

**Evaluation Inventory Data Form for Evaluation Sourcebook**

11/13

U.S. General Accounting Office

Proj. 6360126  
 PN-

625.7  
 R 177 PD-AAA-524-A1

--

1. Agency A.I.D.	
2. Report or Study Title EVALUATION REPORT ON CARE/SIERRA LEONE PENETRATION ROADS	
3. Author/s CARE Representatives, Mr. Rudy Ramp, Mr. Leo	
4. Contractor AID/afr-G-1154	
5. Document ID Number	6. Volume/Paging Annex F - 43 pages + attachments A, B,C,D
7. Date March, 1977	
8. Unit Sponsoring Evaluation AF	
9. Unit Managing Program AF	
10. Program(s) Evaluated  Rural Development, Africa  A.I.D. Reference Center Room 1656 MS	
11. Public Availability	12. Functional Code(s)  151

▲ PD-AAA-524-A1.

625.7

R 177

ANNEX F

CARE/Sierra Leone Rural Penetration Roads

Grant No. AID/afr-G-1154

Evaluation

USAID/Monrovia

March, 1977

TABLE OF CONTENTS

	<u>PAGE</u>
Part I: Introduction	1
Part II: Summary Findings and Recommendations	2
Part III: Project Background	6
A. Project Identification	
B. Project Definition	
C. Longframe	
Part IV: Achievement of Project Goal and Purpose	10
Part V: Project Outputs	14
A. Construction	
B. Engineering	
C. Maintenance	
D. Traffic Survey (Map)	
Part VI: Financial Analysis	27
A. Contributions	
B. Construction Cost Analysis	
Part VII: Socio-Economic Impact	36
Attachments:	
A. Road Maintenance Plan	
B. Machinery and Vehicles Available at Start of Project	
C. Traffic Survey Tables	
D. Short-Term Socio-Economic Survey	
	(Anthony Airey, Njala University College)

## Part I - Introduction

This evaluation report covers the activities of the first two years, January 1975 through January 1977, of the three year Sierra Leone Rural Penetration Roads Project implemented by CARE, Inc. The \$640,000 of AID funds granted to date were obligated in FY 1975 under one of the first Operational Program Grants to a Private Voluntary Organization. Although the current terms of reference for the Operational Program Grants (OPG's) to voluntary organizations place responsibility for evaluation with the organization itself, a joint USAID/CARE review was deemed appropriate.

The purpose of the evaluation is twofold:

- a) To review the progress to date in achieving project outputs and in contributing to the project purpose as defined in the 1975 project documents; and
- b) To provide findings and recommendations with regard to a CARE proposal for an extension and expansion of the project.

The evaluation has been conducted jointly by CARE/Sierra Leone representatives, Mr. Rudy Ramp and Mr. Les Gallagher, and by USAID/Liberia representatives, Mr. Howard Guiot, Mr. Richard Goldman, and Ms. Nancy Tumavick. The traffic survey discussed in Part V, and baseline data gathering, and initial socio-economic impact analysis presented in Part VII have been conducted by Mr. Tony Airey of Njala University in Sierra Leone. Input from the Government of Sierra Leone has been provided through CARE liaison.

## Part II - Summary Findings and Recommendations

Based on the evaluation team's on site review, the financial and comparative cost analysis, and the opinions of rural development experts located in the project area, the CARE Rural Penetration Roads Project has been successful in constructing feeder roads complementing rural development schemes in the eastern area of Sierra Leone. The criteria used in making this judgment must necessarily discount the unrealistic targets established by the Grant Agreement in terms of miles of road to be constructed within the three year life of project, and the total budget. Below are summary findings and recommendations substantiated by the data and analysis contained in the report.

### FINDINGS

- 1) The rural penetration roads constructed have succeeded in providing farmer access to the agricultural inputs and extension services under the Integrated Agricultural Development Project (IADP). The socio-economic-survey and traffic surveys conducted for the evaluation substantiated in increasing number of extension agent visits utilizing the rural penetration roads. (See Parts IV, V D, and VII).
- 2) The baseline survey that USAID/Liberia was to conduct immediately after road site selection in late 1975 was never undertaken. In conjunction with the evaluation, an independent researcher was engaged for the initial survey. Using a matrix methodology of four community types based on road access, the results of the 47-community survey supported the hypothesis that rural penetration roads have an impact on permanent housing construction, increased local services and facilities, monetized economy, and access to agricultural information and services. (See Part VII)
- 3) The Site Selection Sub-Committee has succeeded in de-politicizing road selection. In July, 1975 following project approval, the GOSL formed a project coordinating committee within the office of the Vice President. The committee, based on the recommendations of a Road Site Selection Sub-Committee, established sound development criteria used in identifying 250 miles of roads in the IADP Eastern Area. The construction schedule has followed these priorities and successfully "depoliticized" the Rural Penetration Road Project.
- 4) The original three-year targets of constructing 900 miles of rural penetration roads, 120 bridges, and 7,425 culverts at a total cost of \$4 million (estimated \$4,500 per mile) were unrealistic. In retrospect, responsibility for the planning deficiencies rest with both CARE and AID for: a) lack of on-site engineering expertise to review the proposal; and b) lack of appreciation of Class IV road standards as opposed to the crop

extraction roads CARE had been constructing in Sierra Leone prior to the AID grant. (See Part V A).

5) By June 30, 1977, CARE expects to have completed a total of 224 miles of feeder roads, bridges and box culverts and 672 pipe culverts. Based on calculations of actual in-kind and cash contributions from all sources for FY 1976, the cost is an estimated \$12,000 per mile. In the cumulative experience of the team members, this is substantially lower than any penetration roads under construction in Africa. (See Part VI B)

6) The Road Maintenance Plan required by the Grant Agreement and submitted by CARE to the Ministry of Works in January, 1976, was never implemented by the GOSL. In retrospect, the Plan did not include provision for adequate mechanized maintenance and relied too heavily on commercial labor which was not technically capable of sustaining major road repairs. CARE and MOW have devised a more realistic Plan, taking into consideration the mechanized maintenance needs based on average daily traffic count of the various roads, which calls for an estimated recurrent budget contribution from the MOW beginning with Le 144,260 (US \$125,451) in FY 77/78. (See Part V C)

7) As confirmed by a USAID/Liberia engineer, CARE is designing, constructing and/or rehabilitating roads in accordance with the Ministry of Works standards and specifications for Class IV roads. The roads are thus eligible, in accordance with standards established for Sierra Leone under UNDP guidance, for maintenance by the Ministry of Works. The initial traffic survey conducted indicates an ADT of 50 vehicles which justifies continuing this standard of construction. (See Part V B)

8) By June 19, 1977 approximately 794 of the contributions anticipated from CARE, the GOSL, USAID, Peace Corps and VSO in the Grant Agreement will be met. Projecting the contributions through the original life of project, December 31, 1977, the only shortfall will be an estimated \$75,000 attributable to the GOSL. (See Part VI A)

9) There are several unique features of the project which may limit replicability of the low-cost approach in other West African countries:

- a. CARE is a voluntary, non-profit organization whose competent, experience project personnel have focused on cost-saving, innovative approaches. On a comparative cost basis, similar rural penetration road construction would amount to an estimated \$30,000 per mile if executed by a private contractor.
- b. While the original design of the project included one bridge per 7.5 miles of road constructed, CARE has realized substantial savings by decreasing

that ratio to one bridge or box culverts per 16 to 17 miles of road constructed.

- c. Peace Corps and VSO recruitment policies, combined with CARE experience have provided increasingly more qualified volunteer personnel to the project. Intensive yet inexpensive construction supervision (12 person staff at \$600 per mile) have helped to increase productivity.
- d. CARE has conscientiously pursued Sierra Leonian managerial, technical and supervisory skills. By April, 1977 both the Project Manager and Assistant Manager positions will be held by Sierra Leonians. During the 1976 rainy season, 60 middle and lower level skilled workers received in-service training. Free communal labor is made available to the project through the chiefdoms with local trained supervisors.
- e. Used road construction equipment was made available as in-kind contributions to the project. Although the equipment required substantial rehabilitation, the initial investment was low. (See Part VI B)

#### RECOMMENDATIONS

1. The May 30, 1975, Grant Agreement anticipated a total AID contribution of \$1,145,757 of which \$640,000 was obligated in the agreement. While the CARE/Sierra Leone Director recommended that CARE/New York apply for the additional \$505,757 in January 1977, the evaluation revealed that AID/Washington had not yet received the request. The project budget prepared by CARE calls for the obligation of the second tranche of \$505,757 prior to June 30, 1977. The evaluation team recommends that the second tranche be made available as soon as possible to allow completion of the 224 miles and to facilitate spare parts procurement for the next construction season.

2. AID should consider an extension and/or expansion of support to the project based on: a) the evaluation findings of a continuing need for penetration roads complementary to rural development schemes (particularly those of IADP), b) the high priority assigned to rural penetration roads by the GOSL, c) the on-site capability of CARE, d) the two year track record of producing quality roads at a cost notably below the average in Africa. An expansion of the project should give attention to the following:

- a) Maintenance. An additional grant from USAID should be contingent upon a GOSL commitment to provide adequate staff and budget for road maintenance. The proposed establishment of a

Rural Penetration Road Unit within the Ministry of Works responsible both for technical supervision of construction and maintenance is one good option.

- b) Equipment. While rehabilitated construction equipment has kept initial capital costs down, during the FY 75/76 construction season the average availability was only 55% which had a negative impact on the per mile production rate. It is uneconomical to continue to maintain the existing equipment based on this downtime. A project extension should include new equipment requirements.
- c) USAID-financed Procurement. Procurement regulations under the Grant Agreement have been unduly restrictive and have caused complications and delays in procurement. A new grant should anticipate waiver requirements, at minimum for Small Business Notification, sole source procurement for spare parts, and higher local purchase cost limits.
- d) GOSL contributions. Adequate attention needs to be given to availability of GOSL budget support for construction as well as maintenance and to potential exchange rate fluctuations in relation to Leone contributions.
- e) Bridges. While the per mile cost will necessarily increase, from a developmental point of view of linking agricultural areas, long span bridges should be included in design plans for an additional grant.
- f) Evaluation. In addition to normal periodic monitoring of road engineering, evaluation of socio-economic impact of the roads should be continued. Mr. Airey's baseline data survey needs to be repeated annually and his personal continued involvement would be desirable.
- g) AID Project Manager. With the retirement and departure of Mr. Peter Daniells, the USAID/Liberia project monitor, a new project manager should be named. The peculiar nature and funding of Operational Program Grants to voluntary organizations leaves AID project management responsibility and authority dispersed. Adequate authority should be placed with USAID/Liberia to be responsible to CARE/Sierra Leone routine requests for information and clarification.

Part III - Project Background

A. Project Identification

In December 1972, with assistance from the International Development Association (IDA), an Integrated Agricultural Development Project (IADP) was undertaken in 32 chiefdoms of the Eastern Area of Sierra Leone. The project was aimed at improving the income and living standards of farmers in the parts of the Eastern and Southern Provinces through new technologies, intensive extension coverage, farmer training, and integration of production with processing and marketing facilities. A major omission in the project design was provision for the penetration roads to support the flow of new services into the area and anticipated flow of increased production out of the area.

The Project Management Unit identified the need for rural penetration roads early in the implementation stage and undertook a comprehensive survey of feeder road requirements, in the IADP area. With the assistance of CARE, which had constructed rural penetration roads in Sierra Leone since 1973, a program was designed to construct feeder roads to complement IADP activities in the eastern area.

The project was formulated in the field during October and November 1974 by representatives from CARE/Sierra Leone, USAID/Liberia and AID/Washington with assistance from IBRD, UNDP and Peace Corps in Sierra Leone. The CARE proposal was submitted to AID/Washington and approved in May 1975 as a Project Paper for implementation by CARE.

B. Project Definition

The two basic documents are the Project Paper dated May 18, 1975 and the grant agreement with CARE dated May 30, 1975. The agreement defines the life of project as three years, from January 1, 1975 and through December 31, 1977. The estimated total budget for the project was \$4,042,768 from the following sources:

U.S. Government	\$1,145,757
General Public, principally from North America	886,008
Government of Sierra Leone	1,785,185
U.S. Peace Corps	93,418
U.K. V.S.O.	79,440
Canada CUSO	52,960

The Agreement obligated USC funds totalling \$640,000 with the note that the estimated additional financing of \$505,757 may be provided by AID if funds are available. The entire amount was authorized for local currency costs.

The Project Logical Framework on the following page is extracted from the Project Paper which was cleared by a CARE representative in addition to the normal AID signatures. While the Logical Framework elements do not appear in the grant agreement, they provide the inputs, outputs, and the planned end of project status.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS
<p><u>Sector Goal:</u> To increase the per capita income of the rural population of Sierra Leone through an increase in agricultural output and productivity.</p>	<p><u>Measures of Goal Achievement:</u> 1. The share of the agricultural sector in the Gross Domestic Product increases from its present share of 30%. 2. A decrease in the level of food imports with a significant reduction in the level of rice imports.</p>
<p><u>Project Purpose:</u> The purpose of this project is to establish a rural penetration road system linking the isolated rural poor to the urban markets and consequently to the monetized economy. These roads will facilitate the supply of agricultural inputs, health and extension services, and education to farmers living in heretofore inaccessible rural areas.</p>	<p><u>End of Project Status</u> 1. Increase in agricultural produce brought to market. 2. Increased usage of seed, seedlings, fertilizer, pesticides, etc. 3. An increase in the area served by extension workers of the GOSL Ministry of Agriculture.</p>
<p><u>Outputs:</u> (1) the construction and rehabilitation of 900 miles of rural roads. (2) the construction of 120 bridges and 7,425 culverts which will allow all weather passage of four wheeled vehicles. (3) Improve of the nutrition standards of rural poor families participating in this project.</p>	<p><u>Magnitude of Outputs:</u> CY 1975: 130 miles of road, 30 bridges, and 1,525 culverts. CY 1976: 475 miles of road, 50 bridges, and 3,500 culverts. CY 1977: 295 miles of road, 40 bridges, and 2,400 culverts.</p> <p>Increase of protein consumption by supplementing the basic rice diet of rural families.</p>
<p><u>Inputs:</u> <u>AID:</u> Funding for national personnel costs, equipment maintenance and repair, and commodities, and Title II food. <u>GOSL:</u> Equipment, equipment operators, fuel, payment for local labor force, and commodities. <u>CARE:</u> American project management and engineering services, office overheads, commodities, equipment. <u>Other Donors:</u> U.S. Peace Corps, VSO, CUSO, each providing engineering services.</p>	<p><u>Implementation Target (Type and Quantity)</u> (Available annually through proj. life) CARE admin. staff and Field Program Coordinator, Volunteer engineers (8), Site Supervisors, machinery operators (18), local labor (1,200), cement (2,640 ts.), re-rod (18 ts.), re-wire (60 rolls), stone (4,994 yds.), sand (3,267 yds.), wood (254 sheets), nails (3,291 lbs.), assorted hand tools, D-6 Cat., D-4 Cat., Motor grader (1), front end loaders (3), dump trucks (2), tractors (5), haulage attachments (5), towable graders (3), towable scraper (1).</p>

MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS										
<p><u>Goal Level:</u></p> <ol style="list-style-type: none"> <li>1. A review of the National Accounts to determine the share of the agricultural sector in the GDP.</li> <li>2. A review of Sierra Leone's international trade statistics.</li> </ol>	<p><u>Assumptions for achieving goal targets:</u></p> <ol style="list-style-type: none"> <li>1. Traditional farmers will respond to price and other incentives offered.</li> <li>2. Present GOSL high priority placed on agricultural development is sustained, supported, and remains directed toward improving the standard of living of the rural population.</li> </ol>										
<p><u>Purpose Level:</u></p> <ol style="list-style-type: none"> <li>1. Records of the Sierra Leone Produce Marketing Board and the Rice Marketing Corporation.</li> <li>2. Records of the MCA regarding site visits by extension workers.</li> <li>3. Records of IDA Project Offices where applicable.</li> </ol>	<p><u>Assumptions for Achieving Purpose:</u></p> <ol style="list-style-type: none"> <li>1. Once access is provided farmers will be willing to produce a surplus for sale.</li> <li>2. Rice Marketing Corporation and the Sierra Leone Produce Marketing Board have the financial ability to purchase the increased output.</li> <li>3. Other inputs are available for increased output.</li> </ol>										
<p><u>Output Level:</u></p> <ol style="list-style-type: none"> <li>1. CARE/Sierra Leone's construction records.</li> <li>2. Sample site visits.</li> </ol>	<p><u>Assumptions for Achieving Outputs:</u></p> <ol style="list-style-type: none"> <li>1. Location of sites determined in a timely manner.</li> <li>2. Weather conditions permit maintenance of construction schedule.</li> </ol>										
<p><u>Project Budget (\$000):</u></p> <table border="0"> <tr> <td>AID</td> <td style="text-align: right;">1,145,757</td> </tr> <tr> <td>GOSL</td> <td style="text-align: right;">1,785,185</td> </tr> <tr> <td>CARE</td> <td style="text-align: right;">886,008</td> </tr> <tr> <td>Other donors</td> <td style="text-align: right;">225,818</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">4,042,768</td> </tr> </table>	AID	1,145,757	GOSL	1,785,185	CARE	886,008	Other donors	225,818	Total	4,042,768	<p><u>Assumptions for providing inputs:</u></p> <ol style="list-style-type: none"> <li>1. Commodities are purchased and delivered to sites as and when necessary.</li> <li>2. Equipment is available as and when necessary.</li> <li>3. Self-help labor available at times and in numbers required.</li> <li>4. Prices do not rise much beyond those forecast.</li> </ol>
AID	1,145,757										
GOSL	1,785,185										
CARE	886,008										
Other donors	225,818										
Total	4,042,768										
<p><u>Means of Verification:</u></p> <ol style="list-style-type: none"> <li>1. CARE and GOSL records.</li> <li>2. Sample site visits.</li> </ol>											

#### Part IV - Achievement of Project Goal and Purpose

An "increased per capita income of the rural population of Sierra Leone through an increase in agricultural output and productivity" was the stated goal of the project. While not dismissing the goal level achievement out of hand, the actual road construction under the project began with the first dry season after the agreement was signed, in October, 1975. Thus to date, only 15 months of construction activity have taken place which is an inadequate time frame in which to expect any impact at the goal level.

The stated purpose of this project is "to establish a rural penetration road system linking the isolated rural poor to the urban markets and consequently to the monetized economy. The roads will facilitate the supply of agricultural inputs, health and extension services, and education to farmers living in heretofore inaccessible rural areas." To assess the potential impact at this project purpose level, the rural penetration road program needs to be viewed mainly in the context of the Integrated Agricultural Development Project (IADP) which was designed to increase the agricultural output and productivity of farmers in the Eastern Area. It was early recognized by the IADP Project Management Unit that the construction of feeder roads had been neglected in the design of the agricultural project. Yet the entire flow of new technologies and agricultural inputs to participating farmers as well as the anticipated outflow of produce to market was contingent upon an adequate road network. In July, 1975, following formal approval of the project, the GOSL formed a Rural Penetration Road Project Committee within the Office of the Vice President, consisting of representatives from the Ministries of Works, the Interior, Agriculture and Natural Resources (MANR), Development and Economic Planning Social Welfare, Tourism and Cultural Affairs, the Peace Corps and CARE/Sierre Leone. At the initial meeting a Site Selection Sub-Committee, composed of representatives of Ministry of Works, MANR, and CARE, were given the responsibility of identifying 250 miles of roads within the IADP project area to be constructed under the CARE Rural Penetration Project.

The priority list drawn up by the sub-committee and approved by the Project Coordinating Committee has been followed in actual construction. This mechanism successfully overcame the problem encountered by CARE in its pre-project road construction of conflicts between political interests and those of local communities and individual tribal Chiefs. In making its selection, the sub-committee intended that the limited mileage open up as many areas as possible without extending the construction areas too widely and that the roads link up with existing structures such as the Daru bridge and the Vianini road, which facilitate access to the IADP processing centers.

More precisely, the following criteria were used to select the 250 miles:

1. Agricultural Merit-  
Area with the highest agricultural potential and farmer response had to be covered. The list provided details of the agricultural import of each road.
2. Engineering Considerations-  
The team selected those roads which presented no large engineering obstacles in order to ensure that the cost would not exceed a pre-determined average estimated cost per mile.
3. Social Merit-  
Once the agricultural import and engineering justification of a particular site had been established, the team sought to assure that the greatest number of villages benefit from each road.

The IADP progress report issued in June, 1976 indicated that 3,585 farm families had benefited from the IADP project activities under the 1972-1975 first phase and an anticipated 6,000 additional families would derive benefits from the 1976-1978 second phase. The project area covers 32 chiefdoms in the Eastern and Southern Provinces in the districts of Kenema, Pujehun, Bo, and Kailahun. 190 of the total 224 miles of rural penetration roads to be completed by June 30, 1977 are divided among three of these districts: Kenema, Pujehun and Kailahun. (Note: As provided for in the Project Paper, 34 miles of roads were constructed in the Southern Province but outside the IADP area).

During Phase I of the IADP project the following achievements were noted:

- a) Total of 7,137 acres, 119% of target, of swamp rice were developed with an average yield of 2,152 kg/ha for short duration variety (BD2) and 2,690 kg/ha for long duration varieties (RH2, CP4, and Nachin 11).
- b) Total of 770 acres 109% of target, of cocoa were planted, in seedlings obtained from 7 nurseries in the project area and sold to farmers on credit.

- c) A "spray insurance scheme" is operated whereby each project rice farmer and cocoa farmer contribute Le 1.50 (US \$1.30) per acre to cover the cost of chemicals and labor for pest and disease control provided by IADP project personnel.
- d) Extension work and field credit operations for rice and cocoa schemes is effected from 3 substations located at Kenema, Daru and Potoru. The stations are staffed by 37 junior and senior agents for an intensive extension worker to farmer ratio of 1:40 versus the national average of 1:1,470.
- e) The project has developed 10-day training programs for rice, cocoa, and oil palm farmers, a 4-month course for chiefdom administrators, and special 2-week courses for project staff. A total of 3,204 have participated in the various courses.

According to interviews held with the IADP Project Director, Mr. Alpha, and two staff members, the feeder roads were essential to providing the above services to the farmers on a regular basis. Each senior extension agent under the IADP is provided with a vehicle and each junior agent is provided with a motorcycle for maximum mobility, and both means of transportation depend upon the basic penetration road for access. The traffic survey conducted on the feeder roads (which is discussed in Part V) indicates that over a 5-day working week, a total of 57 visits were made by extension agents utilizing the completed roads or those under construction.

In addition to the increased area serviced regularly by the extension workers, the success to date in achieving the project purpose was to be measured by: a) increased usage of seed, seedlings, fertilizer and pesticides, and b) increase in agricultural produce brought to the market. The data provided in the IADP report, summarized a) through e) above, indicates the magnitude of the agricultural inputs made available by the IADP project and the resulting yields from new rice varieties.

Unfortunately, there is no 1976 data currently available from the supply side to directly link the delivery of the inputs to the recipients situated on new CARE feeder roads. Nor is there data from the IADP on the volume of produce marketed as a result of the new technologies and road network. Thus, in terms of the goal objective of increasing income of the rural population, a statistically verifiable relationship cannot be established between rural penetration roads and any increased income.

The authors of the original Project Paper, attentive to the need for independent data collection to measure the impact of the feeder roads, placed that responsibility with USAID/Liberia: "Once the road sites have been selected, USAID/Liberia intends to carry out a sample survey of the proposed sites and the communities which will be served by the roads. The purpose will be to gather baseline data which will be used later in an evaluation of the project." In the absence of this baseline sample survey, and as an integral part of this evaluation, an independent researcher, Mr. Tony Airey of Njala University was commissioned to conduct both a traffic survey and a basic socio-economic impact survey of the rural penetration roads. Mr. Airey's methodology, data, and summary findings from the socio-economic survey are presented in Part VII of this report.

Part V - Project Outputs

A) Construction

The Project Paper called for construction outputs on the following schedule:

	CY1975	CY1976	CY1977
a) construction and rehabilitation of 900 miles of rural roads; and	130 miles	475 miles	295 miles
b) construction of 120 bridges and 7,425 culverts which will allow all weather passage of four wheeled vehicles	30 bridges 1,525	50 bridges 3,500	40 bridges 2,490

The above projections are based on an average of 300 miles of road, 40 bridges, and 2,475 culverts per year at a cost of \$4 million or \$4,500 per mile.

Actual construction outputs to date and planned under the grant through June 30, 1977 at an estimated cost of \$12,000 per mile are as follows:

- a) construction and rehabilitation of 224 miles of rural roads;
- b) construction of 13 bridges and box culverts and 672 pipe culverts which will allow all weather passage of four wheeled vehicles

It is obvious from the above tabulation, that the outputs will fall far short of the original target of 900 miles of road, and at almost triple the cost per mile. While there are several reasons for the shortfall the principal impression is that the project was approved: a) with a lack of on-site engineering expertise on the part of both AID and CARE; and b) with a lack of appreciation of Class IV road standards as opposed to the crop extraction roads CARE had been constructing prior to the AID grant. If viewed from the perspective of the USAID/Liberia engineer in his September, 1976 report, "... it is not possible to construct 900 miles of road in three years at a cost of \$4 million because:

- a) if \$4 million is the total cash and in kind contribution funds available, only a total of 360 miles can be expected to be built with the present equipment fleet; or

- b) if Class IV standards and specifications must be met, only 248 miles of road can be expected to be built in three years at reasonable cost; or
- c) if 900 miles of road must be built in three years, the Class IV standards and specifications will have to be lowered and the project budget increased substantially."

The evaluation team findings supported the conclusion that it was an impossibility to achieve the project target of constructing 900 miles within three years for \$4 million. At least one of the three conditions could not be met. Against these original targets a total of 224 miles will be completed over a period of twenty months (two construction seasons) at a cost of \$2.64 million.

There are additional reasons for producing only 224 miles of road versus the projected 348 to 360 mentioned above:

1. The construction of roads did not commence until November 3, 1975 and with existing funding constraints will terminate at the end of the CARE fiscal year June 30, 1977. The Project Paper and Project Agreement viewed the construction period as three years beginning January, 1975 and ending December, 1977. In terms of construction, the project is actually limited to two seasons over a period of twenty months.
2. No engineering surveys were completed prior to the beginning of the project. Cost and time estimates for the feeder roads were based on CARE's previous experience which proved to be not entirely relevant. Road surveys were contingent upon the GOSL Cabinet approved list of roads which was not available until late October, 1975. While the Grant Agreement specified that the roads were to be built to Class IV standards, no one associated with the project design reviewed the implications of those standards. (See Section B.1. "Engineering: Design".)

3. One of the project features was the rehabilitation of old construction equipment in order to sustain a low-cost approach. Over time this has proven uneconomical. The unusually high cost of repair and maintenance is due principally to the age of the equipment pool which includes pieces that are 18 to 20 years old for which spare parts were no longer available or required 3 months on back order. Average plant availability for the construction season FY 1975/76 was 55%. Since normal road construction standards use 70 - 75% as a lowest acceptable availability factor, the down time experienced has had a significant impact on the per/mile production rate.
4. Another low-cost feature which initially curtailed efficient operations was the assignment of volunteers with limited practical, theoretical, and management skills. As needed skills were more precisely identified, and Peace Corps and VSO recruitment became increasingly responsive to those needs, performance improved substantially. As discussed in the financial considerations in Part VI, the intensive supervision now provided by appropriately trained volunteers is an important factor in high productivity with low costs.
5. While not as significant as the above factors, construction was hampered by an increase of 15.20% in the mean yearly rainfall average in the Eastern area of Sierra Leone.

## B) Engineering

### 1. DESIGN

CARE is designing, constructing and/or rehabilitating existing roads in accordance with MOW Class IV standards and specifications. Annex A of Attachment D - Engineering Analysis of the Grant No. AID/AFR-1154 specifies what these standards and specifications should be:

Average Daily Traffic (ADT)	- less than 151 vehicles/day
Surface Type	- 6" minimum thickness compacted laterite
Design Speed	- 25 mph
Min. Radius of Curvature	- 300 Ft.
Max. Gradient	- 15%
Formation Width (roadbed)	- 16 Ft.
Bridges	- British Standard (BS) 153 Part 3a (Ha Loading equipment to H-20 loading)
	- 12 Ft. wide, inside to inside curbs with provision of bridges to 22 ft. in width where warranted by traffic and area development.

There are no standards or specifications for the drainage structures. The sub-grade and laterite base material which require compaction have no specifications pertaining to density and moisture control. Reinforced concrete pipe culverts and box culvert designs were furnished by CARE.

In order to draw comparisons between the design criteria relating to Class IV roads and rural penetration roads we must look at the UNDP Roy Jorgensen Associates' Report 1973/74 on Road Maintenance, under the heading "Road Classification". It was recommended in the report that roads within Sierra Leone would be put into four categories:-

Class I

Class II

Class III

Class IV

These recommendations were approved and accepted by MOW. Therefore rural penetration now appear to be within the Class IV classification. At its inception the feeder road was a rudimentary track formed by clearing vegetation from the natural soil surface and subsequent improvement dependent on the volume of traffic attracted. Therefore, in order to meet targets as defined in the Project Paper, i.e. 300 miles per year, the funds available would only permit these types of low cost roads, as defined in this paragraph, i.e. rudimentary earthworks such as can be done by hand and by bulldozers used in clearing vegetation; generally the only surfacing materials that can be afforded are the soils found on the line of the road and immediately adjacent to it, which normally would have a low traffic bearing capacity, and when saturated during the rains, these roads would be often impassable.

In order to meet the specifications of Class IV standards approximately 6,000-10,000 cu. yds/mile of earth had to be moved during the last construction season. Using the present unit cost per cu. yd. of earth moved, the cost would be between Le 3,900.00 and Le 7,800.00 as against 4,491.00 which also included bridges and drainage structures.

## 2. CONSTRUCTION METHODOLOGY

The first full year of construction from October 1st 1975 to September 30th 1976, produced approximately 100 miles of road with sufficient concrete pipe culverts (ave. 3/miles), box culverts (ave. 3/100 miles) and bridges (ave. 3/100 miles) to drain the affected areas. Assuming a normal rainy season of 4½ months and 33 weeks of good construction weather, approximately 3 miles/week of road was built. Total equipment availability averaged approximately 55% over the entire construction period.

The construction organization at the end of the construction period consisted of:

- 1 - Project Manager
- 1 - Senior Road Engineer
- 2 - Survey Crews

### Road Construction Group:

- 4 - Section Engineers - PC and VSO
- 4 - Supervisors - S.L.
- 24 - Heavy Equipment Operators
- 20 - Drivers
- 4 - Labourers

Communal Labour

### Concrete Culvert and Bridges Construction Group:

- 4 - Section Engineers - PC and VSO
- 12 - Supervisors - S.L.
- 24 - Masons
- 24 - Carpenters

Communal Labour

Equipment Repair and Maintenance Group:

- 1 - Workshop Manager - Swiss
- 1 - Mobile Service Manager - Swiss
- 4 - Supervisors - PC and VSO
- 15 - Mechanics
- 10 - Mechanic Helpers

Administrative Group:

- 1 - Accountant
- 2 - Cost Clerks
- 1 - Draftsman
- 1 - Secretary

The Project personnel are qualified and capable of performing their respective tasks. Sufficient construction knowledge and field experience may be lacking within some of the groups, particularly in the section engineers. Many of the PC and VSO volunteers are young and lack practical experience to cope with the many construction and personnel problems. Carpenters, masons and heavy equipment operators have demonstrated their skills and aptitude as evidenced in the very satisfactory completed roads, bridges and culverts. Communal labour appears to be adequate and reliable in some areas while in other areas they tend to be unreliable and often the work performed is unsatisfactory.

The road construction group is divided into 4 operational sections. Each section has the following equipment:

<u>Unit #1</u>	<u>Unit #2</u>	<u>Unit #3</u>	<u>Unit #4</u>
2 Dozers	1 Dozer	1 Dozer	1 Dozer
2 Graders	2 Graders	1 1920 Loader	1 Grader
1 Roller	1 Scrapper	6 Dump Trucks	1 JCB Loader
1 920 Loader	1 Roller	1 Tractor/ Trailer	2 Dump Trucks
6 Dump Trucks	1 Dump Truck	(hauling material)	1 Tractor/ Trailer

<u>Unit #1</u>	<u>Unit #2</u>	<u>Unit #3</u>	<u>Unit #4</u>
1 Tractor/ Trailer (hauling material)			

1 Water Bowse

(One 1000 gallon water truck and one mobile repair/service vehicle are used as required for all 4 units.)

Unit Nos. 1 and 2 have an equipment spread considered adequate for the volume and type of construction work planned. Unit No. 3 has one D-4 Dozer which would be considered too small for the type of work required. Also, the spread does not include a compaction roller which would be required. Unit No. 4 equipment spread is not large enough to do the same kind of work as the other units. Consequently, the volume and type of work can not be comparable to Unit Nos. 1 and 2 outputs.

The present equipment fleet except for several pieces purchased in 1976 has an average age of 6-8 years, with some equipment over 15 years old. Normally, a contractor would have an age spread ranging from new (25%) to 2-3 years old (50%) to 4-5 years old (25%). After 6-7 years, the contractor would normally salvage and replace this equipment rather than gamble on another costly major overhaul. CARE received the present equipment fleet as in-kind contributions, with the expectations that the fleet would operate at a 75% availability condition. This has not been the case. For the years 1975 to 1977, the equipment availability factor was 55%. This obviously had a very definite effect on the per mile production rate as well as the high cost of spare parts to maintain the antiquated equipment. It is proposed to replace those pieces of equipment which are uneconomical to repair and maintain, and to augment the present fleet with new equipment. This will result in a higher per mile production rate as well as maintaining a low cost/mile over the next two year period.

## C) MAINTENANCE

### 1. MAINTENANCE PLAN

Page 1 of the Project Paper, Grant No. AID/AFR-6-1154 Attachment D-Project Maintenance, states that within six months CARE/S.L. and USAID/L will formulate a maintenance plan providing for the repair of these roads on a continuing basis. In January 1976 a road maintenance plan was drafted by CARE and submitted to MOW.

The following brief outline of the draft sets down the points of general agreement between CARE and MOW, which was never implemented.\*

"Points of General Agreement"

1. Final responsibility for the maintenance of all rural penetration roads rests with MOW, but it is recognized that funds and resources are not always available to achieve these ends. Therefore, to alleviate such foreseeable problems CARE was encouraged to try to initiate local participation by the villages affected by the rural penetration roads, involving them in road construction and constantly stressing the importance of continuous basic road maintenance.
2. CARE Engineers will undertake to train individuals selected by Paramount Chiefs in the fundamentals of road construction and road maintenance with the intent that these individuals will be taken on permanent employment by the Chiefdoms with responsibility to pioneer road maintenance as a part of the Chiefdom self-help programme.
3. The MOW will second trainee road overseers to CARE for training in the practical aspects of road construction as a supplement to the theoretical training they receive at the MOW training school in Freetown. On completion of their training:
  - a. an appraisal and evaluation of each trainee will be made and a report submitted to MOW.
  - b. the trainee will be assigned to the District Officers to act as the liaison officers between the Area Engineer and the District Officers and to provide technical support for road maintenance to the Chiefdom/villages in their command areas.
4. MOW will assign a total of six road overseer trainees to CARE, two trainees to each of the three construction units.
5. The MOW personnel, during their training with CARE, will receive a salary to be paid by CARE and for which CARE will be reimbursed by the MOW. The salary rate has still to be decided. CARE will meet the cost of any overtime claims and other expenses while in training. Compensation arising out

---

\*See Attachment A, Plan submitted to AID/W prepared by Peter Daniels, dated October 1975.

of accidents on site will be covered under the GOSL Workmen's Compensation Scheme.

6. CARE will provide hand tools for the initial allocation of road maintenance crews."

As a result of non-participation by MOW, CARE has implemented a maintenance programme on a small scale using communal labour.

2. MAINTENANCE IMPOSED BY ROAD STANDARDS, SPECIFICATION AND TRAFFIC

To differentiate between road standards and maintenance requirements for any particular road is difficult since each road, whether it be an ungraded track or major highway, will endeavour to impose its own maintenance priorities. The main essentials for any class of road would be to maintain the flow of traffic, to ensure the safety of road users and thirdly to conserve the assets represented by the roads. The other major factor governing road maintenance is "cost" and this is usually, but not always, related to the ADT of any road. As the roads being constructed by CARE are of Class IV specifications MOW assumes an ADT of 0-50 vehicles on Class IV roads. However, recent traffic counts on 60.6 miles of road constructed in the 1975/76 workseason show 37 miles (57%) having an ADT in the range of 50-150 vehicles.

The Final Report of the UNDP Technical Assistance for Highway Organization and Maintenance gives the following estimated annual costs per mile for routine and periodic maintenance (costs in Leones) of laterite surfaced roads:

	<u>Average Daily Traffic Group</u>	
<u>Routine</u>	<u>50-150<sup>a/</sup></u>	<u>Under 50<sup>b/</sup></u>
Surface	58	20
Drainage	29	29
Roadside	90	28
Bridges	10	10
Other	13	7
	<u>Le 200</u>	<u>Le 89</u>

Notes: a/ Estimates do not include hand tools, equipment depreciation, insurance, management or overhead costs.

b/ These cost estimates provide for only labor costs. There is no provision for hand tools, management and overhead costs or any mechanical operations such as the grading of the roads once per year.

Periodic/Reballasting

Cost/mile	Le 3,351	Le 1,816
Frequency	(2 yr.)	(4 yr.)

The Road Maintenance Plan submitted to AID/W January 1976 described all maintenance to be performed by volunteer village labor with no mechanical maintenance support. CARE now sees the necessity to make one grader pass per year on roads with an ADT of under 50 vehicles and one to three grader passes per year for roads with an ADT in the range 51-150 vehicles. CARE also recognizes the need to reballast road surfaces according to the frequencies outlined above.

The MOW takes the position that:

1. It is not realistic to plan on a volunteer village labor response to meet unskilled labor requirements; and
2. No mechanical grading is required for roads with an ADT of under 50 vehicles.

The MOW position paper dated February 28, 1977, on the maintenance of rural penetration roads constructed by CARE, includes the following commitments:

1. To include in the MOW recurring expenditures budget for FY 77/78 an amount of Le 144,269. (US \$125,450) for the maintenance of the rural penetration roads constructed during the FY 75/76 and FY 76/77 workseasons. Subsequent budget allocations will be based on an annual review of the Rural Penetration Road Construction and Maintenance Program.
2. CARE will manage the maintenance of the rural penetration roads on an experimental basis, the experience gained to be included in a plan to phase over this responsibility to the MOW.

It must be noted that during the FY 76/77 workseason CARE has assumed the responsibility to maintain the roads constructed in FY 75/76. Work to date has been performed exclusively by volunteer village labor and is being supervised by a Sierra Leonean employee of CARE. The Rural Penetration Road Project Coordinating Committee strongly endorses the involvement of village volunteer labor and this endorsement is being communicated to District Officers and Paramount Chiefs.

During the experimental road maintenance phase CARE hopes to demonstrate that it is not only realistic to plan on volunteer village labor but also, because of the financial constraints of the Government, it is an absolutely essential input. The savings

generated from volunteer village labor should be adequate to cover the shortfalls in the road maintenance budget proposed by the UNDP and accepted by the MOW.

#### D. TRAFFIC SURVEY

A survey of traffic use of the CARE feeder roads was carried out over a six day period, beginning Monday the 3rd of January and ending Saturday 8th of January, 1977. On the sampled roads, interview surveys were conducted on origin and destination of pedestrians and of drivers of all vehicles. Additional data was collected for vehicles - namely vehicle type, passengers and commodities carried and nature of business. Additional data collected from pedestrians concerned commodities they were head-loading and nature of business.

The objectives of the survey were threefold:

- 1) To determine and quantify the amount and type of traffic using the recently built CARE feeder roads.
- 2) To provide baseline data for any future assessment of the CARE feeder roads.
- 3) To predict future usage of roads being built.

The methodology used has certain built-in limitations which should be noted. Since the survey was conducted during the dry season, the possible seasonal variation cannot be gauged. Also the survey has not provided an actual ADT for the roads because the use of human enumerators necessitated the adoption of a 12 hour traffic survey. The ADT can only be estimated.

Limited transport facilities and time restricted the number of enumerators available to 12. It was decided to survey all roads which had been completed in the IADP area during the 1975/76 building season requiring 7 enumerators. The remaining 5 enumerators were allocated to roads being built this season. This involved sampling at random 5 roads from the 8 roads under construction in this FY 76/77 season. For each road the daily 12 hour total volume from 7:00 a.m. to 7:00 p.m. was determined. Enumeration sites were selected at entrances to feeder road networks and at strategic points along those feeder roads which have an interconnective function. Sites were situated adjacent to villages since successful enumeration of traffic volumes depended on local cooperation and good will. (See Map)

#### SURVEY FINDINGS

(Note: Tables Appear in Attachment C).

### 1. Traffic Volumes

As Table A indicates, all completed and partially completed roads were being used by traffic with an average 12 hour usage ranging from 3.2 up to 110.9 vehicles. Of the 7 completed roads surveyed, 6 roads had daily averages that can be considered as typical of a rural penetration road in Sierra Leone i.e. less than 100 vehicles a day. R 70, the Bombohun-Kotuma road because of its inter-connective function and high average 12 hour traffic volume (an estimated ADT of 128.6) can be considered as a trunk road.<sup>1/</sup>

In the case of the 6 rural penetration roads, Table A shows that there is a general positive correlation between length of road and volume of traffic. This can be represented by a ratio in which an average one mile of CARE rural penetration road carries an average 3-7 vehicles per 12 hour period. This is a perfectly acceptable rate of usage for rural penetration roads as Davies supports.<sup>1/</sup>

### 2. Traffic Projections

Using the 3.7 ratio it is expected that the roads being built during FY 76/77 will carry the following volumes of traffic when completed:

	Approx. miles length	Anticipated 12 hour volumes
R 90	9.0	33 vehicles
R 43	7.0	26 "
R 116	3.0	13 "
R 75	19.0	70 "

R 121 because of its interconnective function and the already high average traffic flows will, it is expected, become a trunk road, with average 12 hour traffic volumes approaching these of R 70 (Kotuma-Bombohun).

---

Note: <sup>1/</sup> E. J. Davies - Roads and Road Transport in Sierra Leone: Transport Survey of Sierra Leone; Washington 1963.

### 3. Agricultural Extension Services

Table C indicates that over a five day period a total of 57 visits were made to villages located on the newly constructed rural penetration roads by extension workers. 67% of the visits were made by motorcycle and the remainder in vehicles. The dry season survey, the slack period of the agricultural cycle, is probably an underestimation of the intensity of usage of CARE rural penetration roads. As discussed in the Socio-Economic Analysis, Part VII, increased farmer access to agricultural services is one impact of the CARE Rural Penetration Road Project which complements the IADP activities in the eastern area. Since the traffic survey was conducted only on new roads, the absence of data from old rural penetration roads allows no comparison.

### 4. Pedestrian Flows

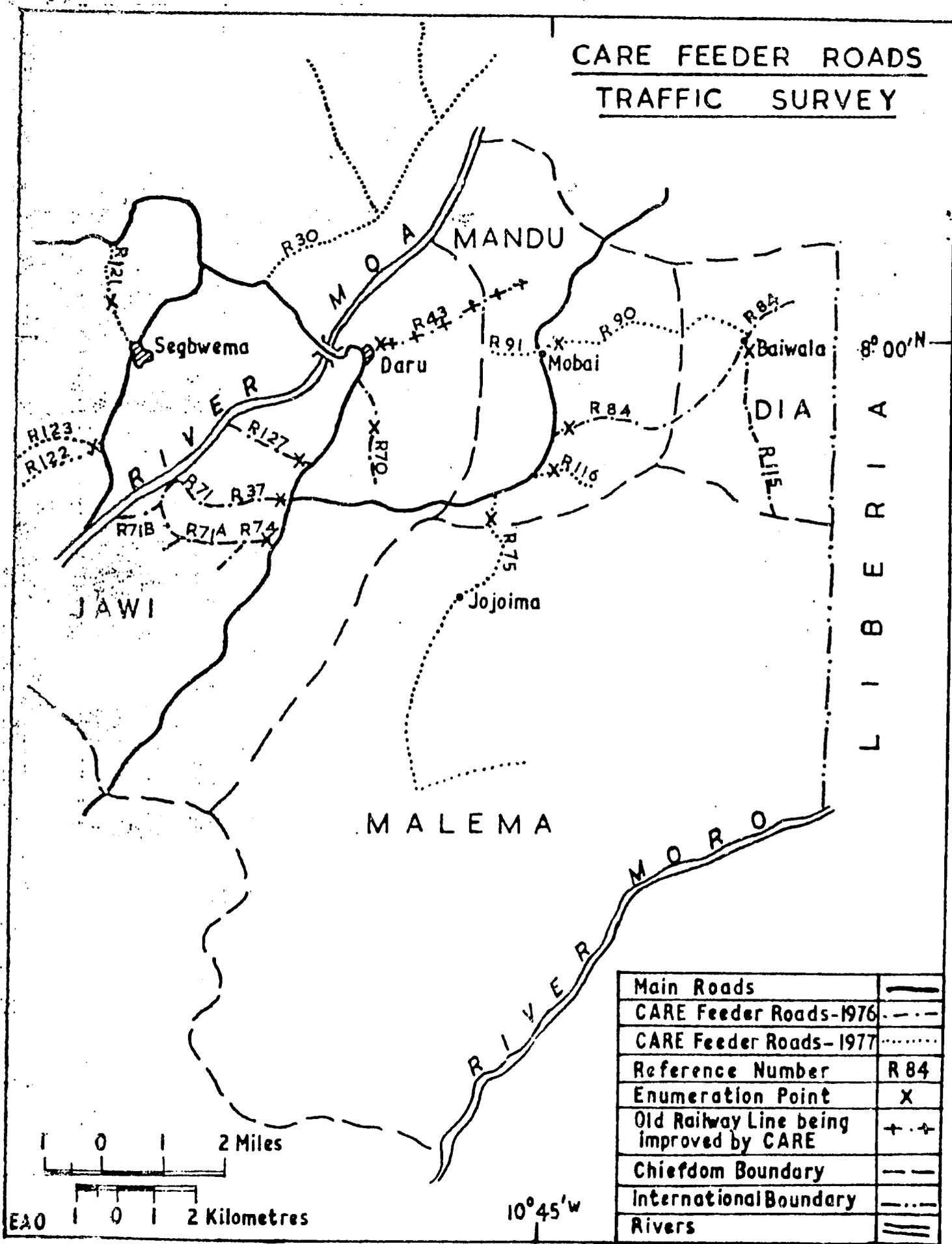
Table B (headloading and destination analysis of a randomly selected day's pedestrians) indicates another area of road usage. The majority of completed roads are being heavily used by pedestrians. Two areas of pedestrian usage, headloading and long distance movement, can be regarded as potential for vehicular traffic and in both these areas the roads show a generally high percentage.

However, the rising cost of transport and the generally lower levels of rural incomes (increased commodity prices may modify this general disparity of income between rural and urban areas) may inhibit any general increase in vehicular usage by the rural communities in this area.

### 5. Heavy Vehicles

The one area where CARE roads without doubt increase the accessibility of rural communities is in the area of heavy vehicles. In particular 2 axle vehicles and tankers are now able to penetrate to the larger rural communities, a phenomenon that both the traffic and the socio-economic survey confirms. The absence of heavy vehicles on the incomplete CARE roads (with the exception of the already opened R 121) indicates the unsuitability of old rural penetration roads to usage by this class of vehicles. (See Table D)

# CARE FEEDER ROADS TRAFFIC SURVEY



Main Roads	—
CARE Feeder Roads-1976	---
CARE Feeder Roads-1977	.....
Reference Number	R 84
Enumeration Point	X
Old Railway Line being improved by CARE	+ + +
Chiefdom Boundary	- - -
International Boundary	.....
Rivers	

0 1 2 Miles

EA0 1 0 1 2 Kilometres

10° 45' W

8° 00' N

PART VI - FINANCIAL ANALYSIS

A) Contributions

1. All Sources

As outlined in Part III, total contributions to the project were estimated at US \$4,042,768 over the three year period, January 1, 1975 through December 31, 1977. The planned and actual contributions are compared below (\$ US):

	<u>A</u> Planned 1/75-12/77	<u>B</u> Actual 1/75-6/77	<u>B% of A</u>
U.S. Government	\$1,145,757	\$1,145,757	100%
General Public	886,008	778,858	87.9%
CARE			
(Cash)	--	(425,569)	
(In-kind)	--	(353,289)	
Government of SL:	1,785,185	1,093,841	61.3%
(Cash)	--	(628,836)	
(In-kind)	--	(465,005)	
U.S. Peace Corps	93,418	180,800	105.0%
U.K. VSO	79,440		
Canada CUSO	<u>52,960</u>	<u>--</u>	<u>0.0%</u>
TOTALS	\$4,042,768	\$3,199,256	79.1%

The above summary of inputs from the various sources includes the following:

(1) The total USG grant of \$1,145,757. It should be noted that as of February, 1977 only \$640,000 had actually been granted by AID to CARE. The second tranche of \$505,757 is included in the summary of contributions in anticipation of the AID grant being made prior to June 30, 1977. CARE has budgeted the second tranche

mainly for: a) local salaries and supplies for the 4th quarter of FY 76/77, and b) spare parts stock required for the FY 77/78 construction season. The \$120,000 cost of the spare parts has been excluded from the total cost for purposes of the per mile cost analysis in the following section, since they are not attributable to the 224 miles of road to be completed by June 30, 1977.

(2) The amount of \$19,234 from the USG grant expended prior to June 30, 1975 for costs of equipment rehabilitation applicable to FY 75/76 operations. In the above summary of inputs, this is the sole amount from any source expended prior to June 30, 1975 applied to FY 75/76 operations. Although the Grant Agreement between the USG and CARE was signed in May, 1975, the terms of the Agreement allowed for this expenditure retroactively.

(3) The value of tools, equipment and other capital assets made available from the previous CARE road construction operations in the area. The equipment considered an in-kind contribution, was valued at \$420,300 of which \$295,000 was contributed by CARE. (See Attachment B).

## 2. Non-GOSL

In reviewing the respective contributions through June 30, 1977, it should be noted that the Grant Agreement called for a three year life of project ending December, 1977. Assuming, as the table does, that the second tranche of \$505,757 from the USG will be forthcoming, by June 30, 1977 the USG will have met 100% of its planned inputs to the project and CARE will have contributed 88% of the planned inputs. The remaining \$107,000 of CARE

contributions is part of the total \$300,000 programmed for support to the proposed extension and expansion of the project. Thus, both the USG and CARE will have fulfilled the terms of the Grant Agreement.

The estimated value of Volunteer services provided through the Peace Corps and Volunteer Services Organization (VSO) have actually exceeded the anticipated dollar value. However, without the backup data in support of the original dollar value placed on volunteer services, it is not possible to judge whether the 105% contribution is attributable to services beyond those anticipated or merely to inflation. The CUSO volunteer services were ultimately not solicited since Peace Corps and VSO were able to provide the technical personnel required. The \$52,960 value originally attached to the CUSO volunteer services will be absorbed in the estimated \$56,000 costs associated with the PCVs and VSO volunteers for the six months between July and December, 1977. The estimate is based on volunteer agency costs of \$10,000 per year for a PCV and \$2,500 per year for a VSO volunteer.

### 3. GOSL

In reviewing the GOSL contributions to the project, approximately 61.3% of the anticipated dollar value, it is necessary to analyze the impact of the severe exchange rate fluctuations which occurred since 1975. According to the Project Paper which was reviewed and approved in AID/Washington in May, 1975, the exchange rate utilized was US\$1-Leone .83. From June, 1975

through October, 1976, however, the Leone had gradually devalued by 30.5% for a new rate of US \$1=Leone 1.20.<sup>1/</sup> Since the GOSL contributions anticipated in the Grant Agreement were not for foreign exchange costs but for local costs, it is appropriate to state the value in Leones rather than dollars.

	US \$	=	Leones	%	(Rate)
Grant Agreement	\$1,785,185		Le 1,481,704	100%	(US\$1=Le.83.)
Actuals:					
July 1975-June 1976 (CARE FY 75/76)	665,881	=	665,881		(US\$1=Le 1.00) <sup>2</sup>
July 1976-June 1977 (CARE FY 76/77)	427,960	=	496,434		(US\$1=Le 1.16) <sup>2</sup>
TOTAL Actuals	\$1,093,841		Le 1,162,315	78.4%	

By this calculation the GOSL has contributed an estimated 78.4% of the total through June, 1977. As was the case during CARE FY 75/76 and FY 76/77, the GOSL has budgeted the annual cash contribution to construction in CARE FY 77/78 (July 1977-June 1978) of Le 300,000 of which approximately one half can be attributed to the remaining six month project period. In addition during CARE FY 77/78 the GOSL will budget an estimated \$125,000 for road maintenance and provide an estimated \$154,000 of in-kind contributions. Based on construction season requirements, approximately

---

<sup>1/</sup> Note: The Leone is tied to the pound sterling and had recovered by January, 1977 to a rate of US \$1=Leone 1.16.  
<sup>2/</sup> Note: The exchange rate is based on an average official exchange rate over the 12 months in accordance with information provided by the American Embassy in Freetown. There are no records available to tie the specific contributions to the appropriate rate.

one quarter or \$70,000 of these amounts are attributable to the period ending December 31, 1977.

Thus by the end of the three year project period as originally defined, the GOSL will have contributed Le 1,393,515 or 94% of the amount project in the Grant Agreement for an anticipated shortfall of Le 88,189 (US\$75,843). The main reason for the shortfall is that the three-year 900 mile target was based on an assumption of three full construction seasons to which both cash and in-kind contributions from the GOSL are closely tied. As pointed out in Part V, there will not be three full seasons. If GOSL budget and in-kind contributions are projected through a full third construction season, i.e. November 1977-June 1978, an additional US \$338,340 is anticipated.

It should be noted that the GOSL cash contributions of Le 300,000 requested by CARE has been budgeted and allocated each year through the Ministry of Finance, Development, and Economic Planning. The fact that the amount represented 25% of the Ministry development budget in FY 76/77 indicates the priority which the GOSL assigned to the rural penetration road project.

The evaluation team recommends that any project extension and/or expansion must give more detailed attention to the local currency requirements, the availability of GOSL budget support, and potential exchange rate fluctuations to the extent possible. Consideration of these variables is of particular importance with regard to the proposed Rural Penetration Road Unit under the Ministry of Public Works and the road maintenance scheme.

B) Construction Cost Analysis

Using the total of the cash and in-kind contributions from Section A above and subtracting depreciated value of the equipment and the value of spare parts inventory that will remain as of June 30, 1977, the cost per mile of the 224 miles to be constructed as of June 30, 1977 is US\$11,775 as follows:

Total Project cost as of June 30, 1977: \$3,199,256

Less:

Depreciated value of equipment

a) Equipment purchased FY 75/76  
\$80,000 x 60% = 48,000

b) Equipment purchased FY 76/77  
\$266,820 x 80% = 213,456

Estimated inventory

a) USG second tranche spare parts	120,000	
b) Spare parts and building materials	180,000	561,456
	Total net cost	<u>\$2,637,800</u>
		224 miles
	Cost per mile	\$ 11,775

Although the per mile cost is almost triple the amount anticipated in the original plan documents, in the cumulative experience of the team members the cost is substantially lower than that of any penetration roads under construction in Africa. The calculation of \$11,775 per mile is purely a cost analysis and not an economic analysis.

There are certain unique features of the CARE/Sierra Leone Rural Penetration Road Project which may prohibit replicating the low cost approach in similar countries of West Africa. The following are a few of the more obvious factors.

1. CARE is a voluntary, non-profit organization whose competent, experienced project personnel have focused not only

on production of miles of road but also on cost-saving, innovative approaches. As a voluntary organization, CARE has been given substantial leeway by the GOSL in, for example, acquiring used road construction equipment that would not have been available to a private sector contractor. With the exception of rather stringent procurement regulations imposed by the AID grant agreement, CARE has been encouraged to pursue its own *modus operandi*. The budget of any private sector contractor for similar road construction work would have necessarily included a 15-20% profit and risk factor.

2. While the original design of the project included one bridge per 7.5 miles of road constructed, CARE has realized substantial savings by decreasing that ratio to one bridge or box culvert per 16 to 17 miles of road constructed. This added criterion has necessarily affected the roads chosen for construction under the initial phases of the project. The GOSL has endorsed this approach and has resolved, at the November, 1976 meeting of the Rural Penetration Road Committee to continue to economize by not including long span bridges "as this will definitely increase cost and slow down progress to a point that the target might not be achieved." CARE estimated the cost per linear foot of bridge at \$1,000 or \$54 per square foot. These estimates are in line with those charged by private contractors for similar standards. (Note: in considering any extension or expansion of the

project, road selection may inevitably include additional bridging which will raise the overall cost per mile of road).

3. The concept of intensive, yet inexpensive road construction supervision under the CARE project differs significantly from that which would normally be provided under a private sector contractor. The low cost of skilled and semi-skilled Peace Corps and VSO volunteers acting in a supervisory capacity allows for a 12 person supervisory staff (at approximately \$600 per mile) versus the 1 person that would be assigned similar responsibilities under a contract (at approximately \$1,000 per mile). Besides the savings of \$400/mile, productivity and efficiency increase with the supervisory staff of 12 volunteers that have been made available to the project.

4. While not significant, the free communal labor supplied for road construction through the local Chiefdoms does eliminate the need for hiring unskilled labor. CARE estimates that during prime construction seasons 60 laborers are made available to each of the four construction spreads. Over the calendar year 1976 approximately 47,200 man days of labor were supplied to the project. Calculating at \$1.08 per man-day, the value of labor amounted to more than \$51,000. Since the labor is not subject to any wage-guidelines or regulations, the equivalent hired labor would probably add more than that amount to actual costs.

5. As pointed out previously, the project low-cost approach was able to take advantage of old construction equipment that CARE was able to rehabilitate. Attachment B lists the used machinery and vehicles brought to the project from all sources at a total value of \$420,331. With a downtime of 45% over the FY 1975/76 season the existing equipment spreads would prove uneconomical and inefficient from the perspective of any private contractor. In considering additional AID assistance over a two year period, it should be noted that new equipment spreads will be required, but will not be fully depreciated over the two-year project extension. Thus, the cost per mile will increase, if viewed in terms of cash contributions required to produce a given number of miles for the two year period.

## Part VII - Socio-Economic Impact

### A) Introduction

The nine roads successfully completed in the Daru area of the IADP, totalling approximately 45 miles, have had an impact on the communications and accessibility of 24 rural communities within the Dia, Jawei, Malema and Madina chiefdoms of the Kailahun District of Sierra Leone. The identification and, as far as possible, the quantification of that impact was the purpose of the socio-economic survey conducted as a part of the evaluation. The specific objectives of the survey were three-fold:

- 1) to identify, and determine the social, economic and agricultural changes that have taken place in the communities along the rural penetration roads built by CARE during the first road construction season, 1975/76;
- 2) to predict social economic and agricultural trends that are affecting these CARE communities; and
- 3) to provide baseline data for any future assessment of the CARE constructed rural penetration roads.

There have been certain limitations on the survey and the analysis, not the least of which is the lack of data on the communities prior to road construction. Secondly, the evaluation timetable required data collection to be completed in one month's time, January 15 to February 15, 1977 which left little time for in-depth analysis. Findings are necessarily tentative. Thirdly, 1976 population and agricultural statistics were not yet available so confirmatory data has generally been lacking.

In order to evaluate the impact of rural penetration roads a matrix methodology was applied dividing the communities into four types based on road access:

Category 1a) Communities, previously inaccessible, now newly connected by rural penetration roads. There are only 9 communities that fall into this category and all of these communities were selected for interviewing.

Category 1b) Inaccessible communities i.e. inaccessible to four wheeled traffic. In the four chiefdoms 21 communities were considered as falling in this category.

Category 2a) Communities situated on old rural penetration roads, the latter having been improved and upgraded by the CARE Rural Penetration Road Project. There are seventeen communities in this category. Baiwala was omitted because it is the chiefdom headquarters of Dia chiefdom. Laoma, Goma and Bombahun were omitted because they were, prior to CARE building their roads, situated on primary and secondary roads. Of the remaining 13 communities 12 were sampled, a 92% sample.

Category 2b) Communities situated on old rural penetration roads outside the scope of the CARE Project. In the four chiefdoms 20 communities were considered as falling within this category of which 13 were selected at random, a 65% sample.

#### B) SUMMARY OF ROAD IMPACT

As evidenced by the data and analysis contained in Attachment D, evaluation of the impact of the CARE constructed rural penetration roads is possible by comparison of the two types of CARE affected communities i.e. 1a newly connected 2b communities situated on old roads outside the IADP/CARE area. This comparison has been concerned with seven aspects of rural life:

- 1) Community Size and Buildings. It is suggested that all 3 road communities are larger, more permanent, both locationally and structurally, and show evidence of new housing construction. Increased use of cement in construction indicates increasing permanency of road side communities.
- 2) Communal Facilities. The old road communities 2a and 2b have a greater number and wider range of facilities, such as mosques, schools, and stores. It is too soon to expect the newly connected CARE communities to adopt these broader and more numerous facilities identified in 2a and 2b communities.
- 3) Transport Facilities. 1b communities are confirmed as being isolated. The 1a and 2a communities all located on roads upgraded or constructed by CARE, have more frequent transport services as well as being accessible to a greater range of vehicles. Furthermore,

vehicle ownership is more common in 2a and 2b communities.

- 4) Marketing of Agricultural Crops. All villages market a similar range of crops, but there is a suggestion that isolated communities market fewer crops than their more accessible counterparts. Marketing of rice by communities on roads may not be just from surplus production. Food crops tend to be bought by buyers in all villages while export crops tend to be carried and sold outside particularly by the 2a and 2b accessible communities. Preference to market crops personally reflects the desire to get a better price for those crops. Farmer preference in inaccessible communities tends to be to sell to buyers which reflects the difficulty and high cost of transport experienced by communities.

Headloading is the main means of marketing from isolated communities and is still common in the 1a communities. Both 2a and 2b communities, however, rely heavily on vehicles and lorries for transporting their marketed crops.

- 5) Agricultural Extension Services. Knowledge of and visits by these services increased with a road, and age of road contact. Isolated communities have the least knowledge of the extension officer, and only 33% of the respondents in 12 communities acknowledged a recent visit. Visiting rates of extension officers were much higher in 1a and 2a communities, with recent visits indicated in 56% and 85% of the communities respectively.

- 6) Other Community Services. The isolation of the 1b communities is confirmed in this sector, both by the low number of visitors and the parochial nature of their business. 1a communities show increased visitor rates but again, these are not indicative of wider development contacts. Both 1a and 2b communities, because of their long established links with the region, show a higher visitor rate with a more sophisticated range of interest including mobile health units, a literacy society representative, and school inspectors.

- 7) Socio-Economic Status. 2a and 2b communities appear to be more materialistic and have greater contacts with the monetarized economy than their 1a and 2b counterparts.

C) VILLAGE DEVELOPMENT TRENDS

Although the evaluation findings can only be tentative it is possible to suggest a model of 1a and 2a community development highlighting the changes that might result from the building of a rural penetration.

1a communities are medium sized rural villages recently connected to the regional road network. As a result they have become more permanent locations and enjoy, and take advantage of the easing of their transportational problems. Increased marketing is not much in evidence yet, but the greater knowledge of extension services and the generally high rate of Extension Worker visit points to greater agricultural inputs in these villages. As a result we can anticipate increased marketing of agricultural crops in the future. Developmental inputs and the locally inspired development of facilities has shown no real evidence of change resulting from greater accessibility. This reinforces the idea that rural change is a more gradual process and that the impact of the building of a rural penetration road will not be felt immediately. There is some evidence of increased participation in the monetarized economy by 1a communities compared with their 1b counterparts.

2a communities represent both the direction of change for 1a communities and the continued cumulative development of communities situated on excellent rural penetration roads. They are large rural villages enjoying a number of facilities rare in 1a communities - notably primary schools and stores. Transport facilities are excellent with a frequent service made by all types of vehicles, in contrast to the restricted service of the 2b communities. There is no real evidence that marketing of agricultural crops is any greater than in their 2b counterparts (in fact the opposite seems to be the case). But greater familiarity with Extension Officers and the frequent visits made by them, point to increased development of agriculture in these villages. The high visitor rates and wide range of interests represented point to a more intensive rural development effort being made in both 2a and 2b communities compared with their 1a and 1b counterparts. Both 2a and 2b communities show evidence of greater participation in the monetarized economy.

In the medium/long term we can expect that the development of the 1a communities will progress until they reach the levels at present enjoyed by 2a and 2b communities. 1b communities will remain smaller, poorer and more self-sufficient, reflecting their comparative isolation from the rural development scene.

The future development of 2a communities is more difficult to predict. It is a common characteristic of developing countries that the "haves" receive a disproportionate share of the development effort. In having their old rural penetration roads upgraded by CARE, we can anticipate those rural communities will more fully and readily participate and enjoy the benefits of other changes, be they economic or social, planned or unplanned.

Attachments

## CARE/SIERRA LEONE RURAL PENETRATION ROADS

Road Maintenance Plan

Reference: Grant No. AID/afr-G-1154

A. Background

FY-1975 funds in the amount of \$649,000 were granted to the Cooperative for American Relief Everywhere, Inc. (CARE) as an initial contribution to a three year project estimated to cost \$3,883,000. Other donors are expected to contribute \$226,000 while the Government of Sierra Leone (GOSL) and CARE will contribute \$1,785,000 and \$668,000 respectively. The project has the goal of increasing per capita income of the rural population of Sierra Leone through an increase in agricultural output and productivity. The purpose of the project, as stated in the Project Paper is "to establish a rural penetration road system linking the isolated rural poor to the rural markets and consequently to the monetized economy. The roads will facilitate the supply of agricultural inputs, health and extension services, and education to farmers living in here-to-fore inaccessible rural areas".

It is anticipated that the construction and rehabilitation of 900 miles of rural roads will be completed by the end of the three year period which began on January 1, 1975.

In accordance with the conditions of project approval, it is required that a maintenance plan providing for the repair of penetration roads on a continuing basis be formulated within six months of project approval or by December 1, 1975.

B. Maintenance Plan

The Project Paper does not address itself to the problem of road maintenance although an ancillary paper, the Engineering Analysis, is appended to the project sub-obligating document, the Project Implementation Order for Technical Services (PIO/T). In that paper, the assumptions of Section (2), Project Maintenance, remain current with only one exception - it is not realistic to suggest that CARE/SL built roads will eventually be reconstructed and maintained by the GOSL Ministry of Works as Class III and II roads. This is most unlikely to happen within the lifetime of the project and for that reason it is not taken into consideration in this maintenance plan.

Rural penetration roads to be built by CARE/SL under the subject project fall into the GOSL, Ministry of Works category of Class IV roads. Standards for this class of road are established both for construction and remedial maintenance and are inspected from time to time for compliance.

It is to be noted that the subject Road Maintenance Plan is necessarily provisional and will remain so until all basic assumptions have been tested and full agreement reached by all interested parties. Preliminary discussions of the subject maintenance plan between CARE/SL representatives, Ministry of Works officials and Area Engineers for the Southern and Eastern Provinces of Sierra Leone were positive. However, the plan and all of its implications have yet to be discussed with GOSL District Officers and Paramount Chiefs. The first meeting to be held at these levels is scheduled for October 30, 1975 following which the plan will require formal approval from the GOSL Ministry of Works.

### C. Criteria for Road Maintenance

In recognition of the fact that project purposes and its goal cannot be obtained if rural penetration roads are not adequately maintained (refer to Annex A for suggested maintenance schedules and standards) on a continuing basis one built, the following criteria are proposed all of which are subject to subsequent evaluation:

1. Decision from the Site Selection Committee on the specific location of rural penetration roads is followed by negotiations with the concerned Paramount Chief regarding the details of road surveying, construction schedules, the provision of labor, including local participation, and plans for maintenance as an ongoing responsibility following completion of construction. This should lead to the signing of a contract between all interested parties including most particularly the local Agricultural Extension Officer (AEO).

2. The AEO, in many instances, can bring strong influence to bear on Paramount Chiefs, as he is the key figure in the introduction of new agricultural techniques and technology. He is also highly dependent on roads for importing agricultural inputs and exporting produce to market. Consequently, it is of considerable importance to any road maintenance program that the AEO be thoroughly familiar with and supportive of the road maintenance plan.

3. The Ministry of Works will have responsibility for assuring the continued maintenance of rural penetration roads.

Initial discussions between the Ministry and CARE/SL confirm the Ministry's interest in seconding a select number of their employees to work as trainees on CARE road construction projects. After completion of training these personnel would be assigned to those Districts most in need of rural road maintenance. No such personnel exist today so it is planned that they would become the fore-runners of a network of lower level supervisory personnel working with Paramount Chiefs in the rural areas.

4. It is estimated that manpower required for minimum maintenance is one man per mile of road. For most effective maintenance work, crews should be made up of five workers each team with its own supply of handtools and wheel-barrows. These will be supplied by CARE/SL after full agreement is reached with all parties concerned and following suitable training of local personnel recruited by the concerned Paramount Chief.

5. To the extent that rural penetration roads are constructed in support of major agricultural development projects, such as the IDA Eastern Area project, the Project Management Unit (PMU), or other appropriate body, will be asked to participate in the implementation of the road maintenance plan through various and appropriate means. Project staff members will often be in a position to assist in reporting on the condition of roads, bridges and culverts and to bring such information to the attention of the proper authorities. In other cases it may be possible from time to time for the PMU to make available a truck or other equipment useful for road maintenance or otherwise provide assistance in kind.

Drafted by: Peter K. Daniells/Regional Development Officer/  
USAID/Liberia

Clearances: Mr. Rudi Ramp, Director  
CARE/Sierra Leone

Dr. Michael A. Samuels, Ambassador  
American Embassy, Freetown,  
Sierra Leone

Mr. Stanley J. Siegel, Director  
USAID/Liberia

I. MACHINERY & VEHICLES AVAILABLE AT START OF PROJECT (JULY 1, 1976)

<u>QTY.</u>	<u>DESCRIPTION</u>	<u>CARE-SL</u>	<u>CARE-LIB</u>	<u>GOSL</u>	<u>BARCLAY</u>	<u>US</u>
1	CAR 12E Graders	\$23,400	-	-	-	-
2	CAT 12E	-	16,075	-	-	-
1	Aveling Barford	6,093	-	-	-	-
1	Hallam Motor Grader	-	-	-	22,380	-
1	Hallam Towable Grader	7,357	-	-	-	-
1	Hallam Towable Grader	-	-	-	-	7,357
1	Hallam Towable Scraper	8,985	-	-	-	-
2	CAT D-4 Dozer	-	-	35,000	-	-
1	CAT D-6 Dozer	-	-	35,000	-	-
1	CAT D-7 Dozer	-	52,821	-	-	-
1	CAT D-7 Dozer	43,904	-	-	-	-
1	CAT 920 Front End Loader	-	22,596	-	-	-
1	JCB Front End Loader	-	-	4,500	-	-
3	David Brown 990 Tractors	27,000	-	-	-	-
2	David Brown 995 Tractors	17,280	-	-	-	-
1	Massey Fergusson Tractor	160	-	-	-	-
1	Power "X" Tailer System	3,766	-	-	-	-
1	Massey Fergusson 21 Trailer	720	-	-	-	-
4	5-Ton Trailer	4,400	-	-	-	-
1	Bedford Lowloader Primemover	-	-	-	17,544	-
1	Hyster Lowloader Trailer	-	-	2,000	-	-
1	Conner Tipper	8,552	-	-	-	-
1	Bedford Tipper	8,913	-	-	-	-
5	Peugeot 404 Pickups	17,556	-	-	-	-
1	Peugeot 504 Sedan	3,960	-	-	-	-
1	Peugeot 504 Station Wagon	5,742	-	-	-	-
6	Yamaha Motorbikes	3,240	-	-	-	-
3	Concrete Mixers	4,140	-	-	-	-
3	Water Pumps	2,880	-	-	-	-
3	Piker Vibrators	3,200	-	-	-	-
1	Arc Welder	-	1,360	-	-	-
1	Atlas Copco Aircompressor	-	2,450	-	-	-
	<u>GRAND TOTAL</u>	<u>\$201,248</u>	<u>\$95,302</u>	<u>\$76,500</u>	<u>\$39,924</u>	<u>\$7,357</u>
					\$420,331	

TABLE A:  
12 HOURS TRAFFIC VOLUME CLASS RANGE

ROAD	Approx. length of road in mls.	0 - 9	10 - 25	25 - 49	50 - 99	100 - 149
Completed Roads	R. 127	4.0		13.8		
	R. 37	6.0	9.2			
	R. 74 (71, 71A, 71B)	12.6		17.3		
	R. 122	2.0	4.7			
	R. 70	6.0				110.9
	R 84 (Laoma to Bomaru Section)	11.1				53.7
	(Baiwala to Bomaru Section)				44	
	R. 115 Baiwala-Senga	5.0		13.3		
Partially completed roads	R. 90	4.0	5.3			
	R. 121	4.9			68.5	
	R. 43*	0.0	3.2			
	R. 116	1.0		10.5		
	R. 75	4.0				51.8
Total miles completed	60.6					

\* Although no miles of construction actually completed, light vehicle traffic in evidence on cleared roadbed.

TABLE B  
PEDESTRIAN TRAFFIC SURVEY

	Road	Total Ped Traffic	Headloading No./%	Long-distance Traffic No./%	Date of Sample
Completed Roads	R. 127	116	24 (21%)	13 (11%)	January 7, 1977
	R 71				
	Nyandehun	244	111 (45%)	23 ( 9%)	January 6, 1977
	R 74				
	Kamboma	798	124 (15%)	50 ( 4%)	January 5, 1977
	R 122				
	Baiima	542	396 (73%)	280 ( 5%)	January 7, 1977
	R 70				
	Bembohun	211	11 ( 5%)	-	January 7, 1977
	R 84				
Partially completed Roads	Laoma	41	11 (27%)	28 (68%)	January 4, 1977
	R 114				
	Baiwala	714	363 (51%)	107 (15%)	January 8, 1977
	R 90				
	Njala	282	67 (24%)	214 (76%)	January 6, 1977
	R 121				
	Baoma	59	5 ( 8%)	36 (61%)	January 6, 1977
	R 43				
	Benduma	174	99 (57%)	31 (18%)	January 4, 1977
	R 116	107	23 (21%)	4 ( 4%)	January 8, 1977
R 75					
Salina	206	59 (29%)	95 (46%)	January 3, 1977	

TABLE C  
EXTENSION OFFICERS USING FEEDER ROADS OVER A 5 DAY WORKING WEEK

Completed Roads	Motorcycle Visits	Vehicle Visits	Incomplete Roads	Motorcycle Visits	Vehicle Visits
R 127	8	2	R 90	-	-
R 37	-	-	R 43	3	2
R 74 (71, 71A, 71B)	1	1	R 116	-	-
R 122	-	-	R 75	10	1
R 84	9	5			
R 114	7	8			

TABLE D: FEEDER ROAD TRAFFIC SURVEY

Road Number	Enumeration Point	Vehicle Types	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Av.	Average 12 hrs. traffic volume
R 127	Goma	Heavy vehicles	1	-	2	2	-	2	1.1)	13.6
		Light "	4	15	9	10	25	13	12.6)	
R 37	Nyandehun Junction	Heavy vehicles	-	-	-	1	1	2	.7)	9.2
		Light "	9	2	13	8	8	11	8.5)	
R 74, 71A 71, 71B	Kambama	Heavy vehicles	-	-	2	4	-	-	1. )	17.3
		Light "	15	17	17	22	14	13	16.3)	
R 122	Baiima	Heavy vehicles	1	-	-	-	2	1	.7)	4.7
		Light "	3	4	5	8	4	-	4.0)	
R 70 (Govt. Bus) *	Bombohun	Heavy vehicles	7	19*	8	14*	13*	15	12.7)	110.9
		Light "	104	90	86	107	88	114	98.2)	
R 84	Laoma	Heavy vehicles	-	-	1	-	-	-	.2)	53.7
		Light "	92	24	48	46	56	55	53.5)	
R115	Senga	Light vehicles	12	8	10	12	18	20	-	13.3
R 84	Baiwala	Light vehicles	38	23	39	44	67	53	-	44
R 90	Njala	Heavy vehicles	-	-	-	-	-	-	-	5.3
		Light "	2	3	4	5	9	9	5.3)	
R 121	Baoma	Heavy vehicles	6	6	14	7	9	5	7.8	68.5
		Light "	62	62	65	66	50	59	60.7	
R 43	Benduma	Heavy vehicles	-	-	-	-	-	-	-	3/2
		Light "	3	2	5	4	5	-	3/2)	
R 116	Kuiva	Heavy vehicles	-	-	-	-	-	-	-	10.5
		Light "	14	8	-	9	8	15	10.5)	
R 75	Salima	Heavy vehicles	-	-	-	-	-	-	-	51.8
		Light "	44	43	60	46	52	66	51.8)	

SHORT TERM SOCIO-ECONOMIC EVALUATION

OF CARE RURAL PENETRATION ROADS

(January 15th - February 15th, 1977)

A. AIREY  
Njala University College  
Njala  
Sierra Leone

### Summary

Summary and conclusions of the socio-economic survey appear in Part VII of the evaluation paper.

### Timetable

The evaluation timetable called for the evaluation to be carried out in the period January 15th to February 15th. While this schedule was adhered to in the collection of field data, analysis has been rather limited and of necessity tentative in its findings.

### Long-term Nature of Community Adjustment

Roads can be built quickly, efficiently and economically by the CARE Program using the skills of voluntary and contract personnel. In contrast, the adjustment of rural communities and farmers to these roads is more haphazard in its organization and timetabling. A short-term evaluation one year after the first roads have been completed is probably too soon to identify and appreciate the longer term scale of rural and agricultural change.

### Methodology

In order to evaluate the impact of these recently built roads a four fold sampling matrix was adopted:-

- 1a) Communities, previously inaccessible, now newly connected by CARE roads.
- 1b) Inaccessible communities i.e. inaccessible to four wheeled traffic.
- 1c) Communities situated on old penetration roads, the latter having been improved and upgraded by CARE.
- 1d) Communities situated on old feeder roads outside the scope of the CARE project.

It is necessary to adopt such a matrix in order to meet the needs of the evaluation and to overcome the problems of limited baseline data. Contrasts between the two sets of paired samples are designed to provide a tentative basis for socio-economic evaluation. The data may also indicate whether the project is meeting the objectives and purposes suggested in the original project proposal.

An essential precondition to this evaluation approach is the geographical proximity of the low sampling units. The newly connected communities were compared with randomly sampled, adjacent, inaccessible, communities. Existing roads improved by CARE were compared with adjacent unimproved roads. In this way the spatial variation of communities reflecting environmental, social, and economic differences was minimized.

### Sampling Procedures

Category 1a. There are only nine communities that fall into this category, all of these communities were selected for interviewing.

Category 1b. In the four chiefdoms 21 communities were considered as falling in this category. A random sample of 13 of these communities was taken (62%).

Category 2a. There are seventeen communities in this category. Baiwala was omitted because it is the chiefdom headquarters of Dia chiefdom. Laoma, Goma and Bombohun were omitted because they were, prior to CARE building their roads, situated on primary and secondary roads. Of the remaining 13 communities 12 were sampled, a 92% sample.

Category 2b. In the four chiefdoms 20 communities were considered as falling within this category. 13 of these communities were selected at random, a 65% sample.

### Data Collection

In each community the headman or, in his absence, the town speaker or a village elder was interviewed by a Mende speaking interviewer. The interviewers, all undergraduates of Njala University College, were trained to administer a prepared, and pretested interview schedule. The interviewers were also instructed to verify the information given by interviewing other town elders or, if possible, school masters. The Interview Schedule was designed to gather information, attitudes and perceptions on a number of socio-economic aspects of rural life. In spite of the obvious problems of this "Limited Interview Technique"<sup>1</sup> it did permit a comprehensive and relatively speedy collection of field data.

It is convenient at this state to organize the field data into the following categories in order to facilitate comparisons between the two sets of paired samples:

1. Community size and buildings
2. Community facilities
3. Transport facilities
4. Marketing of Agricultural Crops
5. Agricultural Extension Services
6. Other community Services
7. Socio-Economic Indicators of Comparative Status

---

<sup>1</sup>D.W. Norman. "Methodology and Problems of Farm Management Investigation - experiences from Northern Nigeria"; African Rural Employment Paper No. 8; Michigan, 1973

## 1. Communities and Buildings

As indicated on Table I, there are marked differences in average number of houses between CARE connected communities and their comparative counterparts. It appears that, CARE project was concerned with connecting the larger rural communities to the urban markets. This apparent bias can be justified both to maximum road benefits and in the need to connect stable rural communities to the regional road network. The 1b category communities because of their low average size can only be regarded as semi-permanent locations<sup>2</sup>. The high failure rate of these communities (32% of the communities sampled in this category were deserted sites) clearly indicates a poor economic base for a viable road.

The increased use of cement both as a skin of the traditional mud and stick walling and more rarely in the form of cement or concrete blocks may also indicate increasing permanency of settlements on road side locations. House owners are both able to import cement (via the road) and feel secure enough to invest time and capital improving the durability of their houses. Newly connected CARE communities in category 1a may well follow this trend towards permanency and increased usage of cement.

Another area indicative of change is in the building of new houses. The nine communities in category 1a are at present engaged in building 15 new houses or an average of 1.7 new houses per community. Where as the 13 communities in category 1b are involved in building 6 new houses an average of .5 houses per community. This trend is even more pronounced between categories 2a and 2b. Where the twelve 2a communities are engaged in building 44 new houses, an average of 3.6 per community, the 13 2b communities are involved with only 10 new houses, an average of only .76 houses per community.

These two contrasts seem to suggest that the communities along the CARE built feeder roads are undergoing a spate of house development, not matched in their paired counterparts. It is perhaps too soon to say whether this is a temporary or persistent phenomenon. Furthermore the number of empty houses observed in each category may confirm the above suggestion that there is more pressure on housing in the 1a and 2a communities. In particular only three empty houses were encountered in the survey of 2a communities.

---

<sup>2</sup>D.J. Siddle in J.I. Clarke "Sierra Leone in Maps";  
University of London Press, 1969.

Finally, the ratio of barns to houses is dependent on the number of houses but this ratio may indirectly reflect the former importance and size of communities. The high ratio of barns in the inaccessible 1b communities reflects in part the desire of farmers to maintain storage facilities close to their farms, while they themselves prefer to live in more accessible communities. Thus one interviewer reported that Baoma, a deserted village near Folu (R37), was still maintained (particularly the barns and adjacent fields), although the villagers had ceased to live there preferring the amenities available in Folu.

It is possible, in conclusion, to suggest that the building of a CARE road has not only conferred stability on the communities along its route but has given them a slight impetus to expand in size, indicated in particular by 2a communities. This is perhaps confirmed by the feeling amongst 2a communities that there has been an increase in population over the past five years (84% of villages felt this to be the case). In contrast, only 38% of 1b communities felt that they had any significant population increase over the same period of time.

## 2. Community Facilities

As can be seen from Table II, 2a and 2b communities have far superior facilities. Because these particular communities have long standing connections with the regional road network one can assume that facilities such as schools and stores are dependent on such links. Thus Naiagolehun, a community of some 26 houses on an old feeder road boasts a primary school (with 129 children) and a store selling hardware, kerosene, canned goods, and biscuits. Sixteen children from the primary school go to secondary schools in Kenema, Kailahun, and Segbwema. Supplies for the store are brought in from Kenema, Segbwema and Pendembu. Clearly such social and economic mobility is only possible on communities made accessible by roads.

It is possible therefore to assume that this pattern of increasing community facilities will take place in the newly connected communities. However it must be said that the creation of such facilities requires a longer time perspective than this short term evaluation can provide.

Table II. Communal facilities and %  
of  
Communities enjoying these facilities

	Mosque	Court Barrie	School	Store	Market	Health Centre	Mill
1a Communities	89%	44%	11%	11%	11%		
1b Communities	77%	31%					
2a Communities	77%	42%	50%	58%	17%	17%	8%
2b Communities	92%	54%	46%	46%			

The water supply of most communities can be seen in Table III to be dominated by natural, potentially hazardous water sources. There is a need with the creation of permanent settlement sites for the input of human energy and capital in order to create a dry season water facility - usually a hand dug well, or pit in a swamp.

2a and 2b communities on old penetration roads have indeed made such an investment and over half their water supplies in the dry season come from such man made water facilities. While this is unsatisfactory from a water purity point of view, it is clearly an attempt by these communities to regularize their dry season water supplies.

It might be anticipated that the newly connected 1a communities will follow this trend and increasingly rely on human assisted rather than wholly natural dry season water supply.

Table III. Dry Season Water Supplies

	Swamp Water Pits	Streams/Rivers	Dry Wells	Ponds
1a Communities	-	44%	44%	11%
1b Communities	18%	68%	8%	8%
2a Communities	33%	25%	25%	16%
2b Communities	62%	23%	-	8%

As in the case of water supplies, it is striking that there is an overwhelming dependence by these rural communities on natural and potentially hazardous sanitary arrangements as indicated in Table IV.

The creation of sanitational facilities does not follow the previous pattern of increasing permanent solutions to be apparent amongst old road communities. There is no ready explanation for this other than to suggest that feeder roads have had as yet minimal impact on the sanitational and environmental health of rural communities.

Table IV. Sanitary Facilities

Communities	Bush	Native Pit Latrines	Built Latrines
1a Communities	20%	76%	4%
1b Communities	69%	24%	8%
2a Communities	66%	16%	16%
2b Communities	46%	46%	8%

Table V: Housing characteristics of the 4 Categories

	Average size (No. of houses)	% of houses using cement	New houses being built per community	Total No. of empty houses	Ratio of barns per house
1a. Communities newly connected by CARE feeder road	37	16%	1.7	7	.5
1b. Inaccessible Communities	11	7%	.5	7	9
2a. Communities on old feeder roads upgraded by CARE	55	19%	3.7	3	8
2b. Communities on old feeder roads	31	19%	.8	5	1

### 3. Transport Facilities

Table VI highlights the frequency of light vehicles (Mazda light vans, pick-ups) calling at communities in the sampling units. The table confirms the inaccessibility of 1b communities to vehicular traffic and we can assume that prior to the building of a CARE road, 1a communities were similarly inaccessible. Therefore, in the period following the completion of the CARE road, 1a communities have developed a rudimentary vehicular service with other centers of the area.

Table VI. Frequency of Mazda Vehicles

Communities	More than 1 vehicle per day	Daily Vehicles	Weekly Vehicles	Monthly	Irregularly
1a Communities	12%	12%	66%		
1b Communities					
2a Communities	75%	25%			
2b Communities	55%	18%		18%	9%

The regularity of this service is at present on a weekly rather than daily basis. It can be anticipated that as these 1a communities develop other contacts so there will emerge a more regular daily service of Mazda vehicles.

Within category 2 communities, 2a communities enjoy a more frequent Mazda service than their paired counterpart. Daily frequency is the rule and the majority of communities enjoy more than one vehicle a day. This contrasts with the more infrequent contacts of 2b communities which can at worst enjoy "occasional visits, through previous arrangement with the driver since the road is too rugged and mountainous" - Tomayana, a 2b community in Malema chiefdom.

The range of vehicle types serving the 3 road-connected communities (1a, 2a, and 2b) also reveals distinct differences as Table VII shows:-

Table VII. % of Communities within  
Each Category  
Enjoying Specified Vehicles Service

Communities	Mazda	Taxi	Lorry	Tanker
1a Communities	67%		33%	11%
2a Communities	92%	50%	58%	75%
2b Communities	85%		23%	

The Mazda light van emerges as the most versatile and ubiquitous of the vehicles using penetration roads in this part of Sierra Leone. Lorries also seem to be able to utilize all types of feeder roads. These are as observation have shown light, single axle vehicles. The Taxis and Tankers which serve the rural communities are, it appears, confined to the improved and excellent laterite surfaces of the CARE roads.

Vehicle ownership is another characteristic of 1a, 2a and 2b communities. In particular village headmen from 12 communities in the 2a and 2b categories reported that vehicles were owned or driven by at least one of their inhabitants. Honda ownership follows a similar pattern as Table VIII below indicates.

Table VIII. Honda Ownership by 3  
Categories of Communities

	1a communities	2a communities	2b communities
No. of communities reporting Honda ownership by inhabitants	1	6	3

#### 4. The Marketing of Agricultural Crops

It was not possible in the short time allotted to this survey to accurately quantify the amount of agricultural produce being marketed by the 4 categories of communities. Community headmen were asked to supply data concerning the range and approximate amounts of agricultural crops marketed by their community. Table IX on the next page summarizes this data.

As can be seen from Table IX all communities in the sample market essentially a similar range of crops. Coffee and cocoa are the dominant crops marketed followed by kola, citrus, banana, cassava, oil palm and rice. There is a suggestion that communities on roads (i.e. 1a, 2a and 2b communities) market greater quantities of these crops. The evidence available at this juncture cannot substantiate this suggestion. Since tree crops dominate the market economy of these communities, it is too early to expect increased production and marketing of these crops. Increased planting of coffee, cocoa, citrus, kola and oil palm that may have taken place in communities responding to the greater access provided by CARE roads, will not reach fruition until 6-7 years hence.

It also appears that communities on roads show a willingness to market all quantities of rice (62% of all communities in category 1a, 2a and 2b sold rice). In contrast, the unaccessible communities tend not to sell rice. This may reflect general farmer unwillingness along the roads to produce and market a surplus. Table X below throws further light on this aspect of rice marketing.

Among 1a and 2a communities the saleable rice may not be surplus production, for there is a strong feeling in these communities that they do not grow enough rice to feed themselves.

Table X. Community Response to Question  
"Is enough rice grown to feed the people here?"

Communities	Enough rice	Almost enough rice	Not enough rice
1a Communities	22%		78%
1b Communities	16%	42%	42%
2a Communities			100%
2b Communities	31%	31%	38%

Table IX: Marketing of Agricultural Crops

	Category 1a		Category 1b		Category 2a		Category 2b	
	Number (%) villages marketing crop	Average amount marketed in bags	Number (%) villages marketing crop	Average amount marketed in bags	Number (%) villages marketing crop	Average amount marketing in bags	Number (%) villages marketed crop	Average amount marketing in bags
Rice	4 (44%)	1 - 10	2 (17%)	1 - 10	6 (50%)	1 - 10	11 (85%)	50 - 100
Kola	9 (100%)	1 - 10	12 (100%)	1 - 10	8 (67%)	20 - 50	6 (46%)	20 - 50
Cocoa	9 (100%)	20 - 50	12 (100%)	10 - 20	12 (100%)	20 - 50	13 (100%)	50 - 100
Coffee	9 (100%)	20 - 50	12 (100%)	10 - 20	12 (100%)	20 - 50	13 (100%)	50 - 100
Oil								
Palm	5 (56%)	- -	4 (13%)	- -	7 (58%)	- -	8 (62%)	- -
Citrus	7 (100%)	50 - 100	9 (75%)	20 - 50	8 (67%)	20 - 50	8 (62%)	20 - 50
Casava	6 (67%)	20 - 50	5 (42%)	10 - 20	4 (33%)	50 - 100	9 (69%)	20 - 50
Banana								
Plant	8 (89%)	20 - 50	6 (50%)	1 - 10	5 (42%)	50 - 100	8 (62%)	20 - 50
Pine-								
Apple	2 (22%)	1 - 10	2 (17%)	1 - 10	1 ( 8%)	1 - 10	1 ( 8%)	1 - 10
Yams								
	2 (22%)	1 - 10	1 ( 8%)	1 - 10	1 ( 8%)	1 - 10		
Beans								
	2 (22%)	20 - 50						
Corn								
	1 (11%)	10 - 20						
Coco-								
Yam	1 (11%)	20 - 50		1	1 ( 8%)	50 - 100	3 (23%)	10 - 20
Ground-								
Nut			3 (25%)	1 - 10			3 (23%)	50 - 100
Sweet								
Potato			2 (17%)	20 - 50	1 ( 8%)	10 - 20	1 ( 8%)	10 - 20

Farmers selling their crops in this area of Eastern Sierre Leone can either sell to a buyer calling at his village or market their produce personally. Table XI below summarizes these marketing channels and farmer preference in the 4 categories of communities.

Table XI. Marketing Channels for Each Crop Produced

Communities	Communities Reporting		Farmers Preference	
	Buyers calling at village	Farmers travelling to sell	to sell to buyers	to travel outside to sell
1a Communities	100%	89%	44%	56%
1b Communities	100%	100%	67%	33%
2a Communities	66%	92%	33%	58%
2b Communities	85%	100%	46%	54%

The majority of communities reported that buyers visited them to purchase agricultural crops. Table XII suggests that these buyers tended to concentrate their efforts on crops for local and national consumption (kola, citrus, banana, oil palm, etc.). Furthermore the communities reported buyers visiting them from as far afield as Freetown and Kono (two major internal markets for agricultural produce). Buyers also come to villages to purchase export crops but the responses in Table XII indicate that this was a less common practice. Therefore it is possible to suggest that travelling outside to sell crops is concerned with the sale of the two principle export crop - coffee and cocoa.

Table XII. % of Communities Selling 2 Crop Types to Visiting Buyers

Crops	1a Commu- nities	1b Commu- nities	2a Commu- nities	2b Commu- nities
Local National food crops	67%	100%	100%	89%
Export crops	78%	42%	33%	44%

The general preference of villages on roads to travel outside to sell their crops (see Table XI) may reflect the larger amounts of coffee and cocoa being produced by such communities (see Table IX). This preference can also be linked to the increased mobility of those farmers and their greater awareness of market prices. Thus the main reason for travelling outside to sell can be summed up in the quote for the headman of Tovisma a la community "prices are better in Daru or Segbwema".

By comparison, the majority of villages in 1b communities preferred to sell to buyers. Problems in transporting their crops were cited as the main reasons for this preference. Thus selling to buyers "lessens transport costs and the risk with thieves" - Moyogbo headman.

Villages not situated on roads with this problem of transport tended to rationalize their difficulties by suggesting that they benefited from selling to buyers who came to their community. The benefits of selling to these buyers was less readily appreciated by more accessible communities where personal sale to an outside buying agent was felt by the headman of Songa to be desirable in order to "get more profit and also to prevent being cheated". This recognition of the lower buying price of a trader was a feature influencing accessible communities marketing channels (see Table XI).

Headloading as Table XIII below shows is still one of the major means of marketing crops. Of course isolated communities rely on this form of human portorage totally, but surprisingly all the communities on roads rely on it to a varying degree. 1a communities show the greatest reliance with 2a communities the least reliance on headloading.

CARE roads also seem to have an impact on the vehicles used in marketing crops. Lorries figure much more importantly in marketing crops from 1a and 2a villages. The lighter more versatile Mazda is more commonly used on the difficult to negotiate old roads.

Table XIII. Transport Medium for Marketing of Crops

	Headloading	Part headloading, part vehicle	Mazda	Lorry
1a Communities		45%	33%	22%
1b Communities	58%	42%		
2a Communities		17%	37%	46%
2b Communities	15%	8%	69%	8%

### 5. Agricultural Extension Services

This aspect of agricultural development is crucial to the CARE project which proposed that "the roads (i.e CARE rural penetration roads) will facilitate the supply of agricultural inputs, health, extension services, and education to farmers in heretofore inaccessible rural areas".<sup>3</sup> Table XIV below suggests that these proposal objectives are not only justified but are being met in the CARE category communities (1a & 2a). Knowledge of aide visits by extension offices is significantly greater in 1a communities than their 1b inaccessible counterparts. In the case of category 2 communities, while there is a similar overwhelming awareness of the extension officer, there is a marked fall off in the visits paid by these to none CARE communities.

Table XIV. Knowledge of and Visits by Extension Officers

Communities	Do you know what an extension office is?		Has one visited you recently?	
	Yes	No	Yes	No
1a Communities	78%	22%	56%	44%
1b Communities	50%	50%	33%	67%
2a Communities	91%	9%	85%	15%
2b Communities	92%	8%	54%	46%

---

<sup>3</sup>Original CARE Proposal. 1974

### 6. Other Community Services

Wider contacts with the larger towns and centres and the return flow of inputs from rural development and governmental agencies can be seen as another benefit of the CARE project.

Table XV indicates the degree to which the four categories of communities are involved in this wider aspect of the rural scene.

In the inaccessible communities where only 2 visitors were reported, both concerned with chieftom matters, we can surmise that this emphasized the small parochial world of these communities. The 1a CARE improved communities show relatively more visitors but again the general nature of the visits seems to be personal and reflect local interests. The 2a and 2b communities show not only an increased number of visitors but, as a study of column 3 of Table XV indicates, they are concerned with the wider aspects of rural community development. One can anticipate that 1a communities will with time show an increasingly similar pattern of increased and important visitors.

Table XV. Communities Reporting  
Important Visitors and the Nature  
of Business over the Month of January  
1977

Communities	% communities reporting visitors	Nature of business/area of interest of visitors
1a Communities	56%	Private business, visit chief, road engineer, army, private business, extension off. (6)
1b Communities	15%	Chieftom clerk, section chief (2)
2a Communities	75%	Water supply, police, agriculture, post control. Agric. Extension, CARE, Road Engineer, Health visitor, School Inspector
2b Communities	62%	Census, literacy society, Agric. Off., Min. of Health, Agric. Instructor, Agric. Advisor, Road Engineer, Mobai Clinic, Mobile Health Clinic

## 7. Socio-Economic Status

There are several indirect indicators of participation by the communities on roads in the monetised economy. Several of these have already been highlighted in previous sections e.g. the increase in Honda ownership (section 3) the existence of primary schools and stores (section 2). In all of these cases the contrasts are more marked between the category 1 and category 2 communities. Honda ownership is quite common in category 2 communities but rare or absent in category 1 communities. Similarly, schools and stores are a common facility of 2a and 2b communities yet are rare in their category 1 counterparts.

In the case of two socio-economic indicators not mentioned so far there is a similar trend emerges:-

### (A) Radio ownership

Table XVI. Average Number of Radios per Community

Community	Radios
1a Communities	2.22
1b Communities	.65
2a Communities	5.66
2b Communities	4.1

As indicated in Table XVI, there is a general increase in radios per community from 1b (with .65) to 2a with 5.66. There is, however, a marked contrast between category 1 and category 2.

### (B) Frequency of Traders

The frequency which traders call on communities may also be used as an indirect indicator of socio-economic status. Increasingly frequent contacts with traders selling manufactured consumables may indicate greater involvement in the monetized economy.

In examining Table XVII below, clearly the more frequent and regular visits of traders to both category 2 communities suggests that these communities have a greater purchasing power which cannot be explained by population differences alone.

Category 1 communities have a much lower frequency of trader visits, weekly rather than daily visits being the rule. Participation in the monetized economy is, one can surmise much more poorly developed.

Table XVII. Frequency of Visits by Traders

Communities	Average house size	Daily visits	Weekly visits	Irregular visits
1a Communities	37	22%	44%	22%
1b Communities	11	31%	31%	31% 7% - no traders
2a Communities	55	92%	8%	
2b Communities	31	85%	15%	