

PROJECT EVALUATION SUMMARY (PES) - PART I

Report Number: L-107

1. PROJECT TITLE <b>CARE Rural Penetration Roads II</b>			2. PROJECT NUMBER <b>636-01114</b>	3. REGION/COUNTRY OFFICE <b>USAID/L</b>
ORG/ <b>aid-G-140C</b>			4. EVALUATION NUMBER (Enter the number maintained by the reporting unit, e.g., Country of AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1, last 5 digits) <b>12/78</b>	
<b>22/B/1</b>			5. REGULAR EVALUATION <input checked="" type="checkbox"/> SPECIAL EVALUATION <input type="checkbox"/>	
6. KEY PROJECT IMPLEMENTATION DATES		7. ESTIMATED PROJECT FUNDING		7. PERIOD COVERED BY EVALUATION
A. Type of Project <b>Development</b>	B. Time Commenced <b>FY 78</b>	C. Fiscal Year <b>FY 80</b>	A. Total <b>\$8,521,200</b>	From (month/year) <b>7/77</b>
			B. U.S. <b>\$3,991,000</b>	To (month/year) <b>10/78</b>

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. LINE NUMBER AND ORIGINATOR (NOTE: REPORT NUMBER WHICH INCLUDES AID/W IS REPORT OFFICE AGENCY, AGENCY TYPE OF DOCUMENT, A.I. REPORT, OFAS, P/C, etc. and is printed in bold type)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Presentation of Evaluation for authorization of 20-year funding	GER/COM/ROD Grant Officer	12/78

Best Available Document

9. INVENTORY OF DOCUMENTS TO BE REVIEWED FOR ABOVE DECISIONS:			10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT		
<input type="checkbox"/> Project Paper	<input checked="" type="checkbox"/> Implementation Plan	<input type="checkbox"/> Other (Specify)	A. <input checked="" type="checkbox"/> Continue Project Without Change	<input type="checkbox"/> Change Project Description and/or	<input type="checkbox"/> Change Implementation Plan
<input type="checkbox"/> Financial Plan	<input checked="" type="checkbox"/> P/C/P	<input type="checkbox"/> Other (Specify)	B. <input type="checkbox"/> Discontinue Project		
<input checked="" type="checkbox"/> Logical Framework	<input type="checkbox"/> P/C/C				
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> P/C/P				
11. PROJECT OFFICER AND HOST COUNTRY OR OTHER BANKING PARTICIPANTS AS APPROPRIATE (Name and Title)			12. Mission/AID/W Office Director Approved		
Arthur V. Patrick, USAID/L Dennis Brown, CARE/SL			Signature:  Typed Name: <b>Reno Ray Gamble, Dir.</b>		

SIERRA LEONE/CARE FEEDER ROADS II

OPG/AFR-R-1400

PROJECT NO. 636-0111

1st ANNUAL EVALUATION REPORT  
Period Ending June 30, 1978

Total Grant : \$3,991,000

1st Year's Funding: \$1,800,000

PIO/T No. : 80018

Appropriation: 72-1181021

Allotment : 843-50-636-00-69-81

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Prepared by: Arthur V. Patrick, USAID/L  
Project Manager

USAID/LIBERIA  
OCTOBER, 1978

MAP 1. SIERRA LEONE : SITUATION OF EVALUATION AREAS.

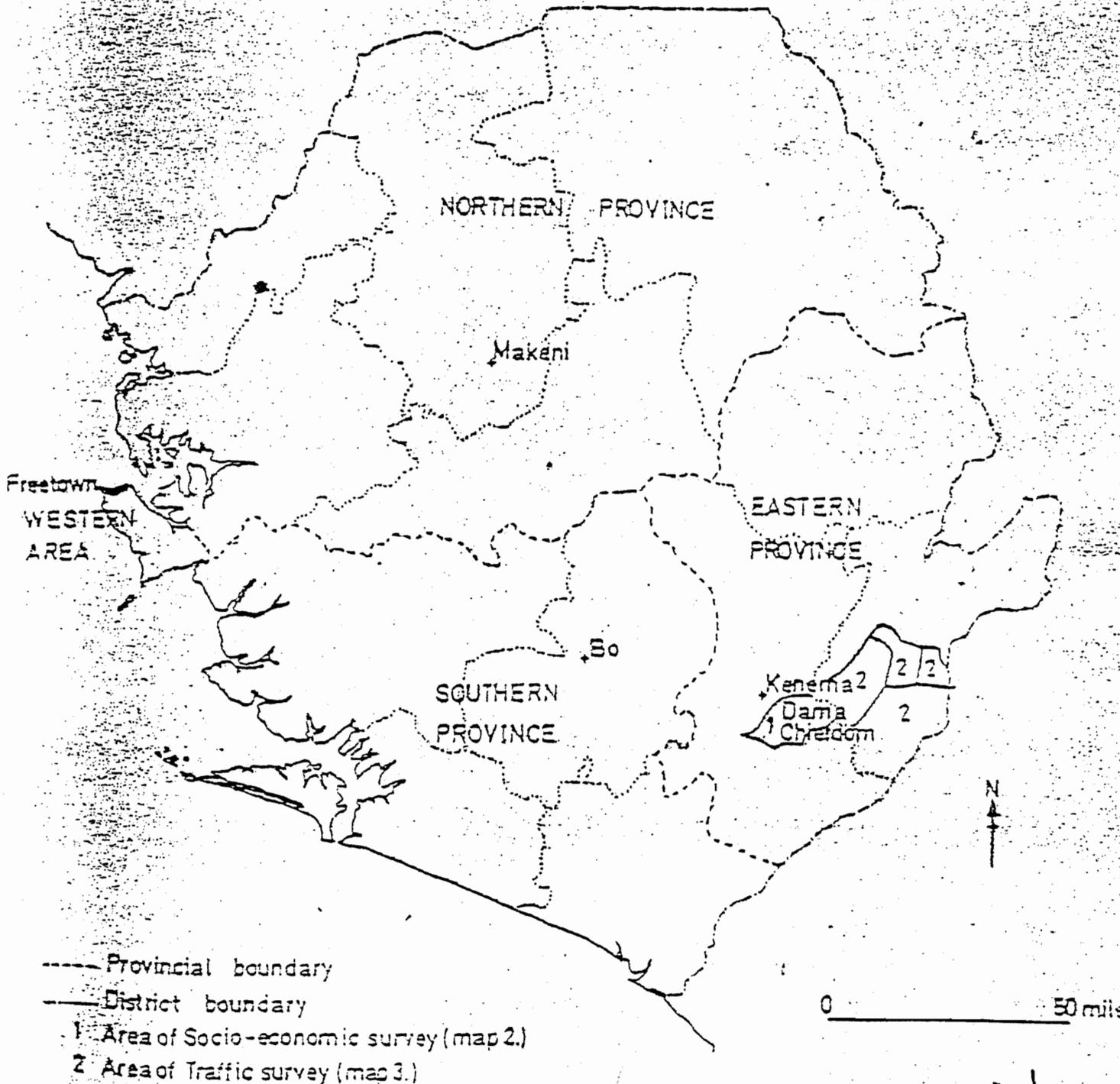


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I. INTRODUCTION

A. Background:

1) In December 1972, with assistance from the International Development Association (IDA), an Integrated Agricultural Development Project (IADP) was undertaken in 32 chiefdoms in Sierra Leone. That project was aimed at improving the income and living standards in potentially rich agricultural areas. A major omission in the project's design was provision for penetration roads to support the anticipated flow of new services into the area and increased farm production out of the area.

2) With the assistance of CARE, which had previously constructed such roads in Sierra Leone, a program was designed to construct feeder roads to complement the IADP activities. CARE, along with representatives from IBRD, UNDP, Peace Corps and USAID, developed a proposal which was submitted to AID/Washington and approved in May, 1975, resulting in the first Operational Program Grant (OPG) No. 1154 awarded to a Private Volunteer Agency (PVA) for implementation of a national development program. A joint USAID/CARE on-site evaluation of OPG-1154 resulted in a recommendation to extend and expand that feeder road program. The result was the subject OPG-1400 to assist in partially financing a \$8.5 million 3 year program to build 400 miles of feeder roads from July, 1977 through September, 1980.

B. Evaluation:

1. Purpose: AID is concerned basically in assessing a project as

to its social and economic impact, its technical soundness and its administrative effectiveness. The subject \$3.99 million OPG-1400 was approved and authorized for three annual incremental fundings, subject to specific "essential terms, covenants and major conditions". One of those major conditions was the completion of an annual evaluation prior to the obligation of the 2d increment of \$1,141,000 for FY-79 and the 3rd for \$1,050,000 for FY-80. These evaluations must show, quote, "satisfactorily to AA/AFR that the GOSL has made progress toward the establishment of a road maintenance capability to maintain the road system in Sierra Leone" unquote. (1)A second purpose of this evaluation is to review the progress to date towards achieving the other project objectives and implementation activities and to spot-light problem areas.

2. Methodology: The Project Authorization and Request for Allotment of Funds, Part II (PAF-II) contains the conditions precedent, covenants and terms of the grant. But unfortunately all of these were not incooperated into the Grant Agreement that was signed, nor was the authorization and funding completed (3/27/78) as early as was first intended (9/1/77). This five months delay contributed greatly to the obvious shortfalls in project outputs as well as inputs. With that critical and pervading delay in mind, the objectives, implementation activities and evaluation scope, as set forth in the Grant Agreement and the project's first year's operations, was assessed.

3. Team Members: The evaluation has been conducted jointly by USAID/Liberia and CARE/Sierra Leone representatives with colloborative  
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(1) See Project Authorization and Request for Allotment of Funds Part II, (PAF-II) Page 1 Dated 2/8/78.

inputs from officials of the GOSL Ministry of Works. The socio-economic and traffic survey up-dating was prepared by an agricultural economist/ecologist at N'Jala University, under an USAID Personal Services contract.

Dennis Brown, CARE/SL  
Feeder Road Project Coordinator  
Antony Airey, N'Jala University  
Christian B. Roberts, Chief Engineer  
Highway Maintenance  
Howard Guiot, USAID/L  
Engineering Advisor  
Arthur V. Patrick, USAID/L  
Project Manager

#### SUMMARY FINDINGS

##### A. Conclusions:

- 1) Of the six basic assumptions upon which the project's effectiveness and its authorization were based, three of them have proven to be erroneous, thereby contributing to unexpected reduced production and increased costs. The fundamental assumption that the subject grant would be approved and authorized by August, 1977 to permit equipment and spare parts purchase and availability by the Dec. 77 start of the dry construction season, proved to be optimistic by six months. This seriously effected the three other project assumptions of a) timely availability of all donors' contributions b) timely delivery of new equipment and c) timely availability of spare parts for old equipment. The delay resulted from lengthy discussions and resolution of AID/W concerns about justifications of short-spur roads of 3 miles or less and about guarantees by GOSL for their budgetary support and the past and future road maintenance capability of their Ministry of Works (MOW).
- 2) The original project purpose of providing farmers in the impact

areas with increased and continued access to agricultural inputs and market outlets is being limitedly achieved in the areas where project roads have been completed. As reported in the updated socio-economic report, (2) a recent survey showed that the use of fertilizer has increased in the road-impacted areas, as well as an increase in agricultural extension service activity. Increases in marketing of low value, high bulk annual crops such as rice, cassava and bananas were also shown for sample communities along some project roads.

3) Original inputs by various donors are expected to be met, but on a delayed or advanced implementation schedule, again due to the initial delay of the project's authorization. Without the AID funds for the first 5½ months of this year, CARE at one point was faced with the possibility of shutting down all of its operations for lack of operating capital. Fortunately, the IBRD agreed to advance a large portion of its contributions.

4) Original output targets will fall short of predictions, due to delayed grant authorization, but some recoupment may be possible during the next construction season when the new equipment and spare parts are available. Based upon pre-grant experiences of CARE and AID's involvement in its first feeder roads' grant, it was estimated that the subject second grant would achieve 400 miles over the 3 year life-of-the project. This was at first estimated as 133 miles per year, but later reduced to 100 miles for the first year's new construction, 38 miles of major maintenance and 153 miles of minor maintenance. Without the AID-funded

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(2) June - Aug 1978, Antony Airey: See Attachment B.

equipment and spare parts only 63 miles of new roads were constructed. With the additional shortcomings of the Ministry of Works' lack of performance, only 5 miles of major maintenance and 80 miles of minor maintenance were accomplished.

5) The project's first year of operation saw several significant changes in design and in the intended execution of the project. Special waivers were initially obtained at the time of authorization, to permit expeditions procurement of specific types and quantities of new equipment, spare parts, fuel and oil and cement with AID funds and from specific sources and origins. There also was a list of roads initially approved for construction during the project's first year of operation. Subsequent studies and recommendations resulted in a) 5 changes in the "MIX" of equipment, b) 2 changes to the approved list of roads to be constructed, c) elimination of cement purchases from AID funds and d) reduction of the amount of fuel and oil to be purchased with AID funds. All of these changes were reviewed and approved as being necessary for the most effective implementation of the project, based upon subsequent realities, but still remained within the original budgets for the respective categories and their cost allocations.

6) CARE's performance has been satisfactory. Despite the handicap of delayed AID authorization and availability of AID funds, CARE has effectively carried out its responsibilities in the areas of administration, staffing, procurement, construction, maintenance, maintenance training and reporting. Where performance has unavoidably been less

than expected, such as reduced road construction and maintenance outputs, performance should increase in the 2d year's operations with receipt of the recently ordered new equipment and spare parts, and with improved participation and performance of the Ministry of Works. CARE's failure to provide the required economic benefits' justification for 6 short spur roads of 3 miles or less was due to failure of USAID/L to accept or reject CARE's inclusion of these roads in FY-78 construction schedule.<sup>3/</sup>

7) The GOSL's performance, other than its Ministry of Works, has been satisfactory. One of the assumptions of project effectiveness was "that GOSL has continued to place a high priority in support of this project by meeting its financial commitments in accordance with the project budget."<sup>4/</sup> This it has done for the past two years as evidenced by its allocations in its National Domestic Development Budgets. It has further performed satisfactorily in approving recommended new roads' site-selections through the sub-committee of the Rural Penetration Roads Project Coordinating Committee which has been established within the Office of The Vice President of Sierra Leone (Hon. S.I. Koroma).<sup>5/</sup>

8) The Ministry of Works' Performance to date has been less than satisfactory. Of the 11 tasks MOW was responsible to perform only 4 have been started to date. Of those 4, the most important has been the funding of a Feeder Roads Maintenance Unit. and the designation of its head, C.B. Roberts, Chief Engineer. Also of significance has been the

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3/ See CARE's Construction Report for 7/77 through 10/77

4/ P. 13, PAF-II, Sec. 2.2.6.C.

5/ Coordinating Committee: Ministry of Agriculture and Natural Resources (MANR), Min. of Finance, Devl, and Economic Planning (MFDEP), Min. of Interior, Min. of Education, Rural Development and Soc. Welfare, Min. of Tourism, Peace Corps, CARE & GOSL Office of the V.P.

designation and deployment of 18 of the 24 MOW on-the-job overseer-trainees in CARE's Road Maintenance Units. Of the 7 tasks not yet started, perhaps the most important non-performance has been the failure to establish the necessary policy of the Feeder Roads Maintenance requirements over the primary and secondary roads' maintenance needs and the requisite advance planning for staff, equipment, scheduling and costs (initial and recurrent) to eventually assume full and effective responsibility for maintenance of all 600 miles of the CARE feeder roads by 1982, or sooner if possible.

9) The performance of the other donors has been satisfactory. Peace Corps (PC), Voluntary Service Organization (VSO) and inputs from IBRD, the Canadian University Students Overseas (CUSO) have all been satisfactory, despite the circumstances of unavoidable delays in the initial implementation schedules. See also item 3 above.

#### B. RECOMMENDATIONS

1) AID's 2d annual incremental funding for FY-79 (\$1.141 million for 2d year's operations) should be authorized by AID/W as soon as possible. But not later than Dec. 31, 1978. Despite the less than adequate performance of the Ministry of Works, two significant factors support this recommendation: a) CARE was prevented from obtaining the critically needed additional equipment and spare parts during any part of the first year's construction period, without which the intended 1st year production targets were never expected to be met; b) four of the five donors to the project made satisfactory and timely contributions to the project. AID's delayed authorization was the primary cause for production shortfalls.

2) The next annual evaluation exercise should be conducted by the Grant Officer and should begin in mid-July, 1979. This follows the end of the dry-season construction period (June) and also coincides with the end of CARE's Fiscal Year, thereby making available CARE's detailed annual reports.

3) The next annual evaluation report should not recommend the 3d incremental funding of \$1.050 million for FY-80, unless there is clear and convincing documentation of consistent and positive Ministry of Work's performance from October, 1978 through June, 1979.

4) The Grant Officer functions and responsibilities should be redesignated from SER/COM/ROD to the USAID/SL office. This would avoid the numerous and unnecessary past delays of administrative and implementation actions and improve coordination between New York, Freetown and Abidjan inputs.

5) REDSO/W should assume from USAID/L all operational support services for Freetown except Executive Office and Controller functions. which USAID/L will continue to provide. This should take effect upon USAID/Liberia's submission of the 1st Annual Evaluation Report to AID/W. See Abidjan 8880 in Nov. 1978.

6) Future project authorizations should contain annually revised implementation schedules which allows for differences/slippages in the time-frames contained in the original proposal and the subsequent dates funds become available for project use.

### III. ASSESSMENT OF PROJECT'S BASIC ASSUMPTIONS

A. The Project Proposal and the subsequent authorization of funds

contained a set of six basic assumptions, (6) the validity of which is necessary for timely achievement of the intended output targets and the project's purpose:

1) All Donor Contributions received in a timely manner. With five donors (7) contributing to the project, it is clear that the assumption that accomplishment of the project purpose is dependent upon timely contributions from each is appropriate. During this grant's 1st year of operation only one donor was significantly tardy.

It was AID's delayed contribution, due to a lengthy AID/W review and approval process, that seriously effected the intended output targets for road production and road maintenance. Because AID's funds were primarily for 1st year purchase of needed new road building and road maintenance equipment and for spare parts for existing old equipment, this delay has also invalidated two other of the basic six assumptions. (See No. 2 and 3 below). In the project proposal and PAF-II implementation schedules, it was anticipated that the AID grant would be approved in AID/W by August, 1977 and equipment orders placed by September, 1977 with delivery by December, 1978. Grant approval did not take place until Feb. 1978. The Grant Agreement was subsequently signed late in March and equipment orders were unable to be placed until June and July 1978. (This was also partially due to CARE making 5 changes in its list of required equipment and again, AID's delays in approving that final list). Final delivery is now expected by late December, 1978. (12 months later than planned).

(6) See p. 13 PAF-II, Sec. 2.2.6 and Logframe Annex H.

(7) AID, CARE, Voluntary Service Organization (VSO)/Peace Corps (PC), GOSL and the World Bank (IBRD).

AID's delay in reviewing and approving the proposal was not intentionally dilatory. Upon its initial review of the proposal, the Executive Committee for Project Reviews (ECPR) raised several reasonable questions concerning a) The economic benefits to be derived from "short spur" roads of 3 miles or less, b) The environmental impact of the roads to be constructed and c) proper maintenance of the road after they are constructed. These issues were finally resolved by adding 2 covenants and one condition precedent to disbursement of funds in the Project Authorization and Request for Allotment of Funds (PAF).

2) Timely delivery of all new equipment. This assumption fell as a result of the failure of No. 1 above. Since 96% of all new equipment procurement in the 1st year was to be funded by AID, none of the new equipment was timely ordered, paid for nor delivered. Currently, estimations for delivery are for December, 1978 at the earliest or Feb. 1979 at the latest, depending upon manufacturers' production schedules and international shipping schedules from U.S. to Sierra Leone.

3. Adequate spare parts available to have existing equipment useful at least 70% of the times needed. The GOSL has supplied CARE with a part of its present fleet of road construction equipment, some of which are U.S. brands and some of which are non-U.S. In an effort to make the old and the new equipment compatible and standardized for parts interchangeability with resulting economies of maintenance and greater technical familiarity, provisions were included in the grant proposal to permit procurement of a mix of spare parts. The grant proposal (Waiver Request No.1) called for \$85,000 of AID funds to be used for purchase of spare parts for existing non-U.S. road building equipment, and up to \$150,000 for spare parts for the new U.S. equipment.

Because of the delayed funding, CARE was forced to, postpone procurement of these critical replacement parts. All of this negatively affected the procurement, utilization and availability of spare parts, resulting in an over-all average of existing machinery being usefully available only 55% of the time.

4) (Dry) weather permits 32 full weeks of construction time. Only 30 working weeks were possible during the first year of this project. This assumption proved to be inaccurate by two weeks or 6% over estimation, due to the unpredictability of the "rainy season" which varies in length and volume between April through November of each year. Experience has indicated that major construction work can be and has been accomplished during the 9 month/32-week "Dry" period starting about mid-October through the end of June. Lesser construction activities such as bush-clearing and grubbing can still be effectively accomplished in moderate rain during the transitional months of light rains from April - June and from October - December.

The 6% overestimation of the work season reflects itself in theoretical shortfall of  $7\frac{1}{2}$  miles of road production each year, under optimum circumstances (or  $22\frac{1}{2}$  miles over the life-of-the Project-LOP). This is significant in the long run to the extent that a ten percent reduction of the 400 miles LOP target results in an Economic Rate of Return (ERR) reduction from 18 percent to a still acceptable 16.1 percent. Any further reduction of miles actually completed would embarrassing render the project economically unjustified at its conclusion. Future production projections for this, and similar projects in similar rain belts should use the more realistic and conservative 30-week dry work season.

5) Adequate and timely availability of local communal labor.

This assumption has proven to be correct and workable. Fortunately, the original pre-1973 concept of using large numbers of communal laborers to construct and maintain the project roads on a self-help basis was modified in light of the following realities:

- a. The supply of unskilled labor is not constant and fluctuates with the agricultural growing season
- b. A daily wage which would be competitive with agriculture could not be paid, and even if it could be paid, it would then result in a deficit agricultural labor supply
- c. The type of feeder roads to be constructed requires considerable cutting and filling and movement of vast volumes of earth which, if done only manually, would require an estimated 3,600 persons for 32 weeks to complete 150 miles.

The present workable system involves a) the site engineers negotiating with clan chiefs for the required number of laborers to volunteer for road work in their immediate area, b) these volunteers are organized into groups that work six and half days for a week, followed by other groups for succeeding weeks and c) the clan chiefs and local recruiters are paid but the volunteers are not. The results have been a reliable flow of approximately 100 volunteers each work day for road construction in all areas and another 100 each day for maintenance throughout the construction season. The GOSL's first project year in-kind contribution value of the communal labor for construction and maintenance is estimated to have been \$45,000 based on a value of \$1.00 per man-day (9 mo. x 25 work-days x \$200 per day).

6. The GOSL has continued to place a high priority in support of this project by meeting its financial commitments in accordance with the project budget. As can be seen in the table below, 28% of Sierra Leone's total national budget for development and economic planning was devoted to this project for FY-78. Although, the percent for FY-79 is only 7%, note that the dollar amount is actually increased by \$28,400 for a total of \$500,000. Note also that in table 1-D, page 28, GOSL actually expended \$6,800 more in FY-77 than budgeted for this project in FY-78.

Summary of the Government of Sierra Leone's  
Domestic Development Budget\*  
(S000)

<u>Category</u>	<u>FY - 78</u>		<u>FY - 79</u>	
	<u>Amount</u>	<u>% of Total</u>	<u>Amount</u>	<u>% of Total</u>
Total Domestic Development Budget	16,082.0		26,291.0	
a) Ministry of Agriculture and Natural Resources	4,055.6	25	4,659.0	18
b) Ministry of Works	1,477.3	9	2,464.0	9
c) Ministry of Education, Social Welfare and Rural Development	1,677.3	12	2,591.0	10
d) Ministry of Health	849.0	5	945.0	4
e) Ministry of Finance Development and Economic Planning	1,715.0	11	6,752.0	26
f) CARE Rural Penetrative Road	471.6	28 of (e)	500.0	7 of (e)

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\* Government of Sierra Leone development estimates: 1977/1978 and 1978/79 (FY= July - June). Table does not list all line items as contained in Government Budget.

FY-77 converted at S1 = Le 1.06  
FY-79 converted at S1 = Le 1

IV. ASSESSMENT OF PROJECT'S BASIC PURPOSE

The basic purpose of the project is to provide approximately 14,800 farmers and their families in the three impact areas (North, East and South) with increased and continued access to agricultural inputs, to market outlets and to a range of development services.<sup>8/</sup> In order to measure the extent of impact this project makes towards achieving the intended goals and purpose, socio-economic surveys are to be conducted as part of the annual evaluations. In July, 1978, Antony Airey of Lanchester Polytechnic University, a visiting lecturer at N'Jala University at Kenema, again headed a survey team of native-speaking agricultural economists that interviewed farmers in one of the project impact areas (East).<sup>9/</sup>

The Dama chiefdom in the Kenema District, east and west of the Kenema-Joru trunk road was studied and traffic surveys made. Dama, a Mende chiefdom, was identified as a suitable site for the survey. In this chiefdom CARE has been building two roads, R.95 and R.95a since late 1976. The communities in the area have had approximately 2 years to adjust to increased accessibility. See map 2 below. Dama also has the advantage of having similar environmental conditions to the adjacent areas where previous research has heretofore been concentrated.

The Dama chiefdom is one of the largest chiefdoms in the district, with an estimated area of 196 square miles. It is the fifth largest chiefdom in population terms, with 16,575 inhabitants. This is an

8/ See p.3 and Annex H of OPG Proposal

9/ See full report in Annex B.

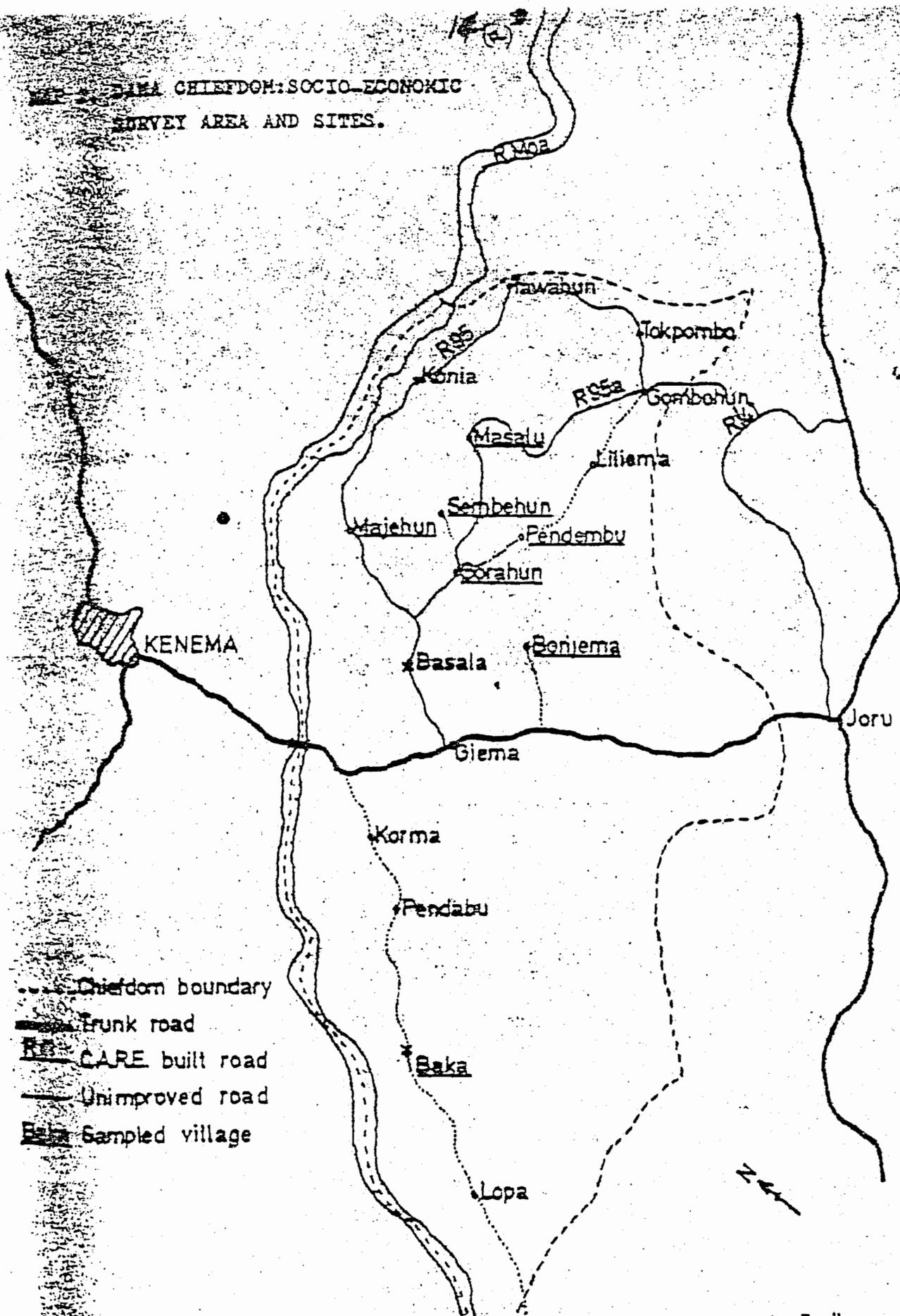
overall density of 84.6 people to the square mile, quite a favorable ratio in national terms; the national density is 98.5 people to the square mile.

For this year's survey an evaluative framework was established based on the "with/without CARE" situation, since longitudinal "before and after" analysis has not, as yet, been possible. Using secondary sources, particularly data on the 1:50,000 map series (2d edition) and unpublished information from the 1974 census of population, settlements were pre-selected in an attempt to identify distinctions between those which have been directly affected by the CARE Feeder Road Building Programme (F.R.B.P.) and otherwise similar communities not involved with the CARE program. The following classes were identified:

1. Villages on secondary roads.
  - (a) Villages affected by the F.R.B.P.'s upgrading and renovation of the secondary road.
  - (b) Villages sited on unimproved secondary roads.
2. Villages on seasonally motorable tracks.
  - (a) Villages affected by the F.R.B.P.'s upgrading and renovation of the track.
  - (b) Villages sited on unimproved track.
3. Villages on minor tracks, which may or may not be motorable.
  - (a) Villages affected by the F.R.B.P.'s upgrading and renovation of the track.
  - (b) Villages sited on unimproved track.

Another settlement was selected, which appeared to be totally unconnected to the national road network other than by footpaths. This was to serve

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KEMA CHIEFDOM: SOCIO-ECONOMIC SURVEY AREA AND SITES.



- - - Chiefdom boundary
- ▬ Trunk road
- R CARE built road
- Unimproved road
- Sampled village

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as an overall control which might be categorized as 4c type settlement.

Within each village up to 50% of the farming households (mawe) were selected at random to be interviewed by Mende interviewers. The interviewers, all under-graduates of Njala University College, were trained to administer a Prepared and pre-tested interview schedule. These completed schedules, 117 in number, provided the basic data for the analysis in the report. Excerpts are presented below that relate to progress towards achieving the project's basic purpose.

A. Increased knowledge of availability of Agricultural Extension Services. The study revealed that this intermediate goal was being met, as evidenced by greater use of crop fertilizers by villagers along the project roads. This was due primarily to increased visitations by the local Agricultural Extension Service Officers. The Cacao Development Officer revealed that over 50% of his contacts were now in the road-related villages as opposed to only 11% in the near-by non-road communities. The figures were 50% and 24%, respectively, for the Swamp Rice Development Officer.

B. Increased Marketing of Crops. (See page 19).

The majority of the population in Dama chiefdom depend on agriculture for both subsistence and cash income. There is some diamond mining, but it is ill-organized and speculative in nature, with, it would appear, a declining impact on the chiefdom's economy. Agricultural activities in Dama chiefdom are primarily concerned with the cultivation of rice, coffee and Cacao. The former is generally the principal crop in an annual rotational bush fallow system. Rice is the subsistence crop, providing

the preferred staple in the typical farmers diet.

Coffee and cacao are the usual cash crops of the chiefdom farmers. Coffee is more important than the latter; there were 52,000 coffee farmers in Eastern Province in 1970, compared with 40,000 cacao farmers.

Both crops are produced by smallholders who have planted or inherited their tree crop farms as more permanent features of the agricultural landscape. Acreages are therefore small (in per capita terms), more than two thirds of coffee and cacao farms in the area are less than 10 acres in size.

There are a wide variety of secondary crops grown by Dama farmers; fruits, vegetables, and ancillary staples. These are usually intercropped with the primary users of the land. The annuals with the rice farm and the perennials in the plantations or the gardens adjacent to the village.

The study indicated that communities along the CARE roads increased the types of crops grown to 7, while the non-road communities averaged only 6.3 types. The sale of low value, high bulk annual crops were also favorably effected by the new roads which had the additional benefit of reducing head-load transportation costs by 50% (from Le 3.00 to Le 1.50).

The "slash and burn" method of upland rice production created a new income source for the farmers along the CARE roads in the production and sale of firewood. Prior to the new CARE roads, sale of firewood to others was not profitable due to the weight, bulk and inconvenience of head-loading this by-product. After the CARE roads, in one village, as many as 50 percent of the householders were engaged in selling firewood and it was clear that this was an innovation dependent on the CARE road

R-95A. This represents an unexpected cash income benefit of the CARE road building efforts in the studied area.

C. Increased Transportation Facilities and Benefits.

Although it is too soon to see such direct benefits as increased poda-poda numbers or usage (all-purpose passenger and goods' "bush-taxi") there have been user-savings benefits in the form of a) no "rainy season" surcharge for villagers along the CARE roads and b) regular year round service due to the all-weather capability of the CARE roads.

D. Improved Development Services.

In terms of the communal infrastructural improvements, the new roads have had a positive impact. Two new concrete barriers (open communal meeting halls) have been built, both in the "A" communities of Masalu and Majihum. Cement is a product too heavy to headload so bush sticks and clay were traditionally used in permanent buildings. Since completion of R-95A, there has been a spate of concrete construction. The road has also enabled skilled labor to penetrate the previously remote area (a cement mason). The road connected communities have also experienced regular Sunday visitations of a "dresser" (a private dispenser/nurse to the villagers along this road. Thus, the roads and the "dresser" are meeting the need for western medical attention strongly felt by most rural people in Sierra Leone.

From the above we can conclude that, even in this short period of time, the intermediate socio-economic benefits are taking place and the intermediate goals and project purpose are being met.

V. COMPARISONS OF PLANNED AND ACTUAL DONOR INPUTS

The project was estimated to cost a total of \$8,521.100, from 5 donors, requiring 3 years to complete 400 miles of new roads, bridges and culverts as well as maintaining these new roads and the 100 miles of roads CARE built under the predecessor OPG-1154. During the first year's operations under the present OPG, the 5 donors were scheduled to make a total of \$3.631.200.<sup>11/</sup>

For a number of reasons, principally that of timing, 3 of the 5 donors made less than their scheduled contributions, resulting in the other 2 donors making accelerated contributions during the period (CARE and IBRD). A total of \$2.748.600, or 75.7% of the goal, was actually expended through June 30, 1978.

A. A.I.D. (See Table 1-A)

AID's total contribution of \$3.991.000, 47% of the total project costs, is an Operational Program Grant (OPG) to CARE, to be annually funded by increments of \$1.8 million in FY-78 (including banking charges), \$1.141 million in FY-79 and \$1.05 million in FY-80. These funds are for the foreign exchange (42.4%) and local costs (57.6%) of:

- Procurement of most of the required new construction and maintenance equipment and materials (U.S. made)
- Some local costs personnel and procurement costs
- Some fuel and oil cost
- Some equipment spare parts and workshop tools
- All of the CARE Headquarters' overhead costs
- Costs of preparing annual evaluation reports

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<sup>11/</sup> See Table I, page 24

The bulk of AID's first year's funds were intended for major new equipment purchases (\$1,248,800) by means of a Federal Reserve Letter of Credit (FRLC). Additional expenditures of \$306,000 was intended for fuel and oil, CARE/NY overhead costs and the costs for the socio-economic up-dating survey.<sup>12/</sup> Of the \$1,747,400 planned expenditures during the first year, only \$733,200 or 42% was actually expended.<sup>13/</sup> Of that amount, only \$312,500 were expended for new equipment which included two bulldozers purchased locally in Monrovia and trucked by low-boy to Sierra Leone.

B. CARE. (see Table 1-B)

CARE's total contribution of \$1,200.8 million, is 14% of the total project costs, of which 74.4% of its contribution is for local costs and 25.6% for foreign exchange. CARE's contributions are for:

- Local and expatriate personnel costs, project equipment maintenance costs
- Hand tools, materials and equipment acquisition costs
- Administration, supervision and actual construction costs

CARE is responsible for construction of selected roads with necessary bridges and culverts. CARE must also develop and implement a rural roads maintenance program, while training local MOW staff, pending MOW's assumption of all maintenance duties and costs by the end of the project (1980).

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<sup>12/</sup> See Table I-A, page 25

<sup>13/</sup> Orders were subsequently placed for an additional \$697,000 of equipment and \$237,000 in steel culverts, which will not be paid for until delivered late this year.

CARE's first year planned contributions were for \$370,400. Due to delayed grant authorization, CARE actually expended \$525,600 or 42% over the planned amount. The bulk of its accelerated funding was required to fill the AID funds' gap for U.S.-source commodity procurement and the GOSL gap for the maintenance equipment depreciation fund.<sup>14/</sup> Substantial accelerated funding for local personnel costs was also necessary to avoid shutting down the project at one point.

C. IBRD (See Table 1-C)

The total contribution of the World Bank (International Bank for Reconstruction and Development) to this project is \$1.2 million, the bulk of which is for locally purchased road construction equipment and materials. Of that amount, \$911,200 was for first year expenditures. As shown in Table 1-C, IBRD contributed almost 14% more than budgeted during the first year. All indications are that IBRD will meet or exceed its future commitments to this project which are substantially less than the first year's allocation.

D. GOVERNMENT OF SIERRA LEONE (GOSL) - See Table 1-D

The total value of the GOL contributions, in cash and in kind, amount to \$1,792,900 for the life-of-the project, almost two-thirds of which is for commodities. The first year's funding was planned for \$189,7000. GOSL, LOP costs increase for the end of the project due to substantial project increases in local commodities' procurement (cement, etc.) as well as contribution to the maintenance depreciation fund.<sup>15/</sup>

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<sup>14/</sup> CARE is to perform all road maintenance until such time as MOW can assume this responsibility. All recurring road maintenance costs will be borne by the GOSL, including a provision for quarterly deposits into a special fund for depreciation of equipment to be used later to replace worn out equipment. At the end of the project an estimated \$218,000 will be available.

<sup>15/</sup> See Table 2. Page 30.

All contributions to the fund are provided under the GOSL budget and at the end of the project; an estimated \$218,800 will be available (plus any bank interest earned) for the replacement of road maintenance equipment and spare parts for the future maintenance of project roads. GOSL's first year's contributions fell short of the input target by only 2.3% GOSL development budgets and annual financial support is expected to continue satisfactorily due to a) the establishment and funding of the Feeder Maintenance Unit in MOW and b) because the Office of the Vice President supports and helps coordinate the feeder road program.

E. PEACE CORPS AND OTHER VOLUNTEER ORGANIZATIONS (See Table 1-E)

The total value of the combined contributions of the three volunteer organizations\* is budgeted as \$337,500 for the life-of-the project. This contribution is the estimated costs to those organizations to transport and sustain their volunteers in the field. The

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\* U.S., Peace Corps (PC), U.K. Volunteer Service Organization (VSO) and Canadian University Students Organization (CUSO).

first year's attributable contribution is \$112 500 of which only \$95,300 were expensed, due to the unavailability of certain skilled volunteers, planned for the project. For the most part, those volunteers that were involved in assisting this project have been consciencious and productive. The succeeding year's contributions are budgeted for the same \$112.500 for each of the next 2 years. Those targets are believed to be realistic and attainable.

VI. PLANNED AND ACTUAL OUTPUTS (CARE AND MOW)

A. CARE

1. Construction or rehabilitation of 400 miles of roads over 3-year life of the project (133 miles per year) at approximately \$14,000 per mile<sup>16/</sup>. Due to several reasons previously stated, most of which were beyond CARE's/only 63 miles of road were constructed or reconditioned during this first year and at a cost of approximately \$17,000 per mile<sup>17/</sup>. This amounts to a 47% shortfall in construction and 21.4% overrun of estimated costs.
2. Of the 174 miles of road previously constructed of CARE's from 1975 thru 1977, major road maintenance was to be performed on 38 miles of those roads (under the 1st AID Grant OPG-AFR-1154) and minor or routine maintenance on 153 miles. Actual output was only 5 miles of reballasting and 80 miles of routine maintenance. This is a shortfall of 13.1% and 52.3% respectively.

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16/ See page 18 of the OPG Proposal, PAF-II

17/ See page A-8 of Engineer's Technical Analysis, Annex A.

B. MINISTRY OF WORKS (MOW)

1. As shown in the projects' log frame in PAF-II, the MOW output target was the establishment of a Feeder Roads Maintenance Unit within its organization, with responsibility for participating in CARE's OJT and to supervise the feeder roads' maintenance. All of this would be preparatory to assuming full operational responsibility for all feeder roads produced by CARE, at the end of this project in September, 1980.
2. The MOW has taken substantial initial steps towards meeting this target by the creation of the Feeder Roads Maintenance Unit, headed by its Chief Engineer Maintenance, Mr. C. B. Roberts.<sup>(18)</sup> Another positive action has been the allocation of 18 MOW "overseers" to work directly with CARE field units for on-the-job-training (OJT) and the posting of an Area Engineer in the Kenema district.
3. MOW's shortcomings involve its slow progress in a) developing an operational implementation plan, geared to progressive assumption of responsibilities for full take over by 1980.  
b) limited road inspections and reports by the Area Engineer  
and c) limited road surveys and design of additional roads  
to come under this program.

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(18) See letter to CARE from the Secretary to the Vice President, dated 12 Sept 1977, in Project Files.

C. CONCLUSIONS

CARE must substantially increase its output production in order to maintain a favorable cost-benefit ratio to justify continuation of the project. MOW will have to show marked and sustained improvement in its progressively greater participation in and preparation for taking over the CARE Maintenance Program.

T A B L E I

1st Year Financing FY-78  
Project Cash Flow\*  
(Dol \$000)

	<u>Planned</u>	<u>Actual</u>	<u>\$Difference</u>	<u>Percent Difference</u>
AID	1,747.4	733.2	1,014.2	27.8
GOSL	489.7	478.4	11.3	2.3
CARE	370.4	525.6	155.2	42.0
IBRD	911.2	925.1	13.9	15.3
PC/VSO	<u>112.5</u>	<u>95.3</u>	<u>17.2</u>	<u>17.2</u>
Total:	3,631.2	2,757.6	- 873.6	24.1 short

\* See Table 5 p. 36 and p. 1 of Annex D: OPG Proposal/PAF-II.

P R O J E C T F I N A N C I N G

TABLE I-A

July 77 - June 78  
(Dol \$000)

USAID

		<u>Planned</u>	<u>Actual</u>	<u>\$ Difference</u>
A.	<u>PERSONNEL</u>			
1.	U.S. Techicians	-	-	-
2.	3d Country	-	-	-
3.	Local Personnel	<u>192.6</u>	<u>169.8</u>	<u>-22.8</u>
	Sub-total:	192.6	169.8	22.8
B.	<u>COMMODITIES</u>			
1.	U.S. Procured	1,154.8	-	-1,154.8
2.	3d Country	-	186.0	186.0
3.	Local	<u>94.0</u>	<u>126.5</u>	<u>32.5</u>
	Sub-total:	1,248.8	312.5	- 936.3
C.	<u>OTHER COSTS</u>			
1.	Fuel and Oil	171.5	125.4	- 46.1
2.	Maint. Equip. Depreciation		-	-
3.	CARE/NY Overhead	124.5	124.5	-
4.	Other Support Costs	<u>10.0*</u>	<u>1.0</u>	<u>- 9.0</u>
	Sub-total:	306.0	250.9	- 55.1
	<u>Grant Total:</u>	1,747.4	733.2	-1,014.2

\* For the Personal Service Contract (PSC) portion of Annual Evaluation.

P R O J E C T F I N A N C I N G

TABLE I-B

July 77 - June 78  
(Dol \$000)

CARE

A. <u>PERSONNEL</u>	<u>Planned</u>	<u>Actual</u>	<u>\$ Difference</u>
1. U.S. Technicians	38.5	38.5	-
2. 3d Country	71.9	18.0	-53.9
3. Local Personnel	<u>82.2</u>	<u>87.2</u>	<u>+ 5.0</u>
Sub-total:	192.6	143.7	-48.9
 B. <u>COMMODITIES</u>			
1. U.S. Procured	34.1	176.9	+ 142.8
2. 3d Country	-	0.5	+ 0.5
3. Local	<u>26.0</u>	<u>24.4</u>	<u>- 1.6</u>
Sub-total:	60.1	201.8	+ 141.7
 C. <u>OTHER COSTS</u>			
1. Fuel and Oil	1.5	27.8	+ 26.3
2. Maint. Equip. Depreciation	-	25.0	+ 25.0
3. CARE/NY Overhead	-	-	-
4. Other Support Costs <u>116.2*</u>		<u>118.3</u>	<u>+ 2.1</u>
Sub-total:	117.7	171.1	+ 53.4
Grand Total:	370.4	525.6	+ 155.2

\* Includes office supplies, printing, postage, telephone, cables, electricity, building maintenance and renovation, staff housing expenses, furniture and fixtures, travel expenses, audit insurance, publicity, bank charges, sudry.

P R O J E C T F I N A N C I N G

TABLE I-e

July 77 - June 78  
(Dol S000)

IBRD

	<u>Planned</u>	<u>Actual</u>	<u>\$Difference</u>
<b>A. <u>PERSONNEL</u></b>			
1. U.S. Technicians	-	-	-
2. 3d Country	-	-	-
3. Local Personnel	-	61.4	+ 61.4
Sub-total:	-	61.4	+ 61.4
<b>B. <u>COMMODITIES</u></b>			
1. U.S. Procured	-	-	-
2. 3d Country	-	-	-
3. Local	911.2	599.2	- 312.0
Sub-total	911.2	599.2	- 312.0
<b>C. <u>OTHER COSTS</u></b>			
1. Fuel and Oil	-	221.3	+ 221.3
2. Maint. Equip. Depreciation	-	-	-
3. CARE/NY Overhead	-	-	-
4. Other Support Costs	-	43.2	+ 43.2
Sub-total:	-	264.5	+ 264.5
Grant-Total:	911.2	925.1	+ 13.9

P R O J E C T F I N A N C I N G

TABLE I-D

July 77 - June 78  
(Dol \$000)

GOSL

	<u>Planned</u>	<u>Actual</u>	<u>S Differences</u>
A. <u>PERSONNEL</u>			
1. U.S. Technicians	25.7	37.6	+ 11.9
2. 3d Country	7.5	-	- 7.5
3. Local Personnel	<u>52.0</u>	<u>92.1</u>	<u>+ 40.1</u>
Sub-total:	85.2	129.7	+ 44.5
B. <u>COMMODITIES</u>			
1. U.S. Procured	8.6	21.1	+ 12.5
2. 3d Country	217.1	42.9	- 174.2
3. Local	<u>125.0</u>	<u>243.4</u>	<u>+ 118.4</u>
Sub-total:	350.7	307.4	- 43.3
C. <u>OTHER COSTS</u>			
1. Fuel and Oil	-	36.1	+ 36.1
2. Maint. Equip. Depreciation	43.8	-	- 43.8
3. CARE/NY Overhead	-	-	-
4. Other Support Costs	<u>10.0</u>	<u>5.2</u>	<u>- 4.8</u>
Sub-total:	53.8	41.3	- 12.5
Grant-Total:	489.7	478.4	- 11.3

2.3% short

P R O J E C T F I N A N C I N G

TABLE I-E

July 77 - June 78  
(Dol S000)

PC/VSO

A. <u>PERSONNEL</u>	<u>Planned</u>	<u>Actual</u>	<u>\$ Difference</u>
1. U.S. Technicians	90.0	81.6	- 8.4
2. 3d Country	22.5	13.7	- 8.8
3. Local Personnel	<u>-</u>	<u>-</u>	<u>-</u>
Sub-total:	112.5	95.3	- 17.2
B. <u>COMMODITIES</u>			
1. U.S. Procured	-	-	-
2. 3d Country	-	-	-
3. Local	<u>-</u>	<u>-</u>	<u>-</u>
Sub-total:	-	-	-
C. <u>OTHER COSTS</u>			
1. Fuel and Oil	-	-	-
2. Maint. Equip. Depreciation	-	-	-
3. CARE/Ny Overhead	-	-	-
4. Other Support Costs	<u>-</u>	<u>-</u>	<u>-</u>
Sub-total	-	-	-
Grant-total	112.5	95.3	- 17.2

15.3% short

TABLE 2  
PROJECT CASH FLOW

	<u>AID</u>	<u>GOSL</u>	<u>CARE</u>	<u>IBRD</u>	<u>PC/VSO</u>	<u>TOTAL</u> \$(000)
7/77 - 9/78	1,747.4	489.7 <sup>1/</sup>	370.4	911.2	112.5	3,631.2
10/78 - 9/79	1,169.7	515.5 <sup>2/</sup>	385.4	101.7	112.5	2,284.8
10/79 - 9/80	<u>1,073.9</u>	<u>787.9<sup>3/</sup></u>	<u>445.0</u>	<u>186.0</u>	<u>112.5</u>	<u>2,605.1</u>
<u>TOTAL:</u>	3,991	1,793.1 <sup>4/</sup>	1,200.8	1,198.9	337.5	8,521.1

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1/	Includes provision for maintenance equipment depreciation fund of	\$43.8
2/	" " " " " " " "	\$87.5
3/	" " " " " " " "	\$87.5
4/	" " " " " " " "	a total of
		\$218.8.

TECHNICAL ANALYSIS

SIERRA LEONE/CARE RURAL PENETRATION ROADS II

1st ANNUAL EVALUATION REPORT

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Prepared by: Howard Guiot, USAID/L  
Gen. Engr. Advisor - 10/30/78

## TECHNICAL ANALYSIS

### I. Major Findings

After one complete construction season starting in October 1977 and ending in July 1978, CARE has accomplished the following:

- A. Set up an appropriate organization with adequate<sup>d</sup> filled manning tables to effectively carry out a road construction and maintenance program.
- B. Demonstrated capability to construct more than 100 miles of feeder roads per year.
- C. Used MOW Class VI Standards in the design of feeder roads, culverts and bridges.
- D. Applied sound engineering techniques during the construction and maintenance of the feeder road network.
- E. Made proper use of equipment; adequately maintained the equipment; and produced high unit production outputs.
- F. Established an operable road maintenance unit with MOW participation.
- G. Created no adverse physical environmental impacts during road construction.

### II. Project Management

Overall project management is administered by the CARE Director in Freetown through the Project Coordinator. The Project Manager located in the principal field office in Bo, has total responsibility for all construction and maintenance activities. The Project Manager has a supervisory staff of three senior site engineers, a workshop

manager, two maintenance engineers and an project manager for administration.

Each senior site engineer is responsible for an project area e.g., Eastern, Northern and Southern. Site construction and maintenance supervision is under the direction of Peace Corps and VSO personnel. The workshop manager has the central shop in Bo and three sub-workshops in Daru, Potoru and Makeni. Shop supervision is performed by PC and VSO volunteers.

Procurement of goods and services is handled by the field office in Bo, the headquarters in Freetown, and the CARE New York office. All procurement activities are controlled by the Project Coordinator, whether it is the purchase of new equipment, a dozen wheel barrels, 1000 sacks of cement or bulk lot of repair parts. In the majority of cases competitive prices are sought before purchases are made. Field requests for supplies are prepared well in advance for jobsite delivery. There have been very few construction delays due to the lack of materials and supplies except in the case of the late delivery of AID financed new equipment.

The total work force for the project varies throughout the year due to seasonal construction and maintenance activities. From November to June, the average work force was approximately 425 personnel of which management staff, supervision and foremen comprise fifteen (15%) percent.

The organization and manning table indicate a proper and adequate mix for the type, quantity, and quality of road construction and

maintenance being carried out.

### III. Design Standards and Engineering

MOW design standards for class IV roads are being used by CARE in the design of the feeder road network.

The design of any new road or the rehab of an existing road follows the same procedure:

#### 1 - Field Reconnaissance

Design engineer travels on foot or by vehicle the entire length of the road, taking notes on culvert locations; special features of the terrain i.e., swamps, steep grades; availability of lateritic soils, etc.

#### 2 - Preliminary Survey

Survey crew runs a traverse so that long section profiles and road center lines can be plotted.

#### 3 - Preliminaries Plans

From the field notes, long sections are plotted with the proposed culvert location and size. Horizontal curve information is also located on the plans.

#### 4 - Final Plans

After the design engineer has checked the preliminary design data, culvert sizes, location of laterite material, borrow pits and any swamp areas, the final plans are drawn and taken to the field for construction.

The level of engineering and degree of accuracy in obtaining field data for the designs quite adequate for the type of road constructed. These data are also sufficiently accurate for quantity/cost estimating.

### IV. Construction Operations

#### A. General

Road construction is carried out by assigning the senior site

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engineer various pieces of heavy equipment i.e., scrapers, dozers, front end loaders, graders and dump trucks. Usually the engineer divides the equipment into construction spreads - one for clearing, grading and surfacing, the other for bridge and culvert works. Each section is headed by an engineer from the Peace Corps or VSO.

During the construction of the roadbed, careful selection is made of suitable fill material for the embankment section while unsuitable cut material is wasted. Thus far, most of the roads have been built with very little wasted material which is due principally to careful selection of the horizontal alignment and varying the vertical grades to reduce the earthwork quantities. Suitable compaction is obtained in heavy fill areas by mechanical rollers and the passing of the heavy equipment over the entire roadbed during construction. Soils test equipment such as penetrometers are used when the select surface material is placed on final grade.

Drainage culverts and bridges are started soon after clearing and rough grading has been completed. CARE has decided to use corrugated steel pipe for the drainage structures which will eliminate the need for concrete headwalls. This should result in a reduction in the cost/mile. Standard bridge designs prepared by CARE and reviewed by MOW are used for most of the stream crossings. During the pouring of the concrete deck, samples are taken and sent to the MOW testing lab in Freetown for analysis. The results are then sent back to the field for review.

During the construction phase, CARE advises the MOW area engineer of the road location and type of construction or rehabilitation planned for the areas. The purpose is to keep the area engineer informed of the work in his area and to afford him the opportunity to inspect and consult with <sup>the</sup> CARE engineer on methods and techniques of construction practices.

CARE site engineers prepare weekly progress reports which are consolidated into a monthly report, indicating construction during the period, survey/design activities, workshop/equipment outputs, procurement and shipping activities as well as personnel statistics. USAID receives copies of this report on a timely basis.

B. Equipment And Workshops

The present equipment pool including the equipment on order for year-end delivery is adequate for constructing 150 miles of road per year. Because the average equipment age will be significantly reduced when the new equipment is added to the fleet, the percent availability for equipment use should reach 70-75% which would be highly acceptable. This will mean higher output rates with corresponding lower costs/mile.

Equipment abuses and misuse are practically non-existent. The site engineers are effectively supervising the operators and mechanics in the care and maintenance of the equipment.

The central workshop at Bo does most of the major overhaul work on the fleet. The three sub-workshops are strategically located in areas where road construction activities are concentrated. This reduces the

need of long equipment hauls for repair work. There are two mobile service units which augment the sub-workshops for field repair work.

CARE's concept of the central workshop with small satellite shops have proven to be very effective and has contributed immensely in keeping the equipment availability percent/<sup>relatively</sup>high, when considering the age of the equipment averages 6 - 8 years. With construction startup 1978. <sup>a</sup> commencing in November, the entire fleet will be in/ready condition which is indicative of the quality of supervision staff and craftsmen working in these shops.

C. Construction Costs.

The average cost per mile for the 1977/78 construction period was estimated to be \$14,000 and based on 100 miles of road. Actual costs incurred during this period have been calculated to be approximately \$20,000/mile which is a substantial increase. The Project Coordinator prepared a summary of costs and explanation of overruns from which is quoted:

"Estimated Construction Costs Per Mile, FY-78 (Jul 77 - Jun 78)"

E X P E N D I T U R E

<u>Source</u>	<u>Local (Le)</u>	<u>CIK (Le)</u>	<u>New York (S)</u>
IBRD	720,349	260,230	
GOSL	279,348	65,424	
AID	448,009		
CARE	350,967		393,365
VOLUNTEER	-	95,417	-
Total:	1,798,673	421,071	
@	1.06	1.06	
\$	1,696,861	397,237	393,365
Grand total:	2,487,463		

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Total Spent:	2,487,463
Less increase of Inventory over FY-78	<u>594,168</u>
	1,893,295
Less 4/5 cost of equipment purchased in FY-78	<u>602,828</u>
add 1/5 value of previously purchased equipment	<u>78,319</u>
	1,368,286
Less road maintenance Wiema Bridge, workshop improvement	<u>111,333</u>
	1,257,442
Divided by miles	<u>63.11</u> as per June 78 report
	19,925

D. COMMENTS:

1. CARE incurred costs in the establishment of the Makeni and Potoru (South) operations. However, due to the unavailability of new machinery, the anticipated mileage was not accomplished. North has 4.1 miles, South has 8.1 miles or 12.2 miles where the proposal had 49.5 miles planned. Because of the short fall of production compared to the cost of establishment, both these sites were very uneconomical.
2. Structures costs were higher than anticipated. The original proposal called for culverts at 3 per mile; our rate of installation neared 4.35, or 45% higher and increasing the cost by \$1,260 per mile. In addition, more bridges were constructed than anticipated. Original proposal called for a bridge every 15 miles whereas the rate for the 1977/78 construction season was one every 11 miles, a 20% increase. This has increased construction costs by an additional \$330 per mile.
3. As can be seen from monthly report, 459 Sierra Leoneans were employed at the peak (June). The proposal, however, called for 481 when 4 full units were to be functioning. This results in a higher personnel cost per mile than anticipated. In financial terms this resulted in \$410,600 being spent whereas \$326,800 was expected to be spent for staff to construct 100 miles. This is a problem, which a PVO using Volunteer Engineers with altruistic motives in supervisory posts, can expect to encounter. They are a bit less likely to layoff staff during rainy periods or to deny opportunities for overtime when weather or other conditions may not fully warrant such work. Particular job categories which were over are operators where backup operators are being kept on staff, storekeepers and security. This was a \$1,327 overrun per mile which is significant. There is definite concern on behalf of Management about the number of staff on hand and closer surveillance of this item will be implemented.

Therefore considering these comments we have the following: -  
Cost per mile - \$19,925.

	Culvert over-cost	-	1,260
	Bridge % increase	-	330
	Labour overrun	-	<u>1,327</u>
			2,912
	<u>2,917</u>		
	\$17,008		

As indicated in the Project Coordinator's comments, there were several costs which were not considered in the original estimate. The increase in the number of culverts required and the additional bridge structures per mile were underestimated because primarily due to lack of information regarding the terrain in the project areas. A normal 10% contingency could be applied to allow for the inaccurate estimate.

The labor cost per mile is a element which can definitely be controlled and closer surveillance should be exercised to prevent this kind of cost buildup.

The actual cost per mile was derived from the total expenditures for the construction period divided by the number of equivalent miles built. Because only 63.1 miles were built, the cost per mile does appear to be high. As a corollary, if all of the equipment had been available in November 1977, 100 miles might have been built with very little additional costs and therefore the cost per mile might have be closer to \$14,000. However, this assumption is probably incorrect, also. The potential costs/mile will probably fall somewhere between the two figures, the need for good cost accounting is quite apparent.

Until recently, cost data collection was very sporadic with regards to in-place quantity measurements, labor costs and equipment use charges. Records were incomplete and it was virtually impossible

to analysis the various cost components of construction to determine unit costs for each work item. The Bo office now has a cost accounting section to collect and record all cost data used in the preparation of a job estimate/actual expenditure report. With these new cost reporting procedures, it should not be difficult to analyze potential cost overruns and pinpoint major construction inefficiencies.

V. Maintenance Operations

A. General

The road maintenance program as outlined in the OPG is being carried out with a measurable degree of success. Roads previously built in 1976 and 1977 by CARE are being maintained jointly by CARE and MOW. Further, these roads are maintained by manual as well as mechanical means at reasonable costs/mile.

Thus far there have been positive indicators that show how CARE's maintenance operation can be eventually turned over to the MOW Highway Maintenance Unit. This is based on frequent visits to the road maintenance worksites, inspection of work performed by CARE and MOW and discussions held with CARE management. Excerpts from CARE reporting documents are submitted to illustrate the degree of success in achieving this goal:

FEEDER ROADS MAINTENANCE PROGRAM

" During the 1978 work season the maintenance required on those roads constructed in the 1976 and 1977 work seasons continues to be carried out jointly by CARE and MOW under the management of CARE. Maintenance costs are being covered by the GOSL under a special line item in the Development Budget. Based on the experience gained to date a more precise plan is being proposed for the phase over of the management of the feeder roads maintenance operation from CARE to the MOW Maintenance Unit by 1980.

SIERRA LEONE/CARE FEEDER ROADS II

OPG/AFR-R-1400

PROJECT NO. 636-0111

1st ANNUAL EVALUATION REPORT  
Period Ending June 30, 1978

Total Grant : \$3,991,000

1st Year's Funding: \$1,800,000

PIO/T No. : 80018

Appropriation: 72-1181021

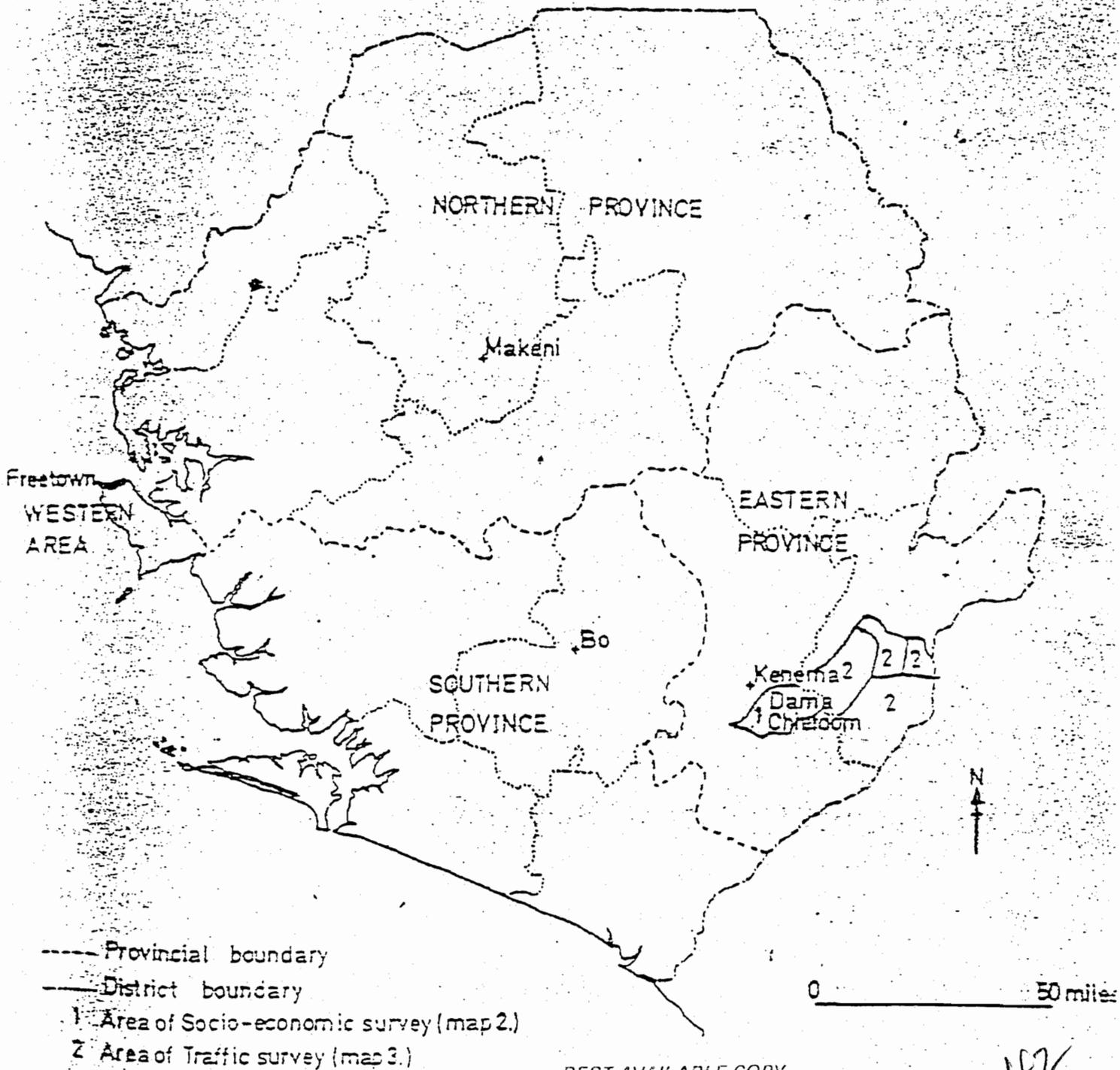
Allotment : 843-50-636-00-69-81

Prepared by: Arthur V. Patrick, USAID/L  
Project Manager

USAID/LIBERIA  
OCTOBER, 1978

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MAP 1. SIERRA LEONE : SITUATION OF EVALUATION AREAS.



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Annex A: "Technical Analysis", H. Guiot, USAID/L, 10/30/78

Annex B: "Socio-Economic and Traffic Evaluation", A. Airey, 8/78

PRESENT STATUS OF MAINTENANCE OPERATIONS

Personnel

1. CARE:

- a) Assigned one Peace Corps Volunteer and Feeder Roads Maintenance Manager in overall charge of feeder roads maintenance.
- b) All equipment operators, artisans, and 24 communal labour foremen employed by CARE.
- c) Assigned one Rural Development Assistant to the Maintenance Manager to assist with dissemination of information about the maintenance program and to help train communal labour foremen in the basic techniques of feeder road maintenance.

2. MOW:

- a) The Executive Engineer for Kenema Area has been assigned the additional responsibility of feeder roads maintenance. He has arranged for the assignment of 18 MOW employed Overseers to feeder roads maintenance under the supervision of the Maintenance Manager. He also made an inspection of maintenance requirements in November 1977.
- b) Assigned a civil engineer to the Makeni Area Engineer's office responsible for the survey and design of the roads to be constructed. This engineer will eventually also be responsible for the maintenance of feeder roads in this area, after completion of his survey and design assignment (FY-80).

Financing

1. All feeder road maintenance costs are covered under a newly created line item in the MODEP Development Estimates under the heading of Pilot Project: Maintenance Feeder Roads.
2. For the 1978 construction season Government has budgetted Le 100,000 under this head.
3. These funds are being released directly to CARE.

Management/Organizational Support

Management and organizational support is provided to the feeder roads maintenance unit by the Feeder Roads Project Bo/Freetown in the following ways:

-All-

- 1) Liaison with MOW/Freetown
- 2) Civil engineering back-up as and when required
- 3) Purchasing and storage of building materials
- 4) Administrative infrastructure for paying salaries and providing other administrative support as and when required.
- 5) Mechanical workshop back-up

## II. PHASE-OVER TIME FRAME ALTERNATIVES

- A. As a minimum CARE will assume the responsibility for the maintenance of every feeder road constructed for up to two years after completion of construction. During this period:
  - 1) Corrections in any construction short comings can be made.
  - 2) The communal labour can be organized and trained in basic road maintenance techniques.
- B. If the planned I.B.R.D. financing for the 2d phase 4 years MOW Highway Maintenance Programme materializes, the maintenance of feeder roads will be integrated as an activity of this programme. But as the start-up date has not yet been firmly established it is not possible to project a date for the integration of feeder roads maintenance into this programme.
- C. If the I.B.R.D. financing does not materialize the integration of the feeder roads maintenance activities as a responsibility of the MOW Highway Maintenance Unit will be completed by July 1982. The maintenance of the roads in the Eastern Area should be fully integrated by July 1980 with Bo and Makeni to be integrated by 1982.

## III. STEPS TO BE TAKEN

The following steps will be taken according to a time-table to be established by MOW and CARE to facilitate a smooth transition of management responsibilities from CARE to the MOW Highway Maintenance Unit.

- A. MOW will assign one engineer as soon as possible to each area to be solely responsible for the maintenance of all feeder roads constructed by CARE. Initially MOW will post

Road Inspectors these would be supported by Engineers as soon as possible.

1. This position will be within the organizational framework of the MOW Highway Maintenance Unit.
2. Until such time as the management of feeder roads maintenance is taken over by the MOW Highway Maintenance these engineers and/or I.O.W.S. will be responsible to the CARE maintenance managers.
3. The schedule for the appointment of feeder road maintenance engineers by MOW is as follows:
  - a) Kenema area - the first engineer to be appointed immediately. The second engineer would be appointed by March 1979.
  - b) Bo area - July, 1979.
  - c) Makeni area - it is expected that Mr. Songa, who is responsible for the survey and design of feeder roads being constructed in the NAP/LADP, will transfer to maintenance by 1980 when construction is schedule to be completed.

MODEP will continue to provide funds in the Development Estimates under the head Pilot Project: Maintenance Feeder Roads to be released directly to CARE for the maintenance of feeder roads for two years after completion of construction and before being included in the maintenance program of the MOW Highway Maintenance Unit.

All MOW Maintenance Engineers and Overseers, until this time under the direct supervision of the CARE Maintenance Manager, will transfer under the management of the MOW Highway Maintenance Unit.

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B. Road Works - Mechanical

R-84 (Dodo Bomaru)

Reballasting continued on fill #5, where flooding had occurred during the previous year, causing erosion of the road surface. About 900 yds was reballasted, with 6" fill at the lowest point.

Grader Hours	16	@	14.50	=	Le	232.00
Roller	12	@	13.50			42.00
Tipper	12	@	6.10			73.20
Man hours	79	@	.50			39.50
Management overhead was charged						386.70
						in June
Communal labor output for two days	=				16	
					average	= 8

R-90 (Sakiema Hill) - 81 miles

After completing the stone pitching last month, the road was again regraded, because of steep gradient erosion which started with the first rains. It is recommended that the hill be reballasted latter this season with a 8" layer of quality laterite (with mixed stones)

Grader hours	20	@	14.50	=	Le	290.00
Roller	11	@	3.50			38.50
Man hours	54	@	37.50			30.75
						338.25

Communal labor output for 2 days	=	8	
	average	=	4

R-70 (Daru - Bombohnu - Kotuma) 6.25 miles

Began and completed regrading road surface, also did some reballasting in areas needed. There was a problem of the IDA oil palms overhanging R-70 for the first mile which prevented the sun from drying the road. The result was continuously wet conditions which caused pot holes. Permission was received from the IDA plantation manager to cut back or trim those palms.

Grader hours	106	@	14.50	=	Le	1,537.00
Roller	75	@	3.50			262.50
Tipper	42	@	6.10	=		256.20
Man hours	400	@	0.50	=		200.00
Overhead	6.25	@	37.50	=		234.37
						2,490.07

Communal labor output 16 days	=	104	
	average	=	6.5

MAINTENANCE DIVISION

July, 1978

Reporters: Dennis Brown: Project Coordinator  
Edward Frechette: Maintenance Manager

B. MAINTENANCE COSTS

The CARE Maintenance Unit prepares a monthly report which indicates the type of road maintenance performed, the amount of labor & equipment used, and the costs for each operation. A report for July 1978 is quoted below to illustrate how and where costs are allocated.

Based on these figures, the average road maintenance costs per mile were:

	<u>A C T U A L</u>		<u>E S T I M A T E D</u>	
	<u>Routine</u>	<u>Periodic</u>	<u>Routine</u>	<u>Periodic</u>
ADT 0-50	\$469	\$2686	\$ 77	\$1579
ADT 51-150	\$505	\$1792	\$174	\$2513

Actual routine maintenance costs/mile were somewhat higher than estimated:

Average \$187/miles actual  
Average \$126/miles estimated

However, the actual periodic maintenance costs/mile approximated the estimated costs/mile:

Average \$2239/miles actual  
Average \$2046/miles estimated

The higher routine maintenance costs mile can be attributed principally to the use of mechanical equipment. Originally it was planned to perform routine maintenance with communal labor only. However, to return the road platform back to an acceptable standard, it required both mechanical equipment & communal labor which increased the costs mile. While it is not possible at this time to determine if these average costs mile of \$187 should be considered the norm for this type of maintenance, costs mile in similar countries using a mechanical communal labor mix indicate that routine maintenance costs are closer to the \$187 mile figure.

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R-30 (BandaJuma - Mamoma - Gbeka)

Began regrading 16 miles of the road surface. Because of persistent rain, regrading had to be done a second time in certain areas.

Grader hours	51	@	11.50	=	Le	739.50
Roller	10	@	3.50	=		168.00
Tipper	10	@	6.10	=		61.00
Loader	40	@	13.50	=		540.00
Man hours	209	@	0.50	=		104.50
Overhead	6	@	37.50	=		225.00
						<u>1,838.00</u>
Communal labor output 7 days				=	56	
average				=	7	

C. Structural Maintenance

R-81 - Goeh

Installation of one two foot diameter steel culvert. This was done to relieve an existing 2'6" pipe that wasn't capable to withstand the flow in the swamp. Excavation was done to a six feet depth from level of the existing road. Pipe is completed and stone pitched.

Tipper	37	@	6.10	=	Le	225.70
Tractor	69	@	5.50	=		379.50
Man hours	610	@	0.30	=		183.00
Cement	20	@	4.60	=		92.00
						<u>880.20</u>
Communal labor output 11 days				=	198	
average				=	18	

R-91 - Mobai

Because of flooding in the previous seasons, two drainage outlets were excavated through the old road. The ditches - 6' x 18' x 5' were also stone pitched to allow the water to rush through without collapsing.

A fourth relief culvert is in the process of being installed after a study was done of the swamp catchment area.

Tipper	59	@	6.10	=	Le	359.90
Tractor	78	@	3.50	=		429.00
Man hours	740	@	0.30	=		222.00
Cement	30	@	4.60	=		138.00
Wire nails	10	@	0.44	=		4.40
						<u>1,153.30</u>
Communal labor output 15 days				=	150	
average				=	10	

D. Manual Maintenance

The following items were issued to communal labor headmen by CARE

<u>Item</u>	<u>Rate</u>	<u>=</u>	<u>Le</u>
Shovels	6.25	19	118.75
Rakes	5.50	19	104.50
Watering cans	4.50	21	94.50
			<u>317.75</u>

<u>Chiefdom</u>	<u>Road</u>	<u>J o b</u>	<u>Average Lab/month</u>	<u>Average lab/month</u>
Jawi	127	Pothole filling	32	1.2
Jawi	37	Clearing drainage, repair road surface	38	1.4
Jawi	71A	Brushing road side verge	50	1.9
"	71B	" " " "	46	1.7
"	74	Clearing drainage and road repair	54	2.0
"	70	Brushing and clearing drainage	156	6.0
Jalahun	30	Brushing and road surface repair	153	5.8
"	121	" " " " "	20	0.7
Pejewa	30	" " " " "	52	2.0
Upper Bambara	84	Brushing and clearing ditches	45	1.7
Mandu	116	Brushing	42	1.6
"	75	"	70	2.6
"	84	Clear drainage ditches	56	2.1
"	90	Clear culvert pipe, brushing	38	1.4
"	43	Repair road surface	40	1.5
"	91	Drainage clearing	83	3.2
Dea	84	Clearing drainages	20	0.7
"	115	Brushing and repair road surface	26	1.0
"	90	Brushing and clearing culverts	10	0.3
Malema	75	Pot hole filling	75	2.8
"	116	Brushing and repair road surface	49	1.8
"	76	Brushing and clearing drainages	25	1.0
		Total:	<u>1,180</u>	<u>44.4</u>

Seventeen MOW overseer learners were also involved in manual maintenance directing the CARE communal labor headmen and laborers. One learner was transferred to Kenema to take a course to become an "overseer".

CARE had 24 communal labor headmen  
 $33.45 \times 24 = \text{Le } 802.80$

Summary

<u>Communal labor daily average</u>		<u>Expenditures</u>	
Roadworks	26.5	Roadworks	5,101.02
Structures	28.0	Structures	2,003.50
Manual	<u>41.4</u>	Manual	<u>1,120.55</u>
	<u>78.9</u>		<u>8,255.07</u>

C. Traffic Survey

The road maintenance unit conducted the bi-annual traffic survey during the months of April - May 1978. The survey was done on 16 roads totalling 87 miles and continued for one week for 24 hours or 16 hours each day depending on traffic flow. The results indicate the average daily traffic count was 138 with a high of 210 and a low of 20. This ADT of 138 is very near the maximum for the MOW Class IV design standards.

VI. ENVIRONMENTAL IMPACT

Feeder road construction and maintenance for the period November 1977 through July 1978 caused only slight adverse environmental, social, ecological and public health impacts in the project area.

The impact identification and evaluation summary is based on information contained in the initial environmental examination and the latest on-site observations.

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A. Impact Areas and Sub-Areas<sup>1/</sup>

Impact Identification and Evaluation<sup>2/</sup>

LAND USE

1. Change the Character of the land through:

a. Increasing the population.....	<u>    L    </u>
b. Extracting natural resources.....	<u>    N    </u>
c. Land clearing.....	<u>    L    </u>
d. Changing soil character.....	<u>    N    </u>
2. Altering natural defenses.....	<u>    N    </u>
3. Foreclosing importance uses.....	<u>    N    </u>
4. Jeopardizing man or his works.....	<u>    N    </u>
5. Other factors	

<sup>1/</sup> See Explanatory Notes for this form

<sup>2/</sup> Use the following symbols: N = No environmental impact  
L = Little environmental impact  
M = Moderate environmental impact  
H = High environmental impact  
U = Unknown environmental impact

Impact Areas and Sub-Areas

Impact Identification and Evaluation

WATER QUALITY

1. Physical state of water.....	L-N
2. Chemical and biological.....	L-N
3. Ecological balance.....	L
4. Other factors	
Run-off from road.....	L

ATMOSPHERIC

1. Air additives.....	N
2. Air pollution.....	L
3. Noise Pollution.....	L
4. Other factors	
_____	
_____	

NATURAL RESOURCES

1. Diversion, altered use of water.....	L
2. Irreversible, inefficient commitments.....	N
3. Other factors	
_____	

CULTURAL

1. Altering physical symbols.....	L
2. Dilution of cultural traditions.....	M
3. Other factors	
Ethics.....	M
Educational.....	M

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Impact Areas and Sub-Areas

Impact Identification and Evaluation

SOCIO-ECONOMIC

- |   |   |
|---|---|
| 1. Changes in economic/employment patterns..... | M |
| 2. Changes in cultural patterns.....            | L |
| 3. Changes in population.....                   | M |
| 4. Other factors                                |   |
| Agricultural Activity.....                      | H |

HEALTH

- |  |   |
|--|---|
| 1. Changing a natural environment.....   | I |
| 2. Eliminating an ecosystem element..... | N |
| 3. Other factors                         |   |
| Accessibility to medical attention.....  | M |
| Control of epidemiological diseases..... | M |

GENERAL

- |   |       |
|---|-------|
| 1. International impacts.....             | N     |
| 2. Controversial impacts.....             | N     |
| 3. Larger program impacts (positive)..... | M     |
| 4. Other factors                          |       |
| _____                                     | _____ |
| _____                                     | _____ |

OTHER POSSIBLE IMPACTS (not listed above)

- |       |       |
|-------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

A. AIREY

SOCIO-ECONOMIC AND TRAFFIC EVALUATION

OF CARE FEEDER ROADS IN SIERRA LEONE.

First report of the  
evaluation conducted in Eastern  
Province

June 1978 - August 1978

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GEOGRAPHY DEPARTMENT  
LANCESTER, POLYTECHNIC,  
COVENTRY,  
ENGLAND.

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## INTRODUCTION

This socio economic evaluation organised and conducted over a period of four weeks follows one of the established methodologies of social science research, namely that of the limited interview technique. This technique is eminently suitable to evaluative work of this kind. It is relatively easy and cheap to organise; it is speedy in its execution and enables the researcher to interview a large sample of respondents. It does have several major criticisms and these should be born in mind when reading this report, or attaching any significance to its findings:-

1. Memory Recall - Since this research is based on a single interview the memory recall of the respondent is of paramount importance and heavy reliance is placed on the accuracy of this recall. Human nature being what it is we can expect several types of errors to creep in:-

- (a) Loss of memory - The human memory has a limited accuracy and this accuracy is reduced with time. Therefore figures and information involving recall from the past will have a larger error factor than those of the present.
- (b) Percentual bias - An individual's perception of his environment will influence his factual judgment of that environment. Thus those communities unaffected by the CARE Feeder Road Building Programme (F.R.B.P.) may exaggerate their transport difficulties. In contrast, CARE affected communities may be less inclined to exaggerate this aspect of their life since they are no longer constrained by transport problems.
- (c) Disguising the truth - Areas which the individual respondent feels are sensitive to action from officials or the opinion of his peers will be areas in which he will obscure the truth. Thus the ownership of radios may be an under-estimate. Most radio owners do not have the required government licence and are, therefore, sensitive to enquiries as to radio ownership.

2. Measurement or Observation errors - Measurement or observation errors will occur since the tool for measuring change is based on a single 40 minute interview. These errors will arise in a number

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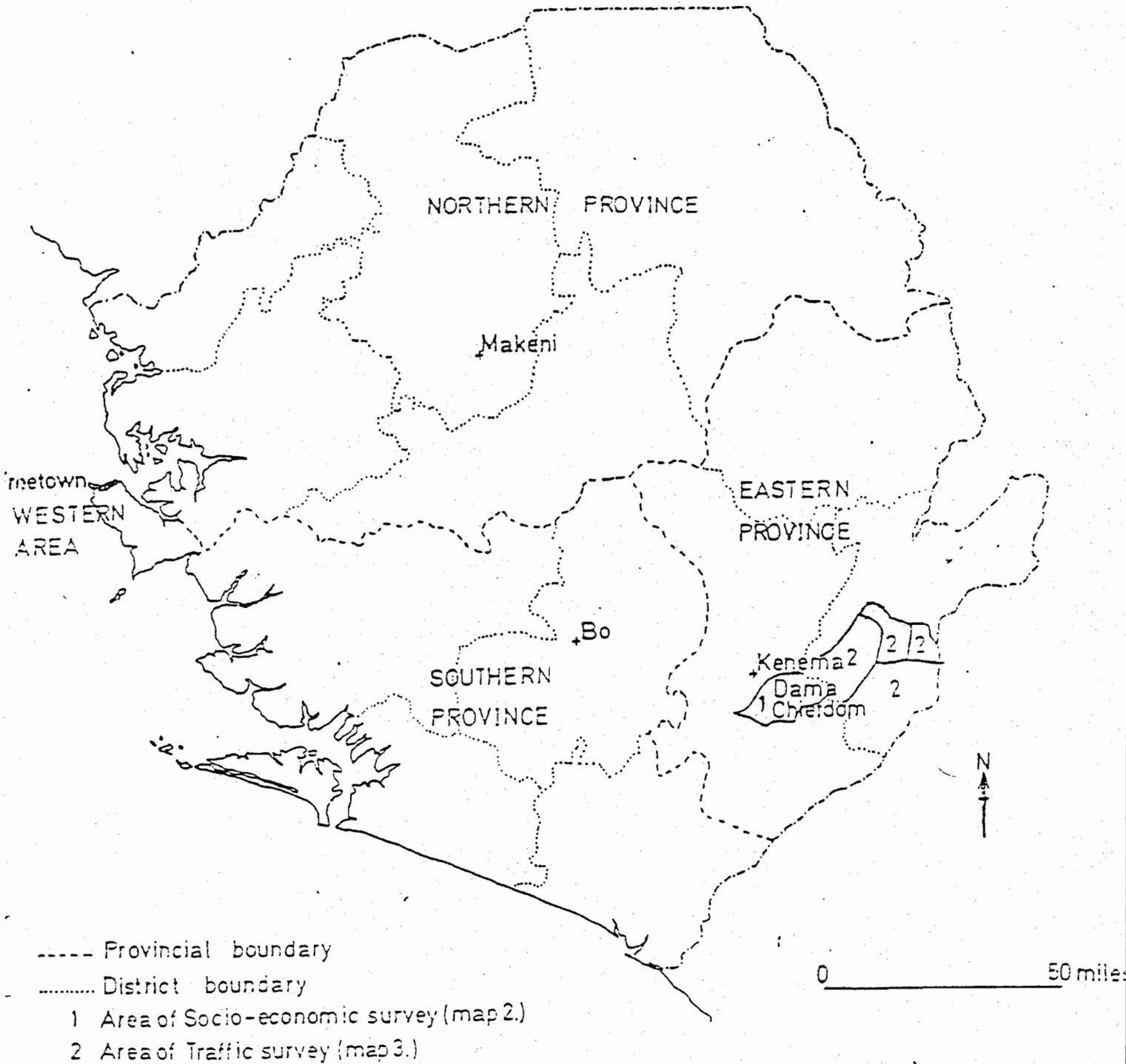
of ways. Misinterpretation of the questions asked, mistranslations and answer evasion are common sources of error. However, these errors can and were minimized by using several techniques:-

- (a) Training the interviewer.
- (b) Pre-testing the interview schedule.
- (c) Incorporating check-questions into the schedule to test the validity of the answers given.

3. Problems of understanding - More importantly, however, is the danger of complacency that this technique may induce. Can an understanding of the real process of change and the social, economic, cultural, agricultural and demographic background to that change be gauged from a single interview? This is a rhetorical question to which there is no ready answer.

Nevertheless, the field experience of the author linked with an academic training in agriculture, resource development and ecology of West Africa, ensures that the difficulties of this type of research have been recognised. Measures have been taken to meet these criticisms but such is their fundamental nature that they can never be completely overcome.

MAP 1. SIERRA LEONE : SITUATION OF EVALUATION AREAS.



PART ONE

THE SOCIO-PSYCHIC EVALUATION

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GENERAL BACKGROUND TO DAMA CHIEFDOMLocation

Dama chiefdom is situated in the Kenema district of the Eastern Province of Sierra Leone (see Map 1). It is one of the largest chiefdoms in the district, with an estimated area of 196 square miles. It is the fifth largest chiefdom in population terms, with 16,575 inhabitants<sup>1</sup>. This is an overall density of 84.6 people to the square mile, quite a favourable ratio in national terms; the national density is 98.5 people to the square mile.

Climate

Dama chiefdom, like most of the south-eastern chiefdoms of Sierra Leone has a hot tropical climate with a long rainy season, lasting usually from April to November. In the rainy season August and September have the highest monthly totals. Annual average totals exceed 100 inches, with some 25% falling in the above mentioned months.

Relief and Drainage

Dama chiefdom has a varied relief. Relief-forms range from the numerous inland valley swamps associated with the minor valleys to the free draining interfluvies rising up to a 1000 feet. Relief tends to be highest in the south, decreasing northwards to the fertile terraces of the river Moa.

The drainage network of Dama is very dense and dendritic, flowing northwards into the Moa. The terrain is therefore very irregular.

This undulating characteristic and the frequent valley swamps make road building and maintenance very difficult.

Vegetation

The natural vegetation (Tropical Rain Forest) has virtually disappeared from Dama. Little virgin forest exists since all the natural vegetation has, at worst been cleared for agriculture or modified by the felling of timber. In the present landscape low farm bush dominates the vegetation whilst the taller secondary and possibly some primary forest is confined to the higher, remoter interfluvies. Both the farm bush and the secondary forest indicate differing degrees of interference by man.

<sup>1</sup> Unpublished 1974 Census information.

### Economy

The majority of the population in Dama chiefdom depend on agriculture for both subsistence and cash income. There is some diamond mining, but it is ill-organised and speculative in nature, with, it would appear, a declining impact on the chiefdom economy.

### Agriculture

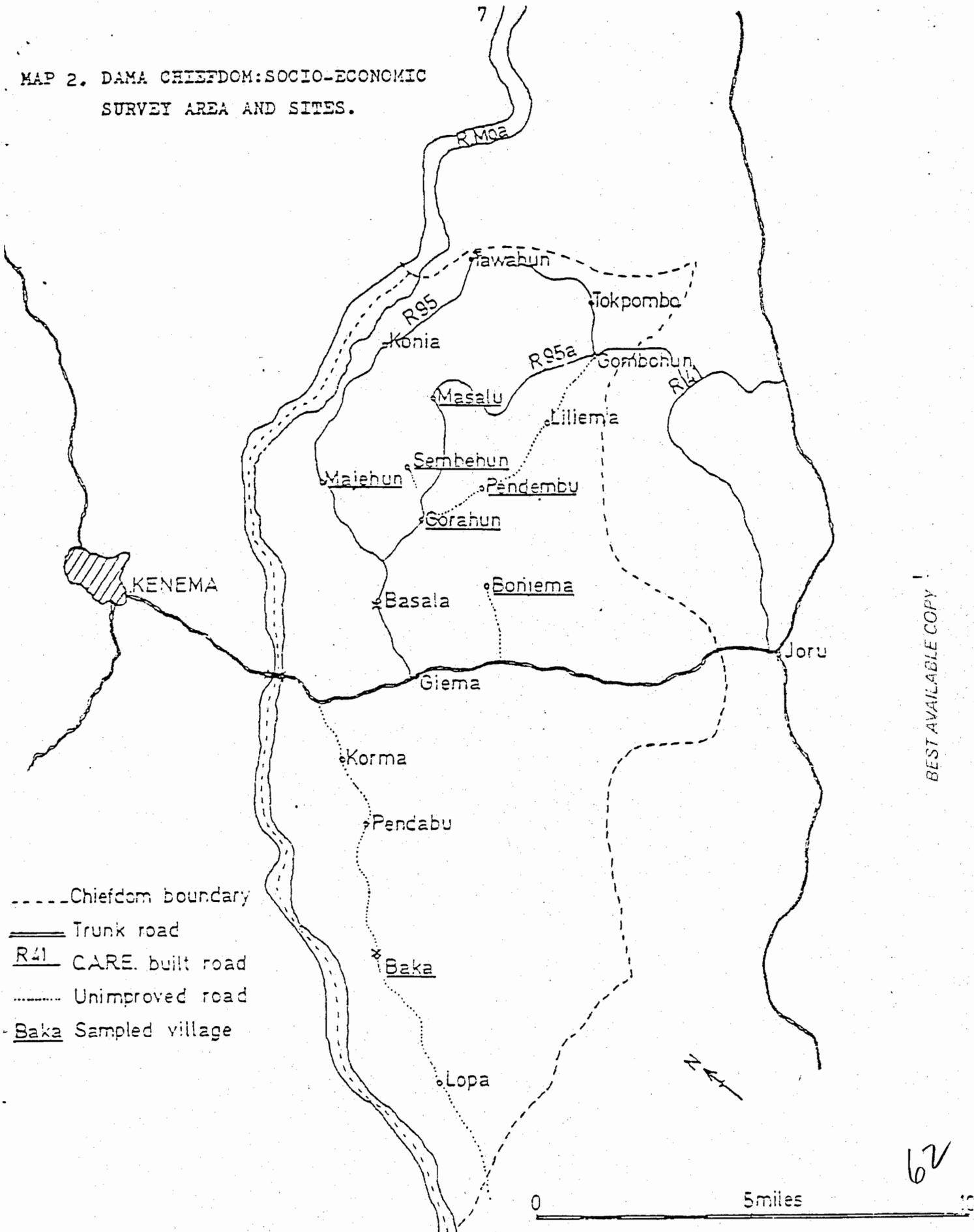
Agricultural activities in Dama chiefdom are primarily concerned with the cultivation of rice, coffee and cacao. The former is generally the principal crop in an annual rotational bush fallow system. The bush is brushed and burned in the late dry season and then planted in the rains with upland rice and a wide variety of subsidiary crops. This rice-farm is usually abandoned at the end of the farming calendar and a fresh area of bush is cleared for the succeeding rice farm. Rice, less commonly may be grown in a more permanent situation using the numerous swamps of the chiefdom. In both cases rice is the subsistence crop, providing the preferred staple in the typical farmers diet.

Coffee and cacao are the usual cash crops of the chiefdom farmers. Coffee is more important than the latter; there were 52,000 coffee farmers in Eastern Province in 1970 compared with 40,000 cacao farmers.<sup>2</sup> Both crops are produced by smallholders who have planted or inherited their tree crop farms as more permanent features of the agricultural landscape. Acreages are therefore small (in per capita terms), more than two thirds of coffee and cacao farms in the area are less than 10 acres in size.

There are a wide variety of secondary crops grown by Dama farmers; fruits, vegetables, and ancillary staples. These are usually inter-cropped with the primary users of the land. The annuals with the rice farm and the perennials in the plantations or the gardens adjacent to the village.

2 S.L. Government. Agricultural Statistical Survey of Sierra Leone 1970/71 Freetown.

MAP 2. DAMA CHIEFDOM: SOCIO-ECONOMIC SURVEY AREA AND SITES.



SOCIO-ECONOMIC EVALUATION - 1978Objectives

1. To measure the achievement of the intermediate goals established in previous evaluations.
2. To identify other social, economic and agricultural characteristics of the CARE affected communities.

Methodology

Dana, a Mendechiefdom in Kenema district was identified as a suitable site for the survey. In this chiefdom CARE has been building two roads, R.95 and R.95a since late 1976. The communities in the area have had approximately 2 years to adjust to increased accessibility.

Dana also has the advantage of having similar environmental conditions to the adjacent areas where previous research has heretofore concentrated. Further research in these early areas of study was considered to be overloading an already intensely studied situation.

An evaluative framework was established based on the "with - without CARE" situation, since longitudinal "before and after" analysis has not, as yet, been possible. Using secondary sources, particularly data on the 1:50,000 map series (2nd edition) and unpublished information from the 1974 census of population, settlements were pre-selected in an attempt to identify distinctions between those which have been directly affected by the CARE Feeder Road Building Programme (F.R.B.P.) and otherwise similar communities excluded from the scheme. The following classes were identified:-

1. Villages on secondary roads.
  - (a) Villages affected by the F.R.B.P.'s upgrading and renovation of the secondary road.
  - (b) Villages sited on unimproved secondary roads.
2. Villages on seasonally motorable tracks.
  - (a) Villages affected by the F.R.B.P.'s upgrading and renovation of the track.
  - (b) Villages sited on unimproved track.
3. Villages on minor tracks, which may or may not be motorable.
  - (a) Villages affected by the F.R.B.P.'s upgrading and renovation of the track.
  - (b) Villages sited on unimproved track.

Another settlement was selected, which appeared to be totally unconnected to the national road network other than by footpaths. This was to serve as an overall control which might be categorised as 4c type settlement.

Within each village up to 50% of the farming households (mawe) were selected at random to be interviewed by Mende interviewers. The interviewers, all under-graduates of Njala University College, were trained to administer a prepared and pre-tested interview schedule. These completed schedules, 117 in number provided the basic data for the analysis that follows.

Problems in applying the designed evaluative frame.

The initial evaluative frame, developed as it only could be from secondary sources, proved to be inadequate. Initial field visits showed that some settlements no longer enjoyed the same degree of connectivity to the national road network as assumed in the evaluation design. Sembahun, the village on a minor track, although unaffected by the F.R.B.P. (and thus category 3B) was, in fact, linked to the national network by a track of a motorable standard built through self-help in 1975. Masala, its paired 3A counterpart had, as a result, been less accessible until in 1977 CARE built R.95a through the village. Sembahun, thus has had a longer period of time in which to make adjustments to increased accessibility. Similarly, it was discovered that the 4c community had also, through local initiative, built a motorable track to the main Joru - Kenema trunk road. This village, as a result, had become more accessible than some others within higher categories (2A and 2B, 3A and 3B.) It could not, therefore, be used as a totally unconnected control as originally intended. In view of the limited time available, it was not feasible to include a settlement which fitted this control situation. In spite of this, the validity of the overall results of the evaluation is not seriously affected.

Findings: How far have the intermediate goals been met?

This report will take, in order, the various goals detailed in the briefing document.

1. Increased Agricultural Extension Service Activity

- (a) Increased knowledge of availability of this service - The agricultural extension service in Dana chiefdom is chiefly concerned with the development of swamp rice and cacao as part of the general aims of the Integrated Agricultural Development Project (I.A.D.P.) Knowledge of I.A.D.P. Extension Officers and Fertilizer may be taken as indicative of agricultural change. Table 1 highlights the difference between the paired villages in respect of these indicators.

TABLE 1 - Number of positive responses to questions assessing Extension Service Activity

Settlement Category & Name	No. Interviewed	Know. of Extension Officer	Visits by Agricultural Teachers	Know. of Fertilizer	Use of Fertilizer	Know. of I.A.D.P.
1A Majihun	25	1	7	24	8	25
2A Gorahun	10	2	5	6	2	9
3A Masalu	13	5	3	9	1	13
TOTAL	48	8 (17%)	15 (31%)	39 (82%)	11 (23%)	47 (98%)
1B Baka	23	14	12	14	4	16
2B Pendembu	15	1	2	11	0	15
3B Sembahun	12	6	5	11	1	12
TOTAL	50	27 (53%)	19 (38%)	36 (72%)	5 (10%)	43 (86%)
1C Bonjena	19	0	0	15 (79%)	0	15 (79%)

It would appear from these findings that communities affected by the F.R.B.P. (category A) have differentially more awareness of fertilizer and the I.A.D.P., yet have apparently less contact with the Extension Officer, at least under his official title. Yet, it might be said, knowledge and practice are far from synonymous and it is in the area of practice that the A communities score higher than their B counterparts, particularly in the use of fertilizer since twice as many farmers in the A communities actually use it. Had recent political events<sup>(1)</sup> not brought about a reduction in I.A.D.P. activity

(1) The 1977 General Election and subsequent bi-elections.

the difference might have been greater.

- (b) Increased visitation rates - By contrast visitation rates, according to the respondents, are slightly higher in the B communities than their A counterparts. This is unexpected and may reflect a sampling bias but is more plausibly attributed to differential awareness and/or recall since the evidence of the I.A.D.P. officer suggests that, in fact, the latter receive the more attention.

Interviews with the two I.A.D.P. officers responsible for Dama chiefdom, not only contradicted the summary data, but more significantly widened the geographic horizons of the examination of Extension Service activity. A summary analysis of the I.A.D.P. adopted farmers in the years 1974, 1975 and 1976, indicates that in Dama chiefdom there was a bias towards the area north-east of the Joru-Kenema trunk road. This area later became the focus of road building by CARE routes R.95 and R.95a being selected presumably because of the developmental promise shown by this part of the chiefdom. In all 52% of Dama chiefdoms Project farmers came from this north-eastern sector, an area that had only 40% of the chiefdoms population. Unfortunately, an official concerned indicated the Project returns for 1977 and 1978 are not available, but that this bias has continued, reinforced no doubt by the recruiting slogan used by the relevant Extension Officer to persuade the farmers in this area to join the Project "The I.A.D.P. (and CARE!) have built this road for you, because you are the best farmers in the chiefdom, so you must live up to this reputation and become an I.A.D.P. farmer."

Further evidence of bias comes from the Extension Officers monthly travel claims, differential preference for visiting communities on R.95 and R.95a seems very pronounced. For the Cacao Development Officer, 50% of his mileage claim for April 1978 concerned travel over these two roads. Of the remainder of his claim, 30% concerned travel over trunk roads (mainly travel to and from Kenema, where the Projects Headquarters are situated.) No more than 11% of his claim concerned travel over the remaining roads and tracks of Dama Chiefdom. Similarly, the Swamp Rice

Table 2. Range and average amounts of marketed crops

	No. Interviewed	Coffee <sup>1</sup>		Cacao <sup>1</sup>		Rica <sup>1</sup>		Cassava <sup>2</sup>		Orange <sup>2</sup>		Banana <sup>2</sup>		Inga <sup>2</sup> Ollala Kornals		Kola <sup>3</sup>		Total
		Units Sold	No. of Farmers Involved															
1A Majihun	(25)	56	22	78.5	21	23	6	25.5	4	103	10	28	9	5	2	48	2	8 crops
2A Gorahun	(10)	13	7	15	5	19	4	24	2	18	5	1	1			15	4	7 crops
3A Masalu	(13)	15.5	7	4	2	32	9	3	1	4	2					6	2	6 crops
Total	(48)	84.5	36	97.5	28	74	19	54.5	7	125	17	29	10	5	2	69	8	
Average per farmer		2.3		3.5		3.9		7.8		7.4		2.9		2.5		8.6		7
1B Baka	(23)	158	17	43	4	24	3	5	1	11	3			14	3	98	10	7 crops
2B Fendemby	(15)	62.5	15	35.5	11	7	3			4	2					6	2	5 crops
3B Scabohun	(12)	50	11	17.3	4	49	8	16	3	50	3	2	2			8	3	7 crops
Total	(50)	270.5	43	95.8	19	70	14	21	4	65	8	2	2	14	3	110	15	
Average per farmer		6.3		5.0		5		5.25		8.1		2		4.7		7.3		6.3
4B Bongema	(19)	81.5	16	65.5	9	19	3	44	5	99	11	7	2	11	3	23	8	7 crops

1 = bushels 2 = bags 3 = kettles 4 kettles = 1 bushel 3 bushels = 1 bag.

1 bushel = unit of capacity weighing approx 65 lbs, though its weight varies with the crop measured.

Development officer visited 17 Dama villages during May 1978. Ten, (59%) were situated on the CARE roads already mentioned, as against four (24%) on unimproved rural roads, and three on the Joru-Kenema road (18%). It would appear that there is some truth in the remark made by these men, "We concentrate on the farmers on the CARE roads because it is easier and quicker to supervise them."

## 2. Increased Marketing of Agricultural Crops

(a) Increase in types of crops harvested - Table 2 summarises the crop marketing situation with regards to Dama Chiefdom. Farmers in the A communities sold a slightly wider range, marketing on average seven different products, as against 6.3 for their B category counterparts. In Bonjema, past community road building effort appears to have stimulated sales over the full range of crops sold.

The most significant difference between the categories can be seen in the relative importance of the annual crops, i.e. the crops which will have been planted subsequent to CARE road building activity. In the case of rice, cassava and bananas, a higher percentage of farmers in the A communities are involved in the sale of these crops. (Table 3)

TABLE 3 - Farmer involvement in marketing main crops (% selling each crop)

	Coffee	Cacao	Rice	Cassava	Orange	Bananas	Danga	Kola
A communities	77%	60%	37%	15%	37%	23%	5%	17%
B communities	84%	56%	25%	7%	15%	3%	7%	32%

Increasing interest in the marketing of these crops is a good indicator of farmer response to increased accessibility because of their high road dependency. From an economic point of view, they have a low value/bulk ratio and profit margins are small. Headloading costs are punitive. Thus headloading from Sebehun (category 3B) to the roadside at Gorahun would double the total cost of transport from production centre to

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urban market (Kenema), an increase from Le1.50 to Le3.00. Since the selling price of cassava was no more than Le6.00 per bag, poor accessibility in this case carries a penalty of 25% on profit margin.

The increased marketing of oranges may also reflect the increased accessibility of the A communities. Most farmers have planted orange trees in the past and can be left unharvested without damage. The marked difference in the percentage of harvesting in the flexible 'pick/not pick' situation. Oranges, like cassava have a low profit margin and are, therefore, very responsive to transport costs/ accessibility.

The high value crops, i.e. coffee, cacao and kola do not show the differences in distribution/importance as do the lower value crops. Farmer preference, soil difference, etc. are probably more important in the case of these crops. The B communities market more coffee than caca, probably because these communities have an average slightly more and apparently larger coffee farms. Cacao seems to be a more widespread crop among the A communities. The increased importance of kola among B community farmers is due to the close association of kola trees (as a shade crop) among the coffee groves.

Another product which becomes marketable in the A communities is the cutting and sale of firewood from burned clearings, later to become the upland rice farms. Masalu and Gorahun have recently begun to participate in this trade, a new source of income for the A villages now functionally close to Kenema. In one village between Gorahun and Masalu as many as 50% of the householders were engaged in selling firewood and it was clear that this was an innovation dependent on the CARE road. One farmer interviewed sold one trip of wood (worth Le12.00) during the weeks field work in the chiefdom. This is a welcome increase in rural income, though presumably the long term ecological implications may be less favourable. Nevertheless, this clearly represents a cash income benefit of the road building in Dana chiefdom.

(b) Increased marketing of rice - There is some evidence in Tables 2 and 3 that the selling of rice is more generalised throughout the A communities, this almost inevitably lowers the per capita sales of rice compared with the B communities.

It is somewhat of a puzzle, therefore, to note that 90% of the A communities and 74% of the B communities feel that they do not have enough rice to feed them through the Hungry Season. We might assume that increased sale of rice is responsible, yet the most common reason for the insufficiency of rice given by these farmers is the problem of pests. Perhaps the disposal of rice to meet social obligations is responsible for this enigma.

### 3. Increased Transportation Facilities

(a) More frequent transport services - There are four all-purpose Mazda poda podas based in villages served by the CARE-built R.95 and R.95a; these are at Tokpombo, Madina, Konia and Tawahun. A fifth poda poda is based at Liliema, a large village not served directly by R.95a. The basic pattern of transport services in the area and indeed in most of rural Sierra Leone is for the rurally based poda poda to leave the home village in the early morning, at about 6:30a.m. with a full load of passengers, its destination in this case being Kenima. The poda poda will spend the rest of the day plying for goods/passengers wherever it's driver perceives demand to be, this will not necessarily be in its home area. In the late evening, the poda poda will pick up its passengers of the morning and return to base. Such is the regularity of the ebb and flow that discounts are paid on return journeys. The driver will "less" the returning passengers some 10 cents and a guaranteed full load for his return journeys. This is the basic pattern of passenger vehicle movement and interviews with drivers indicate that there has been no real increase in the intensity of poda poda usage of the roads, nor in the number of poda podas based in the area. It would seem that the presence of vehicles reflects demand and this basic demand would have been met whether or not the road surface had been improved.

Improvements, per se have had no significant effect as yet on vehicle numbers. The 12 hour Origin and Destination Survey conducted at Basala does indicate a slight increase in the passenger/goods vehicle using the roads. Five per cent of the drivers interviewed in this survey said that they had not used the two roads prior to their improvement by CARE. These represent the incursion of non-local vehicles and may indicate increased competition between drivers for custom.

The two roads have influenced frequency in one major way. By improving the road surface to an all-weather capability, all the year round frequency is a feature of transport services on the CARE roads. During the 1977 rainy season the CARE roads were motorable even when the Baka road, an unimproved secondary road, was washed out. However, this wet season capability may not mean increased accessibility, since other links in the network may be broken; in this case the Joru-Kenema road (a trunk route in the national network) was impassable and Kenema could not be reached from the improved CARE "feeders".

In addition to the inconvenience of less certain frequency, the villager on the unimproved road has to pay a rainy season surcharge on top of his basic fare. The poda poda driver is charging the user this extra fare to cover the increased wear and tear to his vehicle as it negotiates the much deteriorated rainy season road. According to the drivers, this surcharge was of the order of 50% of the normal dry season fare. On the other hand the villagers of Baka claimed that under really bad conditions (as prevailed last year) they were charged Le2.00 to travel to Kenema, normally a 50 cent fare. In contrast the communities associated with the CARE roads were not subject to this increase associated with the rainy season.

- (b) Greater range of vehicles using the roads - Traffic counts at Baka, on an unimproved road, and Basala on R.95, show that the latter road carries a wider range of vehicles:-

TABLE A - Frequency distribution of main traffic classes.

	Motor Cycles		Cars/Taxis		Poda Poda		Heavy Vehicles		TOTAL
	Total	%	Total	%	Total	%	Total	%	
Baka <sup>1</sup>	7	3%	19	3%	192	86%	6	3%	224
Basala R. 95, R. 95a	62	32%	21	11%	100	52%	8	4%	191

<sup>1</sup> based on a 12 hour traffic count.

Source Traffic counts organised by author.

The motor cycle category seems sensitive to the road surface. Travel is extremely perilous for this class of vehicle in the rainy season and, therefore, there is minimal usage of the unimproved road from Baka.

Cars and taxis have only a slightly increased propensity to use the CARE road. This is probably a response to the bad condition of the Joru-Kenema trunk road which a taxi would have to negotiate before reaching the good road surface of R. 95 and R. 95a.

In contrast the vehicle of the unimproved road is the poda poda, a versatile, robust vehicle ideal for the poor road surface over which they have to travel. Travel by poda poda is the norm for the population living on or close to the rural roads of Sierra Leone. There is, as indicated earlier, an added cost element charged for the poda poda service during the rainy season.

Heavy vehicles in this instance do not seem to differ widely in their usage of either road.

- (c) Vehicle ownership are common among villagers in communities linked by new roads - Vehicle ownership seems to be rare in Dama chiefdom. Of the 119 households interviewed, only two households owned vehicles, one a bicycle and the other a Honda motor cycle. Both these vehicles were owned by households situated on the CARE built roads, the Honda in Majihun and the

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bicycle in Gorahun. This represents an estimated 5% of the households in the A communities, and confirms, though hardly in a dramatic manner, the supposition that vehicle ownership is more common in communities linked by new roads. It is dangerous though, to assume too strong a causal relationship between vehicle ownership and new roads. New vehicles reflect as much the socio-economic status of the individuals who own them.

#### 4. Change in Socio-Economic Status

- (a) Population more materialistic - One of the ways that the population might be regarded as more materialistic is in the selling of their crops. Information on the prices realisable and the source of such information might be taken to indicate the farmers contact with the real world of produce marketing. In general the knowledge of the official government Produce Marketing Board is very low, no more than one third of the farming household knew of the organisation by its official name. Farmers usually sell their produce either to licenced Buying Agents or to unofficial middlemen. Yet there is a strong feeling among producers that full and fair prices are not paid. "They do not give the real price." In spite of this, over half the farmers of A and B communities equally relied on the middleman/trader for information about produce prices. The one area where the A communities seem more realistic vis a vis their B counterparts is in the use of radio broadcasts put out by the S.L.P.M.B. Some 44% of farmers in the A communities reported that they used the radio to gain price information before selling their produce, this compares with 27% of farmers in the B communities.

Apart from this one instance it is very difficult to gauge materialism in terms other than the possession of consumer goods, and this is only one aspect of an attitude of mine we might define as materialism.

As Table 5 shows below, the A communities appear to have more material possessions than their B counterparts:-

<u>TABLE 5 - Material possessions of the two groups</u>						
	Umbrellas	Plastic Buckets	Watches	Radios	Charcoal Iron/Goose	Honda or Bicycle
A villages	113(89%)	116(91%)	34(27%)	31(24%)	30(24%)	6(5%)
B villages	92(73%)	84(67%)	45(36%)	21(16%)	33(26%)	0(0%)

Higher proportions of the households in the A situation have umbrellas, plastic buckets, radios and Hondas and/or bicycles. On the other hand they appear to have fewer watches and marginally fewer charcoal irons. All of these items are freely available in the towns of Sierra Leone and constitute the sort of goods a rural household would aspire to owning. Prices in Kenema are approximately:-

Umbrella	-	Le5.00
Bucket	-	Le5.00
Watch	-	Le12.00
Radio	-	Le50.00
Charcoal Iron	-	Le10.00

By multiplying these prices and the number of items owned by each group it is possible to get some approximation of the comparative value of material goods in each group. A communities have possessions worth some Le26.37 per household, B communities have slightly less in terms of per household value of goods Le23.38. The difference, though slight, between the two may represent a more materialistic attitude and it follows a greater general participation in the monetarized economy.

- (b) Increased contact with the monetarized economy - As suggested above, there is a slight difference in the material possessions of the two groups. Yet when one looks at the income side of the economic equation, farmers in the B category sell much more produce by value, an average of Le415.11 per household, than

their A counterparts who sell only an average of Le255.96 per household. The B households seem to be far wealthier, but where does this wealth go? School fees seems to be part of the answer. This is on average, practically one child who has attended or is attending Primary or Secondary school in the B communities. This compares with an average of one child for every four households in the A situation.

Housing is another area where the increased wealth might be disposed of in the B situation, as later sections show these communities have more concrete houses than the A counterparts.

In conclusion, it is fair to say that there is a little real evidence to suggest that the CARE affected villages have increased contact with the monetarized economy.

#### 5. Increased in other Community Services

- (a) Increased number of visitors - here is no evidence that the newly built roads have increased the number of visitors to the A communities. In fact only 55% of the households in the A category reported that they had received a visitor in the last four weeks. This compares with the 62% of households receiving a visitor in the B category. In the A communities, not only did fewer households receive visitors but also the average number of visitors per 'visited household' was less than in the B communities. (1.92 visitors compared with 2.35 in the B counterpart).

From a developmental point of view this lower rate of visitor would appear to not be particularly significant. Approximately three quarters of the visitors to both situations came on family business. The remaining quarter of the visitors concerned themselves with trading, buying produce etc. In all the communities, only one official visitor concerned with rural development was reported. He was a Public Health/Sanitary inspector and he visited Baka, one of the B communities.

Whether this pattern reflects the influence of the rainy season is a matter of speculation. The impression one gains in this part of Sierra Leone is that there is a general dearth

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of rural development project, apart from the I.A.D.O. which represents a rather narrow agricultural view of rural development. This in a way is unfortunate since the roads built by CARE afford a splendid opportunity for aspects of rural development other than agricultural.

There is one development that has taken place since the building of R.95a and that is the less institutional but regular visitations of a dresser (a private dispenser/nurse) to the villages along this road. All 3A communities reported being visited regularly every Sunday by this dresser. He is meeting the need for western medical attention strongly felt by all rural people in Sierra Leone. The problem is that this sort of paramedical service may do as much harm as good, since dressers, in general are poorly qualified.

- (b) New mosques, churches, schools, stores - In terms of the communal infrastructural improvements the new roads have had a positive impact.

New mosques have been built in four villages, two in the A communities of Gorahun and Masalu, and two in the B communities of Baka and Pendembu. All of these structures are constructed from concrete blocks and represent a considerable investment of wealth by these communities. Similarly, two new concrete barriers (open communal meeting 'halls') have been built, both of them in the A communities of Masalu and Majihun.

Whilst it can be argued that these buildings reflect wealth, particularly from the high coffee and cacao prices farmers have been receiving in recent years, the role of accessibility is just as important. A good example of this is the village of Masalu, which prior to the building of R.95a had to headload all its produce etc. to Konia on the nearest motorable road some two miles away. Cement was a product which the people argued could not be headloaded over this distance and local resources such as bush sticks and clay were used in wall building. Since the completion of R.95a, there has been a spate of construction in concrete; a mosque, a barrier and

spacious house for one of the wealthier individuals of the community have gone up. Moreover, the road also enabled the skilled labour to penetrate to this previously remote area. A mason from Segbwema was employed to organise the construction of these buildings. In addition to this he brought a skill unknown to this area before, namely, the casting of concrete water tubs. Approximately six households in this community employed him in this capacity. Diffusion of skills and innovations is very much in evidence from this one village and it was all made possible by the work of CARE.

Another area where the roads can be said to play a role in the development of community infrastructure, is in the facilitation of individual enterprise. One example is the occurrence of rice mills in the area. Baka and Majihun have a mill, both are a similar size and have the advantage of superior accessibility, since both are on secondary roads, albeit one is unimproved. The third rice mill is to be installed later this year in the village of Masalu. The small population of this village (an estimated 125 individuals) is insufficient to economically justify the building and installation of a mechanical mill. One supposes that the entrepreneur involved looks to the new road to widen the catchment area of potential customers to his mill.

In terms of schools and stores, the two largest villages, Majihun and Baka are the only settlements to possess these facilities. In both cases Majihun (the A community) have the larger school and also a greater number of stores. It is not possible without further study to say whether this is a result of the impact of R.95.

6. Changes in Community Size and Buildings

- (a) Communities larger and more permanent both locationally and structurally -  
The rather small scale nature of this investigation means that it is difficult to draw any conclusions as to the validity of this indicator of change. We can anticipate that the smaller communities of less than 35 people will, unless

they are adjacent to the road, be susceptible to movement of the site to a roadside location. This is a common phenomenon in rural Sierra Leone and indicates a very fluid settlement pattern.

Within the communities studied, the institutional use of cement for the community facilities, indicates a stability that is not so apparent when buildings are composed of mud and stick. This example at the community level does not seem to have followed at the individual level. The A communities have slightly fewer cement houses than their B counterparts and 17% of buildings in A villages use concrete skins or blocks compared with 20% in the B villages.

- (b) Evidence of new building construction - There are two areas of evidence that suggest increased house construction. First the average residential building in the A communities is 13 years old. In contrast the B communities average building is 15 years old.

Similarly, an examination of the houses built in recent years shows that 6 houses or 11% of those surveyed in the A villages, were built in 1977 and 1978. In contrast only 3 houses or 5% of the residences surveyed in the B villages are of this age. There seems to be double the rate of new house-building in the villages affected by the CARE road building programme. These new houses are predominantly of the traditional mud and stick construction, cement usage does not seem to be associated with this spate of new house building.

#### 7. Changes in the agricultural systems

If we accept the supposition that the roadside is a desirable site for settlement, and this certainly seems the case for much of this part of the country, then it follows that these sites will attract proportionally more of the population growth at present experienced in the developing country (Sierra Leone's population rate is estimated at 2.1% per annum). This phenomenon will place greater stress on the traditional system of rotational bush following. This population pressure will be exacerbated by the

roadside communities' tendency to sell, and it follows, to grow more cash crop. Since the chief cash crop are tree crops, replacement of the bush fallow by coffee or cacao plantations (peasant farmer smallholdings) will also be a feature of the changing agricultural scene. This scenario would appear to match well the cases of the two larger communities studied, namely Majihun and Baka. In these two communities the age of the bush burned for the 1978/1979 rice crop is below the level most agriculturalists would consider necessary for the maintenance of productivity of the rotational bush fallow system. In Majihun 13 farmers made upland rice farms using bush of an average 6.6 years age. In Baka 23 farmers made upland rice farms using bush of an average 6.9 years. In both these cases the fallow period is very short and probably reflects shortage of land. This is confirmed in Majihun, where over half the farmers (56%) in the village report that they have problems acquiring more land, only 17% of Baka farmers felt this. When farmers in this area have not enough land or have too short a fallow then, and here I quote a group of farmers, "We have to go into the swamps". Significantly 64% of farmers in Majihun had a swamp rice farm compared with 22% in Baka. So we can anticipate in a road/population growth situation there will be a gradual diminishing of the fallow period for the upland rice bush and a concomitant rise in the development of swamp rice.

#### Changes in population

In this area of change the roads can be seen to have an entirely permissive role, in other words they do not bring about the change directly but allow other changes to act more strongly.

In all communities studied, there appears to be considerable out-migration of population from the village of birth to other places. The A communities reported that an average of 2.05 people brought up by the household, now live away, the figure for the B communities is higher at 2.43 per household. This is a high loss in percentage terms 23% and 27% of the average household of 6.7 persons (plus those living away = 8.75 in A communities and 9.13 in the B communities). This out-migration can be broken into two

streams; female migration which is essentially rural-rural migration (marriage being the prime motivator for the move); male migration on the other hand tends to be more rural-urban. Female migration is more important, the ratio of female to male out-migrants is 1.46:1 in both places.

Correlation analysis of this migratory process suggests that there is a strong correlation between the average number living away (per household) and the rate of primary and secondary schooling. (1) Since four times as many boys as girls are enrolled in these schools, there is a strong correlation between number of boys educated per household and the number of men living away. (2) There does not seem to be as strong a correlation between the number of people enjoying an arabic education and those living away (3)

Thus we can assume ~~that~~ formal school encourages out-migration particularly of males since there is an educational bias towards them. By encouraging the building of schools and spread of formal education, roads may be indirectly encouraging out-migration.

(1) Spearmans Rank Correlation of +.6

(2) " " " of +.6

(3) " " " " +.14

CONCLUSION

The six areas with which this evaluation has been concerned, i.e. the intermediate goals, represent aspects of rural life likely to have been influenced by increased accessibility. To these six are added two more areas of change, agricultural systems and population migration. For each goal, quantification has been attempted and the general results can be summarised thus:-

1. Knowledge of agricultural extension services and indicators of agricultural change is high overall among all the farmers surveyed. Where the CARE affected communities benefit over the non-CARE affected is in:-
  - (a) the greater use of fertilizer
  - (b) greater attention from the I.A.D.P. Officers.
2. It is confirmed that a wider range of crops are marketed by the CARE affected communities and it is suggested that there are more farmers involved, i.e. marketing is more generalised. Particularly important as yet are the annual crops with a low value/bulk ratio. Firewood is another marketable product directly attributable to CARE road activities. However, this product will only be found where CARE roads are built within the functional region of the important natural towns.
3. There is no real evidence, as yet, of any significant increase in transport facilities, but the findings of 5% generated traffic using the roads suggests increasing competition for trade.
 

The CARE communities benefit from all year round accessibility and lower costs of transport in the rainy season.
4. Increased materialism is a difficult concept to apply and this is an area where there is apparently no consistency. CARE affected communities have slightly higher value of material possessions. Yet mean income is lower; the apparently wealthier unaffected communities, it is suggested, spend their income in less material ways - education, housing etc.
5. Regarding increased visitor rates, the CARE affected communities lag behind the unaffected. Yet the improvement of the road has

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allowed the ingress of a mobile paramedic, suggesting that CARE has improved the availability of western medicine to its affected communities.

6. There has been a spate of new building in the CARE affected communities. The use of concrete has so far been a feature of communal rather than individual building activities. Nevertheless, at individual level, the new building rate is almost double that of the unaffected communities, though in both cases houses are built with traditional mud and stick walls.
7. In the CARE affected communities we can expect the agricultural systems to change in the long term. With shortening of fallows on the upland soils, greater use of swamps can be anticipated.
8. Population migration will also be a feature of the long term demographic changes affecting the CARE communities. There is a suggestion that with increased educational opportunity selective migration of the young men is more common. If we anticipate greater participation in education by the CARE communities we can also anticipate greater migration. These appear to be the trends identified in Dana chiefdom which we might attribute to the impact of CARE road building activities. In the complex web of rural interaction and change, road building is but a part of the whole process we might call development. Therefore it should not be forgotten that other forces may have a role to play in explaining the patterns of change outlined in this paper.

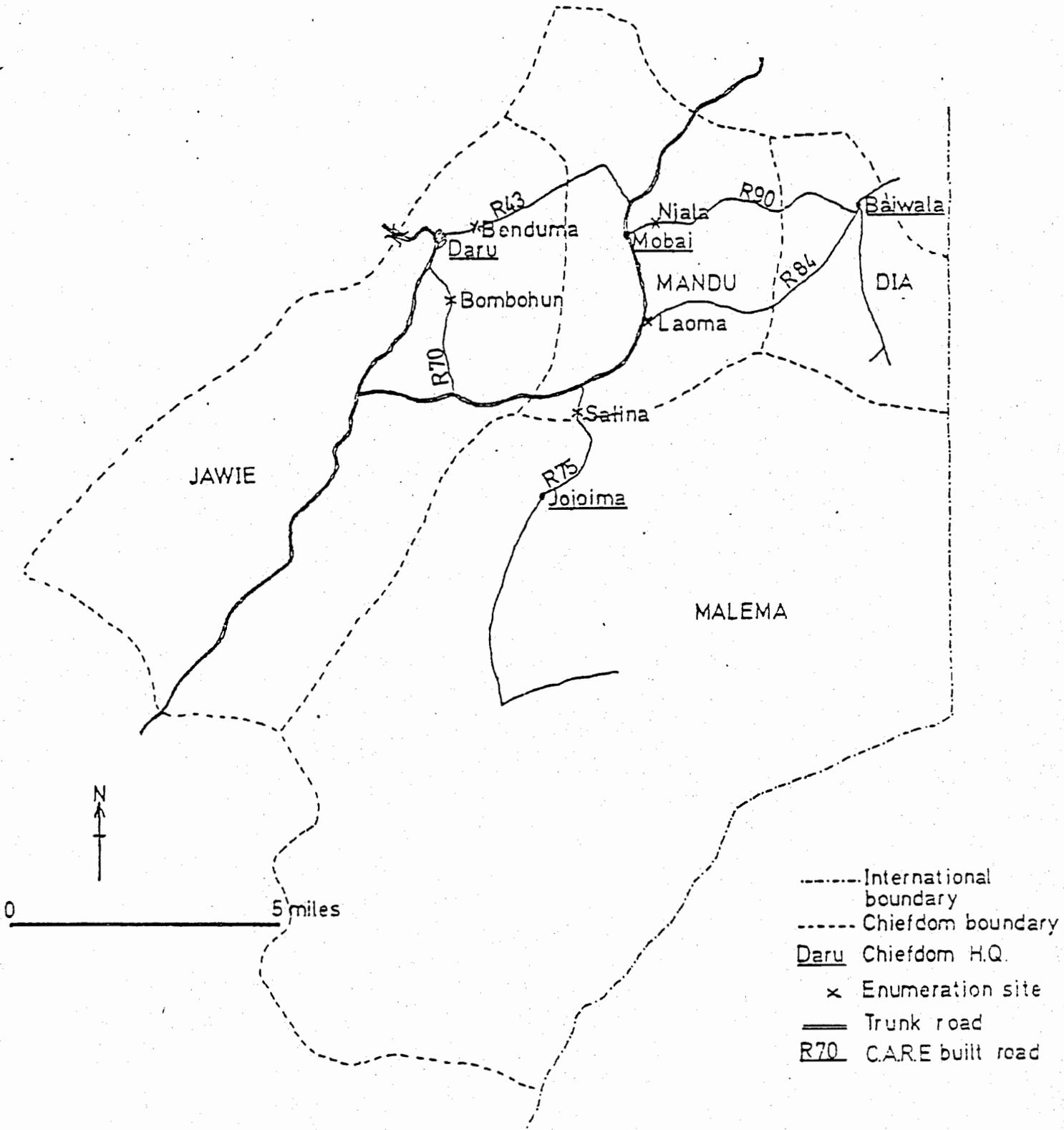
PART TWO

THE TRAFFIC SURVEY

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MAP 3. TRAFFIC SURVEY SITES IN THE DARU AREA.



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T R A F F I C   S U R V E Y

A survey of traffic using the existing CARE roads was undertaken for a seven day period beginning Thursday June 24 and ending Wednesday July 5th 1978. This survey encompassed twenty-four hours of every day, in order to determine accurately the A.D.T. of each road surveyed. It was also combined with an Origin and Destination Study conducted during the daylight hours, i.e. 7:00a.m. to 7:00p.m.

Objectives of Survey

1. To provide rainy season data.
2. To supplement existing dry season data
3. To provide a framework for future traffic survey methodology.

Methodology

The need for careful supervision and the limited number of student enumerators necessitated counting at a sample of the sites already surveyed by Mr. Frechette (Maintenance Section) during the dry season. The sites were selected at random from the information provided by the April/May Maintenance Report. In all, five roads were randomly selected from the list of twenty-four hour sites, i.e. R.42, R.70, R.84 and R.90 (a 45% sample).

The traffic survey was planned to be of a continuous seven-day twenty-four hour nature but the unforeseen closure of R.84 with its repercussions on R.90 (i.e. diverted traffic) necessitated the use of the returns for only six of these seven days as the basis for A.D.T. and analysis.

Traffic Volumes

As Table 1 indicates, volumes on all roads fell below an A.D.T. of a hundred and as such it is possible to suggest that these roads fall into the rural feeder road category hypothesised by Davies. (1)

Similarly, at the temporal level, as Table 2 shows, these roads have the typical bi-modal distribution of traffic in the average twenty-four day. The early morning peak reflecting the general outward movement of vehicles matched by an evening peak of predominantly inward flow. This, plus the fact that the bulk of the traffic is

(1) F.J. Davies - Roads & Transport in Sierra Leone. Transport Survey of Sierra Leone, Wash. 1963

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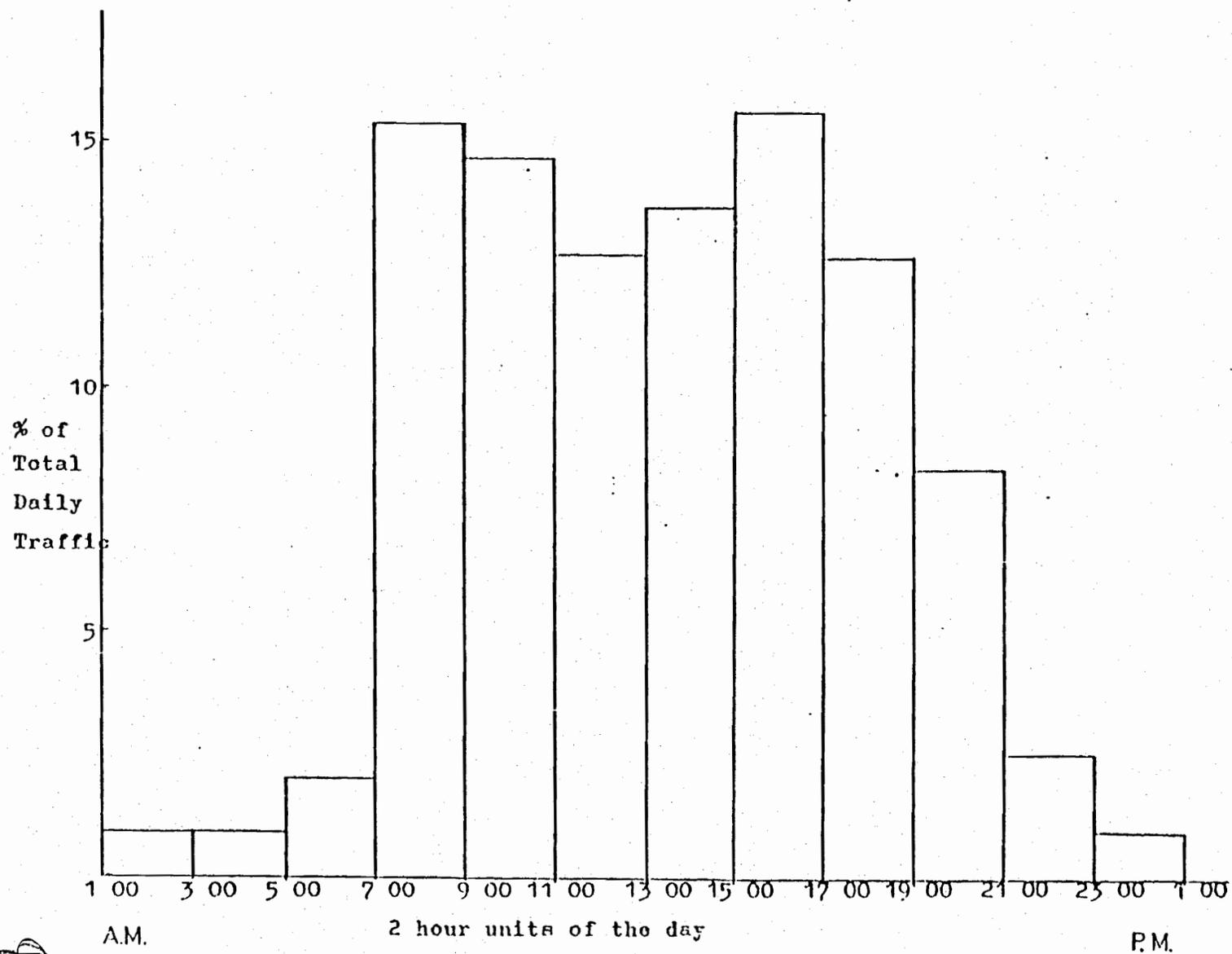
Table 1: Traffic volumes, composition and A.D.T. for the five roads surveyed.

Road Number	Enumeration Site	Vehicle Class	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Total Week	Daily Average	Total Daily ADT
R70	Bombohun	1 M/c	18	18	10	13	21	13	8	101	14.4	89.7
		2 Car/Taxi	16	20	25	26	20	27	36	170	24.3	
		3 Pass/v	40	35	30	26	37	29	32	229	32.7	
		4 H/v	18	23	21	17	21	20	8	128	18.3	
R43	Bonduma	1 M/c	21	12	14	13	14	14	12	100	14.3	75.7
		2 Car/Taxi	27	20	29	25	29	31	30	191	27.3	
		3 Pass/v	30	18	23	21	16	28	29	165	23.6	
		4 H/v	10	15	6	12	11	4	16	74	10.6	
R75	Salina	1 M/c	15	18	10	14	26	28	17	128	18.3	84
		2 Car/Taxi	23	28	33	24	36	38	33	215	30.7	
		3 Pass/v	40	30	35	26	50	24	27	232	33.1	
		4 H/v	2	2	2	3	2	0	2	13	1.9	
R84	Laoma	1 M/c	33	11	36*	21	27	27	21	140*	23.3*	79.2
		2 Car/Taxi	34	23	17*	20	15	29	22	143*	23.8*	
		3 Pass/v	45	32	10*	26	31	28	28	190*	31.7*	
		4 H/v	1	0	0	0	1	0	0	2*	0.3*	
R90	Njala	1 M/c	23	19	20*	16	28	9	19	114*	19*	28.5
		2 Car/Taxi	4	1	15*	2	6	7	3	23*	3.8*	
		3 Pass/v	9	2	25*	5	4	3	8	31*	5.2*	
		4 H/v	0	0	0	2	1	0	0	3	.5	

\* On Wednesday R84 was closed and R90 received diverted traffic, these Wednesday figures have been deleted from A.D.T. calculations and the A.D.T. of these roads is based on 6 days.

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Table 2: Percentage of total daily traffic occurring in 2 hour units of the 'average day'.



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confined to the daylight period (an overall average of 84.6% of the traffic using these roads does so between 7.00 a.m. and 7.00 p.m.) confirms the rural nature and provenance of these five roads.

Traffic Composition

TABLE 5 - Breakdown of traffic users by four traffic classes.

	R.70 Borbohun	R.43 Benduma	R.75 Salina	R.84* Laona	R.90* Njala	TOTAL
1. Motor Cycles	101 (16%)	100 (13.9%)	128 (21.8%)	140 (29.5%)	114 (66.7%)	595 (25%)
2. Cars Taxis	170 (27.1%)	191 (36%)	215 (36.6%)	143 (30.1%)	23 (13.5%)	742 (30%)
3. Poda Poda	229 (36.5%)	165 (31.1%)	232 (39.5%)	190 (40%)	31 (13.1%)	847 (33%)
4. Heavy Vehicles	128 (20.4%)	74 (14%)	13 (2.2%)	2 (.4%)	3 (1.8%)	220 (10%)
	* 6 day					

From the above information, we can tentatively pick out three different classes of roads, each indicated by different percentage composition of vehicle types:-

1. R.90 type - Here the major road user is the motor cycle, composing as it does some two-thirds of traffic volume on this road. Here the personal mobility of a few wealthier individuals dominates the traffic scene, "Public Service" vehicles are relatively less important - an average of nine passing the check point every twenty-four hour period, carrying some fifty-four people per average day. This dominance of the motor cycle can be considered a CARE induced phenomenon. Motor cycle ownership and use in unimproved situations is very much less than on the CARE road network. (see Socio Economic Survey.)
2. R.75 and R.84 type - In this type, motor cycle usage is high, but the poda poda is the dominant modal class. There are many more people travelling by these general purpose fare-paying vehicles, a daily average of thirty-three poda podas used these roads

carrying some three hundred and ninety-six people.

This more intensive use by fare-paying vehicles could be indicative of the wider service area of these roads and the fact that they link important rural villages and towns, such as chiefdom administrative centres to the national trunk network.

3. R.70 and R.43 type. These roads can be identified by the greatly increased occurrence of heavy vehicle traffic. Whilst this class never dominates the traffic categories, it does contribute some 14% - 20% of the traffic using these roads. Since these vehicles are principally concerned with carrying goods rather than passengers, this type of road can be seen to have a goods movement component which the other two categories lack. As a result, these roads might be considered (and subsequent sections confirm this viewpoint) as having a natural trunk road function as well as a purely rural one.

#### Impact of the Rainy Season

The A.D.T.'s for the five sampled roads indicates that there has been a general reduction in traffic volumes which is so widespread that we can safely attribute it to seasonal influences (see Table 4 below.)

<u>TABLE 4 - Dry and Rainy Season A.D.T.'s compared to indicate percentage decrease during Rainy Season.</u>			
	Dry Season A.D.T.	Rainy Season A.D.T.	% Decrease
R.70 Bombohun	134.9	89.7	34%
R.43 Bonduma	101.9	75.7	26%
R.75 Salina	119.4	84	30%
R.84 Laoma	101.9	79.2*	22%
R.90 Njala	36	28.5*	21%
Overall	494.1	357.1	28%
* based on 6 days			

This overall reduction of 28% is to be expected and might be considered as typical, in the absence of similar statistics, of

rural Sierra Leone. It reflects not so much the worsening travel conditions that are associated with the Rainy Season in West Africa but rather the combination of agricultural/economic trends producing a low point in the travel patterns of rural Sierra Leone.

These trends are:-

1. The greatly increased labour demands of agriculture during the busiest time of planting and weeding. Farmers and potential travellers tend to be preoccupied on their farms or in their villages.
2. The chief marketable crops, (coffee, cacao, oranges, rice) of this part of Sierra Leone tend to be sold during the Dry Season from November to May. During the Rainy Season a little rice is sold along with kola, oil palm kernels and cassava. These, as the Socio-Economic Survey indicates, are not grown and sold on the same scale as coffee and cacao. Movement of goods, one would expect to be low, as Table 5 in general confirms.

<u>TABLE 5- Movement of Passengers and Goods</u> <u>on commercial vehicles over twelve hour period</u>				
	Passengers	Goods expressed as Passenger Units		Goods as % Passengers
		Poda Podas/Taxi (1)	Heavy Vehicles (2)	
R.70	1,197	65.6	3,880 (97)	330%
R.43	1,733	211.5	1,720 (43)	110%
R.75	1,903	127	480 (12)	32%
R.84	2,307*	337.5*	0* (0)	15%*
R.90	228*	37.5*	40* (1)	34%*

- (1) For Poda Poda and Taxi - Passenger Unit calculation was based on cost of transport:-  
1 Bag/bundle salt, cement, cloth, 1 basket fish produce, 2 cartoons/ crates beer, soft drink, empty drums are cost equivalents of a passenger, 1 bag of farm produce is cost equivalent to 2.5 passengers.
- (2) For Heavy Vehicles - 1 heavy vehicle considered equivalent to 40 passengers. Figures in parenthesis are the actual number of heavy vehicles.
- \* based on 6 days

Thus for three roads, goods movement is less than a third of passenger movement. Only in the case of R.70 and R.43 does the proportion of goods outweigh that of passengers. In the case of these two roads the role of the heavy vehicle is paramount and as later sections suggest, this reflects regional rather than local supply/demand.

3. It follows from (2) that the Rainy Season is also the season of financial stringency. Limited marketing of agricultural produce means limited cash availability and therefore low travel opportunity.

#### Generated Traffic

An attempt to measure the generated traffic using the CARE roads was made by asking drivers, "Did you use this road before CARE improved it?" Table 6 indicates the number of new drivers as a proportion of old pre-CARE drivers.

TABLE 6 - New drivers as a percentage of Old drivers

	New drivers	Old drivers	% Difference(1)
R.70 Bombohun	249	209	110%
R.43 Benduma	374	10	3,740%
R.75 Salina	39	406	10%
R.34 Laoma	43	427	10%
R.90 Njala	27	143	19%

(1) to nearest 1%

The responses to this question gives a general idea of the percentage traffic generated by new drivers. The validity of the response can be gauged by the case of R.43 Benduma where some 374 drivers claimed they had never used this road before. Since prior to CARE activities, R.43 was a derelict railway, this seems an entirely reasonable finding. Nevertheless, inspite of the implied validity of the findings, cautious use must be made of the figures:-

- (1) They indicate new drivers and therefore this will include newly qualified drivers or drivers new to the area.

(2) Old established drivers in the area may have occasionally used the road prior to CARE and may have, with improvement, stepped up the intensity of their use of the road. This certainly seems to have been the case on R.90. Here 143 drivers on a six day period claimed they had used the road before, i.e. they were old drivers. Yet in a traffic survey held before the road was completed only 32 vehicles (plus drivers) were counted over the same time span. Clearly generated traffic is of the order of 450% not the 19% implied by the responses to this question.

### Origins and Destinations

Table 7 indicates the importance of the Origins and Destinations given by the vehicles using the five roads.

	R.70 <sup>1</sup> Bombohum 160	R.43 <sup>1</sup> Bencuma 30	R.75 <sup>1</sup> Salina 169	R.84 <sup>2</sup> Lacma 244	R.90 <sup>2</sup> Njala 125
Villages	(15%) 581	(3%) 554	(17%) 703	(28%) 543	(42%) 162
Local Chiefdom Towns e.g. Pendembu, Mobai, Jojoima, Daru, Baiwala	(53%)	(63%)	(70%)	(62%)	(54%)
Other Chiefdom Towns	11 (1%)	63 (7%)	5 (1%)	82 (9%)	11 (4%)
Nationally important towns (i.e. more than 5,000 population)	338 (31%)	231 (26%)	133 (13%)	11 (1%)	0 -
	1,090	878	1,010	880	298

The settlement categories used roughly conforms to a hierarchy of settlements, villages being the least important, towns of more than 5,000 people (1974 census definition) being the most important.

The hierarchy is also spatial since one and two are local categories of settlement whilst three and four are more distant.

The dominant modal origin or destination for all vehicles is the local chiefdom town, i.e. Jojoima, Pendembu, Mobai, Baiwala, Daru. These towns offer specialised functions/facilities not available in their rural hinterland. These would include produce marketing

facilities, stores, dispensaries/hospitals, schools, legal facilities, etc.

They are central places about which rural life revolves and the CARE built roads have probably assisted these towns to retain and increase their local importance. The roads have done this by encouraging more travel as the section on Traffic Generation tentatively suggests.

However, the second modal class of destination indicates marked differences of vehicles allegiance. Thus the traffic using R.70 and R.43 stands out as having a strong national orientation. One third of the vehicles on both roads originated or completed its journey in other than the local communities.

In contrast the second modal class of destination of R.75, R.84 and R.90 is the local village, emphasizing the essentially parochial nature of these three roads.

#### Conclusion

The results of the Traffic Survey and the Origin and Destination Study have been analysed from several viewpoints and a picture of the Rainy Season traffic characteristics has been presented. All of the roads surveyed have a rural character and the term "feeder road" would seem appropriate on traffic volume criteria (though not it would seem in the Dry Season situation). Yet such are the differences of composition, passenger: goods ratio and origin/destinations, that further examination and qualification of the use of "feeder road" is necessary.

A functional classification of rural roads in Sierra Leone (CARE built) would include the following:-

- (1) Feeder roads. These at a basic level are rural penetration roads, i.e. they terminate in villages or even farms, and their function is to provide accessibility from these areas to the more important chiefdom towns. As such we might expect traffic using these roads to be light, with a strong parochial orientation. R.90 Njala might be considered as typifying this road type.
- (2) Secondary roads. These are the collector roads, connecting the larger rural centres, i.e. the more important chiefdom towns to the trunk road network. R.75 and R.84 would seem to be characteristics typical of this road type. They are busier in volume terms,

have a larger goods component and as the Origin and Destination Study shows, the chiefdom town is the most important origin destination for vehicles using these roads.

This secondary-collector function is also confirmed by the pre-CARE status of these two roads, i.e. they are improved secondary roads and therefore are, in theory, a maintenance responsibility of the M.O.W.

- (3) Trunk roads. These are the arterial roads throughout the country that have an inter-connective function, i.e. they connect the commercial population and agricultural centres of this region to adjacent regions and ultimately the national capital. Origin and destination and significant heavy vehicle usage indicate that R.70 and R.43 have a trunk road function.