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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations For the Review of the Development Loan Committee

LIBERIA - HIGHWAY MAINTENANCE EQUIPMENT

669-H-020

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AID-DLC/P-1068

February 7, 1973

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Liberia - Highway Maintenance Equipment

Attached for your review are the recommendations for authorization of a loan in an amount not to exceed $4,400,000 to the Government of the Republic of Liberia to assist in financing the foreign exchange cost of procurement of maintenance equipment and vehicles; spare parts for new and existing GOL-owned U.S. equipment; 50% of the local costs (up to $100,000) of rehabilitating existing equipment; radio communications equipment; traffic counting devices; and procurement services.

Please advise us as early as possible but in no event later than close of business on Wednesday, February 14, 1973, if you have a basic policy issue arising out of this proposal.

Rachel R. Agee
Secretary
Development Loan Committee

Attachments:
Summary and Recommendations
Project Analysis
ANNEXES I-X

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February 7, 1973

LIBERIA: HIGHWAY MAINTENANCE EQUIPMENT

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February 7, 1973

SUMMARY AND RECOMMENDATIONS

1. Borrower: The Government of Liberia (GOL). The Ministry of Public Works (MPW) will be responsible for project execution.

2. Amount: $4.40 million.

3. Terms:

   Interest: 2% per annum during the grace period; 3% per annum thereafter.

   Maturity: 40 years including a 10-year grace period.

   Currency of Repayment: Principal and interest to be paid in U.S. dollars.

4. Total Cost of Project:

IBRD	2.48 million
Germany	1.15 million
A.I.D.	4.40 million
GOL	0.88 million
TOTAL	8.91 million

5. Project Description: The highway maintenance project consists of the following components: (a) consulting services to assist the MPW to reorganize its maintenance operations, to train maintenance personnel, and to improve its road maintenance through the training of management personnel and the application of modern management techniques; (b) procurement of maintenance equipment and spare parts; and (c) rehabilitation, construction and equipping of maintenance workshop facilities.

6. Purpose of Loan: To finance the procurement of maintenance equipment and vehicles; spare parts for new and existing GOL-owned U.S. equipment; radio communications equipment; traffic counting devices and procurement services; and 50% of local costs (up to $100,000) of rehabilitating existing equipment.

7. Background: In recent years, road maintenance operations in Liberia have not kept pace with the expansion of the country's primary, secondary and rural road network. Thus, at GOL request, the UNDP in 1970 financed a detailed highway organization and maintenance study which was carried out by an Italian consulting firm. Primarily on the basis of this study, completed in August 1972, the GOL, with the assistance of the IBRD, prepared a Five-Year Highway Maintenance and Development Program. It presented the program at its first Multi-Donor Conference

held in late October 1972. Ten countries and international organizations sent representatives, several of which expressed interest in financing portions of the five-year program, which was estimated by the GOL to cost approximately $39 million. This project represents the first steps in implementing this program.

8. Views of Country Team: The Country Team strongly endorses the project.

9. Export-Import Bank Clearance: Received January 22, 1973.

10. Issues: None.

11. Recommendation: Authorization of a loan of $4.40 million to the Government of Liberia.

A.I.D./W CAPITAL ASSISTANCE COMMITTEE

Loan Officer:	Robert V. Shoemaker
Engineer:	Ronald Henrikson
Counsel:	Michael Kitay
Desk Officer:	Richard Mendosa

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I. INTRODUCTION

A. Project Background

Liberia's road network is approximately 4,150 miles long and includes approximately 2,900 miles of public roads, and 1,250 miles of privately owned roads (open to the public) constructed by various concessions. The public roads include 1,044 miles of primary roads (asphalt and laterite), 487 miles of secondary roads (laterite) and 1,230 miles of rural roads. Over 90% of the total system was constructed after 1950.

The GOL constructed these public roads using primarily force account, with the help (mainly between 1953 and 1962) of technical experts from the U.S. Bureau of Public Roads. It financed this construction mainly with foreign loans and grants. From 1951 through 1963, it received loans of $16.2 million from the Export-Import Bank. In 1962, the GOL obtained a U.S. supplier credit of $23 million, and in 1964, it received a $4.25 million loan from the IBRD.

In 1962 U.S. involvement, under A.I.D., was broadened as part of an effort to improve the MPW's capacity to plan, administer and develop the transportation infrastructure, and to improve its capacity to maintain it. From 1962 through 1967 A.I.D. provided approximately $3.9 million in grant assistance and $620,000 under project support loans for advisory services, equipment, spare parts, and other commodities for force account construction and maintenance. As Liberia's public road network expanded, A.I.D. became increasingly concerned about the lack of adequate highway maintenance.

In this context, beginning in 1968, A.I.D. shifted emphasis from providing advisory services to providing operational, OPEX-type personnel in key areas in order to gain more influence over MPW maintenance efforts. Between 1968 and 1972 A.I.D. provided approximately $1.1 million in loan and grant funds in support of these activities.

Further, during this period A.I.D. began discouraging GOL use of force account construction in favor of contract construction in order to free the limited MPW resources for critically needed highway maintenance. In this context, in 1968 and 1972 A.I.D. authorized loans of $975,000 and $3.4 million respectively for the construction of four rural access roads (totaling approximately 155 miles) under contract.

In total, since 1962 A.I.D. has provided approximately $5.5 million in loan and grant assistance to the MPW and its predecessor agencies for equipment and services. During this period, A.I.D. efforts to assist the MPW in developing its maintenance

capability were not sufficient to keep pace with the expansion of the road network; a substantially expanded highway mainterance effort was required. In this context, the UNDP agreed to a GOL request to provide financing for a detailed highway organization and maintenance study. The IBRD was selected as the executing agency and signed a contract in August 1970 with Sauti Overseas Anstalt, an Italian firm, to carry out the study.

Following the completion of the Sauti Study in August 1972, the GOL, with the assistance of the IBRD, held in October the first Multi-Donor Conference in its history. It presented its Five-Year Highway Maintenance and Development Program, which is based primarily on the recommendations contained in the Sauti Report. A total of ten countries and international organizations sent representatives, including the U.S., Germany, Israel, Italy, Rumania, Sweden, the U.K., the AFDB, IBRD, and UNDP. Several delegations expressed interest in financing portions of the five-year program, which was estimated by the GOL to cost approximately $39 million. This project represents the first step in implementing the program.

B. Borrower and Implementing Agency

The Borrower will be the Government of Liberia. The administration and implementation of the project will be the responsibility of the Ministry of Public Works (MPW, formerly called the Department of Public Works).

The MPW is headquartered in Monrovia and is responsible for the entire national public highway network, as well as for city streets and rural roads. The MPW is headed by a Minister, who is assisted by a legal counselor, a technical assistant and an administrative assistant.

The organization of the MPW is discussed in detail in Section II.

C. Relationship to the A.I.D. Program

The A.I.D. assistance program to Liberia conforms closely to the GOL's priorities and objectives. The Government has indicated its determination to increase the diffusion of economic benefits to reach a greater number of Liberia's population through integrated rural development programs. The Government's National Planning Council has established integrated rural development as its highest priority. This is to be accomplished through balanced regional planning and growth in agriculture, education, health and transportation and communication. U.S.A.I.D. has responded to this priority by adopting in its Development Assistance Program (DAP) an emphasis on agricultural

development which will be reinforced by loans for rural access roads. However, a prerequisite to the rational expansion of the rural access road system is the establishment of a viable highway maintenance capacity by the GOL which this project is designed to achieve.

The continued maintenance of roads will reduce transport costs and ensure movement of agricultural products for export and internal consumption, thereby resulting in increased income for Liberia's rural population. Improved highway maintenance will also allow improvements in the GOL's administration of tax collection and contribute to improving governmental administration in rural areas.

Thus, the proposed project represents not only an integral part of Liberia's infrastructure requirement but also a key factor with respect to the achievement of integrated rural development.

D. Export-Import Bank Clearance

The Export-Import Bank reviewed the project on January 22, 1973, and concluded that the project was more appropriate for A.I.D. financing.

II. PROJECT ANALYSIS

A. Project Description

The A.I.D.-financed project consists of the procurement of highway maintenance equipment, spare parts and procurement services to enable the MPW to improve and expand its highway maintenance capability. The A.I.D.-financed project is one component of a comprehensive highway maintenance program the remaining components of which will be financed by the IBRD and the Federal Republic of Germany (FRG).

The components of the program include the following:

- The reorganization of the MPW as a major prerequisite to the establishemnt of a viable, on-going highway maintenance and development capability by the Ministry.

- The training of MPW operational personnel (equipment operators, mechanics, drivers and foremen) in order to raise their skills to a level adequate to enable them to perform their duties efficiently.

- The construction, rehabilitation and re-equipping of workshop facilities to permit the MPW to effectively maintain its existing and an expanded highway maintenance equipment fleet.

- The procurement of new highway maintenance equipment, and of spare parts for the rehabilitation of the MPW's existing U.S.-manufactured equipment to ensure that sufficient equipment is available to enable the MPW to adequately maintain the Liberian highway network, including any anticipated expansions thereto.

To assist the GOL in carrying out this program, various technical and capital assistance efforts will be undertaken by A.I.D., the IBRD, and the Federal Republic of Germany.

1. Technical Assistance

To carry out the technical assistance aspects of the program, the following will be financed by the donors designated:

a. A Project Coordinator will act as advisor to an inter-ministry committee and provide liaison both between the various donors and the MPW and, as necessary, among the donors themselves. The coordinator will be financed by the IBRD.

b. Management Consultants financed by the IBRD will assist the MPW in implementing the proposed reorganization plan outlined in the Sauti study. These consultants will also establish a training program for the administrative and technical staff of the MPW. The team will consist of nine men providing approximately 325 man-months of services.

c. Training Consultants financed by the Federal Republic of Germany will provide formal and on-the-job training for equipment operators, mechanics, drivers and foremen. The team will consist of eight men providing approxiamtely 285 man-months of services.

2. Capital Assistance

To carry out the capital assistance components of the program, the following will be financed by the donors designated:

a. Workshop Construction and Rehabilitation will be undertaken, as well as the procurement of shop equipment and tools in accordance with recommendations contained in the Sauti Report. The IBRD has agreed to finance this component.

b. Highway Maintenance Equipment and Vehicles will be provided under A.I.D. financing as will spare parts for maintaining new and existing equipment, radio sets and traffic counters.

B. Reorganization of the Ministry of Public Works

1. Overall Organization

As of 1971 the MPW employed approximately 2,079 people. It owns and operates over 225 pieces of equipment, approximately 200 of which are assigned to the maintenance section. The specific functions of the MPW include the control of all labor for public works, the construction and maintenance of roads and the supervision of public works in municipal districts, cities and townships. These functions are carried out through three bureaus, each headed by a Deputy Minister: Administration, Technical Services and Operations. (Annex II presents an organizational chart and a summary description of the existing organization of the MPW.) The Sauti Study recommends that the MPW be reorganized as a prerequisite to any extensive highway development. Under the proposed reorganization, which has already been accepted by the GOL, the Bureau of Administration will remain as it is structured, although its accounting procedures will be drastically revised. The Bureau of Technical Services' Planning and Programming Division would be removed and placed directly under

the Office of the Minister of Public Works. This division would then be strengthened with additional staff; otherwise, the Bureau of Technical Services will remain as it is structured. The Bureau of Operations should, according to the Sauti Study, receive a major reorganization. (A detailed discussion of the reorganization of the Bureaus of Technical Service and Operations and an organizational chart are presented in Annex III.)

2. Maintenance and Construction (Bureau of Operations)

Under the present organization, the Bureau of Operations is responsible, through its District and County Engineers Division, for the MPW's maintenance and force account construction operations. Under this present system, the highway network is divided into six geographic maintenance districts, each headed by a resident engineer. The principal functions of a district are the maintenance of roads and bridges; the direct supervision of field operations, personnel, equipment and facilities; and administrative control of funds allocated by the MPW for the district.

There is, however, presently no uniformity in the number of miles of road maintained by each district or in the relationships between the assignment of equipment and the number of miles of road maintained. For example, although Montserrada District includes only 27% of the primary and secondary road network, it manages nearly 50% of the MPW's equipment. On the other extreme, Nimba Grand Gedeh District includes 28% of the network yet manages only 10% of the equipment.

The Sauti Report points out that the following organizational deficiencies also represent a serious constraint to efficient operation of the MPW: (a) The general lack of a clear definition of responsibilities; (b) The lack of supervision from headquarters over the operations of the resident engineers; (c) Inadequate accounting of maintenance expenditures; and (d) Inadequate planning and programming of maintenance operations.

To correct the above deficiencies, the Sauti Report recommends the following major changes in the organization of the Bureau of Operations: (a) The gradual reorganization of the existing maintenance districts, primarily to achieve a more uniform workload; (b) Placing the districts under the direct supervision of the Chief of the Bureau of Operations; (c) The reassignment of maintenance equipment to districts in proportion to the number of primary, secondary and rural road mileage included within the district; (d) The separation, at the division level, of the construction and maintenance functions of the Bureau of Operations; (e) The establishment of a direct line of

authority between the construction and maintenance divisions and the maintenance districts; and (f) The establishment of a separate maintenance section for city streets under the Maintenance Division.

3. Equipment Maintenance and Repair Operation (Bureau of Operations)

The Mobile Equipment Division was established to operate MPW workshops and to carry out preventive maintenance and repair of the MPW's fleet of vehicles and equipment, to advise the Deputy Minister in charge of the Bureau of Operations on shop performance, and to procure and distribute spare parts and supplies for district shops.

However, only the Monrovia main depot is operated directly by this division. The other district shops have been put under the immediate authority of the resident engineer of each district. The Sauti Study indicates that the resulting diffusion of responsibility for equipment maintenance is a major factor contributing to the high proportion of deadlined equipment. (Annex II contains an appraisal of the maintenance capabilities of the various MPW workshops.)

In addition, the MPW has not been successful in establishing a system for the recording and reporting of maintenance activity on each unit of equipment, a cricial aspect of an effective maintenance program. Thus, no data are available on the life of the equipment, on labor or repair costs or on the frequency of different kinds of repairs, which would permit an assessment of each unit and therefore of the fleet as a whole.

Further, without an adequate reporting system, it is not possible to assess the need for spare parts. As a result, there is no uniformity in their distribution. For example, although Montserrado district uses only about 40% of the total equipment supply, over 90% of the spare parts are concentrated in Monrovia. In addition, a substantial percentage (perhaps 70%) of the existing stock of spare parts are no longer useable because they fit unserviceable and/or obsolete units.

Under the proposed new highway organization, the Mobile Equipment Division would be entirely responsible for the technical control of the equipment (i.e. its maintenance, servicing and repair) and have full authority to order any unit withdrawn from

service for repair or overhaul. This division would also supervise the Central Workshop, Parts Depot and Equipment Pool in Monrovia, and all District (out-station) shops. Other principal functions of the Mobile Equipment Division would include the following: preparation of documents for bidding and contracting with respect to equipment procurement, keeping an inventory of highway maintenance equipment, keeping an inventory of workshop equipment and tools, establishing and controlling equipment rentals and keeping equipment record cards. (Further details of the proposed reorganization are contained in Annex III.)

C. Training Requirements

1. Operational Personnel

The Sauti Report indicates that, in general, the MPW highway maintenance personnel are of good working capacity and are in need of only refresher training of 3 to 6 months duration.

However, the quality of the MPW's equipment maintenance personnel is very low, especially in the case of mechanics, electricians and blacksmiths. The report traces the poor quality to low salaries and promotions not based on capability, low level of skills with a high percentage of illiterates, deterioration in cases of good initial capacities due to inadequate activity on the job and the lack of training and refresher courses.

The study recommends, therefore, that in addition to raising the salaries of MPW personnel to levels competitive with those of private enterprise, both basic long-term and refresher training should be provided to these personnel as appropriate.

The Report identifies approximately 300 MPW operational employees, including equipment operators, mechanics and drivers who will require training during the project period.

2. Administrative and Technical Personnel

The Sauti Study indicates that, on the whole, the professional capability of administrative and technical personnel is reasonably satisfactory, although it recommends that more impetus be given to providing, on a systematic basis, in-service training to these personnel. One of the responsibilities of the management assistance team will be to assist in setting up an in-service training program. In some cases, instructors for such courses might be found within the MPW's existing professional staff. Where this is not possible, perhaps higher education institutions within Liberia could provide staff.

Furthermore, on-the-job training will be provided to the administrative and technical personnel assigned as counterparts to the nine-man management assistance team.

D. Workshop Facilities

The Sauti Report points out that adequate workshops and garages where supplies and spare parts can be stocked and where equipment can be repaired without undue delay are a critical need of the Highway Maintenance Division. Presently, of the six MPW district workshops, only the two constructed and equipped with German assistance are satisfactory. The four others require improvements. Workshops are small and open air, and workshop equipment and tools are insufficient and obsolete. The Report recommends therefore that existing workshop facilities be rehabilitated and each one provided with additional tools and equipment adequate for carrying out the Report's prescribed level of equipment maintenance. The IBRD-funded workshop rehabilitation and equipment program (discussed in Section G below) is designed to permit adequate maintenance of the MPW's existing and projected equipment fleet.

E. Equipment Requirements

Based on an analysis of the operating equipment available to each district at the time the study was made, the Sauti consultants concluded that the Ministry's mechanized maintenance capacity for laterite roads (including grading, ditching and gravelling) is less than 20% of the minimum level required on an annual basis. Although this situation would be substantially improved if the existing equipment were better maintained and more rationally assigned to the various districts, the current size of the MPW equipment pool is clearly inadequate to properly maintain the existing road network.

An April 1971 evaluation by the Sauti consultants of the existing fleet of maintenance equipment indicated that of the MPW's approximately 200 units; 88 units (44%) were in fair to good condition; 56 units (28%) in bad condition; 43 units (22%) in very bad condition; and 12 units (6%) were recommended for scrap. (Annex II contains a detailed list of the present equipment by condition.) This equipment evaluation is now two years old and, given the 12% to 24% rate of equipment depreciation, the above situation has certainly worsened considerably. It was this lack of maintenance equipment that the Sauti consultants identified as the major problem facing the MPW. After evaluating the MPW's maintenance equipment requirements, the consultants final report of August 1972 recommended reequipment of the MPW's fleet. Their recommendations for equipment procurement are discussed in part G-2 of this section.

F. Technical Assistance

1. Project Coordinator

Given the complexity of the maintenance program, the fact that each component is critical to the success of the program and that the components are to be provided by different donors, close donor coordination is essential. Under the project, this is to be achieved through the project coordinator, who would be appointed to the MPW and would report directly to the Minister. Generally, he would be responsible for synchronizing the activities of the various donor agencies involved in the maintenance program and would advise the Government on program implementation. The Government recognizes the need for a project coordinator and the IBRD has indicated it would consider funding the position.

2. Management Assistance

To assist the MPW in carrying out the reorganization recommended in the Sauti Study, the IBRD has agreed to finance 325 man-months of management consultant services over four years. (See Annex VIII for a breakdown of the management consultant team.) Three experts will be assigned to the newly created Maintenance Division to assist in planning and supervising maintenance operations. Another group of three experts will assist the Mobile Equipment Division in organizing the Central and District Workshops. One expert will assist in the establishment of most accounting and data processing systems within the Bureau of Administrative Services.

A transport economist will be assigned to the Planning and Programming Division at various intervals over the four years to assist a team of engineers and economists in the preparation of a comprehensive highway development program for the coming decade. All the experts will train counterpart staff. However, since it has been determined that there are no qualified mechanical or equipment engineers among the MPW's personnel, the IBRD has agreed that civil engineers may be assigned as counterparts.

3. Training Assistance

The Sauti Study identified approximately 300 persons of the MPW Bureau of Operations staff who require basic or refresher training. The German Government has agreed to expand its existing basic training program to include refresher training for intermediate level supervisors, such as foreman and master mechanics, in the proper use and maintenance of equipment, personnel administration and keeping job records. It will also provide up to 3 years training

for operational personnel, especially mechanics, as appropriate. Thus, under the German assistance program, three more training experts will be provided, along with training aids, in addition to the five training experts already in the field. In support of this effort, the GOL will provide classrooms and dormitories to handle approximately 60 trainees per year.

The Sauti Report clearly indicates that the lack of trained operational personnel, especially mechanics, is a critical constraint to effective highway and equipment maintenance. The training needs outlined in the Report are extensive. Therefore, it is essential to the project that the training program is begun at the earliest date.

In this context, the Bank plans to send an advance party of two technicians to Liberia immediately following the completion of negotiations in April 1973. These experts would be responsible for initiating an urgent program for identifying MPW personnel to be trained. Special attention will be paid to identifying mechanics for refresher and/or basic training. The primary objective of this effort is to ensure that an adequate number of mechanics is available to carry out preventive maintenance when the new equipment arrives.

G. Capital Assistance

1. Reconstruction and Equipping of Workshop Facilities

To assist the GOL in carrying out the workshop rehabilitation and equipping program outlined in the Sauti Report, the IBRD has agreed to finance the reconstruction of, and equipment and tools for, the Central Workshop in Monrovia and three others located at Plebo, Wenshu and Tapeta. It also recommends that one additional service shop be built and equipped at Robertsport, two existing garages be modernized and two new ones constructed at Zwedr and Ganta.

The IBRD recognizes the importance of properly synchronizing the completion of the workshop rehabilitation and equipment program with the arrival of new maintenance equipment. Therefore, in addition to the two training technicians mentioned earlier, the IBRD is sending in April a third technician, who will carry out a detailed evaluation of the MPW's workshop equipment and tool needs. He will also assist the MPW in finalizing the workshop rehabilitation program, which is expected to be completed in early 1975.

2. Maintenance Equipment and Spare Parts

The Sauti Study contains a detailed analysis of the MPW's existing equipment requirements based on: (1) The 1972-1975 highway maintenance program proposed by the Sauti consultants; (2) An analysis of the MPW's existing equipment (April 1971); (3) Total mileage of the different types of roads making up the highway network; and (d) The distribution of the maintenance fleet to six districts and two sub-districts as required to provide them with an adequate maintenance capability.

A detailed list of the required maintenance equipment is presented in Annex VII, as are cost estimates.

The estimated cost of the recommended equipment and spare parts, including the procurement services of an equipment specialist, and up to $100,000 for local costs related to rehabilitation of existing U.S.-source equipment is $4.35 million. The following is a summary breakdown of the A.I.D. financed portion of the total program:

Maintenance equipment and vehicles	$2,674,000
Spare parts for new equipment	267,400
Spare parts for existing U.S. equipment ($250,000 spare parts plus $100,000 labor)	350,000
Shipping and insurance	486,210
Procurement services	190,000
Contingency	396,760
Total	$4,363,370
Say	$4,400,000

Prior to initiating procurement, the IBRD, GOL and A.I.D. will review and approve the final list of equipment to be procured.

It is anticipated that the A.I.D. financed equipment will arrive late 1974. Given a one-year warranty against major equipment breakdowns, no major maintenance support for the new equipment will be required of the GOL until late 1975. The rehabilitation of existing workshops and the acquisition of workshop tools and equipment are expected to be completed by late 1974. Refresher training for MPW operational personnel, including mechanics, is expected to be completed by mid-1974, thus mechanics will have been adequately trained to handle routine maintenance. Thus, the

MPW is expected to be adequately perpared, both in terms of facilities and trained mechanics to carry out routine maintenance of A.I.D. financed equipment.

As the Sauti Report correctly points out, training mechanics to carry out major equipment overhaul is a long-term (four to six years) undertaking. In the meantime, A.I.D. and the Bank agree that during the project period the MPW should continue its present practice of contracting with local dealers representing equipment manufacturers to carry out major repair of the MPW's existing equipment. In support of this program, during the first year A.I.D. will finance fifty percent (up to $100,000) of the local cost of such repairs on existing U.S.-source equipment.

Based on past A.I.D. experience, bulk procurement of spare parts for stock is likely to result in excessive wastage, as mechanical units for which spares are procured become unserviceable. Therefore, spare parts for existing equipment (except for consumable spares) would be procured through local dealers representing U.S. firms. The MPW would contract with local dealers to undertake an on-the-spot inspection of existing equipment to identify the current spare parts required to place this equipment back in service. This list will be reviewed by the A.I.D.-funded equipment specialist. He will, in addition, prepare a list of consumable spares such as filters, belt etc. required for existing equipment. U.S. manufacturers would be paid for spares shipped under a letter of credit established with a U.S. bank. Procurement of spare parts for existing U.S.-source equipment will require authorization of proprietory procurement since only Caterpillar parts fit Caterpillar equipment, Ford parts fit Ford equipment, etc.

3. Technical Soundness

The Sauti consultant firm and the IBRD staff have studied this project in great detail. They have developed a complete Ministry of Public Works reorganization scheme and a comprehensive road maintenance program for the GOL. The A.I.D. technical review confirms the suitability of the program and, with only minor changes, concurs in the consultant's recommendations for the highway maintenance program. The consultant's cost estimates (based on international tenders) have been updated to reflect prices anticipated from Code 941 sources of the same equipment.

All technical and engineering requirements of Section 611 of the Foreign Assistance Act of 1961, as amended, have been met, in that: (1) it is anticipated that funds will be used in a technically sound manner; and, (2) technical plans necessary to carry out the project as well as reasonably firm cost estimates for completing the project have been made.

III. ECONOMIC ANALYSIS

A. Transport and the Liberian Economy

High forests in the interior, swampy coastal areas and the absence of good road-making material on the coast, coupled with Liberia's scattered population have made the provision of adequate transportation facilities difficult and costly, and therefore have been significant obstacles to Liberia's development.

Liberia's domestic transport system consists mainly of road and rail transport. Domestic air passenger transport has declined by about 15 percent annually over the past five years and accounts for an insignificant part of total domestic traffic. There are approximately 300 miles of railways in Liberia, all of which are privately owned by the mining companies and haul primarily iron ore. The only exception is the Yekepa-Buchanan line (164 miles) which also carries rubber and logs and about 150 passengers per day between these two points. Nevertheless, the country depends almost entirely on roads for internal transport of both goods and passengers.

There is no overall transport planning in Liberia. Each mode plans its own development, often independently of others. This situation has arisen in large measure from the fact that the railways and, to a lesser extent, roads have been privately developed and are being operated to serve the mining enclave sectors (mining and rubber and forestry). The public road network has been undertaken on an ad hoc basis and does not serve the country's economic potential. Further, the GOL has concentrated on new construction of primary and secondary roads at the expense of road maintenance. These shortcomings are recognized in the Five-Year Highway Maintenance and Development Program, which includes a substantial technical assistance and equipment procurement program aimed at improving the MPW's highway planning and programming, and maintenance capability.

B. Road Transport

1. Growth of the Highway System

Although approximately 3,850 miles of road have been constructed in Liberia since 1950, the road network is still inadequate for the country's size and population. It provides only 1 mile of road for every 10 square miles of land area, one of Africa's lowest ratios. Thus, some areas of the country remain isolated, making the diffusion of economic benefits to the rural population more difficult.

2. Traffic Growth

There is little data available on the existing traffic flows outside Monrovia. Since no systematic traffic count program has been initiated in Liberia, comparison of data over a period of several years does not allow meaningful conclusions. However, based on (a) traffic surveys organized by the MPW in 1969, (b) an origin-destination survey carried out by Sauti Consultants in 1971, and (c) traffic studies of the Monrovia area carried out in 1967 and in 1971 by Stanley Consultants as part of a feasibility study, estimated traffic volumes on the public roads were obtained: 150 miles of roadway support, more than 1,000 vehicles per day; and 1,100 miles, more than 100 vehicles per day. Close to Monrovia, volumes between 2,000 and 5,000 vehicles per day were counted. On the basis of a thorough analysis of economic trends, Sauti consultants forecast that traffic on the more important roads will increase at about 5 percent per annum over the next five years. Consultants to be provided under the project will assist the MPW in establishing a systematic traffic count program.

Statistics obtained from the Ministry of Commerce and Transport indicate that the vehicle fleet grew by about 11 percent annually over the last 10 years, to 23,000 units in 1970 (see Table below). About 60 percent of the fleet consists of passenger cars, 17 percent of buses and some 23 percent of trucks. These estimates are not considered completely accurate since the Ministry's statistics on vehicle registration include vehicles going out of service. Gasoline consumption provides a more accurate indicator of vehicle use.

Development of the Vehicle Registration and Gasoline Consumption

	Vehicle Registration (Units)					Gasoline Consumption (in '000 US gallons
Year	Passenger Cars	Taxi Cabs	Trucks	Buses	Total	
1961	-	-	-	-	7,900	9,150
1962	-	-	-	-	8,500	14,400
1963	-	-	-	-	9,280	-
1964	-	-	-	-	9,500	8,800
1965	-	-	-	-	10,000	8,460
1966	5,762	1,728	2,795	1,447	11,732	10,730
1967	7,268	2,299	3,483	1,986	15,035	12,111
1968	8,919	3,434	4,543	2,785	19,681	14,340
1969	9,880	3,353	4,908	2,995	21,635	17,000
1970	9,377	4,735	5,234	3,864	23,210	19,000
Average Annual Growth Rate:					11.35%	10.65%

Sources: Consultants Sauti Report
Motor Vehicle Division of the Treasury Department

C. Economic Benefits

1. General

The proposed project will address the transport sector's highest priority need: the development within the MPW of a viable maintenance capability which will permit rehabilitation and better maintenance of Liberia's existing road network. The savings in vehicle operating costs which will result from the project will release considerable foreign exchange which can be invested in other segments of the economy. Further, given the competitive nature of Liberia's trucking industry, it is expected that the reduction in transport costs will be passed on to Liberian producers and consumers. Taken as a whole, these elements should be a positive factor in developing the Liberian economy.

2. Highway Maintenance Program

Expenditures on improved road maintenance may be viewed in terms of various trade-offs: (1) maintenance costs versus vehicle operating costs, (2) maintenance costs versus construction or reconstruction costs, and (3) present maintenance costs versus future maintenance costs. Thus, an improvement in the MPW's maintenance capability would result in net economic benefits due to (1) savings to road users in vehicle operating costs, (2) savings in interest to the extent that improved maintenance results in delaying required investment in highway reconstruction or upgrading, (3) reduction in the cost of regular and periodic maintenance as a result of greater efficiency of operation.

In its analysis of the benefits which will accrue from the maintenance program, the IBRD treated the program as a total package. Thus, total benefits were evaluated against total costs, irrespective of the source of financing. Basically, the IBRD's analysis involves a comparison of vehicle operating cost and highway maintenance cost (both expressed as functions of traffic volumes) with and without the project. In its analysis the Bank assumes that benefits begin the first year of the project, increasing steadily thereafter. Further, it categorizes roads in terms of pavements and surface condition and by present and projected traffic volumes. It based its estimates of traffic volumes and growth rates, vehicle operating and road maintenance costs and capital investment costs on the Sauti study as modified by the finding of the recent IBRD Appraisal Mission.

In its analysis, the Bank assumes the economic life of the maintenance project to be 8 years, the weighted average life of equipment. In the absence of a systematic traffic count program in Liberia, it bases traffic volumes and projections on existing data, and

considers a ± 20% error possible in the estimates for these inputs. Further, it considers a ± 10% error to be possible in its estimation of vehicle operating costs. Also, the Bank includes an additional 20% in its estimates of capital costs of the road maintenance program to cover quantity and price uncertainties. The Bank also performed a sensitivity analysis, taking into consideration the possible variations in inputs discussed above. Its analysis showed that under the worst possible conditions of traffic volumes, and operating and capital costs, the maintenance program would yield an IRR of 16%. However, on the basis of the most likely estimates of inputs, the program yields an IRR of 30% and a B/C ratio of 1.5. (See Annex VII for details of benefit-cost calculations.)

IV. FINANCIAL ANALYSIS

A. Financial Requirements

The total estimated financial requirements of the project are as follows:

Component (in millions of dollars)	FX	Local Cost	Total Cost
Program Coordinator	0.19	0.01	0.20
Consultant Services-Reorganization	1.62	0.30	1.92
Consultant Services-Training	1.15	0.15	1.30
Maintenance, Equipment, Spare Parts, etc.	4.30	0.35	4.65
Workshop Rehabilitation	0.25	0.05	0.30
Contingency	0.42	0.12	0.54
TOTAL	7.93	0.98	8.91

The GOL will finance all local costs, the estimates of which were prepared by IBRD's Appraisal Mission. These costs represent project-related increases in the GOL capital budget.

B. Financing Plan

1. Total Highway Maintenance Project

The financial plan for the total project is as follows:

	Foreign Exchange	Local Cost	Total Cost
IBRD	2.48 (31%)		2.48 (28%)
FRG	1.15 (15%)		1.15 (13%)
A.I.D.	4.30 (54%)	0.10 (11%)	4.40 (49%)
GOL		0.88 (89%)	0.88 (10%)
	7.93 (89%)	0.98 (11%)	8.91 (100%)

2. A.I.D. Component

A.I.D. proposes to finance the foreign exchange cost of the maintenance equipment and spare parts component of the project. The financial plan for the A.I.D. portion of the project will be as follows: (in millions of dollars)

	Foreign Exchange	Local Costs	Total Costs
A.I.D. Contribution	4.30	.10	4.40
G.O.L. Contribution	——	0.25	0.25
Total	4.30	0.35	4.65

The $100,000 in local cost to be funded under the proposed loan represents A.I.D.'s contribution to the local cost of repairing existing GOL-owned U.S. manufactured equipment under contracts between the MPW and local dealers representing U.S. manufacturers. It should be noted that the GOL contribution of $250,000 does not include the recurrent cost of equipment operation and maintenance (salaries and POL), estimated in the Sauti Report as averaging $2.5 million per year.

C. Economic and Financial Status of the GOL and Repayment Prospects

Liberia's GDP at market prices rose to $437.7 million in 1971 from $417.5 million in 1970, a 4.8% increase, compared with a 7.0% average increase during 1967-70 period. While no reliable official deflators are available for Liberia, if the increase in GDP is discounted at a modest 3-4% for inflation*, there was little growth in real GDP from 1970 to 1971. Further, given an estimated 3% increase in population, Liberia may have suffered a slight drop in real per capita GDP during the period.

A combination of relatively low iron and rubber prices (which together account for approximately 86% of Liberia's merchandise exports); the decision by a group of Japanese businessmen not to invest at this time in the $500-600 million Wologisi iron mining project; the phasing down of oil exploration activities; and investor uncertainity about the implications of GOL economic policy pronouncements account in large measure for the relatively modest rise in GDP.

Foreign trade is the foundation of the Liberian economy, with exports accounting for 51% of GDP in 1970 and 1971. With exports of $224 million and imports of $162.4 million, Liberia registered a favorable balance of trade of $61.6 million in 1971. This was slightly below 1970's surplus of $64 million and well below the $81.2 million surplus recorded in 1969. It should be noted that these impressive trade surpluses continue to be offset by sizeable outflows of profits and factor payments. The value of exports rose 4.8% from 1970 to 1971. Imports, however, climbed 8.2% during the same periods. The pattern of a faster rate of growth in value of imports over

* The official price index for Monrovia increased 7.3% for the first 8 months of 1972.

exports appears likely to continue over the next several years and demonstrates Liberia's need for export diversification and import substitution.

The contribution of the non-enclave sectors of the economy to GDP has remained substantially unchanged for the past several years. Public capital formation continues to be dominated by infrastructure projects, such as roads, communications, and power, with investment in agriculture constituting only 3% of the total. Thus, development outside the enclave sectors continues to lag, with the result that significant progress toward diffusing economic growth and development remains a goal and not a reality. This situation results mainly from the present lack of agriculture sector projects and is expected to change in the near future when the results of the IBRD-financed rural development studies become available.

The GOL's fiscal position in 1971 showed continued stability. The surplus on current accounts declined somewhat in 1971, amounting to approximately 21% of current revenues compared to approximately 25% in the two previous years. Debt service payments continue to absorb about 25% of current revenues, placing a heavy strain on government finances.

External debt servicing outlays (principal and interest) during the past five years, and projected through 1980, are shown in the table below in relation to actual and projected export earnings. In projecting the debt service burden, it is assumed that new debts will have the same terms as have characterized recent loan commitments to Liberia, including a minimum grace period of seven years. Export growth, projected at 5.5 percent, is based on data presented in the most recent (July 1971) IBRD report on "The Current Economic Position and Prospects of Liberia". The projections represent an extension of the IBRD's debt servicing projections, which were contained in the above report and which were based on Liberia's public and private debt outstanding as of December 31, 1969. The Bank's projections have been revised to reflect additional foreign aid to cover the foreign exchange components of (1) development projects which the GOL has undertaken since 1969 and (2) development projects which the GOL has indicated it plans to undertake and which various aid donors have made tentative commitments to finance or have expressed an interest in financing.

Liberia's Debt Service Burden
(US$ million)

Year	Debt Service (Principal & Interest)	Actual Export of Goods and Services	Ratio of Debt Services to Export of Goods and Services
1967	9.9	158.8	6.2
1968	13.4	169.0	7.9
1969	17.9	195.9	9.1
1970	15.4	213.7	7.2
1971	17.2	224.0	7.7
	Projected Debt Service (Principal & Interest)	Projected Export of Goods and Services	
1972	16.9	236.3	7.1
1973	18.0	249.3	7.2
1974	20.8	263.0	7.9
1975	19.5	277.4	7.0
1976	19.1	292.7	6.5
1977	19.4	308.8	6.2

Under these assumptions, the debt service ratio (ratio of debt service to export of goods and services) is projected to remain relatively stable through 1975, after which it shows a slight decline. The projected relative stability of the debt service ratio is based on the assumption that the GOL's policy of reducing reliance on short-maturity, hard-term supplier's credit will continue.*

Thus, for the foreseeable future, Liberia's debt ratio does not represent a constraint to contracting further debt. However, with the financial situation of the public sector being the main constraint, continued caution must be exercised in contracting new conventional debt.

*Between 1964 and 1969 these loans were reduced from 35% of external, public debt outstanding to 22%.

The Liberian economy is basically sound and the general outlook over the longer term is favorable. Substantial increases in forest production are expected over the next several years and earnings therefrom should show a quantum jump in 1974 with the opening of the $19 million plywood factory.

Continued increases in rubber production and total value are also expected although rubber prices have been somewhat unstable. Further, possibilities exist for expansion and upgrading of iron ore production. Thus, assuming that a substantial portion of Liberia's external financing is obtained on concessionary terms, and improvements continue in tax administration and control of the annual budget, the prospects for Liberia repaying the loan are reasonable.

D. Availability of Other Sources of Financing

Liberia has recently been successful in mobilizing loan assistance from a variety of sources. Major Free World aid donors other than U.S. and the IBRD include the UNDP, Germany, Italy and the U.K.

As noted in Section I-A above, this project represents the first step in the implementation of the Five-Year Highway Maintenance and Development Program presented at the Multi-Donor Conference in October. This is a multi-donor project with financing being provided by the IBRD and Germany (FRG) as well as the U.S. (see Section IV-A).

In addition to the financing proposed under this project, nearly $25 million in commitments, some of which were tentative, were made by the following donors: African Development Bank $5.4 million; Italy $12.0 million (commodity credits); U.K. $0.47 million; and the U.S. $7.0 million (for 3 rural roads totaling 195 miles in length).

Since (a) approximately 85% of the MPW's highway equipment is of U.S. manufacture, (b) the Sauti Study recommended that in the interest of simplifying maintenance procedures, the MPW should procure similar equipment, and (c) the MPW requested that A.I.D. provide funding for additional equipment and spare parts, it would appear that the project committee believes financing of this equipment would most appropriately be provided by the U.S.

V. OTHER CONSIDERATIONS

A. Impact on U.S. Economy and Balance of Payments

This loan will not conflict with any U.S. business interests, nor will it have any adverse impact on the U.S. balance of payments. The loan will have a beneficial effect on the U.S. economy since all goods and services provided for herein will probably be procured from U.S. sources.

B. Effect on Private Enterprise

Although the loan will be used to finance a public program, the primary beneficiary will be private enterprise. The loan funds will finance contracts with private U.S. firms, and the project benefits will accrue principally to road users in the Liberian private sector.

VI. ENVIRONMENTAL IMPACT

This project does not have a significant environmental impact. It involves the procurement of highway maintenance equipment to be utilized by the MPW to maintain previously constructed roads. The selection of equipment to be used under the project essentially replaces equipment which has become obsolete. The equipment selected for procurement will be equipped with the normal pollution control equipment required under U.S. legislation at the time of manufacture.

VII. IMPLEMENTATION

A. Procurement of Maintenance and Communications Equipment, Spare Parts, Traffic Counters and Consultant Services

Under present planning, the MPW will enter into a contract with a U.S. firm which would provide the required procurement services. Under this contract, the services of an equipment specialist for approximately 2 years would also be included. His responsibilities would include: (a) reviewing equipment specifications prepared by the GOL to ensure their conformance with A.I.D. requirements, (b) preparing bid documents for GOL and A.I.D. approval, (c) inspecting equipment prior to shipment and upon arrival in Liberia, and (d) assisting the GOL in the preparation of monthly progress reports on loan implementation.

Following the arrival of spare parts for existing equipment, the A.I.D.-funded equipment specialist will recommend a program to the MPW for contracting with local dealers to carry out major repairs of existing equipment on a systematic basis. At the same time, he will recommend a systematic program for carrying out minor repairs of this equipment using MPW workshop facilities.

Prior to the arrival of new equipment, the equipment specialist will recommend to the MPW a program of preventative maintenance on new equipment.

By the time the A.I.D.-funded equipment specialist's contract expires in mid-1975, the reorganization of the MPW will have been completed and workshop facilities will be capable of carrying out normal maintenance.

B. Timetable

February 1973	Loan Authorized
April 1973	Loan Agreement Signed
May 1973	Selection of U.S. consulting firm to provide procurement services
August 1973	Completion of review of equipment specifications, workshop conditions, preparation of bid documents, and satisfaction of conditions precedent
September 1973	Advertisement of equipment IFB
October 1973	Approval of equipment rehabilitation program
January 1974	Award of Bids for equipment
July 1974	Start of arrival of new equipment
September 1974	All equipment in country

VIII. ISSUES

None.

IX. CONDITIONS AND COVENANTS

The following conditions will be discussed with the GOL during the negotiation of the loan and will be included in the Loan Agreement conditions precedent as appropriate:

1. Conditions precedent to initial disbursement (for procurement services):

a. technical (management) assistance agreement between the IBRD and Liberia to assist in the reorganization of the MPW;

b. technical assistance agreement between the Federal Republic of Germany (FRG) and Liberia to finance the training of operational personnel;

c. evidence of adequate financial support to meet local costs of the project and to assure that an effective and continuing maintenance program will be implemented.

2. Conditions precedent to disbursements for maintenance equipment, and for spare parts for new and existing MPW-owned U.S. equipment:

a. MPW plans for workshop reconstruction and procurement of workshop tools and equipment satisfactory to A.I.D.;

b. procurement services contract between the GOL and a U.S. firm;

c. arrangements with local dealers representing U.S. manufacturers for carrying out major overhaul (i.e. fourth and fifth echelon) on MPW equipment;

d. a contract with an individual acceptable to A.I.D. to fill the position of project coordinator.

CHECKLIST OF STATUTORY CRITERIA
DEVELOPMENT LOAN FUND

I. COUNTRY PERFORMANCE

A. Progress Towards Country Goals

1. FAA Secs. 201 (b)(5), 201 (b)(7), 201(b)(8), 208.
Discuss the extent to which the country is:

(a) Making appropriate efforts to increase food production and improve means for food storage and distribution.	The GOL's five year development plan 1972-1976 for Agriculture and Forestry puts the agriculture sector as top priority in development of the economy. A primary goal is to diversify agriculture production by increasing production of rice, tree crops, and livestock production. There are price support schemes, and new milling and warehouse facilities.
(b) Creating a favorable climate for foreign and domestic private enterprise and investment.	Liberia has reaffirmed the Open Door Policy by creating incentives to investors and to attract foreign investment, which is responsible for most of the economic development of the country. Both foreign investment and national entrepreneurs are encouraged to participate.
(c) Increasing the people's role in the developmental process.	The government's policy is to create balanced and sustained economic progress of all parts of the country through integrated rural and urban regional development programs. Considerable efforts are being made in the educational field at all levels.

(d) Allocating expenditures to development rather than to unnecessary military purposes or intervention in other free countries' affairs.	The level of military expenditure is minimal (6% budget in 1971) and limited to that required to insure internal order and stability.
(e) Willing to contribute funds to the project or program.	See Sections II and IV for GOL contribution.
(f) Making economic, social, and political reforms such as tax collections improvements and change in land tenure arrangement; and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.	The GOL has recently taken steps to strengthen government operations and tighten management and administrative practices. President Tolbert has taken disciplinary action against several officials for corruption, and introduced new tax measures. More land is being made available for production, and there is considerable freedom of the press.
(g) Responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.	The GOL is attempting, through the building of a resource base by increasing export crops & through agricultural projects aimed at the village level, to effectuate economic and social reforms for the improvement of living standards. Improved highway maintenance can play an important role with respect to improving the standard of living.

B. Relations with the United States

1. FAA Sec. 620 (c). Is the government indebted to any U.S. citizen for goods or services furnished or ordered where: (a) such citizen has exhausted available legal remedies, including arbitration, or (b) the debt is not denied or contested by the	None to our knowledge.

government, or (c) the indebtedness arises under such government's, or a predecessor's unconditional gaurantee?

2. FAA Sec. 620(d). If the loan is intended for construction or operation of any productive enterprise that will compete with U.S. enterprise, has the country agreed that it will establish appropriate procedures to prevent export to the U.S. of more that 20% of its enterprise's annual production during the life of the loan? — Not applicable.

3. FAA Sec. 620(e)(1). Has the country's government, or any agency or subdivision thereof, (a) nationalized or expropriated property owned by U.S. citizens or by any business entity not less than 50% beneficially owned by U.S. citizens, (b) taken steps to repudiate or nullify existing contracts or agreements with such citizens or entity, or (c) imposed or enforced discriminatory taxes or other exactions, or restrictive maintenance or operation conditions? If so, and more than six months has elapsed since such occurence, identify the document indicating that the government, or appropriate agency or subdivision thereof, has taken appropriate steps to discharge its obligations under international law toward such citizen or entity? If less than six months has elapsed, what steps if any has it taken to discharge its obligations? — No.

4. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction by mob action of U.S. — No.

property, and failed to take appropriate measures to prevent a recurrence and to provide adequate compensation for such damage or destruction?

5. FAA Sec. 620(l). Has the government instituted an investment guaranty program under FAA Sec. 221(b)(1) for the specific risks of inconvertibility and expropriation or confiscation? — Yes.

6. FAA Sec. 620(o): Fisherman's Protective Act of 1954, as amended, Section 5. Has the country seized, or imposed any penalty or sanction against, any U.S. fishing vessel on account of its fishing activities in international waters ?If, as a result of a seizure, the U.S.G. has made reimbursement under the provisions of the Fisherman's Protective Act and such amount has not been paid in full by the seizing country, identify the documentation which describes how the withholding of assistance under FAA has been or will be accomplished. — No.

7. FAA Sec. 620(q) Has the country been in default, during a period in excess of six months, in payment to the U.S. on any FAA loan? — No.

8. FAA Sec. 620(t). Have diplomatic relations between the country and the U.S. been severed? If so, have they been renewed? — No.

C. Relations with Other Nations and the U.N.

1. FAA Sec. 620(i). Has the — No.

country been officially represented at any international conference when that representation included planning activities involving insurrection or subversion directed against the U.S. or countries receiving U.S. assistance?

2. FAA Sec. 620(a); 620(n). Has the country sold, furnished, or permitted ships or aircraft under its registry to carry to Cuba or North Viet-Nam items of economic, military, or other assistance?

No.

3. FAA Sec. 620(u); App. Sec. 108. What is the status of the country's U.N. dues, assessments, or other obligations? Does the loan agreement bar any use of funds to pay U.N. assessments, dues, or arrearages?

To the best of our knowledge Liberia is up to date on its U.N. dues, assessments, and other obligations. Yes, the loan agreement limits the use of loan funds for the specific project.

D. Military Situation

1. FAA Sec. 620(i). Has the country engaged in or prepared for aggressive military efforts directed against the U.S. or countries receiving U.S. assistance?

No.

2. FAA Sec. 620(s). What is (a) the percentage of the country's budget devoted to military purposes, and (b) the amount of the country's foreign exchange resources used to acquire military equipment? Is the country diverting U.S. development assistance or P.L. 480 sales to military expenditures? Is the country diverting

(a) 6%.
(b) Minimal foreign exchange is spent on military equipment.
(c) No.
(d) No.
(e) No.

its own resources to unnecessary military expenditures? Has the country spent money for sophisticated weapons systems?

II. CONDITION OF THE LOAN

A. General Soundness

-- Interest and Repayment

1. FAA Secs. 201(d), 201(b)(2). Is the rate of interest excessive or unreasonable for the borrower? Are there reasonable prospects for repayment? What is the grace period interest rate; the following period interest rate? Is the rate of interest higher than the country's applicable legal rate of interest?	The rate of interest is not excessive or unreasonable. The grace period is 10 years at 2% interest and 3% interest during the remaining 30 years. The rate of interest is less than Liberia's applicable legal rate of interest.

-- Financing

1. FAA Sec. 201(b)(1). To what extent can financing on reasonable terms be obtained from other free-world sources, including private sources within the U.S.?	Financing from other free-world sources, including private sources within the U.S., is not available. See Section IV of CAP.

-- Economic and Technical Soundness

1. FAA Sec. 201(b)(2), 201(e). The activity's economic and technical soundness to undertake loan; does the loan application, together with information and assurances, indicate that funds will be used in an economically and technically sound manner?	Yes. See Section II, III and IV of CAP.
2. FAA Sec. 611(a)(1). Have engineering, financial, and other plans necessary to carry out assistance, and a reasonably firm estimate of the cost of assistance to the U.S., been completed?	Yes. See Sections II and IV of CAP.

3. FAA Sec. 611(b); App. Sec. 101.
If the loan or grant is for a water or related land-resource construction project or program, do plans include a cost-benefit computation? Does the project or program meet the relevant U.S. construction standards and criteria used in determining feasibility?

Not applicable.

4. FAA Sec. 611(e). If this is a Capital Assistance Project with U.S. financing in excess of $1 million, has the principal A.I.D. officer in the country certified as to the country's capability effectively to maintain and utilize the project?

Yes.

B. Relation to Achievement of Country and Regional Goals.

-- Country Goals

1. FAA Secs. 207, 281(a). Describe this loan's relation to:

a. Institutions needed for a democratic society and to assure maximum participation on the part of the people in the task of economic development.

The loan will be implemented by the Ministry of Public Works. It is intended to help strengthen the MPW's highway maintenance capability

b. Enabling the country to meet its food needs, both from its own resources and through development, with U.S. help, of infrastructure to support increased agricultural productivity.

Properly maintained roads will facilitate the movement of agricultural products and of agricultural inputs needed for increased agricultural productivity.

c. Meeting increasing need for trained manpower.

A primary goal of the project is to help the MPW to meet its need for trained mechanics. See Section II C of the CAP.

	efficient operations and maintenance of the expanded system. This will contribute to the skills of the Liberian Telecommunications technicians.
d. Developing programs to meet public health needs.	Not applicable.
e. Assisting other important economic, political, and social development activities, including industrial development; growth of free labor unions; cooperatives and voluntary agencies; improvement of transportation and communication systems; capabilities for planning and public administration; urban development; and modernization of existing laws.	The loan will assist GOL efforts to develop an on-going capability to adequately maintain its road system.
2. FAA Sec. 201(b)(4). Describe the activity's consistency with and relationship to other development activities, and its contribution to realizable long-range objectives.	See Section III of CAP.
3. FAA Sec. 201(b) (9). How will the activity to be financed contribute to the achievement of self-sustaining growth?	As indicated in the CAP, this project will perform an integrating function with respect to multinational economic activity in Liberia. Thus, an expanded telecommunications network is a long-term objective of the GOL.
4. FAA Sec. 201(f). If this is a project loan, describe how such project will promote the country's economic development, taking into account the country's human and material resource requirements and the relationship	A prerequisite to a rational expansion of Liberia's existing road network into rural areas is the development of an adequate road maintenance capacity by the GOL. This project is designed to assist the GOL in achieving that objective.

between ultimate objectives of the project and overall economic development.

5. FAA Sec. 201(b) (3). In what ways does the activity give reasonable promise of contributing to development of economic resources, or to increase of productive capacities?

See Section III of CAP.

6. FAA Sec. 281(b). How does the program under which assistance is provided recognize the particular needs, desires, and capacities of the country's people; utilize the country's intellectual resources to encourage institutional development; and support civic education and training in skills required for effective participation in political processes.

Better communications will provide greater national and international contact and exchange and permit the Government to be more responsive to the needs of the people.

7. FAA Sec. 601(a). How will this loan encourage the country's efforts to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions?

See Section III of CAP.

8. FAA Sec. 202(a). Indicate the amount of money under the loan which is: going directly to private enterprise; going to intermediate credit institutions or other borrowers for use by private enterprise; being used to finance imports from private sources; or otherwise being used to finance procurements from private sources.

The entire loan will be used to procure goods and services from private enterprise.

9. FAA Sec. 611(a)(2). What legislative action is required within the recipient country? What is the basis for a reasonable anticipation that such action will be completed in time to permit orderly accomplishment of purposes of loan?	None required.
-- Regional Goals	
1. FAA Sec. 619. If this loan is assisting a newly independent country, to what extent do the circumstances permit such assistance to be furnished through multilateral organizations or plans?	Not applicable.
2. FAA Sec. 209. If this loan is directed at a problem or an opportunity that is regional in nature, how does assistance under this loan encourage a regional development program? What multilateral assistance is presently being furnished to the country?	First question, not applicable. The World Bank Group, the U.N. and the African Development Bank are providin assistance to Liberia.
C. Relation to U.S. Economy	
-- Employment, Balance of Payments, Private Enterprise.	
1. FAA Secs. 201(b)(6);102, Fifth. What are the possible effects of this loan on U.S. economy, with special reference to areas of substantial labor surplus? Describe the extent to which assistance is constituted of U.S. commodities and services, furnished in a manner consistent with improving the U.S. balance of payments position.	Approximately $4.3 million of the loan will be used for the procurement of Code 941 goods and services. However, because of the technical requirements only U.S. firms will probably be able to suppl the necessary equipment. (See Section V of the Capital Assistance Paper.)

2. FAA Secs. 612(b), 636(h). What steps have been taken to assure that, to the maximum extent possible, foreign currencies owned by the U.S. and local currencies contributed by the country are utilized to meet the cost of contractual and other services, and that U.S. foreign-owned currencies are utilized in lieu of dollars?	No U.S. foreign owned currencies available for project. The GOL will contribute to the project. See Section IV of the CAP.
3. FAA Sec. 601(d);App.Sec.109. If this loan is for a capital project, to what extent has the Agency encouraged utilization of engineering and professional services of U.S. firms and their affiliates? If the Loan is to be used to finance direct costs for construction, will any of the contractors be persons other than qualified nationals of the country or qualified citizens of the U.S.? If so, has the required waiver been obtained?	The loan agreement restricts procurement of these services to Liberia and Code 941 countries, which included the U.S. The loan agreement contains standard AID clause in regard tothird-country nationals.
4. FAA Sec. 608(a). Provide information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items.	The draft loan agreement contains the standard AID clause in this regard.
5. FAA Sec. 602. What efforts have been made to assist U.S. small business to participate equitably in the furnishing of commodities and services financed by this loan?	AID procedures will be followed to provide notice of intended procurement to U.S. small business.
6. FAA Sec. 621. If the loan provides technical assistance, how is private enterprise on a contract basis utilized? If the facilities of other Federal agencies will be utilized, in what ways are they particularly suitable; are they competi-	Technical assistance will be provided on a contract basis. No other Federal agency involved.

tive with private enterprise (if so, explain); and how can they be made available without undue interferences with domestic programs?

7. FAA Sec. 611(c). If this loan involves a contract for construction that obligates in excess of $100,000, will it be on a competitive basis? If not, are there factors which make it impracticable? — Not applicable

-- Procurement

1. FAA Sec. 604(a). Will commodity procurement be restricted to U.S. except as otherwise determined by the President? — Yes.

2. FAA Sec. 604(b). Will any part of this loan be used for bulk commodity procurement at adjusted prices higher than the market price prevailing in the U.S. at time of purchase? — No.

3. FAA Sec. 604(e). Will any part of this loan be used for procurement of any agricultural commodity or product thereof outside the U.S. when the domestic price of such commodity is less than parity? — No.

D. Other Requirements

1. FAA Sec. 201(b). Is the country among the 20 countries in which development loan funds may be used to make loans in this fiscal year? — Yes

2. App. Sec. 106. Does the loan agreement provide, with respect to capital projects, for U.S. approval of contract terms and firms? — Yes.

3. FAA Sec. 620(k). If the loan is for construction of a productive enterprise, with respect to which the aggregate value of assistance to be furnished will exceed $100 million, what preparation has been made to obtain the express approval of the Congress?	Not applicable.
4. FAA Secs. 620(b), 620(f); App. Sec. 109(b). Has the President determined that the country is not dominated or controlled by the international Communist movement? If the country is a Communist country (including, but not limited to, the countries listed in FAA Sec. 620(f) and the loan is intended for economic assistance, have the findings required by FAA Sec. 620(f) and App. Sec. 109 (b) been made and reported to the Congress?	Yes.
5. FAA Sec. 620(h). What steps have been taken to insure that the loan will not be used in a manner which, contrary to the best interest of the United States, promotes or assists the foreign aid projects of the Communist-bloc countries?	The loan agreement contains the standard AID clause in this regard.
6. App. Sec. 110. Will any funds be used to finance procurement of iron and steel products for use in Viet-Nam other than as contemplated by Sec. 110?	No.
7. FAA Sec. 636(i). Will any part of this loan be used in financing non-U.S.-manufactured automobiles? If so, has the required waiver been obtained?	No.
8. FAA Secs. 620(a)(1) and (2), 620(p); App. Sec. 117. Will any assistance be furnished	No.

or funds made available to the government of Cuba or the United Arab Republic?	
9. FAA Sec. 620(g). Will any part of this loan be used to compensate owners for expropriated or nationalized property? If any assistance has been used for such purpose in the past, has appropriate reimbursement been made to the U.S. for sums diverted?	No. No such assistance has been used for this purpose.
10. FAA Sec. 201(f). If this is a project loan, what provisions have been made for appropriate participation by the recipient country's private enterprise.	Not applicable
11. App. Sec. 104. Does the loan agreement bar any use of funds to pay pensions, etc., for persons who are serving or who have served in the recipient country's armed forces?	Yes. The loan agreement limits the use of loan funds for the specific project.
12. MMA Sec. 901.b. Does the loan agreement provide, for compliance with U.S. shipping requirements, that at least 50% of the gross tonnage of all commodities financed with funds made available under this loan (computed separately by geographic area for dry bulk carriers, dry cargo liners, and tankers) be transported on privately owned U.S.- flag commercial vessels to the extent such vessels are available at fair and reasonable rates for U.S. flag vessels. Does the loan agreement also provide for compliance with U.S. shipping requirements, that at least 50% of the gross freight revenues of goods shipped under this loan	Yes.

must be earned by privately owned U.S.- flag commercial vessels to the extent such vessels are available at fair and reasonable rates for U.S.- flag vessels?

13. FAA Sec. 481. Has the country failed to take adequate steps to prevent narcotic drugs from entering the U.S. unlawfully?

No, Liberia is cooperative with the U.S. and international organizations in the control of narcotic drugs.

14. FAA Sec. 604(e). Has there been compliance with restriction against procuring with A.I.D. funds agricultural commodities outside the U.S. when the domestic price of such commodity is less than parity?

No agricultural commodities will be procured with funds provided under this loan.

MINISTRY OF PUBLIC WORKS: PRESENT MAINTENANCE ORGANIZATION(1)

I. Organization

The Ministry of Public Works is headed by a Minister who is in control of management, supervision, administration and direction.

The Minister of Public Works, who is assisted by a Legal Counselor, one technical assistant and one administrative assistant, is responsible for the administration and supervision of all business relating to: (a) control of all labor for public works; (b) construction and maintenance of roads; and (c) supervision of public works in municipal districts, cities and townships.

The Ministry is responsible for implementing the public works projects undertaken by the Government. Its functions are carried out through three Bureaus, each headed by a Deputy-Minister: Administrative Bureau, Technical Services Bureau and Bureau of Operations. (See the organizational chart, Figure I.)

The Bureau of Operations is responsible for the maintenance of public highways, urban roads, building and grounds. Its activities are carried out according to the following organizational pattern:

A. County and District Engineers Division - This division is responsible for road maintenance, force-account construction and maintenance of the Ministries' buildings.

For highway maintenance the Bureau of Operations has organized several districts and county offices, which for the purpose of this report have been defined as "districts." Each district is headed by a resident engineer.

The districts are:
- Montserrado county (including Grand Cape Mount county)
- Bong and Lofa counties (maintenance district I)
- Nimba and Grand Gedeh counties (maintenance district II)
- Bassa county
- Sinoe county
- Maryland county.

B. Public Properties Division - This division is responsible for the construction and maintenance of public buildings and the operation of the woodwork shop.

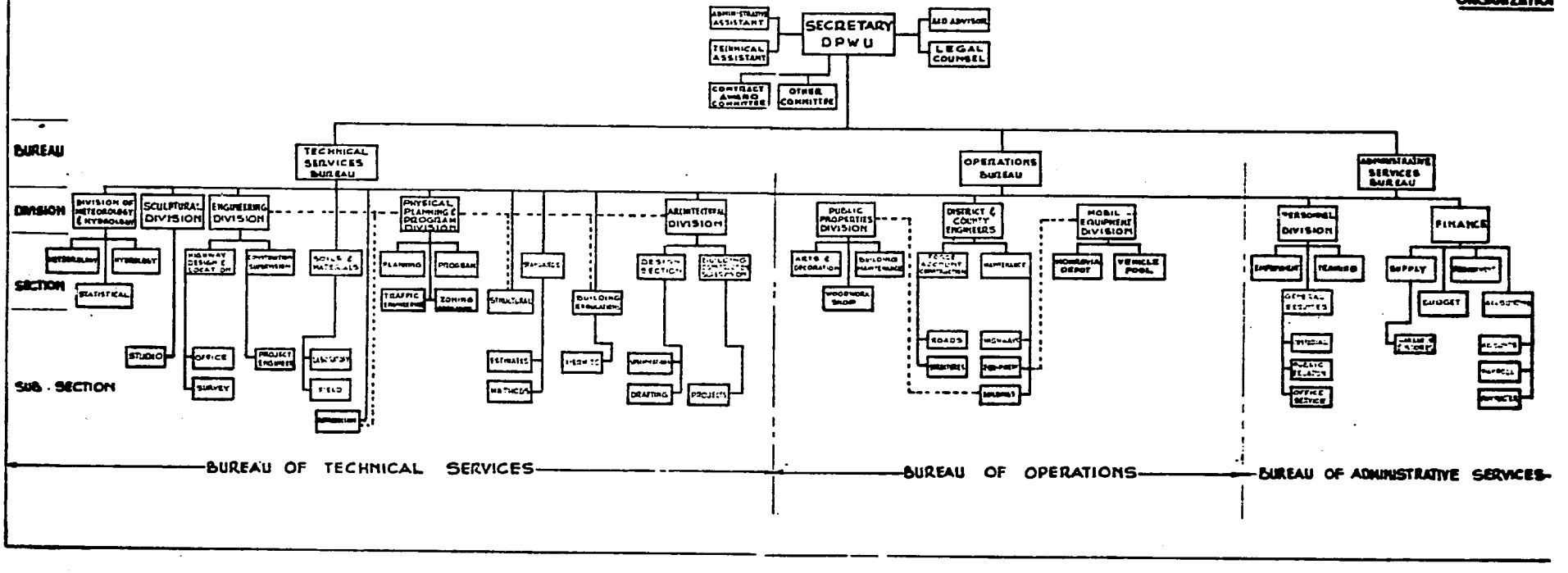
C. Mobile Equipment Division - This division performs the following duties for which its Chief of Division is responsible:

1) Advises the Deputy-Minister for Operations on shop

(1) SOURCE: "Republic of Liberia - Highway Organization and Maintenance Study" (Sauti Report) Prepared by Sauti Overseas Anstalt in August, 1972.

FIGURE 1
ORGANIZATION

DEPARTMENT OF PUBLIC WORKS ORGANIZATION PLAN FOR 1969



performance;

2) Procures and distributes parts and supplies to all shops;

3) Screens applicants for employment and informs the Secretary of employees' work progress.

This division, located in the Ministry of Public Works headquarters, is responsible for the maintenance and repair of the Ministry's fleet of vehicles and equipment. These operations are carried out by the central shop in Monrovia and by outlying workshops in the various districts. The outlying shops are limited in supervision of equipment according to the available shop facilities and staff.

From March 1969 the direct supervision of the outlying shops was transferred to the resident engineers of the respective areas, who are in close touch with the equipment division in Monrovia on all matters concerning equipment needs, operation and repair.

II. Existing equipment, workshops and spare parts

A. Inventory of equipment

1. Maintenance Equipment

An inventory was made in January 1971 and up-dated to April 1971 showing the mobile equipment for highway maintenance at the different maintenance districts and at the main depot in Monrovia. This was performed in accordance with the terms of reference of the Sauti study, on the basis of a direct check of most of the units and the collection of related information from the MPW personnel.

For each unit the following information was obtained: the cost of delivery of the unit, an appraisal of its actual condition, its estimated percentage of efficiency and its residual value. The mechanical condition of the equipment has been assessed by estimating for each unit the residual value as a percentage of its cost on delivery.

In addition to the maintenance equipment recorded in this inventory, there is a separate pool for some roads of Bassa and Sinoe counties, which are maintained by a German team in cooperation with MPW personnel. This is being done for training, in accordance with an agreement for technical cooperation with Federal Republic of Germany. The list of this additional pool of equipment is shown in Table 1.

Table 2 summarizes the total number of mobile units, exclusive of the special pool, by categories of equipment. As is seen from Table 2, only about one-third of the equipment is in good or very good condition.

FRG Financed Equipment Pools
Bassa and Sinoe Counties

A. GRAND BASSA COUNTY

Description	Make	Purchase year
Motor grader	Caterpillar	1971
Motor grader	Caterpillar	1971
Dump truck	Ford	1971
Dump truck	Ford	1971
Dump truck	Ford	1971
Dump truck	Ford	1971
Tractor Low-boy assembly	Ford	1971
Front end Loader on trucks	Caterpillar	1971
Asphalt distributor	Ford	1971
Asphalt Kettle	-	1971
Water truck with pump	-	1971
Vibratory roller	-	1971
Diafragm pump with gasoline engine	-	1971
Steel wheel roller	-	1971
Concrete mixer with gasoline engine	-	1971
Pick-up	Ford	1971
Pick-up	Ford	1971
Pick-up	Ford	1971
60 KVA diesel electric generator	-	1971

B. SINOE COUNTY

Description	Make	Purchase year
Motor grader	Caterpillar	1971
Motor grader	Caterpillar	1971
Motor grader	Caterpillar	1971
Diesel electric generator	-	1971
Dump truck	Ford	1971
Dump truck	Ford	1971
Dump truck	Ford	1971
Dump truck	Ford	1971
Dump truck	Ford	1971
Dump truck	Ford	1971
Crawler tractor with dozer blade	Caterpillar	1971
Front end Loader on truck	Caterpillar	1971
Tractor-Low-boy assembly	Ford	1971
Farm tractor	-	1971
Rubber tyred roller	-	1971
Pick-up	Ford	1971
Power plant	-	1971

Equipment inventory
(% : Average percentage of original value)

Table 2

Equipment / Condition	Very good		Good		Fair		Bad		Very bad		Scrap	Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	No.
Motor graders	5	88	2	67	-	-	9	26	7	13	-	23
Loaders	4	89	-	-	5	44	4	31	4	16	-	17
Tractors	-	-	2	65	4	42	5	30	4	16	2	17
Scrapers	-	-	-	-	3	42	-	-	4	12	-	17
Rollers	-	-	4	62	89	40	54	27	1	20	-	18
Asph. pavers	1	100	-	-	-	-	-	-	-	-	-	1
Asph. plants	1	100	-	-	-	-	-	-	-	-	-	1
Asph. boilers	-	-	-	-	1	40	-	-	-	-	-	1
Asph. spreaders	1	80	-	-	-	-	-	-	1	15	-	2
Asph. kettles	-	-	1	60	1	45	-	-	-	-	1	3
Shovels	-	-	-	-	-	-	2	27	-	-	-	2
Dump-Trucks	7	90	22	70	1	55	16	25	20	13	8	79
Truck tractors	1	100	1	65	-	-	1	25	1	10	-	4
Truck tankers	-	-	-	-	2	50	2	25	-	-	-	4
Grease unit	-	-	-	-	-	-	2	25	1	2	-	3
Stake beds	1	95	-	-	1	40	1	25	-	-	1	4
Fork lift	-	-	-	-	1	50	-	-	-	-	-	1
Trailers	-	-	2	60	-	-	5	25	-	-	-	7
Truck-mounted crane	-	-	-	-	-	-	2	32	-	-	-	2
Unspreaden rod 90 concrete	-	-	-	-	1	55	1	25	-	-	-	2
Spot mix	-	-	-	-	-	-	1	25	-	-	-	1
Total No.	21	-	39	-	28	-	56	-	43	-	12	199

Note : Excluding German equipment of Bassa and Sinoe

2. Present force-account construction

Table 3 shows the equipment regarded by the MPW as force-account construction fleet. This equipment is assigned to the various maintenance districts.

B. Workshops and their equipment

Each maintenance district has nominally at least one workshop for the repair and servicing of road equipment, as follows:

District	County	Workshop
Montserrado	Montserrado	Monrovia
Grand Cape Mount	Grand Cape Mount	Robertsport
District I	Lofa	Weinsoe
District II	Nimba	Tapeta
	Grand Gedeh	
Maryland	Maryland	Pleebo
Sinoe	Sinoe	Greenville
Grand Bassa	Grand Bassa	Buchanan

The repair capacity of the various MPW workshops can be summarized as follows:

1) There is one big workshop in Monrovia which is intended to carry out the preventive maintenance and major repairs for all equipment owned by the MPW. It has a staff of 106 technicians and workmen.

2) Tapeta, Weinsoe and Pleebo each have a workshop able to do preventive maintenance and check-ups for district equipment.

3) The workshops of Robertsport, Buchanan and Greenville are only able to carry out servicing operations.

Annex III shows for each shop a brief description, an indication of the equipment and a list of the personnel. According to this list, the present value of the shop equipment of the most important workshops has been estimated as follows:

- Monrovia	$25,000
- Tapeta	10,000
- Weinsoe	5,000
- Pleebo	5,000
Total	$45,000

According to the Annual Report for 1969 of the Ministry of Public Works, approximately 3,500 repair jobs were completed on both light and heavy equipment by the combined units of the Mobile Equipment Division. The Report also states that spare parts were purchased through the AID commodity loan.

In addition to the shops listed above, two road maintenance training centers were built, one near Buchanan and the other in Juazon, Sinoe county.

Table 3

Counties

Equipment	Montserrado		Bong		Nimba		Sinoe		Basa		Cape Mount		Maryland		Total	
	R*	D**	R	D	R	D	R	D	R	D	R	D	R	D	R	D
Cat Dozer	1		1										2		4	
Grader	1												1		2	
Grease Unit					1										1	
Stick-Body (Truck)				1												1
Dump Truck			1	1	2			1			1				4	2
Tanker		1														1
Sheepsfoot Roller	5														5	
End Loader	1														1	
Scraper				1						1						2
Pick-up		1				1		1								3
Roller (Tired)	1														1	
Tractor			1												1	
Totals	9	2	3	3	3	1		2		1	1		3		19	9

*Running
**Down

These training centers primarily maintain the Harbel-Buchanan and Greenville-Tchien roads, but also the following roads: Buchanan-Kabli, Buchanan-Nimba, Marshall road and the local road in Bassa.

C. Warehouses for spare parts supply

For the supply of spare parts there are six district warehouses: in Monrovia, Tapeta, Weinsoe, Pleebo, Buchanan and Greenville. A central warehouse in Monrovia supplies all of them. This is located at the main depot and is divided into three stores, for heavy parts, light parts, tires and batteries.

The district spare-parts stores consist of small rooms in the workshops; their capacity and stock are limited. The stock value of each of these warehouses at the time of our inventory was as follows:

- Monrovia	about	$120,000
- Tapeta	less than	10,000
- Weinsoe	less than	5,000
- Pleebo	less than	5,000
- Buchanan	less than	500
- Greenville	less than	500

III. Organization for the handling of the mobile equipment

A. General considerations

The condition of the equipment is shown in the inventory forms. From these we learn that most of the equipment shows wear and that out of a total of 164 units, 78 are not in good enough working condition for continuous highway maintenance. If we consider as in good condition the equipment with an estimated residual life of at least 60%, we see that the units in such condition are hardly 31% of the total.

The total units are distributed among the districts as follows:

- Montserrado and Grand Cape Mount	= 45.8%
- District No. I	= 20.2%
- District No. II	= 10.3%
- Maryland	= 15.3%
- Sinoe	= 4.2%
- Grand Bassa	= 4.2%

When considering the residual life for the different units as an average for each district we obtain the following percentages:

	Average % of residual life (out of a total of 10,000 hours)
- Montserrado	56.4
- District No. I	13.8
- District No. II	9.5
- Maryland	13.9

From this we observe that Montserrado district, with almost one half the total number of units, also has the newest equipment.

From the inventory we also observe that two makes of equipment prevail: Caterpillar for earthmoving equipment and Ford for vehicles. This is of course an advantage, since it means easier supply of spare parts, easier maintenance and repair operations and more efficient training of personnel. Machines of other makes encounter difficulties in the supply of spare parts and repair (for instance, the three Allis Chalmers loaders which, though relatively new, are out of service for lack of spare parts).

B. Existing stock of spare parts

From the list of values of the stock in the different districts and from inspection at the warehouses the following conclusions were reached:

1. Most of the existing stock of spare parts (91.1%) is concentrated in Monrovia, even though the Montserrado district equipment represents 45.8% of the total equipment.

2. A substantial percentage of the existing stock is represented by parts that are no longer usable because they fit mechanical units already out of service. It has not been possible to ascertain what percentage of the total value these unusable parts represent, perhaps as much as 70% of the stock.

3. There are some Kardex files for spare parts, but they are not complete and most of them need up-dating.

4. In spite of the fact that Monrovia has well-equipped branch agencies where spare parts can be had for both Ford and Caterpillar equipment, the procedure in use for such purchases is a lengthy one. Some mechanical units have been out of service for 3-4 months for lack of a part which could easily be bought in Monrovia.

C. Mobile Equipment Division and district shops

The Mobile Equipment Division was set up to handle the preventive maintenance and repair of the mobile equipment. One division chief, one equipment inspector and three clerks represent the personnel at the head office.

The Monrovia main depot is operated directly by this division. The district shops, on the other hand, are only indirectly dependent: at the beginning all such shops were under the Mobile Equipment Division, but afterward they were put under the resident engineer of the district.

In fact the line of authority from the Mobile Equipment Division to the district shops is a very thin one. The shop superintendent is responsible for the district shop and the preventive maintenance and

repair of the district's mobile equipment. But for every action the shop superintendent must report to the resident engineer, whether to request shop equipment or spare parts or for approval of the workshop's activity.

D. Shop subsections

A division into subsections can only be observed at the Monrovia main depot, which includes the following subsections:

- machine tools
- arc and autogenous welding
- heavy equipment repair
- vehicle and light equipment repair
- washing and greasing
- warehouses.

At the district shops there are no subsections but only separate rooms for hand tools, storage and the generator. Shop operations are performed in the open yard or under a protecting roof.

The servicing shops are small premises, with no partitions and no equipment.

E. Shop operations

In the shops the following operations can be performed:

Monrovia main depot: washing and greasing, arc and autogenous welding, some machine - tool operations, replacing and vulcanization of tires, adding fuel, change of oil, charge and testing of batteries, grinding-in of valve seats, engine timing, replacing parts when a tune-up with control devices is not required.

District shops: repair of tires, adding fuel, change of oil, welding, replacing parts, tuning up or employment or extractors.

Servicing shops: repair of tires, refueling and easy replacing of small parts.

F. Printed forms in use in the shops

There are three printed forms only: "bin cards" for the spare parts in the stores, "master report" and "repair order".

The master report is a card which was originally intended to be filled out for each unit of the mobile equipment when entering service, and it is supposed to indicate the mechanical characteristics of the unit. However, such a card was filled out for only 30-40% of the equipment, and then mostly with wrong data. For these reasons the master report is not to be relied upon.

The repair order is filled out every time a unit is sent to the shop. This form is well conceived and would record the shop operations satisfactorily if it were filled out with the requested data. Unfortunately the forms are seldom correctly filled, and they are very seldom forwarded to the head office at the Mobile Equipment Division. On the other hand even the few which do reach the head office have no further use in the collection of data.

The situation concerning the recording and reporting on shop operations can therefore be summarized thus:

- There are no cards for the different units of equipment.
- Because of the faulty completion of the repair orders there are no data available on the life of spare parts, on the labor or repair costs.
- There are no cards for recording the different repairs with corresponding costs during the life of each mechanical unit.
- Because of lack of programming of shop activities, the work is not well balanced among the different sections.

No study can be made on the frequency of different kinds of repair and need of spare parts.

G. Shop personnel

1. Quality and availability of personnel

With the present equipment the shop personnel is sufficient for repair and maintenance, and in some district shops it is even in excess.

Unfortunately the quality is very low, especially in the case of mechanics, electricians and blacksmiths. The low quality is apparently due to the following causes:

- Level of salaries lower than the average offered in the local market.
- Salaries and promotions not based on real capacities.
- Low level of instruction, with a high percentage of illiterates.
- Deterioration in cases of good initial capacities due to the low degree of activity on the job.
- Lack of training and refresher courses.

2. Salaries and job evaluation

As already mentioned, salaries are 35-40% lower than those paid by private contractors. Moreover there is no valid job evaluation; differences of salaries and ranking of categories are mostly arbitrary.

IV. Training

At the present time the only training course for personnel of shops and highway maintenance is the one established with the cooperation of the Government of the Federal Republic of West Germany within an agreement of technical cooperation.

Such programs are aimed at the training of equipment operators, foremen and mechanics. The contract will be for two years; in this period a rather high level of training can be expected for the following personnel (assuming a 50% productivity)(1).

- 20 equipment operators
- 20 foremen
- 10 mechanics.

V. MPW maintenance operations

There are no records on the cost and type of maintenance operations executed by the MPW in past years.

The Ministry's annual reports for 1969 and 1970 describe maintenance operations as: surface repair, seal-coating, patching, side brushing, grading, cleaning and construction of ditches, bridge repair, pot-hole patching, repair of culverts, surfacing sections and failure areas, resurfacing eroded sections and unspecified maintenance described as general maintenance.

The maintenance operations carried out at present by the personnel and the equipment of the MPW can be summarized as follows: a) For paved roads: patching, seal-coating, resurfacing, ditching and clearing right-of-way. b) For lateritic roads: grading, ditching, graveling, clearing right-of-way. For specific mechanized operations we can give rough maintenance capacity figures for each district using its own equipment, as follows:

1) Paved roads

The Montserrado maintenance district is in charge of all the Liberian network of paved roads (excluding the Harbel-Buchanan road, which is maintained by the training depot of Buchanan).

- Patching 6000 sq yd per year
- Seal-coating 150 miles per year
- Resurfacing 90 miles per year

2) The yearly maintenance capacity for lateritic roads by district is shown in Table 4

Table 4

Maintenance capacity of lateritic roads

District	Operation	Yearly Maintenance capacity (miles)	Remarks
Montserrado	Grading and ditching	200	
	Gravelling	100	
District I	Grading and ditching	200	
	Gravelling	100	without compaction
District II	Grading and ditching	100	
	Gravelling	50	without compaction
Maryland	Grading and ditching	100	
	Gravelling	50	
Grand Bassa*	Grading and ditching	100	
	Gravelling	50	
Sinoe*	Grading and ditching	-	
	Gravelling	-	

(1) MPW data (*) Excluding German equipment

As appears from the Table above, the maintenance capacity of the present organization is inadequate to keep the road network at an acceptable level of serviceability.

This inadequacy seems to be due mainly to lack of equipment, since when observing the MPW's personnel individually, it appears that there is a good working capacity, as plenty of dedicated and talented professionals are among them.

When considering the organization as a whole one cannot however, overlook some deficiencies in it which, if no proper remedies were taken, could gravely hamper the expected results of the program.

Concerning highway maintenance such deficiencies can be summarized as follows:

- a continuous and permanent supervision from Headquarters over the operations and the decisions of the resident engineers appears to be lacking in the organization;
- the programming of the highway maintenance investment and the corresponding allocation of funds does not seem to conform with the actual needs of the highway network resulting from the traffic flows;
- the reporting to Headquarters of maintenance operations performed in the field appears to lack a continuous and detailed routine;
- the accounts of the maintenance expenditures have not been properly kept and it is now difficult to ascertain the actual maintenance expenditure in the past years;
- the mobile equipment owned by the MPW is not being properly maintained: one can observe an extensive lack of preventive maintenance in most of the units, which means a shortening of their useful life and a consequent increase in their operating costs;

PROPOSED NEW HIGHWAY ORGANIZATION (1)

I. The Proposed Organization

The proposed new organizational plan of the Ministry of Public Works and Utilities relating to its highway activities is illustrated in Figure 1. A comparison of this chart with the existing organization discloses that it is intended to create, within the Bureau of Operations, two well-defined divisions, namely:

A. Construction Division

B. Maintenance Division

and that between these divisions and the districts there will be established a direct line of authority, which also extends to the Mobile Equipment Division.

This direct line of authority already exists for the Bureau of Administrative Services and its Personnel and Finance Divisions, and the Bureau of Technical Services.

The centralization through the Bureau or Operations of all activities connected with construction and maintenance of roads and bridges achieves better planning and consequently an efficient use of public funds through program budgeting. The establishment of a new Planning Division is recommended.

II. Construction Division

The formation of this division was already visualized in the Department of Public Works annual report for 1969, its responsibility being to handle force-account and day-labor construction.

A separate study should, of course, be devoted to the organization of this division, including staff needs, office space, road equipment, planning, programing and budgeting.

III. Maintenance Division

This division would comprise the following office and sections:

- Office of the Chief Engineer of Maintenance
- Highway and Bridge Maintenance Section
- Equipment Mobilization Section
- City Roads Section
- Traffic Operating Section
- Reconditioning Roads Section

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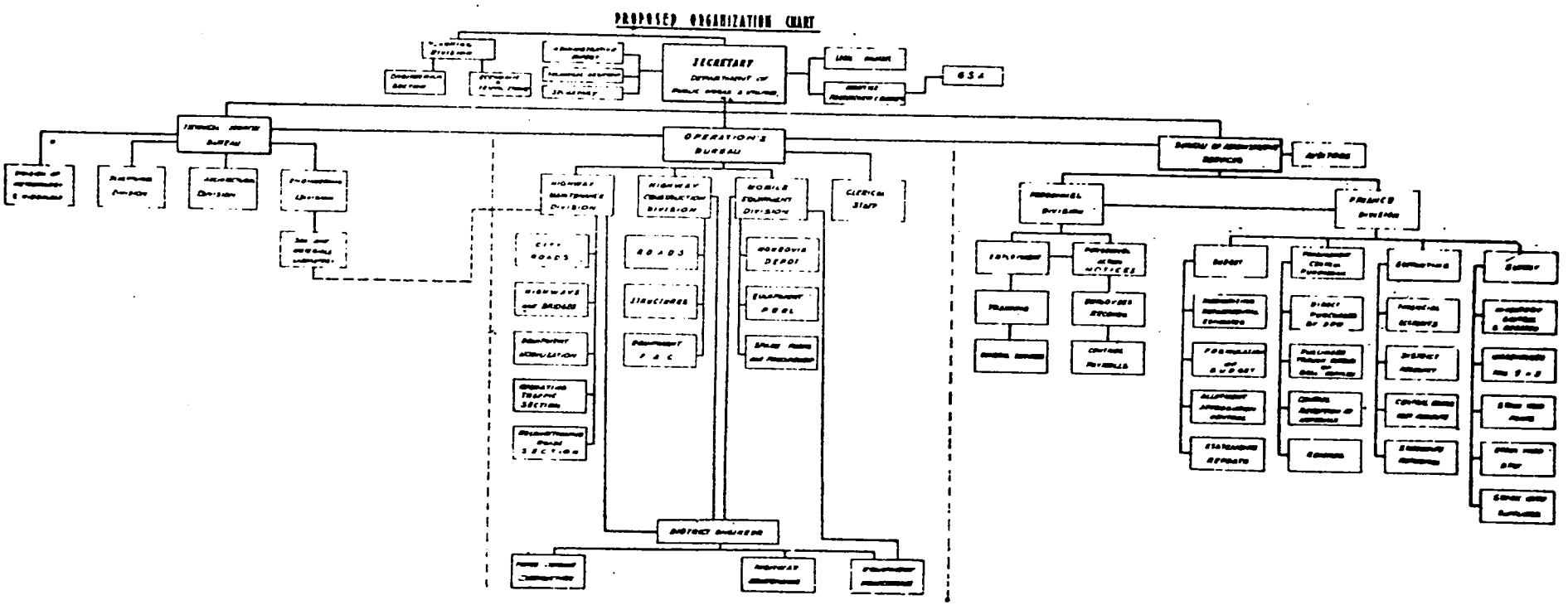
(1) Source: Sauti Study

Table


PROPOSED ORGANIZATION CHART
SECRETARY
OPERATION'S BUREAU
HIGHWAY MAINTENANCE DIVISION
HIGHWAY CONSTRUCTION DIVISION
MOBILE EQUIPMENT DIVISION
CLERICAL STAFF
ROADS
STRUCTURES
DISTRICT ENGINEERS
PERSONNEL DIVISION
FINANCE DIVISION
BUDGET
GSA

A. Office of the Chief Engineer of Maintenance

The Chief Engineer of Maintenance would be responsible for all planning, programing and budgeting concerning maintenance of roads and bridges.

B. Highway and Bridge Maintenance Section

This section would be responsible for the preparation of the individual work orders and cost estimates for the different types of work to be executed on specific sections of roads as programmed.

The aforementioned section would represent the link between the Maintenance Division at Headquarters and the various District Maintenance Sections.

Through its Engineer or Engineers appointed for the purpose, the section would be responsible for inspecting on site all maintenance operations in line with the approved work programs and corresponding work orders, checking quality of the work performed and if the progress of work is adhering to the specified time schedules on which costs were based.

Likewise, the Highway and Bridge Maintenance Section would be responsible for, among its other functions and responsibilities, making periodic revisions of the maintenance programs in accordance with up-dated traffic data obtained from the Planning Division of the Bureau of Technical Services. The same section would also be responsible for checking the progress reports and cost summaries as submitted by each district, which would be filed by order of district, enabling speedy reference to previous accomplishment reports.

On the basis of the information received from each district and from the central cost office of the Finance Division, the following would also be responsibilities of the Highway and Bridge Maintenance Section:

- Control of costs of all maintenance operations, by means of a comparison between original estimates and actual costs.

- Keeping statistical records of maintenance operations and corresponding performance costs.

- Preparation of a monthly report on road maintenance activities for the Minister of Public Works and Deputy Ministers.

C. Equipment Mobilization Section

The responsibilities of this section would be the following:

- the efficient use of the equipment assigned to the various districts for maintenance operations;

- the transfer of units from one work site to another;

- keeping statistical records from the data reported in the equipment time and operating reports and in the monthly cost summaries relating to equipment operation;

- joint responsibility with the Mobile Equipment Division for technical problems concerning the operation and servicing of the maintenance equipment.

In the new organization, while the technical control of the equipment would be exercised directly by the Mobile Equipment Division, the use of the equipment itself for maintenance operations would be entirely vested in the Maintenance Division through its Equipment Mobilization Section mentioned above.

The outstanding responsibility of the aforementioned section would be to ensure the good utilization of the equipment in the field by supervising the performance and evaluating the weekly equipment time and operating reports received from each district.

D. City Roads Section

This section would be responsible for the supervision of all maintenance work connected with city roads in the most important cities of the Republic.

Similarly, as in the case of a district, the above-named section would be responsible for preparing the necessary program budget indicating the total funds required for maintenance of the city roads or streets. This budget should be detailed by item of expenditure, which is submitted to the Finance Division of the Bureau of Administrative Services for inclusion in the Ministry's general budget.

E. Traffic Operating Section

This section would be responsible for (a) handling traffic data (under supervision of the Planning Division), (b) highway signs installations, (c) mile posts, guardrails and courtesy poles, and (d) highway marking and striping.

F. Reconditioning Roads Section

This section would be responsible for all reconditioning works. For this purpose a special earth-moving equipment pool will be at the disposal of this section.

IV. Mobile Equipment Division

In the proposed new highway organization, this division would be entirely responsible for the technical control of the equipment, its maintenance, servicing and repair, and would have full authority to order any unit to be withdrawn from service for repair or overhaul.

The principal functions of the Mobile Equipment Division would be the following:

- preparation of documents for bidding and contracting relating to purchases of equipment. This embodies preparation of the necessary specifications and selection of the most suitable mechanized units and auxiliary equipment spare parts, etc.
- keeping inventory of equipment
- keeping inventory of workshop machinery and tools
- establishing and controlling equipment rentals.
- keeping equipment record cards
- mobile Equipment Division Payroll
- preparation of Purchase Requisitions

The above-named division would, likewise, be responsible for supervision of the (a) Central Workshop, Monrovia, (b) Parts Depot (Warehouse No. 1), Monrovia, (c) All District (out-station) Shops, and (d) Equipment Pool, Monrovia.

A. Central Workshop

Among its other functions, this workshop, under the supervision of a Shop Superintendent, would be responsible for carrying out major repairs and periodic overhauls of all the MPW equipment.

Its other responsibilities would be the following:

- preventive maintenance and servicing of the Montserrado district equipment;
- coordination of the activities of the district (out-station) shops;
- study the use of shop machinery and equipment;

- control of the activities of the district shops by means of spot checks placing requisitions with the Procurement Section of the Finance Division for the replenishment of stocks of spare parts and materials required for repair units;

- reporting to the Equipment Engineer any anomalies of the established procedures for the operation of the shops and servicing of equipment.

B. Parts Depot

This would be responsible for the following:

- control of spare parts, re-ordering (replenishment of stock items or parts used) despatch to district shops;

- reporting to Finance Division value of incoming and outgoing parts by means of appropriate internal control forms;

- keeping stock cards of equipment parts and accessories;

- controlling fast and slow moving parts.

C. District (out-station) Shops

The Mobile Equipment Division would be responsible for the technical operations of each of the district shops which, as already stated, includes the efficient use of the shop machinery and tools, recording repair costs and filling in the corresponding repair orders, copies of which are submitted to the above-named division.

D. Equipment Pool

This section would be responsible for controlling all MPW vehicles used for the transportation of materials and supplies, from stockyards in ports to stockyard in Monrovia or to central warehouse or direct to districts.

Likewise, the above-named section would be responsible for recruiting, selecting and training operators and drivers as may be needed by the different districts, following established training courses to be defined by the Equipment Engineer, and reporting the intended employment of such personnel via the action notices to the Personnel Division of the Bureau of Administrative Services for final approval by the Minister of Public Works.

Another responsibility of the Equipment Pool would be the control of lubrication and maintenance of all equipment in operation in the various districts, irrespective of the control of such services exercised by the equipment supervisors at the worksites who are responsible for the operative condition of each unit.

The above-named section would maintain a line of advisory responsibility with the Mobile Equipment Sections of the districts, to which sections the equipment supervisors would report any defects in the mechanical operation of the unit (notified by the operator or driver) for repair either on location or in the district shop.

All the above procedures and others connected with equipment operation, maintenance and repair would be described in appropriate instruction manuals prepared by the Equipment Engineer with the cooperation of his technical staff.

V. Planning Division

It is recommended that a new Planning Division, the control of which would be exercised directly by the Minister of Public Works, be established.

In this division would be included representatives of the Ministry of Planning.

The functions of this division would be the following:

- make a systematic scheme for national road design standards
- set the priorities for new road construction
- up-date all data necessary for feasibility studies
- plan the traffic counts on the entire network and work out the results
- study the road transport cost
- make recommendations on planning matters to the Minister.

The division would be organized in two different sections:

- Economic and Traffic Section
- Engineering Section.

All the people assigned to this division would be on a high level and well experienced.

The cost estimate for this new division will not be less than $100,000 per year.

VI. District Organization

The organization of each district would reflect the main functions of the M.P.W. For this reason, in addition to Highway Maintenance, these would properly represent the functions of Highway Construction, Building Maintenance and Mobile Equipment (Fig. 2).

Figure 2

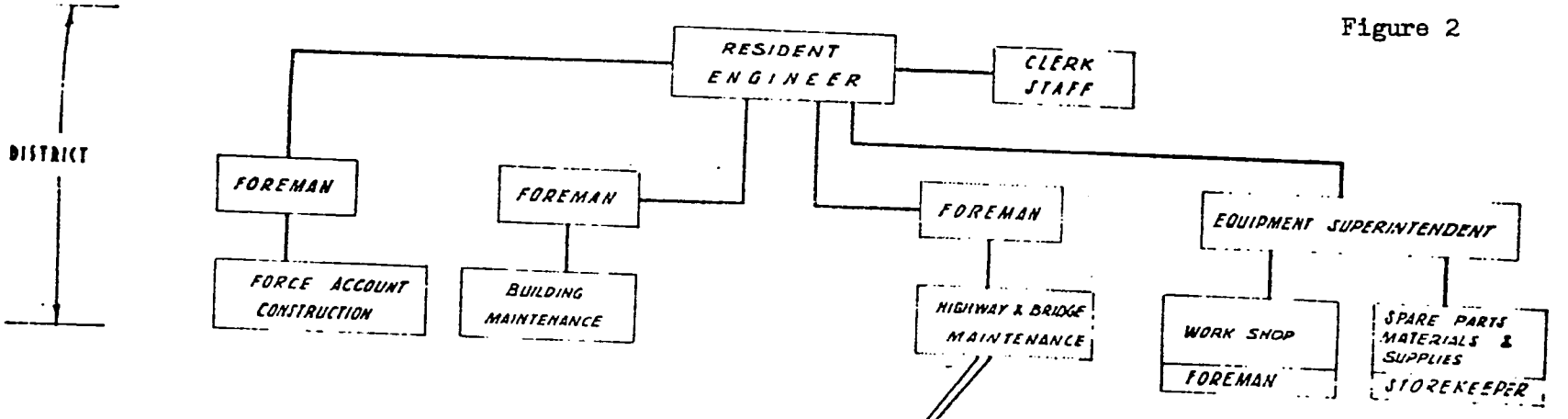
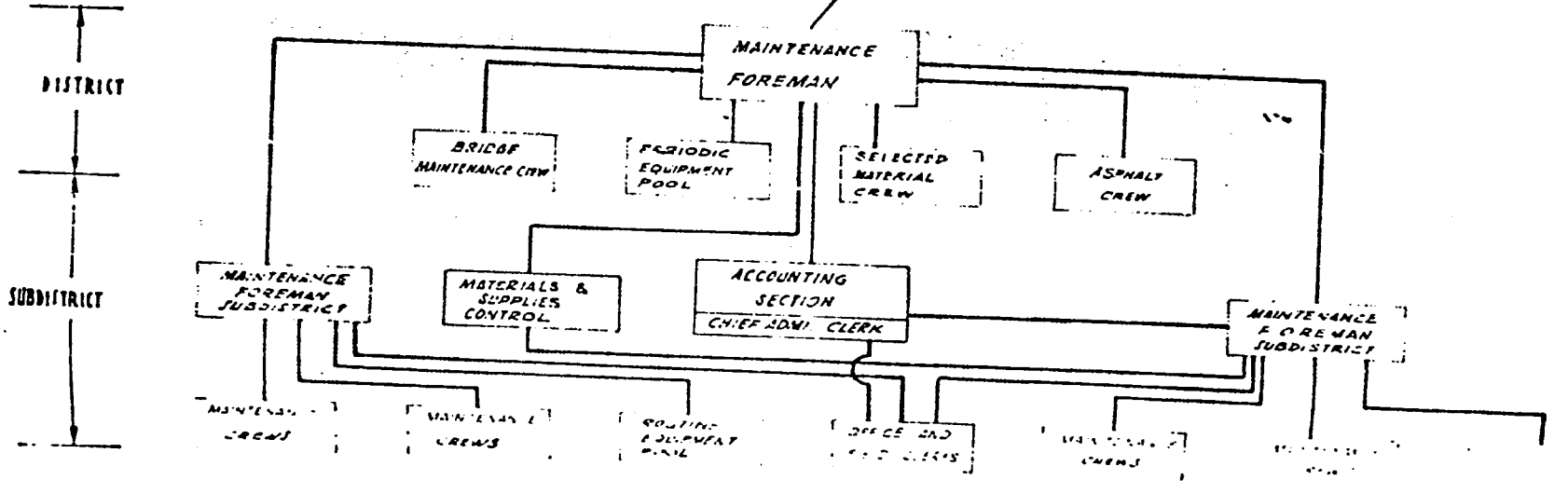


Figure 3



As regards the highway maintenance proper, each district is generally divided into subdistricts, each of which comprises a length of road of about 150 miles.

The subdistricts in turn are divided into a number of maintenance crews, each in charge of lengths of roads varying from 30 to 60 miles. These crews are considered as operating units to carry out maintenance operations as per indications in the respective work orders which are prepared by the Maintenance Engineer or road superintendent based on the overall maintenance program. These operations would refer in the main to repair of local failures, traffic services (road signs, etc.) clearing of right-of-way, drainage and culverts, all of which work will be executed manually.

The maintenance crews would be given light equipment, such as pick-ups and trucks, as well as all necessary tools and implements, such as picks, shovels, wheelbarrows, hand compactors, etc. The equipment would be used for transportation of personnel, materials, tools and possibly fuel.

For the mechanized operations, an equipment pool, consisting of an adequate number of graders, pneumatic rollers, wheel tractors, water tanks, trucks and pick-ups, would be assigned to each subdistrict for carrying out routine maintenance but to the whole district for carrying out periodic maintenance. In addition, a special pool would be assigned to each district for quarrying of selected material, the necessary equipment consisting of a bulldozer, a wheel-type loader and an adequate number of trucks.

II. Equipment Rentals

The cost of purchasing maintenance equipment and the cost of operating it represent a substantial part of the total cost of maintenance.

In order to ensure that the various maintenance operations fully absorb their share of the operating costs of equipment used, the Consultants recommend the establishment of rental rates based on the landed and installed cost of the unit and the useful life of the unit expressed in hours.

The component costs of equipment rental are:

A. Fixed Costs

Covering depreciation and interest.

B. Repair Costs

labor, spare parts including tires, tubes, expendable accessories and material, as well as, tire repairing and repair jobs placed with commercial shops.

C. Operation Cost

Is the cost of motor fuels and lubricants consumed in operating and servicing equipment, including servicing done by commercial service centers. It includes the cost of operator's wages and incidental amounts of labor involved in servicing.

D. Indirect Costs

Are those not identified with any particular unit of equipment, thus requiring a pro rata distribution to all equipment benefited. Such costs include the Shop Superintendent's salary and those of his administrative staff, insurance, general overhead and depreciation of shop machinery.

Equipment rental would, therefore, include all the component costs mentioned above, since the accounting records will follow the standard practice of keeping a "Clearing Account" to record the actual operation costs with the rentals covered through the number of hours the units were used, monthly cost summaries being submitted to the Mobile Equipment Division for due examination and approval.

As indicated by item A depreciation is a fixed cost. It is included for the purpose of setting up an appropriation, either in the ordinary or in the development budget for the replacement of equipment purchased through loan account so as to maintain the equipment fleet in its original number of units, types and capacity.

The amount of the appropriation would represent the proportionate depreciation corresponding to each year of the life of the different types of equipment. For budgeting purposes it may be considered advisable that the depreciation rates be based on replacement rather than on the original purchase value where there have been substantial changes in prices.

The corresponding yearly appropriation would be considered "continuing appropriation," which the Consultants recommend should be matched by an equivalent amount deposited in a bank account designated for the specific purpose mentioned above and to be used as purchase requisitions are submitted by the Ministry of Public Works.

The financial accounts of the MPW would record the amount of depreciation charged to the pertinent maintenance operations which benefited by the services of the equipment, which will be offset by a credit to a depreciation reserve account.

The cost of depreciation is important for determining the true cost of maintenance and therefore is an item which cannot be overlooked in the budget and accounting.

In establishing equipment rentals this permits the District Engineer to determine the hourly cost of the equipment he has used on each job and, likewise, shows him the loss suffered by the MPW when equipment remains idle or not used properly in accordance with the estimated time schedules to permit transfer of the unit to other worksites or districts.

The organization of the Mobile Equipment Division is therefore extremely important for setting in motion all the controls with regard to equipment.

PROPOSED REORGANIZATION OF THE MAINTENANCE DISTRICTS

I. General Criteria

A. There are six maintenance districts in Liberia at present:

1. The Montserrado maintenance district, which also handles highway maintenance for Grand Cape Mount county.
2. District I which comprises Lofa county.
3. The "Interior District No. II" which comprises the counties of Nimba and Grand Gedeh.
4. The Maryland maintenance district.
5. The Sinoe maintenance district.
6. The Bassa maintenance district.

B. The criteria for our proposed new allocation of maintenance districts are the following:

1) The districts shall have, as far as possible, a uniform work load and therefore shall include roughly the same total length of the road network.
2) Districts shall be drawn so as to locate a workshop in each district as centrally as possible with respect to its road network.
3) Maintenance districts shall be made small enough to allow a clear assignment of responsibility, easy control and good work programing.

The optimum solution would be to divide the territory into districts roughly coinciding with the counties, but this does not seem immediately practicable, both for organizational reasons and because it is necessary to make a careful check of the personnel cadres and to hold special training courses before this new organization can be set up.

This solution must therefore be introduced gradually, and the proposed changes should move in that direction. Our immediate proposals involve only a few modifications.

(?) Source: Sauti Study

a) Some servicing shops should be provided in addition to the existing workshops. In the short run these will relieve the disadvantages of the noncentral location of the workshops and will represent an operational decentralization of the existing districts; in the long run they will form the nucleus of the new workshops of the districts to be formed on the basis of county lines.

b) The responsibilities of the present District No. II should be reduced to include only Nimba county, where the traffic is increasing, and a new district should be formed consisting of Sinoe county and a large part of Grand Gedeh county.

c) The present Maryland district should be extended into Grand Gedeh county as far as Kahnwiake.

We recommend that the counties of Montserrado and Grand Cape Mount should, for the time being, remain within the ambit of a single district.

II. Proposed Maintenance Districts

District I

As at present, this comprises the counties of Montserrado and Grand Cape Mount, with a workshop at Monrovia and a servicing shop at Robertsport. In the future it will be convenient to form two districts on the basis of the individual counties and to convert the servicing shop at Robertsport into a workshop.

The maintenance of the whole network of paved roads with the sole exception of the Buchanan-Harbel section[1] should be taken over by this district.

The mixing plant and the store should be located outside the Monrovia urban area, if possible between the Freeway and Fifteenth Gate.

District II

This comprises the counties of Lofa and Bong (like the present District No. I), with a workshop at Weinsoe and a servicing shop at Voinjama.

The present traffic levels on the Bong roads, the total length of the roads in this district and the expectation that the Wologisis deposits will be worked in the near future require top priority for the division of this district into the two counties composing it.

(1) This section will be maintained 1972-1974 by the personnel and equipment provided by the West German Government.

District III

This coincides with the county of Grand Bassa. The workshop is located in the neighborhood of Buchanan.

District IV

This comprises the whole of Sinoe and nearly all of Grand Gedeh counties, with the exception of the extreme southern part of Grand Gedeh (about ten miles before Kahnwiake). The workshop is located at Juahzon, and a servicing shop is proposed at Swedru.

District V

This coincides with Nimba county. The workshop is at Tapeta, and a servicing shop is proposed at Ganta.

District IV

This coincides with the county of Maryland, extended to a part of Grand Gedeh county (to 10 miles beyond Kahnwiake). The workshop is located at Pleebo and the servicing shop at Kahnwiake.

III. Sub-districts

As is shown in Fig. 1, every district has been subdivided where this was considered necessary for the more efficient organization and supervision of maintenance in sub-districts.

District I has been subdivided into 2 sub-districts: the first consisting of part of Montserrado county and containing all the paved roads except for those of Bassa county, the second comprising the remaining part of Montserrado and Grand Cape Mount county.

The headquarters of the first sub-district will be Monrovia, those of the second at Bomi Hills.

District II has been divided into 2 sub-districts: the first including Bong county with the exception of the Kakata-Bong Mine road (which comes under sub-district I of district II), the second consisting of Lofa county.

The headquarters of the first sub-district are located at Gbarnga, those of the second at Voinjama.

District III has not been divided into sub-districts.

District IV has been subdivided into 2 sub-districts: the first consisting of part of Grand Gedeh county, the second of Sinoe county and the remaining part of Grand Gedeh. This is to allow the maintenance of the Babu-Greenville road to fall entirely in one sub-district.

The headquarters will be a Swedru and Juahzon respectively.

District V has been divided into 2 sub-districts: the first being responsible for the region north of Nimba county and the second for that to the south.

The headquarters of the two sub-districts are located at Ganta and Tapeta respectively.

District IV has not been subdivided into sub-districts.

The criteria for division into sub-districts and the area organization are described in greater detail in Chapter XVI.

Table 2 shows schematically the subdivision of the area with an indication of the mileage of primary and secondary roads under the jurisdiction of every district and sub-district.

Table 2

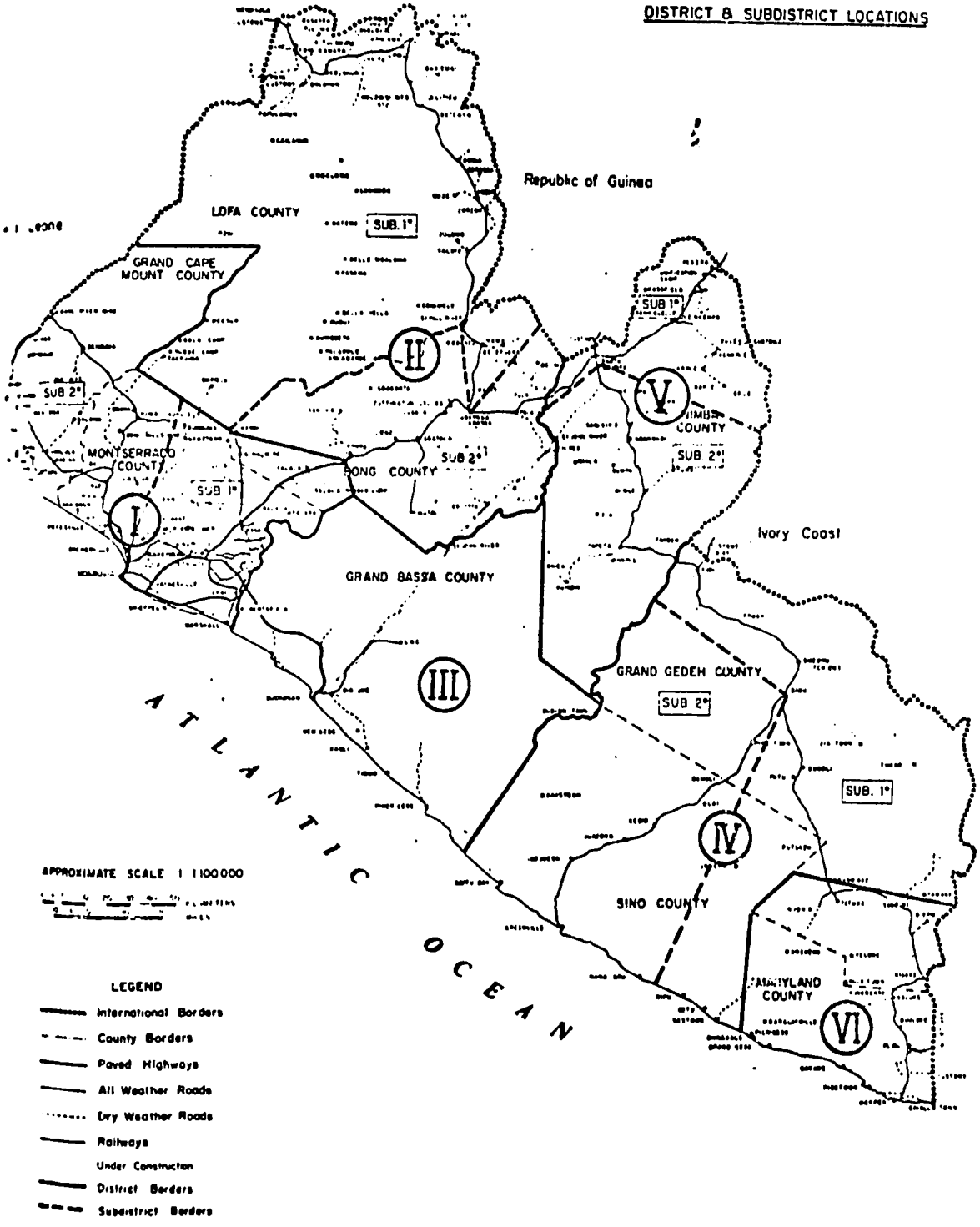
Road mileage for maintenance districts
(primary and secondary roads)

District	Sub-district	Miles		
		Paved roads	Lateritic roads	Total
I	1st	154	148.5	302.5
I	2nd	-	197.5	197.5
II	1st	-	209	209
II	2nd	-	196	196
III	-	49	82	131
IV	1st	-	139.5	139.5
IV	2nd	-	109	109
V	1st	-	114.5	114.5
V	2nd	-	130.5	130.5
VI	-	-	101	101
Total		203	1,427.5	1,630.5

ANNEX IV

FIG. 1

LIBERIA



THE EQUIPMENT, SPARE PARTS, WORKSHOPS AND FACILITIES REQUIREMENTS FOR THE PROGRAM (1)

- RECOMMENDATIONS -

Remarks on the economic advantage of either renewing a mechanical unit or overhauling it

Of the several factors according to which it may be determined whether it is more economic to repair a mechanical unit or to replace it, the most important is the total cost of the spare parts necessary for the repair. Such cost is of course influenced by the state of repair and type of the unit.

The Table 1 gives the average values in percentages of the initial value of the unit itself, and of spare parts necessary for the reconditioning of the different types of equipment according to the state of repair of the units.

TABLE 1

(Values in percentages of the initial values of the unit)

Wheel-type Units (including tires)	Very Good	Good	Fair	Bad	Very Bad
Track-type units	10-15	15-20	20-30	30-45	45-60
Wheel-type units (including tires)	10-15	15-20	20-25	25-35	35-45
Motorgraders (including tires)	5-10	10-15	15-25	25-30	30-35
Rollers (including tires)	5-10	10-15	15-20	20-25	25-30
Trucks (including tires)	5-10	10-20	20-30	30-40	40-50

These percentages indicate the value of the spare parts only, with no labor included. Such hand labor for the repair can be estimated at 5% - 15% of the spare parts value.

The difference depends on the type of repair, which may be a mere removing and replacing of pieces or may involve machine tool operation.

(1) Source: Sauti Study

In evaluating the efficiency of the existing equipment and its residual value the purchase year and the actual preventive maintenance situation were considered.

The annual depreciation has been estimated on the basis of the following considerations:

- For the year 1971 the depreciation has been kept as for the previous years (i.e., between 15% and 25%, according to the age of the unit) since there have been no actual changes in the actual depreciation of the existing equipment.

- For the year 1972 it has been considered that an improvement in the maintenance organization should be obtained by this time. The annual depreciation has been reduced accordingly for the units purchased more recently.

- The units with more than five years of life have mostly been considered as no longer dependable, with the exception of those units which have not been subject to such exacting jobs, as for instance sheepsfoot rollers and fixed plants.

- For the units classified as "bad" and "very bad" no reconditioning has been considered since such repair would prove excessively expensive.

- From 1973 it has been assumed that the preventive maintenance organization should by this time have reached an acceptable efficiency. As depreciation, an annual percentage of 12.5% has therefore been considered for the units purchased more recently. For the ones with more than five years of life the depreciation has been kept at 14-15% since they would still suffer from an initial lack of correct maintenance.

- The units considered as no longer worth repairing should be disposed of or used as a source of spare parts.

Based on the above assumptions and the estimated equipment requirements of the 1973-1976 maintenance program recommended in the study, the Sauti consultants estimated each districts equipment requirements during the program period. These are summarized in Table 2.

TABLE 2

Total equipment requirements:

Equipment	Total No.	DISTRICTS						Recond Pool	Total
		1st	2nd	3rd	4th	5th	6th		
Pick-up	18	4	3	3	3	3	2	-	18
Dump truck 130 HP	52	13	9	9	7	7	4	3	52
Dump truck 190 HP	24	6	6	3	3	3	3	-	24
Grader 125 HP	27	6	6	2	5	5	2	1	27

TABLE 2 (continued)

Equipment	Total No.	DISTRICTS						Recond Pool	Total
		1st	2nd	3rd	4th	5th	6th		
Wheel loader 80 HP	9	2	2	1	1	1	1	1	9
Vibratory hand compactor	15	4	4	2	2	2	2	-	15
Wheel tractor 60 HP	11	3	2	2	1	1	1	1	11
Pneumatic roller 10 t	11	3	2	2	1	1	1	1	11
Water tanker 10 cu.m	18	6	4	3	1	1	1	2	18
Rotary broom	2	1	-	1	-	-	-	-	2
Asphalt distributor 4000 lt	2	1	-	1	-	-	-	-	2
Asphalt finisher	2	1	-	1	-	-	-	-	2
Pneumatic roller 10 t s.p.	2	1	-	1	-	-	-	-	2
Steel roller 8-10 t s.p.	2	1	-	1	-	-	-	-	2
Stitch-in-time	2	1	-	1	-	-	-	-	2
Striping machine	2	1	-	1	-	-	-	-	2
Spreader box	3	3	-	-	-	-	-	-	3
Low bed trailer 20 t	7	1	1	1	1	1	1	1	7
Dozer 140 HP	7	1	1	1	1	1	1	1	7
Mobile service van	6	1	1	1	1	1	1	-	6
Grease unit	6	1	1	1	1	1	1	-	6

DETAILED COST BREAKDOWN OF A.I.D. - FINANCED EQUIPMENT

		Number Units	FOB Unit Price	Total FOB
Dump Truck 130 HP		39	$ 9,000	$ 351,000
Dump Truck 190 HP		24	12,000	288,000
Grader 125 HP		21	30,000	630,000
Loader 80 HP		5	20,000	100,000
Hand Compactor (vibrator)		15	1,500	22,500
Tractor 60 HP		11	6,500	71,500
Pneumatic Roller 9 Ton (towed)		11	5,000	55,000
Tank Truck		18	14,000	252,000
Rotary Brom		2	2,500	5,000
Asp Distributor		1	25,000	25,000
Asp Finisher		1	45,000	45,000
Pneumatic Roller SP 10 Ton		2	13,000	26,000
Steel Roller Tandem 8-10 Ton		2	12,000	24,000
Patching Truck		2	14,000	28,000
Stripping Machine		2	2,500	5,000
Spreader Box		3	3,000	9,000
Low Bed Trailer (20-25 Ton)	(7)	5	4,000	20,000
Truck Tractor	(0)	5	20,000	100,000
Bulldozer 140 HP		7	40,000	280,000
Mobile Service Vans	(6)	3	30,000	90,000
Mechanic's Truck 4 x 4 w/Tool		7	10,000	70,000
Grease Unit (Trailer Mounted)		6	5,000	30,000
Grease Unit (Trailer Truck Mounted)		7	11,000	77,000
Traffic Counters		10	1,000	10,000
Radio Equipment (7 Bases - 8 Mobile)		L.S.	60,000	60,000
Subtotal				$2,674,000
Spare Parts 10%				267,400
Subtotal				$2,941,400
Procurement Services 5% + $40,000				190,000
Spare Parts for Existing Equipment ($250,000 parts +$100,000 labor)				350,000
Shipping & Insurance 15%				486,210
Subtotal				$3,967,610
Contingency 10%				396,760
		TOTAL		$4,364,370
		Say		$4,400,000

ANNEX VI

Table 2

A. Summary of Sauti and A.I.D. Recommended Equipment

1.	Total Units Recommended by Sauti		228
2.	Total Units Recommended by A.I.D.		244
3.	Difference		
	a. Mechanic Trucks	+7	
	b. Grease Trucks	+7	
	c. Truck Tractor	+5	
	d. Mobile Service Vans	-3	
		16	
4.	Units Supplied New A.I.D.		199
5.	Units of MPW to be Reconditioned		45
		Total	244

B. Units to be Reconditioned

	Type	No in MPW	No. To Be Reconditionad	Unit Cost	Total
1.	Dump Trucks	79(35F)	13	$ 3,600	$ 47,000
2.	Pickups	45(20F)	18	1,000	18,000
3.	Graders	7(6F)	6	10,000	60,000
4.	Loaders	4(4G)	4	10,000	40,000
5.	Asphalt Distributor	1(G)	1	4,000	4,000
6.	Asphalt Paver	1(VG)	1	10,000	10,000
7.	Low Bed Trailer	2(2F)	2	1,500	3,000
				Total	$182,000
				10% Estimate Error	18,000
8.	Cost FOB Reconditioning Parts				$200,000

9. Cost to Procure Above 45 Units New

FOB - $597,700

10. Cost Difference Between Reconditioning Versus New Procurement

a.	New FOB Costs	$579,700
b.	Spare Parts FOB	-200,000
c.	Labor Costs	-100,000
		$279,700

Summary of Economic Analysis of Project

I. Highway Maintenance Program
Cost Inputs (US$ million)

Year	1	2	3	4	5	6	7	8	Total
With Project									
A. Capital Costs									
1. Bank/IDA/USAID/FRG Contribution *	2.14	2.95	1.29	1.05	-	-	-	-	7.43
2. Government Contribution	.68	.72	.19	.04	-	-	-	-	1.63
Sub Total	2.82	3.67	1.48	1.09	-	-	-	-	9.06
B. Recurrent Costs									
1. Equipment Renewal	.17	.18	.22	.30	.30	.30	.30	.30	2.07
2. Administration and other expenses	1.90	2.16	2.49	2.62	2.62	2.91	3.20	3.50	21.40
Sub Total	2.07	2.34	2.71	2.92	2.92	3.21	3.50	3.80	23.47
Total (A and B)	4.89	6.01	4.19	4.01	2.92	3.21	3.50	3.80	32.53

* Includes 20% Bank/IDA contributions for physical and price contengencies.

(US$Million)

Year	1	2	3	4	5	6	7	8	Total
Without Project*	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	9.60
Administrative Costs	3.69	4.81	2.99	2.81	1.72	2.01	2.30	2.60	21.93

Benefit Inputs

Network and Traffic

Surface Type	Mileage	Weighted Average ADT	Average Transport Cost (per veh/mile)
1. Paved	982	1154	8.2
2. Good	1428	210	16.3
3. Fair Laterite	708	210	24.6
4. Poorlaterite/earth	1270	65	30.6

Network Condition (Extent of roads by surface type)

Year	1	2	3	4	5	6	7	8
With Project								
Paved Roads	203	203	203	203	203	203	203	203
Good Laterite	350	429	499	569	632	716	793	882
Fair "	775	752	692	634	578	511	425	355
Poor " /earth	1575	1519	1509	1497	1490	1473	1482	1463
Without Project								
Paved Roads	203	203	203	203	203	203	203	203
Good Laterite	296	133	47	38	16	10	10	10
Fair "	805	630	227	140	93	50	50	50
Poor " /earth	1599	1937	2426	2522	2591	2640	2640	2640

* It is assumed that without the project DPW annual maintenance expenditures would stay at US$1.20 million, that paved roads would be adequately maintained but Lateriteand earth roads would continue to be inadequately maintained.

Annual Transport Costs

Assumptions

1. It is assumed that paved roads would continue to be adequately maintained with or without the poject No reduction in transport costs are therefore obtained on these.

2. Total transport costs are based on consultants actual link by link analysis rather than on average traffic for each class of roads.

A. With Project

Year	1	2	3	4	5	6	7	8
Cost (US$ million)								
Good Laterite	6.0	8.5	12.9	16.7	18.5	21.8	24.0	24.1
Fair Larerite	6.8	8.2	7.3	6.1	4.7	2.7	1.0	1.6
Poor Laterite/ earth	3.9	1.5	2.6	2.8	2.9	3.1	3.2	3.4
Total	16.7	18.2	22.8	25.2	26.1	27.6	28.2	29.1

B. Without Project

Year	1	2	3	4	5	6	7	8
Cost (US$ million)								
Good Laterite	3.8	2.1	1.5	2.8	1.5	1.2	1.0	1.6
Fair "	8.2	9.2	7.6	8.0	7.8	7.3	7.9	8.6
Poor " /earth	5.2	9.0	16.2	19.2	25.0	31.1	37.4	41.0
Total	17.2	20.3	25.3	30.0	34.3	39.6	46.3	51.2
Savings in Transport Costs (B - A)	0.5	2.1	2.5	4.8	6.2	12.0	18.1	22.1

Benefit/Cost Ratio (discounted at 10%) = 1.54

Economic Return = 32% (say 30%)

Technical Assistance Requirements
(man-months)

	Provided by	73/74	74/75	75/76	76/77	Total
Program Coordinator	UNDP	10	10	10	10	40
Sub total :						40
Highway Maintenance Program						
Program Director (Supervisor)	Consultants Bank	3	1	1	2	7
Highway Maint. Engineer (Project Manager)	"	17	11	11	11	50
Mechanical Engineer (Deputy Project Manager)	"	15	11	11	8	45
Master Mechanics	"	12	10	12	11	45
Master Mechanics	"	11	11	11	11	44
Highway Technician	"	11	11	12	12	46
Highway Technician	"	6	11	11	10	38
Administrative Expert	"	16	4	6	4	30
Transport Economist	"	8	4	4	4	20
Sub total :						325
Training Program						
Project Manager	German tech. assistance	10	10	10	10	40
Workshop Specialist (2)	"	12	20	20	20	72
Road Maintenance Spec. (2)	"	12	20	20	20	72
Theoretical Course Spec. (2)	"	10	20	20	20	70
Adminis. Affairs Spec. (1)	"	1	10	10	10	31
Sub total :						285
Grand total :						650

Source: Consultant's report

LIBERIA: HIGHWAY MAINTENANCE EQUIPMENT AND SPARE PARTS

CERTIFICATION PURSUANT TO SECTION 611(e) OF THE

FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, William C. Wild, Jr., Director of the U.S. A.I.D. Mission to Liberia, do hereby certify that in my judgment the Republic of Liberia will have the financial capability and the human resources capability to implement, maintain, and utilize effectively the subject capital assistance project. This certification takes into consideration the requirements placed on the Republic of Liberia to maintain and utilize other projects previously financed or assisted by the United States.

This judgment is based on the facts, inter alia, that:

1. The Government has given a high priority to the construction and maintenance of the road network as an essential element in tis development plan.

2. Past performance in amintaining and utilizing successfully capital assistance provided under other A.I.D. projects.

William C. Wild, Jr.

William C. Wild, Jr.

Jan. 17, 1973

Date

CAPITAL ASSISTANCE LOAN AUTHORIZATION

Provided from: Development Loan Funds
Liberia - Highway Maintenance Equipment Loan

Pursuant to the authority vested in the Administrator of the Agency for International Development (hereinafter called "A.I.D.") by the Foreign Assistance Act of 1961, as amended, and the delegations of authority issued thereunder, I hereby authorize the establishment of a loan pursuant to Part I, Chapter 2, Title I, the Development Loan Fund to the Government of the Republic of Liberia ("Borrower") of not to exceed Four Million Four Hundred Thousand Dollars ($4,400,000) to assist in financing the foreign exchange cost of procurement of maintenance equipment and vehicles; spare parts for new and existing GOL-owned U.S. equipment; 50% of the local costs (up to $100,000) of rehabilitating existing equipment; radio communications equipment; traffic counting devices; and procurement services. This loan is subject to the following terms and conditions:

1. Interest and Terms of Repayment. The interest on this loan shall be three percent (3%) per annum on the disbursed balance of the loan, except during the grace period when the interest shall be two percent (2%) per annum. The loan shall be repaid within forty (40) years from the date of the first disbursement under the loan, including a grace period of not to exceed ten (10) years.

2. Currency of Repayment. Provision shall be made for repayment of the loan and payment of the interest in United States dollars.

3. Other Terms and Conditions.

   (a) Equipment, materials and services financed under the loan shall be procured from the United States or countries included in Code 941 of the A.I.D. Geographic Code Book as in effect at the time orders are placed for such equipment, materials and services.

(b) On the basis of the justification set forth in Section II D. 2 of the Loan Paper, and pursuant to the authority granted to me by A.I.D. in Manual Order 1415.5, I hereby authorize the proprietary procurement of spare parts for United States vehicles and highway maintenance equipment presently owned and operated by MPW.

(c) This loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

_____

Assistant Administrator for Africa

_____

Date