | 173,922 | 180,451 | 156,995 | 716,348 | (35.2%) |
| Material Cost | 50,692 | 100,876 | 76,373 | 91,078 | 95,831 | 414,850 | (20.4%) |
| Labour Cost | 26,717 | 64,176 | 72,132 | 92,006 | 85,916 | 340,947 | (16.8%) |
| Contingency | 19,860 | 42,346 | 48,085 | 52,394 | 45,086 | 207,771 | (10.2%) |

( Contingency : 15% )

### 6.1.4 Construction and Maintenance Equipment Cost

#### (1) Required Number of Equipment

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

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

- 1-Motor Grader

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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

| EQUIPMENT NAME | WORKABLE | EXISTING | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) |
|---|---|---|---|---|---|---|---|
| Bulldozer/Ripper | 250 | 0 | 0.13 | 0.24 | 0.40 | 0.50 | 0.38 |
| Swamp Bulldozer | 250 | 0 | 0.00 | 0.00 | 0.01 | 0.01 | 0.04 |
| Motor Grader | 250 | 0 | 0.35 | 0.67 | 0.98 | 1.03 | 0.75 |
| Hand-guide Vib. Roller | 250 | 0 | 0.20 | 0.64 | 0.48 | 1.48 | 1.34 |
| Tire Roller | 250 | 0 | 0.14 | 0.27 | 0.18 | 0.00 | 0.00 |
| Vibratory Roller (D&T) | 250 | 0 | 0.26 | 0.48 | 0.63 | 0.79 | 0.63 |
| Hydraulic Excavator; Wheel | 250 | 0 | 0.01 | 0.03 | 0.05 | 0.05 | 0.12 |
| Wheel Loader | 250 | 0 | 0.44 | 0.85 | 1.26 | 1.23 | 0.95 |
| Water Tank Truck | 250 | 0 | 0.16 | 0.29 | 0.37 | 0.44 | 0.37 |
| Dump Truck | 250 | 0 | 3.49 | 7.72 | 10.58 | 10.84 | 8.42 |
| Flat Bed Truck with Crane | 250 | 0 | 0.11 | 0.27 | 0.23 | 0.81 | 0.79 |
| Flat Bed Truck | 250 | 0 | 0.22 | 0.51 | 0.36 | 0.44 | 0.41 |
| Portable Crusher/Screening | 250 | 0 | 0.11 | 0.21 | 0.35 | 0.15 | 0.08 |
| Concrete Mixer | 250 | 0 | 0.07 | 0.22 | 0.16 | 0.40 | 0.34 |
| Water Pump | 250 | 0 | 0.05 | 0.16 | 0.12 | 0.29 | 0.24 |
| Concrete Vibrator | 250 | 0 | 0.02 | 0.04 | 0.03 | 0.05 | 0.06 |
| Asphalt Sprayer | 250 | 0 | 0.14 | 0.27 | 0.18 | 0.00 | 0.00 |

NOTE WORKABLE : workable days in a year
EXISTING : number of existing equipment

Table 6-1-8 EQUIPMENT PURCHASE COST

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( 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 | 1 | 47,800 |
| Road Stabilizer | W=1850 mm | 85,950 | - | - |
| Hand-guide Vib. Roller | 1000 Kg | 8,500 | 2 | 17,000 |
| Tire Roller | 8-15 ton | 31,070 | 1 | 31,070 |
| Vibratory Roller (D&T) | 4 ton | 29,000 | 1 | 29,000 |
| Vibratory Roller | 4 ton | 29,000 | - | - |
| Rough Terrain Crane | 10 ton | 100,400 | - | - |
| Hydraulic Excavator; Wheel | 0.3 m3 | 41,100 | - | - |
| Wheel Loader | 1.2 m3 | 70,200 | 2 | 140,400 |
| Water Tank Truck | 4000 ltr. | 12,750 | 1 | 12,750 |
| Dump Truck | 3.0 ton | 14,700 | 11 | 161,700 |
| 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 | 1 | 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 | 789,060 |
| OWNERSHIP COST (FOREIGN) | 303,087 |
| EQUIPMENT COST SUPPLEMENTED | 485,973 |

NOTE : OWNERSHIP COST (FOREIGN) for Existing Equipment

| | |
|---|---|
| Motor Grader | 22,152 |

### 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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

| I T E M | UNIT | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) | ( TOTAL ) |
|---|---|---|---|---|---|---|---|
| Site Clearance In Light Bush | m2 | 0.00 | 0.00 | 0.00 | 4500.00 | 0.00 | 4500.00 |
| Subgrade Preparation | m2 | 42000.00 | 64500.00 | 45607.50 | 137407.50 | 125549.00 | 415064.00 |
| Normal Fill | m3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fill in Swamp | m3 | 0.00 | 0.00 | 65.25 | 171.59 | 1539.37 | 1776.20 |
| Normal Excavation to Spoil | m3 | 748.00 | 1194.50 | 838.50 | 7502.10 | 8017.90 | 18301.00 |
| Sub Base Course | m3 | 3855.00 | 6993.40 | 6311.40 | 14031.80 | 11605.00 | 42796.60 |
| Base Course | m3 | 3720.00 | 7332.00 | 13588.00 | 5790.00 | 3120.00 | 33550.00 |
| Shoulder | m2 | 39250.00 | 78750.00 | 137500.00 | 127200.00 | 85300.00 | 468000.00 |
| Asphalt Patching | m2 | 0.00 | 19.80 | 13.20 | 0.00 | 0.00 | 33.00 |
| Surface Dressing (Single) | m2 | 24000.00 | 48000.00 | 32000.00 | 0.00 | 0.00 | 104000.00 |
| Surface Dressing (Double) | m2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Earth Drain | m | 4900.00 | 27180.00 | 35180.00 | 17738.00 | 8902.00 | 93900.00 |
| Earth Drain in Swamp (by machine) | m3 | 0.00 | 0.00 | 450.00 | 922.50 | 2317.50 | 3690.00 |
| Pipe Culvert D80cm | m | 90.00 | 6.00 | 0.00 | 378.00 | 462.00 | 936.00 |
| Masonry Culvert (80x80cm) | m | 27.00 | 318.70 | 229.30 | 36.00 | 0.00 | 611.00 |
| 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 | 98.85 | 145.12 | 109.93 | 841.04 | 693.66 | 1888.60 |
| Gabion Protection | m3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | |
| Superstructure (Timber;Span 3m;10T) | m2 | 0.00 | 0.00 | 0.00 | 32.40 | 39.60 | 72.00 |
| Superstructure (Timber;Span 5m;10T) | m2 | 0.00 | 0.00 | 0.00 | 57.60 | 70.40 | 128.00 |
| Superstructure (Timber;Span 8m;10T) | m2 | 0.00 | 0.00 | 48.00 | 220.80 | 211.20 | 480.00 |
| 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 | 0.00 | 0.00 | 1.00 | 5.05 | 4.95 | 11.00 |
| Substructure (Abut;for Timber;10T) | NO | 0.00 | 0.00 | 1.00 | 17.20 | 19.80 | 38.00 |
| 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 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 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 | 105.88 | 206.25 | 206.00 | 227.00 | 251.50 | 996.63 |
| Routine maintenance of earth road | Km | 32.50 | 60.00 | 61.50 | 45.00 | 42.00 | 241.00 |
| Routine maintenance of gravel road | Km | 62.38 | 118.55 | 116.70 | 135.00 | 162.50 | 595.13 |
| Routine maintenance of asphalt road | Km | 11.00 | 27.70 | 27.80 | 47.00 | 47.00 | 160.50 |
| Maintenance of Timber Bridge (New) | m2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maintenance of Timber Bridge (Exist) | m2 | 32.00 | 64.00 | 64.00 | 32.00 | 64.00 | 256.00 |
| Maintenance of Concrete Bridge (Exist) | m2 | 251.00 | 453.00 | 454.00 | 498.50 | 485.00 | 2141.50 |

## 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.

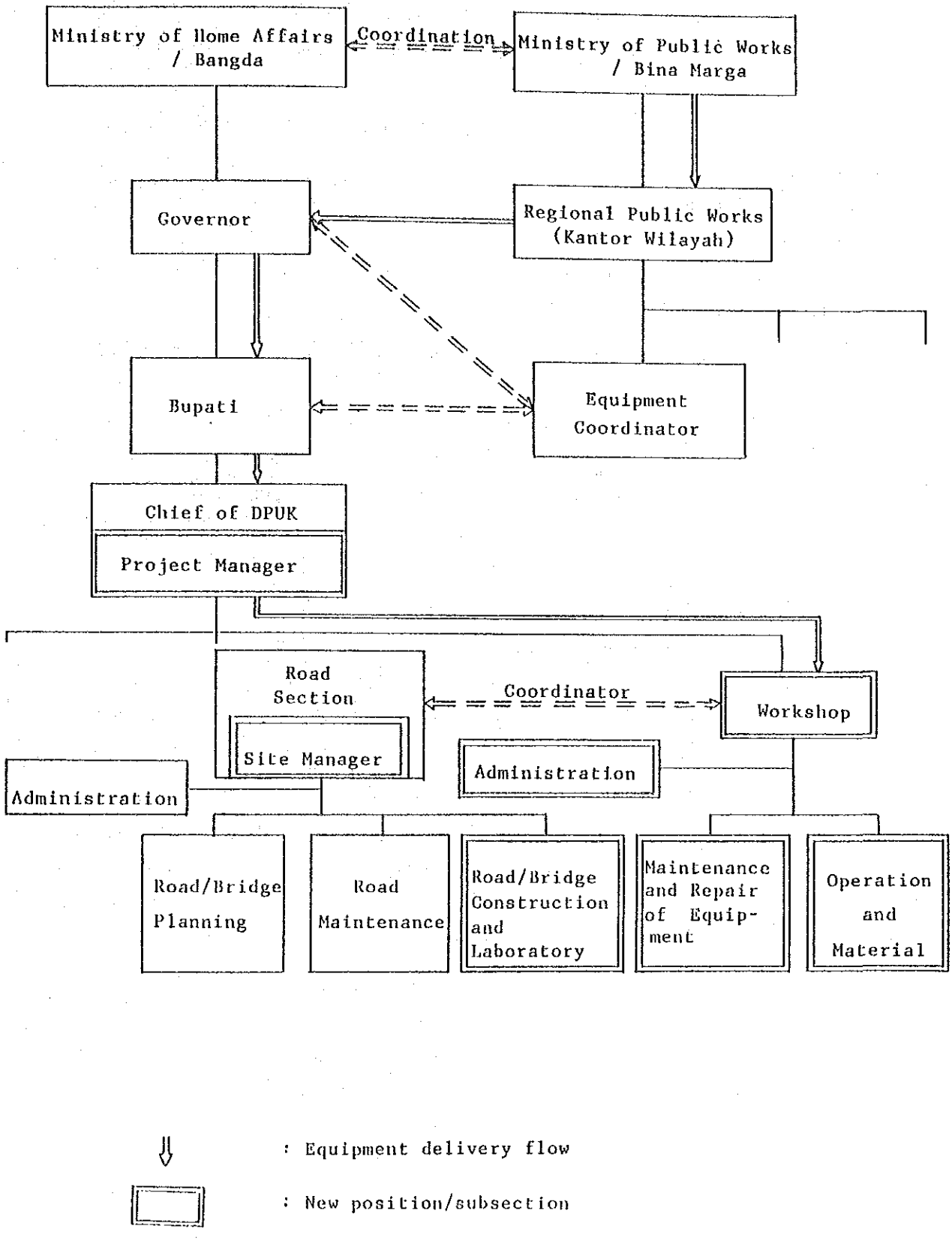
It is recommended that the workshop is newly organized to consist of three sub-sections, i.e. maintenance and repair of equipment, operation and materials, and administration to execute the main tasks described in Clause 3.5.

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



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. : NUSA TENGGARA TIMUR KAB. : SUMBA BARAT SURVEY YEAR : 1984

| Code No. | KECAMATAN NAME | CULTIVATED AREA : (PA) | YIELD RATE : (Y) | FARMER'S POPULATION : (AP) | CIRCULATED COMMODITY : (PG) |
|---|---|---|---|---|---|
| 01 | WALAKAKA | 1,346 | 3.19 | 38,959 | 5,000 |
| 02 | KODI | 5,424 | 1.70 | 26,241 | 14,000 |
| 03 | WAIWEWA BARAT | 3,884 | 1.56 | 27,945 | 12,000 |
| 04 | WAIWEWA TIMUR | 2,563 | 3.17 | 31,365 | 8,000 |
| 05 | LOTI | 779 | 3.41 | 21,808 | 12,000 |
| 06 | LARATAMA | 1,726 | 1.85 | 17,946 | 5,000 |
| 07 | KATIKUTANA | 2,595 | 2.58 | 23,342 | 8,000 |
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| | $r_1$ | $r_2$ | $r_3$ | $r_4$ |
|---|---|---|---|---|
| ANNUAL AVERAGE % GROWTH RATE | 10.7 | 0.8 | 2.5 | 7.1 |

| FARMER'S CONSUMPTION : (Cp) | NON-AGRO REQUIRMENT : (NG) |
|---|---|
| 0.1 Ton/head/year | 0.15 Ton/ton |

| | SEDAN | BUS | TRUCK | MOTOR CYCLE |
|---|---|---|---|---|
| RATE OF EACH VEHICLE TYPE % | 14.72 | 1.32 | 30.92 | 53.04 |

| | |
|---|---|
| AVERAGE FREIGHT TONAGE | 0.6 Ton/Truck |

Appendix A-2 Engineering Data

ROAD LINK DATA

PROVINCE : Nusa Tenggara Timur

KABUPATEN: Sumba Barat

| LINK NO. | BEGINNING POINT (DESA NAME) | END POINT (DESA NAME) | LENGTH (KM) | THROUGH THE KEC. NAME & LENGTH | | REMARKS |
|---|---|---|---|---|---|---|
| | | | | KEC. NAME | LENGTH (KM) | |
| 01 | Hobowungo | Kangonara | 8 | Kodi | 8 | |
| 02 | Waimangura | Rara | 17 | Waiwewa Barat | 17 | 1 |
| 03 | Rara | Dendak | 13 | Kodi | 10 | 3 |
| | | | | Waiwewa Barat | 3 | |
| 04 | Dendak | Leteloko | 7 | Kodi | 7 | 4 |
| 05 | Waimangura | Denduka | 22 | Waiwewa Barat | 22 | 5 |
| 06 | Leteloko | Kahale | 20 | Kodi | 20 | |
| 07 | Elopada | Ombakareke | 15 | Waiwewa Timur | 15 | 6 |
| 08 | Waibangga | Kraikandoku | 16 | Waiwewa Timur | 4 | 7 |
| | | | | Loli | 12 | |
| 09 | Katura | Kapalas | 6 | Katikutana | 6 | |
| 10 | Bereditu | Waimanu | 3 | Loli | 3 | |
| 11 | Tambolaka | Waikelo | 6 | Laratama | 6 | |
| 12 | Waibakul | Maderi | 15 | Katikutana | 15 | |
| 13 | Maderi | Memboro | 24 | Laratama | 21 | |
| | | | | Katikutana | 3 | |
| 14 | Padedewatu | Rua | 4 | Walakaka | 4 | |
| 15 | Ombakareke | Loko Ry | 13 | Waiwewa Timur | 1 | 8 |
| | | | | Laratama | 12 | |
| 16 | Tanakombo | Waikelosawah | 4 | Waiwewa Timur | 3 | |
| | | | | Loli | 1 | |
| 17 | Lendewacu | Loko Ouy | 12 | Katikutana | 12 | |
| 18 | Memboro | Lenang | 32 | Laratama | 26.5 | 2 |
| | | | | Katikutana | 5.5 | |
| 19 | Pasunga | Kapalas | 11 | Katikutana | 11 | |
| 20 | Waikapoda | Rita | 18 | Waiwewa Barat | 3 | 9 |
| | | | | Waiwewa Timur | 15 | |
| 21 | Bondokodi | Bukambani | 7 | Kodi | 7 | |
| 22 | Patiala | Gaura | 25 | Walakaka | 25 | |
| 23 | Malinjak | Maloba | 14 | Katikutana | 14 | |
| 24 | Katikoluku | Simpang Tagubisu | 6 | Katikutana | 6 | |

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 : Nusa Tenggara Timur

KABUPATEN: Sumba Barat

| LINK NO. | BEGINNING POINT (DESA NAME) | END POINT (DESA NAME) | LENGTH (KM) | THROUGH THE KEC. NAME & LENGTH | | REMARKS |
|---|---|---|---|---|---|---|
| | | | | KEC. NAME | LENGTH (KM) | |
| 25 | Waibakul | Tagubisu | 12 | Katikutana | 12 | |
| 26 | Ketewer | Wawarongo | 20 | Laratama | 20 | |
| 27 | Elopada | Kerelimbu | 9 | Weiwewa Timur | 9 | |
| 28 | Rara | Waisindi | 6 | Kodi<br>Waiwewa Barat | 5<br>1 | |
| 29 | Kalimbuweri | Umbuwango | 6 | Waiwewa Barat | 6 | |
| 30 | Wonoroto | Waiholo | 15 | Kodi<br>Waiwewa Barat | 1<br>14 | 10 |
| 31 | Waiholo | Kori | 9 | Kodi | 9 | |
| 32 | Tama au | Lailuri | 5 | Katikutana | 5 | |
| 33 | Lenang | Tanabanas | 27 | Katikutana | 27 | |
| 34 | Maderi | Maradesa | 11 | Katikutana | 11 | |
| 35 | Jl.Dlm.Kota Waikabubak | | 28 | Loli | 28 | |
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Please note the priority No. in the Remarks of this list for each links No. according to the each Kabupaten's development plan.

PROPINSI: Nusa Tenggara Timur

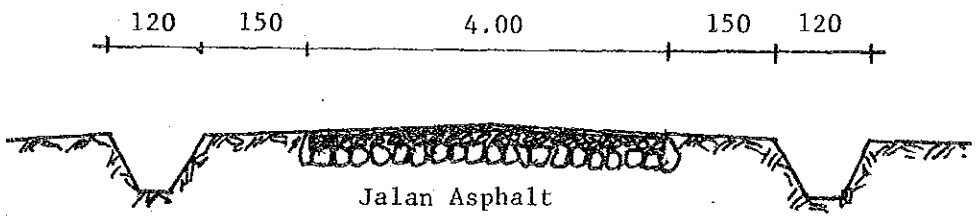
KABUPATEN: Sumba Barat



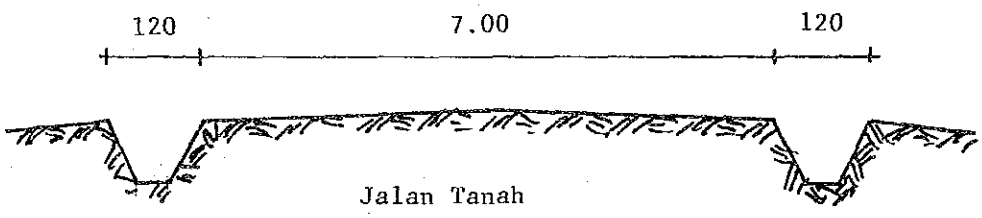
What Kind of Design Criteria has being applied for the new road construction and the improvement for the Kabupaten Road ?
Kriteria Perencanaan yang dipakai pada program penanganan jalan Kabupaten, baik untuk jalan lama maupun pembangunan baru.

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 Asphalt




Jalan Tanah

PROPINSI: Nusa Tenggara Timur

E-03-(1)

KABUPATEN: Sumba Barat

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 | LOCATION From - To (dari - ke) | Lebar perkerasan(m) / Lebar Jembatan | Type perkerasan / Type Jembatan | LENGTH Panjang ( KM ) | COSTS Harga (Rp $10^6$) | REMARKS Keterangan |
|---|---|---|---|---|---|---|
| 35 | Dalam Kota | 4 | Telfort | 2 | | |
| | | 6 | Beton | 4 m | | |
| 07 | Elopada - Ombakareke | 4 | Telfort | 2 | | |
| | | - | - | - | | |
| 15 | Ombakareke - Lokory | 4 | Telfort | 13 | | |
| | | - | - | - | | |
| 10 | Dereditu - Waimanu | 4 | Telfort | 2.75 | | |
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* 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: Nusa Tenggara Timur E-03-(2)

KABUPATEN: Sumba Barat

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 |
|---|---|---|---|---|---|---|
| 35 | Dalam Kota | 4 | Telfort | 1.4 | 18,704 | |
| | | - | - | - | | |
| 07 | Elopada - Ombakareke | 4 | Telfort | 5 | 34,695 | |
| | | - | - | - | | |
| 15 | Ombakareke - Lokory | 4 | Telfort | 4 | 27,990 | |
| | | 6 | Beton | 4 m | 10,975 | |
| 25 | Waibakul - Takubisu | 4 | Telfort | 4 | 29,950 | |
| | | - | - | - | | |
| 05 | Waimangura - Denduka | 4 | Telfort | 6 | 45,000 | |
| | | 6 | Beton | 4 m | 11,000 | |
| 30 | Wonorojo - Waiholo | 4 | Telfort | 4 | 26,990 | |
| | | - | - | - | | |
| 02 | Waimangura - Rara | 4 | Telfort | 12.5 | 76,000 | |
| | | - | - | - | | |
| 12 | Waibaku - Maderi | 4 | Telfort | 15 | 90,250 | |
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* 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: Nusa Tenggara Timur E-03-(3)

KABUPATEN: Sumba Barat 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 | 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 |
|---|---|---|---|---|---|---|
| 35 | Dalam Kota | 4 / - | Telfort / - | 2.25 / - | 46,760 | |
| 25 | Pasunga - Malinjar | 4 / - | Telfort / - | 3.50 / - | 32,352 | |
| 05 | Waimangura - Denduka | 4 / - | Telfort / - | 3 / - | 24,000 | |
| 30 | Wonoroto - Waiholo | 4 / - | Telfort / - | 5 / - | 40,000 | |
| 04 | Dendak - Leteloko | - / 4 | - / Komposit | - / 22 m | - 77,000 | |
| 08 | Waibangga - Kerekan doku | 4 / - | Telfort / - | 15 / - | 99,056 | |
| 19 | Pasunga - Pondok | 4 / - | Telfort / - | 10 / - | 66,073 | |
| 17 | Lendewaln - Lokooui | 4 / - | Telfort / - | 5 / - | 32,965 | |
| 15 | Ombakareke - Lokory | 4 / - | Telfort / - | 3.2 / - | 27,750 | |
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* 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: Nusa Tenggara Timur

E-03-(4)

KABUPATEN: Sumba Barat

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 |
|---|---|---|---|---|---|---|
| 22 | Patiala - Gaura | 4 | Telfort | 25 | 196,840 | |
| | | 4 | Timber | 19 m | 33,630 | |
| 27 | Elopada - Kerelimbu | 4 | Telfort | 8 | 62,510 | |
| | | - | - | - | | |
| 05 | Waimangura - Denduka | 4 | Telfort | 4 | 32,500 | |
| | | 4.5 | Komposit | 8 m | 28,400 | |
| 30 | Wanoroto - Waiholo | 4 | Telfort | 5 | 38,537 | |
| | | - | - | - | - | |
| 06 | Leteloko - Kahale | - | - | - | - | |
| | | 4.5 | Komposit | 24 | 63,000 | |
| 35 | Dalam Kota | 4 | Telfort | 2.4 | 33,750 | |
| | | - | - | - | - | |
| 35 | Dalam Kota | 3 | Asphalt | 1.5 | 24,500 | |
| | | - | - | - | - | |
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* 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: Nusa Tenggara Timur E-03-(5)

KABUPATEN: Sumba Barat

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 |
|---|---|---|---|---|---|---|
| 26 | Bondobugil - Wawarongo | 4 | Telfort | 21 | 160,247 | |
| | | 4 | Timber | 16 m | 24,100 | |
| 35 | Dalam Kota | 4 | Asphalt | 2.5 | 28,426 | |
| | | 4.5 | Komposit | 8 m | 17,867 | |
| 29 | Kalemburi - Umbuwango | 4 | Telfort | 5.5 | 40,000 | |
| | | - | - | - | - | |
| 31 | Waiholo - Kori | 4 | Telfort | 6 | 57,240 | |
| | | - | - | - | | |
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* 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 : Nusa Tenggara Timur

KABUPATEN: Sumba Barat

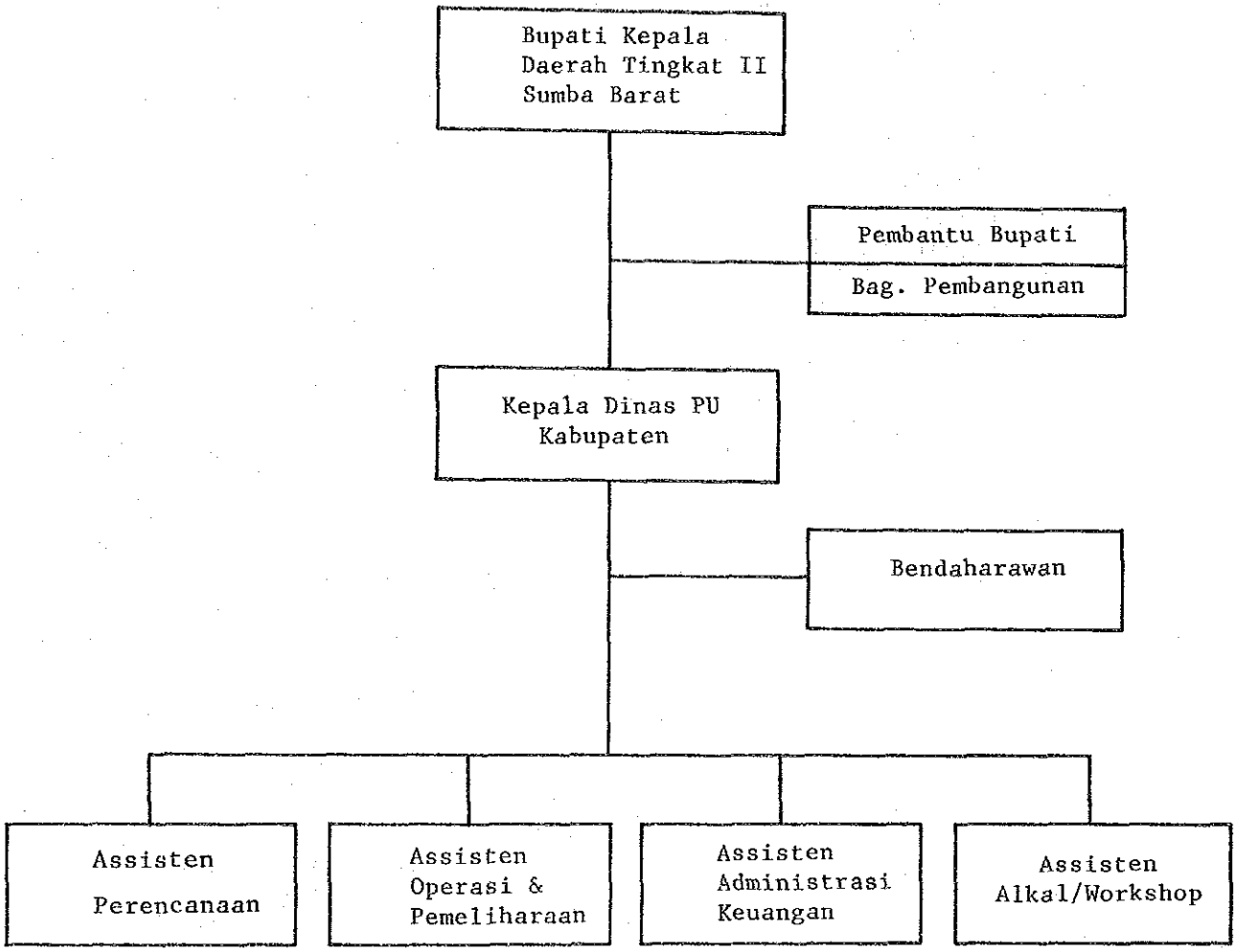
E-04

## 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: Nusa Tenggara Timur

KABUPATEN: Sumba Barat

| DESCRIPTION /Uraian | NUMBER / Jumlah | REMARKS Keterangan |
|---|---|---|
| CONTROLING STAFF Staff teknis PUK | (12) | (6) |
| DPUK ENGINEED Sarjana Teknik | - | - |
| ASSISTANT ENGINEER Sarjana Muda Teknik | - | - |
| TECHNICIAN STAFF Staff Teknik (STM) | 12 | 6 |
| ADMINISTRATION Tenaga Administrasi | 12 | 3 |
| SUPERVISOR Tenaga Pengawas | 25 | 5 |
| | | |
| WORKING FORCE Tenaga Pelaksana Lapangan | (298) | (3) |
| OPERATORS Operators | 1 | 1 |
| DRIVERS Supir | 3 | - |
| MECHANICS Mechanic | 2 | 2 |
| TRADESMAN Tukang | 4 | - |
| L A B O U R Buruh / Pekerja | 284 | - |
| OTHERS Lain-lain | 4 | - |
| TOTAL / JUMLAH | 347 | 17 |

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

## LOCATION AND AREA OF DPUK WORKSHOP

E-06

Lokasi Workshop DPUK

PROPINSI : Nusa Tenggara Timur

KABUPATEN: Sumba Barat

| LOCATION<br>Lokasi | AREA (m2)<br>Luas | NUMBER<br>Jumlah | REMARKS<br>Keterangan |
|---|---|---|---|
| Waikabubak | 20.000 | 1 | |
| | | | |

PROPINSI: Nusa Tenggara Timur

KABUPATEN: Sumba Barat

E-07

## LAND ACQUISITION COST

Daftar harga pembebasan tanah

| DESCRIPTION<br>Uraian | UNIT<br>Satuan | RATE (RP)<br>Harga | REMARKS<br>Keterangan |
|---|---|---|---|
| CITY/kota | M2 | 7,500 | |
| VILLAGE / desa | M2 | 5,500 | |
| RICE FIELD/sawah | M2 | 10,000 | |
| DRY FIELD/ladang | M2 | 3,500 | |
| MIX CROPS/panen | M2 | - | |
| FOREST/hutan | M2 | 2,500 | |
| SWAMP / rawa | M2 | - | |
| OTHERS / lain-lain | M2 | - | |

PROPINSI: Nusa Tenggara Timur

E-08

KABUPATEN: Sumba Barat

Classification of local contractors at Kabupaten level.

Klasifikasi kontraktor di Kabupaten

| COMPANY NAME<br>Nama Kontraktor | CLASS<br>Kelas | CAPITAL<br>Modal (Rp) | NUMBER OF EMPLOYEE<br>Jumlah pegawai | REMARKS<br>Keterangan |
|---|---|---|---|---|
| 8 | B2 | - | - | |
| 2 | C2 | - | - | |
| 22 | C3 | - | - | |
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NOTE: DATI II

PROPINSI: Nusa Tenggara Timur

KABUPATEN: Sumba Barat

E-09

## LIST OF EXISTING EQUIPMENT OF LOCAL CONTRACTOR

Name of contractor

| NAME OF EQUIPMENT<br>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 | | | | | | | |
| - | | | | | | | |

PROPINSI: Nusa Tenggara Timur

KABUPATEN: Sumba Barat



## LIST OF EXISTING EQUIPMENT OF P.U KABUPATEN

| NAME OF EQUIPMENT<br>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 : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 26 (IIIC) LENGTH : 20 Km

UPGRADE : 8.0m 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 | 173 | 91 | 0 | 0 | 0 |
| Subgrade Preparation | m2 | 1215.0 | 21 | 11 | 25,515 | 13,365 | 38,880 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 130.5 | 2,629 | 1,057 | 343,084 | 137,938 | 481,022 |
| Normal Excavation to Spoil | m3 | 0.0 | 1,051 | 524 | 0 | 0 | 0 |
| Sub Base Course | m3 | 146.0 | 3,371 | 1,354 | 492,166 | 197,684 | 689,850 |
| Base Course | m3 | 4800.0 | 4,629 | 2,308 | 22,219,200 | 11,078,400 | 33,297,600 |
| Shoulder | m2 | 80000.0 | 310 | 146 | 24,800,000 | 11,680,000 | 36,480,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 0.0 | 918 | 937 | 0 | 0 | 0 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 0.0 | 796 | 120 | 0 | 0 | 0 |
| Earth Drain in Swamp (by machine) | m3 | 900.0 | 1,231 | 475 | 1,107,900 | 427,500 | 1,535,400 |
| Pipe Culvert D80cm | m | 0.0 | 45,108 | 69,866 | 0 | 0 | 0 |
| Masonry Culvert (80x80cm) | m | 0.0 | 60,016 | 51,497 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 100.0 | 42,886 | 12,288 | 4,288,600 | 1,228,800 | 5,517,400 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 11,575,450 | 1,230,102 | 12,805,552 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 64,851,915 | 25,993,789 | 90,845,704 |
| Overhead ( 15% ) | | | | | 9,727,787 | 3,899,068 | 13,626,855 |
| | | | TOTAL COST | | 74,579,702 | 29,892,857 | 104,472,559 |
| Manual routine maintenance of road | Km | 20.0 | 125,152 | 7,248 | 2,503,040 | 144,960 | 2,648,000 |
| Routine maintenance of gravel road | Km | 20.0 | 200,491 | 88,321 | 4,009,820 | 1,766,420 | 5,776,240 |
| | | | Sub Total | | 6,512,860 | 1,911,380 | 8,424,240 |
| Maintenance of Timber Bridge (New) | m2 | 96.0 | 10,114 | 1,455 | 970,944 | 139,680 | 1,110,624 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 0.0 | 4,507 | 2,664 | 0 | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 4,487,309 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | 153,400 |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 275,940 |
| Maintenance Rate without Bridge | | (%) | : | 9.39 |
| New Bridge Cost Rate | | (%) | : | 14.10 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 18 (IIIC) LENGTH : 32 Km

UPGRADE : 7.0m 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 | 173 | 91 | 0 | 0 | 0 |
| Subgrade Preparation | m2 | 224000.0 | 21 | 11 | 4,704,000 | 2,464,000 | 7,168,000 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 236.3 | 2,629 | 1,057 | 621,232 | 249,769 | 871,001 |
| Normal Excavation to Spoil | m3 | 14578.0 | 1,051 | 524 | 15,321,478 | 7,638,872 | 22,960,350 |
| Sub Base Course | m3 | 20480.0 | 3,371 | 1,354 | 69,038,080 | 27,729,920 | 96,768,000 |
| Base Course | m3 | 0.0 | 4,629 | 2,308 | 0 | 0 | 0 |
| Shoulder | m2 | 96000.0 | 310 | 146 | 29,760,000 | 14,016,000 | 43,776,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 0.0 | 918 | 937 | 0 | 0 | 0 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 1640.0 | 796 | 120 | 1,305,440 | 196,800 | 1,502,240 |
| Earth Drain in Swamp (by machine) | m3 | 1050.0 | 1,231 | 475 | 1,292,550 | 498,750 | 1,791,300 |
| Pipe Culvert D80cm | m | 840.0 | 45,108 | 69,866 | 37,890,720 | 58,687,440 | 96,578,160 |
| Masonry Culvert (80x80cm) | m | 0.0 | 60,016 | 51,497 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 1261.2 | 42,886 | 12,288 | 54,087,823 | 15,497,625 | 69,585,448 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 95,460,637 | 11,874,900 | 107,335,537 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 309,481,960 | 138,854,076 | 448,336,036 |
| Overhead ( 15% ) | | | | | 46,422,294 | 20,828,111 | 67,250,405 |
| | | | TOTAL COST | | 355,904,254 | 159,682,187 | 515,586,441 |
| Manual routine maintenance of road | Km | 32.0 | 125,152 | 7,248 | 4,004,864 | 231,936 | 4,236,800 |
| Routine maintenance of gravel road | Km | 32.0 | 200,491 | 88,321 | 6,415,712 | 2,826,272 | 9,241,984 |
| | | | Sub Total | | 10,420,576 | 3,058,208 | 13,478,784 |
| Maintenance of Timber Bridge (New) | m2 | 584.0 | 10,114 | 1,455 | 5,906,576 | 849,720 | 6,756,296 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 0.0 | 4,507 | 2,664 | 0 | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 12,254,705 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | 211,363 |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 38,707,200 |
| Maintenance Rate without Bridge | | (%) | : | 3.44 |
| New Bridge Cost Rate | | (%) | : | 23.94 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 15 (IIIC) LENGTH : 13 Km

UPGRADE : 6.5m 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 | 173 | 91 | 0 | 0 | 0 |
| Subgrade Preparation | m2 | 2349.0 | 21 | 11 | 49,329 | 25,839 | 75,168 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 1409.4 | 2,629 | 1,057 | 3,705,312 | 1,489,735 | 5,195,047 |
| Normal Excavation to Spoil | m3 | 0.0 | 1,051 | 524 | 0 | 0 | 0 |
| Sub Base Course | m3 | 341.0 | 3,371 | 1,354 | 1,149,511 | 461,714 | 1,611,225 |
| Base Course | m3 | 3120.0 | 4,629 | 2,308 | 14,442,480 | 7,200,960 | 21,643,440 |
| Shoulder | m2 | 32500.0 | 310 | 146 | 10,075,000 | 4,745,000 | 14,820,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 0.0 | 918 | 937 | 0 | 0 | 0 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 8000.0 | 796 | 120 | 6,368,000 | 960,000 | 7,328,000 |
| Earth Drain in Swamp (by machine) | m3 | 1740.0 | 1,231 | 475 | 2,141,940 | 826,500 | 2,968,440 |
| Pipe Culvert D80cm | m | 0.0 | 45,108 | 69,866 | 0 | 0 | 0 |
| Masonry Culvert (80x80cm) | m | 0.0 | 60,016 | 51,497 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 0.0 | 42,886 | 12,288 | 0 | 0 | 0 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 37,931,572 | 15,709,748 | 53,641,320 |
| Overhead ( 15% ) | | | | | 5,689,735 | 2,356,462 | 8,046,197 |
| | | | TOTAL COST | | 43,621,307 | 18,066,210 | 61,687,517 |
| Manual routine maintenance of road | Km | 13.0 | 125,152 | 7,248 | 1,626,976 | 94,224 | 1,721,200 |
| Routine maintenance of gravel road | Km | 13.0 | 200,491 | 88,321 | 2,606,383 | 1,148,173 | 3,754,556 |
| | | | Sub Total | | 4,233,359 | 1,242,397 | 5,475,756 |
| Maintenance of Timber Bridge (New) | m2 | 0.0 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 52.0 | 4,507 | 2,664 | 234,364 | 138,528 | 372,892 |

| | | | | |
|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 4,745,194 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 644,490 |
| Maintenance Rate without Bridge | | (%) | : | 8.88 |
| New Bridge Cost Rate | | (%) | : | |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 11 (IIIB-1) LENGTH : 6 Km

UPGRADE : 7.0m 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 | 173 | 91 | 0 | 0 | 0 |
| Subgrade Preparation | m2 | 42000.0 | 21 | 11 | 882,000 | 462,000 | 1,344,000 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 0.0 | 2,629 | 1,057 | 0 | 0 | 0 |
| Normal Excavation to Spoil | m3 | 748.0 | 1,051 | 524 | 786,148 | 391,952 | 1,178,100 |
| Sub Base Course | m3 | 3360.0 | 3,371 | 1,354 | 11,326,560 | 4,549,440 | 15,876,000 |
| Base Course | m3 | 1680.0 | 4,629 | 2,308 | 7,776,720 | 3,877,440 | 11,654,160 |
| Shoulder | m2 | 18000.0 | 310 | 146 | 5,580,000 | 2,628,000 | 8,208,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 24000.0 | 918 | 937 | 22,032,000 | 22,488,000 | 44,520,000 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 0.0 | 796 | 120 | 0 | 0 | 0 |
| Earth Drain in Swamp (by machine) | m3 | 0.0 | 1,231 | 475 | 0 | 0 | 0 |
| Pipe Culvert D80cm | m | 84.0 | 45,108 | 69,866 | 3,789,072 | 5,868,744 | 9,657,816 |
| Masonry Culvert (80x80cm) | m | 0.0 | 60,016 | 51,497 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 25.6 | 42,886 | 12,288 | 1,097,881 | 314,572 | 1,412,453 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 53,270,381 | 40,580,148 | 93,850,529 |
| Overhead ( 15% ) | | | | | 7,990,557 | 6,087,022 | 14,077,579 |
| | | | TOTAL COST | | 61,260,938 | 46,667,170 | 107,928,108 |
| Manual routine maintenance of road | Km | 6.0 | 125,152 | 7,248 | 750,912 | 43,488 | 794,400 |
| Routine maintenance of asphalt road | Km | 6.0 | 365,600 | 165,200 | 2,193,600 | 991,200 | 3,184,800 |
| | | | Sub Total | | 2,944,512 | 1,034,688 | 3,979,200 |
| Maintenance of Timber Bridge (New) | m2 | 0.0 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 0.0 | 4,507 | 2,664 | 0 | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 17,988,018 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 13,444,032 |
| Maintenance Rate without Bridge | | (%) | : | 3.69 |
| New Bridge Cost Rate | | (%) | : | |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 8 (IIIC) LENGTH : 16 Km

UPGRADE : 5.5m road bed, 4.0m road with surface Subbase 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 | 173 | 91 | 0 | 0 | 0 |
| Subgrade Preparation | m2 | 0.0 | 21 | 11 | 0 | 0 | 0 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 0.0 | 2,629 | 1,057 | 0 | 0 | 0 |
| Normal Excavation to Spoil | m3 | 0.0 | 1,051 | 524 | 0 | 0 | 0 |
| Sub Base Course | m3 | 914.0 | 3,371 | 1,354 | 3,081,094 | 1,237,556 | 4,318,650 |
| Base Course | m3 | 3840.0 | 4,629 | 2,308 | 17,775,360 | 8,862,720 | 26,638,080 |
| Shoulder | m2 | 24000.0 | 310 | 146 | 7,440,000 | 3,504,000 | 10,944,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 0.0 | 918 | 937 | 0 | 0 | 0 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 11260.0 | 796 | 120 | 8,962,960 | 1,351,200 | 10,314,160 |
| Earth Drain in Swamp (by machine) | m3 | 0.0 | 1,231 | 475 | 0 | 0 | 0 |
| Pipe Culvert D80cm | m | 0.0 | 45,108 | 69,866 | 0 | 0 | 0 |
| Masonry Culvert (80x80cm) | m | 18.0 | 60,016 | 51,497 | 1,080,288 | 926,946 | 2,007,234 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 1.5 | 42,886 | 12,288 | 64,329 | 18,432 | 82,761 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 38,404,031 | 15,900,854 | 54,304,885 |
| Overhead ( 15% ) | | | | | 5,760,604 | 2,385,128 | 8,145,732 |
| | | | TOTAL COST | | 44,164,635 | 18,285,982 | 62,450,617 |
| Manual routine maintenance of road | Km | 16.0 | 125,152 | 7,248 | 2,002,432 | 115,968 | 2,118,400 |
| Routine maintenance of gravel road | Km | 16.0 | 200,491 | 88,321 | 3,207,856 | 1,413,136 | 4,620,992 |
| | | | Sub Total | | 5,210,288 | 1,529,104 | 6,739,392 |
| Maintenance of Timber Bridge (New) | m2 | 0.0 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 0.0 | 4,507 | 2,664 | 0 | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 3,903,164 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 1,727,460 |
| Maintenance Rate without Bridge | | (%) | : | 10.79 |
| New Bridge Cost Rate | | (%) | : | |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 7 (IIIC) LENGTH : 15 Km

UPGRADE : 5.5m road bed, 3.5m road with surface Subbase Cource

(Rp)

| I T E M | UNIT | QUANTITY | <<< UNIT COST >>> LOCAL | FOREIGN | <<<<<< COST LOCAL | FOREIGN | >>>>>> TOTAL |
|---|---|---|---|---|---|---|---|
| Site Clearance in Light Bush | m2 | 4500.0 | 173 | 91 | 778,500 | 409,500 | 1,188,000 |
| Subgrade Preparation | m2 | 0.0 | 21 | 11 | 0 | 0 | 0 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 0.0 | 2,629 | 1,057 | 0 | 0 | 0 |
| Normal Excavation to Spoil | m3 | 280.0 | 1,051 | 524 | 294,280 | 146,720 | 441,000 |
| Sub Base Course | m3 | 840.8 | 3,371 | 1,354 | 2,834,336 | 1,138,443 | 3,972,779 |
| Base Course | m3 | 3150.0 | 4,629 | 2,308 | 14,581,350 | 7,270,200 | 21,851,550 |
| Shoulder | m2 | 30000.0 | 310 | 146 | 9,300,000 | 4,380,000 | 13,680,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 0.0 | 918 | 937 | 0 | 0 | 0 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 13200.0 | 796 | 120 | 10,507,200 | 1,584,000 | 12,091,200 |
| Earth Drain in Swamp (by machine) | m3 | 0.0 | 1,231 | 475 | 0 | 0 | 0 |
| Pipe Culvert D80cm | m | 0.0 | 45,108 | 69,866 | 0 | 0 | 0 |
| Masonry Culvert (80x80cm) | m | 0.0 | 60,016 | 51,497 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 0.0 | 42,886 | 12,288 | 0 | 0 | 0 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 38,295,666 | 14,928,863 | 53,224,529 |
| Overhead ( 15% ) | | | | | 5,744,349 | 2,239,329 | 7,983,678 |
| | | | TOTAL COST | | 44,040,015 | 17,168,192 | 61,208,207 |
| Manual routine maintenance of road | Km | 15.0 | 125,152 | 7,248 | 1,877,280 | 108,720 | 1,986,000 |
| Routine maintenance of gravel road | Km | 15.0 | 200,491 | 88,321 | 3,007,365 | 1,324,815 | 4,332,180 |
| | | | Sub Total | | 4,884,645 | 1,433,535 | 6,318,180 |
| Maintenance of Timber Bridge (New) | m2 | 0.0 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 16.0 | 4,507 | 2,664 | 72,112 | 42,624 | 114,736 |

| | | | | | |
|---|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 4,080,547 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 1,589,111 |
| Maintenance Rate without Bridge | | (%) | : | 10.32 |
| New Bridge Cost Rate | | (%) | : | |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 6 (IIIB-1) LENGTH : 20 Km

UPGRADE : 6.5m 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 | 173 | 91 | 0 | 0 | 0 |
| Subgrade Preparation | m2 | 97500.0 | 21 | 11 | 2,047,500 | 1,072,500 | 3,120,000 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 0.0 | 2,629 | 1,057 | 0 | 0 | 0 |
| Normal Excavation to Spoil | m3 | 1780.0 | 1,051 | 524 | 1,870,780 | 932,720 | 2,803,500 |
| Sub Base Course | m3 | 9120.0 | 3,371 | 1,354 | 30,743,520 | 12,348,480 | 43,092,000 |
| Base Course | m3 | 5320.0 | 4,629 | 2,308 | 24,626,280 | 12,278,560 | 36,904,840 |
| Shoulder | m2 | 50000.0 | 310 | 146 | 15,500,000 | 7,300,000 | 22,800,000 |
| Asphalt Patching | m2 | 33.0 | 3,656 | 1,652 | 120,648 | 54,516 | 175,164 |
| Surface Dressing (Single) | m2 | 80000.0 | 918 | 937 | 73,440,000 | 74,960,000 | 148,400,000 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 22300.0 | 796 | 120 | 17,750,800 | 2,676,000 | 20,426,800 |
| Earth Drain in Swamp (by machine) | m3 | 0.0 | 1,231 | 475 | 0 | 0 | 0 |
| Pipe Culvert D80cm | m | 0.0 | 45,108 | 69,866 | 0 | 0 | 0 |
| Masonry Culvert (80x80cm) | m | 402.0 | 60,016 | 51,497 | 24,126,432 | 20,701,794 | 44,828,226 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 67.2 | 42,886 | 12,288 | 2,881,939 | 825,753 | 3,707,692 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 193,107,899 | 133,150,323 | 326,258,222 |
| Overhead ( 15% ) | | | | | 28,966,184 | 19,972,548 | 48,938,732 |
| | | | TOTAL COST | | 222,074,083 | 153,122,871 | 375,196,954 |
| Manual routine maintenance of road | Km | 20.0 | 125,152 | 7,248 | 2,503,040 | 144,960 | 2,648,000 |
| Routine maintenance of asphalt road | Km | 20.0 | 365,600 | 165,200 | 7,312,000 | 3,304,000 | 10,616,000 |
| | | | Sub Total | | 9,815,040 | 3,448,960 | 13,264,000 |
| Maintenance of Timber Bridge (New) | m2 | 0.0 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 120.0 | 4,507 | 2,664 | 540,840 | 319,680 | 860,520 |

| | | | | |
|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 18,759,848 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 37,545,368 |
| Maintenance Rate without Bridge | | (%) | : | 3.54 |
| New Bridge Cost Rate | | (%) | : | |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 5 (IIIC) LENGTH : 22 Km

UPGRADE : 6.0m road bed, 3.5m road with surface Subbase 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 | 173 | 91 | 0 | 0 | 0 |
| Subgrade Preparation | m2 | 12000.0 | 21 | 11 | 252,000 | 132,000 | 384,000 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 0.0 | 2,629 | 1,057 | 0 | 0 | 0 |
| Normal Excavation to Spoil | m3 | 253.0 | 1,051 | 524 | 265,903 | 132,572 | 398,475 |
| Sub Base Course | m3 | 2052.8 | 3,371 | 1,356 | 6,919,988 | 2,779,491 | 9,699,479 |
| Base Course | m3 | 4200.0 | 4,629 | 2,308 | 19,441,800 | 9,693,600 | 29,135,400 |
| Shoulder | m2 | 55000.0 | 310 | 146 | 17,050,000 | 8,030,000 | 25,080,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 0.0 | 918 | 937 | 0 | 0 | 0 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 17800.0 | 796 | 120 | 14,168,800 | 2,136,000 | 16,304,800 |
| Earth Drain in Swamp (by machine) | m3 | 0.0 | 1,231 | 475 | 0 | 0 | 0 |
| Pipe Culvert D80cm | m | 0.0 | 45,108 | 69,866 | 0 | 0 | 0 |
| Masonry Culvert (80x80cm) | m | 101.0 | 60,016 | 51,497 | 6,061,616 | 5,201,197 | 11,262,813 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 63.1 | 42,886 | 12,288 | 2,706,106 | 775,372 | 3,481,478 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 66,866,213 | 28,880,232 | 95,746,445 |
| Overhead ( 15% ) | | | | | 10,029,931 | 4,332,034 | 14,361,965 |
| | | | TOTAL COST | | 76,896,144 | 33,212,266 | 110,108,410 |
| Manual routine maintenance of road | Km | 22.0 | 125,152 | 7,248 | 2,753,344 | 159,456 | 2,912,800 |
| Routine maintenance of gravel road | Km | 22.0 | 200,491 | 88,321 | 4,410,802 | 1,943,062 | 6,353,864 |
| | | | Sub Total | | 7,164,146 | 2,102,518 | 9,266,664 |
| Maintenance of Timber Bridge (New) | m2 | 0.0 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 52.0 | 4,507 | 2,664 | 234,364 | 138,528 | 372,892 |

| | | | | | |
|---|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 5,004,928 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 3,879,791 |
| Maintenance Rate without Bridge | | (%) | : | 8.42 |
| New Bridge Cost Rate | | (%) | : | |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 4 (IIIC) LENGTH : 7 Km

UPGRADE : 6.0m 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 | 173 | 91 | 0 | 0 | 0 |
| Subgrade Preparation | m2 | 36000.0 | 21 | 11 | 756,000 | 396,000 | 1,152,000 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 0.0 | 2,629 | 1,057 | 0 | 0 | 0 |
| Normal Excavation to Spoil | m3 | 662.0 | 1,051 | 524 | 695,762 | 346,888 | 1,042,650 |
| Sub Base Course | m3 | 3902.0 | 3,371 | 1,354 | 13,153,642 | 5,283,308 | 18,436,950 |
| Base Course | m3 | 240.0 | 4,629 | 2,308 | 1,110,960 | 553,920 | 1,664,880 |
| Shoulder | m2 | 14000.0 | 310 | 146 | 4,340,000 | 2,044,000 | 6,384,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 0.0 | 918 | 937 | 0 | 0 | 0 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 3800.0 | 796 | 120 | 3,024,800 | 456,000 | 3,480,800 |
| Earth Drain in Swamp (by machine) | m3 | 0.0 | 1,231 | 475 | 0 | 0 | 0 |
| Pipe Culvert D80cm | m | 0.0 | 45,108 | 69,866 | 0 | 0 | 0 |
| Masonry Culvert (80x80cm) | m | 36.0 | 60,016 | 51,497 | 2,160,576 | 1,853,892 | 4,014,468 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 223.5 | 42,886 | 12,288 | 9,585,021 | 2,746,368 | 12,331,389 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 34,826,761 | 13,680,376 | 48,507,137 |
| Overhead ( 15% ) | | | | | 5,224,014 | 2,052,056 | 7,276,070 |
| | | | TOTAL COST | | 40,050,775 | 15,732,432 | 55,783,207 |
| Manual routine maintenance of road | Km | 7.0 | 125,152 | 7,248 | 876,064 | 50,736 | 926,800 |
| Routine maintenance of gravel road | Km | 7.0 | 200,491 | 88,321 | 1,403,437 | 618,247 | 2,021,684 |
| | | | Sub Total | | 2,279,501 | 668,983 | 2,948,484 |
| Maintenance of Timber Bridge (New) | m2 | 0.0 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 64.0 | 9,143 | 2,573 | 585,152 | 164,672 | 749,824 |
| Maintenance of Concrete Bridge (Exist) | m2 | 9.0 | 4,507 | 2,664 | 40,563 | 23,976 | 64,539 |

| | | | |
|---|---|---|---|
| Earthwork & Pavement Unit Cost | (Rp/Km) | : | 7,969,030 |
| Timber Bridge Unit Cost | (Rp/m2) | : | |
| Concrete Bridge Unit Cost | (Rp/m2) | : | |
| Survived Value | (Rp) | : | 7,374,780 |
| Maintenance Rate without Bridge | (%) | : | 5.29 |
| New Bridge Cost Rate | (%) | : | |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 3 (IIIC) LENGTH : 13 Km

UPGRADE : 6.0m 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 | 173 | 91 | 0 | 0 | 0 |
| Subgrade Preparation | m2 | 0.0 | 21 | 11 | 0 | 0 | 0 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 0.0 | 2,629 | 1,057 | 0 | 0 | 0 |
| Normal Excavation to Spoil | m3 | 0.0 | 1,051 | 524 | 0 | 0 | 0 |
| Sub Base Course | m3 | 650.0 | 3,371 | 1,354 | 2,191,150 | 880,100 | 3,071,250 |
| Base Course | m3 | 3120.0 | 4,629 | 2,308 | 14,442,480 | 7,200,960 | 21,643,440 |
| Shoulder | m2 | 26000.0 | 310 | 146 | 8,060,000 | 3,796,000 | 11,856,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 0.0 | 918 | 937 | 0 | 0 | 0 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 6100.0 | 796 | 120 | 4,855,600 | 732,000 | 5,587,600 |
| Earth Drain in Swamp (by machine) | m3 | 0.0 | 1,231 | 475 | 0 | 0 | 0 |
| Pipe Culvert D80cm | m | 0.0 | 45,108 | 69,866 | 0 | 0 | 0 |
| Masonry Culvert (80x80cm) | m | 0.0 | 60,016 | 51,497 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 0.0 | 42,886 | 12,288 | 0 | 0 | 0 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 29,549,230 | 12,609,060 | 42,158,290 |
| Overhead ( 15% ) | | | | | 4,432,384 | 1,891,359 | 6,323,743 |
| | | | TOTAL COST | | 33,981,614 | 14,500,419 | 48,482,033 |
| Manual routine maintenance of road | Km | 13.0 | 125,152 | 7,248 | 1,626,976 | 94,224 | 1,721,200 |
| Routine maintenance of gravel road | Km | 13.0 | 200,491 | 88,321 | 2,606,383 | 1,148,173 | 3,754,556 |
| | | | Sub Total | | 4,233,359 | 1,242,397 | 5,475,756 |
| Maintenance of Timber Bridge (New) | m2 | 0.0 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 40.0 | 4,507 | 2,664 | 180,280 | 106,560 | 286,840 |

| | | | | | |
|---|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 3,729,387 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 1,228,500 |
| Maintenance Rate without Bridge | | (%) | : | 11.29 |
| New Bridge Cost Rate | | (%) | : | |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 2 (IIIC) LENGTH : 17 Km

UPGRADE : 6.5m 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 | 173 | 91 | 0 | 0 | 0 |
| *Subgrade Preparation* | m2 | 0.0 | 21 | 11 | 0 | 0 | 0 |
| Normal Fill | m3 | 0.0 | 1,791 | 866 | 0 | 0 | 0 |
| Fill in Swamp | m3 | 0.0 | 2,629 | 1,057 | 0 | 0 | 0 |
| Normal Excavation to Spoil | m3 | 0.0 | 1,051 | 524 | 0 | 0 | 0 |
| Sub Base Course | m3 | 990.0 | 3,371 | 1,354 | 3,337,290 | 1,340,460 | 4,677,750 |
| Base Course | m3 | 4080.0 | 4,629 | 2,308 | 18,886,320 | 9,416,640 | 28,302,960 |
| Shoulder | m2 | 42500.0 | 310 | 146 | 13,175,000 | 6,205,000 | 19,380,000 |
| Asphalt Patching | m2 | 0.0 | 3,656 | 1,652 | 0 | 0 | 0 |
| Surface Dressing (Single) | m2 | 0.0 | 918 | 937 | 0 | 0 | 0 |
| Surface Dressing (Double) | m2 | 0.0 | 1,097 | 1,478 | 0 | 0 | 0 |
| Earth Drain | m | 9800.0 | 796 | 120 | 7,800,800 | 1,176,000 | 8,976,800 |
| Earth Drain in Swamp (by machine) | m3 | 0.0 | 1,231 | 475 | 0 | 0 | 0 |
| Pipe Culvert D80cm | m | 12.0 | 45,108 | 69,866 | 541,296 | 838,392 | 1,379,688 |
| Masonry Culvert (80x80cm) | m | 54.0 | 60,016 | 51,497 | 3,240,864 | 2,780,838 | 6,021,702 |
| Retaining Wall and Wing Wall (Timber) | m2 | 0.0 | 16,634 | 246 | 0 | 0 | 0 |
| Retaining Wall and Wing Wall (Masonry) | m3 | 146.5 | 42,886 | 12,288 | 6,282,799 | 1,800,192 | 8,082,991 |
| Gabion Protection | m3 | 0.0 | 13,159 | 120 | 0 | 0 | 0 |
| New Bridge (Timber) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| New Bridge (Concrete) | SET | 1.0 | -- | -- | 0 | 0 | 0 |
| | | | Sub Total | | 53,264,369 | 23,557,522 | 76,821,891 |
| Overhead ( 15% ) | | | | | 7,989,655 | 3,533,628 | 11,523,283 |
| | | | *TOTAL COST* | | 61,254,024 | 27,091,150 | 88,345,174 |
| Manual routine maintenance of road | Km | 17.0 | 125,152 | 7,248 | 2,127,584 | 123,216 | 2,250,800 |
| Routine maintenance of gravel road | Km | 17.0 | 200,491 | 88,321 | 3,408,347 | 1,501,457 | 4,909,804 |
| | | | Sub Total | | 5,535,931 | 1,624,673 | 7,160,604 |
| Maintenance of Timber Bridge (New) | m2 | 0.0 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.0 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.0 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 36.0 | 4,507 | 2,664 | 162,252 | 95,904 | 258,156 |

| | | | | |
|---|---|---|---|---|
| Earthwork & Pavement | Unit Cost | (Rp/Km) | : | 5,196,775 |
| Timber Bridge | Unit Cost | (Rp/m2) | : | |
| Concrete Bridge | Unit Cost | (Rp/m2) | : | |
| Survived Value | | (Rp) | : | 1,871,100 |
| Maintenance Rate without Bridge | | (%) | : | 8.11 |
| New Bridge Cost Rate | | (%) | : | |

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

| I T E M | UNIT | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) | ( TOTAL ) |
|---|---|---|---|---|---|---|---|
| EQUIPMENT : | | | | | | | |
| Bulldozer/Ripper | hr | 182.2 | 357.9 | 593.8 | 740.0 | 555.8 | 2429.7 |
| Swamp Bulldozer | hr | 0.0 | 0.0 | 2.1 | 5.7 | 51.3 | 59.1 |
| Motor Grader | hr | 522.6 | 992.0 | 1457.7 | 1531.6 | 1123.3 | 5627.2 |
| Hand-guide Vib. Roller | hr | 294.4 | 959.0 | 719.9 | 2216.5 | 1999.2 | 6189.0 |
| Tire Roller | hr | 200.0 | 399.9 | 266.6 | 0.0 | 0.0 | 866.5 |
| Vibratory Roller (D&T) | hr | 378.5 | 705.1 | 944.6 | 1179.5 | 938.6 | 4146.3 |
| Hydraulic Excavator; Wheel | hr | 3.2 | 38.0 | 61.1 | 73.4 | 173.8 | 349.5 |
| Wheel Loader | hr | 647.1 | 1267.7 | 1888.7 | 1840.7 | 1416.1 | 7060.3 |
| Water Tank Truck | hr | 233.2 | 428.0 | 542.2 | 658.3 | 542.0 | 2403.7 |
| Dump Truck | hr | 5223.9 | 11569.8 | 15867.1 | 16248.0 | 12617.3 | 61526.1 |
| Flat Bed Truck with Crane | hr | 158.4 | 404.6 | 335.3 | 1207.5 | 1177.8 | 3283.6 |
| Flat Bed Truck | hr | 327.9 | 754.7 | 526.6 | 645.3 | 600.2 | 2854.7 |
| Portable Crusher/Screening | hr | 154.7 | 306.7 | 511.6 | 210.5 | 117.3 | 1300.8 |
| Concrete Mixer | hr | 94.3 | 319.8 | 232.7 | 595.5 | 495.3 | 1737.6 |
| Water Pump | hr | 69.3 | 229.5 | 166.5 | 420.4 | 356.6 | 1242.3 |
| Concrete Vibrator | hr | 19.4 | 48.8 | 34.3 | 70.2 | 79.2 | 251.9 |
| Asphalt Sprayer | hr | 200.0 | 399.9 | 266.6 | 0.0 | 0.0 | 866.5 |
| LABOUR : | | | | | | | |
| Mandor | man day | 496.2 | 1307.6 | 1526.9 | 2331.0 | 2057.1 | 7718.8 |
| Skilled Labourer | man day | 201.2 | 470.5 | 716.4 | 3515.4 | 3784.5 | 8688.0 |
| Carpenter | man day | 9.7 | 55.7 | 252.7 | 1762.6 | 1886.5 | 3967.2 |
| Mason | man day | 124.7 | 451.8 | 330.6 | 875.6 | 693.6 | 2476.3 |
| Labourer | man day | 4923.2 | 15492.6 | 18293.3 | 19782.4 | 15717.3 | 74208.8 |
| Driver | man day | 1044.2 | 2373.4 | 3067.0 | 3256.4 | 2583.4 | 12324.4 |
| Operator | man day | 625.8 | 1354.3 | 1707.7 | 2117.6 | 1714.3 | 7519.7 |
| MATERIAL : | | | | | | | |
| Bitumen | l | 41000.0 | 82026.6 | 54684.4 | 0.0 | 0.0 | 177711.0 |
| Asphalt Oil | l | 8200.0 | 16400.0 | 10933.3 | 0.0 | 0.0 | 35533.3 |
| Kerosene | l | 9800.0 | 19602.8 | 13068.5 | 0.0 | 0.0 | 42471.3 |
| Sand | m3 | 237.5 | 428.7 | 293.8 | 587.9 | 599.0 | 2146.9 |
| Cement | bag | 331.4 | 883.8 | 627.1 | 1356.4 | 1418.5 | 4617.2 |
| River Stone | m3 | 124.7 | 451.8 | 330.6 | 875.6 | 693.6 | 2476.3 |
| Steel Moulds | set | 90.0 | 6.0 | 0.0 | 378.0 | 462.0 | 936.0 |
| Timber | m3 | 0.3 | 3.6 | 21.9 | 157.8 | 169.0 | 352.6 |
| Paint | l | 0.0 | 0.0 | 120.5 | 1106.8 | 1205.1 | 2432.4 |
| Reinforcing Steel | kg | 3267.1 | 4867.1 | 3364.1 | 12586.3 | 14737.8 | 38822.4 |
| Tying Wire | kg | 29.7 | 44.2 | 30.5 | 114.4 | 133.9 | 352.7 |
| Equivalent Royalty | m3 | 9237.7 | 17884.3 | 22818.8 | 25890.0 | 21413.9 | 97244.7 |

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

| ITEM | 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 | 410.7 | 773.4 | 771.1 | 787.5 | 899.2 | 3641.9 |
| Hand-guide Vib. Roller | hr | 165.0 | 415.5 | 417.0 | 705.0 | 705.0 | 2407.5 |
| Tire Roller | hr | 410.7 | 773.4 | 771.1 | 787.5 | 899.2 | 3641.9 |
| 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 | 111.9 | 220.6 | 217.8 | 269.4 | 313.0 | 1132.7 |
| Water Tank Truck | hr | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Dump Truck | hr | 1001.7 | 2154.9 | 2140.9 | 3025.3 | 3287.4 | 11610.2 |
| Flat Bed Truck with Crane | hr | 294.0 | 537.9 | 538.9 | 547.6 | 570.7 | 2489.1 |
| Flat Bed Truck | hr | 1681.5 | 3248.9 | 3243.6 | 3512.1 | 3917.7 | 15603.8 |
| Portable Crusher/Screening | hr | 56.2 | 111.1 | 109.6 | 136.0 | 157.8 | 570.7 |
| Concrete Mixer | hr | 0.9 | 1.6 | 1.6 | 1.8 | 1.7 | 7.6 |
| Water Pump | hr | 0.9 | 1.6 | 1.6 | 1.8 | 1.7 | 7.6 |
| Concrete Vibrator | hr | 0.9 | 1.6 | 1.6 | 1.8 | 1.7 | 7.6 |
| Asphalt Sprayer | hr | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LABOUR : | | | | | | | |
| Mandur | man day | 567.8 | 1133.9 | 1132.6 | 1322.7 | 1448.0 | 5605.0 |
| Skilled Labourer | man day | 125.8 | 307.5 | 308.5 | 491.3 | 501.2 | 1734.3 |
| Carpenter | man day | 7.9 | 15.3 | 15.3 | 10.2 | 15.6 | 64.3 |
| Mason | man day | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Labourer | man day | 6796.6 | 13575.1 | 13561.0 | 15855.8 | 17329.2 | 67117.7 |
| Driver | man day | 506.9 | 1010.2 | 1007.2 | 1200.3 | 1316.7 | 5041.3 |
| Operator | man day | 174.4 | 331.9 | 330.2 | 353.2 | 404.9 | 1594.6 |
| MATERIAL : | | | | | | | |
| Bitumen | l | 1485.0 | 3739.5 | 3753.0 | 6345.0 | 6345.0 | 21667.5 |
| Asphalt Oil | l | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Kerosene | l | 165.0 | 415.5 | 417.0 | 705.0 | 705.0 | 2407.5 |
| Sand | m3 | 28.4 | 70.8 | 71.1 | 119.3 | 119.2 | 408.8 |
| Cement | bag | 13.4 | 24.2 | 24.3 | 26.7 | 26.0 | 114.6 |
| 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 | 0.6 | 1.2 | 1.2 | 0.8 | 1.3 | 5.1 |
| Paint | l | 3.5 | 7.1 | 7.1 | 3.5 | 7.1 | 28.3 |
| Reinforcing Steel | kg | 69.1 | 124.8 | 125.1 | 137.4 | 133.6 | 590.0 |
| Tying Wire | kg | 0.6 | 1.1 | 1.1 | 1.2 | 1.2 | 5.2 |
| Equivalent Royalty | m3 | 1586.5 | 3127.0 | 3087.1 | 3816.0 | 4434.6 | 16051.2 |

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

| ITEM | UNIT | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) | ( TOTAL ) |
|---|---|---|---|---|---|---|---|
| EQUIPMENT : | | | | | | | |
| Bulldozer/Ripper | hr | 182.2 | 357.9 | 593.8 | 740.0 | 555.8 | 2429.7 |
| Swamp Bulldozer | hr | 0.0 | 0.0 | 2.1 | 5.7 | 51.3 | 59.1 |
| Motor Grader | hr | 933.3 | 1765.4 | 2228.8 | 2319.1 | 2022.5 | 9269.1 |
| Hand-guide Vib. Roller | hr | 459.4 | 1374.5 | 1136.9 | 2921.5 | 2704.2 | 8596.5 |
| Tire Roller | hr | 610.7 | 1173.3 | 1037.7 | 787.5 | 899.2 | 4508.4 |
| Vibratory Roller (D&I) | hr | 378.5 | 705.1 | 944.6 | 1179.5 | 938.6 | 4146.3 |
| Hydraulic Excavator; Wheel | hr | 3.2 | 38.0 | 61.1 | 73.4 | 173.8 | 349.5 |
| Wheel Loader | hr | 759.0 | 1488.3 | 2106.5 | 2110.1 | 1729.1 | 8193.0 |
| Water Tank Truck | hr | 233.2 | 428.0 | 542.2 | 658.3 | 542.0 | 2403.7 |
| Dump Truck | hr | 6225.6 | 13724.7 | 18008.0 | 19273.3 | 15904.7 | 73136.3 |
| Flat Bed Truck with Crane | hr | 452.4 | 942.5 | 874.2 | 1755.1 | 1748.5 | 5772.7 |
| Flat Bed Truck | hr | 2009.4 | 4003.6 | 3770.2 | 4157.4 | 4517.9 | 18458.5 |
| Portable Crusher/Screening | hr | 210.9 | 417.8 | 621.2 | 346.5 | 275.1 | 1871.5 |
| Concrete Mixer | hr | 95.2 | 321.4 | 234.3 | 597.3 | 497.0 | 1745.2 |
| Water Pump | hr | 70.2 | 231.1 | 168.1 | 422.2 | 358.3 | 1249.9 |
| Concrete Vibrator | hr | 20.3 | 50.4 | 35.9 | 72.0 | 80.9 | 259.5 |
| Asphalt Sprayer | hr | 200.0 | 399.9 | 266.6 | 0.0 | 0.0 | 866.5 |
| LABOUR : | | | | | | | |
| Mandur | man day | 1064.0 | 2441.5 | 2659.5 | 3653.7 | 3505.1 | 13323.8 |
| Skilled Labourer | man day | 327.0 | 778.0 | 1024.9 | 4006.7 | 4285.7 | 10422.3 |
| Carpenter | man day | 17.6 | 71.0 | 268.0 | 1772.8 | 1902.1 | 4031.5 |
| Mason | man day | 124.7 | 451.8 | 330.6 | 875.6 | 693.6 | 2476.3 |
| Labourer | man day | 11719.8 | 29067.7 | 31854.3 | 35638.2 | 33046.5 | 141326.5 |
| Driver | man day | 1551.1 | 3383.6 | 4074.2 | 4456.7 | 3900.1 | 17365.7 |
| Operator | man day | 800.2 | 1686.2 | 2037.9 | 2470.8 | 2119.2 | 9114.3 |
| MATERIAL : | | | | | | | |
| Bitumen | l | 42485.0 | 85766.1 | 58437.4 | 6345.0 | 6345.0 | 199378.5 |
| Asphalt Oil | l | 8200.0 | 16400.0 | 10933.3 | 0.0 | 0.0 | 35533.3 |
| Kerosene | l | 9965.0 | 20018.3 | 13485.5 | 705.0 | 705.0 | 44878.8 |
| Sand | m3 | 265.9 | 499.5 | 364.9 | 707.2 | 718.2 | 2555.7 |
| Cement | bag | 344.8 | 908.0 | 651.4 | 1383.1 | 1444.5 | 4731.8 |
| River Stone | m3 | 124.7 | 451.8 | 330.6 | 875.6 | 693.6 | 2476.3 |
| Steel Moulds | set | 90.0 | 6.0 | 0.0 | 378.0 | 462.0 | 936.0 |
| Timber | m3 | 0.9 | 4.8 | 23.1 | 158.6 | 170.3 | 357.7 |
| Paint | l | 3.5 | 7.1 | 127.6 | 1110.3 | 1212.2 | 2460.7 |
| Reinforcing Steel | kg | 3336.2 | 4991.9 | 3489.2 | 12723.7 | 14871.4 | 39412.4 |
| Tying Wire | kg | 30.3 | 45.3 | 31.6 | 115.6 | 135.1 | 357.9 |
| Equivalent Royalty | m3 | 10824.2 | 21011.3 | 25905.9 | 29706.0 | 25848.5 | 113295.9 |

Appendix A-5

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( 1000 Rp )

| I T E M | UNIT | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) | ( TOTAL ) |
|---|---|---|---|---|---|---|---|
| EQUIPMENT : | | 70,088 | 147,975 | 202,753 | 203,560 | 159,360 | 783,736 |
| Bulldozer/Ripper | 16874 | 3,074 | 6,039 | 10,019 | 12,486 | 9,378 | 40,996 |
| Swamp Bulldozer | 12405 | 0 | 0 | 26 | 70 | 636 | 732 |
| Motor Grader | 14343 | 7,495 | 14,228 | 20,907 | 21,967 | 16,111 | 80,708 |
| Hand-guide Vib. Roller | 1667 | 490 | 1,598 | 1,200 | 3,694 | 3,332 | 10,314 |
| Tire Roller | 11776 | 2,355 | 4,709 | 3,139 | 0 | 0 | 10,203 |
| Vibratory Roller (D&T) | 7133 | 2,699 | 5,029 | 6,737 | 8,413 | 6,695 | 29,573 |
| Hydraulic Excavator; Wheel | 13621 | 43 | 517 | 832 | 999 | 2,367 | 4,758 |
| Wheel Loader | 17551 | 11,357 | 22,249 | 33,148 | 32,306 | 24,853 | 123,913 |
| Water Tank Truck | 4381 | 1,021 | 1,875 | 2,375 | 2,884 | 2,374 | 10,529 |
| Dump Truck | 5929 | 30,972 | 68,597 | 94,076 | 96,334 | 74,807 | 364,786 |
| Flat Bed Truck with Crane | 5432 | 860 | 2,197 | 1,821 | 6,559 | 6,397 | 17,834 |
| Flat Bed Truck | 3700 | 1,213 | 2,792 | 1,948 | 2,387 | 2,220 | 10,560 |
| Portable Crusher/Screening | 46371 | 7,173 | 14,221 | 23,723 | 9,761 | 5,439 | 60,317 |
| Concrete Mixer | 9164 | 864 | 2,930 | 2,132 | 5,457 | 4,538 | 15,921 |
| Water Pump | 522 | 36 | 119 | 86 | 219 | 186 | 646 |
| Concrete Vibrator | 348 | 6 | 16 | 11 | 24 | 27 | 84 |
| Asphalt Sprayer | 2150 | 430 | 859 | 573 | 0 | 0 | 1,862 |
| LABOUR : | | 13,376 | 37,465 | 45,453 | 60,605 | 51,590 | 208,489 |
| Mandur | 2000 | 992 | 2,615 | 3,053 | 4,662 | 4,114 | 15,436 |
| Skilled Labourer | 2000 | 402 | 941 | 1,432 | 7,030 | 7,569 | 17,374 |
| Carpenter | 2000 | 19 | 111 | 505 | 3,525 | 3,773 | 7,933 |
| Mason | 2000 | 249 | 903 | 661 | 1,751 | 1,387 | 4,951 |
| Labourer | 1500 | 7,384 | 23,238 | 27,439 | 29,673 | 23,575 | 111,309 |
| Driver | 2500 | 2,610 | 5,933 | 7,667 | 8,141 | 6,458 | 30,809 |
| Operator | 2750 | 1,720 | 3,724 | 4,696 | 5,823 | 4,714 | 20,677 |
| MATERIAL : | | 48,933 | 96,864 | 72,361 | 85,127 | 89,623 | 392,908 |
| Bitumen | 500 | 20,500 | 41,013 | 27,342 | 0 | 0 | 88,855 |
| Asphalt Oil | 1500 | 12,300 | 24,600 | 16,399 | 0 | 0 | 53,299 |
| Kerosene | 300 | 2,940 | 5,880 | 3,920 | 0 | 0 | 12,740 |
| Sand | 9000 | 2,137 | 3,858 | 2,644 | 5,291 | 5,391 | 19,321 |
| Cement | 6000 | 1,988 | 5,302 | 3,762 | 8,138 | 8,511 | 27,701 |
| River Stone | 8000 | 997 | 3,614 | 2,644 | 7,004 | 5,548 | 19,807 |
| Steel Moulds | 8500 | 765 | 51 | 0 | 3,213 | 3,927 | 7,956 |
| Timber | 200000 | 60 | 720 | 4,380 | 31,560 | 33,800 | 70,520 |
| Paint | 4000 | 0 | 0 | 482 | 4,427 | 4,820 | 9,729 |
| Reinforcing Steel | 1500 | 4,900 | 7,300 | 5,046 | 18,879 | 22,106 | 58,231 |
| Tying Wire | 1250 | 37 | 55 | 38 | 143 | 167 | 440 |
| Equivalent Royalty | 250 | 2,309 | 4,471 | 5,704 | 6,472 | 5,353 | 24,309 |

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( 1000 Rp )

| ITEM | UNIT | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) | ( TOTAL ) |
|---|---|---|---|---|---|---|---|
| EQUIPMENT : | | 29,335 | 57,644 | 57,373 | 66,698 | 74,570 | 285,620 |
| Buildozer/Ripper | 16874 | 0 | 0 | 0 | 0 | 0 | 0 |
| Swamp Bulldozer | 12405 | 0 | 0 | 0 | 0 | 0 | 0 |
| Motor Grader | 14343 | 5,890 | 11,092 | 11,059 | 11,295 | 12,897 | 52,233 |
| Hand-guide Vib. Roller | 1667 | 275 | 692 | 695 | 1,175 | 1,175 | 4,012 |
| Tire Roller | 11776 | 4,836 | 9,107 | 9,080 | 9,273 | 10,588 | 42,884 |
| Vibratory Roller (D&T) | 7133 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hydraulic Excavator; Wheel | 13621 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wheel Loader | 17551 | 1,963 | 3,871 | 3,822 | 4,728 | 5,493 | 19,877 |
| Water Tank Truck | 4381 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dump Truck | 5929 | 5,939 | 12,776 | 12,693 | 17,937 | 19,490 | 68,835 |
| Flat Bed Truck with Crane | 5432 | 1,597 | 2,921 | 2,927 | 2,974 | 3,100 | 13,519 |
| Flat Bed Truck | 3700 | 6,221 | 12,020 | 12,001 | 12,994 | 14,495 | 57,731 |
| Portable Crusher/Screening | 46371 | 2,606 | 5,151 | 5,082 | 6,306 | 7,317 | 26,462 |
| Concrete Mixer | 9164 | 8 | 14 | 14 | 16 | 15 | 67 |
| Water Pump | 522 | 0 | 0 | 0 | 0 | 0 | 0 |
| Concrete Vibrator | 348 | 0 | 0 | 0 | 0 | 0 | 0 |
| Asphalt Sprayer | 2150 | 0 | 0 | 0 | 0 | 0 | 0 |
| LABOUR : | | 13,341 | 26,711 | 26,679 | 31,401 | 34,326 | 132,458 |
| Mandur | 2000 | 1,135 | 2,267 | 2,265 | 2,645 | 2,896 | 11,208 |
| Skilled Labourer | 2000 | 251 | 615 | 617 | 982 | 1,002 | 3,467 |
| Carpenter | 2000 | 15 | 30 | 30 | 20 | 31 | 126 |
| Mason | 2000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Labourer | 1500 | 10,194 | 20,362 | 20,341 | 23,783 | 25,993 | 100,673 |
| Driver | 2500 | 1,267 | 2,525 | 2,518 | 3,000 | 3,291 | 12,601 |
| Operator | 2750 | 479 | 912 | 908 | 971 | 1,113 | 4,383 |
| MATERIAL : | | 1,759 | 4,012 | 4,012 | 5,951 | 6,208 | 21,942 |
| Bitumen | 500 | 742 | 1,869 | 1,876 | 3,172 | 3,172 | 10,831 |
| Asphalt Oil | 1500 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kerosene | 300 | 49 | 124 | 125 | 211 | 211 | 720 |
| Sand | 9000 | 255 | 637 | 639 | 1,073 | 1,072 | 3,676 |
| Cement | 6000 | 80 | 145 | 145 | 160 | 156 | 686 |
| River Stone | 8000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Steel Moulds | 8500 | 0 | 0 | 0 | 0 | 0 | 0 |
| Timber | 200000 | 120 | 240 | 240 | 160 | 260 | 1,020 |
| Paint | 4000 | 14 | 28 | 28 | 14 | 28 | 112 |
| Reinforcing Steel | 1500 | 103 | 187 | 187 | 206 | 200 | 883 |
| Tying Wire | 1250 | 0 | 1 | 1 | 1 | 1 | 4 |
| Equivalent Royalty | 250 | 396 | 781 | 771 | 954 | 1,108 | 4,010 |

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

( 1000 Rp )

| I T E M | UNIT | ( 1988 ) | ( 1989 ) | ( 1990 ) | ( 1991 ) | ( 1992 ) | ( TOTAL ) |
|---|---|---|---|---|---|---|---|
| EQUIPMENT : | | 99,423 | 205,619 | 260,126 | 270,258 | 233,930 | 1,069,356 |
| Bulldozer/Ripper | 16874 | 3,074 | 6,039 | 10,019 | 12,486 | 9,378 | 40,996 |
| Swamp Bulldozer | 12405 | 0 | 0 | 26 | 70 | 636 | 732 |
| Motor Grader | 14343 | 13,385 | 25,320 | 31,966 | 33,262 | 29,008 | 132,941 |
| Hand-guide Vib. Roller | 1667 | 765 | 2,290 | 1,895 | 4,869 | 4,507 | 14,326 |
| Tire Roller | 11776 | 7,191 | 13,816 | 12,219 | 9,273 | 10,588 | 53,087 |
| Vibratory Roller (D&T) | 7133 | 2,699 | 5,029 | 6,737 | 8,413 | 6,695 | 29,573 |
| Hydraulic Excavator; Wheel | 13621 | 43 | 517 | 832 | 999 | 2,367 | 4,758 |
| Wheel Loader | 17551 | 13,320 | 26,120 | 36,970 | 37,034 | 30,346 | 143,790 |
| Water Tank Truck | 4381 | 1,021 | 1,875 | 2,375 | 2,884 | 2,374 | 10,529 |
| Dump Truck | 5929 | 36,911 | 81,373 | 106,769 | 114,271 | 94,297 | 433,621 |
| Flat Bed Truck with Crane | 5432 | 2,457 | 5,118 | 4,748 | 9,533 | 9,497 | 31,353 |
| Flat Bed Truck | 3700 | 7,434 | 14,812 | 13,949 | 15,381 | 16,715 | 68,291 |
| Portable Crusher/Screening | 46371 | 9,779 | 19,372 | 28,805 | 16,067 | 12,756 | 86,779 |
| Concrete Mixer | 9164 | 872 | 2,944 | 2,146 | 5,473 | 4,553 | 15,988 |
| Water Pump | 522 | 36 | 119 | 86 | 219 | 186 | 646 |
| Concrete Vibrator | 348 | 6 | 16 | 11 | 24 | 27 | 84 |
| Asphalt Sprayer | 2150 | 430 | 859 | 573 | 0 | 0 | 1,862 |
| LABOUR : | | 26,717 | 64,176 | 72,132 | 92,006 | 85,916 | 340,947 |
| Mandur | 2000 | 2,127 | 4,882 | 5,318 | 7,307 | 7,010 | 26,644 |
| Skilled Labourer | 2000 | 653 | 1,556 | 2,049 | 8,012 | 8,571 | 20,841 |
| Carpenter | 2000 | 34 | 141 | 535 | 3,545 | 3,804 | 8,059 |
| Mason | 2000 | 249 | 903 | 661 | 1,751 | 1,387 | 4,951 |
| Labourer | 1500 | 17,578 | 43,600 | 47,780 | 53,456 | 49,568 | 211,982 |
| Driver | 2500 | 3,877 | 8,458 | 10,185 | 11,141 | 9,749 | 43,410 |
| Operator | 2750 | 2,199 | 4,636 | 5,604 | 6,794 | 5,827 | 25,060 |
| MATERIAL : | | 50,692 | 100,876 | 76,373 | 91,078 | 95,831 | 414,850 |
| Bitumen | 500 | 21,242 | 42,882 | 29,218 | 3,172 | 3,172 | 99,686 |
| Asphalt Oil | 1500 | 12,300 | 24,600 | 16,399 | 0 | 0 | 53,299 |
| Kerosene | 300 | 2,989 | 6,004 | 4,045 | 211 | 211 | 13,460 |
| Sand | 9000 | 2,392 | 4,495 | 3,283 | 6,364 | 6,463 | 22,997 |
| Cement | 6000 | 2,068 | 5,447 | 3,907 | 8,298 | 8,667 | 28,387 |
| River Stone | 8000 | 997 | 3,614 | 2,644 | 7,004 | 5,548 | 19,807 |
| Steel Moulds | 8500 | 765 | 51 | 0 | 3,213 | 3,927 | 7,956 |
| Timber | 200000 | 180 | 960 | 4,620 | 31,720 | 34,060 | 71,540 |
| Paint | 4000 | 14 | 28 | 510 | 4,441 | 4,848 | 9,841 |
| Reinforcing Steel | 1500 | 5,003 | 7,487 | 5,233 | 19,085 | 22,306 | 59,114 |
| Tying Wire | 1250 | 37 | 56 | 39 | 144 | 168 | 444 |
| Equivalent Royalty | 250 | 2,705 | 5,252 | 6,475 | 7,426 | 6,461 | 28,319 |

Appendix A-6 QUANTITIES OF BRIDGE ON PROPOSED ROAD LINKS

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | WAIMANGURA I | 1 | WNGR | PB | | | | 5.00 | 1 | 5.00 | 4.00 | 20.00 | | 0 | 2 | IIIC |
| | WAIMANGURA II | 14 | WNGR | KB | | | | 4.00 | 2 | 2.00 | 4.00 | 16.00 | | 1 | 2 | |
| 3 | LOKODANDA | 3 | RARA | KB | | | | 4.00 | 1 | 4.00 | 4.00 | 16.00 | | 0 | 2 | IIIC |
| | MATARA PORE I | 6 | RARA | KB | | | | 3.00 | 1 | 3.00 | 4.00 | 12.00 | | 0 | 2 | |
| | MATARA PORE II | 6 | RARA | KB | | | | 3.00 | 1 | 3.00 | 4.00 | 12.00 | | 0 | 2 | |
| 4 | WAIKADADA | 1 | DDK | PB | | | | 3.00 | 1 | 3.00 | 3.00 | 9.00 | | 0 | 2 | IIIC |
| | BONDOKODI | 6 | DDK | LL | | | | 16.00 | 3 | 5.33 | 4.00 | 64.00 | | 2 | 2 | |
| 5 | PERO | 4 | WNGR | KB | | | | 2.00 | 1 | 2.00 | 4.00 | 8.00 | | 0 | 2 | IIIC |
| | DELLO | 12 | WNGR | KB | | | | 3.00 | 1 | 3.00 | 4.00 | 12.00 | | 0 | 2 | |
| | WALIATE | 18 | WNGR | GB | | | | 8.00 | 1 | 8.00 | 4.00 | 32.00 | | 0 | 2 | |
| 6 | UMBUNGEDO | 5 | LTLK | GB | | | | 24.00 | 2 | 12.00 | 5.00 | 120.00 | | 1 | 2 | IIIB-1 |
| 7 | PALLA | 9 | ELPD | KB | | | | 4.00 | 1 | 4.00 | 4.00 | 16.00 | | 0 | 2 | IIIC |
| 15 | WAIKASI | 10 | OBKR | KB | | | | 9.00 | 1 | 9.00 | 4.00 | 36.00 | | 0 | 2 | IIIC |
| | WAI WAGGE | 12 | OBKR | KB | | | | 4.00 | 1 | 4.00 | 4.00 | 16.00 | | 0 | 2 | |
| 18 | KALANGGA II | 9 | KLGA | -- | TM | 10T | (C) | 12.00 | 2 | 6.00 | 4.00 | 0.00 | 48.00 | 1 | 2 | IIIC |
| | KALANGGA III | 10 | KLGA | -- | TM | 10T | (B) | 5.00 | 1 | 5.00 | 4.00 | 0.00 | 20.00 | 0 | 2 | |
| | PRAIWUNGA I | 15 | KLGA | -- | TM | 10T | (C) | 12.00 | 2 | 6.00 | 4.00 | 0.00 | 48.00 | 1 | 2 | |
| | PRAIWUNGA II | 17 | KLGA | -- | TM | 10T | (C) | 6.00 | 1 | 6.00 | 4.00 | 0.00 | 24.00 | 0 | 2 | |
| | KAPULUTA II | 18 | KLGA | -- | TM | 10T | (C) | 6.00 | 1 | 6.00 | 4.00 | 0.00 | 24.00 | 0 | 2 | |
| | KAPULUTA III | 19 | KLGA | -- | TM | 10T | (C) | 30.00 | 4 | 7.50 | 4.00 | 0.00 | 120.00 | 3 | 2 | |
| | KAPULUTA IV | 19 | KLGA | -- | TM | 10T | (C) | 6.00 | 1 | 6.00 | 4.00 | 0.00 | 24.00 | 0 | 2 | |
| | KAPULUTA V | 20 | KLGA | -- | TM | 10T | (B) | 9.00 | 2 | 4.50 | 4.00 | 0.00 | 36.00 | 1 | 2 | |
| | NGADUBOLU I | 20 | KLGA | -- | TM | 10T | (A) | 3.00 | 1 | 3.00 | 4.00 | 0.00 | 12.00 | 0 | 2 | |
| | NGADUBOLU II | 20 | KLGA | -- | TM | 10T | (A) | 3.00 | 1 | 3.00 | 4.00 | 0.00 | 12.00 | 0 | 2 | |
| | NGADUBOLU III | 21 | KLGA | -- | TM | 10T | (B) | 5.00 | 1 | 5.00 | 4.00 | 0.00 | 20.00 | 0 | 2 | |
| | NGADUBOLU IV | 23 | KLGA | -- | TM | 10T | (C) | 24.00 | 3 | 8.00 | 4.00 | 0.00 | 96.00 | 2 | 2 | |
| | LENANG I | 24 | KLGA | -- | TM | 10T | (B) | 9.00 | 2 | 4.50 | 4.00 | 0.00 | 36.00 | 1 | 2 | |
| | LENANG II | 25 | KLGA | -- | TM | 10T | (A) | 3.00 | 1 | 3.00 | 4.00 | 0.00 | 12.00 | 0 | 2 | |
| | LENANG III | 26 | KLGA | -- | TM | 10T | (A) | 3.00 | 1 | 3.00 | 4.00 | 0.00 | 12.00 | 0 | 2 | |
| | LENANG IV | 26 | KLGA | -- | TM | 10T | (A) | 3.00 | 1 | 3.00 | 4.00 | 0.00 | 12.00 | 0 | 2 | |
| | LENANG V | 27 | KLGA | -- | TM | 10T | (B) | 4.00 | 1 | 4.00 | 4.00 | 0.00 | 16.00 | 0 | 2 | |
| | LENANG VI | 28 | KLGA | -- | TM | 10T | (A) | 3.00 | 1 | 3.00 | 4.00 | 0.00 | 12.00 | 0 | 2 | |
| 26 | KARENDI | 14 | BDBG | -- | TM | 10T | (C) | 24.00 | 3 | 8.00 | 4.00 | 0.00 | 96.00 | 2 | 2 | IIIC |

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

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 2 (IIIC) LENGTH : 17 Km

( Rp )

| ITEM | UNIT | QUANTITY | <<< UNIT COST >>> LOCAL | FOREIGN | <<<<<< COST LOCAL | FOREIGN | >>>>>> TOTAL |
|---|---|---|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 0.00 | 56,640 | 5,169 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;10T) | m2 | 0.00 | 62,738 | 5,706 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;10T) | m2 | 0.00 | 83,101 | 7,490 | 0 | 0 | 0 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 0.00 | 70,232 | 6,390 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 0.00 | 76,675 | 6,920 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 0.00 | 97,245 | 8,758 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 0.00 | 58,730 | 153,470 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 0.00 | 60,004 | 171,836 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 0.00 | 61,573 | 187,373 | 0 | 0 | 0 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 0.00 | 67,094 | 213,107 | 0 | 0 | 0 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 0.00 | 71,830 | 251,428 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;10T) | NO | 0.00 | 493,269 | 48,256 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;10T) | NO | 0.00 | 1,305,608 | 207,275 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;BM50) | NO | 0.00 | 725,437 | 71,452 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;BM50) | NO | 0.00 | 1,480,446 | 233,222 | 0 | 0 | 0 |
| Substructure (Pier;for Concrete;BM50) | NO | 0.00 | 1,828,515 | 498,467 | 0 | 0 | 0 |
| Substructure (Abut;for Concrete;BM50) | NO | 0.00 | 3,772,574 | 1,035,886 | 0 | 0 | 0 |
| Desolition of Bridge (Timber->Timber) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Desolition of Bridge (Timber->Concrete) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Desolition of Bridge (Concrete) | m2 | 0.00 | 89,963 | 109,912 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (New) | m2 | 0.00 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.00 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 36.00 | 4,507 | 2,664 | 162,252 | 95,904 | 258,156 |
| ( 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 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 3 (IIIC) LENGTH : 13 Km

( Rp )

| ITEM | UNIT | QUANTITY | UNIT COST LOCAL | UNIT COST FOREIGN | COST LOCAL | COST FOREIGN | TOTAL |
|---|---|---|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 0.00 | 56,640 | 5,169 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;10T) | m2 | 0.00 | 62,738 | 5,706 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;10T) | m2 | 0.00 | 83,101 | 7,490 | 0 | 0 | 0 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 0.00 | 70,232 | 6,390 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 0.00 | 76,675 | 6,920 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 0.00 | 97,245 | 8,758 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 0.00 | 58,730 | 153,470 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 0.00 | 60,004 | 171,836 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 0.00 | 61,573 | 187,373 | 0 | 0 | 0 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 0.00 | 67,094 | 213,107 | 0 | 0 | 0 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 0.00 | 71,830 | 251,428 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;10T) | NO | 0.00 | 493,269 | 48,256 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;10T) | NO | 0.00 | 1,305,608 | 207,275 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;BM50) | NO | 0.00 | 725,437 | 71,452 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;BM50) | NO | 0.00 | 1,480,446 | 233,222 | 0 | 0 | 0 |
| Substructure (Pier;for Concrete;BM50) | NO | 0.00 | 1,828,515 | 498,467 | 0 | 0 | 0 |
| Substructure (Abut;for Concrete;BM50) | NO | 0.00 | 3,772,574 | 1,035,886 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Timber) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Concrete) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Concrete) | m2 | 0.00 | 89,963 | 109,912 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (New) | m2 | 0.00 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.00 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 40.00 | 4,507 | 2,664 | 180,280 | 106,560 | 286,840 |
| ( 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 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 4 (IIIC) LENGTH : 7 Km

( Rp )

| ITEM | UNIT | QUANTITY | <<< UNIT COST >>> LOCAL | FOREIGN | <<<<<< COST LOCAL | FOREIGN | >>>>>> TOTAL |
|---|---|---|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 0.00 | 56,640 | 5,169 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;10T) | m2 | 0.00 | 62,738 | 5,706 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;10T) | m2 | 0.00 | 83,101 | 7,490 | 0 | 0 | 0 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 0.00 | 70,232 | 6,390 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 0.00 | 76,675 | 6,920 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 0.00 | 97,245 | 8,758 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 0.00 | 58,730 | 153,470 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 0.00 | 60,004 | 171,836 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 0.00 | 61,573 | 187,373 | 0 | 0 | 0 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 0.00 | 67,094 | 213,107 | 0 | 0 | 0 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 0.00 | 71,830 | 251,428 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;10T) | NO | 0.00 | 493,269 | 48,256 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;10T) | NO | 0.00 | 1,305,608 | 207,275 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;BM50) | NO | 0.00 | 725,437 | 71,452 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;BM50) | NO | 0.00 | 1,480,446 | 233,222 | 0 | 0 | 0 |
| Substructure (Pier;for Concrete;BM50) | NO | 0.00 | 1,828,515 | 498,467 | 0 | 0 | 0 |
| Substructure (Abut;for Concrete;BM50) | NO | 0.00 | 3,772,574 | 1,035,886 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Timber) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Concrete) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Concrete) | m2 | 0.00 | 89,963 | 109,912 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (New) | m2 | 0.00 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 64.00 | 9,143 | 2,573 | 585,152 | 164,672 | 749,824 |
| Maintenance of Concrete Bridge (Exist) | m2 | 9.00 | 4,507 | 2,664 | 40,563 | 23,976 | 64,539 |
| ( 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 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 5 (IIIC) LENGTH : 22 Km

( Rp )

| ITEM | UNIT | QUANTITY | UNIT COST LOCAL | UNIT COST FOREIGN | COST LOCAL | COST FOREIGN | TOTAL |
|---|---|---|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 0.00 | 56,640 | 5,169 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;10T) | m2 | 0.00 | 62,738 | 5,706 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;10T) | m2 | 0.00 | 83,101 | 7,490 | 0 | 0 | 0 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 0.00 | 70,232 | 6,390 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 0.00 | 76,675 | 6,920 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 0.00 | 97,245 | 8,758 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 0.00 | 58,730 | 153,470 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 0.00 | 60,004 | 171,836 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 0.00 | 61,573 | 187,373 | 0 | 0 | 0 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 0.00 | 67,094 | 213,107 | 0 | 0 | 0 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 0.00 | 71,830 | 251,428 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;10T) | NO | 0.00 | 493,269 | 48,256 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;10T) | NO | 0.00 | 1,305,608 | 207,275 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;BM50) | NO | 0.00 | 725,437 | 71,452 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;BM50) | NO | 0.00 | 1,480,446 | 233,222 | 0 | 0 | 0 |
| Substructure (Pier;for Concrete;BM50) | NO | 0.00 | 1,828,515 | 498,467 | 0 | 0 | 0 |
| Substructure (Abut;for Concrete;BM50) | NO | 0.00 | 3,772,574 | 1,035,886 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Timber) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Concrete) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Concrete) | m2 | 0.00 | 89,963 | 109,912 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (New) | m2 | 0.00 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.00 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 52.00 | 4,507 | 2,664 | 234,364 | 138,528 | 372,892 |
| ( 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 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 6 (IIIB-1) LENGTH : 20 Km

( Rp )

| ITEM | UNIT | QUANTITY | <<< UNIT COST >>> LOCAL | FOREIGN | <<<<<< COST LOCAL | FOREIGN | >>>>>> TOTAL |
|---|---|---|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 0.00 | 56,640 | 5,169 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;10T) | m2 | 0.00 | 62,738 | 5,706 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;10T) | m2 | 0.00 | 83,101 | 7,490 | 0 | 0 | 0 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 0.00 | 70,232 | 6,390 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 0.00 | 76,675 | 6,920 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 0.00 | 97,245 | 8,758 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 0.00 | 58,730 | 153,470 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 0.00 | 60,004 | 171,836 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 0.00 | 61,573 | 187,373 | 0 | 0 | 0 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 0.00 | 67,094 | 213,107 | 0 | 0 | 0 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 0.00 | 71,830 | 251,428 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;10T) | NO | 0.00 | 493,269 | 48,256 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;10T) | NO | 0.00 | 1,305,608 | 207,275 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;BM50) | NO | 0.00 | 725,437 | 71,452 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;BM50) | NO | 0.00 | 1,480,446 | 233,222 | 0 | 0 | 0 |
| Substructure (Pier;for Concrete;BM50) | NO | 0.00 | 1,828,515 | 498,467 | 0 | 0 | 0 |
| Substructure (Abut;for Concrete;BM50) | NO | 0.00 | 3,772,574 | 1,035,886 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Timber) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Concrete) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Concrete) | m2 | 0.00 | 89,963 | 109,912 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (New) | m2 | 0.00 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.00 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 120.00 | 4,507 | 2,664 | 540,840 | 319,680 | 860,520 |
| ( 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 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 7 (IIIC) LENGTH : 15 Km

( Rp )

| ITEM | UNIT | QUANTITY | <<< UNIT COST >>> LOCAL | FOREIGN | <<<<<< COST LOCAL | FOREIGN | >>>>>> TOTAL |
|---|---|---|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 0.00 | 56,640 | 5,169 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;10T) | m2 | 0.00 | 62,738 | 5,706 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;10T) | m2 | 0.00 | 83,101 | 7,490 | 0 | 0 | 0 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 0.00 | 70,232 | 6,390 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 0.00 | 76,675 | 6,920 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 0.00 | 97,245 | 8,758 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 0.00 | 58,730 | 153,470 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 0.00 | 60,004 | 171,836 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 0.00 | 61,573 | 187,373 | 0 | 0 | 0 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 0.00 | 67,094 | 213,107 | 0 | 0 | 0 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 0.00 | 71,830 | 251,428 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;10T) | NO | 0.00 | 493,269 | 48,256 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;10T) | NO | 0.00 | 1,305,608 | 207,275 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;BM50) | NO | 0.00 | 725,437 | 71,452 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;BM50) | NO | 0.00 | 1,480,446 | 233,222 | 0 | 0 | 0 |
| Substructure (Pier;for Concrete;BM50) | NO | 0.00 | 1,828,515 | 498,467 | 0 | 0 | 0 |
| Substructure (Abut;for Concrete;BM50) | NO | 0.00 | 3,772,574 | 1,035,886 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Timber) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Concrete) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Concrete) | m2 | 0.00 | 89,963 | 109,912 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (New) | m2 | 0.00 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.00 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 16.00 | 4,507 | 2,664 | 72,112 | 42,624 | 114,736 |
| ( 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 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 15 (IIIC) LENGTH : 13 Km

( Rp )

| ITEM | UNIT | QUANTITY | <<< UNIT COST >>> LOCAL | FOREIGN | <<<<<< COST LOCAL | FOREIGN | >>>>>> TOTAL |
|---|---|---|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 0.00 | 56,640 | 5,169 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;10T) | m2 | 0.00 | 62,738 | 5,706 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;10T) | m2 | 0.00 | 83,101 | 7,490 | 0 | 0 | 0 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 0.00 | 70,232 | 6,390 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 0.00 | 76,675 | 6,920 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 0.00 | 97,245 | 8,758 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 0.00 | 58,730 | 153,470 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 0.00 | 60,004 | 171,836 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 0.00 | 61,573 | 187,373 | 0 | 0 | 0 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 0.00 | 67,094 | 213,107 | 0 | 0 | 0 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 0.00 | 71,830 | 251,428 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;10T) | NO | 0.00 | 493,269 | 48,256 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;10T) | NO | 0.00 | 1,305,608 | 207,275 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;BM50) | NO | 0.00 | 725,437 | 71,452 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;BM50) | NO | 0.00 | 1,480,446 | 233,222 | 0 | 0 | 0 |
| Substructure (Pier;for Concrete;BM50) | NO | 0.00 | 1,828,515 | 498,467 | 0 | 0 | 0 |
| Substructure (Abut;for Concrete;BM50) | NO | 0.00 | 3,772,574 | 1,035,886 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Timber) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Concrete) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Concrete) | m2 | 0.00 | 89,963 | 109,912 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (New) | m2 | 0.00 | 10,114 | 1,455 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.00 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 52.00 | 4,507 | 2,664 | 234,364 | 138,528 | 372,892 |
| ( 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 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 18 (IIIC) LENGTH : 32 Km

( Rp )

| ITEM | UNIT | QUANTITY | <<< UNIT COST >>> LOCAL | FOREIGN | <<<<<< COST LOCAL | FOREIGN | >>>>>> TOTAL |
|---|---|---|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 72.00 | 56,640 | 5,169 | 4,078,080 | 372,168 | 4,450,248 |
| Superstructure (Timber;Span 5m;10T) | m2 | 128.00 | 62,738 | 5,706 | 8,030,464 | 730,368 | 8,760,832 |
| Superstructure (Timber;Span 8m;10T) | m2 | 384.00 | 83,101 | 7,490 | 31,910,784 | 2,876,160 | 34,786,944 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 0.00 | 70,232 | 6,390 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 0.00 | 76,675 | 6,920 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 0.00 | 97,245 | 8,758 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 0.00 | 58,730 | 153,470 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 0.00 | 60,004 | 171,836 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 0.00 | 61,573 | 187,373 | 0 | 0 | 0 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 0.00 | 67,094 | 213,107 | 0 | 0 | 0 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 0.00 | 71,830 | 251,428 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;10T) | NO | 9.00 | 493,269 | 48,256 | 4,439,421 | 434,304 | 4,873,725 |
| Substructure (Abut;for Timber;10T) | NO | 36.00 | 1,305,608 | 207,275 | 47,001,888 | 7,461,900 | 54,463,788 |
| Substructure (Pier;for Timber;BM50) | NO | 0.00 | 725,437 | 71,452 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;BM50) | NO | 0.00 | 1,480,446 | 233,222 | 0 | 0 | 0 |
| Substructure (Pier;for Concrete;BM50) | NO | 0.00 | 1,828,515 | 498,467 | 0 | 0 | 0 |
| Substructure (Abut;for Concrete;BM50) | NO | 0.00 | 3,772,574 | 1,035,886 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Timber) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Concrete) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Concrete) | m2 | 0.00 | 89,963 | 109,912 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (New) | m2 | 584.00 | 10,114 | 1,455 | 5,906,576 | 849,720 | 6,756,296 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.00 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 0.00 | 4,507 | 2,664 | 0 | 0 | 0 |
| ( Without Overhead ) | TOTAL COST (Timber Bridge) | | | | 95,460,637 | 11,874,900 | 107,335,537 |
| | (Concrete Bridge) | | | | 0 | 0 | 0 |
| | TOTAL COST (without Maintenance) | | | | 95,460,637 | 11,874,900 | 107,335,537 |
| ( Overhead : 15% ) | TOTAL COST (Timber Bridge) | | | | 109,779,733 | 13,656,135 | 123,435,868 |
| | (Concrete Bridge) | | | | 0 | 0 | 0 |
| | TOTAL COST (without Maintenance) | | | | 109,779,733 | 13,656,135 | 123,435,868 |

PROV : NUSA TENGGARA TIMUR KAB : SUMBA BARAT

LINK NO : 26 (IIIC) LENGTH : 20 Km

( Rp )

| ITEM | UNIT | QUANTITY | <<< UNIT COST >>> LOCAL | FOREIGN | <<<<<< COST LOCAL | FOREIGN | >>>>>> TOTAL |
|---|---|---|---|---|---|---|---|
| Superstructure (Timber;Span 3m;10T) | m2 | 0.00 | 56,640 | 5,169 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;10T) | m2 | 0.00 | 62,738 | 5,706 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;10T) | m2 | 96.00 | 83,101 | 7,490 | 7,977,696 | 719,040 | 8,696,736 |
| Superstructure (Timber;Span 3m;BM50) | m2 | 0.00 | 70,232 | 6,390 | 0 | 0 | 0 |
| Superstructure (Timber;Span 5m;BM50) | m2 | 0.00 | 76,675 | 6,920 | 0 | 0 | 0 |
| Superstructure (Timber;Span 8m;BM50) | m2 | 0.00 | 97,245 | 8,758 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 3m;BM50) | m2 | 0.00 | 58,730 | 153,470 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 5m;BM50) | m2 | 0.00 | 60,004 | 171,836 | 0 | 0 | 0 |
| Superstructure (Concrete;Span 8m;BM50) | m2 | 0.00 | 61,573 | 187,373 | 0 | 0 | 0 |
| Superstructure (Concrete;Span10m;BM50) | m2 | 0.00 | 67,094 | 213,107 | 0 | 0 | 0 |
| Superstructure (Concrete;Span15m;BM50) | m2 | 0.00 | 71,830 | 251,428 | 0 | 0 | 0 |
| Substructure (Pier;for Timber;10T) | NO | 2.00 | 493,269 | 48,256 | 986,538 | 96,512 | 1,083,050 |
| Substructure (Abut;for Timber;10T) | NO | 2.00 | 1,305,608 | 207,275 | 2,611,216 | 414,550 | 3,025,766 |
| Substructure (Pier;for Timber;BM50) | NO | 0.00 | 725,437 | 71,452 | 0 | 0 | 0 |
| Substructure (Abut;for Timber;BM50) | NO | 0.00 | 1,480,446 | 233,222 | 0 | 0 | 0 |
| Substructure (Pier;for Concrete;BM50) | NO | 0.00 | 1,828,515 | 498,467 | 0 | 0 | 0 |
| Substructure (Abut;for Concrete;BM50) | NO | 0.00 | 3,772,574 | 1,035,886 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Timber) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Timber->Concrete) | m2 | 0.00 | 15,471 | 1,908 | 0 | 0 | 0 |
| Demolition of Bridge (Concrete) | m2 | 0.00 | 89,963 | 109,912 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (New) | m2 | 96.00 | 10,114 | 1,455 | 970,944 | 139,680 | 1,110,624 |
| Maintenance of Concrete Bridge (New) | m2 | 0.00 | 2,107 | 4,093 | 0 | 0 | 0 |
| Maintenance of Timber Bridge (Exist) | m2 | 0.00 | 9,143 | 2,573 | 0 | 0 | 0 |
| Maintenance of Concrete Bridge (Exist) | m2 | 0.00 | 4,507 | 2,664 | 0 | 0 | 0 |
| ( Without Overhead ) | TOTAL COST (Timber Bridge) | | | | 11,575,450 | 1,230,102 | 12,805,552 |
| | (Concrete Bridge) | | | | 0 | 0 | 0 |
| | TOTAL COST (without Maintenance) | | | | 11,575,450 | 1,230,102 | 12,805,552 |
| ( Overhead : 15% ) | TOTAL COST (Timber Bridge) | | | | 13,311,768 | 1,414,617 | 14,726,385 |
| | (Concrete Bridge) | | | | 0 | 0 | 0 |
| | TOTAL COST (without Maintenance) | | | | 13,311,768 | 1,414,617 | 14,726,385 |