REPUBLIC OF SIERRA LEONE

MAKENI-KAMAKWIE ROAD PROJECT

FEASIBILITY STUDY REPORT

MAY 1980

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to the request of the Government of the Republic of Sierra Leone, the Japanese Government has decided to conduct a survey on Makeni - Kamakwie Road Project and entrusted the Japan International Co-operation Agency (JICA) with the survey.

The JICA sent to Sierra Leone a survey team headed by Mr. Koichi Fukurono and a supervisory group headed by Mr. Minoru Enomoto from August 22 to December 4, 1979.

The team had discussions with the officials concerned of the Government of Sierra Leone and conducted a field survey. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will prove to be useful for the development of the Project and contribute to the promotion of friendly relations between our two countries.

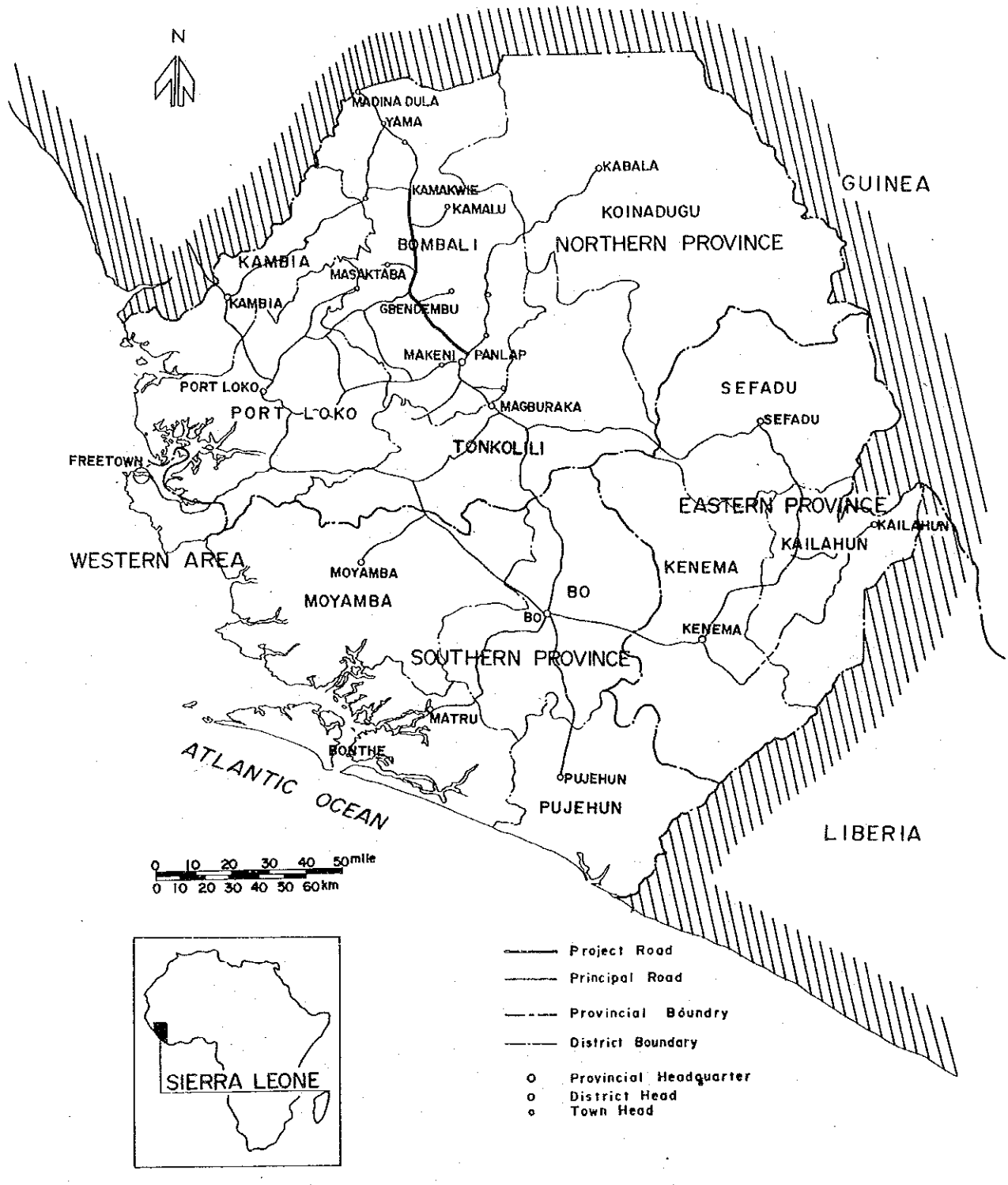
I wish to express my deep appreciation to the officials concerned of the Government of Sierra Leone for their close cooperation extended to the team.

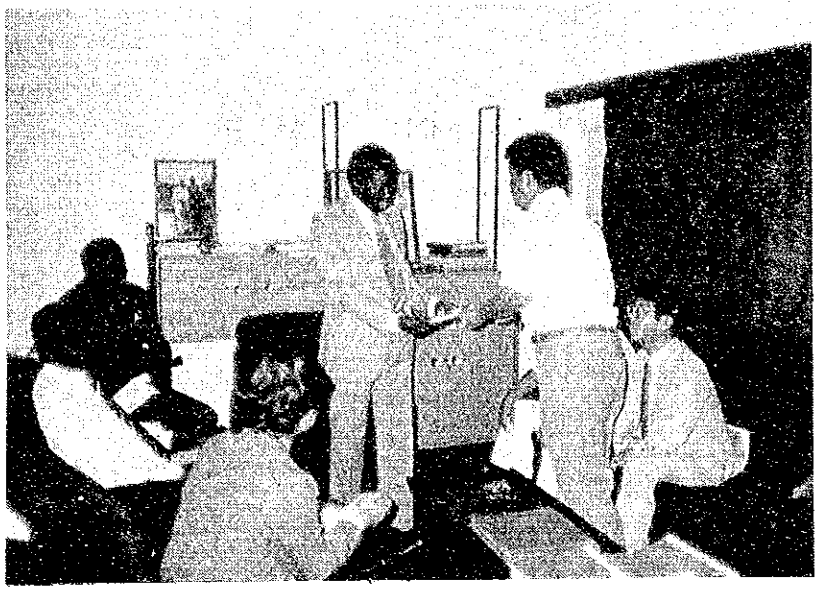
May, 1980

Keisuke Arita

Keisuke Arita
President
Japan International Cooperation Agency

LOCATION MAP



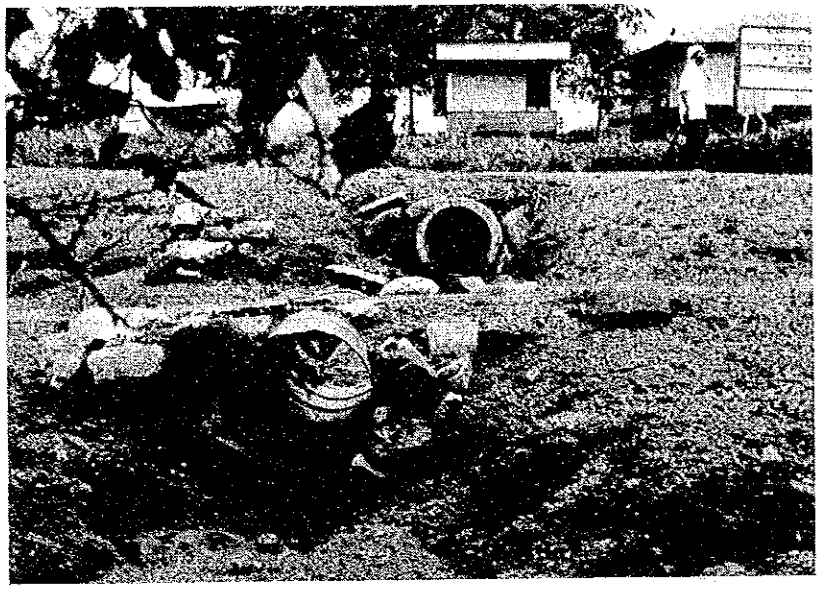


Presentation of the Interim Report to Honorable Edward J. Kargbo, the Minister of Works

JICA Mission doing the inventory survey

The Topographical Survey Teams headed by Ministry of Works officials

The existing Mabole Bridge.



A look at one of the existing pipe culverts.

One of the existing I section steel girder bridges.

Panlap Junction, where the Project will begin.

A typical plateau section of the existing road.

Kamakwie Junction, the project ending point.

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SUMMARY AND RECOMMENDATIONS

SUMMARY AND RECOMMENDATION

1. Recommendation

(01) The feasibility study of the Makeni - Kamakwie Road Construction Project for an extension of approximately 53 miles has resulted in the following conclusions:

a) The proposed Project is to utilize the existing road to the maximum and to upgrade it into a paved 2-lane Class I road (of the Road Classification of Sierra Leone; design speed of 50 MPH) which will be serviceable throughout the year.

b) The required investment fund for Alternative A which should be recommended will be 16.8 million Leones (in 1978 prices), 72% of which will be required in foreign exchange. Time required for the construction work will be three years.

c) It is recommended that the Government of the Republic of Sierra Leone implement this Project very soon in view of the favourable economic assessment and the significant contribution possible to the accomplishment of such national objectives as the minimization and ultimate elimination of regional gaps, discouragement of population influx into urban areas, and economic integration with neighbouring countries.

2. Summary

1) The Project Area

(02) The Makeni - Kamakwi Road construction will have direct impacts on seven (from Makari-Gvanti to Sela-Limba) out of thirteen chiefdoms of the Bombali District. Approximately 110,000 people are engaged in agriculture in this Area. The major crops are rice, cassava, maize, groundnuts,

palm kernels, oranges, mangoes, and bananas, all of which are barely sufficient to meet the local demand in terms of quantity, with little surplus, if any. Tobacco leaves have recently emerged as a cash crop. Cattle, sheep, and goats are raised in the northern part of the Project Area.

2) Current Situation of the Project Road

(03) Average daily traffic (ADT) on the existing road is at present still small and range from about 50 to 150 vehicles. Traffic is heavier in the vicinity of Panlap (close to Makeni) and Kamakwie (the largest city in the Project Area, with a population of about 10,000) than on the road between these cities.

(04) Vans and pickup trucks represent the largest share (about 40%) of total traffic in terms of ADT, followed by (medium-size) trucks and mini-buses (15% to 40%); passenger cars still represent only 10% to 20%. The high passenger occupancy rate of 70% to 80% of the capacity and the high goods loading rate of 40% to 75% reflect low automobile density.

(05) The horizontal and vertical alignments of the existing road are fairly good, with the exception of some sections which run through ridges or dales where visibility is inadequate. Road width is generally 20 to 30 feet, but there are cut or embanked sections where the width is only 10 to 15 feet. The slopes are generally stable. The surface is of gravel and silty clay and is desirably well-compacted under repeated loads of the existing traffic, except in some sections such as Tombianu - Maiyafa and Makali - Kenedi. There are 24 bridges, 13 bridge-culverts and 144 pipe culverts, all of which are relatively well-maintained, partly because of the sub-grade soil which is resistent to subsidence, although they cannot be expected to withstand the heavier loads of larger vehicles which are expected in the future.

(06) A topographical survey, an hydraulic analysis, and weather, soil, and construction material investigations have been conducted in addition to an inventory survey. Findings from these efforts to obtain basic

information needed for road designing (see Appendices) showed no cause for design difficulty. It should be pointed out, however, that in road designing adequate attention should be paid to drainage in view of the heavy annual precipitation (about 120 inches) in this Area, daily precipitation exceeding four inches at times. As for the required road construction materials, embankment and "selected" materials can be procured near the construction site, a new quarry can be opened in Matehun (17 miles from Panlap), Gbendenbu, or Kamakanka for crushed stones, and gravel and sand can be obtained from major nearby rivers.

3) Agricultural Prospect

(07) Agricultural activities in the Project Area are still under-developed in comparison with the activities in the western part of Sierra Leone and with Southern and Eastern Provinces. When a well-developed transversal road becomes available in this Area, from which population is currently flowing out, the marketability of the Area's crops will be improved to stimulate farmers to step up production. Along with the progress of extension activities, this stimulation will lead to a farmers' income increase and, in turn, to the discouragement of the Area's population/labour force outflow. Thus, the future Area population increase rate with Project implementation is assumed at 2.0%, and ultimate population in the year 2010 (at the end of the useful life of the Project Road) at 193,000, as opposed to 1.2% and 157,000 without Project implementation. Also, assuming that the number of persons per household remains constant (6.4 per household at present), the number of households in 2010 is estimated at 27,000 with the Project and 22,000 without. Approximately 90% of these households will be farming families.

(08) Future values of average planting rate, yield per unit of land, and number of livestock animals are estimated, by assuming that the average farm size (cultivated land of 4.3 acres per farming family) will remain constant in the future and translating it into total area size of farm land, total agricultural production, and producers surplus as shown in Table 1. Increase in cultivated land up to the year 2010 is estimated at 57,700 acres, which is believed to be very realistic in view

of the fact that in the Project Area agricultural development potential is high but the current land utilization is extremely low and sparse.

Table 1 Agricultural Development in the Project Area

Item \ Year	Present	With the Road Project		Without the Road Project	
	1978	1990	2010	1990	2010
Farmland (Acre)	72,301	87,462	129,963	83,426	105,902
Agri. Production (1,000 lbs)	98,848	168,602	290,957	157,363	212,600
of which Rice (1,000 lbs)	47,955	79,471	154,800	73,468	113,219
Animals (head)	8,461	10,072	14,702	9,608	11,981
of which Cattle (head)	4,241	5,049	7,369	4,816	6,005
Producers Surplus					
Agri. Production (1,000 lbs)	38,871	88,368	168,134	80,903	113,305
of which Rice (1,000 lbs)	11,702	32,326	76,600	28,499	49,498
Animals (head)	2,677	3,075	4,305	2,933	3,508
of which Cattle (head)	1,349	1,550	2,171	1,478	1,769

Source: JICA Mission

4) Future Traffic Volume

(09) Taking into consideration the estimated future population, the rise in the mobility of the inhabitants, and the producers surplus of agricultural products in the Project Area, future traffic volume on the Project Road is estimated as shown in Table 2. In the year 2010, a traffic of 995 vehicles per day is estimated for the Panlap-Mabole Section, where traffic is the heaviest. This will be slightly heavier than the current traffic volume on the Makeni - Lunsar - Magburaka trunk road. As for traffic composition, the ratio of passenger cars will increase.

Table 2 Future Traffic Forecast

(Vehicles/day)

Section	1979	1985	1990	1995	2000	2005	2010
1 Panlap-Mabole	160	240	321	432	572	758	995
2 Mabole-Sendugu	135	204	260	333	419	524	643
3 Sendugu-Masakutaba	94	130	165	212	268	336	414
4 Masakutaba-Bankabi	81	106	131	162	197	237	280
5 Bankabi-Kenedi	94	125	155	195	241	297	360
6 Kenedi-Kamakwie	101	135	175	228	296	384	498

Source: JICA Mission

5) Alternative Road Development Plans

(10) The characteristics of three alternatives with different routes and construction staging plans have been reviewed.

Alternative A

This alternative proposes the upgrading, in one stage, of the existing road to meet the Class I Road Standard of Sierra Leone with a design speed of 50 miles per hour, a lane width of 22 feet, shoulders of five feet on both sides, a road surface of 2-coat dressing, and all new bridges, culverts, and other structures.

Alternative B

This alternative is the same as alternative A, except that the construction work is staged in such a manner that certain road sections are constructed initially in conformity with the Class II Road Standard (design speed of 40 miles per hour) and improved to a Class I Road ten years later, and that, of the various structures, only the bridge over the Mabole is constructed in the second stage.

Alternative C

This alternative proposes the one-stage construction of a new Class I Road beside the existing road, utilizing flat lands available one to six miles away from the existing road.

(11) A comparative review of these three alternatives revealed that Alternative C will require about 35% higher construction cost than the other two alternatives, with not necessarily higher development effects. Alternative C will no longer be considered.

6) Preliminary Design

(12) The followings are to govern the preliminary design of the Project Road:

a) Road alignments must conform with the local topography.

b) The standard road cross section should be as indicated in Fig. 1.

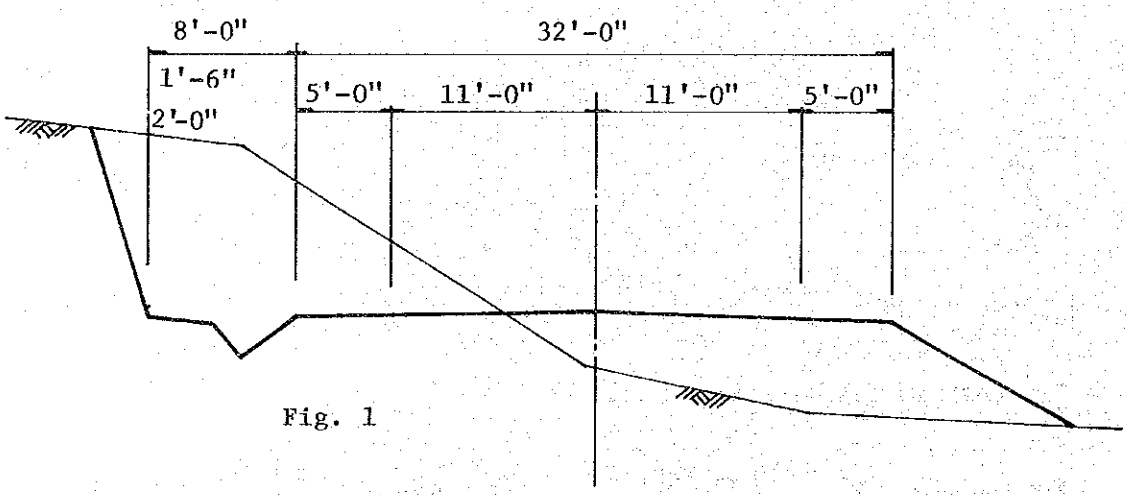


Fig. 1

c) The volume of earth to be produced by cutting should be as close to the volume of earth needed for embankment as possible, to facilitate maximum utilization of the former (with the exception of surface soil down to a depth of about one foot, which will be unsuitable for embankment) for the latter and minimum cut-earth discarding.

d) For embankment in marshes and dales, adequate blind drains and impervious layers must be installed.

e) The gradient of embankments must be 1:1.5 (vertical : horizontal) and that of cuttings, 1:0.2 to 1:0.4, depending on the soil condition (both with slope protection where necessary).

f) Surface drainage must be by roadside naked ditches.

g) Several standard kinds of culverts must be used for the ease and economy of construction work.

h) All bridges must be constructed as pre-tension precast concrete girder bridges, except for the one over the Mabole which must be a 324-foot 3-span post-tension precast concrete girder bridge.

i) For the sub-base course, a selected material of sandy clay with a gravel content found on the current road must be used, for the base course, a mixture of selected material and crushed stones, and for wearing course, the surface dressing (spray-and-chip treatment) which is usually used in Sierra Leone.

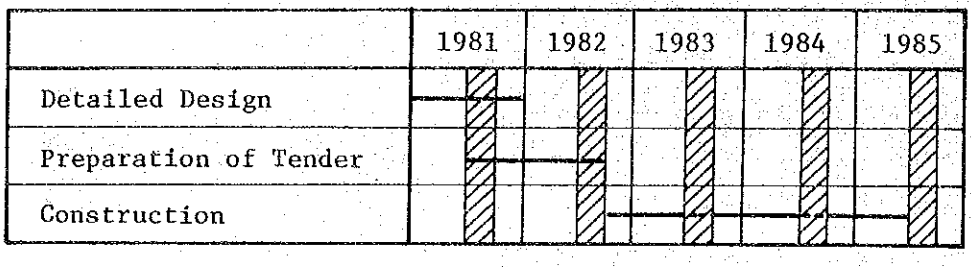
j) At junctions and in villages, road channelization must be made as necessary and bus stops, parking zones, sidewalks, traffic signs, and other ancillery facilities must be installed.

6) Construction Plan

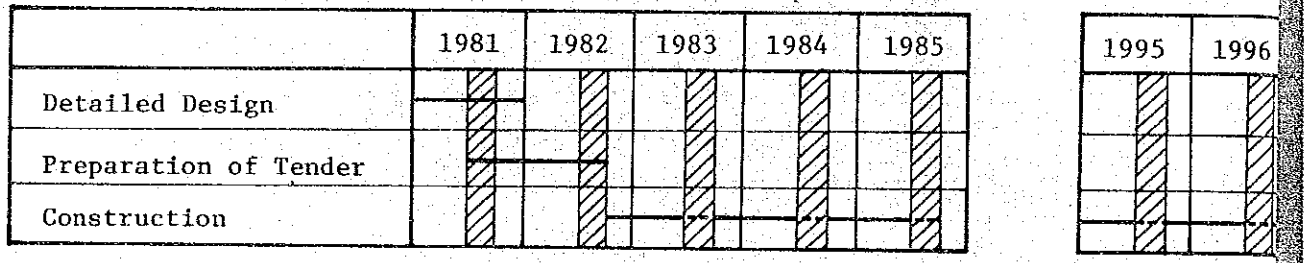
(13) Earth work, bridge construction, and paving are to be conducted through standard methods and practices, without adopting any unusual methods. The earth work is to be conducted by the side-borrow method, borrowing from one side in general improvement sections and from both sides in new construction sections. The demolition/removal of existing bridges and the laying of new bridges and culverts are to be conducted in the dry season. Adequate supplies of crushed stones and chips should be prepared beforehand in order to enable concentrated paving during the dry season.

(14) Construction work schedule is as follows:

Construction Schedule for Alternative Plan A



Construction Schedule for Alternative Plan B



Note: ▨ Suspension period of construction because of heavy rainfall.

(15) Construction costs are estimated in Table 3.

Table 3 Construction Cost

Alternative A (1,000 Le)

	Local	Foreign	Total
Direct Construction Cost	3,874	9,561	13,435
Physical Contingency	194	478	672
Engineering & Administration	293	1,051	1,344
Price Contingency	387	956	1,343
Total	1,478	12,046	16,794

Source: JICA Mission

Alternative B (1,000 Le)

	Stage 1		Stage 2		Total
	Local	Foreign	Local	Foreign	
Direct Construction Cost	3,417	8,562	629	1,704	14,312
Physical Contingency	171	428	32	85	716
Engineering & Administration	259	938	49	181	1,427
Price Contingency	342	856	63	170	1,431
Total	4,189	10,784	773	2,140	17,886

Source: JICA Mission

(16) Routine road maintenance cost is estimated at 20,000 Leones per year (or, after the year 2005, 77,300 Leones), and five-year remedial maintenance cost at 260,800 Leones.

7) Economic Assessment

(17) Construction material import taxes and price contingency were excluded from the financial cost of the construction shown in Table 3 to arrive at the economic cost of the Project. As a result, the economic cost came to approximately 74% of the financial cost (or, in terms of 1978 prices, 12,400,000 Leones for Alternative A and 13,100,000 Leones for Alternative B). If the opportunity cost of labour is considered to be nil, the economic cost comes to about 68% of the financial cost (11,400,000 Leones for Alternative A and 12,100,000 Leones for Alternative B).

(18) Against the above cost estimates, direct benefit (road user benefit) is estimated at 1,750,000 Leones for the year 2010 and the cumulative total of direct benefit at 29,200,000 Leones; development benefit (increase in the value added of agricultural products) is estimated at 5,520,000 Leones for the year 2010 and the cumulative total of this benefit at 66,500,000 Leones.

(19) Based on these cost and benefit data, a favourable internal rate of return is indicated for this Project: 14.4% with labour cost and 15.2% without labour cost for Alternative A, and 15.2% with labour cost and 16.0% without labour cost for Alternative B.

(20) If the foreign exchange portion of the funds needed for this Project can be generated from a soft loan with an interest rate of 3 to 5% per annum, the Project will bring a net benefit of 30,000,000 to 40,000,000 Leones to the nation's economy in terms of net present value (NPV).

(21) While the economy of Alternative A is about comparable to that of Alternative B, Alternative A is more desirable in view of the possibly decreasing load-bearing capacity of the aged bridge over the Mabole.

PART 1

ANALYSES OF CURRENT CONDITIONS

CHAPTER 1 A REVIEW OF SIERRA LEONE

CHAPTER 2 CURRENT CONDITIONS OF THE PROJECT AREA

CHAPTER 3 CURRENT CONDITIONS OF THE PROJECT ROAD

CHAPTER 1

A REVIEW OF SIERRA LEONE

1.1 Society and Economy

1) Population

A population census was taken in 1963 and in 1974, which revealed the population increase and geographical population distribution presented in Table 1-1. In 1974, the national population was 2,735,000. Average annual rate of population increase during the eleven years between the two censuses was 2.1%, which ranks about in the middle of those of developing nations. A regional comparison, however, reveals a clear contrast between the Western Area (where the national capital is located) and the Kono District of the Eastern Province (where the diamond mine is located) where population increase is very rapid, and other parts of the nation, particularly the Southern Province, where population increase is minimal. This gap represents serious urban problems, such as unemployment and housing shortage, in population centers on one hand, and labour outflow from rural villages and the resultant impoverishment on the other.

If the national population continued to grow at an annual rate of over 2% after 1974, it must have exceeded 3,000,000 by the present time. Urbanization is slow in Sierra Leone, where about 80% of the population is rural village inhabitants, and only 10% is concentrated in the capital Freetown. Other population centres, such as Bo, Kenema, Makeni, and Sefadu, have a population in the ten thousands.

As for tribal composition, the Mendes, who are concentrated in the southern part, represent about 32% of the population ; they and the Temnes, who live mostly in the capital and the northwestern areas, are the two great tribes in Sierra Leone. Other tribes are Limba, Loko, Kono, Koranko, Susu, Fulah, etc.

Table 1-1 Geographical Distribution of Population

Province/District	Population in 10^3		Annual Growth Rate (%)	Percentage in 1974 (%)
	1963	1974		
Southern Province	542.2	596.8	0.9	21.8
Bo	209.8	217.7	0.3	8.0
Bouthe	80.1	87.7	0.8	3.2
Mayamba	167.4	188.7	1.1	6.9
Pujehun	84.9	102.7	1.7	3.8
Eastern Province	545.6	775.9	3.2	28.4
Kailahun	150.3	180.3	1.7	6.6
Kenema	227.4	266.6	1.5	9.7
Kono	167.9	328.9	6.3	12.0
Northern Province	897.6	1,046.1	1.4	38.2
Bombali	198.8	233.6	1.5	8.5
Kambia	137.8	155.3	1.1	5.7
Koinadugu	129.1	158.6	1.9	5.9
Port Loko	247.5	292.2	1.5	10.7
Tonkolili	184.4	206.3	1.0	7.5
Western Area	195.0	316.3	4.5	11.6
Freetown	127.9	n.a.	-	-
Rural Areas	67.1	n.a.	-	-
Total	2,180.4	2,735.2	2.1	100.0

Source: 1963 census and the provisional results of 1974 census

2) Recent Economic Trend

Economic activities in Sierra Leone had been limited to agriculture, livestock, and limited fisheries until the exploitation of diamond and iron ore mines in the 1930s. Presently, mining is the major source of foreign exchange receipts and government revenue. (Diamonds represent about 50% of total export value.) The average annual rate of increase in gross domestic products (GDP) during the 1960s after national independence was 4.6%, which is fairly high among West African nations. However a scrutiny of yearly achievement reveals that the GDP growth rate varied yearly and ranged from over 10% to a negative growth, due to the fact that the growth was supported chiefly by weather-sensitive agriculture. Since the beginning of the 1970s, the economy became stagnant, as shown in Table 1-2,

and turned to a negative growth situation in 1975. Because the population continued to grow despite the economic recess, average per capita GDP basically continued to shrink since the oil crisis of 1973.

This economic stagnation can chiefly be attributed to a decline in the production of diamonds, which had been the major foreign exchange earner. The production dropped by 50% down to 1,080,000 carats in 1976 and further to 770,000 carats in 1977. It is believed that the reason for this decline, in addition to increased smuggling and illicit mining, was that the deposits at profitable mines were exhausted during the forty years since the opening of these mines.

The decline of this export industry brought about an unprecedentedly large trade deficit to the Sierra Leone economy, and the nation's international balance of payments and government finance presented critical pictures. Trade deficit increased from 44,000,000 dollars in 1977 to 85,000,000 dollars in 1978, while deficit international balance of payments swelled from 8,000,000 dollars to 50,000,000 dollars. On the other hand, the international prices of diamond, bauxite, cocoa, and palm kernels - the major exports of Sierra Leone - rose considerably from 1977 to 1978. It was fortunate that trade deficit was reduced by the rise in export values from 140,000,000 dollars to 187,000,000 dollars, although export quantity dropped. Otherwise, the Sierra Leone economy would have been in a more serious situation.

The foreign exchange reserve was exhausted down to 30,000,000 dollars by the end of 1978, and this was insufficient to pay for 1.5 month worth of imports. At this time, the total amount of irrevocable letters of credit already exceeded the reserve, and external debts exceeded external assets by 16,000,000 Leone.

Another source of economic difficulty in Sierra Leone is price inflation. This economy, which was described as one of "the most seriously affected" (MSA), was plagued by over 20% imported inflations since the oil crisis, and the rate of yearly domestic price increase reached 30% in 1978 and 35% in 1979. In this difficult situation, the Government of the Republic

Table 1-2 Selected National Accounts Aggregates

	1972-73	1973-74	1974-75	1975-76	1976-77
At Current Prices (million Leones)					
1. Gross domestic product at factor cost	353.5	425.8	521.0	558.6	661.7
2. Gross national product at factor cost	347.7	419.2	514.2	548.8	650.5
3. Net national product at factor cost	315.4	381.2	469.7	499.5	590.1
4. Gross domestic product at producers' prices	393.3	477.8	572.7	613.5	737.3
5. Gross national product at producers' prices	387.5	471.2	565.9	603.7	726.1
6. Gross domestic capital formation	46.2	75.7	90.1	74.5	102.2
7. Private consumption expenditure	299.6	364.1	476.6	528.9	618.3
At 1972-73 Prices (million Leones)					
8. Gross domestic product at f.c.	353.5	363.6	376.3	368.6	372.7
9. Gross domestic capital formation	46.2	64.0	65.3	51.0	53.2
Per Capita Income (Leones)					
10. Gross domestic product at f.c.	134.6	158.9	190.6	200.3	232.5
11. Gross national product at f.c.	132.4	156.5	188.1	196.8	228.6
12. Gross domestic product at producers' prices	149.7	178.3	209.5	220.0	259.1
13. Gross domestic product at f.c. at 1972-73 prices	134.6	135.7	137.7	132.1	130.9

Source: Annual Statistical Digest, 1977, Central Statistical Office

of Sierra Leone is making efforts to foster the mining industry (through stamping out the smuggling of diamonds, stepping up diamond production, encouraging mining activities in the alluvium, by re-opening the Malampa Mine, and by expanding bauxite and rutile), to expand agricultural production, and to develop the tourist industry. The Government is also making efforts to foster export-oriented industries, to rebuild government finance, and to improve international balance of payments through obtaining external loans from EEC, oil producing countries, the African Development Bank, and the Bank of Arabia through cutting the funds for the dollars, through saving ministerial expenses by 15% (in 1977), and through restricting the importation of automobiles and other consumer goods.

3) Industry

The industrial structure of Sierra Leone consists of about 40% agriculture and about 10% each mining, commerce, and transport/communication, as it is clear from the GDP by industrial origin presented in Table 1-3. The share of agriculture has been rising yearly, not so much because of an expansion in the agricultural sector itself, but more because of a decline in other sectors, particularly in mining. The manufacturing sector represents only a small share of the GDP.

(1) Agriculture

About 80% of the population relies on agriculture, which represents 40% of the GDP. In this sense, agriculture is an important sector. According to the 1970/71 agricultural census, farmers numbered 286,000 and cattle raisers about 20,000 (mostly semi-nomadic Fulahs). Of the national territory of 7,200,000 hectares, about 500,000 hectares are used for cultivation, and about 80% of this is cultivated by the bush fallow (or slash-and-burn) method.

Said census indicated an average agricultural land size per farming household at 1.8 hectares, as opposed to 1.5 hecatres estimated by a 1974 Study (CSO) and to 1.33 hectares by a 1979 Study (LRSP).

More than 70% of the farmers is engaged in the cultivation of rice,

Table 1-3 Gross Domestic Product at Factor Cost by Kind of Economic Activity Percentage Distribution

	1972-73	1973-74	1974-75	1975-76	1976-77
1. Industries					
1.1 Agriculture, forestry and fishing	30.4	30.5	35.7	38.1	39.9
1.2 Mining and quarrying	17.8	18.4	14.7	10.8	10.2
1.3 Manufacturing and handicrafts	6.0	6.1	5.8	5.6	5.4
1.4 Electricity and water supply	0.4	(0.2)	0.0	0.8	0.7
1.5 Construction	3.2	3.7	3.0	3.1	3.3
1.6 Wholesale and retail trade and hotels and restaurants	13.9	14.2	14.5	12.2	13.4
1.7 Transport, storage and communications	10.8	11.2	11.1	11.7	10.7
1.8 Finance, insurance, real estate and other business services	8.3	7.9	7.6	8.5	7.8
1.9 Other services	2.7	2.7	2.6	3.1	2.7
1.10 Less imputed service charge of financial intermediaries	(1.2)	(1.5)	(1.6)	(1.5)	(1.2)
1.11 Total industries	92.3	93.0	93.4	92.8	92.9
2. Producers of Government Services	7.3	6.6	6.3	7.1	6.7
3. Producers of Private Non-profit Services to Households	0.4	0.4	0.3	0.4	0.3
4. G.D.P. at Factor Cost	100.0	100.0	100.0	100.0	100.0

Source: National Accounts Section, Central Statistics Office

which is the most important crop. Yet, only 22% produces surplus rice for shipment to market. Rice is the staple food, and average yearly rice consumption is 120 kilogrammes (264 pounds) per person, which is the highest in Africa. For this reason, 20,000 to 40,000 tons of rice is being imported every year. In 1976/77, about 18% of total imports was food, and one fourth of the food was rice.

Other staple food aside from rice are maize, cassava, yam, sweet potato, groundnut, and some legumes. Export crops are coffee, cocoa, palm kernel, kola, and ginger. As for fruits mango and orange are much in cultivation.

Table 1-4 Production of Major Crops

Crop	1973/74	1974/75	1976/77	1977/78
Rice (Paddy)	470.0	520.0	560.0	600.0
Coffee	3.1	7.2	5.5	10.0
Cocoa	7.6	5.4	6.0	6.4
Palm Kernel	39.0	49.5	42.0	30.2
Palm Oil	34.0	38.0	42.0	44.5

Source: Draft Annual Plan, Ministry of Development and Economic Planning, 1978/79

(2) Mining

In addition to diamonds, the most important mining products, bauxite and rutile, are being produced and exported. In 1977/78, mining products represented 61% of total exports, and diamonds alone, 56%. About 2,000,000 tons of iron ore used to be produced yearly in the first half of the 1970s, with Japan as the major importer of the ore, but the production has been discontinued since 1975.

Table 1-5 Mineral Exports

Minerals	1976/77		1977/78	
	Quantity	Value	Quantity	Value
Diamond	961.2	62.8	707.7	101.2
Bauxite	774.6	7.7	738.6	7.4
Rutile	-	-	3.2	n.a.
Total	-	70.5	-	108.6

Note: Quantity figures are in thousand carats for diamonds and thousand metric tons for both bauxite and rutile. Values are in million Leones.

Source: Draft Annual Plan, 1978/79

(3) Manufacturing

Development of the manufacturing sector is difficult due to a small domestic market. The total value-added remained only 35,400,000 Leones or only 5.4% of GDP in 1976/77. The Government is trying to promote the processing of primary products (agricultural, livestock, forestry, and fishery products) and import-substituting industries, such as sugar, salt, chemicals, soap, construction materials, shoes, and garments.

Currently operating factories produce flour (mill), oil (extraction), soft drink, beer, confection, sugar (refining), tobacco, garments, furniture, woodwork, corrugated cardboard, printed matter, shoes, polyethelene container, mattress, cosmetic, paint, match, soap, nail, etc.

4) International Trade and Payments

Sierra Leone suffers from continuous and excessive trade deficits for its economic scale, as pointed out earlier. Major import and export items are listed in Tables 1-7 and 1-8. Major export destinations are the

Table 1-6 Trend of External Trade

(million Leones)

	1973	1974	1975	1976	1977
Exports and Re-exports (FOB)	105.9	122.9	104.9	109.3	140.1
Imports (CIF)	127.1	188.4	167.5	171.3	206.2
Trade Balance	-21.2	-65.5	-62.6	-62.0	-66.1

Source: Economic Review, October-December, 1977, p. 57, Bank of Sierra Leone

Table 1-7 Value of Major Exports

(1,000 Leones)

	1973	1974	1975	1976	1977
Diamonds	64,558	74,625	63,031	71,986	62,080
Iron Ore	11,113	12,541	13,820	-	-
Bauxite	3,481	4,081	2,666	4,568	7,886
Cocoa	5,044	7,335	6,750	7,725	18,122
Coffee	9,924	2,804	6,604	7,275	35,083
Palm Kernel	5,227	7,679	4,295	3,297	723
Palm Oil	-	-	3,538	3,889	4,899
Palm Cake	-	-	1,222	1,479	1,613
Piassava	389	901	569	616	512
Ginger	281	277	292	578	772
Timber	-	-	-	1,811	829
Cola Nuts	426	193	63	382	679
Others	3,260	8,689	1,777	2,455	3,207
Total	103,703	119,035	104,227	106,061	136,403

Source: ibid. p. 59

Table 1-8 Value of Major Imports

(thousand Leones)

	1973	1974	1975	1976	1977
Food	30,616	41,867	26,679	30,960	35,770
Beverages and Tobacco	4,465	4,762	5,426	7,550	9,339
Crude Materials	1,589	3,719	2,736	1,980	3,534
Mineral and Fuel	7,532	21,574	20,149	12,419	29,166
Animal and Veget. Oils	1,205	1,392	1,237	1,645	2,734
Chemicals	9,050	11,972	12,218	13,957	15,950
Manufactured Goods	34,420	45,885	47,677	51,516	51,014
Machinery and Transport Equipment	25,058	38,609	34,253	33,231	37,997
Miscellaneous Manufactured Articles	11,538	16,001	15,408	16,272	19,276
Miscellaneous	1,737	2,642	2,077	1,727	1,428
Total	127,204	187,676	167,800	171,258	206,208

Source: ibid. p. 61

Table 1-9 Balance of Payment (net inflow)

(million Leones)

	1974	1975	1976	1977
Goods and Services:	-28.8	-70.6	-66.8	-74.8
1. Merchandise	-7.2	-45.8	-31.5	-36.4
2. Freight & Insurance	-6.6	-8.6	-9.0	-10.5
3. Investment Income	-6.5	-6.8	-9.8	-11.2
4. Other Private Services and Government Transactions	-8.5	-9.4	-16.5	-16.7
Transfer Payment:	5.3	18.8	9.4	11.8
5. Private	0.8	1.6	2.2	5.6
6. Central Government	4.5	17.2	7.2	6.2
Capital & Monetary Gold:	14.1	46.2	61.0	51.1
Net Unrecorded Items	-9.5	-5.6	+3.6	-11.9

Source: ibid. p. 55-56

United Kingdom (about 25%) and EC (45%), and import sources, the United Kingdom, the United States, and Japan (1975).

5) Public Finance

A review of the Sierra Leone Government's financial scale and structure based on 1977/78 records reveals that, in current accounts, total revenue was about 152,000,000 Leone (66% indirect tax and 25% direct tax, the remainder being various non-tax revenues) and total expenditure 213,000,000 Leone, for a deficit of 61,000,000 Leone. Subtracting the public debt charge (loan redemption) of 213,000,000 Leone from the expenditure, the net current deficit for this year was 27,000,000 Leone. The Government met the entire amount of this deficit with domestic borrowings. In that year, public investments amounted to a total of 48,000,000 Leone. The Government depended on foreign borrowings (long-term low-interest loans) and grants for a major part of this total, generating 16,000,000 Leone from domestic sources. In comparison, investments in the private sector was 69,000,000 Leone in the same year.

1.2 Development Plan

The Government of Sierra Leone released the National Development Plan (1974/75 - 1978/79) formulated under the cooperation of UNDP. This plan aims at economic growth, more equitable income distribution, improvement of the level of rural living, and export industry promotion. The initial plan of making a total development investment of 284,000,000 Leone (49% in foreign exchange; in 1973/74 price) was disregarded when the impact of the oil crisis disabled the execution of the plan, and the Government changed the five-year plan to a yearly plan, under which the economic development plan is reviewed and decided each year. The Government is also currently engaged in the formulation of a three-year development plan to start in 1980/81.

The Government's development plan will be reviewed below, based on its 1978/79 Plan.

1) Development Investment Framework

Government development investment amounts to 66,100,000 Leone, the largest amount so far, of which 26,300,000 Leone is to be in domestic currency. Of the 26,300,000 Leone, 14,600,000 Leone is to depend on the Consolidated Revenue Fund, 6,200,000 Leone on domestic borrowings, and the remainder on the SLPMB, the PL 480, and the OPEC Special Fund. The Government plans to rely on external loans (bilateral, multilateral, and grants) for the entire amount of 39,900,000 Leone to be invested in foreign exchange.

For expenditure, the total investment fund is distributed to economic, social, and general services and is assigned to relevant government agencies. The Ministry of Agriculture and Natural Resources receives the greatest allocation (15,000,000 Leone), followed by the Ministry of Works (8,800,000 Leone), the Ministry of Education (8,600,000 Leone), and the Ministry of Energy and Power (7,800,000 Leone).

Table 1-10 Public Investment Estimate by Sector
1978/79

(Le Million)

Sector	Domestic Source	Foreign Source	Total
1 Economic Services	11.2	24.9	36.1
2 Social Services	3.8	10.6	14.5
3 General Services	11.2	4.3	15.5
Total	26.3	39.8	66.1

Note: "Economic Services" includes road development and other investments by the Ministry of Works

Source: Draft Annual Plan 1978/79

2) Project Selection Criteria

Priority is given to the following projects in the subject plan:

a) Projects in which the Government has already made an investment and which, therefore, would result in a substantial loss should they be discontinued.

b) Projects which are currently being executed with bilateral or multilateral loans or other external loans.

c) Projects for which foreign assistance has been committed and which are, therefore, ready for implementation.

A large number of projects enjoy foreign assistance. Examples in 1977/78 are agricultural, road, and stadium projects under Chinese assistance; a medical equipment project under USSR assistance; agricultural, health, and educational projects under EEC assistance; an oil exploration project under Italian assistance; workship agricultural projects under British assistance; road and timber projects under West German assistance; abattoir (publicly-operated slaughterhouses) and fishery projects under Danish assistance; and an agricultural development project under American assistance.

1.3 Transport

The railway, which was constructed in the latter half of the nineteenth century, had been abolished by 1975 in several phases, and the means of transport currently available in Sierra Leone are motorcars, aeroplanes, and ships. The major transport is motorcars, as aeroplanes and ships represent only small portions of the total domestic traffic volume.

The Sierra Leone Government Railway, with its narrow-gauge rails, low speed, and small capacity, was gradually demolished in accordance with a recommendation in the UNDP Land Transport Survey (1966 - 1970), and high-standard expressways were constructed in its place. The new roads were built where railway tracks used to be, and this was a success because branch roads originally installed as feeder roads to service major railway stations were automatically connected with the new trunk roads to form an integral road network.

Since 1974, progress has been made in road construction under the assistance of UNDP, the United Kingdom, West Germany, and so forth. Currently, the Makeni - Kabala Road is being constructed as a trunk road to serve the northern agricultural area.

The major transport in Sierra Leone, road transport, will be discussed below.

1) Road Network

The present road network in Sierra Leone is formed by main trunk roads running east-west (transveral) starting from Freetown and extending far into inland mineral and agricultural resource areas, by supplementary trunk roads running north-south (the Makeni - Kamakwie Road under the present plan is one of these trunk roads), and by feeder roads converging into the trunk roads (see Fig. 1-1). The total extension of these roads is 4,323 miles, 68 miles (16%) paved and 3,642 miles unpaved (see Table 1-11). (Major inter-city distances are presented in Appendix.)

Table 1-11 Road Mileage

	Class I	Class II	Class III	Class IV	Total
Paved	465.8	180.1	28.5	7.0	681.4 (16%)
Laterite	416.2	849.9	1,791.3	585.3	3,641.7 (84%)
Total	888.0 (20%)	1,029.0 (24%)	1,819.8 (42%)	592.3 (14%)	4,323.1 (100%)

Note: See Chapter 3-1 for road classification.

Source: "Country Review Paper of Sierra Leone," 1979 Government of Sierra Leone

2) Traffic Volume

The Ministry of Works conducted traffic surveys during the past decade. A time series data resulting from the findings of these surveys are

graphically presented in Fig. 1-2 in terms of average daily traffic (ADT) taken at a large number of survey points at each Ministry defined area. The indicated national average traffic volume increase rate of 7.83% per year (although this rate differs from one area to another) is very high in comparison with the average population increase rate of 2.1% and the average Gross Domestic Products (GDP) increase rate of 1.2%.

The graphical presentation in Fig. 1-3 of traffic volume distribution based on the Ministry's 1978 traffic survey indicates that traffic is heavy in the state capital Freetown, the eastern mining areas and on the transversal trunk roads connecting these two areas.

3) Road Development Programme

Road development activities in Sierra Leone was triggered by the recommendation in the UNDP Land Transport Survey of 1970 for the development of the Freetown - Sefadu and the Freetown - Kenema transversal trunk roads and the Sefadu - Kenema north-south trunk road. The transversals have already been completed.

After the UNDP survey, the Government of Sierra Leone formulated the National Development Plan, 1974/78, which contained new road development programmes as shown in Table 1-12. Many of these programmes have been completed by now.

The Highway Programme of Fig. 1-4 shows the complete national road network of Sierra Leone after the completion of all the roads under the National Development Plan, and the completion of the Makeni - Kamakwie Road under the present plan (which was not covered by the National Plan).

4) Motorcar Ownership

The total number of motorcars in Sierra Leone increased by 47% from 1959 to 1972, an average annual increase rate of approximately 15%, as shown in Table 1-13.

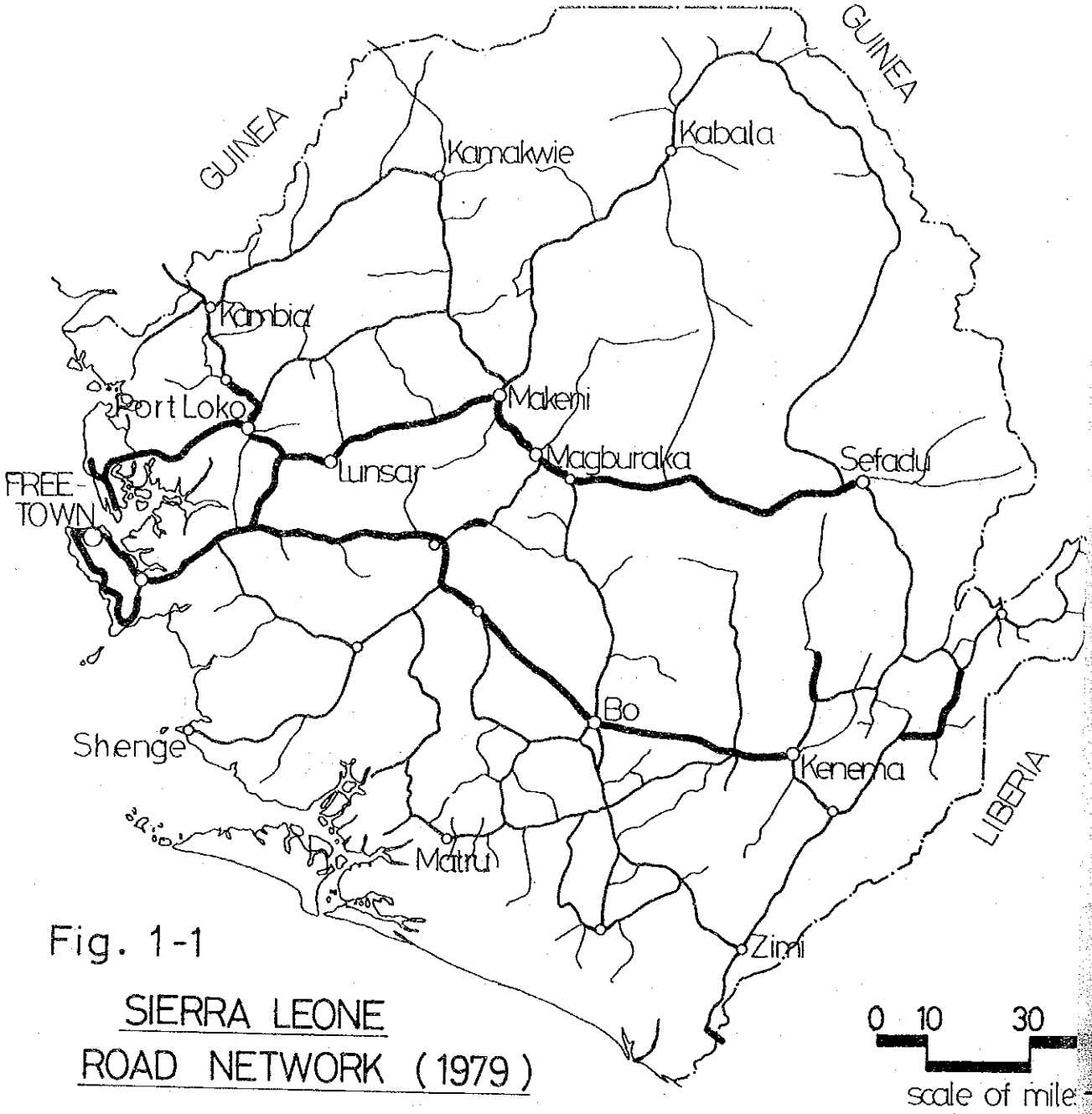


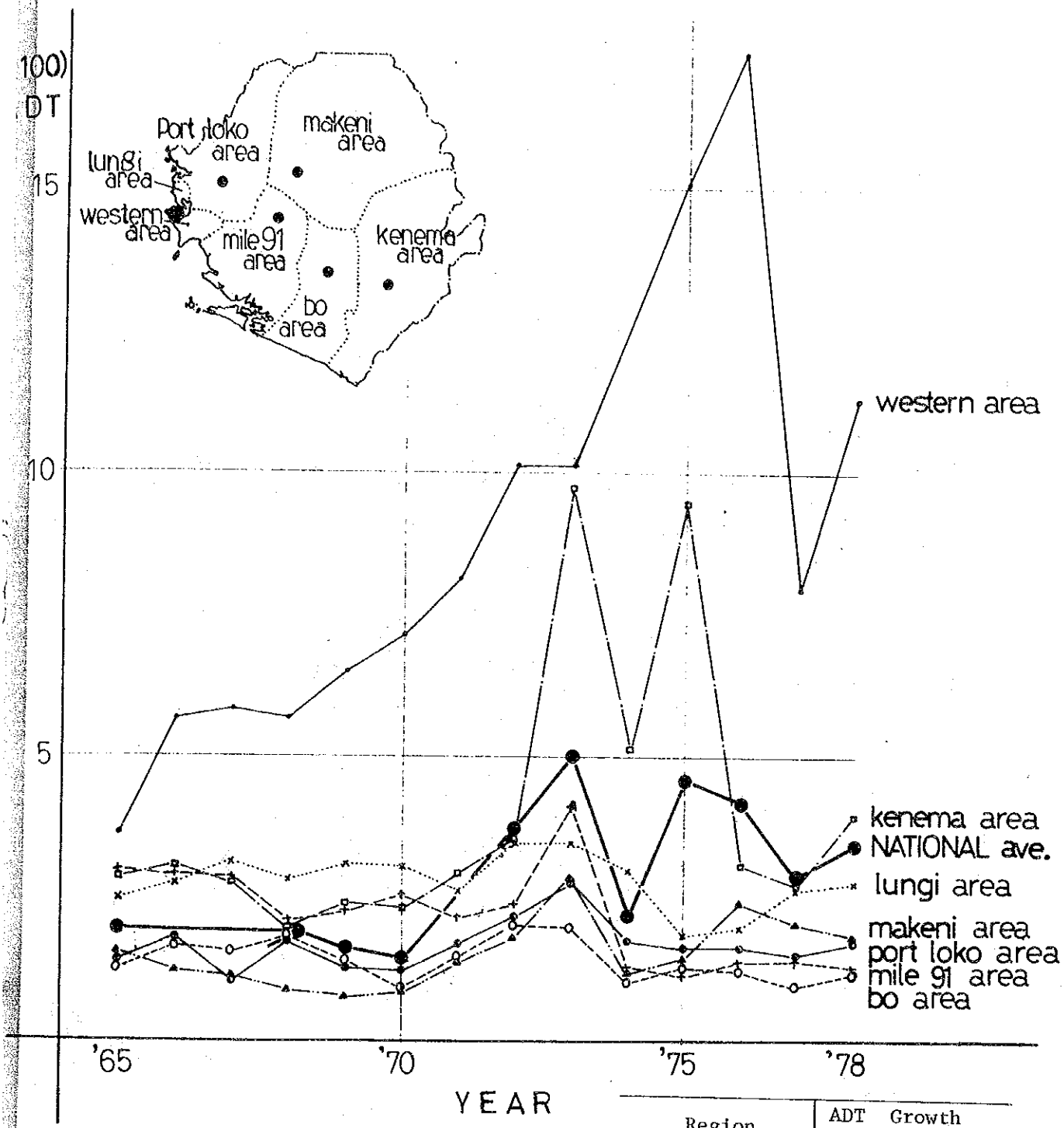
Fig. 1-1

SIERRA LEONE
ROAD NETWORK (1979)

Key

- main roads paved (class I, II)
- main roads unpaved (class I, II)
- minor roads (class III, IV)

Source: Minstry of Works



Region	ADT Growth Rate per Annum
National ave.	7.83 %
Western area	10.02
Lungi area	-1.05
Port Loko area	1.75
Makeni area	5.50
Bo area	-2.20
Kenema area	6.20
Mile 91 area	-5.72

Fig. 1-2 Regional Traffic Trends

Source : Ministry of Works' Statistics

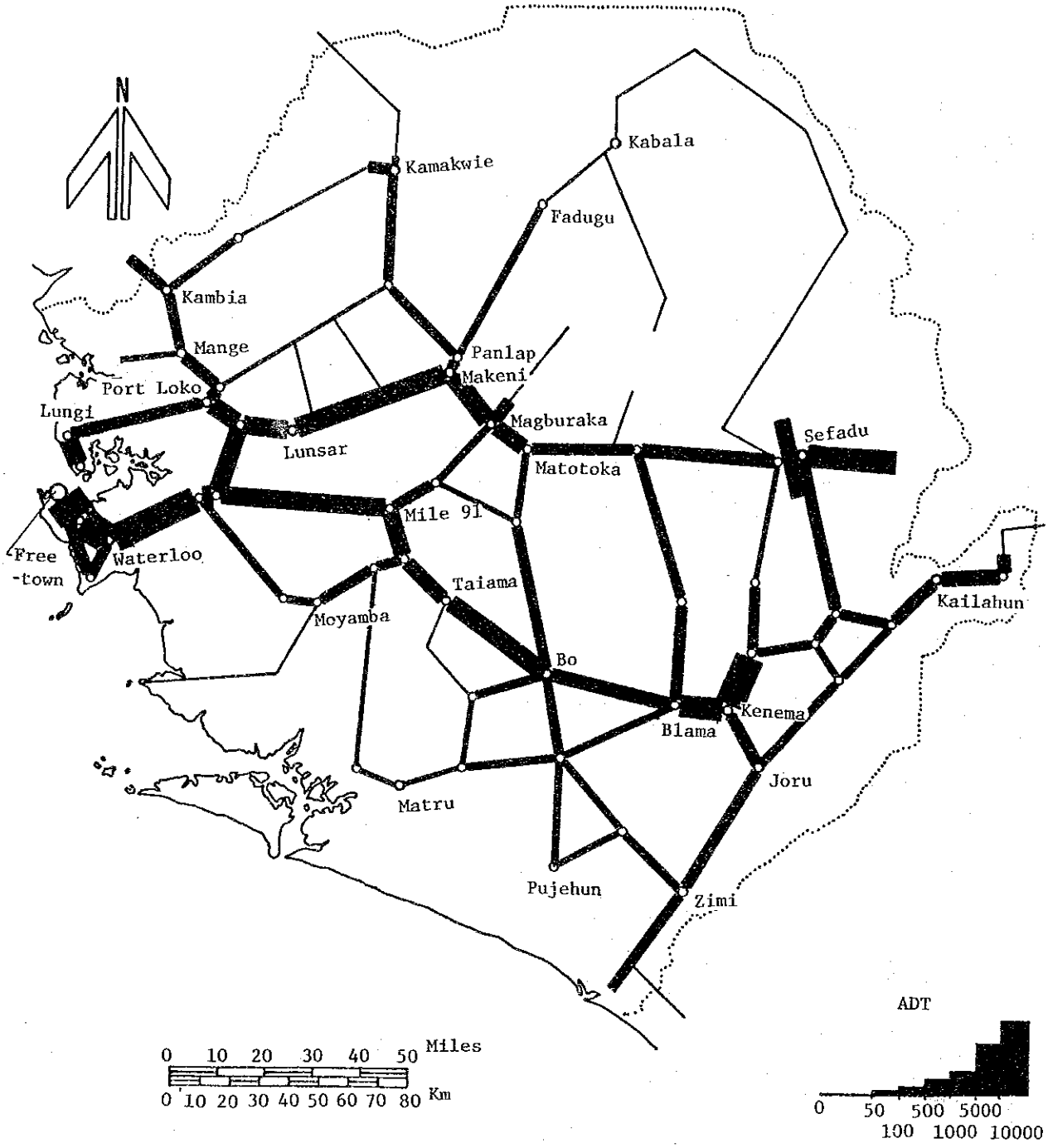
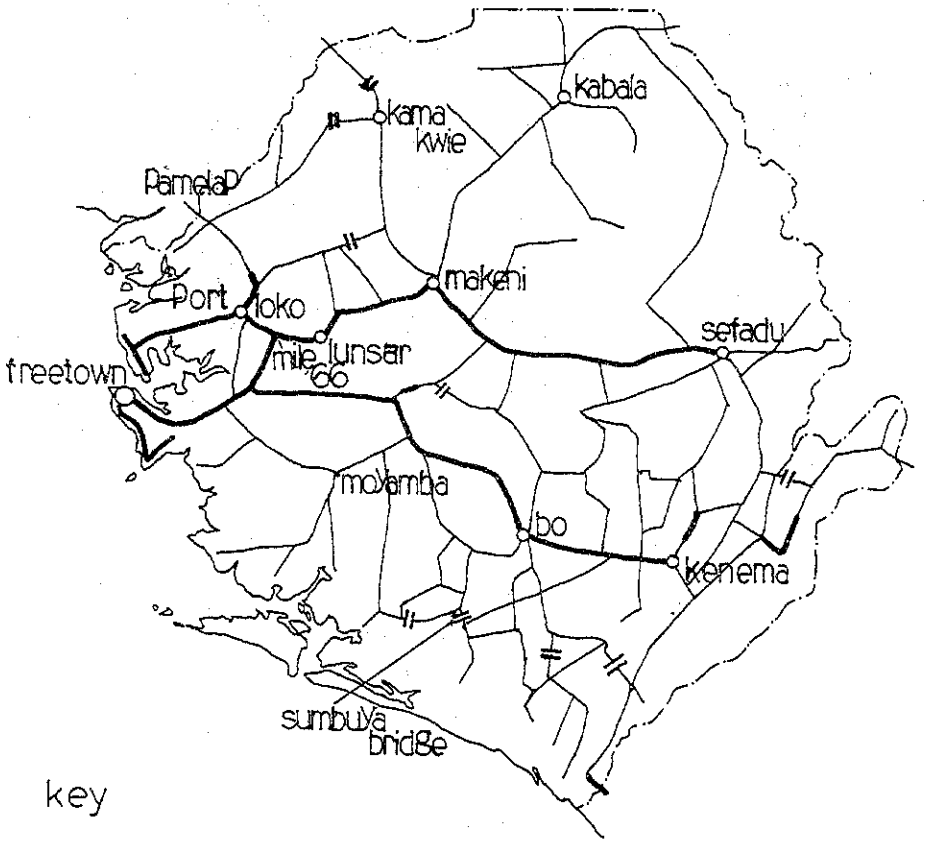


Fig. 1-3 Present ADT in SIERRA LEONE (1978)

Source: 1978 Annual Average Daily Traffic Volume (ADT), MOW

PRESENT



key

Paved road

unPaved road

ferry boat

PLAN

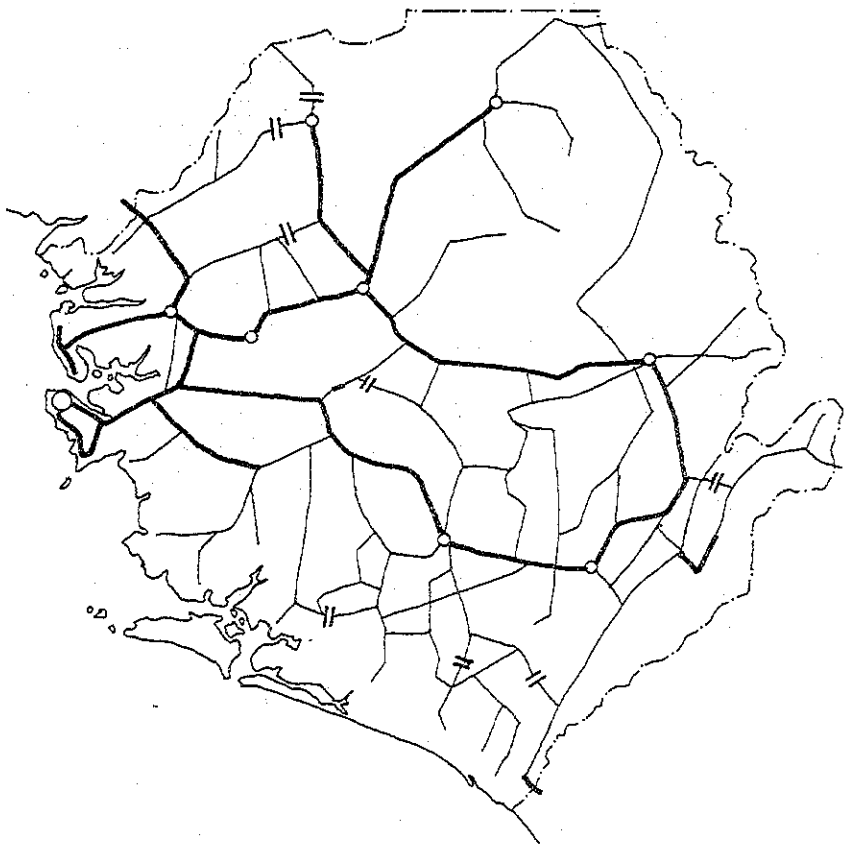


Fig. 1-4

HIGHWAY PROGRAMME

Source:
JICA Mission

Table 1-12 Road Development Programmes under National Development Plan, 1974/78

Road	Mileage	Progress
Freetown - Waterloo (Urban Section)	5.5	-
Freetown - Waterloo (Rural Section)	20.5	Completed June, 1977
Bo - Kenema	42.0	Completed June, 1975
Mano River Bridge	7.0	Completed in 1975
Moyamba - Songo Road	40.0	-
Makeni - Kabala Road	76.0	Under construction
Mille 66 - Pamelap Road	38.5	-
Sumbuga Bridge	(900 feet)	-
Mange Bridge and Kambia Bridge	-	Completed in 1975 and 1977
Feeder Roads	650.0	

Source: National Development Plan 1974/78

Table 1-13 Vehicle Registration in Sierra Leone

(100)

Year	Cars, Light Vans	Buses, Lorries Taxis	Total
1959	5.5	3.6	9.1
1960	5.0	3.2	8.2
1961	7.5	3.8	11.3
1962	7.1	3.4	10.5
1963	9.6	4.2	13.8
1964	11.2	5.5	16.7
1965	13.5	7.8	21.3
1966	13.6	6.6	20.2
1967	14.3	6.3	20.6
1968	19.4	9.6	29.0
1969	21.8	10.4	32.2
1970	24.5	11.7	36.2
1971	26.0	12.8	38.8
1972	28.5	14.2	42.7

Source: "Country Review Paper of Sierra Leone" 1979 Government of Sierra Leone "National Development Plan 1974/75-1978/79"

5) Mass Transport

The only public transport currently available in Sierra Leone is a large passenger bus service offered by the Road Transport Corporation (RTC). RTC, which was established in 1965 and was renewed and strengthened in 1971, offers the Sierra Leone - Guinea international large express bus service, a domestic inter-city large express bus service, and a large city bus service in Freetown. RTC's gross operational revenue reached approximately 1.8 million Leones (or 3.6 billion yen at 1 Leone = 200 yen) in 1978.

Mini-buses called "poda-poda" in Freetown and trucks converted into buses (with a 20 to 25 passenger capacity) in and between local cities offer non-public mass transport service. Taxicabs are in great use by passengers who share rides.

CHAPTER 2

CURRENT CONDITIONS OF THE PROJECT AREA

CHAPTER 2

CURRENT CONDITIONS OF THE PROJECT AREA

In this Chapter, the nature, society, and industry of the Project Area will be outlined. The Project Area is the area which will be under the direct impact of the Makeni - Kamakwie Road Development, ie. the seven chiefdoms from Makari Gvanti to Sela-Limba, as indicated in Fig. 2-1, of the thirteen chiefdoms in the Bombali District.

Although the construction of the Makeni - Kamakwie Road will also have an impact on Makeni City, on the economics of neighbouring districts, particularly the Tambaka Chiefdom, and on livestock activities in the adjacent Guinea, these areas are excluded from the definition of Project Area and left for discussion under appropriate subjects.

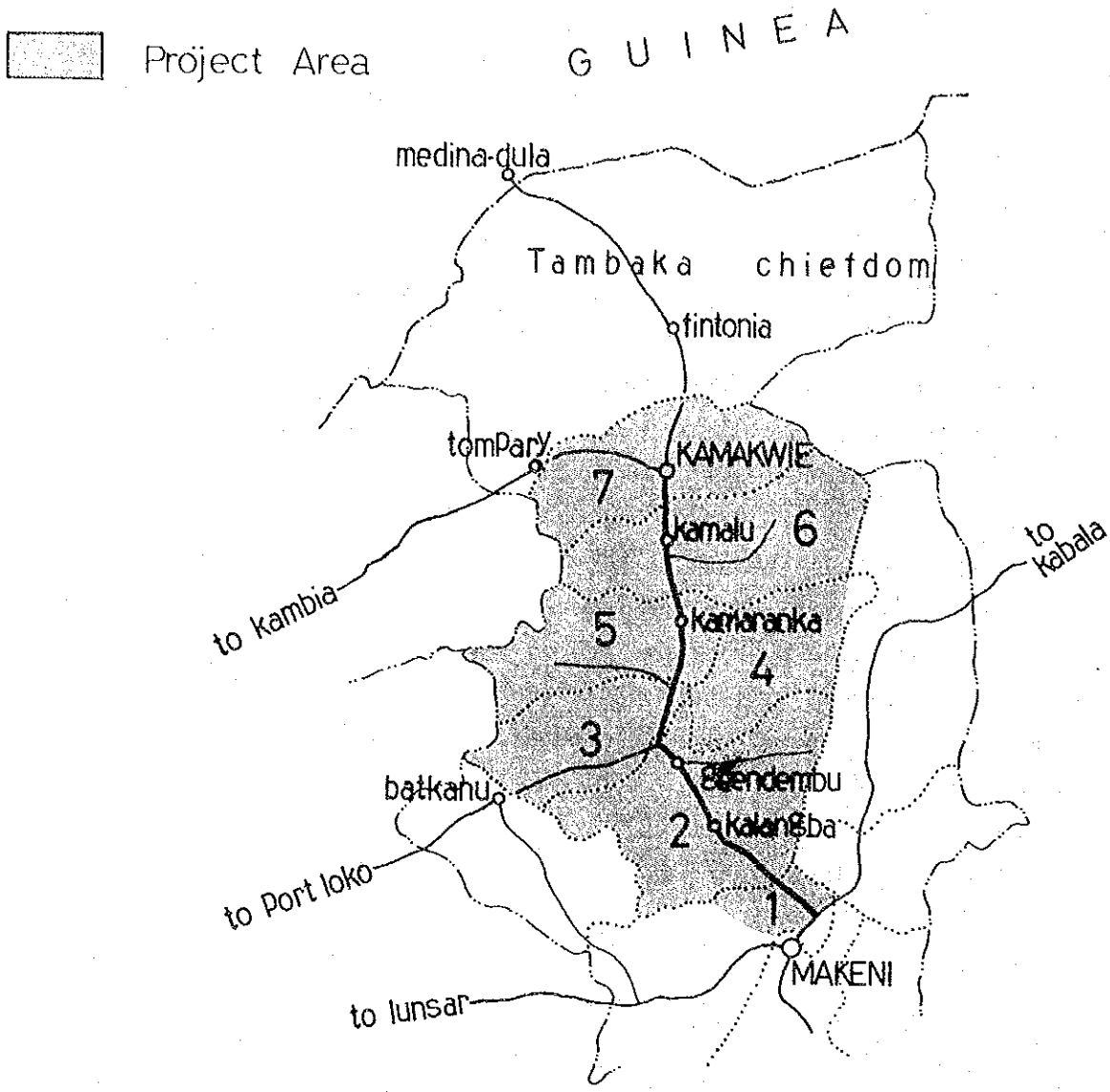
2.1 Natural Conditions

1) Topography

The Project Area is a land of approximately 1,167 square miles surrounded by the two major rivers of Sierra Leone: the Mongo on the north and west and the Mabole on the east and south. The southwestern half of the Project Area is a moderately undulating boliland (a geological classification) from 150 to 250 feet above sea level, and the northeastern half extends from the boliland to the northwestern plateau and gently undulates at a somewhat higher 200 to 500 feet above sea level. Steep outlier hills rising higher than 600 feet spot the Project Area.

2) Climate

Weather data taken at Makeni during 37 years show an average annual precipitation of 121.4 inches, of which 114.6 inches fell during the wet



		Area (Sq. Miles)
1.	Makari Gbanti*	135
2.	Gbendembu-Gowahun	139
3.	Sanda Tenraran	60
4.	Magbaiamba**	303
5.	Gbanti-Kamaranka	200
6.	Sanda Loko	175
7.	Sela-Limba	155
	Project Area Total	1,167
	Bombali District	3,083

Note: * excluding the southern part of Panlap
** excluding the eastern part of the Mabole River

Fig. 2-1 Geographical Extension of the Project Area

season (May to November) and only 6.8 inches fell during the dry season (December to April). In the northern and northeastern parts of the Project Area, rainfall is slightly less than in Makeni. Temperature fluctuates little by season, the mean temperature being 78°F in August and 83°F in March/April. The periodical dry and hot winds blowing from the Sahara Desert in January and February are called "harmattan."

3) Soil and Vegetation

Most of the Project Area geologically comprises the Rokel river series, which underlies the boliland and the granite and acid gneisses. The soil is predominantly sand with a high proportion of laterite gravel and acid of a low nutrient status. The farm land, grassland, and swamp soils are generally deeply bleached of bases, and decomposed organic matter supports vegetation. The topsoil of the swampland is mainly sandy loam or sandy clay loam. The boliland soil is strongly acid (pH 5.0 - 4.0) with low clay and sand contents and low inherent fertility.

As for ecology, the southern part of the Project Area is dense bush/grove, which becomes thinner and increasingly associated with the grassland toward the north and finally turns to a savannah.

2.2 Socio-Economic Conditions

1) Population

The Project Area population based on the 1963 and 1974 (preliminary) census data is shown in Table 2-1. During the eleven years between the two censuses, population increased by an average rate of 1.2% per year, which was fairly low compared with the national average of 2.1%. The low population increase rate indicates that the Area inhabitants were flowing out, particularly to Freetown, the capital, and diamond mining areas to the east.

If the Area population since 1974 continued to grow at an annual rate of 1.2%, it must have reached 107,000 by 1978. Most of the population live in small 10- to 15-home villages scattered along the Makeni - Kamakwie Road. The largest town in the Project Area is Kamakwie, with a population of about 10,000.

Table 2-1 Population Trends of the Project Area

Chiefdom	Population		Annual Growth Rate (%)
	1963	1974	
Makari Gbanti	5,885	7,567	2.3
Gbendembu Gowahun	22,141	24,346	0.9
Sanda Tenraran	12,922	15,905	1.9
Magbaiamba	5,511	5,210	0.5
Gbanti Kamaranka	13,921	15,774	1.1
Sanda Loko	12,528	13,486	0.7
Sela Limba	18,763	22,323	1.6
Project Area Total	91,671	104,611	1.2
Bombali District	198,776	233,626	1.5

Source: 1963 and 1974 National Censuses

2) Labour Force

According to the 1974 census, the average family size in the rural part of the Bombali District was 6.4 persons, 3.0 of which were economically active. Using the indicated crude labour participant ratio of 47%, the total number of households in the Project Area in

1978 is estimated at 16,700 and the size of labour force, 50,300 (presumably including a fair number of the potentially jobless).

3) Ethnic Groups

Of the eighteen major ethnic groups in Sierra Leone, four represent most of the inhabitants in the Project Area: the Temnes, the Foulahs, the Lambas, and the Lokos. A large number of the Temnes live in Makeni City; the number of Foulahs increase toward the north.

4) Industry

Agriculture is the industrial mainstay of the Project Area; about 90% of the population rely on agriculture. The most important crop both in terms of quantity and value is rice, whose production is presently barely enough to supply local demand, with little producer surplus. Other major crops are cassava, maize, groundnut, palm kernel, tobacco, orange, and banana. Livestock is also important in the northern part. Agricultural and livestock activities will be discussed in 2.3 in this chapter.

Other industrial activities are insignificant. Manufacturing in particular is yet to be developed, and the only factory with modern facilities is that of the Mabole Fruits Company Ltd., established in 1978 for making juice and jam from orange, mango, banana, and guava. There are small-scale rice milling plants in Kamakwie and Kamalu.

5) Administration

The Project Area covers seven chiefdoms governed by Paramount Chiefs and Chiefdom Councilors. Each chiefdom is divided into sections headed by Section Chiefs. Sections are further subdivided into towns and villages headed by mayors. Each of these traditional local authorities exercise strong political power in his territory.

6) Social Infrastructure

In the Project Area, there are two secondary schools, one at Kamakwie and the other at Gbendembu, and several primary schools at major towns and villages. A Catholic mission operates a hospital at Kamakwie and a dispensary at Gbendembu. More advanced educational and medical facilities are two secondary schools, a teachers training college, a public hospital, and four private hospitals in Makeni.

Water supply facilities are generally limited. In Kamakwie, a public water supply network is in service, but in most rural parts, inhabitants use river or well water. In the dry season, these natural water sources either dry up or are contaminated. Electrification has also made little progress. Generators are available only in Kamakwie (a public operation) and Gbendembu (operated by the Catholic mission).

Transport facilities will be discussed in Chapter 3.

2.3 Current Agricultural Status

In contrast to Eastern Province, where such export crops as coffee, cocoa, and oil palm are produced in addition to ordinary crops of rice, maize, and cassava, and Southern Province, where rice, palm oil, and other crops are produced, agricultural activities are limited in Northern Province, particularly in the Project Area, where production of rice, maize, and other crops and livestock products is still primitive in method and small in quantity. Much of upland rice and other dry field crops such as maize, Guinea corn (sorghum), millet, and cassava are produced by the slash-and-burn farming method. Paddy rice is cultivated in lowlands and in dales and is totally rainfed--no irrigation facility exists. The livestock area in Northern Province, where chiefly the Fulahs are engaged in nomadic raising of cattle, sheep, and goats, is one of the major livestock producing areas in Sierra Leone, but is located outside the Project Area.

1) Soil

Soil in the Project Area is derived from granite and acid gneisses and may be classified into swamp soil and upland soil depending on whether it is hydromorphic or not. The upland soil is sand or sandy clay, often with a gravel content, and shows an evidence of intense decomposition due to heavy rain and high humidity in wet seasons. It is bleached of bases, has a low content of organic matter (humus), and shows low pH value and low fertility. The swamp soil is alluvial or colluvial sandy clay loam with a higher humus content than the upland soil. Swamps, caused by the flooding of the Little Scaries, the Mabole, and their tributaries and by poor drainage, are found in the lowlands in the western part of the Project Area. These swamps, which occupy about 20% of the Project Area, are called "bolilands" and can be reclaimed as rice paddies by controlling the flood and developing drainage facilities.

2) Land Use

The land utilization map of Sierra Leone, prepared by UNDP/FAO (Fig. 2-1), has been translated into a table of land use in the Project Area (Table 2-2), which shows that land used for rice (paddy and upland) constitutes 5.6%, grassland 3.9%, forests 19.0%, savannas 52.9%, and unarable land 14.0%. In other words, about 70% of the Project Area are either savannas or forests. The savannas consist of a savanna woodland, a mixed tree savanna, and a Lophira tree savanna. The forests consist of a secondary forest, a regrowth forest, and a swamp fringewood. The gently declining parts and low parts of the savannas and forests are suitable for reclamation and cultivation.

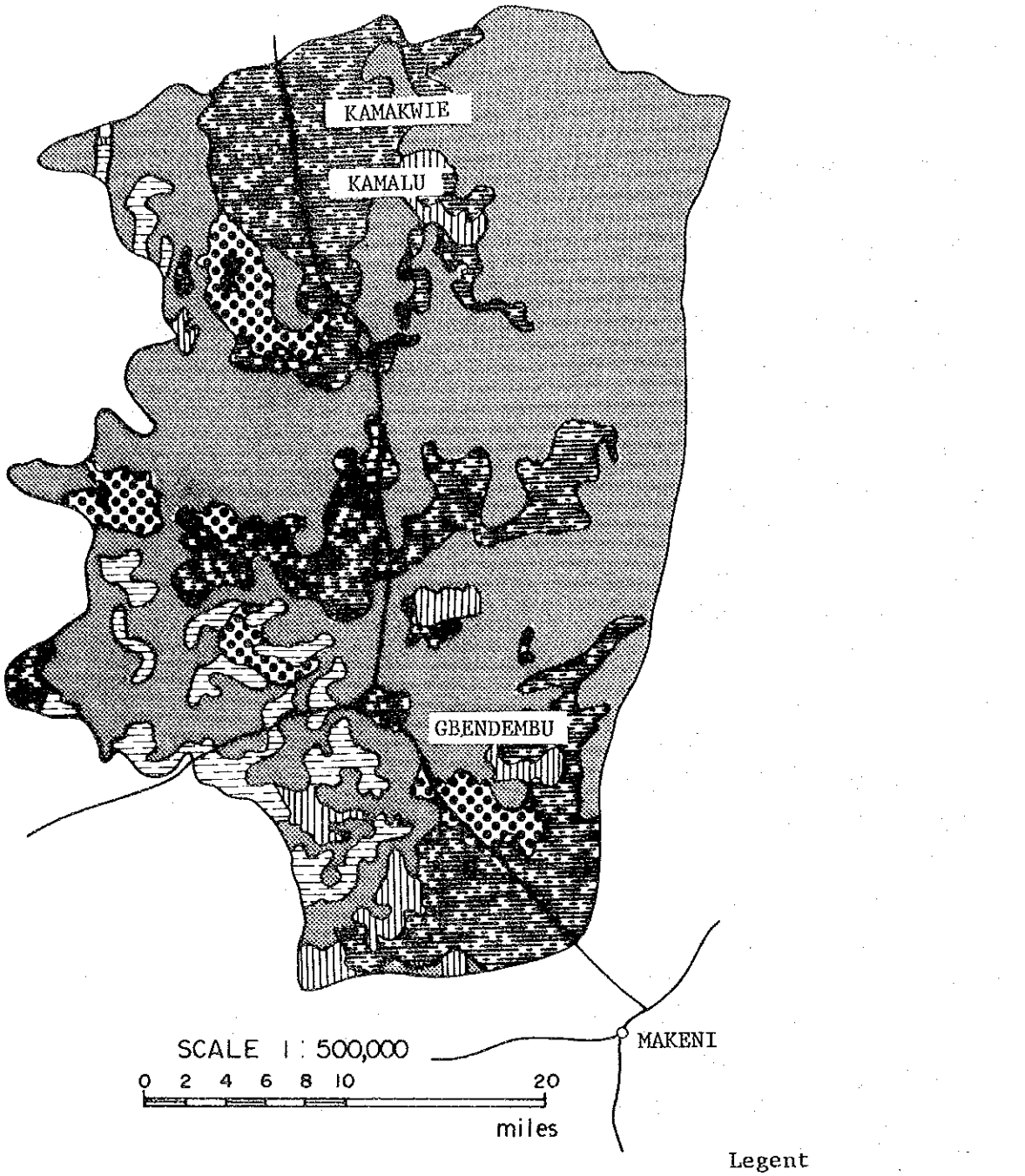


Fig. 2-2 Present Land Use in the Project Area

Source : Land Use in Sierra Leone by the Land Resources Survey Project 1978-UNDP/FAO

Table 2-2

Land Use in the Project Area

	Mile^2	Acre	%
Rice cultivation land[1)]	64.6	41,344	5.6
Upland Crop cultivation land	53.1	33,984	4.6
Grassland	45.1	28,800	3.9
Forest	219.0	140,160	19.0
Savanna	610.7	390,848	52.9
Unarable land[2)]	161.6	103,424	14.0
Total	1,154.0	738,560	100.0

Note: 1); Swamp rice and upland rice cultivation fields
2); JICA Mission's estimate

Source: Land Use in Sierra Leone by The Land Resources Survey Project, 1978 - UNDP/FAO

3) Land System

The land system is very complicated in the Project Area, differing from one tribe to another. As a principle, land belongs to the community and is allocated by the Paramount Chief. Right to use a land, whether allocated directly or transferred within a family or close kin, continues for a life-time and may be inherited unless a return of tenure is claimed. The existing land ownership system is complicatedand beyond systematic description. A land is usually sold only for a short period of time or when the ownership cannot be inherited, and payment for the land is made with money or in kind. Land thus sold and bought is referred to as a "beggar land".

4) Current Agricultural Production

Few statistical data are available on agricultural production in the Project Area, and assumptions must be made on the basis of the

1970/71 Agricultural Census and the current (1978) population as revealed by the 1963 and 1974 Population Censuses.

(1) Demography and Farm Land

a) Population

Population in the Project Area in 1978 is estimated at 107,112, based on 1963 and 1974 population data and an average annual increase rate of 1.2%. (See Table 2-1).

b) Farming Household

Assuming that the average number of persons per household (6.5) as revealed through the 1970/71 Agricultural Census has remained constant until 1978, and, that 90% of all households in the Project Area are engaged in agriculture, the total number of farming households in 1978 is estimated at 15,063.

c) Farm Size

The average size of cultivated land per farming household, 4.8 acres, as revealed through said agricultural census is used for 1978.

d) Total Cultivated Land

Total area size of cultivated land in the Project Area in 1978 is estimated on the basis of b) and c) above, as shown in Table 2-7, to be 72,300 acres. The yield rates are estimated on the basis of the 1970/71 Agricultural Census.

(2) Crop Raising Practices

Rice

Rice is the staple food of the people of Sierra Leone and, according to the West African Rice Development Association (WARDA), represented

Table 2-3 Family Size, Farmland and Farm Population (1970/71)

(1) Family Size

	Number of Farm Population	Number of Farm Household	Number of Persons/Family
Bombali District	113,950	17,798	6.40
Northern Province	563,892	90,185	6.25
Sierra Leone	1,888,121	286,137	6.60

Source: Agricultural Census in Sierra Leone in 1970/71

(2) Average Size of Farmland per Household

	Number of Farm Population	Holding Acreage	Average Acreage per Household
Bombali District	17,798	85,513	4.80
Northern Province	90,185	446,080	4.95
Sierra Leone	286,137	1,286,348	4.50

Source: Agricultural Census in Sierra Leone in 1970/71

(3) Farm Population per Family

	Laborforce for Farming		Sub-total	Dependent	Total
	Male	Female			
Bombali District	2.91	1.38	4.29	2.11	6.40
Northern Province	3.35	1.75	5.10	1.15	6.25

Source: Agricultural Census in Sierra Leone in 1970/71

82% of total food supply in 1975. The domestic production, however does not meet demand, and the Sierra Leone Government is forced to import 22 million pounds to 88 million pounds of rice each year, and, therefore, the Government is implementing rice production expansion projects throughout the nation for the ultimate objective of self-sufficiency in rice. The German Agency for Technical Cooperation (West Germany) estimates in its "Study on the Marketing, Processing, and Storage of Rice in Sierra Leone" that total rice production in the Bombali District was 44 million pounds, in terms of polished rice weight, or 7% of the total national production in 1977.

Generally, rice is cultivated in either paddies or uplands. Paddy rice is grown in lowlands and dales and belongs to Oryza Glaberrima Steud, which is low-yielding but relatively resistent to diseases and tastes better than newly introduced varieties. Of Oryza Sativa L, Anethoda CP 4 is cultivated. Rice is seeded in a seedbed in June or July and transplanted to fields in July or August. Fertilizers and insecticides are hardly ever used. Harvesting is done in November or January. Rice yield is estimated at about 1,300 pounds per acre.

Upland rice is cultivated chiefly by the slash-and-burn method. Seeding is done in May or June, and harvesting in October or December. Generally, fertilizers and insecticides are not used. Averagy yield is estimated at about 1,000 pounds per acre.

Maize, Guinea Corn (Sorghum), and Millet

Maize, Guinea corn, and millet are cultivated in the uplands for farmers' consumption.

Maize is sown in June or July and harvested in October or November. The yield rate is about 900 pounds per acre. Guinea corn and millet are cultivated in dry and relatively lean land unsuitable for maize cultivation. Guinea corn is sown in May through June and harvested in November or December. The yield rate is about 1,000 pounds per acre. Millet is sown in May or June and harvested in September or October.

The yield rate is about 900 pounds per acre.

Cassava

Cassava is cultivated for farmers' consumption. A stalk of about 0.8-1.0 feet in length is inserted into the ground for cultivation, and harvesting is done at anytime throughout the year when needed. Thus, time from planting to final harvesting is six to ten months. The yield is estimated at about 4,500 pounds per acre.

Groundnut

Groundnut is an important vegetable oil crop, along with sesame seed and oil palm kernel. Groundnut grows well in well-drained sandy clay or sandy loam soil and, therefore, is suitable for cultivation in the Project Area except in the bolilands. The Government encourages the cultivation of this cash crop in the Bombali District. The Marece, Kono, and Cambia varieties are seen in Sierra Leone. Only a few farmers fertilize the groundnut field. Groundnut is planted in June or July and harvested in October or November. The yield rate is about 1,000 pounds (in shell) per acre.

Tobacco

Tobacco cultivation was first introduced to the Bombali District by the Rockel Leaf Tobacco Company, which contracts farmers on a cultivation area size basis and provides seedlings, chemicals, and other necessary materials, as well as cultivation funds(at 10% annual interest) and -- in collaboration with the Agricultural Extension Office -- technical assistance. The Extension Office recommends 448 pounds of compound fertilizer as initial manure and 336 pounds of sulphate of potash as additional manure, both per acre, as standard practice. Seedlings are transplanted in early May, and matured leaves are harvested in August or September. The leaves are dried for five days in a curing bin either by fire-curing or flue-curing (the latter produces better quality tobacco), flattened out by removing wrinkles, classified into grades, and bound by grade. The quantity of leaf tobacco production and the purchase price of the tobacco company in 1978 are shown in Table 2-4 by grade.

Table 2-4

Quantity and Purchase Price of Leaf Tobacco

Rockel Leaf Tobacco Company, 1978

Grade	Price (Le/lbs)	Composition (%)
1st Class	55	75
2nd Class	45	20
3rd Class	30	5

Source: Rockel Leaf Tobacco Company

The yield rate of tobacco leaves is about 1,000 pounds per acre by flue-curing and about 1,200 pounds per acre by fire-curing. The leaves are collected from the farmers and shipped by the tobacco company's Makeni office to the tobacco factory in Freetown.

Fruits

The soil and climate of the Project Area are suitable for growing oranges, mangoes, and bananas ; the Area is well-known in Sierra Leone particularly for oranges. The Mabole Fruit Juice Company plant was built on the right bank of the Mabole in 1978 and has a production capacity of one ton of juice per hour. The plant also produces jam.

Oranges are picked in October and November, mangoes in April through June, and bananas throughout the year. Per acre yields are about 9,000 pounds for orange, about 4,400 pounds for mango, and about 2,900 pounds for banana.

(3) Production Quantities

The production quantities of various crops raised in the Project Area are estimated by applying the average per acre yield rate to the cultivated land area size discussed in Chapter 2.3, 4), (1). The results

are shown in Table 2-7. For quantities by chiefdom and by crop, please refer to Table 5-6. Per acre yield rates of various crops in 1978 are estimated on the basis of the rates indicated for the Bombali District by the 1970/71 Agricultural Census and the effects which the current Integrated Agricultural Development Project will have had by 1978.

(4) Livestock

(i) Livestock Raising

The Northern Province, particularly the Bombali District, where farmers are active in livestock raising, is the source of meat in Sierra Leone. Meat supply does not meet demand, however, and many cattle, sheep, and goats are imported to Guinea each year. The import quantity cannot be estimated with any reasonable degree of accuracy, because the nomads freely move across the border with their livestock. The nomadic raising of cattle, sheep, and goats is chiefly carried out in the savannas in order to avoid tsetse-borne trysontrypanosomiasis infection.

Cattle

With the exception of a small number of cattle of the Sahiwals breed, an introduced breed, and its improvement, the cattle raised are mostly of the N'dama breed. N'dama cattle are small in body size, the adult animal weighing from 400 to 700 pounds, and have short horns and no back hump. The nomads burn grass at the end of each dry season in order to graze cattle on fresh soft grass during the following rainy season and when the grass grows old and hard and, therefore, unsuitable for grazing, they move on for fresh grass and water. The mortality rate is high, reported to be 15% for N'dama cattle, and is particularly high among the very young. The Hunting Technical Service Limited, England, uses herd of 40 cattle per family as a model, as shown in Table 2-5 which is based on the "Sierra Leone Livestock Development Study."

Table 2-5 Model Herd Composition of Cattle in Sierra Leone

Model holding	40 heads of cattle, 4 family members	
Herd composition	Calves less than 1 year	9 heads
	Immature stock including 4 year-olds	11
	Cows	14
	Steers and bulls	6
	Total	40

Source: JICA Mission

The above model centers on cows ; models of beef cattle should include less cows and more steers.

Sheep and Goats

Live matured sheep weighs 40 to 70 pounds, and goat 40 to 55 pounds. According to FAO's report in 1971, the birth of goats is high at two per year, and the mortality rate is very high, ranging from 16% to 67% by year.

(ii) Average Herd Size

No statistical data are available on the average number of livestock raised per family. The raising density is estimated as shown in Table 2-6, based on the results of an aerial livestock sample survey conducted by the Ministry of Agriculture and Natural Resources in early 1979.

Table 2-6 Raising Density of Livestock in the Project Area in 1978

(Unit: head per square mile)

Livestock	Type A Area*	Type B Area**
Cattle	12.25	24.49
Sheep	4.40	8.79
Goat	7.79	7.79

Note: * Makeni Gbanti, Pendenbu Gowahun, Sanda Tenraran Gbanti Kamaranka
** Magbaiamba, Sande Loko, Sela Limba

Source: Type B is estimated based on the results of the Aerial Livestock Samples Survey by MANR in 1979.
Type A is estimated by the JICA Mission.

The total number of livestock by animal is estimated by multiplying the density per square mile as shown in Table 2-7, by the area size of each chiefdom; it is assumed that 30% of the total are marketed.

Table 2-7 Agricultural Production Status in the Project Area in 1978

Crop Production

Crop	Cropping Area (acre)	lbs/acre	Production (1,000 lbs)
Swamp rice	6,478	1,300	8,421
Upland rice	39,534	1,000	39,534
Maize	2,458	900	2,212
Guinea corn	723	1,500	1,085
Millet	1,909	1,300	2,482
Cassava	1,634	4,500	7,353
Sweet Potato	1,084	2,900	3,144
Groundnuts	13,795	1,000	13,795
Tobacco	2,025	1,100	2,228
Orange	1,634	9,000	14,706
Mango	607	4,400	2,671
Banana	419	2,900	1,215
Total	72,300	-	-

Number of Livestock

Livestock	Number of Livestock Raised	Number of * Marketable Livestock
	head	head
Cattle	14,136	4,241
Sheep	5,077	1,523
Goat	8,990	2,697

Note: Number of livestock x 0.3
Source: Estimates based on the results of the Agricultural Census in 1970/71 by the JICA Mission

5) Surplus Crops

It is assumed that the surplus, after satisfying the local demand, of agricultural crops produced in the Project Area is shipped out.

(1) Local Consumption

The consumption quantities in the Project Area of various agricultural crops are estimated on the following assumptions:

a) Per capital average annual consumptions* of rice, meat, maize, Guinea corn, millet, cassava and sweet potato are as follows:

Rice	220 lbs
Meat**	6
Maize***	20.6
Guinea corn***	10.1
Millet***	23.1
Cassava***	68.6
Sweet potato***	29.2

"Rice" and "meat" are estimated on the basis of a national data, and other estimates are based on the 1970/71 Agricultural Census data for the Bombali District.

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* Average per capita annual food supply in Sierra Leone from 1972 to 1974 was 823 K cal (FAO, The Count World Food Survey).

** Average per Capita Annual Meat Consumption:

	In Weight	In No. of Animals
Beef/veal	5.0	0.027
Mutton/lamb	0.5	0.013
Goat Meat	0.5	0.014

*** Assuming the local consumption of the entire production, total production quantities were divided by the population in arriving at these values.

b) No leaf tobacco is consumed in the Area.

c) The rates of local consumption to total production of fruits are estimated as follows, based on indications by the Mabole Fruits Factory personnel:

Orange	20%
Mangoes	50%
Bananas	70%

Based on the above assumptions, consumption quantities and producers surplus in the Project Area of agricultural products are shown by crop or by animal in Table 2-8.

6) Agricultural Support Services

The Agricultural Extension Office of the Ministry of Agriculture and Natural Resources and the Northern Province Office of IADP jointly offer agricultural support services in the Project Area. Technical assistance is chiefly provided by the Extension Office; feeder road construction, potable water well drilling, farm operation fund loan, and the supply of seeds, fertilizers, chemicals, and other farming materials are provided by the IADP Office.

The Extension Office has one branch each in Makeni and Kamakwie. Extension activities are stagnant due to inadequate staff (the number) of extension agents per branch is only six, including the branch head) and budget. IADP activities are vigorous (discussions under 2.4 should be referred to) and, although project progress is somewhat behind schedule, services are offered smoothly. Currently about 30% of all farming households enjoy an IADP fund loan.

Future regional development should be accelerated not only by dependence on IADP activities, but also through the intensification of extension services, the establishment of farmers' agricultural cooperative(s),

Table 2-8 Local Consumption and Producers Surplus (1978)

	Unit	Local Consumption	Producers Surplus
Rice (Paddy)	1,000 lbs	36,253	11,702
Maize	"	2,207	0
Guinea corn	"	1,082	0
Millet	"	2,474	0
Cassava	"	7,348	0
Sweet potato	"	3,128	0
Groundnut	"	2,356	11,438
Tobacco	"	0	2,227
Orange	"	2,941	11,764
Mango	"	1,336	1,336
Banana	"	851	365
Sub total	"	59,976	38,871
Cattle	head	2,892	1,349
Sheep	"	1,392	131
Goat	"	1,500	1,197
Sub-total	"	5,784	2,677

Source: JICA Mission

expansion and development of trunk road(s), and the construction of a feeder road network.

7) Crop Distribution System

(1) Market System

Markets for agricultural crops and other necessities are opened in major towns and villages of each district everyday or periodically. Surplus regional crops are collected by local brokers and shipped to outside consumption centers, such as in Makeni, Port Loko, Bo, and Freetown. Aside from small farmers' storages, only one agricultural product warehouse exists in the Project Area, and this is located in Kamakwie. One small-scale and outdated rice polishing plant is located in Kamakwie and one in Kamalu.

Crop shipment activities reach a peak soon after harvesting because of inadequate storage facilities and of the people's poverty. Thus, crop prices differ greatly before and after harvesting. In order to minimize fluctuations in the price of rice, the Government, through the Rice Corporation, controls the price through the purchase and release of rice as required.

(2) Livestock Distribution (Trade with Guinea)

Important to the livestock industry of Sierra Leone are cattle, sheep, and goats which come from Guinea, but their number is not known because the nomads move freely across the border. The Hunting Technical Service Limited, England, reports that, of the total 57,000 cattle brought to the market in 1978, 34,200 or 60% had come from Guinea. Those which are brought from Guinea to the Bombali District are sold at markets in Tambakha, Lokhata, Saniya, and Fintonia and, after going through a veterinary inspection station of the Ministry of Agriculture and National Resources in Kamakwie or Panlap, are shipped to Makeni by truck. In 1978, 7,400 cattle, 4,000 sheep, and 3,100 goats were channeled through

the veterinary inspection stations, according to their Annual Report and Field Record. These totals consist of livestock from Guinea, the Tanpakha Chiefdom, the Bombali District, and the Port Loko District, and those raised within the Project Area, but breakdown is unknown.

8) Agricultural Crop Transport

The composition of agricultural products of Sierra Leone by means of transport for shipment to market are presented in Table 2-9, based on information from the Central Statistic Office. The table shows that the use of trucks is the highest in the Eastern Province and the lowest in the Northern Province (except in the western region), where the share of "headload" transport is the highest, indicating a low level of road network development. No oxcart has ever been used in Sierra Leone, and those who live away from a truck-served road have to rely on headload transport only. Road network development will be indispensable to future agricultural development in this region.

9) Crop Price

Rice

The price of rice fluctuates substantially by season, as shown in Table 2-10. For the purpose of stabilizing rice price, the Government established in 1965 the Rice Corporation, which functions to maintain a proper balance between demand and supply of rice through importation, purchase from villages, and distribution to the consumer of this commodity. The retail price of rice is established by the Ministry of Commerce and Industry, the Ministry of Agriculture and Natural Resources, and the Rice Corporation.

Table 2-9 Transportation Methods of Agricultural Products to Markets

(in percentage)

	By headload to:		Truck to:		Headload & truck to:		Other means* to:	
	total	province	total	province	total	province	total	province
Southern Province	16.5	48.7	9.4	27.7	7.2	21.2	0.8	2.4
Eastern Province	14.8	43.7	15.3	44.8	3.5	10.3	0.4	1.2
Northern Province	17.6	60.3	4.8	16.5	6.0	20.5	0.8	2.7
Western Area	2.1	70.0	0.3	10.0	0.6	20.0	-	-
Sierra Leone	51.0	55.7	29.7	24.8	17.3	18.0	2.0	1.5

Note: * including boats and bicycles
Source: Central Statistics Office

Table 2-10 Average Retail Price of Milled Rice in Sierra Leone

	Price in Le/2,200lbs
1st Quarter (heaviest season)	380
2nd Quarter	410
3rd Quarter	470
4th Quarter	650
Annual Average	451

Source: Report of "Study on the Marketing, Processing, and Storage of Rice in Sierra Leone"

The functions of the Rice Corporation were transferred in April 1979 to the Sierra Leone Produce Marketing Board (SLPMB), which buys unhulled rice from farmers at 6.00 to 12.00 Leone per bushel, and sells polished rice to consumers at 21.00 Leone per 110 pounds.

Miscellaneous Crop Price

Table 2-11 shows the average prices of various agricultural crops produced in the Project Area, based on information from the Northern Province offices of IADP and the Ministry of Agriculture and Natural Resources and the results of an agricultural survey by the JICA Mission.

Table 2-11 Market Price of Agricultural Products in the Project Area

Products	Unit	Price(Le)*	Remarks
Paddy rice	lb	0.08	
Maize	lb	0.06	
Guinea corn	lb	0.05	
Millet	lb	0.06	
Cassava	lb	0.02	Fresh tuber
Sweet potato	lb	0.03	"
Groundnuts	lb	0.08	Unshelled
Tobacco	lb	0.53	
Orange	lb	0.02	
Mango	lb	0.03	
Banana	lb	0.04	
Cattle	head	0.34	Live body
Sheep	head	0.80	"
Goat	head	0.80	"

Note: * Average price

Source: Mentioned in above paragraph

2.4 Ongoing Development Projects

1) Agricultural Projects

(1) The Integrated Agricultural Development Project

The Agricultural Development 5-Year Plan, 1974-1977, of the Government of Sierra Leone aims at the achievement of self-sufficiency in rice, the promotion of export crops, such as cocoa, coffee, and oil palm kernel, the improvement of agricultural benefits, and the increase of farmers' income. In order to accomplish these objectives, the Government is currently implementing a number of various agricultural development projects throughout the nation, but, of these projects, the Integrated Agricultural Development Project (IADP) for the Northern and Eastern Provinces is most emphasized by the Government. The IADP was implemented in 1972 with loans of 5,000,000 dollars each from the World Bank (IAD) and the Central Bank of Sierra Leone at 8.5% per annum interest, a moratorium of five years, and a redemption period of 25 years. Under the IADP, 3,300 acres of rice paddies, 670,000 acres of cocoa plantations, 508 acres of oil palm plantations, and 955 acres of oil palm farms have already been developed in the Eastern Province. In the Northern Province, the IADP has a regional headquarters in Makeni and covers the project in the Tonkolili and Bombali Districts. In the Project Area, four chiefdoms (Makari Gbanti, Pendenbu Gowahun, Sanda Eraran, and Gbanti Kamaranka) of Bombali are covered by the IADP Project. The Northern Province IADP has two purposes: one is agricultural production expansion and accompanying farmers' income increase, and the other is the establishment of organizations, including farmers cooperative (s), which will continue to offer technical assistance long after the completion of the project.

IADP activities include:

- The construction of feeder roads for a total extension of 20 miles, and the improvement of feeder roads for 280 miles.
- The drilling of 200 common village wells with a 50% subsidy.
- The construction of five village markets.
- The construction of a training centre.

- The construction of the project office building, warehouse(s), and employee dormitory(ies).
- The establishment of extension and other agricultural support systems, fosteration of extension agents, procurement and maintenance of vehicles and other necessary equipment/materials.
- Short-term and middle-term loans to finance labour, fertilizers, chemicals, and other farming expenses.
- Multiplication of superior seeds.
- Feasibility studies on livestock development and afforestration for the production of fuel wood for leaf tobacco curing.

Project implementation has made smooth progress, though a little behind schedule. The project organization consists of five parts:

Administration,

Accounting,

Extension and Training,

Land Preservation/Development,

(Land survey and other efforts to gather information, swampland development, water (flood) control, road construction, potable water supply, supervision of dwelling house construction, and public works) and

Economic Service

(Farming materials supply, farming fund loan, agricultural crop processing as necessary, and market adjustment).

(2) Seed Multiplication

Realizing the need of superior seed (particularly of rice) multiplication and a seed distribution system to successful agricultural development, the Government of Sierra Leone implemented a superior seed multiplication project in 1976, under the assistance of West Germany. Under this project, four seed centres have been established in Sierra Leone: Kobia Main Farm, Makeni Seed Centre, Kenema Seed Centre, and Rokpur Agricultural Experiment Station. The Makeni Seed Centre has seed production

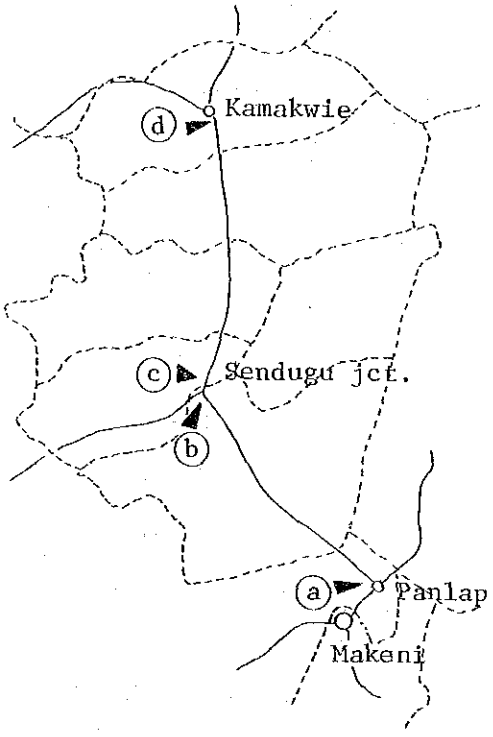

Table 3-1 ADT Traffic Count Station by MOW in January, 1979

	Station	Cars	Vans & Pickups	Trucks & Buses	Extra Heavy Vehicles	Total
ⓐ	Panlap	38	85	40	28	191
ⓑ	Sendugu jct.	9	23	41	-	73
ⓒ	Sendugu jct.	10	27	36	-	73
ⓓ	Kamakwie	20	34	32	7	93

Source: Statistics of MOW

Table 2-12 Quantity of Rice Seed Bought from Seed Growers in Makeni Area (1979)

Variety	Quantity (Bushel)
Rok 3	2,604
Rok 5	38
Rok 6	36
Rok 7	36
CP 4	259
LAC 23	125
RH 2	200
TOS 78	8
CCA 6	6
Total	3,312

Note: It is estimated that additional seeds of as much as 200 bushels will be obtained.

Source: Annual Report for Seed Multiplication Project in 1979, Ministry of Agriculture and Forestry, Sierra Leone

Table 2-13 Crop Production in 1970/71

Crop	District or Province	Cropped Area (Acre)	lbs/Acre	Production (1,000 lbs)
Swamp rice	Bombali D.	7,038.15	1,229	8,648
	Northern P.	119,297.55	1,274	151,939
	Southern P.	36,192.68	1,295	46,852
	Sierra Leone	206,810.17	1,367	272,588
Upland rice	Bombali D.	46,786.91	1,029	48,131
	Northern P.	224,725.26	1,063	238,935
	Southern P.	233,934.94	1,183	276,802
	Sierra Leone	600,747.31	1,168	701,746
Maize	Bombali D.	3,663.59	884	3,240
	Northern P.	10,418.64	884	9,210
	Southern P.	11,743.87	884	10,381
	Sierra Leone	25,891.41	884	22,887
Guinea corn	Bombali D.	1,237.80	1,100	1,362
	Northern P.	8,282.75	1,100	91,110
	Southern P.	519.20	1,100	571
	Sierra Leone	11,737.46	1,100	12,911
Millet	Bombali D.	6,805.28	982	6,683
	Northern P.	9,671.86	982	9,499
	Southern P.	1,429.80	982	1,404
	Sierra Leone	14,090.29	982	13,838
Cassava	Bombali D.	2,211.38	4,337	9,590
	Northern P.	27,219.98	4,337	118,049
	Southern P.	6,803.83	4,337	29,507
	Sierra Leone	41,180.14	4,337	178,593
Sweet potato	Bombali D.	1,252.25	2,323	2,980
	Northern P.	8,239.76	2,323	19,137
	Southern P.	615.83	2,323	1,430
	Sierra Leone	17,338.60	2,323	40,270
Groundnuts	Bombali D.	14,407.81	962	13,855
	Northern P.	26,766.82	962	25,740
	Southern P.	4,703.25	962	4,523
	Sierra Leone	34,128.10	962	32,818
Orange	Bombali D.	758.46	8,593	6,518
	Northern P.	3,246.56	8,593	27,898
	Southern P.	2,152.06	8,593	18,493
	Sierra Leone	11,861.91	8,593	101,932
Mango	Bombali D.	296.32	4,419	1,310
	Northern P.	864.45	4,419	3,820
	Southern P.	343.62	4,419	1,519
	Sierra Leone	1,730.56	4,419	7,648
Banana	Bombali D.	221.34	2,946	652
	Northern P.	1,571.87	2,946	4,631
	Southern P.	2,320.26	2,946	6,836
	Sierra Leone	10,221.64	2,946	30,115

Source: Agricultural Census in Sierra Leone in 1970/71

CHAPTER 3

PRESENT CONDITIONS OF THE PROJECT ROAD

CHAPTER 3

CURRENT CONDITIONS OF THE PROJECT ROAD

3.1 Current Traffic Situation and Characteristics

1) Road Network

The Makeni - Kamakwie Road is a semi-trunk road which starts from the central city (Makeni) of the Northern Province, runs through one of the nation's principal agricultural areas, and reaches a "nucleus" city (Kamakwie) of the north for a total extension of 53.1 miles (about 85.4 kilometers). The feeder roads (at least seven of which are very important) which converge into the Makeni - Kamakwie Road play a vital role in the shipment of agricultural products. The Sendugu - Batkanu - Port Loko Road,* an inter-city road, performs the role of a feeder road and also converges into the Makeni - Kamakwie Road.

2) Current Traffic Volume

Current ADT on the Makeni - Kamakwie Road is estimated at about 50 vehicles in rural areas and 150 in suburban areas. The following supports these estimates:

(1) The Ministry of Works took traffic surveys at Panlap, Sendugu, and Kamakwie in January (dry season) of each year since 1975. The 1979 findings of ADT are given in Table 3-1. (See Appendix F,G for a detailed time series data.)

* This used to be the major access to Port Loko and Freetown from the Kamakwie District before the completion of the Lunsar - Makeni - Sefadu Expressway.