STUDY OF HIGHWAY MAINTENANCE REQUIREMENTS

IN THE

REPUBLIC OF TOGO

PREPARED FOR

THE AGENCY FOR INTERNATIONAL DEVELOPMENT

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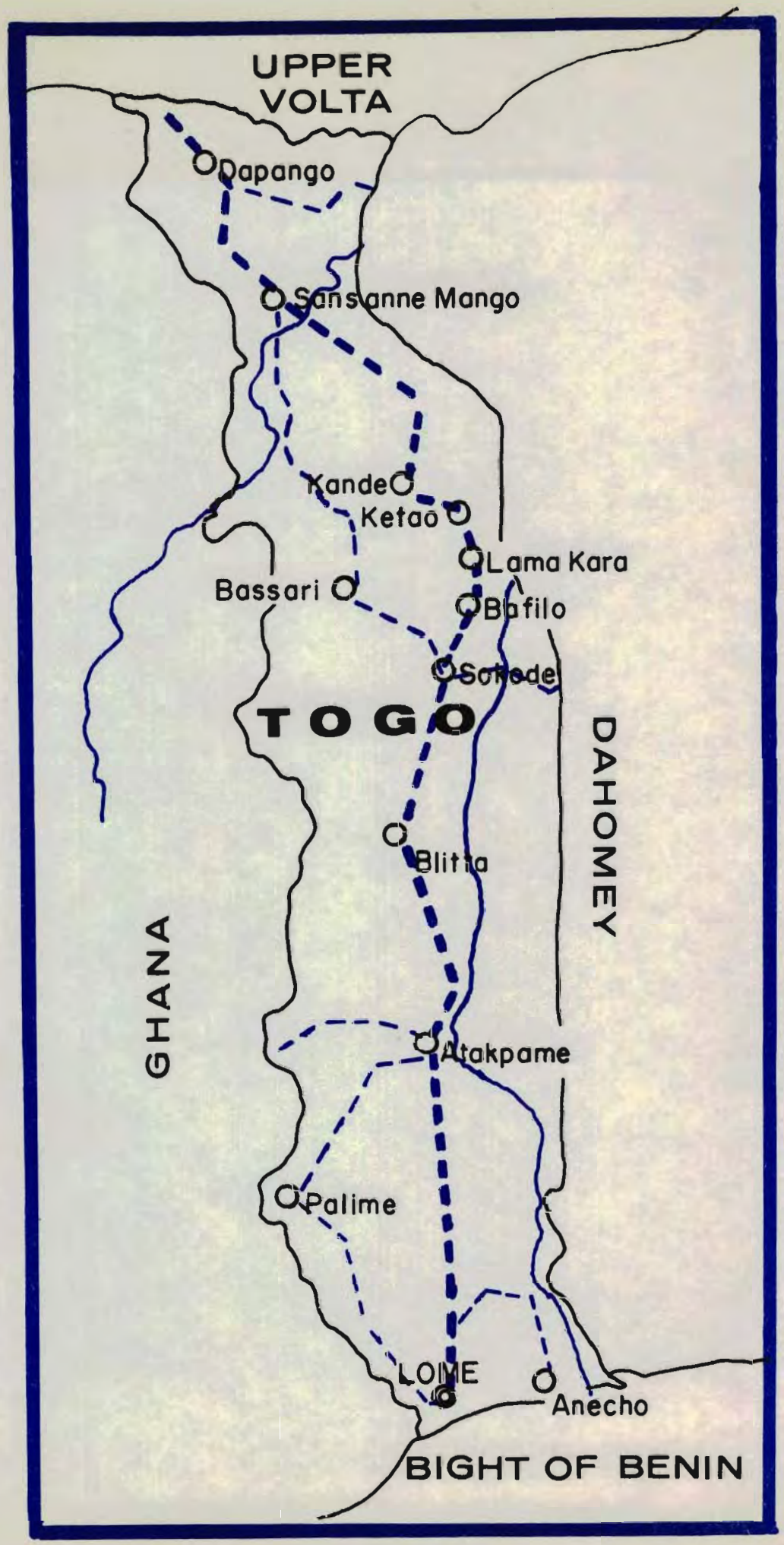
UPPER VOLTA
Dapango
Sansanne Mango
Kande
Ketao
Lama Kara
Bassari
Bafilo
Sokode
TOGO
DAHOMEY
Blitta
GHANA
Atakpame
Palime
LOME
Anecho
BIGHT OF BENIN

CHAPTER ONE

SUMMARY AND RECOMMENDATIONS

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CHAPTER ONE

SUMMARY AND RECOMMENDATIONS

The economy of Togo is essentially agricultural and is characterized by a relatively modest level of demand for transport. In general the road network is adequate to service farming and urban areas but the condition of the roads is almost universally poor and the Consultants recommend the implementation of an extensive program of highway maintenance designed to upgrade the condition of all existing National roads. Such a program will provide immediate and significant benefits to the economy and moreover, these benefits will be spread throughout the whole of the economy and not just confined, as in the case of a specific highway investment, to users in the immediate area of the project.

According to one leading international lending agency".... road maintenance does not have the political glamor of new construction and for this reason it is often neglected. Developing countries, and some of the financing agencies, must come to realize the large benefits deriving from a relatively small investment in road maintenance".[1]

The Consultants, after studying all available data dealing with the highway system and existing highway maintenance practices in Togo, and having considered the Government of Togo's stated objectives in the transportation sector for the period 1966 to 1970, concluded that the present highway maintenance practices and equipment are inadequate for the purpose and urge that the following recommendations be accepted and implemented as soon as possible.

I. OPERATIONS AND PRACTICES

1. Begin immediately to overhaul the entire earth road portion of the National Highway System and surface all earth roads with gravel or laterite whichever is convenient.

This will take 12 years at a rate of approximately 121 kilometers of reconstruction to higher standards each year.

2. Revise existing highway standards and maintenance practices to incorporate:

1. S. C. Hardy, International Bank for Reconstruction and Development, September, 1966 The Financing of Highways and Highway Systems in Developing Countries.

a. improved cross-sections
b. elimination of trees from shoulders
c. standard right-of-way widths and ditches
d. a regular schedule of reprofiling and regrading

3. Schedule the following operations for all National roads at the suggested intervals:

Operation	Frequency per year	
	Paved	Earth
Reprofiling	0	4
Machine surfacing	0	4
Grade shoulders and ditches	6	8
Mow shoulders	2	2
Hand-clean ditches	2	2
Inspect structures	1	1

II. EQUIPMENT

1. To accomplish the above programs the Highway Department will require the following equipment:

Item	Number		
	New	Old	Total
Front end loaders	4	6	10
Dump trucks	32	11	43
Motor scrapers	-	4	4
Asphalt distributor	-	1	1
Truck trailer, low bed, 25-ton	1	1	2
Concrete mixers	2	-	2
Fork lift - 5 ton	-	1	1
Water trucks	8	3	11
Tractors, farm type	4	11	15
Road rollers, rubber-tired	2	7	9
Road rollers, steel-wheeled	2	1	3
Road rollers, other	-	1	1
Motor graders	9	15	24
Bulldozers	4	6	10

2. It is essential that expatriate advisers be employed for a minimum of two years to assist the Department in setting up maintenance schedules, arranging allocation of equipment, instituting training classes,

preparing curricula, translating technical aids into French and local languages and paving the way for senior Togolese personnel to assume management of the training operation.

The provision for additional equipment will not resolve Togo's current highway maintenance problems. Only by proper use and maintenance of this equipment will the department be able to achieve its goal. The Consultant recommends the overhaul of current equipment maintenance practices and provision for a greater supply of parts and tools to ensure proper maintenance of existing and proposed equipment. In the absence of technical advisers and an expanded maintenance budget, the Consultant would not recommend the purchase of additional equipment.

III. COSTS

The current Five Year Plan anticipates increasing expenditures from the current average of 111 million CFA francs to 277 million CFA francs per year for highway maintenance. This will be sufficient to ensure proper highway maintenance as recommended herein and the Government of Togo budget should be expanded to meet the needs of the new program.

The foreign debt portion of the Government of Togo's budget will be sufficiently restricted as to require long-term development loans or grants for the proposed program.

The entire program as recommended herein will cost:

TABLE I-1

ESTIMATED COST OF PROPOSED HIGHWAY MAINTENANCE PROGRAM [2]
(Millions of FCFA)

Item	Offshore	Onshore	Total
1. Equipment	270.8	-	270.8
2. Parts	27.1	-	27.1
3. Tools and shop equipment	16.0	-	16.0
4. Materials laboratory	11.0	0.6	11.6
5. Technical Advisers	59.6	14.0	73.6
6. Parts for existing equipment	41.0	-	41.0
7. Additional local staff and material costs [3]	-	1,653.0	1,653.0
TOTALS	425.5	1,667.6	2,093.1

2. A 5% contingency has been included in all costs in anticipation of possible increases in prices prior to project implementation. The more usual 10% contingency amount was considered to be excessive as equipment prices quoted to the Consultants were adjudged to be extremely accurate. All Offshore equipment and material costs are estimated delivered to Lome, Ministry of Works and exclude import duties.
3. Certain of these items, (e.g., asphalt, fuel, etc.) will be offshore costs, however, they are funded from the normal maintenance budget of the Government of Togo.

IV. BENEFITS

Given the current condition of roads, the proposed improved maintenance program will result in user savings, discounted at 8 percent, of 2,349,000,000 CFA francs over the five-year period.

The Consultant is satisfied that the project is viable and has calculated the Net Present Worth of the benefits to be 585,299,598 CFA francs.

The Internal Rate of Return on the investment is 40% and the Benefit/Cost Ratio is 1.33:1.

V. FURTHER CONSIDERATIONS

The possibility of private contractors in Togo providing all or a portion of the required highway maintenance services was explored and found to be impractical.

The street maintenance requirements of the municipality of Lome were reviewed. It was found that the proposed national program would provide only marginal assistance to the municipality. However, the Consultants recommend that consideration be given to coordinating the programs of the Heavy Equipment Training Center at Lome with those of the municipality in order to explore areas of possible assistance.

CHAPTER TWO

INTRODUCTION

CHAPTER TWO

INTRODUCTION

The Republic of Togo is located on the Gulf of Benin and is bounded by Ghana on the west, Upper Volta on the north and Dahomey on the east. The country covers 56,000 square kilometers (approximately 22,000 square miles). It measures almost 400 miles from north to south and 31 miles from east to west along the coast, forming a 30-66 mile wide corridor between Ghana and Dahomey. It is one of the smallest nations in West Africa. (See Table I).

Topographically, Togo is mostly flat, except for the Atakora and Fazao Mountain ranges which form a watershed for the Volta River Basin in the west and the Mono River to the East. These mountains begin approximately at Palime in the southwest and extend northward and northeast to Bassari, Bafilo, Lama Kara and Kande which are the principal communities located in the hilly part of the country. The highest mountain is near Palime (Mount Agou, 1,020 meters). Temperatures in recent years have ranged from a low of 15.2° at Sokode to 37.0°C at Mango - both temperatures having been recorded in the month of December. For most of the country, rainfall is heaviest from June to September, whereas along the coast the rains fall primarily during April.

The country is divided naturally into four regions, the Maritime or Coastal Region in the south, the fertile Plateau Region, the Central Region and the Savanes Region. The principal administrative areas coincide with these regions.

TABLE II-1

AREA AND POPULATION - WEST AFRICAN STATES
(1961)

Country	Population (000)	Sq. Kms. (000)	Population (per Sq. Km.)
Togo	1,440	56	26
Dahomey	1,934	116	18
Gambia	267*	10	26
Ghana	6,727	238	29
Guinea	2,570	246	12
Ivory Coast	3,100	322	10
Liberia	1,290*	111	12
Mali	4,100	1,204	3
Mauritania	640*	1,086	1
Niger	2,700	1,267	2
Nigeria	30,418	924	39
Portuguese Guinea	544*	36	15
Senegal	2,973	197	15
Sierra Leone	2,450	72	34
Upper Volta	4,400	274	16

SOURCE: United Nations Statistical Yearbook, 1962

* NOTE: Data based on mid-year estimates, all others on latest available census.

The population in January 1965 was estimated at 1.62 million giving an average density of 29 persons per square mile, which is relatively high for West Africa. However, population density varies from 225 persons per square mile in the Sokode area, while other areas are virtually uninhabited. Population growth has been estimated at some 2.6 percent per annum.

Lome, the capital city, had an estimated population of 84,000 in 1965. The second largest community is Sokode, headquarters of the Central Region, with a reported population of 16,000.

The chief means of livelihood in Togo is agriculture which provides employment for over 80% of the population and accounts for 70% of total exports. The principal agricultural produce consists of peanuts, millet, rice, corn, manioc and in addition there are important crops of coffee, cocoa, cotton, kapok and palm produce.

Togo is a member of the franc area and the West African Monetary Union which is composed of Dahomey, Ivory Coast, Mauritania, Niger, Senegal, Togo and Upper Volta. The Treaty establishing the West African Monetary Union went into effect on November 1, 1962 and provides for a common currency - the CFA franc - which is equal to 0.02 French franc, and a common central bank, the BCEAO.

The nation which was formerly a part of German Togo and which became a French mandate after World War I, is today a part of the Francophone portion of West Africa. It obtained independence from France in 1960, but as with other former French possessions, its commercial and financial ties with France remain significant.

With respect to traffic patterns in Togo, it should be noted that the largest volume of traffic is along the Atlantic Coast, or east-west oriented, the heaviest traffic load being borne by the Anecho-Lome coast road. Many of the interior areas are comparatively self-sufficient, developing only modest traffic demand, as goods locally produced are moved to local markets largely by means of head-load. An uncertain amount of trade goes to Ghana in the west and Dahomey in the east, and only a portion of the country's produce finds its way to the market in Lome, the most important commercial as well as administrative center of the nation.

CHAPTER THREE

THE ECONOMY OF TOGO

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CHAPTER THREE

THE ECONOMY OF TOGO

The following is a brief discussion of the principal economic indicators in Togo, as well as a review of the more important factors of the Five-Year Development Plan.

I. POPULATION

Togo's population was estimated to be 1,620,000 in 1965, compared with 1,543,600 in 1961.[4] The 1965 population is divided among the regions as follows:[5]

Region	Population	Density per Sq. Km.
Maritime	552,000	89
Plateau	430,000	22
Central	391,000	54
Savanes	245,000	25

SOURCE: Inventaire Economique du Togo, 1964, Publié par le Ministere des Finances de l'Economie et du Plan, Service de la Statistique General (hereinafter called Inventaire Economique du Togo, 1964)

The foregoing indicates an average growth rate of 2.6 percent with a reported birth rate of 5.5 percent and a mortality rate of 2.9 percent. The 1961 data show that there were 730,000 men to 813,000 women, indicative of a higher mortality rate among men.

The population is divided into 163,000 municipal residents and 1,457,000 rural dwellers. The latter make up 90% of the total reflecting the degree of underdevelopment of the nation. The major municipalities, (defined as those with a population of at least 10,000), are listed below, (1965 population estimates):

Municipality	Population	Region in which Located
Lome	84,000	Maritime
Sokode	16,000	Central
Palime	15,000	Plateau
Tsevie	14,000	Maritime
Anecho	12,000	Maritime
Atakpame	12,000	Plateau
Bassari	10,000	Central
TOTAL	163,000	

SOURCE: Inventaire Economique du Togo, 1964, p. 21

4. This figure is taken from the Inventaire Economique du Togo, 1964. A slight discrepancy between this and the figure quoted in Chapter II, Table II-1 will be noted.
5. As there is no official census, these figures are estimates only.

The importance of the nation's agricultural role indicates that future transport demands will center on the movements of agricultural commodities and that improvements in the transport system must be related to agricultural output targets.

II. EMPLOYMENT

Togo is fundamentally an agricultural state; only a small portion of its total working population is engaged in industry, trades and government service. Out of a total estimated labor force of about 700,000, only 24,500 represent non-agricultural, salaried wage earners. Of this number, 12,000 were employed by the government directly and the balance were employed in the private sector.

The people of Togo, on the whole, still have a very modest standard of living; the major portion of the Togolese population, particularly in the north, subsists on a self-sufficient agriculture. There is no available census of business in Togo and the labor ministry's data are insufficient for any detailed analysis. It is clear, however, that because of the relatively small number of persons actually employed and the predominance of "family workers", in the non-agricultural section, any major increase in purchasing power or industrialization is at this time remote.

At the present time, about forty percent of school-age children actually attend school and the number has been rising; however, the state of education is far from satisfactory as the number of pupils per class, especially in primary schools, is quite large, (between 50 and 60). There is a severe shortage of teachers and the availability of schools and administrative staff is insufficient. Outside of the urban areas, virtually 100% of all women are illiterate as are 96% of the men, (15 years and older), and even in Lome, the literacy rate among men is 67% and only 21% among women. Persons with technical expertise are normally trained outside of the country.

Any program, therefore, which requires skilled manpower must carefully evaluate the availability of such a resource. In planning the proposed road maintenance program, it must be recognized that the implementation of any program is likely to depend in part on the importation of appropriate manpower skills as well as materials and equipment.

It should be noted that wages for public officials typically exceed 250,000 CFA a year contrasted with 21,900 CFA per capita GNP for all Togolese in 1965. As a result, the current Five Year Development Plan has called for a wage freeze for all public officials. It remains to be seen whether or not such a policy will be politically sustainable.

Togo's employment situation is summarized in the Five Year Development Plan as follows:

> "In brief, the existing employment situation is characterized by the dominant position of the traditional sector, the excessive importance of the public sector, inadequate qualifications and, finally, the beginning of urban unemployment, evident in Lome, where about ten thousand, (10,000) persons are involved."[6]

Consequently, emphasis is being placed on stimulating private sector employment. Qualitatively the public sector, however, (in terms of higher salaried jobs), is programmed under the Five Year Development Plan to rise more sharply than the private sector in the 1966-1970 plan period.

TABLE III-1

FIVE YEAR PLAN TARGET POSITIONS 1966-1970

Summary-New Jobs	Grade A (executives)	Grade B (junior executives)	Grade C (qualified employees)	Grade D (skilled workers)	Laborers	Total
Private Sector	55	210	655	3,100	5,740	9,760
Public Sector	290	480	1,315	295	-	2,380
OVERALL TOTAL	345	690	1,970	3,395	5,740	12,140*

SOURCE: Five Year Development Plan, 1966-1970

NOTE: Excludes 975 "Permanent Employees" in Economic Departments

6. Five Year Development Plan, p. 254.

III. GROSS NATIONAL PRODUCT AND FIVE YEAR DEVELOPMENT TARGETS

Gross national product information is generally lacking in Togo. GNP was estimated at about 37 billion in 1965 and 24 billion CFA in 1958, representing an annual increase of about 6-1/2 percent. Since there is no price index, any change in real GNP cannot be known. The Togolese government divides the GNP into four sectors:[7]

Primary Sector	18.7 billion	50.4%
Secondary "	4.0 "	10.8%
Tertiary "	10.6 "	28.6%
Administration	3.8 "	10.2%

The primary sector represents almost entirely agricultural output. Transport, food processing, marketing, although falling into other categories, are, of course, directly related to this sector.

The per capita GNP for 1965 was estimated at 21,900 CFA Fr.

1. Development Planning

In 1964, the government announced that a five-year development plan for the period 1964-68 would be established, however, delays in its preparation postponed the starting date to 1965. The objectives of the development plan are:

(a) to replace the present dependence on the production of raw materials and the import of manufactured consumer goods

(b) to diversify the economy

(c) to develop all parts of the country evenly, eliminating or minimizing current regional descrepancies

(d) to develop internal and external trade

(e) to develop increased agricultural production and establish light industries[8]

7. Five Year Development Plan, p.4
8. IMF Staff Papers, p.427

To attain these objectives, the government of Togo anticipates instituting an extensive program including increased worker training, education, public health, encouragement of rural cooperatives, and the reorganization of the planning administration.

Agricultural investments will be given priority, including (a) developing present underdeveloped areas, (such as the Oti and Mono valleys where sugar cane and cotton are to be cultivated); (b) general expansion of coffee, cocoa, rice and cotton production; (c) introduction of new crops, such as sugar cane, tobacco, and vegetables; (d) diversification and rationalization of current agricultural production. Small agro-processing industries will be established and measures will be taken to develop infrastructure facilities, (e.g., the port of Lome and roads).

The criteria to be employed by the Government in selecting projects include the importance of investment for Togo's economy, increased employment of Togolese nationals and foreign exchange saving.

In order to encourage foreign and domestic private investments, an investment code is now in preparation. The new code will replace the present system of fiscal exemptions and special concessions accorded to new investments by the Government.

Since achieving independence, Togo has relied heavily on external public funds to finance investment. In the future also, it does not seem likely that domestic savings will be sufficient to finance all the investment needed for Togo's economic development. Therefore, for the implementation of its five-year plan, Togo will continue to rely on foreign financial assistance. The following table summarizes the 1970 Plan targets for the Togo economy.

TABLE III-2

PROPOSED INCREASES IN GDP SECTORS, 1966-1970

(BILLIONS OF CFA)

	1965	1970	% Annual Increases*
Agriculture and Fishing	17.8	21.2	3.5
Mining	2.0	3.1	9.1
Manufacturing	1.5	3.4	17.8
Construction	0.8	1.2	8.4
Transportation	1.7	2.2	5.3
Commerce and Trade	8.0	10.7	6.0
Government	3.9	5.2	5.9
Services	1.4	1.8	5.2
Total	37.1	48.8	5.6

* These targets have not been adjusted for transfers representing repatriation of profits on foreign capital. Such adjustment reduces the proposed annual increase to 5.3%, (34.5 billion CFA Francs in 1965 and 44.7 billion CFA Francs in 1970.)

SOURCE: Based on Five-Year Development Plan, pp. 259-261

Under the 1966-1970 Development Plan considerable emphasis has been placed on the improvement of infrastructure and the establishment of new industries including commercial fishing. The Net Domestic Product Increase over the 5-year period is calculated to be 27.2% or 4.9% per annum.[9]

The following represents the basic sector objectives in terms of aggregate incomes, (personal and corporate):

TABLE III-3

GROWTH OF AGGREGATE INCOMES

	1965 (Millions)	1970 (Millions)	1970/65 Annual Increase
Government	3,925	5,175	5.7%
Agriculture	17,770	21,065	3.5%
Industry (a)	2,900	4,910	11.1%
Traditional Activities and non-Industrial Work (b)	1,160	1,435	4.4%
Transport	1,395	1,590	2.6%
Large-Scale Modern Commerce	1,390	1,845	5.8%
African Trade	2,450	3,120	4.9%
Services	1,455	1,705	3.7%
Banks and Insurances	260	330	5.0%
Total	32,705	41,175	4.7% (c)

SOURCE: Five Year Development Plan, 1966-1970, Page 265

(a) Without C. T. M. B., phosphate mining, the respective values and percentages are: 1965: 1,020. 1970: 2,250 and 17.1%.

(b) Including the non-industrial sector of building and public works.

(c) This percentage is incorrectly given in the table on p. 265 as 4.8%.

9. Five Year Development Plan based on Table I, p. 259

The transport sector's aggregate income is expected to grow the least because the railroad is to be almost completely phased out by 1970 and the new port operation will require less manpower than the present operation though the plan suggests absorbing the 125 redundant port workers into sea fishery, road transportation and other industrial sectors.

The proposed investment schedule under the Five Year Plan is shown below:

TABLE III-4

INVESTMENT TARGETS - TOGOLESE FIVE YEAR PLAN
(Millions of CFA)

Sector	Public	Private	Total	Percent of Total
Transport and Communications	8,206	2,100	10,306	36
Rural Development	5,141	800	5,941	21
Housing and Town Planning	1,734	2,800	4,534	16
Trade and Industry	1,416	2,400	3,816	13
Education	1,336	300	1,636	6
Health	1,195	140	1,335	4
Administration	840	-	840	3
Social Welfare	184	-	184	1
Totals	20,052	8,540	28,592	100

SOURCE: For public investment only: Five Year Development Plan, p. 246

The heavy emphasis on infrastructure is in the form of new roads including the surfacing of over 300 kms. for 4 billion CFA and completion of the new port for 3 billion CFA.

The attainment of the goals of the Five Year Development Plan is somewhat doubtful since Togo is depending for 64% of the total finance on foreign sources.

TABLE III-5

MEANS OF FINANCING FIVE YEAR DEVELOPMENT PLAN
(Millions of CFA)

Financing	Public	Private	Total	Percent of Total
(a) Internally				
Budget	3,409	-	3,409	12
Private Savings	-	6,730	6,730	24
Sub-total	3,409	6,730	10,139	36
(b) Externally				
Loans	4,540	-	4,540	16
Grants	12,103	800	12,903	45
Private Capital	-	400	400	1
Supplier Credits	-	610	610	2
Sub-total	16,643	1,810	18,453	64
Grand Total	20,052	8,540	28,592	100

BALANCE OF PAYMENTS

The data below show recent balance of payments figures for Togo. They reflect only transactions with countries outside of the franc zone. There is a substantial but unrecorded amount of trade with neighboring countries, (e.g., Ghana and Dahomey). Overall estimates of Togo's trade balance, made by the West African States Central Bank and the International Monetary Fund, are shown in Table III-6. As a result of the inflow of private capital and foreign aid, especially in 1965, Togo has managed to avoid a payments balance deficit, (except for a minor one in 1962).

The current trade deficit, which is now about 28 percent, (i.e., 72 percent of imports are covered by exports), is expected to be reduced to 15 percent by 1970. It is also hoped that the percentage of imports composed of capital goods will increase and that mineral products, as a result of increased production of phosphates, will occupy a more important place in the export list.

TABLE III-6

OVERALL BALANCE OF PAYMENTS 1962-1965
(In Millions of CFA francs)

	1962	1963	1964	1965
	(Minus sign indicates debit, no sign indicates credit)			
Goods and Services				
Exports (f.o.b.)	4,240	4,509	7,448	6,626
Imports (c.i.f.)	-6,724	-7,167	-10,286	-11,100
Trade Balance	-2,484	-2,658	- 2,838	- 4,474
Private Services*	-	- 500	- 575	-
Government Services**	-	578	578	543
Balance on goods and services	-	-2,580	- 2,835	-
Transfer Payments				
Private transfer payments*	- 500	373	373	-
Official transfer payments**	1,400	884	584	1,150
of which :EDF	(300)	(577)	(371)	(523)
France	(600)	(300)	(208)	(627)
Total	900	1,257	957	-
Capital				
Official	-	- 34	-	-
Private	1,280	1,180	2,069	-
Total	1,280	1,146	2,069	-
Errors and Omissions	-	396	488	-
TOTAL	- 304	219	679	1,787
Monetary Movements				
Central Bank	-	- 325	128	- 1,760
Treasury	-	- 96	- 460	275
Other Institutions	-	202	- 347	- 302
Total	304	- 219	- 679	- 1,787

SOURCE: 1962 and 1963 data supplied by the Banque Centrale des Etats de l'Afrique de l'Ouest; 1964 and 1965 data are International Monetary Fund estimates

* In 1962 figures, Private services have been included under private transfer payments.
** In 1962 figures, Government services have been included under official transfer payments.

The chief imports in terms of value are those shown in Table III-7.

TABLE III-7

TOGO: IMPORTS BY MAJOR CATEGORIES

(1960 - 1964)
(In Millions of CFA francs)

	1960		1961		1962		1963		1964	
	Value	Percent of Total	Value	Percent of Total	Value	Percent of Total	Value	Percent of Total	Value	Percent of Total
Foodstuffs and beverages	820	13	1,071	17	1,469	22	1,421	20	1,729	17
Tobacco	266	4	316	5	507	8	460	6	503	5
Energy	351	5	483	7	418	6	433	6	463	4
Manufactured consumption goods and intermediate products	2,211	35	2,442	38	2,824	42	2,281	32	3,882	38
Capital Goods	2,804	43	2,164	33	1,506	22	2,572	36	3,710	36
TOTALS	6,452	100	6,476	100	6,724	100	7,167	100	10,287	100

SOURCE: Service de la Statistique Generale; Inventaire Economique du Togo, 1962-1964; and Bulletin de Statistique.

Togo's principal exports, of which approximately 50 percent go to countries in the Franc zone, are as follows:

TABLE III-8

TOGO'S PRINCIPAL EXPORTS
(Billions of CFA francs)

	1961	1962	1963	1964	1965	% of 1965
Coffee	1.25	1.43	0.80	2.52	1.37	21
Cocoa	1.29	1.18	1.18	1.63	1.69	25
Phosphates	0.16	0.49	1.07	1.95	2.14	32
Palm Products	0.31	0.29	0.40	0.45	0.58	9
Cotton	0.31	0.25	0.35	0.17	0.29	4
Manioc	0.29	0.12	0.14	0.14	0.10	2
Peanuts	0.16	0.08	0.12	0.11	0.08	1
Copra	0.18	0.07	0.12	0.15	0.05	1
Other	0.67	0.33	0.33	0.33	0.33	5
TOTAL	4.62	4.24	4.51	7.45	6.63	100

SOURCE: Inventaire Economique du Togo, 1964 and 1965

FOREIGN DEBT

Table III-9 shows Togo's external debt position. The 196 million CFA franc debt service represents 2.9% of the value of exports. The largest loan, for the Port of Lome by the Federal Republic of Germany, will require servicing as of 1968. This means that Togo's debt service will be increased by another 190 million CFA (or to about 6% of export value). The capacity of Togo for assuming further debt burdens is increasingly limited and will depend largely on the country's ability to increase GNP and exports. At this time it does not appear likely that the existence of the new port will provide an increase in benefits commensurate with the new debt burden.

Savings in port operations, once the new port is completed, will not be sufficient or significant enough to cover the increased debt and this fact, together with the availability of competitive harbors in neighboring countries and the relatively low amount of increased agricultural output expected in the near future is likely to minimize the national economic benefits of the port.

While total debt service of 6% of exports is not excessive for a developing country, the relatively modest level of Togolese exports, fluctuating agricultural export prices, and the reliance on French grants and protective tariffs all tend to restrict the ability of the Government of Togo to enter into long-term commitments for projects which will not have an immediate and favorable effect on the overall economy or balance of payments.

TABLE III-9

FOREIGN PUBLIC DEBT AS OF DECEMBER 31, 1965
(In Millions of CFA francs)

Source	Year Contracted	Original Amount	Interest Rate Percent	Maturity (Years)	First Maturity Year	Interest(a) Payments in 1965	Amortization in 1965	Total Amount outstanding
Miscellaneous	1931	13.5	4.0	50	1931	0.5	0.4	7.6
Miscellaneous	1932	19.4	4.5	50	1933	0.9	0.3	13.3
France, OCCE	1956	5.6	2.2	20	1958	0.1	0.3	3.7
"	1956	60.0	2.2	20	1958	1.3	2.8	39.0
"	1957	25.0	2.5	20	1959	0.6	0.6	18.2
"	1958	25.0	2.5	8	1965	0.6	-	25.0
"	1960	10.0	2.5	15	1961	0.2	0.6	7.4
"	1962 (b)	1,214.7	1.0	40	1962	12.1	8.8	1,184.2
"	1965	50.0	2.5	10	1966	1.2	-	50.0
France, FAC	-	45.0	2.5	8	1965	1.1	-	45.0
Germany, Federal Republic of	1963	3,270.8	2.0	25	1968	6.5	-	3,270.8
Yugoslavia	1962	415.8	3.0	8	1965	12.5	94.0	321.7
Netherlands	1964	272.2	6.0	10	1964	16.3	34.4	237.8
		5,427.0				53.9	142.2	5,223.7

SOURCE: Data supplied by the Togolese Authorities

(a) Estimated by Fund staff on the basis of the agreed rate, therefore actual payments may be somewhat less.

(b) Represents rescheduled debt on account of Togo's contribution to the FIDES program in the years 1947-59 financed by loans from the OCCE.

AGRICULTURE

Togo is basically an agricultural economy and in 1965 cash and subsistence crops accounted for 50 percent of the GNP. Principal crops and yearly production are shown in the table below:

TABLE III-10

PRODUCTION OF PRINCIPAL CROPS
1960 to 1965
(Thousands of metric tons)

A. For Export	1960	1961	1962	1963	1964	1965
Cocoa	9	13	11	11	14	18
Coffee	5	10	13	7	19	9
Cotton	9	7	6	9	4	6
Palm products	13	12	11	11	15	15
Copra	3	4	3	3	3	1
Peanuts	12	11	22	17	18	20
Sub-totals	51	57	66	58	73	69
B. For Subsistence						
Manioc-Cassava	564	667	987	1,088	1,015	972
Yams	800	473	857	1,397	1,675	999
Corn	81	70	84	66	77	94
Millet and Sorghum	99	50	74	119	125	131
Rice	11	9	18	23	17	24
Beans	9	6	13	14	12	n. a
Voandru Nuts	7	6	7	9	9	n. a
Sub-totals	1,571	1,281	2,040	2,716	2,930	2,220
TOTALS - ALL PRODUCTION	1,622	1,338	2,106	2,774	3,003	2,289

SOURCE: Inventaire Economique & Bulletin de Statistique, 1965

Export market prices are stabilized by the Agricultural products Marketing Board, (Office des Produits Agricoles du Togo, OPAT). As is common to most of West Africa, the earnings of the marketing board are used to defray budgetary deficits rather than to subsidize producers when there is a fluctuation in world prices. Thus, OPAT's operation tends to have a repressing impact on the economy and discourages rather than encourages agricultural production.

It will be noted that the entire export crop amounted to less than 70,000 tons in 1965. This means about 35,000 truck movements per year at a conservative 2 tons per truck or less than 100 movements a day if the produce is hauled to the port of Lome from the producing areas.[10] Thus, even if export crops, etc., are increased by 50 percent, or more than twice the planned twenty-one (21%) percent increase of the current five year plan, the demands on the transport system are still likely to be insignificant.

Livestock Raising and Fishing

As a result of disease the number of cattle, sheep, goats and pigs has declined in recent years and Togo has had to depend on livestock and meat importation from Dahomey, Niger, Upper Volta and Nigeria. In 1965 10,000 head of cattle, and 78 tons of meat were imported at a total cost of CFA 28 million, but the amount is of no great significance from the standpoint of transport requirements. Nearly 500 million CFA is to be invested under the Five Year Development Plan to build up Togo's stock of cattle, sheep and goats.

Togo imported 5700 tons of fish in 1965 at a cost of 268 million CFA. Imports have been rising steadily in recent years to meet greater demands, but under the development plan it is expected that the fishing industry in Togo will yield 16,300 tons per annum as a result of improvement of techniques and more efficient marketing. This will mean an increase of almost 159% over the 1965 total output of 6,300 and will require an investment of 143 million CFA in five years.

MINING AND MINERALS

Togo's principal mineral resource at the present time is phosphate mined in the southeast of the country around Tsevie and Tabligbo.

Production of phosphate has risen from 57,000 tons in 1961 to an estimated one million tons in 1966 and represents a major long-range source of revenue for the Republic of Togo which will increase its holding in the company during the five year plan. It should be noted that company owned trucks, railway and pipeline are used for transport between the mines and Porto Seguro, thus the industry has no significant impact on the transportation sector.

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10. Two hundred (200) per day of the trucks return empty, but the 2-ton load is probably only 40% of actual average truck capacity in Togo (see Chapter 6).

Other significant mining activity is quarrying and rock crushing with relatively large limestone operations south of Nuatja. These minerals are used for building and road construction and are moved largely by railroad.

A geological reconnaissance survey is currently being made in Togo in the hope that more mineral resources might be discovered in commercially-exploitable quantities. There are known deposits of bauxite, chromite, asbestos and dolomite in the Palime, Atakpame and Anie sections. Red schor, rutile and gold exist in the Lama Kara area and some iron has been noted to the west of Lama Kara. Manganese deposits have been located near Dapango. To date, however, there is no indication that any of these deposits is suitable for commercial exploitation.

The Government is considering the production of 20,000 tons per annum of marine salt and, contingent upon the opening of the new port, the establishment of a clinker pulverising plant with 60,000 tons annual capacity. At the moment, there are no immediate anticipated requirements of mining and mineral production which would warrant a heavy investment in transportation facilities.

ELECTRICITY AND WATER RESOURCES

Power generation in Togo is available on a grid system basis only in Southern Togo. A fuel-operated plant at Lome, (3160 kw) and a hydroelectric plant near Palime, (1100 kw), represent the entire existing electric output capacity of Togo except for the privately-operated generators - principally one used by the phosphate plant - and a total of 500 kw. generated collectively by various small municipal diesel plants.

Electricity rates in Lome are exceptionally high, (14.4 CFA per Kwh), and there is an impending shortage of power. The Five Year Development Plan recommends feasibility studies for extending the grid system and forming a link between Togo and Dahomey.

The following table summarizes capital outlays for electricity proposed under the Five Year Development Plan. The biggest outlay, 421 million CFA, will be devoted to extending power lines in the Lome area, increasing generating capacity by installing two 3000 kw generators and converting from 110 to 220/380 volts.

TABLE III-11

SUMMARY OF INVESTMENT IN ELECTRIFICATION PROJECTS - TOGO
(Millions of CFA)

Project	1966	1967	1968	Total Amount
International Linkup Plan	45	44	-	89
Extensions in Lome Area	210	211	-	421
Transfer of Generators - 160 kw. Lome to Palime	-	-	10	10
Additional equipment:				
Atakpame	3	-	-	3
Sokode installation to provide continuous supply	25	-	-	25
TOTALS	283	255	10	548

SOURCE: Five Year Development Plan, p. 85

There are no plans for capital expenditures after 1968. The National Government is expected to pay 30 million CFA francs per annum on loan repayments and other costs are to be met by direct revenues of the Togo Electric Power Company.

One thousand, one hundred and six (1,106) million CFA francs are programmed for Togo's municipal water supply, drainage and sewerage systems, designed especially to alleviate critical deficiencies in Lome.

The biggest rivers of Togo include the Oti which forms a common boundary with Ghana in the northwest sections of Togo; and the Mono in the central and southeastern part of Togo. Both rivers have been considered for hydroelectric and irrigation purposes, however, only the Mono project- which would have to be a Joint Venture with Dahomey - is currently under serious consideration.

A series of dams could be built to solve electricity and irrigation problems, but in view of the fact that the Volta dam in neighboring Ghana has a potential capacity of providing hydroelectric power to virtually all of Togo, parts of Dahomey and Upper Volta, it would seem unnecessary for Togo to construct duplicate facilities. Undoubtedly increased availability of electricity and

irrigation would stimulate some industrial development, increase agricultural output and, in turn, make greater demands on the transport network.

Irrigation has not played a major part in Togo's attempt to increase agricultural production. This is partly because for a considerable portion of the country, the rainfall is substantial permitting a fairly high yield in crops such as manioc and yams. However, irrigation projects are now being considered as more water storage and hydroelectric power become available.

Meanwhile, in the absence of any specific power and irrigation development targets, no immediate need for related transport investment is manifest.

INDUSTRY

Manufacturing in Togo consists at the present time of a certain amount of food processing, cotton weaving, a brewery and local handicrafts. The following table lists the principal firms, their output, capital and number of employees.

TABLE III-12

PRINCIPAL INDUSTRIAL FIRMS IN TOGO

Type of Industry	Invested Capital (Millions CFA fr.)	Output	No. of Employees
Tapioca and Starch (Compagnie du Benin, S.A.)	205	12,000 tons (1965 estimate)	102
Palm Oil (Public Enterprise at Alokoegbe)	104	516 tons (1963) (1,000 tons capacity)	51
Soap and Perfume (La Chimique Africaine, S.A.)	59	780 tons soap, 22 liters perfume (1963)	42
Beverages (two companies) at Lome (data are for the larger of the two)	46	8,820 hectoliters (1963) (18,000 hl. capacity)	76

Type of Industry	Invested Capital (Millions CFA)	Output	No. of Employees
Textile Mill, Dadjz, Industrie Textile Togolise	240 authorized 900 required	Started in 1966 (5 million meters of ginned cotton annual target)	500 est.
Beer Brasserie Togolise	125 authorized 185 required	Started in 1965 (10,000 hectoliters annual capacity - 400,000 bottles sold in March 1966)	40

SOURCE: Compiled from Inventaire Economique, 1964 pp. 63-67 and IMF Staff Paper, 1966

Of the foregoing, only the Textile Mill at Atakpame is located outside of the Lome area.

Various surveys of manufacturing and service industries were taken by the Government of Togo between 1962 and 1964. These indicate that the employment and output is typically quite small for each establishment. Only one in three establishments actually hires salaried workers. Most of the labor is performed by non-salaried family workers. It is only in the field of publishing, department stores, hotels and banking that there are more than 10 employees per establishment.

The Five Year Development Plan envisions the following goal for industrial development: "expansion of existing industries, including the phosphate plant; added investment of 24 million CFA for palm oil production and 105 million CFA to double the capacity of starch output from 6,000 to 12,000 metric tons." [11]

Other proposed investments include:

Type of Industry	Proposed Capital (Millions of CFA)	Proposed Annual Capacity
Abattoir	250	-
Salt Production	280	100,000 metric tons
Pulverized Clinker	270	60,000 metric tons
Distillery	75	-
Twine (from coconuts)	30	100 metric tons

11. Five-Year Development Plan, pp. 202-204

Brickmaking, plastics and paper and cardboard manufacturing are also under consideration. The Five Year Development Plan recommends research into the feasibility of more food processing industries, (e.g., dairy products, flour, biscuits, pastes, confectionary, manioc roots, peanut oil, coffee, fodder and assorted preserves), as well as manufacturing of nails, agricultural and other tools. The Plan proposes expenditures of 1,270 million CFA for industrial development purposes, including surveys, 369 million CFA of this sum is to be provided by foreign investors or aid.

It is clear that yield for domestic use and export is not likely to make substantial demands on transport such as cannot be accommodated with present facilities and improvements proposed under the Five Year Development Plan. There is no indication that lack of road transport is a hindrance to industrial development at the present time. Should all proposed production goals under the Five Year Development Plan be realized, there will be sufficient time to reappraise the transport requirements as the output goals are achieved.

RETAIL TRADE

The service sector of the Togolese economy is developed to the extent that one of the traditional commercial aspects of Togo is the market. Market day plays an important part in the life of the Togolese and almost any community of about 2,000 persons or more normally conducts a market once a week, typically once every six days; and in some bigger towns, the market is open every day.

Local trade is, of course, on a small scale and does not appear to be confined by international boundaries as there is an interchange of products between Dahomey and Togo and Ghana and Togo. By far the greatest amount of goods moving to and from the market are moved by headload.

In Lome the following major trading companies are represented:

United Africa Company
S.G.G.G.
John Holt
S.C.O.A.
Sotexim (Government outlet)

These organizations distribute merchandise throughout the country by hired trucks, and imported goods find their way to the bigger markets such as Palime, Atakpame, Sokode, Lama Kara, Mango, Dapango, Ketao,

Vogan, etc. It would be difficult to determine conclusively to what extent the present highway and railroad system impedes the distribution of goods. Freight rates are relatively expensive and if the cost of transport could be reduced, it may be possible to reduce[12] the prices of commodities and thereby increase sales.

Studies by S. E. D. E. S. have shown that prices of goods distributed from Lome do not vary in accordance with distance from Lome; and existing price differentials in various markets cannot be attributed to variations in transport charges. But even if transport cost and prices were related so that price reductions could be achieved, the increase in sales is not likely to be large enough to warrant a major transport investment.

The annual per capita income in Togo is estimated at about $80. 00 a year. Even with price reductions, total increases in consumption of imported goods are likely to remain small, unless, of course, agricultural output and purchasing power rises significantly. The principal problems in the retail field appear to be seasonal fluctuations in prices, lack of storage facilities, inadequate marketing organization and in some instances a considerable oversupply of retail facilities.

There is no retail census and statistics concerning the consumption of consumer goods are not available.

SUMMARY

The foregoing affirms that Togo is a rural nation which is still in a comparatively early state of development. Such development, however, is occurring, and if the national plan targets which call for an unadjusted rate of increase in the Gross Domestic Product of 5. 6% per year can be realized even given the current low base, Togo can consider itself to be well on the way toward taking its place among the progressive states in Africa.

Two major findings have a bearing on the purpose of this report. One is that the present domestic output as well as the envisioned production targets in the Five Year Development Plan are not substantially impeded by the existing transport resources in the nation. With the comparatively

12. SEDES, op. cit., p. A-25

low volumes of traffic, except along the coastal route, roads serve as a means of access rather than as thoroughfares. It would appear, therefore, that maintenance of these vital access roads should be given priority and that such a policy will serve the nation's transport needs well until agricultural, mineral, and industrial output clearly justifies larger investments in superior road systems.

Finally, a brief analysis of the government's capacity to support additional external debt indicates that a modest increase in debt for highway maintenance purposes can be absorbed as the effective ratio of debt service to exports will be approximately six (6%) percent by 1968. The proposal to phase out deficit operations, such as the railroad services, which now impose an undue strain on the nation's finances, should also free funds for an improved highway maintenance program in the future.

CHAPTER FOUR

TRANSPORTATION SYSTEM IN TOGO

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CHAPTER FOUR

TRANSPORTATION SYSTEM IN TOGO

I. INTRODUCTION

The present transport system in Togo essentially consists of a 4,662 kilometer highway network and a railroad operating for 436 kilometers over three main branches. There is virtually no internal water transport except for some local haulage along Lake Togo and the lagoons. Maritime transportation facilities are at the port of Lome as well as Porto Seguro where primarily phosphates are loaded for export from a private facility.

Airline traffic is mainly external as Lome is located along several international routes. A local airline, Air Togo, operates north-south flights between Lome and Dapango twice a week.

Although Togo extends about 700 kilometers into the interior from the Gulf of Benin, the principal transport axis within the country extends along the coast between Lome and Anecho, a distance of only 43 kilometers. In addition to internal traffic, this route handles international movements, typically between Ghana and Togo and between Dahomey and Togo. There is also some through traffic between Accra, Ghana and Lagos, Nigeria.

II. ROAD NETWORK

1. Description

Togo's entire road system consists of 1,662 kilometers of national highways of which 204 kilometers are paved, and approximately 3,000 kilometers of district roads, all of which are unpaved. Tables IV-1 and IV-2 show the kilometrage, basic road network and routes for the principal highways in Togo.

TABLE IV-1

BASIC STATISTICS - NATIONAL HIGHWAYS - TOGO - 1964

Region	District	Paved kms.	Earth kms.	Route kms.	Area km.^{2}	Population (1964-'000s)	Route kms/ km.^{2}	Route kms/ '000 pop.	Population ('000s/ route km)
Maritime	Lome	35	38	73	280	154	2.6	0.50	2.1
	Anecho	43	34	77	1,420	216	5.4	0.40	2.8
	Tabligbo	-	-	-	1,200	56	-	-	-
	Tsevie	-	119	119	3,200	124	3.7	1.00	1.0
Plateaux	Klouto(Palime)	4	149	153	3,260	130	4.7	1.20	0.9
	Nuatja	-	50	50	3,100	59	1.6	0.90	1.2
	Atakpame	6	203	209	9,870	111	2.1	1.90	0.5
	Akposso	-	126	126	4,200	107	3.0	1.20	0.9
Centrale	Bafilo	-	31	31	900	25	3.0	1.30	0.7
	Bassari	-	115	115	6,070	81	1.7	1.40	0.7
	Lama Kara	-	91	91	1,075	94	9.0	1.00	1.0
	Niamtougou	-	56	56	1,275	45	4.4	1.30	0.8
	Pagoudou	-	14	14	480	41	2.9	0.40	2.9
	Sokode	82	131	213	10,140	106	2.1	2.00	0.5
Savanes	Dapango	-	122	122	4,570	153	2.7	0.80	1.3
	Kande	-	54	54	1,660	35	3.3	1.50	0.7
	Mango	-	159	159	3,900	51	4.0	3.10	0.3
TOTALS		170	1,492	1,662	56,600	1,586*	Avge= 3.0	1.05	0.9

SOURCE: Inventaire Economique du Togo (1965 edition)

* Actual total 1,588 because of rounding, but government data shows 1,586 in its statistics.

SUMMARY:

National			District	
Paved (a)	Earth (Class II) (b)	Earth (Class III) (c)	(Class III)	TOTAL
170	1133	359	3,000	4,662 kms.

a. Since publication of this table approximately 34 kms. of earth roads have been paved.

b. All-weather

c. Not passable during rainy season

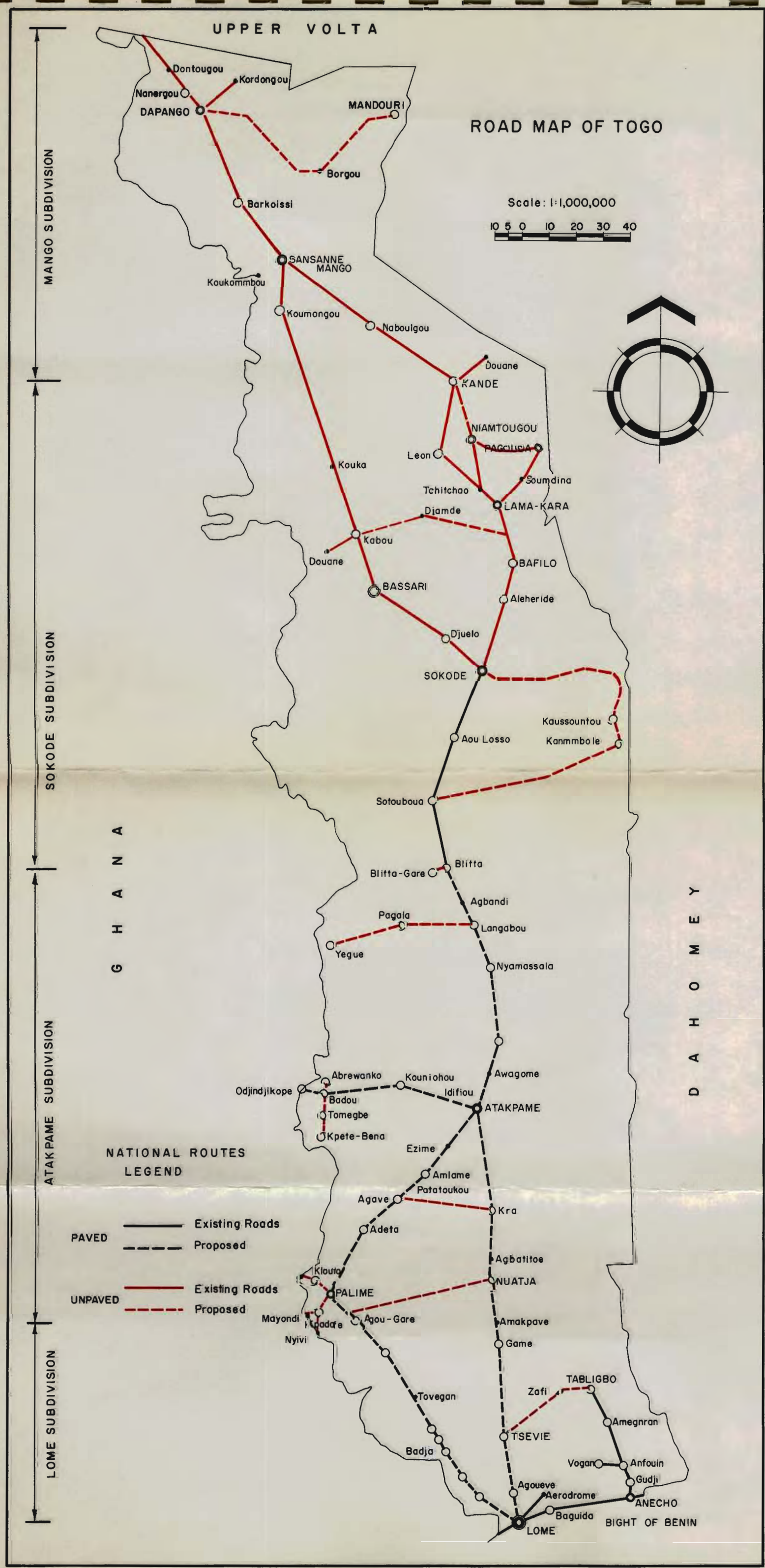
ROAD MAP OF TOGO
Scale: 1:1,000,000
10 5 0 10 20 30 40
UPPER VOLTA
GHANA
DAHOMEY
BIGHT OF BENIN
MANGO SUBDIVISION
SOKODE SUBDIVISION
ATAKPAME SUBDIVISION
LOME SUBDIVISION
Dontougou
Kordongou
Nanergou
DAPANGO
MANDOURI
Borgou
Barkoissi
SANSANNE MANGO
Koukommbou
Koumongou
Naboulgou
Douane
KANDE
NIAMTOUGOU
PAGOUDA
Leon
Kouka
Soumdina
Tchitchao
LAMA-KARA
Djamde
Kabou
Douane
BAFILO
BASSARI
Aleheride
Djuelo
SOKODE
Kaussountou
Kanmmbole
Aou Losso
Sotouboua
Blitta
Blitta-Gare
Agbandi
Pagala
Langabou
Yegue
Nyamassala
Awagome
Abrewanko
Kouniohou
Odjindjikope
Badou
Idifiou
ATAKPAME
Tomegbe
Kpete-Bena
Ezime
Amlame
Patatoukou
Agave
Kra
Adeta
Agbatitoe
Klouto
NUATJA
PALIME
Mayondi
Kpadore
Agou-Gare
Amakpave
Nyivi
Game
TABLIGBO
Zafi
Tovegan
Amegnran
TSEVIE
Badja
Vogan
Anfouin
Gudji
Agoueve
Aerodrome
ANECHO
Baguida
LOME
NATIONAL ROUTES
LEGEND
PAVED
Existing Roads
Proposed
UNPAVED
Existing Roads
Proposed

TABLE IV-2

LIST OF ROADS IN TOGO
(1966)

Class I (up to 15 ton loads) Bituminous surface		
Aflao-Hillah-Condji	50 kms.	
Blitta-Gare-Sokode	82 kms.	
Anfoin-Vogan	10 kms.	
Adjido-Anfoin	13 kms.	
Route Aerodrome	5 kms.	
Traversee Atakpame	6 kms.	
Traversee Palime	4 kms.	
Anfoin-Tabligbo	34 kms.*	204
Class II (up to 6.5 ton loads)		
Lome-Blitta	277 kms.	
Sokode-Frontiere, Hte. Volta	369 kms.	
Lome-Palime	123 kms.	
Palime-Atakpame	106 kms.	
Atakpame-Badou	90 kms.	
Palime-Kametonou	22 kms.	
Palime-Kpadape-Nyivie-Klosiam	28 kms.	
Sokode-Bassari	57 kms.	
Lama Kara-Ketao - Limite Dahomey	27 kms.	1,099
Class III (up to 1.2 ton loads)		
Badou-Odjindjikope	10 kms.	
Badou-Kpete-Beno Kmite-Ghana	23 kms.	
Badou-Abrewanko	3 kms.	
Bassari-Mango	142 kms.	
Tchitchao-Niamtougou	24 kms.	
Koumea-Sio-Kawa-Pagouda	15 kms.	
Niamtougou-Defale-Kande	30 kms.	
Sokode-Kambole	76 kms.	
Mango-Koukombou	11 kms.	
Dapango-Korbongou	13 kms.	
Deutougou-Korbongou	9 kms.	
Bretelle	3 kms.	
Unclassified district roads	3,000 kms.	3,359

* Anfoin-Tabligbo road formerly an earth road was paved in 1966

SUMMARY:	Class I	204 kms.			
	Class II	1,099 kms.			
	Class III	3,359 kms.	TOTAL	=	4,662 kms.

Despite Togo's relatively small land area and high population density as compared with other West African nations the kilometers of road per 100 square kilometers of area in 1963 - the last year for which comparative data were available - was very low. Of the 14 West African states studied, only five - Guinea, Mali, Liberia, Mauritania and Niger have fewer kilometers of road per 100 square kilometers and the population per square kilometer of these five countries is at least 50 percent lower than that of Togo. Thus, even by West African standards, the current road system in Togo is relatively limited.

TABLE IV-3

BASIC HIGHWAY STATISTICS - FOURTEEN WEST AFRICAN STATES (1963)

Country	Paved Roads kms.	Total Road length-kms.	Area Km^2 ('000)	Kms. of roads/'000 $km.^2$	Vehicle Registrations (excl. motorcycles)	Population per vehicle
Togo	206	2,790	56	4.98	7,700	187
Dahomey	524	6,163	116	5.31	7,500	258
Gambia	153	1,175	10	11.70	2,700	99
Ghana	3,475	28,627	238	12.00	44,721	150
Guinea	-	7,607	246	3.09	18,000	143
Ivory Coast	894	32,128	322	10.00	37,000	84
Liberia	137	1,915	111	1.73	9,000	143
Mali	725	11,946	1,204	0.992	9,000	455
Mauritania	6	5,603	1,086	0.516	4,130	155
Niger	129	7,237	1,267	0.571	5,000	540
Nigeria	12,407	73,252	924	7.93	72,229	421
Senegal	1,236	13,008	197	6.60	47,000	63
Sierra Leone	406	6,385	72	8.87	13,604	180
Upper Volta	60	16,712	274	6.10	9,529	462

SOURCE: International Road Federation, Highway Expenditures, Road and Motor Vehicle Statistics for 1963.

NOTE: These data are derived from different sources than those referred to in this report, however, all data are assumed to be internally consistent. The population data used to compute vehicle statistics are based on information in Table I-1, in the Introduction.

Togo's principal highway artery, though not its most heavily traveled highway, is the road from Lome north to the Upper Volta border. This road passes through all regional capitals which include Lome itself in the Maritime Region, Atakpame in the Plateau Region, Sokode in the Central Region and Mango in the Savanes (Steppes) Region. As mentioned previously however, the most heavily traveled highway is along the coast between Lome

and Anecho. Other important road segments include those from Lome to Palime and from Anecho to Tabligbo. Roads connecting major centers but which are in less than satisfactory condition, include those between Atakpame and Palime, Atakpame and Badou, Sokode and Bassari and Lama Kara and Ketao.

The official classification of roads into Class I, II and III as described in Togo's Economic Inventory, 1964 (1965 publication), is based on permissible loads. In fact, as the Consultants discovered, this classification provides no indication of the quality of a specific road. The Consultants have, therefore, used the categories "paved", "improved" and "earth track" as more indicative of actual road conditions in evaluating the Togolese road network and preparing current user costs of operating on each type of facility.

2. Organization

The maintenance of the national highways is under the jurisdiction of a Chief Engineer in each region. The district roads are the responsibility of the local district administrator. In addition, there is a highway department in the City of Lome which has charge of municipal streets (see Appendix A). Other municipalities having a district administrator who technically has the responsibility for district roads, actually rely on the regional district engineers to provide maintenance services. Much of the district kilometrage is in such poor condition that many communities are isolated or can be reached only on foot, particularly during the rainy season. During interviews with commercial truckers, for example, it was indicated that they refuse to take cargo to some of the more remote parts of the country because of the extremely bad road conditions.

3. Traffic Counts

TABLE IV-4

AVERAGE DAILY TRAFFIC COUNTS AT SELECTED STATIONS

Road Section	Total Vehicles per Day		
	1960	1962-63	1966
Lome-Anecho	1,000	980	1,674
Lome-Tsevie (Agueve)	150	300	684
Atakpame-Blitta (Agbandi)	50	45	50
Blitta-Sokode	75	90	105
Mango-Dapango	50	15	22
Palime-Atakpame (Sodo)	150	65	117
Sokode-Bassari	25	15	22
Lame Kara-Ketao	25	30	51
Palime-Kdapdafe (Ghana)	50	n. a.	108
Lome-Palime (Badja)	n. a.	60	72
Sokode-Lame Kara (Aleheride)	n. a.	65	76
Mango-Lama Kara (Kande)	n. a.	20	15

SOURCE: Transportation Reconnaissance Survey Team Final Report, 1961, SEDES (1962-63) and Ministry of Public Works (1966)

The above data are not necessarily comparable as traffic counts were not taken at the same time each quarter or year. Nevertheless, they are sufficient to indicate that there has been some growth, particularly in the Lome area.

It will be noted that the traffic volumes recorded by the count stations range from a nominal amount on some roads to approximately 1,700 per day along the heavily traveled Lome-Anecho road.

The data however, clearly indicate that for most of the country the traffic volume is extremely low, usually under 100 vehicles per day. Approximately 50 to 80 percent of the road users are trucks, passenger vehicles being more frequent in the Lome area and becoming proportionately fewer in the rural sections. There are virtually no long distance buses within Togo, but there are small buses and vans (camionettes) which are used for localized passenger traffic.

Atakpame - Blitta Section of North - South Road

This road approaches the ideal as far as maintenance is concerned. Shoulder is not well-marked but ditch is cleared and undergrowth does not encroach on traveled way.

The most typical freight and mixed transport vehicle in Togo is the 5-ton diesel truck. The Renault "Dindon" van is the most common light truck and carries both passengers and light freight.

Private vehicle traffic is mainly limited to urban trips or short trips between Lome and the principal towns in the south. The majority of all non-urban automobile traffic were taxis with the Peugeot 404 "Familiale" model by far the most common vehicle employed.

4. Vehicle Registrations

Table 5 provides data on motor vehicle registrations for the period 1960-1964. It will be noted that the number of vehicles registered per year has not grown in recent years but has fluctuated at about 900. The total of 5,813 vehicles (6,048 including special vehicles) as of January 1, 1965 does not reflect the number of vehicles actually in operation at that time as some had been scrapped or were out of the country. Furthermore, of the 5,813, 1,212 are government operated and another 137 belong to the diplomatic community.

TABLE IV-5

VEHICLE REGISTRATIONS IN TOGO - 1960-1964

Type of Vehicle	Year					Adjust-ments	TOTAL
	1960 (b/fwd)	1961	1962	1963	1964		
Motorcycles							
Government	17	12	-	19	11	-	59
Private	135	48	56	101	120	4	464
Special	-	1	2	-	-	2	5
TOTAL	152	61	58	120	131	6	528
Passenger Automobiles							
Government	144	8	52	38	53	1	296
Private	864	350	429	336	339	5	2,323
Special	40	37	66	86	58	51	338
TOTAL	1,048	395	547	460	450	57	2,957
Commercial Vehicles							
Government	310	103	95	115	76	2	701
Private	710	255	221	168	201	13	1,568
Special	8	4	11	4	20	12	59
TOTAL	1,028	362	327	287	297	27	2,328
TOTAL - THREE CATEGORIES	2,228	818	932	867	878	90	5,813

SOURCE : Inventaire Economique, 1964

Table 5 does not include the following vehicles registered in 1964:

Buses	25
Special Commercial Vehicles (unclassified)	12
Tractors	137
Trailers	28
Semi-trailers	23
Other non-classified	10
TOTAL	235

In addition, registrations were reported for 1965 as follows:

Motorcycles	8
Private Automobiles	550
Commercial Vehicles	352
TOTAL	910

TABLE IV-6

VALUE OF MOTOR VEHICLE IMPORTATION - TOGO
1960 and 1965

	1960 ('000 CFA fr.)	1965 ('000 CFA fr.)	Rate of Growth	
			Total	Per annum
Passenger vehicles (including taxis)	167,991	299,945	78.5	12.2
Trucks and vans	182,212	249,413	36.9	6.5
WEIGHT	Metric Tons	Metric Tons		
Passenger vehicles	497.7	747.8	50.3	8.5
Trucks and vans	703.6	805.8	4.5	2.75

SOURCE: Republic Togolaise, Bulletin de Statistique 1961, No. 8
" " " " 1966, No. 5

From these data it appears that vehicle imports have only been growing at a rate of about 8.5 percent a year for private vehicles and 2.75 percent for trucks though this is not indicative of similar rates of growth in

registrations. These import figures compare with an anticipated 5.6 percent per annum estimated rate of increase in GDP. It is likely, however, that the road system in its present state does not encourage the excessive use of automobiles beyond the Lome area. Furthermore, the rise in purchasing power of Togolese (except for Government officials) does not appear sufficient to anticipate any major increase in the growth of automobiles outside of Lome at the present time.

Unfortunately, the only available data on vehicle importation is classified according to weight of vehicle and duty paid. There is no record of actual number of vehicles imported. Thus the above data gives only a general indication of growth in vehicle imports and registrations. Table 5 shows a rise in vehicle registration from 2,228 in 1960 to 5,813 in 1964, or an annual rate of growth of 27.5%. However, these figures do not include deductions for scrapped vehicles since they include all registrations (issue of license plates) which are made on a once-per-vehicle basis. If we assume an average 3-year life for all vehicles and deduct 742 vehicles (one-third of the 2,228 vehicles registered in 1960), we obtain the following vehicle registration figures net of scrapped vehicles.

Year	Percent Increase	Annual Increase	Vehicles Scrapped	Net Increase	Total
1960					2,228
1961	3.4	818	743*	75	2,303
1962	8.2	932	743*	189	2,492
1963	5.1	867	743*	124	2,616
1964	4.2	878	768**	110	2,726

* = 1/3 of 1960 registration total
** = 1/3 of 1961 registration total

This amended data gives an annual growth rate of 5-1/4 percent which probably more closely approximates actual growth. However, no truly accurate indication of the rate of total vehicle growth can be obtained from existing data. Registration fees and charges data are equally inaccurate.

5. The Fleet of Vehicles

(a) Sources of Information - Two main sources are available for obtaining information on the number and kind of vehicles circulating in Togo, these are the records of registrations and the fiscal records of sales and licenses. These two sources are official, however, they cannot furnish valid information on the fleet at any given time.

According to SEDES,[13] "The registration of a new vehicle, or the change of registration of a second-hand vehicle, are recorded in files kept by the subdivisions of the Administration of Public Works. The grey card mentions the name of the owner, the place of registration, and the technical characteristics of the vehicle (weight, payload etc.). One copy of the grey card is filed with the Statistical Service."

On the surface this system of recording registration appears reasonable, however, cards of vehicles withdrawn from circulation are not withdrawn from the files with the result that current total registration according to the Administration may at any time be grossly overstated or at least highly inaccurate.

(b) User Taxes - The Government of Togo places the following import duties on all imports of vehicles, parts and fuel.

TABLE IV-7

IMPORT DUTIES ON VARIOUS USER COST COMPONENTS

	Percent Duty on CIF Price
Trucks up to 10 tons	5%
All other vehicles	15%
Tires and Tubes	20%
Parts	15%
Lubricants	15%
Diesel fuel	5 CFA per litre
Gasoline	12.5 " " "

SOURCE: U. S. Department of Commerce

In addition to the above import duties, a sales tax of 15.71% is levied on all sales in the country. This tax is calculated on the basis of the gross sales price, including import duties.

However, current duties and taxes on vehicles, fuel and parts in Togo are significantly lower than most other areas of West Africa, Ghana for example.

(c) Motor Fuel Consumption Data - Additional data indicating the rate of gasoline and diesel fuel consumption in Togo are shown in Table 8.

13. SEDES, op. cit., p.117

Basic statistics are not officially broken down by types of users, but the Bureau of Mines has assisted in preparing estimates of the amount sold for highway purposes. The data show that while there has been only a modest increase in gasoline consumption there has been a great increase in diesel fuel consumption in the four years since 1961 - 2% versus 69%. Diesel consumption rose from 56% of gasoline consumption in 1961 to 92% in 1965. Moreover these statistics exclude amounts used by the largest consumers - the railroad, power station and phosphate mine. It is possible, however, that industrial users and small power plants consumption figures are included in the diesel fuel totals, therefore, the exact amount of diesel fuel used by road transport cannot be determined.

TABLE IV-8

MOTOR FUEL CONSUMPTION DATA (Cubic Meters)

Year	Gasoline	Index	Diesel	Index
1961	11,914	100	6,672	100
1962	10,957	92	6,580	99
1963	10,948	92	7,338	110
1964	11,435	96	9,486	142
1965	12,180	102	11,249	169

SOURCE: Public Works Department, Bureau of Mines

6. Bus and Truck Transport

There is little official information available about bus and truck transportation. There is no bus system, however twelve seat Renaults, Citroens and Rover vehicles typically are used in the municipal area in Lome and some larger trucks are equipped with wooden benches and used for intercity purposes. Except for the more frequented coastal routes (west to Ghana and east to Anecho and Dahomey), bus transport outside of Lome is subject to the hazards of poor road conditions, and breakdowns of vehicles are common. There are apparently no fixed schedules, although there were some in the past. Representative passenger fares are as follows:

Lome to Cotonou	350 CFA
Lome to Atakpame	400
Lome to Sokode	900
Lome to Dapango	1500
Lome to Niamey	2500

It will be noted that a few of these truck-buses operate the entire distance to the north of Togo as well as branching off into Dahomey and north to Niger.

Local passenger fares are as follows:

	Truck	Rail
Lome-Agueve (12 kms.)	50	35
Lome-Tsevie (35 kms.)	125	105
Lome-Baguida (14 kms.)	75	40
Lome-Anecho (43 kms.)	75	70

Where rail transport is available, it is used in preference to buses except along the coastal road.

Truck transport consists mostly of moving high bulk to value agricultural produce south to market and to export outlets. The SEDES study made several estimates of total tonnages for main road haulages. From this a net tonnage by trucks was estimated at about 240,000 tons with an average load of 1.6 tons per vehicle (trucks and vans). These data are for 1962 and an estimated increase of about 10 to 15 percent for the past three years brings the main road haulage to about 264,000 to 276,000 tons in 1965. This does not include east-west international traffic along the coastal highway for which there are no available estimates.

"Up" and "Down" traffic are the terms used for goods moving North or South respectively. The former consists predominantly of high-value to bulk imports and accounts for only about 25 percent of the traffic along North-South routes. In terms of volume, Southbound tonnage, including produce for export, makes up the other 75 percent so that there is a considerable imbalance of about 3:1 in the direction of traffic.

There are at present four commercial trucking enterprises as distinct from owner-operated enterprises in Lome. Trucking demand is largely seasonal with cocoa moving between October and January and coffee, peanuts and cotton between January and April. The balance of the freight consists of some imported goods, construction materials and general commerce. Most of Togo's truck operators do not own more than two vehicles. The largest transport company however, the SGGG, has a fleet of 29 trucks and operates as a general trading combine including retailing, wholesaling, warehousing, freight forwarding and transportation.

III. RAILROAD TRANSPORT

Table 9 shows some of the major railroad statistics for the Chemin de Fer Togolais (CFT).

TABLE IV-9

SELECTED RAILROAD STATISTICS
Chemin de Fer Togolais

Year	Revenues Freight (CFA Francs)	Revenues Passenger (CFA Francs)	Number Passengers '000s	Passenger Kms. ('000, 000s)	Freight* ('000 tons)	Ton Kilometers (1,000,000)
1950	66.9	87.2	1,486	57.7	138.7	12.3
1960	61.0	194.1	2,287	78.8	96.3	8.4
1961	46.9	208.4	2,342	82.4	59.7	6.3
1962	63.3	196.3	1,827	70.7	73.6	8.7
1963	55.2	197.7	1,835	71.9	78.2	7.0
1964	59.2	216.3	1,831	77.3	104.9	8.2

* Includes Baggage and Red Cross Supply shipments
SOURCE: Inventaire Economique de Togo, 1964

Freight traffic fluctuates with agricultural output - most of the tonnage consists of produce; cement and coal shipments, formerly carried in substantial quantities, have dwindled to negligible amounts.

Passenger traffic has levelled off in recent years at about 1.8 million per year. It should be noted that passenger traffic accounts for more than three-quarters of all revenues.

There are three principal lines: Lome-Blitta (276 kms.), Lome-Palime (116 kms.) and Lome-Anecho (44 kms.) giving a total of 436 kms. of main route. In addition, there are 55 kms. of branch lines, yards, dock connections, etc. The railroad is physically deteriorating and according to the SEDES report is one of the world's most expensive to operate at a cost of 21 CFA francs per ton-mile and 4.4 CFA francs per passenger kilometer. Except for the coastal road, the railroad has been protected in the past by lack of improved parallel highways and by improvement of the road between Blitta and Sokode which stimulated rail and truck interchange traffic at Blitta. However, the railroad is subject to an imbalance of nearly 3:1 (as is truck transport) in the volumes of south and northbound traffic; consequently the railroad typically sustains an annual operating deficit of over 200 million CFA.

Passenger transport by rail continues to be fairly popular, but the average trip is short (about 40 kms.). Typical passenger fares are shown below in CFA.

Route	1st Class	3rd Class
Lome-Tsevie	210	105
Lome-Atakpame	1,000	500
Lome-Blitta	1,600	830
Lome-Palime	715	355
Lome-Anecho		70

The railroad operation is to be phased out over the next few years under the Five-Year Plan as roads are improved and it is assumed that better bus transport will be made available to replace railroad passenger service.

IV. WATER TRANSPORT

One of the most important transport facilities in Togo is Port Lome which will be replaced by Benin Port in 1968. Table 10 provides statistics for the amount of traffic handled at present.

TABLE IV-10

SELECTED STATISTICS - PORT OF LOME

Year	Ships	Freight Discharged ('000 Metric Tons)	Freight Loaded ('000 Metric Tons)	Passengers Disembarked	Passengers Embarked	Value (millions CFA) Imports	Value (millions CFA) Exports
1950	224	46.9	60.5	2,242	1,951	30.7	18.1
1960	360	85.9	48.3	2,266	1,871	114.7	32.8
1961	364	86.0	57.3	2,475	1,882	116.2	37.0
1962	469	106.5	56.2	2,847	2,039	138.0	29.8
1963	477	103.8	53.4	2,565	2,883	140.1	32.3
1964	486	109.2	65.1	2,777	3,770	147.9	40.8
1965	362	116.5	56.7	2,314	1,670	160.2	39.6

SOURCE: Inventaire Economique du Togo, 1964 and 1965

The amount of freight and its value discharged has risen substantially while exports have remained fairly stable. To the extent that railroad tonnage has not changed significantly it can be assumed that most of the increase in imported tonnage is transferred to trucks for distribution in Lome and up-country. Bearing in mind that the traffic ratio of southbound to northbound traffic is nearly 3:1, and exports by sea make up only about one-half of the import tonnage, it must be concluded that only about 15 percent (or about 18,000 tons) of the imports are destined for points other than the Lome area. Since about one-third goes by rail, truck traffic generation of imports beyond Lome is therefore modest. Lome's harbor volume has declined somewhat since the opening of Port Cotonou in 1965, however, it is anticipated that much of the traffic will return to Togo when the new and more efficient facilities at Port Benin are opened in 1968.

A secondary port used for phosphate exports is at Porto Seguro (Kpeme). One of the local oil companies also uses this facility for the importation of petroleum products. Phosphate exports have risen from 57,000 tons in 1961 to over one million tons in 1965. From a transportation standpoint, this port operation is self-sufficient, and does not affect road traffic except for the growing community around the port and mine area. For import purposes (fuels), the phosphate pier is substantially under-utilized.

River and other inland water transport (for example, along Lake Togo) is local in nature and no traffic data are available.

V. AIR TRANSPORT

Lome International Airport is served by Nigeria Airways and Air Afrique with direct flights east to Cotonou and Lagos, West to Accra and north to Ouagadougou. There are 14 flights a week by these two lines. In addition, Air Togo contracts for round-trip service twice weekly to Sokode, Mango and Dapango. Another field exists at Tchitchao while an emergency field is planned for Atakpame. Table 11 provides data for air traffic at Lome Airport.

The table below indicates that foreign travel and transport to and from Lome has increased substantially and is likely to continue to do so, especially since the runway at the airport is to be lengthened in order to accommodate jet planes which are currently prohibited from landing.

TABLE IV-11

SELECTED STATISTICS / AIR TRAFFIC / LOME AIRPORT

Year	No. of Airplanes	Passengers		Passengers	Freight Tons		Mail Tons	
		Arriving	Departing	In Transit	Unloaded	Loaded	Unloaded	Loaded
1960	397	3,145	2,935	6,907	141.2	19.6	26.8	15.7
1961	340	2,875	2,461	3,371	170.0	30.0	37.7	9.2
1962	272	2,933	2,915	2,898	123.4	20.1	47.8	11.9
1963	439	4,192	4,767	2,936	115.7	56.1	35.5	14.4
1964	707	6,241	6,352	6,320	131.2	58.8	41.3	17.0
1965	725	6,867	6,939	10,938	163.2	76.8	67.1*	

*Combined total

SOURCE: Inventaire Economique du Togo, 1964 and 1965

For Togo's local airline no data are published. However, it was indicated that for the first six months of 1966 air passenger traffic averages were as follows:

	Passengers/Month
Lome-Sokode	13
Sokode-Lome	11
Lome-Mango	6
Mango-Lome	6
Lome-Dapango	6
Dapango-Lome	6
TOTAL	48

Information on freight or mail carried was not available, but amounts are minimal as the craft in operation is a 6-seat twin-engined Cessna. Flights to Dapango are frequently suspended because of rain and the runway is not usable when wet. In view of the low traffic density, local airfares are comparatively high; for example, the one-way fare from Lome to Sokode is 6,500 CFA, to Mango 10,000 CFA and to Dapango 16,500 CFA.

VI. TRANSPORT RATES AND COSTS

1. Trucking

In the absence of a definable truck transport system, only an approximate range of freight charges can be established. As typical truck operators

do not own more than two vehicles, the rates are dependent on scale of operation, type and distance of roads travelled, characteristics of freight (e.g. higher rates on cotton because of high bulk to weight) as well as on prices fixed by the government. Thus small contractors may charge 7 to 12 CFA per ton kilometer and larger operators charge 11 to 17 CFA. Their higher rates are presumably justified on the grounds of more dependable service. Official rates - not necessarily adhered to - vary from 6 to 12 CFA on main roads and 15-25 CFA on other roads. 20 to 25 CFA per ton kilometer on feeder roads is common.

A costing study by SEDES indicates a typical truck cost per ton kilometer of 9 to 10 CFA with the higher amount applicable to joint freight and passenger haulage.

In Chapter V of this report the analysis of user costs for a 5-ton diesel truck indicates a per ton kilometer cost of 7.7 FCFA including taxes, for a full load over all types of roads. Even assuming operation at only 50% of capacity, it is clear that commercial trucking is relatively profitable in Togo.

Passenger or mixed haulage is generally more profitable since it is usually on a two-way basis and less seasonal than freight.

2. Railroads

The railroad tariff for freight is broken essentially into two classes - express and ordinary. There are, however, a further 19 classifications covering specialized commodity groups. All freight charges are computed on a distance basis.

In 1962, the railroad operated at a loss of 219 million CFA francs and the following selected income and expenditure figures for the same period will give some indication as to the reason:

	Cost	Revenue
Passenger/km.	4.4 CFA	2.56 CFA
Baggage & Express Freight/ton km.	33.7	22.20
Ordinary Freight/ton km.	21.0	7.96

SEDES concludes that the Togolese railroad is the most costly to run in the whole of Africa and probably in the world. The deficit is absorbed largely by wharfage charges at Port Lome.

Under present conditions, railroad costs per ton kilometer are more than twice those of trucking. For comparison purposes, some representative freight rates are shown in Table 12.

TABLE IV-12

SELECTED FREIGHT RATES (CFA PER TON KM.)

	Rail Express		Ordinary Rail			Truck
Route	Class I	Class III	Class I	Class III	Class IV	
Lome to:						
Atakpame	1,000	500	1,000	500	415	200
Tsevie	210	105		85		125
Blitta	1,655	830	1,650	830	690	
Palime	715	355			245	400
Anecho					70	

SOURCE: Field interviews

VII. TRANSPORT IN THE FIVE-YEAR DEVELOPMENT PLAN

The Five-Year Development Plan for Togo, approved in 1966, calls for the following investment targets:

1. Roads

(a) Paving of existing roads as follows:

TABLE IV-13

5-YEAR PLAN PROPOSED SURFACING
(Millions of CFA)

	1966	1967	1968	1969	1970	TOTALS
Lome-Tsevie	100	180				280
Lome-Palime	60	400	400			860
Tsevie-Blitta			160	580	600	1,340
Total expenditure on Road Works	160	580	560	580	600	2,480
Technical survey - Tsevie-Blitta	135					135
Total expenditure, work and plans	295	580	560	580	600	2,615

SOURCE: Five-Year Development Plan, p.56

(b) Unpaved roads to be improved as follows:

TABLE IV-14

PROPOSED EXPENDITURE FOR EARTH ROAD IMPROVEMENTS (Millions of CFA)

Road Sector	1966	1967	1968	1969	1970	TOTAL
Dapango-Mandouri		13	40			53
Niamtougou-Kande				17	40	57
Lama Kara-Kabou		20	20	20	10	70
Sokode-Kambole-Sotouboua		20	60	60	60	200
Adele Highway	16	75	75			166
Agave-Haito					57	57
Nuatja-Palime				30	50	80
Tsevie-Tabligbo				34	50	84
TOTAL	16	128	195	161	267	767

SOURCE: Five-Year Development Plan, pp. 58-59
NOTE: This plan is considered to be part of rural development.

The program also proposes expanding the national highway system by 444 kms. by absorbing what is now part of the District road network.

(c) Equipment

Highway maintenance equipment requirements includes:[14]

"Additional equipment for the Public Works Department. A large volume of road work will be carried out by the Public Works Department, and at a later date Public Works sub-divisions will be responsible for maintenance of roads which were previously, in some cases, the responsibility of District administrations.

"These subdivisions will also assist District Administrations in rebuilding and maintaining roads, in particular by providing heavy equipment.

"All this work requires an increase in the Public Works Department's equipment, and a lot more earthmoving vehicles are required.

"The number of new vehicles required has been calculated on the basis of the existing equipment and the new work which the Public Works subdivision will have to carry out.

14. Five-Year Development Plan, p. 57

TABLE IV-15

PROPOSED HIGHWAY MAINTENANCE
VEHICLE REQUIREMENTS - FIVE YEAR PLAN

	Unit Price	Total Cost
	(Millions of CFA fr.)	
8 tanker lorries	2.4	19.2
8 tractors	0.7	5.6
4 road rollers (with tires)	0.8	3.2
12 motor graders	7.5	90.0
4 bulldozers	11.0	44.0
32 tip-trucks	7.0	28.0
4 cement mixers - 320 litre	1.7	54.4
2 compressors and drills (for mountain roads)	0.5	2.0
Store of spare parts		28.6
TOTAL in millions of CFA frs.		279.0

"This equipment is to be purchased during the first two years of the Plan so that the Public Works Department can carry out its tasks.

"It is to be distributed among the subdivisions and there will also be one or two mobile road-work units to carry out operations for the District Administrations."

(d) Summary

TABLE IV-16

SUMMARY OF ROADS AND BRIDGES PROGRAM
(Millions of CFA Francs)

	Expenditures per annum					TOTAL
	1966	1967	1968	1969	1970	
Tarred roads	295	580	560	580	600	2,615
Additional equipment	150	129				279
Earth roads made by PWD	16	128	195	161	267	767
Other works	20		5	40	45	110
District Roads	20	74	76	79	81	330
TOTAL	501	911	836	860	993	4,101
Work in progress	671	75				746

Total maintenance expenditures are budgeted at 277 million CFA per year for five years including 70 million CFA for depreciation.

2. Railroads

108 million CFA is programmed for railway capital expenditures for the 1966-70 period. The railroad deficit by 1970 is estimated at 30 to 130 million CFA francs.

These capital expenditures are required to keep the railroads in operation despite the fact that the whole system is to be phased out as soon as specific plans for replacing rail with road transport have been worked out. The EEC has been requested to furnish technical aid to advise the Togolese Government on the consequences of the phase-out and how it will be best to cope with resultant problems of road planning, coordination, unemployment, and other technical and administrative issues. The abandonment of rail service is likely to justify the surfacing of roads (Lome-Palime and Lome-Blitta in particular) to handle diverted traffic. Approximately 115,000 metric tons of freight and 1.8 million passengers a year (at 1965 levels) would be transferred to that road.

It has been suggested that minimum maintenance be provided for the proposed abandoned right-of-ways in the event that future mineral exploitation warrants reopening of the lines.

3. Water Transport

For the 1966-70 period, 60 million CFA francs and 3,088 million CFA francs have been allocated respectively for improvements to the existing wharf at Lome and construction of the new port facilities at Lome. The wharf operation will be abandoned once the Port becomes operational in 1968. The financial implications of the new port installations have already been discussed in Chapter III.

4. Air Transport

Expansion of runway facilities and raising the Lome Airport up to ICAO standards will account for 200 of 248 million CFA francs in capital outlays for aviation under the Five Year Plan. 30 million CFA is programmed for the improvement of airfields at Sokode, Mango, Atakpame, Tabligbo, Dapango and Bassari; and 18 million for miscellaneous works.

5. Summary

The total public investment allocated for transport is, therefore, as follows:

Transport Sector	Million CFA francs
Roads	4,101*
Rail	108
Water**	3,088
Air	248
TOTAL	7,545

* excludes all work in progress
** excludes 60 million CFA francs for wharf improvements

This represents 7,545 million CFA francs out of a total Five Year private and public investment program of 28,592 million CFA, or about one quarter of the total. The 28,592 million CFA includes an additional 2,060 million anticipated in the form of private transport investment (commercial truck operations, etc.) Thus, 33.6% of all investments under the plan are allocated for transport purposes. To the extent that the transport sector accounted for an estimated five percent of the GDP in 1963-1965, the Five-Year Plan indicates an ambitious program, both relatively and absolutely, to improve the infrastructure.

The entire Five-Year Program will, of course, depend on the realization of agricultural output targets, the earnings of foreign exchange and the amount of foreign aid, variables which cannot be fully assessed for the purpose of this report.

VIII. CONCLUSIONS

The state of transport in Togo leaves much to be desired. The railroad is run down and inefficient, roads are in disrepair, a new port is being constructed but it is likely to have considerable excess capacity. Before it is concluded that much needs to be done to improve transport conditions however, it must also be recognized that such improvements must be closely related to other development targets, particularly agricultural output. There is always a temptation to "overburden" a nation with infrastructure for a variety of reasons.

Present traffic volumes do not appear to warrant any major construction program of highways, except in the Southern portion where traffic is increasing

Combination Rail and Road Bridge on Main Road South of Blitta

and where there is an urgent need to replace the railroad. The differences in cost of operation between earth and asphalted roads do not seem to be as great as is often assumed and this study indicates a variation in operating costs of 11.5 to 31.5% between well-maintained paved and unpaved roads, while the SEDES study indicates a variation of 12 to 15 percent in operating cost between first and second class roads. These facts would indicate that a very substantial increase in traffic must be assured before any large scale road surfacing can be justified on an economic basis. Since Togo depends largely on agricultural output for its economic survival, the primary role of transportation must therefore be access. It would be disastrous if Togo were to institute a program of extensive transport subsidies, such as "Operation Hirondelle" in Dahomey.

It is obvious that Togo should have a highway system of sufficient quality to encourage all areas of the country to participate in its economic growth. This does not mean, however, that first class highways must be built because access can be adequate with reasonably maintained second and third class roads. Thus, emphasis needs to be on maintenance. Only when the volume of agricultural output increases to the extent that there will be a clear benefit in lowering transport costs can the allocation of resources for substantial improvements be justified.

It is inherent in Togo's Five Year Plan that road transportation is to be improved largely at the expense of railroad traffic. The primary emphasis will, therefore, be placed on improving the more heavily traveled roads in the southern portions of the country, with some extension of the network in the central and northern regions, by absorption of present District roads. These targets appear reasonable from a priority standpoint. Whether they can be achieved will depend on the capability of Togo to mobilize capital, and this, in turn, will depend on the success of increasing its output of primary resources.

CHAPTER FIVE

HIGHWAY MAINTENANCE IN TOGO

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CHAPTER FIVE

HIGHWAY MAINTENANCE IN TOGO

I. PRESENT HIGHWAY SYSTEM, MAINTENANCE ORGANIZATION AND PRACTICES

1. Description of Present Road System

There are over 4,662 kms. of roads in the Republic of Togo. Of this total approximately 1,662 kms. are classified as "National Roads". The balance are "District Roads".[15] Of the National Roads network of 1,662 kms. only 204 kms. have bituminous surfacing. The remaining 1,458 kms. are earth roads, some of which have stone or gravel surfaces but many of which are unsurfaced.

The condition of the National Roads in 1961 is shown in Table I which was taken from the "Final Report of the Transportation Reconnaissance Survey Team".[16] The Consultants' survey indicates that the condition of the earth roads has not improved since 1961. There has been a gain, however, in the length of bituminous surfaced roads which increased from slightly over 100 kms. in 1961 to 204 kms. in 1966.

The alignment of these roads is, in general, quite good, following broad ridge routes and crests to minimize cross drainage problems, though there are instances where local realignment to reduce curvature or improve approaches to drainage structures could be made in the interests of safety. Gradients in the mountainous areas are satisfactory for the present traffic volume.

Earth roads are usually constructed with a width of eight to nine meters shoulder to shoulder, but grass has been allowed to grow on the shoulders in many instances so that the available roadway is barely wide enough for two vehicles to pass. Corrugations, longitudinal ruts and frequent potholes adversely affect driving comfort, safety and vehicle upkeep. Most bridges and culverts provide for only one-way traffic, lack guide posts and have rough approaches, all of which conditions present traffic hazards. Some bridges are single lane combined road and railway bridges, with inadequate sight distances and no warning devices.

15. There are some slight discrepancies in the total road kilometrage between the various data sources used in Togo. All kilometrage figures in this report are based on data from the 1965 Edition of the Inventaire Economique du Togo unless otherwise indicated.

16. ICA, Final Report of Transportation Reconnaissance Survey Team for the Republic of Togo, 25 January, 1961 - 25 April, 1961.

Existing ditches are too small, and are not adequately maintained, many being choked with grass, silted up to shoulder level, and too low in the ground to permit lateral drains to remove water from the roadway area. Maintenance generally consists of a grader pulling some material from the mid-point on the shoulder towards the center line. Grass contained in this material is removed by hand labor. The ditches are untouched. The gutter now formed on the shoulder acts as the runway for water draining laterally from the newly crowned road, until such time as traffic forms longitudinal ruts. The water then levels along these wheel tracks until it finally breaks out to one side or the other.

One factor inhibiting mechanical maintenance of roads is the practice of planting trees, usually Kapok or Teak, on the shoulders of the road. It appears that the Forestry Department resists attempts to have these trees removed. There seems to be no policy on right-of-way widths, access roads, etc. Where new highways are being built, the trees are being removed from within the roadway section, however the drainage on the new roads is inadequate and will result in heavy maintenance costs. Furthermore, right-of-way is too narrow, being limited to the construction width of the back-slopes.

An exception to the average road is the recently completed Anfoin-Tabligbo road. Shoulder-to-shoulder width is 8 meters, with a 3-1/2-to-4 meter wide surface treatment. The ditches are wide, being about 10 meters from center-line of roadway to toe of backslope. Apart from the narrow pavement, this is the only road in Togo adequately designed for drainage. However, even on this road grass is growing 8 to 10 feet tall on the shoulder slopes and the shoulders require oiling and maintenance.

The rainy season causes considerable damage to earth roads and to preserve them, the Director of Public Works has instituted the use of traffic barriers during the rainy season. The guards at these barriers are instructed to stop all vehicles with a total weight of three tons or more for four hours after each shower of more than thirty minutes duration. In the dry season traffic is slowed down by the dust raised by the vehicles ahead.

Structures usually have a load limit of 5.5 tons per axle and those over 6 meters long are built for single lane traffic. These shortcomings are the result of a lack of funds for new construction; however, the rainy season restrictions on the roads are needed because of less than adequate maintenance and while the traffic volume may not support the expenditure of funds for new construction, the existing roads should be maintained adequately to protect the present investment and facilitate the movement of goods and people.

Secondary Earth Roads

TABLE I

NATIONAL HIGHWAY SYSTEM

Road Section	Length Km.	Road Type		Bridges		Traffic VPD	Remarks
		Asphalt	Laterite	Permanent	Temporary		
Aflao-Hilakondji	50						
Zebe-Anfoin	10	60.3		2		1,000	Need asphalt resurfacing
Lome-Atakpame	167		167	15	4	150	Need added laterite
Atakpame-Blitta	112		112	11	8	50	
Blitta-Sokode	76	40	36	20		75	36kms. asphalt paving under way
Sokode-Mango	233		233	NA			Need added laterite
Mango-Dapango	80		80	2		50	Need added laterite
Dapango-Upper Volta	31		31	NA			Need added Laterite
Palime-Atakpame	103		103	14	6	150	Need added laterite
Palime-Lome	122		122				Need added laterite
Atakpame-Badou-Kedjebi	105		105	17	15		Need added laterite
Sokode-Bassari	61		61	3		2	Road in bad condition
Bassari-Radier-Lama Kara	82		82	1	13	25	In a very bad condition
Lama Kara-Ketao	27		27	3	1	25	In a very bad condition
Mango-Yendi	13		13	2		50	Bad condition (60 m. bridge built)
Palime-Kametonou	22		22	0	0	50	
Palime-Kpadape-Ghana	16		16			50	Bad condition
Kpadape-Nyive	9		9			50	Bad condition

2. Administration of Highway Maintenance

The Public Works Department of the National Government is responsible for road maintenance in Togo. Funds for the purpose are allocated from the National Budget for National Roads and from the District Budget for District Roads. Budget allocations for the maintenance of the National Roads are made consistently, but, judging from the state of the District Roads, allocations for maintenance of these roads are intermittent and grossly insufficient. The current (1966) maintenance budget for roads is apportioned on the basis of 70,000 CFA per kilometer for Class I (Bitumen) roads, 60,000 CFA per kilometer for Class II roads, and 50,000 CFA for Class III roads.

There is no Highway or Road Department in the Public Works Department as such. There is a Chief Engineer for Roads with two assistants in the Public Works Department Headquarters. The Republic is divided into four Divisions, each of which has one or more sectors. Each Division is administered by an engineer, who has two technical assistants, a Chief of Roads and a Chief of Buildings. Each Division has a pool of maintenance equipment, a workshop, etc., and is responsible for the maintenance of from 300 to 600 kilometers of National Roads.

The four subdivisions and the length of National or primary roads in each are shown below:

National Highways by Administrative Districts [17]

District	Surfaced-Bitumen	Earth	Total
Lome	115.5	297	412.5 kilometers
Atakpame	6.0	384	390.0 "
Sokode	85.0	451	536.0 "
Mango	-	318	318.0 "
TOTALS	206.5	1,450	1,656.5

17. Based on actual geographic districts in Togo, the Highway Distribution would be:

	Surfaced	Earth	Total
Lome	112	157	269
Atakpame	10	528	538
Sokode	82	438	520
Mango	0	335	335
TOTALS	204	1,458	1,662

SOURCE: Ch. IV-Table I.

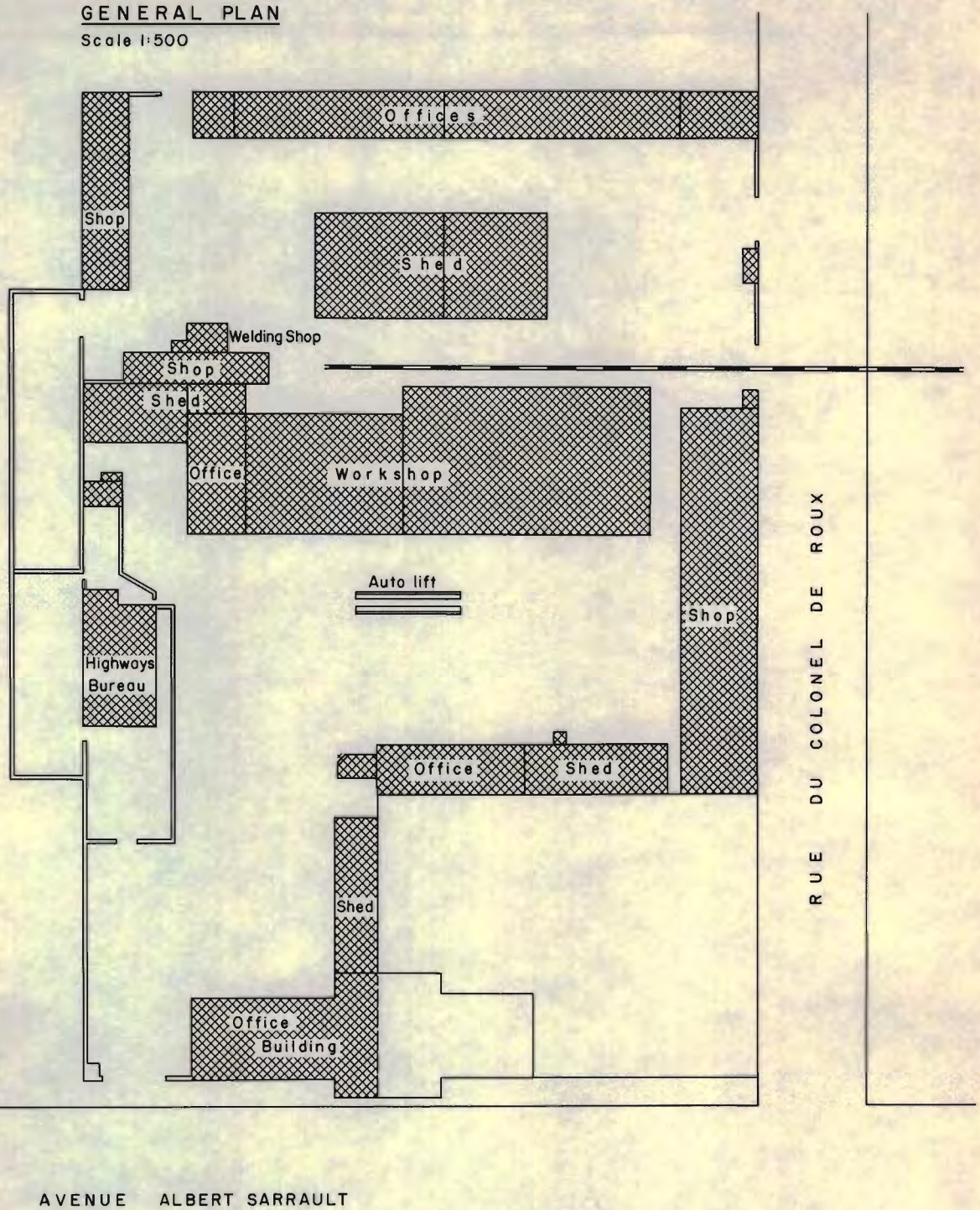
The figures appearing in the text are based on the report prepared by Mr. B. Dagadzi, Le Chef de L'Arrondissement Routes, Ponts et Aerodromes of September 8, 1966. The difference between these two sets of figures is accounted for by the following facts: (a) Administrative divisions are responsible for municipal streets which are not identical in the two lists; (b) The list above reflects administrative districts while census data reflects geographical distrib/utions. Responsibilities are divided on a geographical basis and some responsibilities overlap geographical boundaries. All calculations herein are based on administrative figures.

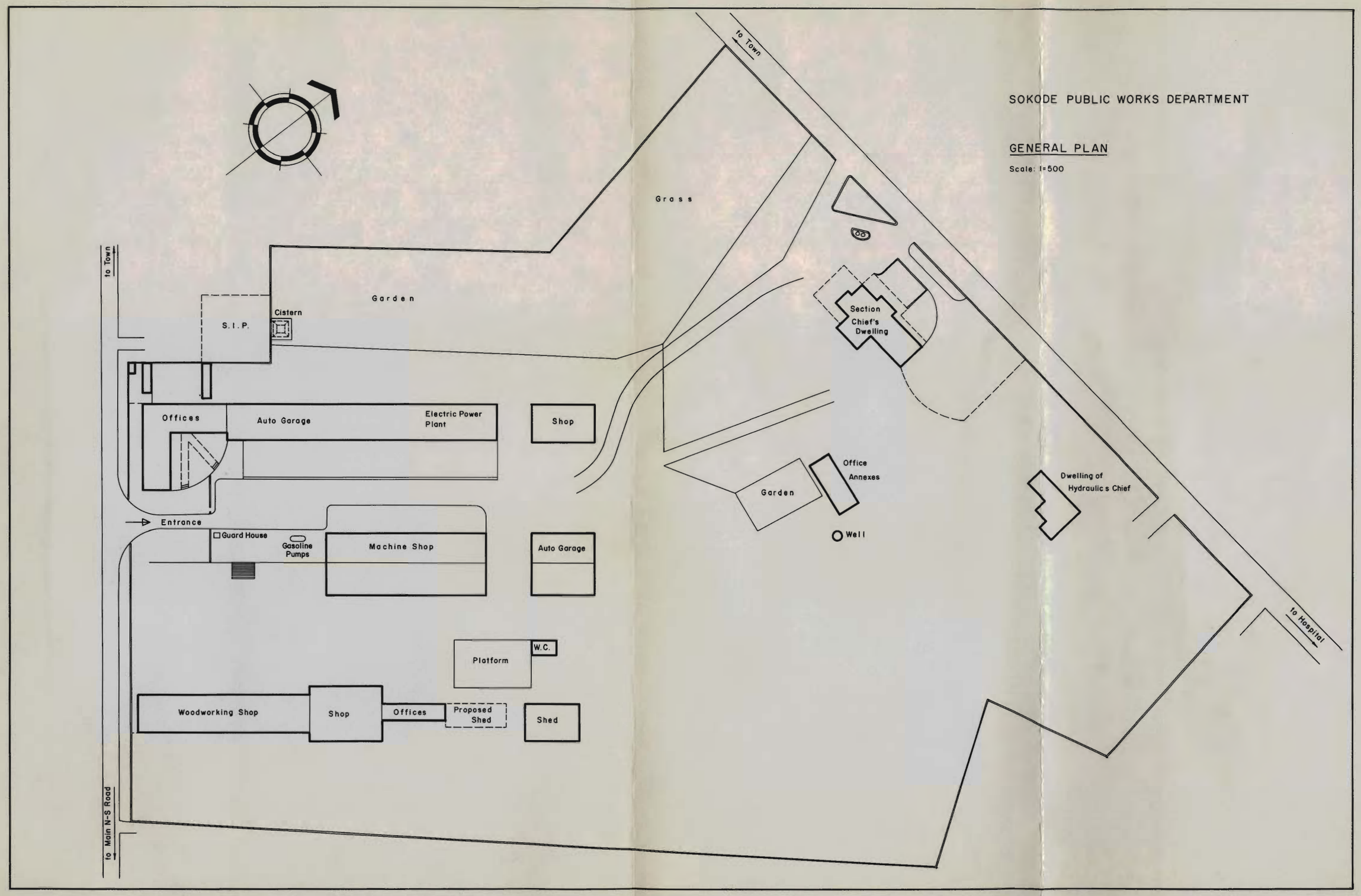
DEPARTMENT OF PUBLIC WORKS

SOUTHERN DISTRICT OFFICE – LOME

GENERAL PLAN

Scale 1:500




SOKODE PUBLIC WORKS DEPARTMENT
GENERAL PLAN
Scale: 1=500
to Town
Grass
Garden
Cistern
S.I.P.
Section Chief's Dwelling
Offices
Auto Garage
Electric Power Plant
Shop
Office Annexes
Garden
Well
Dwelling of Hydraulic s Chief
Entrance
Guard House
Gasoline Pumps
Machine Shop
Auto Garage
to Hospital
Platform
W.C.
Woodworking Shop
Shop
Offices
Proposed Shed
Shed
to Main N-S Road

Each Division is divided into sectors, headed by a "Sector Chief", with teams or gangs of eight workers for each section of road in the sector. These teams are under the direction of a Brigade Chief in each sector. The top level engineers and supervisors in the Department Headquarters at Lome and in the Divisions are competent and industrious. As there are only three engineers with sole responsibility for roads in the Department Headquarters and one in each Division, there are only seven engineers charged with the responsibility for maintenance and construction of the complete network of approximately 1660 kilometers of National Roads. With competent and skilled supervisors at the intermediate level this would not be an impossible task, however in Togo, as in most of the developing nations, there is great shortage of personnel in this category. As a result the highway maintenance program suffers from a lack of direction at the field or working level.

The total number of people employed in the road maintenance program varies seasonally and temporary unskilled laborers are employed to a large extent, dependent on the availability of funds and the seasonal needs. There is a fairly constant force of equipment operators and mechanics of approximately 106 equipment operators and truck drivers and 63 mechanics. In most cases the inspector at the Division level acts as a gang supervisor directing the work of one or more gangs of temporary laborers, depending upon the requirements of the Division.

3. Existing Road Maintenance Equipment and Facilities

A complete inventory of the equipment assigned to road maintenance in the Republic as prepared by the Public Works Department in August 1966 is shown in Annex I. It will be noted that while the total inventory amounts to a very substantial amount of equipment, a great number of the items are in poor condition or immobilized awaiting repairs for which, in many cases, spare parts are not available. This appears to be particularly true of the dump trucks. Admittedly many of these are quite old -- however, the whole system of equipment maintenance and spare parts supply could be improved. Private truckers, for example, appear to be able to keep a much larger percentage of their trucks running than the Public Works Department.

The assignment of equipment to the four Subdivisions of Lome, Atakpame, Sokode and Mango is also shown in Annex I.

Of the total inventory of seventy items of general equipment and forty-five trucks the Consultant considers that only fifty-five and twenty-two, respectively, are worthy of consideration as assets. These items are listed in Table V-2.

TABLE V-2

Existing Equipment Available for the Proposed Maintenance Program

Item	No. of Units		
	Operational	Repairable	Total
Motor graders	8	7	15
Bulldozers	4	2	6
Traxcavators	4	2	6
Motor scrapers	4	-	4
Farm tractors	11	2	13
Rubber tire rollers	7	-	7
Steel rollers	-	1	1
Other rollers	-	1	1
Trucks 2.5 C.M.	2	-	2
Trucks 4 C.M.	6	1	7
Trucks 5 C.M.	9	-	9
Water truck 5,000 litres	3	-	3
Asphalt distributor truck	1	-	1
Low loader 25 ton	1	-	1
Fork lift 5 ton	1	-	1

Major equipment overhaul shops are located at Sokode and Lome. The Sokode Shop is adequate for present requirements. The shop at Lome has recently been expanded and moved to a new site at the airport terminal. Only routine repairs are accomplished at the Atakpame and Mango Subdivision headquarters.

The Lome Shop has stocks of spare parts and supplies the other Subdivisions from its stocks. The warehouse at Sokode is an intermediate supply point for the Mango Subdivision. As one of the principal causes of lost or "downtime" of the equipment is the lack of adequate stock of spare parts or a responsive source of supply of these in the country, the Public Works Department hopes to increase the stocks at Lome and Sokode during 1967 and 1968 at a cost of 41 million CFA.

In addition to the Heavy Equipment repair shops at Lome, there is a Regional Equipment Training Center there which offers training in operation and maintenance of construction equipment. This school will have the capacity to train sixty mechanics and eighty operators per year by 1967.

4. Present Status of Maintenance

The present condition of the roads in Togo leaves much to be desired although the basic system is probably adequate for the volume of traffic if the existing roads were properly maintained.

From the Consultants' observations, it appears that equipment is used only on the primary roads, while the repair of secondary roads is performed by

Two Views of the Tsevie - Tabligbo Road

This road has not been repaired in two years. The upper view illustrates the drivers' habit of avoiding holes with resultant widening of the traveled way.

hand labor recruited from the villages. As a result, the latter are generally in very poor condition. Surface maintenance on these secondary roads consists mainly in placing large stones (approximately 6" diameter) in the ruts and gullies to make the roads passable.

On a field trip from Lome to Dapango the Consultants' team observed only one motor grader working on the road. Two tractors were seen towing a bundle of rails along the shoulder and along the center line of the road with the object of inhibiting the growth of grass. There were a few gangs of laborers cutting grass on the shoulders, and some were cutting shallow ditches from the road through the grass on the shoulders to the side ditches.

Although the primary roads are maintained in somewhat better condition than the secondary roads, their condition is still deplorable, and in many cases they are barely passable. When questioned, the Division Chiefs indicated that their main problem was insufficient funds to carry out the necessary maintenance in their Divisions.

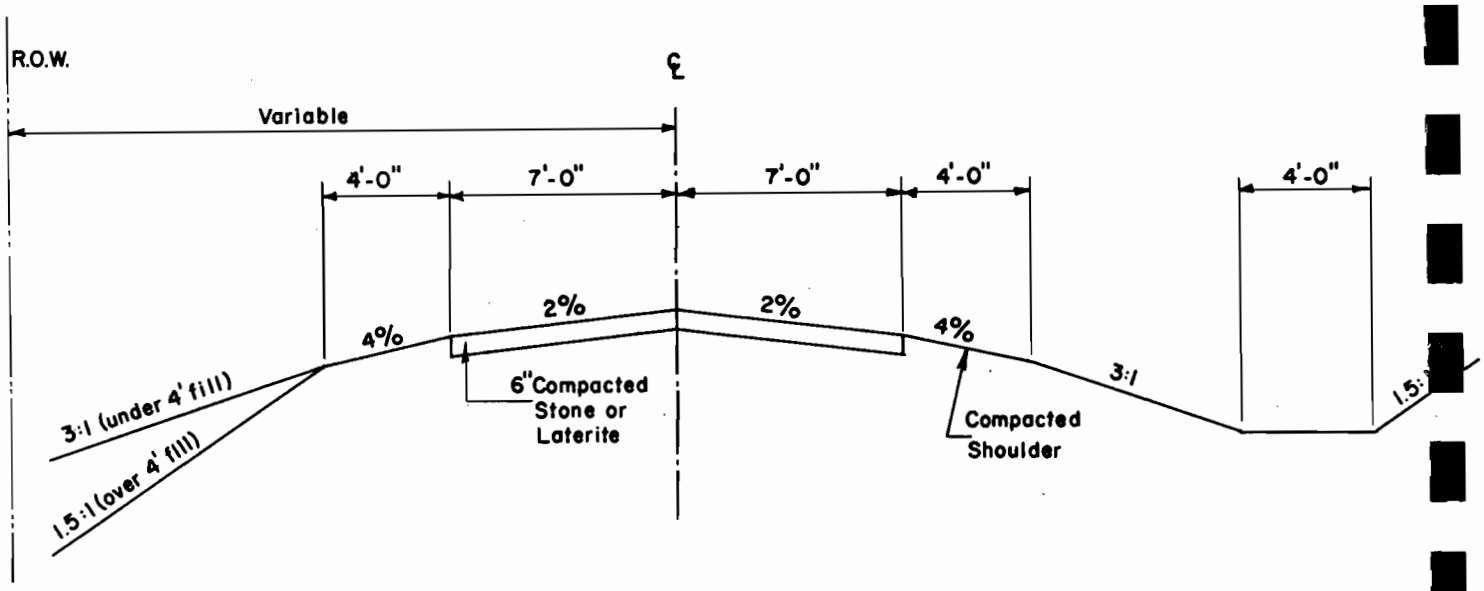
II. RECOMMENDATIONS

1. Design Criteria and Maintenance Standards

The series of photographs in this report illustrate the prevailing conditions on the roads in Togo. In addition to better maintenance, the earth roads especially require a considerable amount of repair and reconstruction to put them in such condition that a normal maintenance program will be effective.

Standard cross-sections, right-of-way widths and ditches must be adopted and adhered to in order to provide proper drainage and room for equipment to be effectively utilized in maintenance operations. In the roadway section proper, a minimum of 2% transverse slope from the center line of the roadway to the shoulder line should be provided. Shoulders should be compacted and have a minimum slope of 4%. The practice of allowing trees to remain in close proximity to the roads creates serious problems. The trees prevent the roads from drying out after rains and the entry of water into the subgrade is encouraged by the rain dripping from the branches. In addition, the roots of the trees severely damage the subgrade. Rather than encouraging the Forest Department to plant trees on the shoulders of the roads, a policy should be adopted to clear all trees within 50 feet of the center line of any road, and in the case of major arteries, 75 to 100 feet depending upon the width of the road.

A standard typical section for two lane, unpaved roads similar to that shown on page 60 should be adopted at once. New roads should be built to conform with this typical section and existing roads brought up to this standard by reconstruction and maintenance.



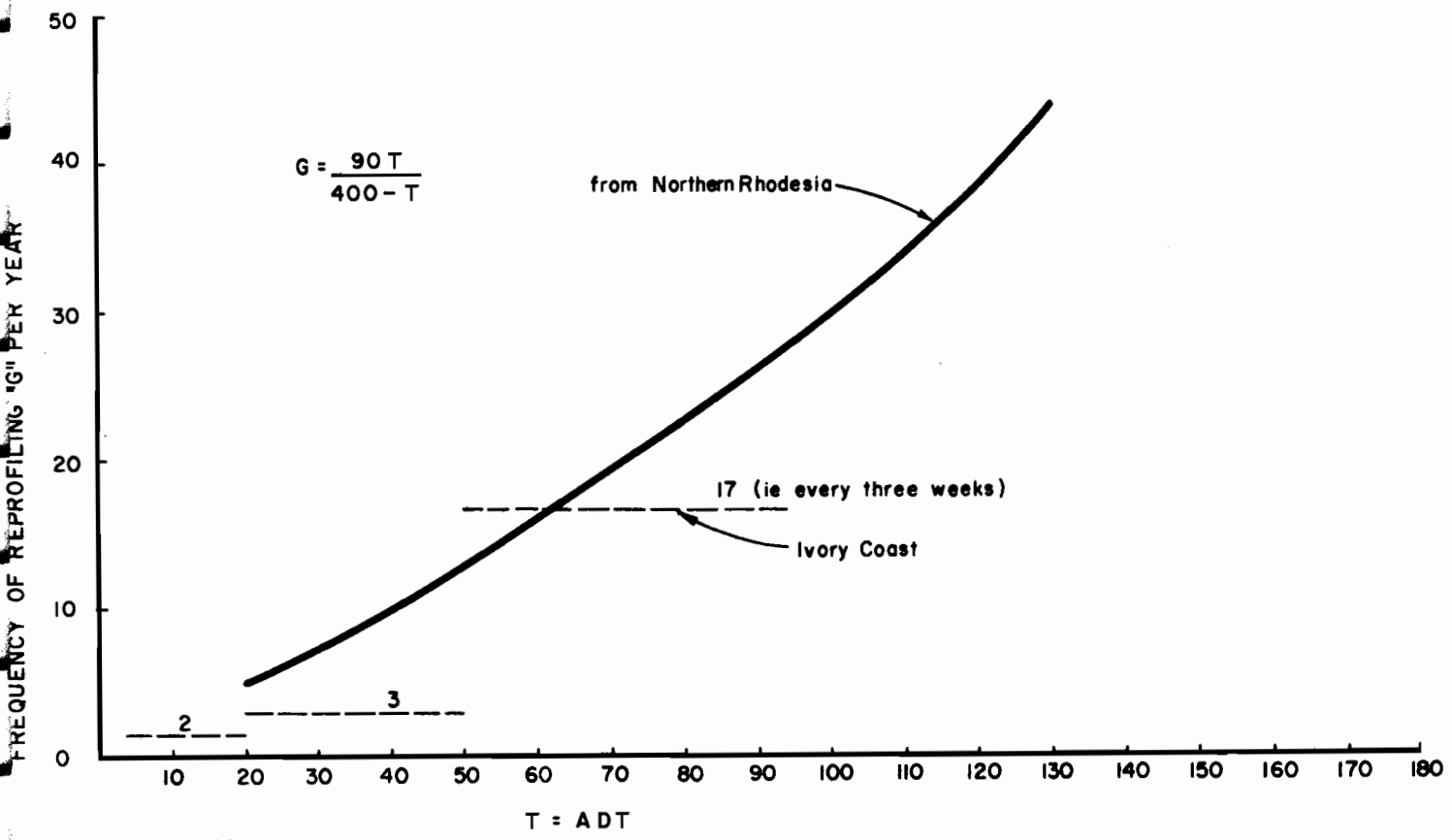
It will be impossible to provide all of the primary roads with the recommended six inches of laterite or stone surfacing immediately. Work can, however, begin at once on removing the grass from the shoulders and reprofiling the roads to provide sufficient crown for proper drainage, and adequate ditches to carry off the surface water. Another high priority item must be the removal of trees that encroach on the roadway, obstruct ditches and channels and create a safety hazard. A program of reconstruction of the roads in addition to normal maintenance operations should be put into operation. Such a program should be set up on a planned basis allowing for surfacing ten to twelve percent of the roads yearly. As suitable materials (stone and/or laterite) are available in practically all sections of the country, and adjacent to the roads, it is a comparatively simple matter to bring in borrow material to raise the road profile and replace material lost annually through storm damage, traffic wear-and-tear, etc. This operation will require a front-loader, grader, dump trucks, water truck, and compactor for each section of road to be repaired.

Daily maintenance efforts should be directed toward cleaning of ditches, improving drainage, grass-cutting and grading of the road surface to maintain sufficient crown and correcting corrugated or "wash-board" conditions.

The roads will require reprofiling at varying intervals depending upon the type of surface, the amount of traffic on the road, etc. The following chart shows the frequency of reprofiling of roads in the Ivory Coast and Northern Rhodesia as a function of the average daily traffic.

Two views of the Sokode - Blitta Road

This is a main road. Note tree-encroachment, failure of pavement at shoulder in top photo and overgrowth on shoulder and ditch in lower photo. Inadequate drainage and subbase failure are also apparent in the lower photo.



The frequencies indicated in this chart are extremely high when compared with results obtained in the United States. A recent study of highway maintenance in the State of Virginia,[18] for example, indicates that earth or gravel roads in that state are regraded an average of 3.70 times per year - their design and original construction was, however, of a higher standard than is prevalent in Ivory Coast or Togo.

The Consultant estimates that the roads in Togo will require approximately twice as many regradings per year. In the light of the Ivory Coast findings, this estimate would be conservative and it is considered that an average of eight regradings per year will approach the optimum consistent with budgetary and personnel limitations in the country.

A much greater effort must be put into road maintenance during the rainy season. The present state of most of the roads is such that very little machine work is possible during the period as water is retained in the roadway and shoulder areas due to wheel tracks, lack of crown, and generally poor drainage. As a result the surfaces do not dry out sufficiently between showers to allow the use of equipment. This condition is shown in the

18. Virginia Maintenance Study, 1963-1965, by Roy Jorgensen & Associates, January 1966.

photographs facing page 54. Once the roads are re-shaped as recommended on page 59, it will be possible to greatly reduce the work stoppages during the wet season as the surface of the roads should dry out sufficiently rapidly to allow work within a few hours after a storm. This will result in considerable economy as machine and manpower utilization can conservatively be expected to increase by 20 to 30 percent during the season. In addition to this savings, some additional economy can result from the fact that during the wet season graders and rollers can be put to work while the roads retain the proper amount of moisture for good workability thus reducing the requirements for water trucks during this period. It is therefore most important that work be started as soon as possible on re-shaping the roads to a satisfactory cross-section and profile.

Even though it is not possible to do much work with equipment during the rainy season with the roads in their present condition there is a great deal of hand work which can and must be done during the wet season to protect the roads from severe storm damage and prepare them for efficient machine work when they have dried out. Crews with hand tools can cut grass from the shoulders, remove trees where they are encroaching on the roadways, fill in large holes in the roadway surface to keep the roads passable, etc. Small crews can patrol the roads during the wet season to open up ditches and culverts which have become blocked and generally improve the drainage where necessary to prevent washouts and severe storm damage wherever possible. These same crews can also make repairs to bridges and other structures where necessary.

A considerable amount of maintenance effort is required on bridges and other structures, as well as patching of bituminous surfacing, cleaning of culvert inlets and drainage channels, filling of holes and repairing storm damage. Much of this would be done with equipment in a more developed country where labor costs are high in comparison with equipment costs. In Togo where the reverse is true these operations should be performed with hand labor wherever practicable. Reconstruction, re-profiling and regrading, on the other hand, cannot be performed by hand labor at an acceptable rate of production in view of the total number of kilometers of roads in the Togolese network, and machines must be provided for these operations. The average man days per kilometer expended on the maintenance of 8,883.7 miles of highways in Virginia, 7,453.8 miles of which were secondary roads, during one year (1 December, 1963 to 30 November, 1964) was 24 or one man for each 10 kilometers of highway, assuming 250 working days per year. The SEDES report points out

that the Director of Public Works for Togo in 1960 proposed the assignment of one laborer for every three kilometers with a foreman for every 14 laborers. In the U.S. where labor costs are relatively high and therefore highway maintenance procedures are very highly mechanized, the number of laborers employed per kilometer of highway to be maintained is much lower than is practical in Togo. Accordingly the deployment proposed by the Director of Public Works is considered realistic and obviously takes into account the economies resulting from the maximum use of relatively inexpensive hand labor and the minimum use of expensive equipment.

Consideration was given to the possibility of two-shift operation of equipment to further reduce the investment in equipment. While new construction of highways involving large quantities of earthwork or paving lends itself to multiple shift operation, maintenance operations do not, even in highly developed countries where there is no shortage of skilled supervisory personnel. The problems of logistics and organization are manifold in two-shift maintenance operations particularly if the work is performed over fairly long distances of road. First, operators, mechanics and supervisors must be scheduled and supplied in accordance with a firm schedule. Equipment must be serviced during the off-hours which means after dark and without supervision. At present the available equipment in Togo is not used effectively on a one-shift basis and it is considered that to attempt to organize and train sufficient personnel to effectively operate on a two-shift basis is not practical.

The recommended schedule for principal maintenance operations is as follows:

	Frequency per Year	
Operation	Paved Roads	Earth Roads
Reprofiling	-	4
Machine Surface	-	4
Grade shoulders & ditches	6	8
Mowing shoulders	2	2
Hand-cleaning ditches	2	2
Inspect structures	1	1

Surface patching, repairing storm damage and slides, repairing bridges and drainage structures, repairing guardrail are all part of a continuous process and cannot be scheduled on a regular basis given the present

condition of the roads in Togo. A major portion of the time of the recommended "one man per 3 kilometers" would be occupied in these items, even if the repair were limited to the most urgent cases. As the regular maintenance program and the use of the equipment becomes more effective, the general condition of the roads should improve to the point where regular schedules can be established for most of these items, although there will always be emergency repairs required to rectify unusual damage from storms, accidents and similar emergencies.

2. Highway Maintenance Organization Staffing

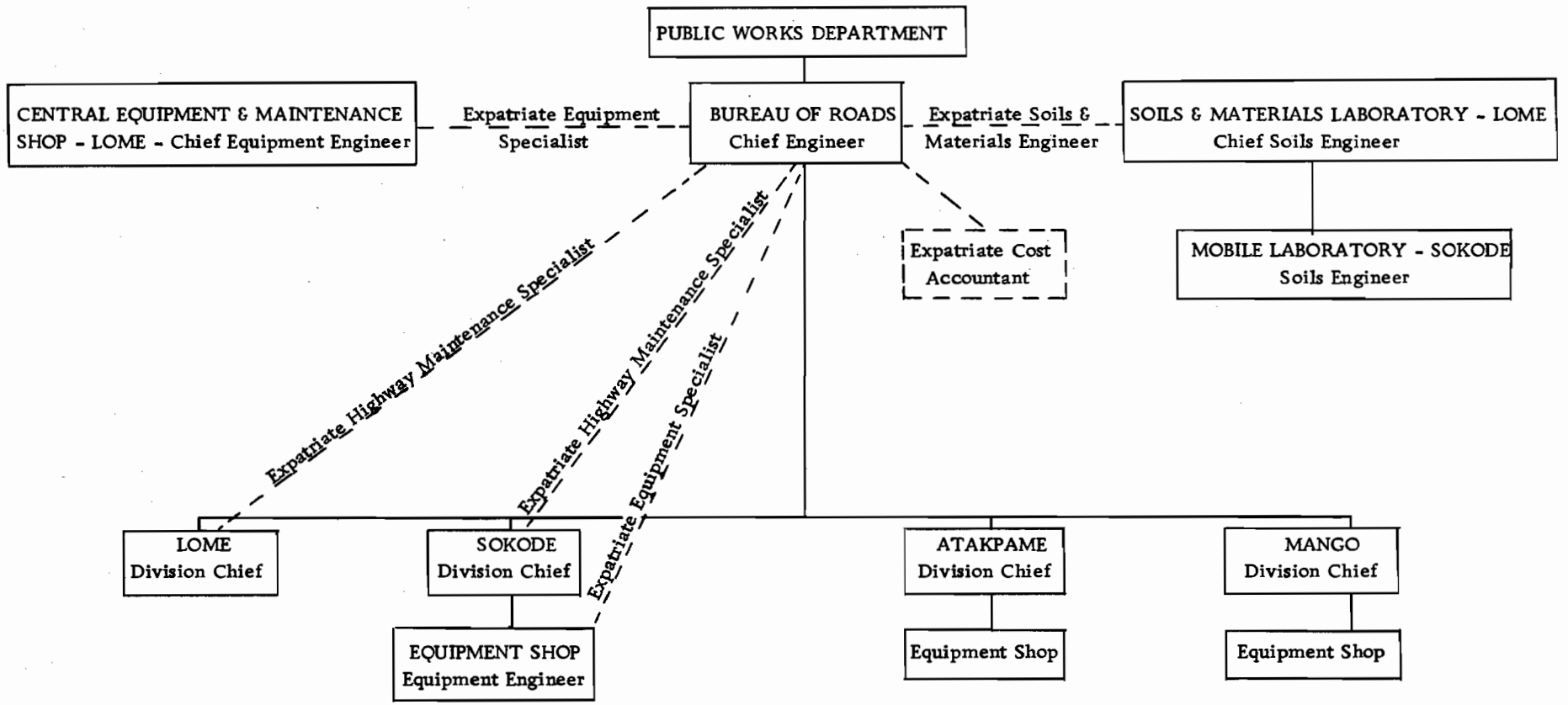
(a) Organization

The responsibility for the construction and maintenance of the highway system in the Republic is vested in the Public Works Department of the National Government. This is standard practice and should not be changed. The Public Works Department is also responsible for all other public works such as buildings, water supply, etc. The Chiefs of the Public Works Divisions at Lome, Sokode, Atakpame, and Mango are thus responsible for all public works in their Divisions, and the Division roads are only one of the many problems with which they are faced. The ideal organization would be to have a separate Road Bureau or Division in the Department of Public Works with Division or District Road Engineers in each of the four Divisions reporting back to the Chief of the Bureau in Lome. This type of organization would give direct line authority and responsibility for all of the roads in the Republic to the Chief of the Bureau. Due to the shortage of engineers and technical personnel in the country it is probably not practical to reorganize the Department of Public Works in this manner at this time. It is recommended, however, that this be considered for the future and that the present organization be retained but that more emphasis be put on the maintenance of the roads and the more effective use of the equipment available for this purpose. The accompanying chart shows in graphic form the above proposed organization together with the relationship of the expatriate advisers. As described earlier in this chapter there is presently a shortage of trained supervisors at the intermediate level. With the establishment of a realistic training program under the direction of the technical advisers, as recommended by the Consultant, this situation will be considerably improved. With sufficient qualified supervisors at this level the present organization should be adequate to administer and control a greatly expanded program of road maintenance.

(b) Equipment Maintenance Practices and Shops

The maintenance practices for the equipment currently owned and operated by the Ministry are seriously lacking in such areas as preventive maintenance scheduling and controls. Equipment was generally being operated

PROPOSED FUTURE HIGHWAY MAINTENANCE ORGANIZATION REPUBLIC OF TOGO



until it failed. There is an urgent need for a regular preventive maintenance program. Under such a program, at regularly scheduled intervals, equipment is given a thorough inspection and cleaning and any necessary repairs are made. The technical advisers proposed herein can introduce such a program which will be a major factor in increasing the annual operating time of both the current and proposed maintenance equipment. This is particularly important since, as pointed out earlier in this chapter, the Public Works Department expects to invest 41 million CFA in spare parts in the two year period 1967-1968 inclusive. These spare parts are to be used primarily in repairing road maintenance equipment presently out of operation.

The equipment shops at Lome and Sokode are adequate, however those in Atakpame and Mango are almost totally lacking in tools and shop equipment. The Consultants recommend an expenditure of 16 million CFA francs for the purchase of tools for these shops so that minor repairs can be handled there rather than in Lome or Sokode. This amount will also cover the cost of two field repair trucks with tools, welding sets, etc. which should be stationed at Lome and Sokode and sent out with mechanics into the Division as necessary to make repairs to equipment in the field. As there is presently a shortage of skilled workers and technicians[21] a request should be made for Peace Corps Volunteers to help fill this void while instructing the local people. In discussions with the Consultant, the local Peace Corps Director indicated his interest in recruiting volunteers to work with the District Commissioners on secondary roads.[22] Such volunteers, with guidance from the specialists recommended in Sub-section 3(c) of this chapter should work in the Divisions and Districts at the "grass roots" level. Their contribution in instructing the foremen and equipment operators, while working along with them, would be invaluable and every effort should be made to obtain the services of ten or twelve of these volunteers for assistance in road and equipment maintenance.

It is also recommended that a construction materials laboratory be established at the Public Works Department Headquarters in Lome and a smaller field laboratory at Sokode. Initially an expatriate Soils and Material Engineer will be required to assist in setting up the laboratory, training technicians and advising the Public Works Department engineers on the proper control of materials, compaction, field testing, etc.

The Regional Equipment Operators' School at Lome (Tokoin) has well equipped shops and, in addition to training operators and mechanics, should be called upon to assist the Public Works Department in maintaining the road equipment.

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21. The Director of the Lome Shop and Spare Parts Pool has in fact received training in both France and the U.S.A., as have several of the mechanics in the Subdivisions but the numbers of these trained personnel are limited.

22. The Training Center in Lome also proposes using 3 Peace Corps instructors, 1965 Annual Report, Heavy Equipment School Lome, Appendix V, p. 3

In addition to possible Peace Corps Volunteers there is a need for assistance by skilled specialists in equipment repair and maintenance and in highway maintenance. These specialists are needed to set up road maintenance and reconstruction programs for the road system, to provide assistance in training and organizing the mechanics and equipment operators, and in establishing realistic budget and costing systems, records and controls.

(c) Technical Advisory Group

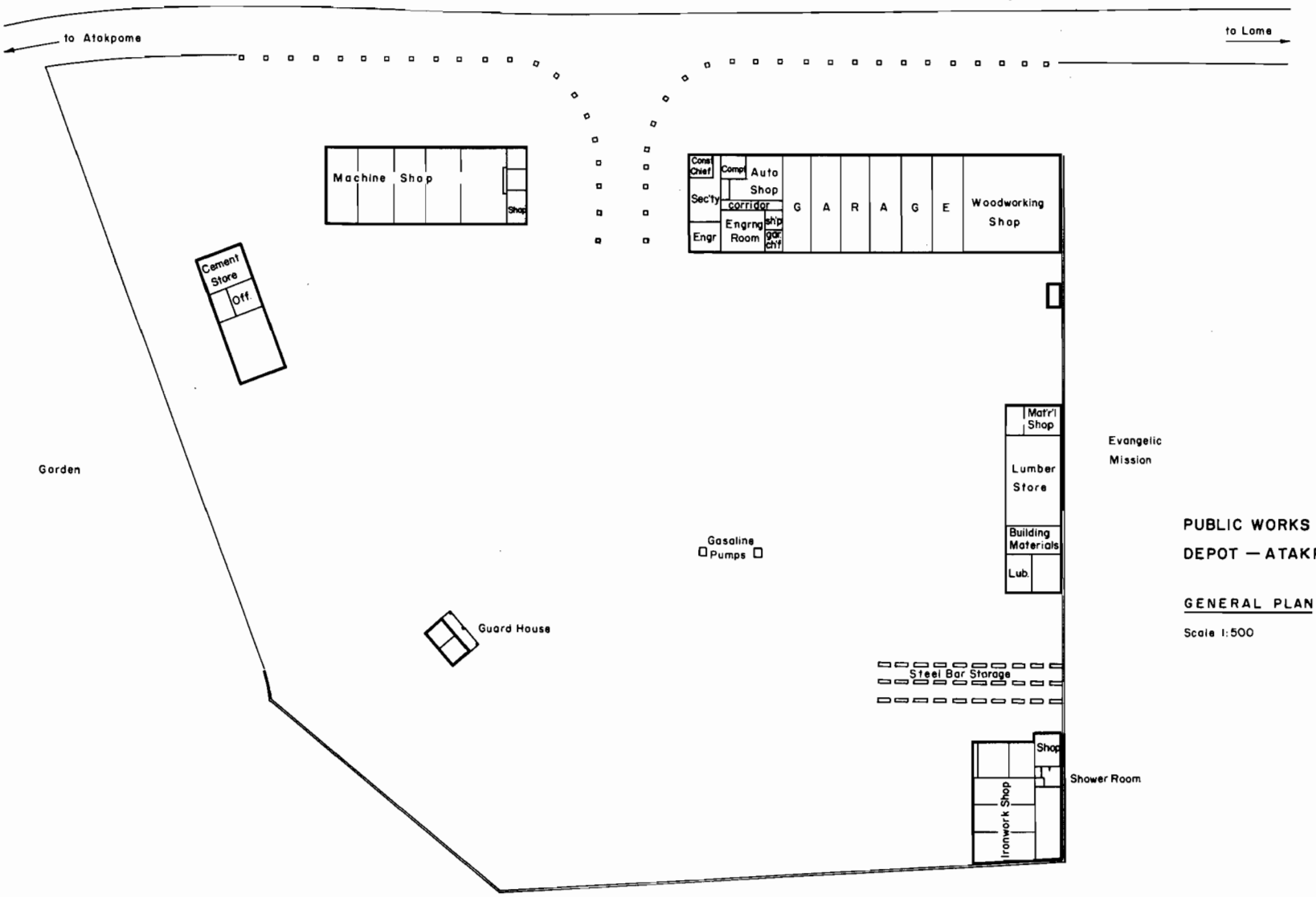
The Consultant, in the recommended administrative staffing of the maintenance program, has provided for the use in an advisory role of expatriate specialists.

The Consultant considers the use of technical advisers to be critical to the successful operation of the revised highway maintenance program in its formative stages. To manage and operate this new pool of modern, high performance equipment with its corresponding high capital investment on an efficient basis will require vastly improved management and maintenance techniques.

The Consultants' field trips in Togo revealed that a great many improvements could be made in areas such as maintenance shop layouts and proper utilization of equipment. These items have a most important bearing on the production that can be realized from the maintenance equipment on the job.

Modern highway maintenance equipment has undergone a series of drastic changes in design and fabrication in the past several years. These changes involve increased horsepower, automatic power shifts and fluid coupled transmissions, planetary axles, full hydraulic steering, hydraulic drives and complicated valve control systems for attachments. In addition, new equipment maintenance and lubrication techniques have been developed.

Thus, in view of the contemplated large capital investment in modern high performance maintenance equipment with related highly technical maintenance and repair requirements, the Consultant considers it mandatory that technical advisory assistance be obtained in the fields of equipment allocation, maintenance and repair, operations, training, and spare parts control. The Department can obtain the services of technical specialists from a management service firm, government agency (such as the United States Bureau of Public Roads), an equipment specialist group, a construction firm or a consulting engineering firm. The Consultant is reluctant to recommend any one of these organizations as being the best qualified to supply these advisory services, since all of them may be able to provide



PUBLIC WORKS DEPARTMENT
DEPOT — ATAKPAME

GENERAL PLAN

Scale 1:500

properly qualified personnel. The Consultant suggests that when the Department solicits requests for organizations to supply the expatriate specialists, careful consideration be given to the professional experience of the specialists proposed by each firm, as well as to the specific cost considerations.

The following staff would be required in addition to possible Peace Corps Volunteers:

(1) Highway Maintenance Specialists (2) - one at Lome and one at Sokode, can immediately set up maintenance programs and schedules for the four Divisions and instruct and assist the Public Works Division Engineers in carrying out these programs. They should also organize reconstruction projects giving the worst sections of the more important roads first priority.

(2) The Equipment Specialists (2) - one each at Lome and Sokode, will have a dual function: training operators in the proper use of the equipment, and training mechanics and supervisors in the proper maintenance of the equipment. Considerable effort must be expended in setting up equipment records, spare parts supply, and orderly procedures, and establishing systematic preventive maintenance and lubrication programs. These should be established and a concentrated training program instituted at once in order that there will be adequate trained personnel and established procedures prior to the arrival of the new equipment.

(3) The Cost Accountant (1) - should be attached to the staff of the Public Works Department Chief Engineer-Roads at Headquarters. His function will be to review and recommend improvements in the present system of road maintenance costing and records. He should also prepare budget requests, develop standards for maintenance costs for various operations and set up systems for comparing costs between Divisions.

(4) The Soils and Materials Engineer (1) - should be stationed in Lome but should spend a considerable amount of time in the field. His first objective should be the establishment of a soils and materials testing laboratory and the training of personnel to operate it. In addition, he should act as Consultant to the Public Works Road Engineers and maintenance supervisors to advise them in proper selection of materials for maintenance and reconstruction of roads and structures, compaction procedures, etc.

The cost of these outside Consultants is estimated to be $150,000 per year (36,750,000 CFA) including 7 million CFA per year in local costs.

(d) Construction Materials Laboratories

(1) Organization

Equipment, staffing, and support engineering capability should be most complete at the Public Works Department Headquarters at Lome. Lesser facilities, self sufficient for routine sampling and testing should be established in Sokode.

The main laboratory in Lome should have the following equipment capabilities:

(i) Minimum Capabilities

Soils	- Classification	
	- Compaction	
	- CBR	
	- Consolidation	
	- Field Density	
	- Field CBR	
Concrete	- Design Batching	
	- Strength Testing	
	- Aggregate Testing	
Bituminous	- Design Mixes	
	- Strength Testing	
Estimated cost including transport and installation		$12,500

(ii) Desired Capability

Soils	- Triaxial Apparatus	
Concrete	- Chemical Analysis	
	- Moisture Analysis	
Bitumen	- Bituminous material testing	
Steel	- Strength Testing	
Estimated cost of equipment including transport		$25,000

The field laboratory at Sokode should have the following capability:

Soils	- Classification
	- Compaction

Heavy Equipment Repair Shed - Mango

Vehicle Repair Shop - Mango

Central Court - PWD Mango

Soils (Cont'd.)	- CBR	
	- Consolidation	
	- Field Density	
	- Field CBR	
Concrete	- Strength Testing	
	- Aggregate Testing	
Estimated cost of equipment including transport		$10,000

The total cost of the required materials testing laboratory equipment to meet the above requirements, including transport and installation, is estimated as follows:

Lome	$37,500
Field Laboratory	10,000
TOTAL COST	$47,500
CFA =	11,637,500

(e) Training Program

In view of the relatively large investment represented by the proposed maintenance equipment purchases and the annual cost of operating and maintaining a pool of this magnitude, it is essential that the personnel be well-trained and the cost of such training is minor in comparison with the unnecessary damage to equipment arising from faulty maintenance, lubrication, repair and operating practices, a result of inadequate training of maintenance personnel.

The Consultant, therefore, recommends that a comprehensive training program be organized well in advance of the arrival of the new equipment. The curriculum should be set up at the existing Training Center in Lome and the senior staff of the Regional Equipment Operators' Training Center School in collaboration with the Department personnel and the expatriate Technical Advisers should develop the course of instruction, translate charts and manuals into the French and local languages, train instructors and supervise the program. Classroom work using visual training aids (charts, manufacturers' handbooks, etc.) should be stressed along with training in shop and field repair techniques, parts control, lubrication, inspection, etc. In this manner the fundamentals will have been covered prior to the arrival of the new equipment and the improved shop practices established and put into effect on the existing equipment. Additional personnel will be

required for the Central and Division shops as well as for the Division operating staff, and once hired they should participate in all aspects of the training program from its inception.

There are presently some one hundred drivers (equipment operators and truck drivers) and sixty mechanics in the Togolese Public Works Department. These people are distributed between the four operating Divisions (Lome, Sokode, Atakpame and Mango) and the Parc et Materiel (Equipment and Supply) Division at Lome. On receipt of the first year's increment of new equipment there will be some 110 pieces of equipment and with the receipt of the second increment this will increase to 140 units, consequently, in addition to the present crews who must be re-trained to upgrade their performance, new operators and mechanics must be trained.

Prior to the arrival of the first increment of new equipment, the incumbent operators and mechanics, numbering approximately 160, should be put through the training course. Another 125 to 150 operators and mechanics will be required after the arrival of the second increment of equipment. This staff must be phased into the training program as the first group phases out.

The Regional Equipment Operator's Training Center School cannot take on the entire load. The School does have some excess capacity, or will have upon completion of its expansion program, and should be able to train a number of top people, say 20 to 30, who can then carry on the program under the direction of the Technical Advisers. The training program will be a continuing activity, and after the initial effort, provision should be made for training at Division level.

In addition to training operators and mechanics, supervisors at the intermediate level, such as shop and job foremen, must be trained in the proper use and maintenance of the equipment, personnel administration, proper keeping of shop and job records, etc. The Training Center School can be of great assistance here, depending upon its workload, but the Technical Advisers will most probably have to take the lead in this endeavor as the most effective place for training at this level is on the job. The two maintenance specialists and the two Equipment Specialists must devote a major portion of their time to this training program, especially in the initial stages. Once a sufficient number of the top people have been trained they will then be able to assume responsibility for the program and the Technical Advisers will be phased out.

(f) Use of Private Contractors

The use of private contractors to provide road maintenance services was considered by the Consultants, however this is not recommended as a substitute for a well-organized and well-equipped road maintenance Division in the Public Works Department. There is a shortage of skilled labor and of

maintenance equipment in the Republic and there are few, if any, private contractors capable of taking over the proposed program. Except for trucks there is very little equipment suitable for road maintenance in the private sector in Togo. Construction Contractors who import equipment are usually expatriates and import expatriate operators, exporting both equipment and personnel on completion of their contracts. The equipment that exists in the private sector is frequently not sufficient to meet the demands for private work and consequently cannot be counted upon for regular or permanent use in the road maintenance program. In case of emergencies caused by severe storms, etc. some assistance can probably be obtained from this sector, however it cannot be depended upon as a substitution for an adequate maintenance department with its own trained staff and equipment.

It is considered that since an efficient program of road maintenance is vital to the economy, the Public Works Department must have a responsive organization under its direction to carry out this function. Private contractors are sometimes used to assist maintenance departments when storms, floods, or other unusual circumstances require efforts beyond the capabilities of the regular maintenance forces. Highway departments, however, typically maintain sufficient forces of their own to provide regular maintenance on their highway systems and many years of experience have proven this to be the most satisfactory arrangement.

(g) General Maintenance

Each Division should have equipment and personnel sufficient to adequately maintain the roads in the Division. Current equipment and the recommended additional equipment will be sufficient to accomplish this while ensuring the availability of machines to implement a regular program of road reconstruction as discussed later, and for emergencies. The number and types of machines to be assigned to each Division will vary depending on the number of kilometers of the various types of roads in the Division, their present condition, the types of materials for maintenance and repair available in the Divisions and the traffic volumes.

A review of the total equipment inventory which will be available, however, indicates that three or four motor graders, six or seven dump trucks, one or two compactors, two water trucks, one bulldozer, and one front end loader can be assigned to each Division and still leave an adequate fleet under the control of the Lome headquarters for use on reconstruction, special projects, emergency repairs, etc. Three motor graders regularly assigned

to the Lome Division which presently has 115 km. of bituminous roads and 297 km.[23] of earth roads could reprofile the earth roads and machine the ditches and shoulders of the bituminous roads more frequently than the recommended six to eight times per year. The three graders, assuming 250 days per year, could work 750 equipment days. To machine the ditches and shoulders of 115 km. of bituminous roads six times per year at a rate of 8 km./day would require 90 days, and to reprofile 297 km. of earth roads eight times per year at a rate of 4 km./day would require 600 days or a total of 690 equipment days per year, leaving 60 equipment days per year for general service.

(h) Reconstruction

It is recommended that one-twelfth (1/12) of the earth roads in the National System be reconstructed each year. As part of this reconstruction they should be surfaced with gravel, crushed stone, or laterite depending upon the availability of material. This will amount to the reconstruction of 121 km. of road per year (1450 ÷ 12).

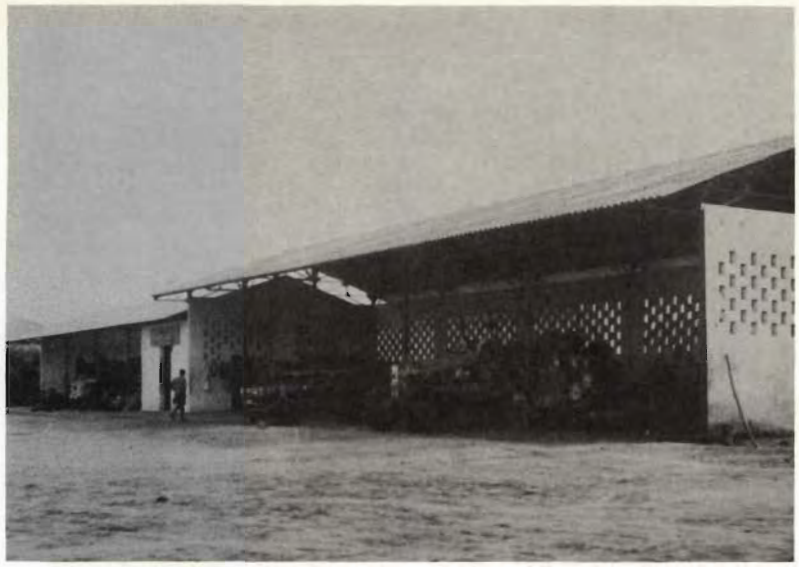
As outlined above in section (g) and on page 76 of this chapter, ordinary maintenance will require 177 working days per year for each motor grader. Assuming that there will be 250 working days per year there will be 73 days in which the fleet of 20 motor graders can be employed on the reconstruction of National Roads and generally providing service to the District Commissioner

To reconstruct 121 km. of road per year with three crews, would fully employ three motor graders for a total of 700 equipment days per year leaving 710 equipment days per year for assistance to District Commissioners on secondary roads.

In addition to motor graders each crew on reconstruction will require one front-end loader, two to three dump trucks depending on the haul distance, one water truck, and one compactor or roller. The total equipment required for the three crews would then be as follows:

3 Motor graders
3 Water trucks
9 Dump trucks
3 Rubber tired compactors
3 Farm type tractors

23. Based on Ministry of Works figures of total kilometrage.



Heavy Equipment Repair Depot near Lomé adjacent to Tokoin Training Center

Operator practising reversing Grader at Tokoin training Center

In addition, steel-wheeled rollers may be required on some sectors where the surfacing material is crushed stone or gravel.

This equipment should be controlled by Lome headquarters and assigned to the Divisions in accordance with the amount and urgency of reconstruction required in the Divisions. While assigned to projects in a Division, the equipment would be under the direction of the Division Chief, who would be responsible for the efficient progress of the reconstruction work.

3. Budget Allocations for Maintenance of Roads

The SEDES report developed a formula, described below, for determining the costs of maintaining the roads in Togo which takes into account the required frequencies of the various operations, their cost, and the average daily traffic on the roads.

The frequencies of reprofiling, reconstruction, surface patching of bituminous roads, striping, and reconditioning of drainage and other structures recommended by the SEDES report are reasonable and consistent with recommended practices. In some cases the Consultant recommends different standards, as in the reprofiling of earth roads where SEDES recommends a frequency of twice a year and the Consultant a frequency of eight. While this is a significant difference, the Consultant recommends that this operation be carried out with motor graders which can accomplish it at a rate of 4 kms. per hour so that the cost is not prohibitive. By increasing the frequency of this item, other items such as repairing corrugations which SEDES rightly includes as an important cost item in Africa, will be accomplished along with the reprofiling at no additional cost.

The total maintenance costs per kilometer are expressed in the SEDES report by two formulae. That for bituminous roads is represented by the formula 130,000 CFA + (200 x T) where T = Average Daily Traffic; and that for earth roads by the formula 40,000 CFA + (1080 x T).

Using these formulae the average annual maintenance costs per kilometer for the National Highway network become 218,000 CFA for bituminous roads and 139,000 CFA for unpaved in the year 1968 based on projected traffic in that year and assuming no additional roads are built.

These figures closely parallel maintenance costs for roads in Kenya and Ghana as shown in the following tabulation:

Country	Paved Roads	Earth Roads
Togo[24]	218,000 CFA	139,000 CFA
Ghana[25]	196,000 "	184,000 "
Kenya[25]	192,000 "	131,000 "

Note: The figures for Ghana and Kenya include equipment depreciation.

(a) Plan Targets

The Public Works Department is currently responsible for the following total kilometrage:[26]

Earth	1450.0
Paved	206.5
	1656.5

Under the current Five-Year Plan[27] the Department will be responsible for a further 444 km. of earth roads:

Dapango-Mandouri	90 km.
Lama Kara-Kabou-Natchamba	80 km.
Kambole-Sotouboua	80 km.
Adele Highway	47 km.
Agave-Haito-Kra	43 km.
Nuatja-Palime	61 km.
Tsevie-Tabligbo	43 km.
	444 km.

Thus, by 1970, the Public Works Department will be responsible for the following roads:

Paved roads (1st class)	531 km.
Earth roads (2nd class)[28]	772 km.
Earth roads (3rd class)[28]	803 km.
	2106 km.

Note: Based on the Plan totals not those of the Public Works Department. There is a 5.5 kilometer discrepancy between the two figures.

24. SEDES, op. cit., pp. 264-270
25. Matthew, J. Betz-Highway Maintenance Costs - A Consideration for Developing Areas.
26. Based on Public Works Department figures
27. Five-Year Plan, p. 65
28. Railway Department Classification

Two Views of the Sokode - Blitta Road

Note narrow "shoulder" and proximity of telephone poles to traveled way. Lower picture clearly illustrates lack of crown, shoulders and ditches as well as failure of subgrade up to white line in foreground.

According to the Plan, the Public Works Department will also assist the District Administrations in the maintenance of their roads, and in providing equipment.

It should be pointed out that the above additional roads will not be new roads but rather current earth roads that will be paved, or present district roads that will be assigned to the national network. Thus the traffic figures and projections developed in this report, which are based on a 10% per year growth in traffic over a constant (1,662 kms). road network will not be lowered by the inclusion of additional roads except to the extent that the traffic on either newly paved or present district roads upgraded under the plan, will probably be lower than the current average. As maintenance costs include a variable figure for ADT, and this could in the future be lower than the present average because of the upgrading of present class II and class III roads, the maintenance costs incorporated herein could be slightly overstated and their employment in the benefit-cost calculations will have the effect of understating the benefit-cost ratio.

The equipment list and recommended maintenance program are based on sufficient equipment to service the full 2,106 kilometer network anticipated by year 1970.

Assuming that the recommendations made herein are accepted by the Togo Department of Public Works and staffing is based on one laborer for every three kilometers of road and the earth roads are reprofiled eight times each year, the annual costs per kilometer for earth roads can be approximated as follows:

Laborers	16,000 CFA
Front loader & Operator 14 hrs. at 580 CFA/hr.	8,120
Motor Grader & Operator 13.6 hrs. at 1120 CFA/hr.	15,232
Dump trucks & drivers 42.4 hrs. at 510 CFA/hr.	21,624
Water truck & driver 15 hrs. at 510 CFA/hr.	7,650
Roller and tractor & operator 12 hrs. at 747 CFA/hr.	8,964
Sub-total	77,590
Supervision, Materials & Overhead at 80%	62,072
TOTAL COST PER KILOMETER	139,662 CFA

NOTE: 3532 grader days for 2100[29] km. = 1.7 equipment days/km. = 13.6 hrs./km.
43 dump trucks for 2100 km. = 5.3 truck days/km. = 42.4 hrs./km.
11 water trucks for 2100 km. = 1.9 truck days/km. = 15 hrs./km.
9 rollers & tractors for 2100 km. = 1.9 equipment days/km. = 12 hrs./km.
10 front loaders for 2100 km. = 1.9 equipment days/km. = 14 hrs./km.

The annual cost as computed above is slightly over the 139,000 CFA recommended in the SEDES report for earth roads which constitute the major portion of the roads in Togo, and closely parallels figures for comparable African areas. The anticipated cost of maintaining paved roads also closely parallels SEDES findings.

As is the practice of the Public Works Department, the above equipment hourly costs do not include depreciation but do include spare parts, repairs, fuel, and lubrication costs. The spare parts cost allowance is based on 10% of the value of the equipment per year. The Public Works Department generally allocates a lump sum per year to cover depreciation of equipment. Thus for the Five-Year Plan 70 million CFA per annum is allotted for this cost.

4. Maintenance Equipment Requirements

Of the existing inventory of maintenance equipment in the Public Works Department the following items are considered as being either usable or repairable:

Item	Usable	Repairable[30]	Total
Water trucks	3	-	3
Tractors, farm type	11	2	13
Road roller (rubber)	7	-	7
Road roller (steel)	-	1	1

29. The Five-Year Plan provides for 2106 km. of roads by 1970 and equipment needs have been based on this figure rounded out to 2100 kms.

30. The Government of Togo proposes spending 41 million CFA on parts which shall be utilized to repair this equipment. This should be sufficient, and no additional funds have been included in this report to repair existing usable equipment.

Item	Usable	Repairable	Total
Road roller (other)	-	1	1
Motor graders	8	7	15
Bulldozers	4	2	6
Front end loaders	4	2	6
Dump trucks	17	1	18
Motor scrapers	4	-	4
Asphalt distributor	1	-	1
Low bed trailer-25 ton	1	-	1
Fork lift - 5 ton	1	-	1
	61	16	77

The Five-Year Development Plan,[31] for the Republic of Togo, lists the additional equipment which the Planners considered necessary to properly reconstruct, repair, and maintain the road system. This equipment is as follows:

Item	Unit Cost (Million CFA)	No.	Total Cost (Million CFA)
Water trucks	2.4	8	19.2
Tractors, farm type	0.7	8	5.6
Road rollers (rubber)	0.8	4	3.2
Motor graders	7.5	12	90.0
Bulldozers	11.0	4	44.0
Front end loaders (rubber tired)	7.0	4	28.0
Dump trucks	1.7	32	54.4
Cement mixers	0.5	4	2.0
Compressors & drills	2.0	2	4.0
		Sub Total	250.4
		Spare parts	28.6
		Total	279.0

The Public Works Department has recommended that the above list be modified by reducing the number of rubber-tired compactors from four to two and adding two steel-wheeled road rollers. The Department has also recommended the addition of a 25 ton low-bed truck and trailer for transporting equipment.

31. Five-Year Plan, 1966-1970, p. 57

The additional equipment as proposed in the Five-Year Plan and amended by the Public Works Department appears to be well selected. The Consultant would propose only some minor changes in the numbers and types of machines. The substitution of two steel-wheeled road rollers for two of the rubber tired compactors is concurred in, as the steel rollers will be more practical in places where resurfacing with stone or laterite can be carried out.

It is recommended, however, that the number of motor graders to be purchased be reduced from twelve to nine. This will give a total inventory of twenty-four, of which twenty should be operational at any one time (83% availability). A recent study [32] of highway maintenance in the State of Virginia (USA) indicates that earth or gravel roads in that state are machined or regraded on an average of 3.70 times per year and that the motor grader machines an average of 6.7 kms. per day. Surfaced (paved) roads in Virginia required machining of their shoulders an average of 1.17 times per year with the graders averaging 17 kms. per day. While traffic and labor skills will be considerably different in Togo, these figures can be used as a guide for the estimation of equipment requirements for road maintenance.

By 1970, according to the Five-Year Plan, 2106 kms. of road will be maintained by the Public Works Department as State roads. Of this number, 531 kms. will be surfaced (bituminized) leaving a total of 1,575 kms. of earth roads in the primary system.

Since the roads in Togo are not constructed to as high standards as those in Virginia, they will require more frequent machinings and reprofiling. Allowing for a maximum of six gradings for the ditches and shoulders on the paved roads and eight for the earth roads at machine speeds of eight and four kilometers per day respectively, the twenty motor graders will be able to handle the workload in 177 work days per year per machine as follows:

531 kms. paved roads, at 8 km./day requires 66 grader-days at 6 gradings/year requires 396 grader-days
1575 kms. earth State roads, at 4 km./day requires 394 grader-days at 8 gradings/year requires 3152 grader-days

Total grader-days = 3,548

$$\frac{3{,}548 \text{ grader-days}}{20 \text{ graders}} = 177$$ working days per year required for the above frequency of grader maintenance.

32. Virginia Maintenance Study, op. cit.

Corrugated Earth Road

Atakpame - Palime Road

Anfoir - Tabligbo Road

These photos illustrate typical failures in roads in Togo:- overgrown shoulders, poor drainage, absence of crown and poor surface maintenance.

The additional equipment requested by the Government of Togo and modified by the Consultant, is then as follows:

Item	Unit Price[33] (Million CFA)	No.	Total Cost (Million CFA)
Water trucks	2.9	8	23.2
Tractors, farm type	0.9	4	3.6
Road rollers-rubber	0.5	2	1.0
Road rollers-steel	1.5	2	3.0
Motor graders	5.0	9	45.0
Bulldozers	7.75	4	31.0
Front end loaders (rubber-tired)	3.8	4	15.2
Dump trucks (5-6 c.y.)	4.2	32	134.4
Concrete mixers	0.6	4	2.4
Compressors and drills	2.0	2	4.0
Truck-trailer (lowboy 25 ton)	8.0	1	8.0
		Sub-Total	270.8
		Spare Parts (10%)	27.1
		Tools and Shop Equip.	16.0
		TOTAL	313.9 CFA

This equipment should be purchased over a two year period to allow time to train sufficient operators and phase the equipment into the four Divisions. A suggested schedule for the purchase is shown below:

Item	1st Year No.	1st Year Cost - CFA	2nd Year No.	2nd Year Cost - CFA
Road rollers-steel	2	3.0	-	-
Water trucks	4	11.6	4	11.6
Tractors-farm type	2	1.8	2	1.8
Road rollers-rubber	1	0.5	1	0.5
Motor graders	5	25.0	4	20.0

33. All prices quoted delivered Lome and include a 5% contingency but exclude any duties or other taxes.

Item	1st Year No.	1st Year Cost - CFA	2nd Year No.	2nd Year Cost - CFA
Front end loader	3	11.4	1	3.8
Dump trucks	20	84.0	12	50.4
Concrete mixer	2	1.2	2	1.2
Compressor	2	4.0	0	-
Truck trailer low-bed 25 ton	1	8.0	0	-
Bulldozer	2	15.5	2	15.5
Total Equipment		166.00		104.80
Spare Parts (10%)		16.6		10.50
		182.60		115.3
Tools & Shop Equip.		8.0		8.0
TOTAL		190.6		123.3

Total in 2 years Million CFA = 313.9

If this plan is adhered to each Division will receive a balanced fleet of machines during the first year and thus will be enabled to institute a realistic program of repair and maintenance. In the following year when the second increment of equipment is delivered, the maintenance program can be expanded.

The total equipment in the P.W.D. for maintenance of roads after the purchase of this additional equipment will be as shown in the following list:

Item	NUMBER New	NUMBER Old	NUMBER Total
Water trucks	8	3	11
Tractors, farm type	4	11	15
Road rollers, rubber-tired	2	7	9
Road rollers, steel-wheeled	2	1	3
Road rollers, other	-	1	1
Motor graders	9	15	24
Bulldozers	4	6	10
Front end loaders	4	6	10
Dump trucks	32	11	43
Motor scrapers	-	4	4
Asphalt distributor	-	1	1
Truck trailer, low bed 25 ton	1	1	2

Item	NUMBER New	Old	Total
Concrete mixers	2	-	2
Fork lift - 5 T	-	1	1

5. Recommendations on Equipment Standardization

While it will never be possible or desirable to standardize the maintenance equipment in a pool to the extent that all equipment will be of the same make, a considerable amount of standardization is essential to facilitate the management of the maintenance equipment pool. Without standardization the problems of maintaining and ordering adequate spare parts supplies, training operators and mechanics, etc., are greatly multiplied. Accordingly, the Consultant recommends that efforts be made to keep the numbers of types, sizes, and makes of maintenance equipment in the pool within reasonable limits. The proposed new equipment listed herein reflects this need for maximum standardization.

When procurement action is taken, bids can be requested for machines by groups or lots, with each bid request containing only one type and size of equipment.

The Consultant explored the possibility of standardizing equipment purchases by manufacturer models as well as by size and type of equipment, however this was not considered practical. Over a period of time, the bid prices from various manufacturers of equipment will vary while technical innovations and new models will change the relative attractiveness of various products. Thus, standardization by manufacturer model would seem impractical. However, guidelines must be established by the expatriate advisers to help the Department ensure against a multiplicity of equipment types being bought in the future.

TABLE V-3

Summary of Program Costs

Millions CFA

Item	Year 1	Year 2	Years 3-6	Total
1. Equipment	166.0	104.8		270.8
2. Parts	16.6	10.5		27.1
3. Tools & Shop Equipment	8.0	8.0		16.0
4. Materials Lab.	11.6			11.6
5. Technical Advisers	36.8	36.8		73.6
6. Parts for Existing Equipment [34]	20.0	21.0		41.0
7. Additional Budget	180.0	225.0	1248.0	1653.0
TOTALS	439.0	406.1	1248.0	2093.1

34. To be provided by Government of Togo under Current Five-Year Plan.

TABLE V-4

Distribution of Costs

(Millions CFA)

Item	Offshore	Onshore	Total
1. Equipment	270.8	-	270.8
2. Parts	27.1	-	27.1
3. Tools & Shop Equipment	16.0	-	16.0
4. Materials Laboratory	11.0	0.6	11.6
5. Technical Advisers	59.6	14.0	73.6
6. Parts for Existing Equipment	41.0	-	41.0
7. Additional Local Staff and Material Costs [35]	-	1653.0	1653.0
TOTALS	425.5	1667.6	2093.1

35. Certain of these items (i.e. asphalt, fuel, etc.) will be offshore costs, however, they are funded from the normal maintenance budgets of the Government of Togo.

CHAPTER SIX

ROAD USER BENEFITS AND GOVERNMENT REVENUES

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CHAPTER SIX

ROAD USER BENEFITS AND GOVERNMENT REVENUES

I GENERAL

Diverse economic benefits are engendered by improved maintenance and various analytical methods exist by which to identify and measure them. In this study, all significant benefits that can be expected to result from improved highway maintenance are identified, measured and quantified in terms of monetary values wherever possible.

Highway benefit studies and the supporting body of research have developed relatively accurate techniques to measure the marginal differences in vehicle operating costs under varying road conditions. These techniques have been adapted to the analysis of the maintenance improvements under review.

In addition to economic and user benefits[36], the program will have beneficial effects on the economic, social and political well-being of Togo. Since this analysis will only assess the economic effects of the proposed maintenance program, we have not dealt in great detail with those benefits which are typically non-quantifiable. This shouldnot however, detract from their significance in the consideration of the investment merits of the proposed program because they can be as or more important than quantifiable economic benefits.

II TYPES OF ROAD USER COSTS

Road user costs can be separated into three broad categories:

36. Transfer benefits in the form of lower transport charges to purchasers of transport services are treated as a component of user benefits. The lower transport charges are a function of user savings and the relative degree of competition among transport firms (including alternative forms of transport). The analysis of potential transfer benefits is important in the evaluation of the generated traffic potential. However, it has no bearing on the quantification of user benefits per se as these benefits (savings) are already included in the analysis of user savings. To include possible transfer benefits would result in double counting.

1. Operating Costs which are a direct function of kilometers traveled and include fuel, tires and oil. Reduction in operating costs can be obtained by:

a. Improved roadway surface
b. Improved roadway maintenance
c. Improved design geometrics
d. Reduction in highway rate of rise and fall

Any changes in one of the above will cause changes in fuel, oil and tire consumption.[37]

2. Time Costs which are normally fixed or semi-fixed. When average vehicle speed is increased or distances shortened, vehicles can produce greater annual output in passenger kilometers or ton kilometers per year.[38]

Increased vehicle kilometrage resulting from time savings affect such items as insurance fees, taxes, technical obsolescence and annual vehicle depreciation, overhead and administration and wages and allowances, by lowering the cost of these items per vehicle kilometer. Furthermore, improved road maintenance will lower vehicle maintenance and repair costs and will increase vehicle life.

3. General Costs[39]. These are specifically related to freight and commercial passenger transport. They include lower accident and insurance charges, fewer breakdowns, decreased damage to freight, smaller claims, and possible reorganization benefits (larger equipment, larger and more efficient firms with greater economies of scale and improved maintenance).

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37. Such changes will also have an indirect effect on vehicle life (depreciation and maintenance) and operating speed (depreciation and wages).

38. Allowances for benefits resulting from reduction in rates of traffic accidents, as a result of highway improvements, are frequently included under general benefits. However, the available data and studies of possible reductions in rates of accidents as a result of highway improvement are inconclusive and frequently contradictory.

39. Kuhn, Tillo: Economic Analysis of Highway Improvements in Developing Countries, Ninth Pan OAS American Highway Congress, Washington, D. C., May 6-8, 1964, p. 6

4. Summary. In analysing user costs and benefits for the proposed maintenance improvement program, primary concern will be with the effect of improved roadway construction on vehicle operating costs and the extent to which these improvements encourage increased traffic.

III. USER COSTS IN TOGO

1. Present Costs. No comprehensive studies have been undertaken in Togo of comparative road user costs for various types and categories of roads. To avoid exorbitant data collection costs, it has been necessary to develop synthetic methods for estimating operating cost differentials for various road conditions in Togo. The greater part of the technical research pertaining to highway benefits has been carried out in the United States. Most of this research reflects conditions and costs peculiar to these areas where individual cost items, vehicle size and traffic patterns vary considerably and it would be inappropriate to apply this information and that for Europe to Togo without modification.

Specific cost characteristics, however, can be extrapolated from the non-Togolese data (cost of tire, oil and fuel consumption, etc.) for various standards of roads and the figures adjusted for local costs and conditions. According to one leading exponent of this method:

> "Many of the tests obtained in the United States from different vehicles under different conditions, in different areas, conform to a consistent pattern once they are translated from absolute into relative terms. Under the circumstances, it seems quite reasonable to apply the United States test results, within reason, in other countries".[40]

The savings coefficients used in the present study are generally based on existing European, African and U.S. studies of vehicles operating over varying surfaces and road conditions. Necessary adjustments have been made on the basis of field research and observations carried out in Togo by the Consultants and the SEDES Group.

40. Kuhn, Tillo, op.cit., p.6

Based on existing research, user costs were prepared for vehicles operating over each major road type in Togo. User costs on roads being maintained as recommended in this Report are calculated in the following pages. User costs on the present badly maintained roads are subtracted from the new costs. The difference multiplied by traffic volumes provides the total highway benefits resulting from the improved maintenance program.

The following summary information was collected for current user costs in Togo, exclusive of taxes:

TABLE VI-1

SUMMARY USER COSTS[41] - EXCLUDING TAXES - EXISTING ROAD NETWORK
(CFA per kilometer)

	Passenger Vehicle	Pickup Truck	General Truck
Operating Speed (kph)	80	60	60
Annual Kilometers	40,000	40,000	50,000
Operating Costs			
Fuel	2.8	2.8	4.3
Oil, Lubricants and washing	0.3	0.3	0.5
Tires	0.7	1.2	2.4
Maintenance and Repairs	3.8	4.6	6.7
Time Costs			
Depreciation and Interest	5.5	5.0	9.2
Wages and allowances	4.7	4.7	3.7
Insurance	1.1	1.8	1.3
Overhead and Administration	1.3	2.6	2.8
TOTAL	20.2	23.0	30.9

41. For detailed calculations of these costs see Appendix B of this report.

The above user costs are current costs for operating on all road types in Togo. However, these costs cannot be equated with costs of transport on any specific road type since the present Togolese network includes paved, unpaved and earth roads.

The DEG analysis of traffic counts indicates the following approximate distribution of annual vehicle kilometrage by all (national and local) road types in Togo.

TABLE VI-2

PERCENTAGE DISTRIBUTION OF ANNUAL VEHICLE KILOMETRAGE

Vehicle Type	Road Category			Total
	Paved	Improved	Earth Track	
Passenger cars and taxis	41	32	27	100
Pickup trucks and vans	27	25	48	100
General trucks	49	25	26	100

SOURCE: DEG, SEDES and MOW traffic data.

By taking the user cost index developed in Appendix B, for vehicle operation in Togo on various road surfaces, relating the index for each road type to the percentage of total vehicle kilometrage over each road for that class of vehicle and then relating these percentages to total user costs obtained for operation over all roads regardless of surface, the current user costs by type of surface are obtained as follows:

TABLE VI-3

CURRENT USER COSTS IN TOGO NET OF TAXES (FCFA/Km)

Vehicle Type	Road Category		
	Paved	Improved	Earth Track
Passenger cars and taxis	19.3	21.8	25.8
Pickup trucks and vans	16.1	23.5	31.8
General trucks	23.1	31.6	45.3

IV. EFFECT OF IMPROVED ROAD MAINTENANCE ON CURRENT VEHICLE OPERATING COSTS IN TOGO

Highway maintenance comprises:

1. Improved maintenance. Upgrading of existing roadways, structures and facilities to uniform or acceptable status to ensure orderly and economical movement of traffic.

2. Regular maintenance. "The preserving and keeping of each roadway, structure, and facility as nearly as possible in its original condition as constructed or as subsequently improved, and such additional work as is necessary to keep traffic moving safely."[42]

While at times it is difficult to distinguish between improved maintenance and general highway improvement which is typically classified as new construction, clearly there is a distinction in degree if not kind.

This report discusses both the upgrading (improved maintenance) of existing roads as well as the undertaking of a continuous program of regular maintenance in Togo.

The major impact of poorly maintained roads on vehicle operating costs in Togo is:

Higher maintenance and repair charges and lower vehicle life.

Higher operating costs resulting from frequent stops and de-accelerations, lower operating speeds, and the necessity for drivers to leave the pavement and drive on the shoulders when passing another vehicle.

The proposed improvements might encourage increased annual vehicle kilometrage thereby lowering certain time costs (i. e. depreciation and other fixed costs per vehicle kilometer) but for the sake of conservatism this report does not include benefits obtained from any increase in annual vehicle kilometrage or other forms of generated traffic as a result of the proposed upgrading of maintenance practices.[43]

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42. Highway Maintenance Costs - A Consideration for Developing Areas, Matthew J. Betz, p. 12
43. Increased vehicle kilometrage is also a function of increased demand for transport services. Since the current annual vehicle kilometrage in Togo is relatively low (see Appendix B) even given the current high rate of vehicle downtime for maintenance and repairs, there is no indication that a reduction in vehicle downtime would lead per se to an increase in annual vehicle kilometrage. There must be a concurrent increase in demand for transport. Thus no benefits have been included for increase in annual vehicle kilometrage.

1. Effect of Improved Road Maintenance on Vehicle Maintenance and Repair Costs

Current vehicle maintenance and repair costs in Togo are high. For example, a comparison of repair costs as a percentage of all user costs in Togo with costs for the same items in other countries produces the following figures.[43]

TABLE VI-4

COMPARISON OF MAINTENANCE AND REPAIR COSTS IN TOGO AND SELECTED COUNTRIES - All Types of Roads [44]
(Percentage of Total User Costs)

	Togo	Brazil(a)	Thailand(b)	Nigeria(c)	USA(d)
Automobiles & Taxis	39.1	18.9	35.4	34.9	37.0
Commercial Vehicles					
Pickup and light trucks	41.7	16.8*	38.7	34.3	N/A
General Trucks	41.7	33.2	38.7	34.3	N/A

SOURCE: (a) Louis Berger, Inc.: Draft Report, Northeast Brazil Arterial Route Study, Recife, December 1966.
(b) Louis Berger, Inc.: Chumpae-Lomsak Highway Study, Bangkok, Thailand, December 1966.
(c) Louis Berger, Inc.: Calabar Mile-35 Report, Enugu, Nigeria, January 1966. Louis Berger, Inc.: The Okigwi Connection, Enugu, Nigeria, November 1966.
(d) AASHO "Road User Benefit Analysis for Highway Improvements", Washington, D.C., 1960. The AASHO figures are obtained by averaging user costs and maintenance and repair costs for 2-lane paved, gravel and earth roads.

*NOTE: The apparent difference between pickup, light trucks and general trucks in Brazil reflects the widespread use of large diesel trucks in northeast Brazil as "General trucks". Since diesel fuel is exceedingly low in comparison with gasoline used by lighter trucks and automobiles in Brazil; annual kilometrage of general trucks is exceedingly higher and maintenance costs relatively higher for larger trucks, the costs of maintenance and repair as a percentage of total user costs per kilometer is much higher for general-arterial road trucks (10-25 ton capacity) than for smaller vehicles in Brazil.

43. By analysing these figures as a percentage of total operating costs the majority of possible distortions as a result of differing price levels can be eliminated.

44. These figures include taxes.

Excluding Brazilian costs which to some extent are dictated by relatively high fuel and lubrication costs in that country, maintenance and repair as a percentage of all user costs averages between 8 and 22% more in Togo than in other countries such as Nigeria and Thailand with relatively primitive road systems.

Discussions with truck owners in Togo indicated that operating costs over properly maintained roads are an estimated 20% lower than those over existing poorly maintained roads. SEDES estimated that properly maintained improved roads will lower maintenance and repair costs by 28% for vehicles currently operating in Togo.

Based on the above analysis, maintenance and repair costs should decline a minimum of 10% on present paved roads and 15% on present improved and earth track roads as a result of the proposed highway maintenance program. Calculations are presented in detail in Appendix B of this report.

2. Increased Vehicle Life

The average vehicle life in Togo is extremely low reflecting the existing high maintenance costs and poor road conditions. Examination of the following table shows lifetime kilometrage of Togolese vehicles to be 20% to 60% less than that recorded elsewhere.

TABLE VI-5

AVERAGE VEHICLE LIFE KILOMETRAGE

	Togo	Brazil	Thailand	Pakistan	Nigeria	USA
Automobiles and Taxis	100,000	200,000	140,000	160,000	83,000	160,000
Taxis					384,000	
Commercial Vehicles						
Pickup and light trucks	100,000	300,000	250,000	500,000	266,667	N/A
General trucks	150,000	525,000	250,000	500,000	266,667	N/A

SOURCE: Data for Brazil, Thailand, Pakistan and Nigeria are derived from Louis Berger, Inc. reports on Technical and Economic Feasibility Studies previously cited on page 90. U.S. data are taken from AASHO, Road User Benefit Analysis for Highway Improvements, Washington, D. C., 1960.

While vehicle owners and truck operators estimate an increase in average vehicle life from 25 to 50% with better maintained roads, and these figures were confirmed by SEDES, for the purposes of this study increases of only 25% and 30% are assumed for automobiles, pickups and trucks, respectively.

However, while actual depreciation charges per kilometer will decline by 25-30%, depreciation and interest charges used in this analysis include the cost of capital which will not decline, and in certain cases will actually rise, with increased vehicle life. Thus adjusting the above estimates of increased vehicle life for cost of capital charges; depreciation and cost of capital charges per kilometer will decline 16% for autos and pickup trucks and 19.6% for general trucks as a result of the proposed improved maintenance program.

3. General Reduction in User Costs

Finally, by reducing the number of stops, slowdowns, and other disruptions, the improved maintenance will significantly lower operating costs.

The effect of the current poorly maintained roads on vehicle user costs in Togo can most readily be evaluated by measuring the effect of the resultant additional braking and acceleration on vehicle operating costs.

Field observations indicated the following average reductions in speed as a result of poorly maintained roads:

EFFECT OF CURRENT POORLY MAINTAINED ROADS ON AVERAGE SPEED

Road Surface	No. of Stops/Km.		Speed Reduction per Stop		No. of Decelerations per Km.		Speed Reduction per deceleration	
	Passenger Cars & Taxis	All Trucks	Passenger Cars & Taxis	All Trucks	Passenger Cars & Taxis	Taxis	Passenger Cars & Taxis	All Trucks
Paved	0.25	0.25	80/0	60/0	1.0	0.5	80/30	60/30
Improved	0.5	0.5	60/0	40/0	0.5	1.0	60/30	40/30
Earth Track	0.1	0.1	36/0	32/0	1.0	1.0	36/30	32/20

In a study of user operating costs prepared by Coquand, the costs of such deceleration and stopping were calculated as equivalent extra distances traveled as follows:

Minimum Speed Reached in Slowing Down km/hr.	Running Speed Km./Hr. 40*	50	60	70	80
	Equivalent Distances Traveled				
0	100m	150m	200m	240m	240m
20*	60	115	165	205	215
30	40	100	150	190	200
40	0	50	100	140	150
50	0	0	50	100	125
60	0	0	0	60	90

* Interpolated

SOURCE: R. Coquand, Cours de Routes - Circulation, Trace Construction, Paris, 1956

Thus, user costs per kilometer are increased as a result of operation on poorly maintained roads by the following factors:

TABLE VI-6

EFFECT OF PRESENT ROAD CONDITIONS IN TOGO ON USER COSTS
(Percent increase per kilometer)

Vehicle Type	Road Category: Paved	Improved	Earth Track
Passenger Car and Taxi	26%	17.5%	12.6%
All Trucks	17.5%	9.0%	12.8%

4. Use of Larger Size Vehicles

The average truck size (4.9 tons) is relatively small when compared with countries such as Brazil (7-8 tons) and Thailand (7 tons).[45] However, with the exception of special vehicles, only trucks with a maximum payload of 6 to 7 tons can be used in Togo as the state of the roads and capacity of bridges make it inadvisable both technically and economically, to use larger units. The main links between Lome and the north (Blitta and Palime) must be improved before larger vehicles can travel without danger or damage to the roads. Furthermore, traffic projections[46] through to 1973 are hardly of a magnitude to justify trucks with a 10-ton payload or greater.

According to SEDES[47] the introduction of 10-ton trucks would lower current

45. Louis Berger, Inc.: Northeast Brazil and Chumpae-Lomsak Studies, op. cit.
46. SEDES, op. cit., p. 276
47. SEDES, op. cit.

ton/kilometer freight costs, including taxes, by 50%. Since, however, the introduction of larger vehicles would be a function of extensive improvements on existing arterial routes, and of the elimination of rail traffic, it would not be a benefit of the improved maintenance program and the Consultants have not, therefore, included any savings from utilization of larger trucks as a benefit of the proposed maintenance program.

It has also been conservatively assumed that there will be no increase in annual kilometrage per vehicle.

5. Summary of Benefits Accruing from Improved Maintenance

Based on current user cost data shown on page 87 of this report, the following user cost savings will result from the proposed maintenance program.

TABLE VI-7

USER COST SAVINGS - ALL VEHICLE TYPES - AS A RESULT OF IMPROVED HIGHWAY MAINTENANCE
(FCFA/Km)

Vehicle Type	Road Category		
	Paved	Improved	Earth Track
Passenger Car and Taxi			
Maintenance and Repair	0.4	0.7	1.0
Depreciation	0.7	0.8	1.1
General Costs	4.0	3.2	2.9
TOTALS	5.1	4.7	5.0
Pickup Trucks and Vans			
Maintenance and Repair	0.3	0.6	0.9
Depreciation	0.4	0.6	0.9
General Costs	2.4	1.9	3.6
TOTALS	3.1	3.1	5.4
General Trucks			
Maintenance and Repair	0.4	1.0	1.7
Depreciation	1.0	1.5	2.5
General Costs	3.4	2.6	5.1
TOTALS	4.8	5.1	9.3

NOTE: General user costs are an inverse function of running speeds.

V. CURRENT VEHICLE KILOMETRAGE IN TOGO

From recent traffic count data provided by the Ministry of Works, and information on the composition of the vehicle fleet operating over various roads in the country,[48] the number of vehicle kilometers traveled per annum on various types of road has been estimated. Using the estimates of user costs on different categories of road developed in Appendix B and summarized earlier in this chapter, the user cost savings attributable to

48. SEDES, op. cit.

adequate maintenance have been calculated. These cost savings will constitute the benefits to be taken into consideration when evaluating the economic returns from the increased expenditure on road maintenance, equipment and staff necessary to implement the proposed program.[49]

The following table shows approximate vehicle kilometrage per section of road.

TABLE VI-8

VEHICLE KILOMETERS - TOGO NATIONAL HIGHWAY SYSTEM
1965 to 1966

Section (i)	Surface (ii)	Length/Kms (iii)	ADT (iv)	Vehicle Kms. per Annum (iii) x (iv) x 365
Aflao-Hillacondi	Paved	50	1700[50]	31,025,000
Anecho-Anfoin	"	13	607	2,880,215
Anfoin-Vogan	"	10	356	1,299,400
Anfoin-Tabligbo	"	34	65	806,650
Blitta-Sokode	"	82	100	2,993,000
Lome-Airport	"	5	1398	2,551,350
Atakpame Streets	"	6	-	-
Palime Streets	"	4	-	-
Sub Total				41,555,615
Lome-Tsevie	Laterite	35	686	8,763,650
Atakpame-Ezime	"	20	85	620,500
Ezime-Agave	"	35	40	511,000
Sub Total				9,895,150
Agave-Palime	Earth	51	91	1,693,965
Palime-Kpadape	"	28	128	1,308,160
Palime-Klouto	"	22	247	1,983,410
Palime-Agougare	"	13	167	792,415
Agougare-Tovegan	"	40	127	1,854,200
Tovegan-Lome	"	70	82	2,095,100
Tsevie-Amakpave	"	39	134	1,907,490
Amakpave-Agbatitoe	"	33	75	903,375
Agbatitoe-Atakpame	"	53	80	1,547,600
Atakpame-Badou-Djidj	"	104	35	1,328,600
Badou-Kpete-Bena	"	23	35	293,825
Badou-Abrewouko	"	3	35	38,325
Atakpame-Agbandi	"	83	80	2,423,600
Agbandi-Blitta	"	35	64	817,600
Sokode-Lama Kara	"	73	65	1,731,925
Forward				20,719,590

49. A complete breakdown of user costs is presented in Appendix B.

50. From this figure approximately 740 vehicles per day should be deducted for international traffic. It will not, of course, be deducted in the maintenance cost calculations.

TABLE VI-8 Continued

Section (i)	Surface (ii)	Length/Kms. (iii)	ADT (iv)	Vehicle Kms. per Annum (iii) x (iv) x 365
Brought Forward				20,719,590
Lama Kara-Kande	Earth	70	45	1,149,750
Kande-Mango	"	90	20	657,000
Mango-Dapango	"	75	24	657,000
Dapango-Frontier	"	62	20	452,600
Sokode-Bassari	"	57	23	478,515
Bassari-Mango	"	142	37	1,917,710
Lama Kara-Ketao-Dahomey Border	"	27	47	463,185
Doutougou-Ghana	"	9	4	13,140
Dapango-Korbongou	"	13	4	18,980
Mango-Koukombou	"	11	4	16,060
Tchitchao-Niamtougou-Kande	"	54	15	295,650
Sokode-Kambole-Dahomey	"	86	40	1,255,600
Other earth roads				3,565,650
Sub Total earth roads				31,660,430
Total Paved and Laterite roads				51,450,765
TOTAL Vehicle Kilometers All Roads				83,111,195

SOURCE: SEDES, MOW traffic count data

The distribution of motor vehicle traffic over all roads in Togo as shown in Table VI-8, was used as the basis for establishing user costs by road surface and vehicle type. However the distribution of motor vehicles over various road surfaces in the national network varies slightly from that of operation on all roads regardless of surface. This difference reflects the slightly different distribution percentages of paved to all roads in the national network as compared to the total Togolese network.

The adjustments produce the following approximate distribution of annual vehicle kilometrage by road types in the national network.

TABLE VI-9

PERCENTAGE DISTRIBUTION OF ANNUAL VEHICLE KILOMETRAGE OVER NATIONAL ROAD NETWORK

Vehicle Type	Road Category			Total
	Paved	Improved	Earth Track	
Passenger Cars and taxis	41.1	32.7	26.2	100
Pickup trucks and vans	27.0	25.0	48.0	100
General trucks	46.1	26.6	27.3	100

SOURCE: DEG., SEDES and MOW traffic data.

The total traffic on the National Highway system by vehicle type is thus as follows:

TABLE VI-10

TOTAL ANNUAL KILOMETRAGE - NATIONAL NETWORK

Vehicle Type	Millions of Vehicle/Kms.
Passenger cars and taxis	27.5
Pickup trucks and vans	14.0
General Trucks	28.2
TOTAL [51]	69.7 [52]

51. Net of international traffic on Aflao-Hillacondi Road.

52. This would require 1,556 vehicles at an average annual kilometrage of 45,000 per vehicle. With an estimated 5,500 to 6,000 vehicles in Togo and an annual kilometrage of 40-50,000 Kms. the figure of 70,000,000 annual vehicle kilometers on the national network would seem reasonable.

Because the laterite-surfaced section of the road system is so short, only 90 kilometers, and is in poor condition, it is difficult to distinguish from improved earth roads. Accordingly, this section has been included in the summary below as improved earth. The remainder of the earth roads run the gamut from fairly well maintained improved earth, as in the Sokode Division, to roads which are hardly better than tracks. About two-thirds of vehicle kilometrage on unsurfaced roads other than laterite, is on these unimproved roads (earth tracks).

The estimated annual kilometrage traveled on each road surface in the National network by each type of vehicle is therefore as follows:

TABLE VI-11

TOTAL ANNUAL KILOMETRAGE-NATIONAL HIGHWAY SYSTEM
(Millions of vehicle kilometers)

Road Type	Passenger Cars and Taxis	Pickup Trucks and Vans	General Trucks	Total
Paved*	11.3	3.8	13.0	28.1
Improved	9.0	3.5	7.5	20.0
Earth	7.2	6.7	7.7	21.6
	27.5	14.0	28.2	69.7

*Net of international traffic
SOURCE: SEDES and MOW traffic count data

VI. PROJECTED TRAFFIC GROWTH 1966 TO 1970

In the past five years traffic on different parts of the Togolese road network has experienced widely varying growth rates, from zero on some roads north of Sokode to 28 percent on the Lome-Tsevie road.

If international traffic is excluded, total vehicle kilometrage in Togo grew from 48 million to 69.7 million between 1962-63 and 1965-66, or about 12-1/2 percent per annum at a compound rate.

Growth of vehicle kilometrage is generally a more accurate indicator of vehicle use than figures for growth in vehicle registration. This is especially true in Togo where, as demonstrated in Chapter IV of this report, the actual vehicle stock is not known.

The Inventaire Economique, 1964 shows a cumulative total of 5,813 vehicles for January 1965, excluding tractors and other specialized vehicles. However, in 1964-65 only 910 new cars, trucks and buses were registered for the first time. If the records are correct, an average vehicle life of more than six years is indicated where in fact the average life of a vehicle in Togo is approximately three years. All non-exempt vehicles plying Togo's roads are required to pay a quarterly license fee, and it should be the case that the total vehicle licenses taken out in a quarter would provide data for arriving at the current vehicle stock. However, in the first quarter of 1966, licenses were issued for only 1996 vehicles, whereas in 1963, the total number of licenses issued was 2137.[53]

Furthermore, analysis of imports, page 37 of this report, shows imports of passenger vehicles to be only 8.5% and trucks 2.75%. Thus it is apparent that the estimates of traffic growth obtained from the traffic census data are, as anticipated above, a more reliable basis for projecting future traffic growth than vehicle registration or licensing data.

Vehicle kilometrage has grown by approximately 12.5 percent per annum in the past three years. A comparison of new vehicles registered in 1960 and in 1965 shows that imports of motor vehicles increased only modestly and estimates based on anticipated scrap rates produce a more reasonable figure of approximately 5-1/4% annual growth in the vehicle fleet between 1960 and 1964.

In view of the greatly increased vehicle kilometrage in the past three years (12.5%) and even given the understatement of vehicle registration, it can be assumed that there has been a considerable increase in the rate of vehicle utilization. There is, of course, a limit to growth in this respect. When it is reached, and if demand for transport continues to rise, the rate of growth in kilometrage will probably decline. But current vehicle utilization in Togo is low and the Government is in the process of phasing out the railway which will undoubtedly result in increased vehicle kilometrage.

Bearing this in mind, the Consultants have assumed that during the years 1966-73, vehicle kilometrage will grow at an average rate of 10 percent per annum for all vehicles. This appears to be reasonable in the light of annual increases in GNP.

From 1958 to 1965 GNP increased at an average rate of 6.5% while the Five Year Development Plan of 1966-1970 calls for an annual accretion

53. 1966 figures provided by the "Service de Contributions Directe", Lome, 1963 data taken from the SEDES report, op. cit.

in GNP of 5 to 6%. To the extent, then, that traffic growth in developing countries is frequently twice that of GNP, the assumption herein of a 10 percent growth rate for traffic is justifiable.

Per vehicle kilometer benefits according to road surface were ascertained on page 94 of this chapter to be as follows:

TABLE VI-12

Benefits per Vehicle Kilometer
(FCFA/Km)

Road Category	Vehicle Type		
	Passenger Cars and Taxis	Pickup Trucks and vans*	General Trucks
Paved	5.1	3.1	4.8
Improved	4.7	3.1	5.1
Earth Track	5.0	5.4	9.3

*NOTE: User costs and benefits for pickup trucks and vans are based on a Renault "Dindon". Since this is a relatively light and economical vehicle to operate the benefits (user savings) are less than those for a passenger car or taxi for which we based operating costs and savings on a relatively expensive Peugeot 404.

When these figures are applied to 1966 vehicle kilometrage, the following benefits accrue to road users from adequate highway maintenance:

TABLE VI-13

Vehicle User Benefits Accruing From Adequate Highway Maintenance at 1966 Traffic Volumes
(Millions CFA francs)

Road Category	Vehicle Type			
	Passenger Cars and Taxis	Pickup Trucks and Vans	General Trucks	Total
Paved	57.63	11.78	62.40	131.81
Improved	42.30	10.85	38.25	91.40
Earth Track	36.00	36.18	71.51	143.69
	135.93	58.81	172.16	366.90

At the assumed 10 percent rate of growth in vehicle kilometrage, the user benefits from 1966 to 1973 from the improved maintenance program would be as follows:

TABLE VI-14

Total User Benefits From Proposed Highway Maintenance Program (Million Francs CFA)

Year	FCFA
1966	367
1967	404
1968	444
1969	488
1970	538
1971	592
1972	651
1973	716

VII. GOVERNMENT REVENUES

The Government of Togo in its role as road owner and operator receives a cash return from highways. The ratio of such cash inflows from the road function to the cash outflows required to maintain and operate the facilities is of significance in evaluating the ability of the Government to obtain sufficient funds from road users to ensure proper maintenance of the facilities.

The major impact of the maintenance program will be observed in the lowering of current user costs. As a result it can be argued that the proposed program will lower rather than raise the direct Government revenue, since the proposed investment would benefit the economy by lowering overall vehicle operating costs including the tax revenue component of these costs.

Thus the revenue to the Government from vehicles operating on the existing facilities should not be considered as an earning or a benefit of the investment, but rather viewed as a component of the general cash flow to the Government which could, if the Government so chose, be utilized to pay the cost of maintaining and improving its highway facilities.

The following direct revenues are obtained by the Government from current road users:

TABLE VI-15

Current Direct Government Revenues from Road Users in Togo

All Roads (CFA Francs)

	Per Kilometer	Total Kilometers (million Kms.)	Total
Autos & Taxis	6.3	27.5	173
Pickup Trucks and Vans	6.5	14.0	91
General Trucks	7.7	28.2	217
Total 1966			481
Direct User Revenues		481,000,000 CFA	

Source: Appendix B

Thus, the Government of Togo is obtaining approximately 500 million CFA per year from road users and this figure should grow at a rate of approximately 10% per annum for the next 6 years.

Total direct user taxes obtained by the Government of Togo from road users will equal at least 1.4 times the average annual anticipated budget of 341 million CFA for road maintenance and upgrading over the next 6 year period.[54]

54. The balance could be available for new capital investment in roads if the Government chose to equate road user charges with road user costs to the Government.

CHAPTER SEVEN

EVALUATION OF PROJECT

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CHAPTER SEVEN

EVALUATION OF THE PROJECT

I. INTRODUCTION

This Chapter of the report presents an economic evaluation of the proposed maintenance program by comparing the value of anticipated benefits with program costs. Three methods of analysis have been employed in the investigation; net present value, benefit cost ratio; and internal rate of return.

II. METHODOLOGY

Each of the above three methods includes certain procedures and steps that are common to all techniques

1. Present Worth as Basis for Project Evaluation

Each method is based on a comparison of the discounted present value of the stream of costs and benefits. Present worth can be defined in the following way:

$$B = \frac{b_1}{1 + r} + \frac{b_2}{(1 + r)^2} + \frac{b_3}{(1 + r)^3} + \ldots + \frac{b_N}{(1 + r)^n} + \frac{R_N}{(1 + r)^n}$$

$$C = \frac{c_1}{1 + r} + \frac{c_2}{(1 + r)^2} + \frac{c_3}{(1 + r)^n} + \ldots + \frac{c_N}{(1 + r)^n}$$

where: N = Total number of periods (typically years) in the time profile of the investment

R_N = Residual value of investment

b_1, b_2, b_3, b_N = Benefits developing in years one, two, three, etc.

c_1, c_2, c_3, c_n = Total costs occurring in years, one, two, three, etc. Such costs include design, supervision, maintenance, administration and training costs as well as the initial capital costs.

r = Rate of Discount

2. Alternate Methodology

As indicated above, there are basically three different approaches to present worth calculations used in the evaluation of capital projects.

a. Net Present Value (NPV)

The net present value (NPV) of a given investment is obtained by deducting the present worth of the stream of costs from the present worth of the stream of benefits. Hence, a project would be considered feasible if the present worth of total benefits exceeded the present worth of total costs ($b-C \geq 0$).

This tool is used increasingly in national investment decisions. However, the same problem arises in utilizing the NPV method as with the Benefit/Cost analysis, that is determining the required discount rate.

b. Benefit/Cost Ratio (B/C)

This method is the most widely recognized and used. The same procedure is followed as in the net present value except that the present worth of the benefits is compared with the present worth of the cost and expressed as a ratio. Thus, the project is viable if $\frac{NPV\ (B)}{NPV\ (C)} \geq 1$.

The major shortcoming in the use of the benefit cost ratio are:

(1) As with the net present value, it is necessary first to determine the discount rate.

(2) In contrast to the net present value approach the benefit cost methodology develops a ratio without indicating the magnitude of the benefits. Therefore, a project with a higher benefit cost ratio could be selected in preference to a project with a lower benefit cost ratio, though the latter might have a higher absolute level of benefits, and thus would be a more desirable undertaking for maximizing the total growth of an economy.

c. Internal Rate of Return (IRR)

The IRR of a given project is defined as the rate of discount at which the present worth of the stream of benefits and costs is equated (i.e., the economic rate of return of a project expressed as a rate of interest over a given time period). The IRR approach is widely used by industry in evaluating investment decisions. The major difference between the IRR method compared with the B/C and NPV approaches is that it assumes no discount rate.

3. Determination of the Rate of Discount

To determine the benefit-cost ratio and net present value for the program under review, the value of anticipated benefits for each year of the Five Year life of the program must first be converted to the equivalent present worth amounts, using a discount rate appropriate to the type of investment. The selection of an appropriate rate of discount for this determination has been the subject of considerable controversy in economic circles. Methods of selection depend in part on whether the discount is viewed as reflecting the general cost of capital to the government, the opportunity (alternate) earnings of funds, or the marginal cost (interest) of the specific loan.

However, the use of actual loan interest rates as the basis for the solution of the rate of discount would seriously understate the probable effective discount rate. The fact that a lender is prepared to offer funds at 3 - 6% for instance, does not mean that such rates apply to a discount rate. The application of this rate of interest as rate of discount would only be of value if such funds were available in unlimited amounts for any government project with a benefit-cost ratio greater than unity at that rate of discount. Since such is not the case, the discount rate must be more representative reflecting the opportunity costs of the capital to give a more accurate picture of the actual cost of capital funds to the host country.

A number of recent writings on the determination of the discount factor indicate that a consensus is being reached to use this opportunity cost of capital, in the area or country where the investment will be made, as the discount factor.[55]

Capital is a scarce resource and, therefore, investment policy should be designed to maximize the return from its employment. This objective will be reached if the return from a given investment is at least as high as the return from any available comparable investment with similar risks.

Therefore, within the broad spectrum of economically sound investment projects, priority must be given to those yielding the highest economic rates of return. To put it differently, an investment in new or better roads should be made only if it can be shown that it will offer a return equal to or higher than that obtainable from available public investments. The earnings which might be obtained by the employment of the capital in such alternative uses are defined as the Opportunity Cost of the Capital.

55. Clell G. Harral, "Presentation and Appraisal of Transport Projects, The Brookings Institute, 1965, p. 113; and Coordinating Consultant Brazil Transport Study " The Opportunity Cost of Capital", March 1966, p. 1.

Total investment will be optimized when the price charged for capital ensures that all capital is employed and that the last investment made yields a return equal to or higher than the return on any alternative investment and the supply of capital will be optimized when the return obtained by that capital is sufficient to draw from the economy just enough real savings to provide for all the investment opportunities which will yield a return equal to or higher than the price charged for that capital. This cost or price for capital which would equate real savings with investment opportunities is the equilibrium price for capital, i.e., the opportunity cost for capital under conditions of general equilibrium.

However, the theoretical definition of the opportunity cost of capital under conditions of general equilibrium ignores the complexities, rigidities, risk and liquidity factors and official intervention which are characteristic of almost all capital markets. It also ignores the great variety of possible investments in both the public and private sectors - investments which differ in scale, in risk, in life expectancy, in purpose, and in their contribution to the economy.

In the absence of more accurate information, we have, in the present analysis, assumed somewhat arbitrarily that the opportunity cost of capital in Togo is at present 8% per annum. That such a rate is a relatively reasonable one is also borne out by the results of a number of studies made by the World Bank. Hans Adler notes that, "While they do not permit any definite judgement, they (World Bank) do indicate a range from about 6 to 12% for the particular countries selected, and there is reason to believe that in most developing countries the rate is at least 8% and frequently more than 10%.[56]

4. Summary of Suggested Methods

A rate of 8% was arbitrarily selected as an Opportunity Cost of Capital in Togo for the purpose of benefit-cost and NPV analyses, but it is recommended that emphasis in evaluating the proposed project be placed on the internal rate of return, because of the absence of any firm basis for selecting the discount factor.

Although certain conceptual problems arise with the use of the internal rate of return as the basis for making investment decisions, it is, in the case of Togo the most convenient method. Thus, a project's viability can be determined in the absence of an appraisal of the opportunity cost of capital.

56. Hans A. Adler, The Economic Evaluation of Transport Projects, in Transport Investment and Economic Development, ed. G. Fromm, The Brookings Institution, 1965, p. 176

It is true that even with the use of the IRR method of analysis, the prevailing opportunity interest rate must be acknowledged, but the IRR method allows one to establish a range rather than an exact rate for the opportunity cost. Once agreement has been reached on the appropriate range of opportunity rates, it is then possible to compare them with the previously determined IRR of a project.

In the meantime, the use of IRR analysis permits the evaluation by decision makers of variety in non-exclusive projects in order to establish investment priorities.

III. SUMMARY OF MAINTENANCE COSTS AND BENEFITS

The formulae for determining maintenance fund allocations are discussed in Chapter V.

For asphalt roads, the per kilometer allocation will be 130,000 + 200T CFA francs, where T is the average daily traffic.

Average traffic on paved roads in 1966 was 364 vehicles per day. An adequate maintenance allocation for 1966 would, therefore, be 202,800 CFA francs per kilometer.

With vehicle kilometrage growing at 10 percent per annum, the annual allocation will be:

TABLE VII-1

ANNUAL ALLOCATION OF MAINTENANCE FUNDS
PAVED ROADS

Year		Per Kilometer	No. of Kms.[57]	Total
1966	130,000+200x364	202,800	204	41,371,200
1967	130,000+200x400	210,000	285	59,850,000
1968	130,000+200x440	218,000	367	80,006,000
1969	130,000+200x532	236,400	449	106,143,600
1970	130,000+200x585	247,000	531	131,157,000
1971	130,000+200x644	258,800	531	137,422,800
1972	130,000+200x708	271,600	531	144,219,600
1973	130,000+200x779	285,800	531	151,759,800

For earth roads, the per kilometer allocation will be 40,000 + 1080T CFA francs.

Average daily traffic on earth roads in 1966 was 76 vehicles. The desirable annual allocation for 1966-73 would therefore be:

TABLE VII-2

ANNUAL ALLOCATION OF MAINTENANCE FUNDS
EARTH ROADS

Year		Per Kilometer	Total Kms.	Total
1966	40,000 + 1080 x 76	122,000	1,456	177,632,000
1967	40,000 + 1080 x 84	131,000	1,485	194,535,000
1968	40,000 + 1080 x 92	139,000	1,515	210,585,000
1969	40,000 + 1080 x 101	149,000	1,545	230,205,000
1970	40,000 + 1080 x 111	160,000	1,575	252,000,000
1971	40,000 + 1080 x 122	172,000	1,575	270,900,000
1972	40,000 + 1080 x 134	185,000	1,575	291,375,000
1973	40,000 + 1080 x 147	199,000	1,575	313,425,000

57. Total kilometers for 1966 are based on data provided in 1964 Inventaire Economique du Togo rather than the Department of Public Works data. Under the Five Year Plan these totals (204 kms. and 1,456 kms.) are to rise to 531 kms. of paved and 1,575 kms. of unpaved roads by 1970. Since additional road kilometrage results from either the paving of existing earth roads or the absorption of existing district roads into the National network rather than construction of additional roads, the Consultant assumes estimated ADT values per road type will not be affected. The Consultant assumes that between 29 and 30 kilometers of paved roads will be added to the National network each year between 1966 and 1970 when the Plan target will be reached.

The value of machinery, equipment and services recommended in Chapter V is 440.1 million CFA francs. It is advised that this equipment be purchased in two installments, costing 259.0 CFA francs in the first year (1968) and 181.1 million CFA francs in the second year (1969).

It is assumed for the purpose of this analysis that these recommendations are followed and also that the recommended annual budget allocation for road maintenance is provided.

Total outlays for road maintenance under this program will therefore be as follows:

TABLE VII-3

TOTAL FUNDS REQUIRED FOR PROPOSED HIGHWAY MAINTENANCE PROGRAM

Year	Equipment	Budget Allocation For Maintenance	Total Requirements
0*	259,000,000	290,591,000	549,591,000
1	181,100,000	336,486,600	517,448,600
2	-	383,157,000	383,157,000
3	-	408,322,800	408,322,800
4	-	435,594,600	435,594,600
5	-	465,184,800	465,184,800

*Year 0 is taken to be 1968 as it is considered that the program will be fully implemented in that year.

In order to obtain costs for the purpose of comparing costs and benefits, the present annual outlays on road maintenance should be subtracted from total costs.[58] In other words, only the additional (marginal) outlay required for the program is responsible for the benefits described in Chapter VI.

58. The additional costs are defined as both the additional costs of the program recommended by the Consultant and the increase in maintenance and equipment costs already proposed under the current 5-year plan as both will be required to obtain the total benefits anticipated.

Annual maintenance allocations in the past five years have been as follows:

1962	104,649,000 CFA francs
1963	119,349,000
1964	120,606,000
1965	111,010,000
1966	140,000,000

The average amount per annum spent between 1962 and 1965 was, therefore, 111 million CFA francs. This level of maintenance expenditure is responsible for current user costs and must be deducted from each year's recommended allocation in the preceding table.

Total net requirements will therefore be as follows:

(1968)	Year 0	438,591,000
	Year 1	406,448,600
	Year 2	272,157,000
	Year 3	297,322,800
	Year 4	324,594,600
	Year 5	354,184,800

These investments will produce the following costs at Year 0 costs discounted at various rates:

Year	Cost of Maintenance	Rate of Discount 8%	12%	16%	20%
0	439,000,000	439,000,000	439,000,000	439,000,000	439,000,000
1	406,000,000	375,925,555	362,499,942	349,999,608	338,333,198
2	272,000,000	233,195,936	216,836,496	202,140,064	188,888,768
3	297,000,000	235,768,104	211,398,660	190,275,129	171,874,791
4	325,000,000	238,884,425	206,543,350	179,494,575	156,732,225
5	354,000,000	240,926,382	200,868,804	168,544,002	142,264,458
		1,763,700,402	1,637,147,252	1,529,453,378	1,437,093,440

It has been demonstrated in Chapter VI that user benefits from the program would be as follows:

TOTAL VEHICLE USER BENEFITS FOR
PROPOSED HIGHWAY MAINTENANCE PROGRAM

1966	367 million CFA francs
1967	404 " " "
1968	444 " " "
1969	488 " " "
1970	538 " " "
1971	592 " " "
1972	651 " " "
1973	716 " " "

These benefits from adequate road maintenance are shown below at various discount rates:

PRESENT WORTH OF PROGRAM BENEFITS

Year	Total User Benefits (Millions FCFA)	Rate of Discount (Millions FCFA)			
		8%	12%	16%	20%
1*	488	452	436	426	407
2	538	461	429	400	380
3	592	470	421	379	351
4	651	479	412	360	325
5	716	487	406	341	300
TOTAL	2,985	2,349	2,104	1,906	1,763

*NOTE: Year 1 is 1969
It is assumed for the sake of conservatism that 6 years of maintenance are required to initially obtain 5 years of road user benefits.

IV. NET PRESENT VALUE

At an 8 percent opportunity cost, the net present value for the proposed maintenance program will be:

Benefit	2,349,000,000 CFA
Costs	1,763,700,402 CFA
NET PRESENT VALUE	585,299,598 CFA

V. BENEFIT COST RATIO

At an 8 percent opportunity cost, the benefit/cost ratio for the proposed maintenance program will be:

$$\frac{\text{Benefit}}{\text{Cost}} \qquad \frac{2,349,000,000 \text{ CFA}}{1,763,700,402 \text{ CFA}} = 1.33:1$$

VI. INTERNAL RATE OF RETURN

The Internal Rate of Return for the proposed maintenance program will be 40%. (See accompanying graph).

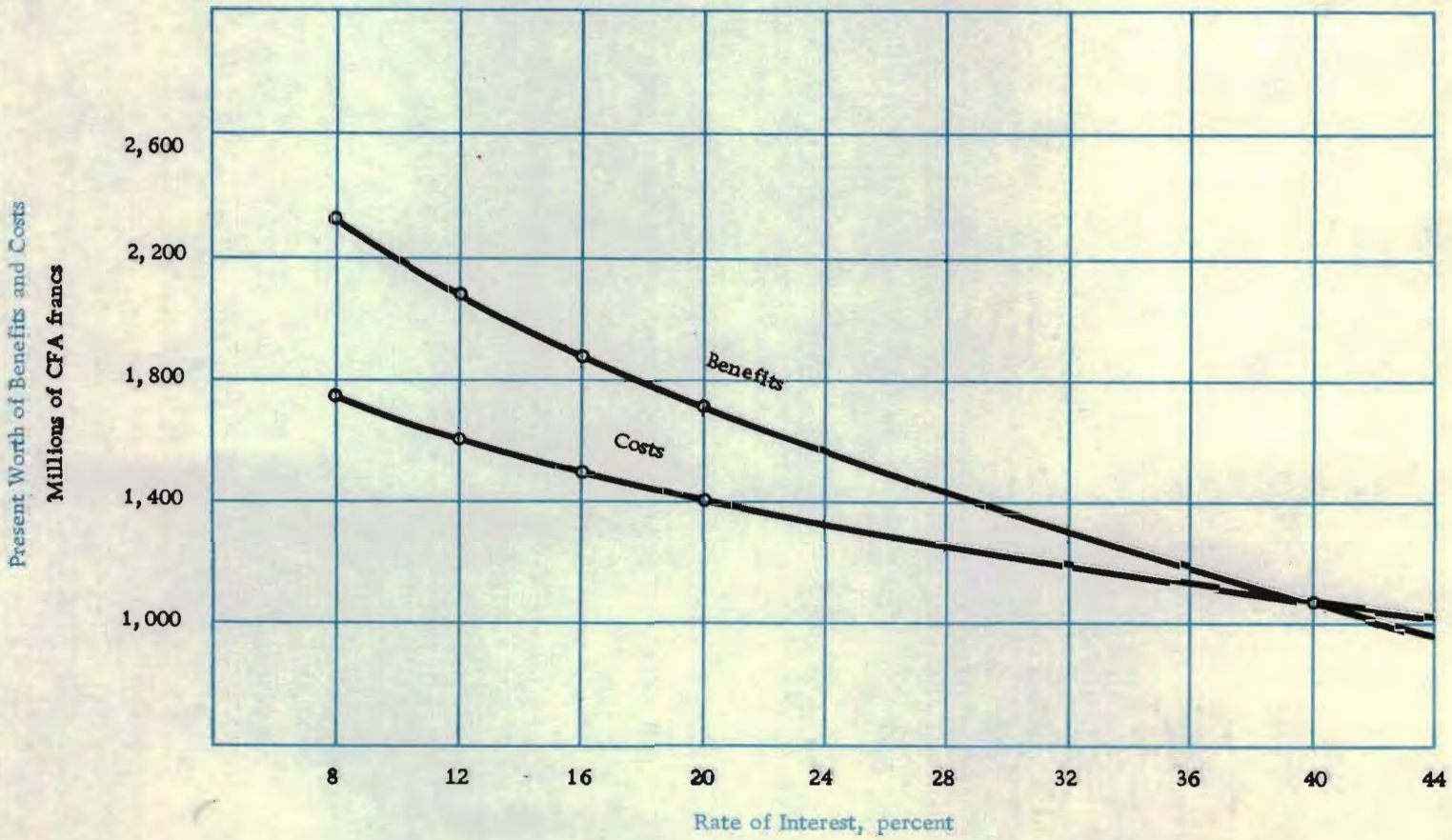
VII. FINANCIAL CAPACITY OF GOVERNMENT OF TOGO TO IMPLEMENT PROPOSED PROGRAM

1. Onshore Costs

The average amount per annum spent by the Government of Togo for National Highway maintenance between 1962 and 1965 was 111 million CFA francs. This was clearly inadequate and contributed to the present poor conditions of the road system.

Under the Five Year Plan the Public Works Department proposed spending 2.5 times as much as the 1962-65 average - or 277,000,000 CFA francs for maintenance and repair of the highway network. For 1966, 140 million francs was obtained by the Department.

The maintenance expenditure recommended in this report for 1966 would be 78,000,000 CFA more than the 140,000,000 CFA budgeted for that year. This would mean an increase of approximately 1.5% in the total Government of Togo budgeted expenditure based on the 1966 budget which amounted to 5,502,000,000 CFA francs. If the program is financed by tax revenues, it would mean an increase in taxes which are now 11.8% of estimated gross domestic product - (37.5 billion CFA), from 4,414 to 4,492 or 1.8%. The ratio of taxation to GDP would change insignificantly by only 0.2%. If the recommended funds for maintenance are not financed by new taxes, the current annual deficit, which was 534,000,000 in 1966, will rise by 15% to 612,000,000 CFA francs.



INTERNAL RATE OF RETURN

In view of the comparatively complex financing of the Togo government, it would be difficult to state whether or not Togo could afford this additional expense under present circumstances. It should be noted that the government at this time still supports major deficit operations, notably the railroad, the port and other facilities including the state-owned hotel. At the same time budgetary deficits tend to be recovered by grants from FIDES and other sources.

TABLE VII-4

COMPARISON OF CONSULTANTS RECOMMENDATIONS FOR HIGHWAY MAINTENANCE EXPENDITURES AND FIVE YEAR PLAN TARGETS
(Million CFA francs)

Year	Equipment		Maintenance		Total	
	5 Year Plan	Consultant	5 Year Plan	Consultant	5 Year Plan	Consultant
1966	150	-	277	-	427	-
1967	129	-	277	-	406	-
1968	-	259	277	180	277	439
1969	-	181.1	277	225	277	406.1
1970	-	-	277	272	277	272
1971	-	-	-	297	-	297
1972	-	-	-	325	-	325
	279	440.1*	1,385**	1,299**	1,664	1,687.1

NOTES: * See Chapter Five
** Both totals based on 5 years of maintenance. If it is assumed as in this report that 6 years of maintenance are required to obtain 5 years of benefits, totals would be 1,662 and 1,653 million CFA respectively.

It appears that a tax increase to cover the program, rather than deficit financing, is warranted for the following reasons:

a. The principal sources of taxation (approximately 90% of all taxes) are indirect taxes including import duties. These are low by comparison with import taxes in neighboring states, particularly Ghana, and probably could be raised moderately without impairing Togo's import cost advantages.

b. For the next five years the Consultants' proposed outlays for maintenance and equipment closely approximate those proposed in the 5-Year Development Plan. This indicates that previous recommendations would conform with those of the Consultants in terms of the Nation's ability to absorb these costs.

c. User savings will be so considerable (500 million CFA per year) that increases in user taxes will hardly be noticed by current and future users, although in effect they will be sufficient to defray the additional maintenance costs. Current taxes for diesel and gasoline fuel (for example) at 32.2% and 47.3% respectively are low enough to allow for moderate increases without significantly inhibiting road use.

d. A rate of taxation of 12% of GNP does not appear excessive. (The range was from 10 percent in Nigeria to 24 percent in the Congo in the 1955 to 1957 period according to the Economic Survey of Africa since 1950, pp. 89 and 95).

2. Foreign Exchange Costs

The foreign exchange costs of the proposed maintenance program amount to 425,500,000 CFA not including normal annual costs for tools, equipment parts, asphalt, etc.

This sum represents 8.15% of the Nation's outstanding debt of 5,224 million CFA as of January 1, 1966. The debt services by 1968 (see Chapter III) will be approximately 386 million CFA or 6 percent of exports. The additional debt service resulting from this program (assuming the entire program is financed through loans) would be:

Interest Rate	Year*	Annual Debt Service (millions of CFA)	1968 Debt Charges
7-1/2%	3	163.8	42.4%
Commercial	7	80.8	20.9
	12	54.9	14.2
3%	25	24.3	6.3
	40	18.3	4.7

NOTE: *Assumes no grace period

To the extent that a nation can borrow reasonably safely up to 10% of the value of its exports, Togo's debt service capacity in terms of its existing debt is an additional 257 million CFA on the basis of 1968 exports (IMF estimate). The Five Year Plan proposes an additional debt of 4,540 million CFA. The Consultants' recommendations, however, exceed the Five Year Plan debt targets for maintenance equipment by 147 million CFA. The total proposed debt would thus be 4,587 million CFA. Using the 10% debt service charge to export guideline, all additional loans proposed under the Plan would have to be at an average rate of 3% for 25 years if the additional cost of the

Consultant's program is included. The 257 million CFA annual debt charge, however, is conservative to the extent that it does not consider current debt maturities in the interim period. Furthermore exports may be expected to rise though some financing will have to be on the basis of harder or commercial interest rates. Finally, the debt limitations will depend on the success of the Togolese Government in obtaining development grants as well as loans. Consequently, the Consultants suggest that a mixture of soft loans and grants be given consideration in implementing the recommended highway maintenance program.

APPENDIX A

APPENDIX A

LOME MUNICIPAL STREET MAINTENANCE

The Consultants were required to review the street maintenance requirements of the City of Lome and comment on possible benefits to be derived by the Municipality from the proposed Highway Maintenance Program.

The Consultants' staff met with the Chief Municipal Engineer of Lome, Mr. Sodogas, who provided the following information.

There are approximately 45 kilometers of paved streets, 81 kilometers of improved earth streets and 500 kilometers of lanes and other thoroughfares in Lome. The annual budget for street maintenance has been approximately 3,000,000 CFA, however, the Municipality has requested twice this amount for 1967. Current useful municipal equipment consists of one Caterpillar 12 motor grader, one Caterpillar 955 H Traxcavator, seven Citroen five-ton dump trucks, and one small water truck. In addition, two International Trucks are inoperative. All new paving construction is done by contract.

The surface of the paved municipal roads is in fair condition but the earth roads need shaping and considerable additional maintenance. There are areas in both types of surface where hazardous conditions exist in the form of large holes and very few of the paved surfaces extend to the gutter. There is a storm sewer system, draining into both the ocean and the lagoon.

The City's maintenance equipment at present is as follows:

A. One traxcavator 955 Series H, RT 3347A, Chassis No. 72A234
B. One motor grader Caterpillar RT 4099A. Serial No. 99E 7721 - Type 12, Series E
C. Two International Trucks, RT 3919A. Type 1600 Series 139 (Both currently inoperative)
D. 7 Citroen 5-ton dump trucks
E. One Austin Water Truck

The following additional equipment has been requested:

F. One traxcavator
G. One compactor - 10 ton
H. One compactor - 5 ton
I. One asphalt spreader
J. 10 trucks
K. 20 trailers (for hauling materials)

The Consultants' recommendations incorporated in this report do not cover the specific needs of the Municipality of Lome.

To the extent that the Lome District Division will have some excess equipment capacity (see Chapter V), limited equipment would be available to assist the City of Lome. Furthermore, the improved equipment maintenance program for road equipment at Lome could also be of service in overhauling existing deadlined municipal equipment (e.g., the two International trucks) thereby increasing the existing capacity. However, with over 600 kilometers of streets, equal to over one-third of the total national system, and with the more specialized needs of municipal streets, it is unlikely that the proposed additional equipment and maintenance program recommended for the national highway system will significantly aid the Municipality.

The street maintenance requirements of the Lome Municipality are sufficiently complex (including the problems of integrating street maintenance with other municipal services and maintenance requirements such as water and sewerage) that they would require comprehensive independent evaluations before firm recommendations could be made.

It is clear, however, that the City of Lome requires assistance and, in the absence of adequate municipal equipment for maintenance purposes, the Heavy Equipment Training Center at Lome should be called on for both equipment and manpower where practical.

The Consultants observed that the Heavy Equipment Training Center's program requires only partial utilization of current equipment and improved coordination between the Training Center and the Municipality should be encouraged to their mutual advantage.

The training center can assist the city by:

1. making equipment available
2. providing manpower - both supervisors and operators
3. assisting in the maintenance and upgrading of the Municipality's existing equipment.

With proper liaison between the Lome District Highway Department, the Training Center and the City of Lome, and a sympathy on the part of all for the needs of the City and the importance of the Capital's having good streets, it should not be difficult to ensure that the Municipality is able to call on equipment and manpower reserves when necessary to adequately maintain its thoroughfares.

APPENDIX B

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APPENDIX B

USER COST CALCULATIONS

Based on interviews with current fleet owners, vehicle users and importers, as well as data available from the Government of Togo, the SEDES report and various other reports, current user costs for vehicle operation in Togo were obtained.

I. PASSENGER VEHICLE USER COSTS IN TOGO - CFA FRANCS/KM.

A. Assumptions

1. Passenger vehicle includes taxis and the typical auto type is a Peugeot 404.

2. Non-urban road average running speed (obtained from field tests) = 60 kph.

3. Annual Kilometrage = 40,000 total lifetime kilometrage = 100,000. These averages were arrived at after weighing information from questionnaires and owners and dealers.

B. Operating Costs

	With Taxes	Excluding Taxes
1. Fuel	5.3	2.8
2. Lubrication, Oil & Washing	0.5	0.3
3. Tires	1.2	0.7
4. Maintenance and Repairs	4.5	3.8
C. Time Costs		
5. Wages and allowances	4.7	4.7
6. Depreciation and interest	7.9	5.5
7. Insurance	1.1	1.1
8. Overhead and Administration (5%)	1.3	1.3
TOTAL	26.5	20.2

D. Notes

1. Prices

The above data assumes the following prices:

(a)	Fuel - Gasoline	37 FCFA per liter
(b)	Lubricants	150 FCFA per liter
(c)	Tires (including inner tubes)	7,000 FCFA each
(d)	Cost of Peugeot 404 delivered Lome (average excluding tires)	785,000 FCFA

2. Calculations

(a)	Fuel consumption (7 kms./liter at 37 FCFA/liter)	5.3 FCFA/km.
(b)	Oil and lubrication costs (10% of fuel consumption based on field studies)	.5 FCFA/km.
(c)	Tires	
	One new set (4 to a set) at 7,000 FCFA each	28,000 FCFA
	One set recaps* (4) cost of recaps 30% of cost of new tires	8,400 FCFA
	Total cost of tires	36,400 FCFA
	Total kilometers per set of tires over existing roads: 20,000 kms. original tires; 10,000 kms. recaps	30,000 kms.
	Tire Cost per kilometer	1.2 FCFA/km.

*Cost of recaps based on interviews with tire marketers; kilometers per tire based on questionnaires and interviews with trucking firms and field tests of SEDES

(d) Maintenance and Repairs

Based on findings of SEDES report[1] confirmed by field interviews.	4,500 FCFA per 1000 km. or 4.5 FCFA per km.

(e) Wages and Allowances

Salary (1 driver)	12,000 FCFA per month
Fringe Benefits, Bonuses and Allowances (30%)	3,600 FCFA per month
Total Cost per month	15,600
Cost per kilometer	4.7 FCFA

Based on discussions with current users, the great majority of current taxis are owner driven. The above bonuses would apply to salaried employees, but, since owners would expect to earn more than 12,000 FCFA per month, the above cost data would also remain applicable for owner driven vehicles.

(f) Depreciation and interest (opportunity cost of capital)

Cost of Peugeot 404 (excluding tires)	785,000 FCFA
Scrap value (10%)	78,500
Balance	706,500
Interest (cost of capital) at 8% per year for 2.5 years ($\frac{.20}{2}$ x cost of vehicle including scrap value)	78,500
Total cost of vehicle and interest	785,000
Total vehicle life (2.5 years - at 40,000 kms/yr)	100,000 km.

1. SEDES, op. cit., p. 150

Cost per km.	7.9 FCFA

(g) Insurance

Annual insurance for a Peugeot 404	42,000 FCFA or 1.1 FCFA per km.

(h) Miscellaneous administration and overhead.

SEDES claims that 13.2% is required for reasonable overhead and profit for a taxi firm. However, since a cost of capital is already included in depreciation and the great majority of the vehicles are owner driven, only 5% of all costs have been included as a reasonable charge for administration and overheads. Since most non-urban passenger traffic in Togo is either Taxi or business traffic, administrative overhead charges have been included for all passenger vehicles.

(i) Tax adjustment	% of Total Cost
(Adjustments were made for direct taxes only)	
Fuel (Gasoline) Import tax 12.50 FCFA per liter plus 15.71% purchase tax on total sales price (including import duty)	47.3
Lubrication - import duty 15% plus 15.71 purchase tax on sales price (including import duty)	33.2
Tires and tubes 20% Import duty on CIF price plus 15.71% purchase tax on sales price (including import duty)	38.9
Maintenance and Repairs Spare parts - 15% import duty on CIF price plus 15.71 purchase tax on sales price (including import duty)	33.2

Parts account for an estimated 50% of M. & R. expenditures	
Tax as a percentage of all M. & R. expenses	16.6
Wages and Allowances - not adjusted	
Depreciation and Interest	
Import duty 15% on CIF purchase price plus 15.71 purchase tax on sales price (including import duty)	33.2
Breakdown of interest and amortization in depreciation charges:	
Depreciation	91%
Interest	9%
Tax as a percentage of total interest and amortization charge (91% x 33.2%)	30.2
Insurance, Overhead and Administration	
No direct tax adjustments	

II. PICKUP TRUCKS

Pickup trucks are defined as closed or open bed trucks of 1/2 to 1-1/2 ton capacity.

A Renault van called a "Dindon" or turkey, was selected as a typical truck-van. These vehicles, unlike the Peugeot 404's, are used both as freight and passenger vehicles, (hence bear more expensive insurance costs). The following direct user costs were obtained for such a vehicle over the existing road network in Togo.

A. General

1. Description	Pickup Truck: Capacity $\frac{1}{2}$ to $1\frac{1}{2}$ tons
2. Average running speed on all types of non-urban roads (obtained from field tests)	40 kph
3. Annual Kilometrage (based on information from owners and dealers and confirmed by SEDES)	40,000
4. Total vehicle life (based on field interviews and confirmed by SEDES)	100,000
5. Vehicle type used	Renault "Dindon"

B. Operating Costs	With Taxes	Excluding Taxes
1. Fuel	5.3	2.8
2. Lubrication, Oil & Washing	.5	.3
3. Tires	1.9	1.2
4. Maintenance & Repairs	5.5	4.6
C. Time Costs		
5. Wages & Allowances	4.7	4.7
6. Depreciation & Interest	7.2	5.0
7. Insurance	1.8	1.8
8. Overhead & Administration (9.5%)	2.6	2.6
9. Total	29.5	23.0

D. Notes

1. Prices

The above data assumes the following prices:

(a) Fuel (gasoline)	37 FCFA per liter
(b) Lubricants	150 FCFA per liter
(c) Tires (including inner tubes)	11,000 FCFA per tire
(d) Vehicle's cost (excluding tires) for Renault "Dindon" delivered Lome	720,000 FCFA

2. Calculations

(a) Fuel consumption 7 kms/liter at 37 FCFA/liter	5.3 FCFA/liter
(b) Oil and lubrication costs (10% of fuel consumption based on field studies)	0.5 FCFA /km.
(c) Tires	
One new set (4 to a set) at 11,000 FCFA each tire and tube	44,000 FCFA
One set recaps (4) at 30% of original tire cost *	13,200 FCFA
Total cost of Tires	57,200 FCFA
Total kilometers per set of tires over existing roads: 20,000 original tires; 10,000 recaps	30,000 kms.
Cost per kilometer	1.9 FCFA/km.

*Cost of recaps based on interviews with tire marketers; kilometers per tire based on questionnaires and interviews with trucking firms and field tests of SEDES.

(d) Maintenance & Repairs

Based on findings of SEDES report[2] confirmed by field interviews	5, 500 FCFA per 1000 km.

(e) Wages & Allowances

Salary - 1 driver	12, 000 FCFA per mo.
Fringe benefits, bonuses and allowances (30%)	3, 600 FCFA per mo.
Total	15, 600
Cost per km. (3333 km. per month)	4. 7 FCFA

Discussions with current users indicate that the great majority of current taxis are owner driven. The fringe benefits included above would apply to salaried employees, but since owners would expect to earn more than 12, 000 FCFA per month, the above would also be applicable in the case of owner driven vehicles.

(f) Depreciation and Interest (opportunity cost of capital)

Cost of Renault Dindon (excluding tires)	720, 000 FCFA
Scrap value (10%)	72, 600
Balance	648, 000
Interest (cost of capital) at 8% per year for 2. 5 years ($\frac{.20}{2}$ x cost of vehicle including scrap value	72, 000
Total cost of vehicle and interest	720, 000

2. SEDES: page 150

Total vehicle life (2.5 years - at 40,000 kms/yr.)	100,000 kms.
Cost per km.	7.2 FCFA

(g) Miscellaneous, Insurance, Administration

Annual insurance for a Renault Dindon	70,000 FCFA or 1.8 per km.

(h) SEDES claims that 13.2% is required for reasonable overhead and profit for pickup truck operation. However, since the cost of capital is already included in depreciation and the great majority of the vehicles are owner driven, only 9.5% of all costs have been included as a reasonable charge for administration, overhead and profit.

(i) Tax Adjustment	Percent of Total Cost
Adjustments have been made for direct taxes only	
Fuel - (Gasoline) Import tax 12.50 FCFA per litre plus 15.71% purchase tax on sales price on 17.50 FCFA/37.00 FCFA	47.3%
Lubrication - Import duty 15% on C.I.F. price plus 15.71% purchase tax on sales price (including import duty)	33.2
Tires and Tubes - 20% import duty on C.I.F. price plus 15.71% purchase tax on sales price (including import duty)	38.9
Maintenance and Repairs Spare parts - 15% import duty on C.I.F. price plus 15.71% purchase tax on sales price (including import duty)	33.2

Parts account for an estimated 50% of M & R expenditures	
Tax as a percentage of all M & R expenses	16.5
Wages and Allowances - not adjusted	
Depreciation and Interest	
Import duty 15% on C.I.F. price plus 15.71 purchase tax on sales price (including import duty)	33.2
Breakdown of interest and amortization in depreciation charges:	
Depreciation	91%
Interest	9%
Tax as a percentage of total interest and amortization charges (33.2 x 91%)	30.2
Insurance, Overhead and Administration	
No direct tax adjustments	

III. GENERAL TRUCKS

General trucks are defined as gas and diesel powered trucks of 2 to 10 ton capacity.

A comprehensive analysis of commercial vehicle user costs for an entire road network typically involves the analysis of a wide variety of commercial vehicle operating costs and the weighting of these costs in accordance with the ratio of the specific vehicle type to either total commercial vehicle registration or commercial vehicle kilometrage.

However, the commercial vehicle distribution in Togo is relatively moderate. In addition to lack of inter-urban buses, in 1963 less than 1.6% of all licensed vehicles and 4.5% of all trucks exceeded 6 ton capacity.[3] General trucks with a payload of 5 tons represented 50% of all trucks (excluding pickups)

3. SEDES - P. 120

licensed. Further the payload of all trucks registered averaged 4.9 tons[4].

Current data confirms that this trend has continued and a 5 ton truck was by far the most significant truck type in Togo in 1966.

Therefore, a 5 ton truck was accepted as typical of general cargo carrying vehicles in Togo. While both diesel and gasoline powered 5 ton trucks are used in Togo, diesel, while initially more expensive, are the more efficient and are gradually replacing gasoline powered trucks. Thus, in these calculations a 5 ton diesel powered vehicle was used as the basis of all calculations. 5 ton trucks are generally divided into light and heavy vehicles according to sturdiness of construction, reliability and cost.

Since the lighter vehicles account for approximately 70% of all 5 ton trucks registered,this type of unit is used in the preparation of general truck user costs.

Based on interviews and field questionnaires, the following operating costs for an average 5 ton diesel were obtained for Togo:

GENERAL TRUCK USER COSTS IN TOGO

A. General

1.	Description	General trucks capacity 2 to 10 tons
2.	Average running speed all of non-urban roads (obtained from interviewing and field observation)	40 kph
3.	Annual kilometrage (based on information obtained from questionnaires and interviews with owners and dealers	50,000
4.	Total vehicle life[5]	150,000 kms.

4. SEDES - P.121
5. Total vehicle life based on information obtained from interviews and studies. Dealers and transporters claimed an average life of 150,000/200,000, while SEDES suggested a useful life of 140,000/180,000. 150,000 was accepted as being representative of current vehicle life for a light 5 ton diesel truck.

5. Typical vehicle type used — 5 ton capacity light diesel

B. Operating Costs	With Taxes	Without Taxes
1. Fuel	6.4	4.3
2. Lubrication, Oil & Washing	0.8	0.5
3. Tires	4.0	2.4
4. Maintenance and Repairs	8.0	6.7
C. Time Costs		
5. Wages & Allowances	3.7	3.7
6. Depreciation & Interest	10.9	9.2
7. Insurance	1.3	1.3
8. Administration & Overhead (10%)	3.5	2.8
Total	38.6	30.9

D. Notes

1. Prices

The above data assumes the following prices as of October, 1966.

(a) Fuel (diesel)	27 FCFA/liter
(b) Oil	150 FCFA/liter
(c) Tires	24,000 FCFA each
(d) Vehicle cost (average 5 ton light diesel) including body and excluding tires	1,606,000 FCFA

2. Calculations

(a) Fuel consumption - 4.75 km./liter at 27 FCFA/liter	6.4 FCFA
(b) Oil and lubrication costs - 5 liters per 1000 kms. at 150 FCFA/liter	0.8 FCFA/km.
(c) Tires	
One set of new tires (6 to a set) at 24,000 each	144,000 FCFA

One set of recaps (6) cost of recaps 25% of original tire cost	36, 000
Total cost of tires	180, 000
Total kilometers per set of tires 30, 000 original tires 15, 000 recaps	45, 000
Cost per kilometer	4. 0

Cost of recaps based on interviews with tire marketers; kilometers per tire based on interviews with trucking firms and confirmed by SEDES.

(d) Maintenance and Repairs

It is difficult to establish actual costs for maintenance and repairs because it is impossible to obtain uniform data even from the larger garages in Togo. SEDES obtained information from four major repair workshops and from two large trucking organizations, indicating a cost of approximately 400, 000 FCFA per year, or 8 FCFA per vehicle kilometer. The general accuracy of this figure was confirmed by the consultant in interviews with truck operators.

(e) Wages and Allowances

Monthly salary (1 Driver)	12, 000 FCFA
Fringe benefits, bonuses and allowances (30%)	3, 600
Total cost per month	15, 600
Cost per kilometer (4, 167 km. per month)	3. 7 FCFA

The majority of existing freight vehicles are owner driven. However, since average owner wages exceed 12, 000 FCFA per month the inclusion of Fringe Benefits, for employed drivers,does not distort these calculations.

(f) Depreciation and Interest (opportunity cost of capital)

Cost of 5 ton light truck (excluding tires)	1,606,000
Scrap value (10%)	160,600
Balance	1,445,400
Interest (cost of capital) at 8% per year for 3 years ($\frac{.24}{2}$ x cost of vehicles including scrap value)	192,720
Total cost of vehicle and interest	1,638,120
Total vehicle life (3 years)	150,000 km.
Cost per km.	10.9 FCFA per km.

(g) Insurance

For diesel lorries with a rating of more than 16 HP, the cost of unlimited third party insurance in Togo is approximately 66,700 FCFA per year. Additional insurance as required would be included under overhead.

(h) Administration and Overhead

SEDES adopts a figure of 10.9 - 11.4% as overhead for general trucking. While most trucking is handled by owner operated or two truck enterprises, current operators quote figures of between 10-15% for overhead and administration. Since the cost of capital has already been included in depreciation, only 10% of total costs have been incorporated for miscellaneous costs, overhead and administration.

(i) Tax Adjustments	Percent of Total Cost
Adjustments are made only for direct taxes.	
Fuel (diesel) 5 FCFA per liter import tax plus 15.71% purchase tax on sale price or $\frac{8.7}{27.0}$	32.2

Lubrication	
Import duty 15% plus 15.71 purchase tax on sales price (including import duty)	33.2
Tires and Tubes	
20% import duty on C.I.F. price plus 15.71% purchase tax on sales price (including import duty)	38.9
Maintenance and Repair	
Spare Parts - 15% import duty on C.I.F. price plus 15.71% purchase tax on sales price (including import duty)	33.2

Parts account for an estimated 50% of M & R expenditures

Tax as a percentage of all M & R expenses	16.6
Wages and Allowances	
Not adjusted	
Depreciation and Interest	
Import duty 5% on C.I.F. price of truck plus 15.71% purchase tax on sales price (including import duty)	17.8
Breakdown of interest and amortization on Depreciation charges	
Depreciation	88.2
Interest	11.8
Tax as a percentage of total interest and amortization charges (88.2 x 17.8)	15.7
Insurance, Overhead & Administration	
No direct tax adjustments	

The following summary information was collected for current user costs in Togo, exclusive of taxes:[6]

TABLE B-1
SUMMARY USER COSTS - EXCLUDING TAXES - EXISTING ROAD NETWORK
(CFA per kilometer)

	Passenger Vehicle	Pickup Truck	General Truck
Operating Speed (kph)	80	60	60
Annual kilometers	40,000	40,000	50,000
Operating Costs			
Fuel	2.8	2.8	4.3
Oil, Lubricants and washing	0.3	0.3	0.5
Tires	0.7	1.2	2.4
Maintenance and Repairs	3.8	4.6	6.7
Time Costs[7]			
Depreciation and Interest	5.5	5.0	9.2
Wages and allowances	4.7	4.7	3.7
Insurance	1.1	1.8	1.3
Overhead and Administration	1.3	2.6	2.8
TOTAL	20.2	23.0	30.9

6. Treatment of Taxes. The data collected on current vehicle operating costs include taxes. All cost data used in this report were then calculated net of taxes to remedy a conceptual error that will result from the use of either the AASHO Report, Road User Benefits Analysis for Highway Improvements, or comparable European techniques as the basis for the breakdown of the components of vehicle operating costs. The incorporation of the tax element in vehicle operating costs as in the AASHO Report, leads to the inclusion of transfer charges in economic costs. They are relevant to a user's own calculations of the benefit to him of a new facility and therefore in projecting volumes of diverted and generated traffic, but they are not relevant in the calculation of the benefits accruing to the economy as a whole from the same facility. The inclusion of tax savings in calculating economic benefits from a proposed road investment leads to a duplication of benefits.

7. Value of Time. AASHO adopts certain arbitrary assumptions to obtain percentage values for time, comfort and convenience for pleasure vehicles. While assignment of time as a cost for commercial vehicles is readily acceptable, serious questions arise in applying such factors to passenger travel since "savings" are produced that are never reflected in the National Income Accounts. The inclusion of arbitrary passenger time savings as well as estimates for pleasure and convenience tend to weight road improvements that are not recorded in National Income Accounts. Although passenger travel time, convenience and pleasure have a value, it is predominantly of social rather than economic value. Such savings do not lend themselves to quantification and inclusion in an economic feasibility analysis except when they can be clearly determined (as in the case of a toll facility). Consequently, all passenger vehicle operating data are included exclusive of comfort and convenience savings. However, since the majority of non-urban passenger vehicle traffic is either taxis or chauffeur driven vehicles, costs of wages, allowances and overhead are included.

IV. OPERATING COST VARIABLES

A. General

Operating costs such as fuel, oil, lubrication and tires, vary with kilometrage, driving speed, class of road surface and geometrics. Maintenance charges are of a semi-fixed nature, but they do vary somewhat with kilometrage and road surface and for this reason are included in this analysis of variables.

Operating costs vary with both speed and surface. Most existing indices and field tests (except those developed by AASHO) are based on given speeds. This presents problems in the application of these ratios, since the operating speeds on roads in Togo frequently vary from the areas for which the basic data were developed. The consultant has, however, made adjustments to allow for differences in operating speeds.

B. Fuel

Field tests carried out by several groups of consultants in Brazil provided the following cost ratios for fuel consumption:

	Fuel Consumption Ratios in Brazil[8]		
Vehicle Type	Paved	Improved	Earth Track
Medium trucks and pickups	100	141	165
Heavy trucks	100	133	187
Private cars	100	100	100

While Doyen[9] obtained the following figures:

	Road Category		
Vehicle Type	Paved	Improved	Earth Track
Private cars	100	115	130
Commercial vehicles	100	130	170

8. Louis Berger, Inc. Engineering and Economic Feasibility Study, BR-101, BR-116 and BR-232 Highways, Brazil, November 1966, Draft Report.
9. Doyen, P., La Rentabilite des Travaux Routiers, Etudes Routieres, 1960

Based on AASHO estimates for passenger cars in normal operation at various speeds over "flat tangent roads", the following fuel and lubrication indices would apply:

	Fuel Consumption		
		(Loose Surface)	
Passenger Car & Taxi	Paved	Improved	Earth Track
Speed (kph)	80	60	36
Index	100	82	94
General Truck & Pickup[10]			
Speed (kph)	60	40	32
Index	100	105	132

These figures probably reflect the use of more powerful engines in the U. S. than are common in Togo and as the former are relatively insensitive to changing pavement surfaces, the effect of road surface on fuel consumption may be understated.

Field surveys conducted in Northeast Brazil by Berger Engineers indicated a 12. 2% differential in fuel consumption for a pickup van between operation over paved roads (80 kph) and improved roads (60 kph).

Field tests conducted over a four month period for pickup trucks operating over paved and unpaved (improved) roads throughout the same region produced the following data:

	Pickup Truck (4 wheel drive)		
	Total Kilometers	Average Operating Speed	Kms/ per liter
Paved Roads	4375	75	5. 25
Improved Roads	4060	42	3. 85

Thus, there is in fact a 29. 2% increase in fuel consumption by pickup trucks operating over improved roads as compared to paved roads.

10. Extrapolated from AASHO passenger car indices

Based on the above data and interviews and field tests conducted by the Consultants in Togo, the following index of fuel costs was obtained:

Fuel Consumption Index

	Road Category		
	Paved	Improved	Earth Track
Passenger Car & Taxi	100	105	110
Pickup Truck	100	130	165
General Truck	100	130	170

C. Oil and Lubrication

Current operating speeds in Togo are such that the most applicable ratios of speed to lubricant consumption appear to be those developed by AASHO as follows:

AASHO Lubrication Cost

	Road Category		
	Paved	Improved	Earth Track
Passenger Cars & Taxis	100	92	113
All Trucks	100	113	165

Doyen,[11] however, shows lubrication costs varying as follows:

Doyen Lubrication Costs

	Road Category		
	Paved	Improved	Earth Track
Private Cars	100	125	150
Commercial Vehicles	100	140	200

and recent studies in East Africa[12] conducted by the U.K. Road Research Laboratory confirm the Doyen data for commercial vehicles at varying speeds.

11. Doyen, P., op. cit.
12. Reynolds, D.J., The Assessment of Priority for Road Improvements, Road Research Laboratory, Technical Paper No. 48, HMSO, London 1960

Thus the following indices have been used in Togo:

Lubrication Costs

	Road Category		
	Paved	Unsurfaced	Earth Track
Passenger Cars & Taxis	100	125	150
Pickup Trucks	100	140	200
General Trucks	100	140	200

D. Tires

Operating costs for tires over varying road surfaces, reflect two countervailing conditions, speed and surface. Each has a significant influence on per kilometer tire costs. High speed and poor surfaces both increase tire wear, but as surface conditions deteriorate speed declines. The conditions are partially off-setting in consequence. Operating costs for tires reflect three variables:

1. Rate of tread wear
2. Tire life
3. Repair costs

U.S. tire tests[13] show that tire wear (tread wear) increases sharply with speed, the tread wear being three times as high at 89 kph as at 59 kph. However, tire costs per kilometer depend on tire life and thus are influenced by other factors in addition to wear. U.S. tests found that tires operating over loose surface failed 26% faster, given the same rate of tread wear, than over paved roads. Furthermore, vehicles operating on lower quality surfaces are more susceptible to tire repair and resultant lower tire life.[14]

One U.S. study[15] indicated ratios of 1.00 (paved), 2.22 (intermediate) and 2.90 (earth) for tire wear over various road surfaces. P. Doyen introduced the following index for tire operating costs:

	Road Category[16]		
	Good Pavement	Unsurfaced	Earth Track
Private Car	100	200	350
Commercial Vehicle	100	200	450

13. R. A. Moyer and Glen L. Tesdall, Tire Wear and Cost on Selected Roadway Surface, Iowa Engineering Experimental Station Bulletin, 1945, p. 161
14. AASHO, p. 121
15. T. R. Agg and H. S. Carter, Operating Cost Statistics of Automobiles & Roads, Iowa Engineering Experimental Station Bulletin, 1928, p. 91
16. Doyen, P., op. cit.

Doyen's analysis does not take into consideration operating speed which in the case of tire costs can be more significant than pavement design.

The Road Research Laboratory tests in Africa[17] included an analysis of tire wear taking both speed and surface into consideration. These tests produced the following index for East Africa.

Index of Tire Cost for East Africa

Vehicle Type	Road Category: Paved	Improved	Earth Track
Freight Vehicles	100	88	125
Buses	100	94	117

and the following index for Zambia alone:

Index of Tire Costs in Zambia[18]

Vehicle Type	Road Category: Paved	Improved	Earth Track
Freight Vehicles	100	124	229
Buses	100	94	133

For the travel speeds indicated in our analysis of traffic in Togo, and using AASHO tire costs for passenger vehicles, the following index is obtained:

AASHO Index of Tire Wear[19]

Flat Tangent Road	Road Category: Paved	Loose Surface	Unsurfaced
Passenger Car Vehicle Speed	80 kph	60 kph	36 kph
Index	100	134	127
All Trucks Operating Speed	60 kph	40 kph	32 kph
Index	100	172	228

17. Doyen, P., op. cit.
18. Reynolds, D. J., op. cit.
19. Zambia, Rhodesia, Malawi, Uganda, Kenya, Road Research Laboratory, p. 23

The findings in the African tests indicate that with the exception of Zambia, tire costs were only between 15-25% higher on non-paved as compared to paved roads, reflecting the trade off of lower operating speeds and higher tire wear on unpaved roads.[20]

This confirms the general AASHO findings which produced cost differentials lower than those presented by Doyen. Interviews with trucking firms and a review of SEDES findings indicated that tire operating costs in Togo for operating over varying road surfaces exceeded the Road Research Laboratory's, but were significantly less than Doyen's findings and probably most closely approximated the AASHO relationships.

Thus, the following index of tire costs over the various road surfaces are given at the "theoretical" running speeds employed in the present study.

Index of Tire Operating Costs

	Road Category (tangent road)		
	Paved	Unpaved	Earth Track
Passenger Car & Taxis	100	135	130
Trucks (all types)	100	170	230

E. Maintenance

The predominant influence on vehicle maintenance is the type of surface. Doyen[21] shows the following relationships of maintenance costs to road surfaces:

	Road Category		
	Paved	Unsurfaced	Earth Track (or poorly paved)
Passenger Car	100	130	180
Trucks	100	150	250

The African tests in Zambia, produced the following index:

	Road Category		
	Paved	Unpaved	Unsurfaced
Trucks	100	211	722

20. AASHO p. 129-136

21. These figures also reflect conditions peculiar to the actual datum area. The relative conditions of the roads varied considerably, especially in the improved road category.

When these rates were compared with information obtained from interviews with road users and with published data in Togo, the Doyen findings were found to be most relevant for existing vehicle maintenance costs in Togo, and they are, therefore, utilized in this study.

F. Time Costs

Depreciation, interest and opportunity costs of capital, overhead, insurance and registration, are fixed (usually annual) costs.

They vary with the total kilometers or ton kilometers driven annually. The total kilometers driven will increase as a result of : (1) higher utilization, (2) minimization of downtime (terminals, repairs, delays, etc.) and (3) increased hourly speed while total hourly utilization remains constant.

When a road system permits higher operating speed or shorter trip distance, annual vehicle kilometrage can be increased. Furthermore, the improved network may encourage higher utilization (two shift operation for truck or bus and more driving hours for a passenger car).

Finally, an improved road network provides for lower rates and tariffs (commercial vehicles), lower operating costs (passenger cars) and greater convenience (passenger cars and buses). Thus total demand for transport can be increased while greater vehicle utilization (kilometers per year) and lower fixed costs per vehicle kilometer are facilitated.

Total kilometrage per year, however, is only partially a function of average vehicle speed over a given road or road network. Other factors, including total demand for transportation, number of hours driven, and percentage of total hours driven over the proposed improved road will have an even greater effect on total annual vehicle kilometrage. For example, a rapid increase in operating speed on a given facility, accounting for only a small percentage of total annual travel for a given vehicle will have little effect on either its average annual operating speed or total annual kilometrage.

However, a major modification in average speed over an entire network could entail significant changes in either:

> The organization and operating practices of transportation enterprises, or
>
> Average private vehicle kilometrage driven.

Based on interviews and discussions with trucking owners and drivers in the project area, and based on findings in comparable developing areas, the following conservative conclusions were reached concerning increased vehicle kilometrage for existing users as a result of possible increases in average vehicle running speed.

1. Commercial Vehicles

The major trucking firms considered that annual kilometrage of arterial commercial truck traffic might vary over a single major arterial road at an average rate of 25% of the total changes in operating speed resulting from improved maintenance.

2. Passenger Cars and Taxis

Because of a higher percentage of city driving for passenger cars (estimated at 50% of all passenger car traffic)[22] total kilometrage will vary over a single non-urban route at an approximate average of 5% of total change in vehicle operating speed.

This will produce the following index of user costs per kilometer[23] for miscellaneous fixed costs (fees, insurance and overhead) in the project area over varying road surfaces:

INDEX OF FIXED USER COSTS PER KILOMETER

	Road Category		
	Paved	Improved	Earth Track
Passenger Car & Taxis	100	102	106
Truck (all types)	100	113	122

One major user cost, depreciation (including interest and opportunity cost of capital), is partially a function of time and requires special consideration.

G. Depreciation and Interest

As AASHO indicates, vehicle depreciation, especially for passenger cars, is a function of both use (wear and tear) and age. In the U.S., many authorities claim depreciation to be a function solely of age. They argue depreciation should be considered a fixed annual cost. Furthermore, AASHO was unable to "demonstrate an effect of highway design element on the

22. SEDES

23. $I = \frac{OP}{ON} \times R$ -- where O = Operating speed; P = Paved roads; N = Other surface;
I= Index; R = Sensitivity of total annual kilometrage to change in operating speed.

amount of depreciation charged to mileage cost of operation."[24]

A lower standard of surface causes greater wear, but this is partially compensated for by lower speed and higher maintenance charges. Therefore, AASHO arbitrarily chose to assign 1/2 of depreciation to wear (a variable cost) while the other half is treated as a fixed annual cost for passenger vehicles. Interviews and analysis of used vehicles prices in Togo, however, demonstrate greater ranges in average annual depreciation, depending on vehicle condition, than are experienced in the U. S. Thus, actual age of passenger vehicles in Togo is relatively less significant and vehicle condition more important than in the U. S.

The AASHO distribution of 50/50 for passenger car age and kilometrage should be adjusted to a maximum of 40/60 in Togo. Only 40% of the total annual passenger car depreciation and interest charges can be treated as a fixed annual cost related to vehicle age, while the balance will be a function (cost) of total kilometrage.

Interviews indicated that for commercial vehicles, depreciation in Togo is a function solely of vehicle kilometrage.

Application of these percentages of fixed annual depreciation costs to estimated increased passenger car and taxi kilometrage resulting from increased operating speeds produces the following percentages of total depreciation and interest charges that will vary with total annual kilometrage:

	Percentage of Annual kmg. varying w/increased operating speed	Percentage of Total Int. & Dep. Costs, Fixed Annual Costs	Percentage of Total Annual Depn. & Int. Charges varying directly w/operating speed
Commercial Vehicles	25	0	0
Passenger Cars & Taxis	5	40	2.0

Thus the following indices of per kilometer costs for depreciation as a result of varying operating speeds over different surfaces are arrived at:

	Road Category		
	Paved	Improved	Earth Track
Passenger Car & Taxis	100	101	102
Trucks (all types)	100	100	100

24. AASHO Road User Benefit Analyses, p. 125

The AASHO method of trading off greater physical deterioration of the vehicle against lower speeds and higher maintenance charges is probably valid in the U.S. In Togo, however, vehicle condition is more critical than age and the effect of operation over unpaved roads significantly shortens a vehicle's life and has a greater effect on vehicle depreciation. Interviews with vehicle owners indicated that average vehicle life, for vehicles operating solely over existing unpaved roads, is about one half of that of a vehicle operated solely over paved roads. This confirms the following general findings of Doyen:[25]

DEPRECIATION COSTS
OVER VARYING ROAD SURFACES

	Road Category		
	Paved	Gravel	Earth
Passenger Cars & Taxis	100	130	180
Trucks	100	150	250

Since the Consultant has made no adjustment in depreciation per kilometer for varying operating speeds in Togo, part of the AASHO "trade off" (operating speed) is not applicable.

Consequently, the fixed depreciation charges directly related to kilometrage must be adjusted in Togo to reflect the influence of varying road surfaces on vehicle life, in order to obtain an accurate estimate of vehicle depreciation per kilometer.

The above Doyen figures, duly adjusted, produce the following index of vehicle depreciation in Togo:

INDEX OF VEHICLE DEPRECIATION

	Road Category		
	Paved	Improved	Earth Track
Trucks (all types)	100	150	250
Passenger Cars & Taxis	100	118	149

25. Doyen, P., op. cit.

V. SUMMARY OF USER COSTS OVER EXISTING ROADS IN TOGO

The following tables present as indices current user costs in Togo according to road classification and vehicle type.

TABLE B-2

Summary of User Costs for Operating over Existing Roads in Togo
(Excluding Taxes)

User Cost Passenger Cars & Taxis

Road Category	Paved	Improved	Earth Track
Operating Speed (kph)	80	60	36
Operating Costs			
Fuel	100	105	110
Oil, lubrication and Washing	100	125	150
Tires	100	135	130
Maintenance & Repairs	100	130	180
Time Costs			
Wages and Allowances	100	102	106
Depreciation & interest	100	118	149
Other Fixed Costs	100	102	106

TABLE B-3

User Cost Pickup Truck & Vans

Road Category	Paved	Improved	Earth Track
Operating Speed (kph)	60	40	32
Operating Costs			
Fuel	100	130	165
Oil, lubrication and Washing	100	140	200

(Table B-3 cont'd)

Road Category	Paved	Improved	Earth Track
Tires	100	170	230
Maintenance & Repairs	100	150	250
Time Costs			
Wages & Allowances	100	113	122
Depreciation & Interest	100	150	250
Other Fixed Costs	100	113	122

TABLE B-4

User Cost: General Trucks

Road Category	Paved	Improved	Earth Track
Operating Speed (kph)	60	40	32
Operating Costs			
Fuel	100	130	170
Oil, lubrication and washing	100	140	200
Tires	100	170	230
Maintenance & Repairs	100	150	250
Time Costs			
Wages & allowances	100	113	122
Depreciation & interest	100	150	250
Other Fixed costs	100	113	122

The DEG analysis of traffic counts indicates the following approximate distribution of annual vehicle kilometrage by all (National and Local) road types in Togo.

Percentage Distribution of Annual Vehicle Kilometrage

Vehicle Type	Paved Road	Improved Road	Earth Track	Total
Autos and Taxis	41	32	27	100
Pickup Trucks & Vans	27	25	28	100
General Trucks	49	25	26	100

SOURCE: DEG, SEDES and MOW Traffic Data

By taking the user cost index for vehicle operation in Togo on various road surfaces, relating the index for each road type to the percentage of total vehicle kilometrage over each road for each class of vehicle and then relating these percentages to current user costs shown in Sections I, II and III of this appendix, for operation over all road types regardless of surface, the current user costs by type of surface and vehicle are obtained as follows:

TABLE B-5

Current User Costs in Togo/Net of Taxes
(FCFA/Km)

Vehicle Type	Paved	Improved	Earth Track
Autos and Taxis	19.3	21.8	25.8
Pickup Trucks & Vans	16.1	23.5	31.8
General Truck	23.1	31.6	45.3

VI. ADJUSTED CURRENT USER COSTS IN TOGO

Based on the foregoing calculations the following current user costs for all vehicle types over paved, improved and earth roads in Togo have been developed by the Consultants.

A. Passenger Cars and Taxis

TABLE B-6

Weighted Cost Index* - Passenger Cars and Taxis

Percentage Distribution of Annual Kilometrage	Road Category: Paved 41%		Improved 32%		Earth 27%		Weighted Total 100%
	Ratio	Fraction of Weighted Total	Ratio	Fraction of Weighted Total	Ratio	Fraction of Weighted Total	
Operating Costs							
Fuel	100	41	105	34	110	30	105
Oil, lubrication & washing	100	41	125	40	150	41	122
Tires	100	41	135	43	130	35	119
Maintenance & Repairs	100	41	130	42	180	49	132

(Table B-6 cont'd)

Percentage Distribution of Annual Kilometrage	Road Category: Paved 41% Ratio	Paved Fraction of Weighted Total	Improved 32% Ratio	Improved Fraction of Weighted Total	Earth 27% Ratio	Earth Fraction of Weighted Total	Weighted Total 100%
Time Costs							
Wages and Allowances	100	41	102	33	106	29	103
Depreciation & Interest	100	41	118	38	149	40	119
Other Fixed Costs	100	41	102	33	106	29	103

*

Index of Ratio of current user costs over all types of roads in Togo to user costs over a paved road.

TABLE B-7

Existing User Costs (a) for Operating Over Different Surfaces - Passenger Cars & Taxis

(FCFA/km)

	Road Category: Paved(b)	Improved(b)	Earth Track(b)
Operating Costs			
Fuel	2.7	2.8	3.0
Oil, lubrication and washing	0.3	0.4	0.5
Tires	0.7	0.9	0.9
Maintenance and Repair	3.6	4.7	6.5
Time Costs			
Wages and Allowances	4.5	4.6	4.8
Depreciation and Interest	5.2	6.1	7.7
Other Fixed Costs	2.3	2.3	2.4
TOTALS	19.3	21.8	25.8

(a) Data obtained by multiplying user cost item for paved road by respective index number.

(b) Data obtained by dividing current Togolese user costs exclusive of taxes, by the weighted user cost index developed in Table B-6.

B. Pickup Trucks and Vans

TABLE B-8

User Cost Index* - Pickup Trucks and Vans

Percentage Distribution	Road Category: Paved 27% Ratio	Paved 27% Fraction of Weighted Total	Improved 25% Ratio	Improved 25% Fraction of Weighted Total	Earth Track 48% Ratio	Earth Track 48% Fraction of Weighted Total	Weighted Total 100%
Operating Costs							
Fuel	100	27	130	33	165	79	139
Oil, lubrication and washing	100	27	140	35	200	96	158
Tires	100	27	170	43	230	110	180
Maintenance & Repair	100	27	150	38	250	120	185
Time Costs							
Wages & allowances	100	27	113	28	122	59	114
Depreciation and Interest	100	27	150	38	250	120	185
Other Fixed Costs	100	27	113	28	122	59	114

* Index of Ratio of current user costs over all types of roads in Togo to user costs over a paved road.

TABLE B-9

Existing User Costs[a] for Operating Over Different Surfaces - Pickup Trucks and Vans

(FCFA/km)

	Road Category: Paved[b]	Improved[b]	Earth Track[b]
Operating Costs			
Fuel	2.0	2.6	3.3
Oil, lubrication and washing	0.2	2.8	4.0
Tires	0.7	1.2	1.6
Maintenance & Repair	2.5	3.8	6.3

(Table B-9 cont'd)

	Road Category		
	Paved[b]	Improved[b]	Earth Track[b]
Time Costs			
Wages & Allowances	4.1	4.6	5.0
Depreciation & Interest	2.7	4.1	6.8
Other Fixed Costs	3.9	4.4	4.8
Total	16.1	23.5	31.8

(a) Data obtained by multiplying user cost item for paved road by respective index number.

(b) Data obtained by dividing current Togolese user costs exclusive of taxes, by the weighted user cost index developed in Table B-8.

C. General Trucks

TABLE B-10

User Cost Index* General Trucks

	Road Category						
Percentage Distribution of Annual Kilometrage	Paved 49%		Improved 25%		Earth Track 26%		Weighted Total 100%
	Ratio	Fraction of Weighted Total	Ratio	Fraction of Weighted Total	Ratio	Fraction of Weighted Total	
Operating Costs							
Fuel	100	49	130	33	170	44	126
Oil, lubrication & washing	100	49	140	35	200	52	136
Tires	100	49	170	43	230	60	152
Maintenance & Repair	100	49	150	38	250	65	152
Time Costs							
Wages & allowances	100	49	113	28	122	32	109
Depreciation and Interest	100	49	150	38	250	65	152
Other Fixed costs	100	49	113	28	122	32	109

Index of Ratio of current user costs over all types of roads in Togo to user costs over a paved road.

TABLE B-11

Existing User Costs[a] for Operating Over Different Surfaces General Trucks

(FCFA/km)

	Road Category		
	Paved[b]	Improved[b]	Earth Track[b]
Operating Costs			
Fuel	3.4	4.4	5.8
Oil, lubrication and washing	0.4	0.6	0.8
Tires	1.6	2.7	3.7
Maintenance & Repair	4.4	6.6	11.0
Time Costs			
Wages & allowances	3.4	3.8	4.1
Depreciation & Interest	6.1	9.2	15.3
Other Fixed Costs & Insurance	3.8	4.3	4.6
Total	23.1	31.6	45.3

(a) Data obtained by multiplying user cost item for paved road by respective index number

(b) Data obtained by dividing current Togolese user costs exclusive of taxes, by the weighted user cost index developed in Table B-10.

VII. COMPARISON OF PRESENT FINDINGS WITH THOSE OF SEDES

To allow for comparison with the SEDES[26] findings, the Consultants have also calculated user cost indices with taxes. The results are tabulated below.

TABLE B-12

User Cost Indices - All Vehicles Over Paved, Improved and Earth Roads - Including Taxes

Vehicle Type	Road Category					
	Paved		Improved		Earth Track	
	SEDES	DEG	SEDES	DEG	SEDES	DEG
Passenger Cars & Taxis	100	100	129	130	-	134
Pickup Trucks & Vans	100	100	129	149	-	206

26. SEDES, op. cit., p. 275

Table B-12 Continued

Vehicle Type	Road Category: Paved SEDES	Paved DEG	Improved SEDES	Improved DEG	Earth Track SEDES	Earth Track DEG
General Trucks	100	100	128	137	-	196

Although there is some consensus in the findings, the comparison is not entirely valid as SEDES incorporated such additional items as licenses into its cost figures and, moreover, based its calculations on a 40,000 Km/year average operation for all vehicle types. Thus the differences in operating costs between various classes of vehicles tend to be minimal when compared with those developed in the current study.

MINISTRY OF PUBLIC WORKS

INVENTORY OF HIGHWAY MAINTENANCE EQUIPMENT

REPUBLIC OF TOGO
30 August, 1966

EARTHMOVING EQUIPMENT

Item No.	Description	Model	Serial No.	Year of Purchase	Hours of Service	Condition	Observations	Location
1	Grader, Caterpillar	12	8T 4225	1949	13,439	Immobilized	Overhaul needed. Due for scrapping	----
2	Grader, Caterpillar	12	8T 11330	1954	11,380	Fair	Complete overhaul needed	Atakpame
3	" " " "	12	8T 11331	1954	10,800	Fair	" " " " " "	Lome
4	" " " "	12	8T 13474	1952	11,980			Lome
5	" " " "	12	8T 7849	1950	11,590	Fair	Spare parts needed for complete overhaul	Mango
6	" " " "	12	8T 7774	1950	12,250	Fair	" " " " " " " " " " "	Sokode
7	" " " "	12	8OC 177	1955	8,980	Fair	" " " " " " " " " " "	Sokode
8	Grader, Caterpillar	212	9T 4330	1951	11,028	Immobilized	Rebuild	Sokode
9	Grader, Caterpillar	12E	99E 2474	1961	7,245	Good		Sokode
10	" " " "	12E	99E 2518	1961	5,090	Good		Atakpame
11	" " " "	12E	99E 2866	1961	5,450	Good		Mango
12	" " " "	12E	99E 7733	1963	3,536	Good		Mango
13	" " " "	112E	68E 407	1961	4,332	Good		Atakpame
14	Grader, Richier	Pr 70	21 073	1956	8,500	Immobilized	Generally deteriorated	Atakpame
15	Grader, Huber-Warco	9D	9DD 64056H	1964	2,160	Good		Lome
16	Grader, Huber-Warco	9D	9DD 64056H	1964	2,042	Good		Lome
17	Tractor, rubber tired, Caterpillar	DW10	1V 1248	1951	14,560	Fair		Atakpame
18	" " " " " " " "	DW20	88E 1745	1961	960	Good		----
19	" " " " " " " "	DW20	88E 1744	1961	2,450	Good		Sokode
20	Scraper, Caterpillar	10	3C 1697	1951	----	Fair		Atakpame
21	Scraper, Caterpillar	10	3C 1698	1951	----	Fair		Atakpame
22	" " " "	70	8C 1856	1951	----	Immobilized	Partly repaired. Shortage of parts	Mango
23	" " " "	70	8C 1859	1957	----			Mango
24	Scraper, Caterpillar	456	1J 2093	1961	----	Good		Sokode
25	Scraper, Caterpillar	463		1963	----	Good		----

Item No.	Description	Model	Serial No.	Year of Purchase	Hours of Service	Condition	Observations	Location
26	Tractor, track type, Caterpillar	D7	4T 419	1956	----	Very bad	To be scrapped, cost of repairs too high, low capacity	Lome
27	Tractor, track type, Caterpillar	D7	4T 911	1956	----	Very bad	To be scrapped, cost of repairs too high, low capacity	Lome
28	" " " " " " " "	D7	3T 12815	1948	----	Good	Traction Scraper N:70	Mango
29	" " " " " " " "	D7	3T 26433	1954	9, 343	Fair	Reduced engine capacity. Fair output	Atakpame
30	Tractor, track type, Caterpillar	D7	3T 24875	1954	8, 455	Immobilized	Damaged engine. Broken wimble	Sokode
31	" " " " " " " "	D7A	17A 17889	1961	7, 480	Good		Lome
32	" " " " " " " "	D7A	47A 1442	1963	3, 560	Good		Sokode
33	Tractor, track type, Continental	CD7	26 117	1957	----	Immobilized	In an accident, to be repaired	Atakpame
34	" " " " " " " "	CD7	26 675	1960	----	Fair		Atakpame
35	Tractor, track type, Continental	CD8	27 250	1959	8, 680	Passable	Generally deteriorated, with reduction of capacity	Mango
36	Traxcavator, Caterpillar	HT4	7U28943	1954	9, 872	Immobilized	Broken transmission	Lome
37	Traxcavator, Caterpillar	D4	7U29027	1955	8, 655	Passable		Sokode
38	" " " "	955	60A - 1994	1961	4, 232	Good		Sokode
39	" " " "	955	60A - 1995	1961	4, 800	Good		Mango
40	" " " "	966	33A - 593	1961	3, 050	Good		Atakpame
41	" " " "	966	33A - 594	1961	4, 670	Good		Lome
42	Traxcavator, Continental	TPC		1960		Fair		----
43	Tractor, rubber tired, Renault	D35	R 7070	1958		Good		Lome
44	" " " " " " " "	D35	R7050/7282	1958				Mango
45	" " " " " " " "	D35	R7050/5628	1958		Immobilized	Down for overhaul	Mango
46	" " " " " " " "	D513	R7023	1955		Immobilized	Faulty chassis	Sokode
47	" " " " " " " "	D35	R7060/7011	1958		Fair		Sokode
48	" " " " " " " "	D35	R7050/5626	1958		Fair		Atakpame
49	" " " " " " " "	P70	R7022/110	1960		Good		Atakpame
50	Tractor, rubber tired, International	IH560D	3892/SY	1961		Immobilized	Damaged engine	----
51	" " " " " " " "	IH560D	38940SY	1961		Good		Lome
52	" " " " " " " "	IH560D	38922SY	1961		Good		Sokode
53	" " " " " " " "	IH560D	38923SY	1961		Good		Sokode
54	Tractor, rubber tired, Renault	Super 7	7508/580	1965		Good		Lome
55	" " " " " " " "	Super 7	7508/590-4	1965		Good		Sokode
56	" " " " " " " "	Super 7	7508/597	1965		Good		Atakpame
57	Tractor, rubber tired, Renault	Super 7	7508/607	1965		Good		Mango

Item No.	Description	Model	Serial No.	Year of Purchase	Hours of Service	Condition	Observations	Location
58	Roller, compactor, Huber	5T	5-107	1948		Immobilized	Old engine	Lome
59	" " "	10T	10-260	1948		Immobilized	Down for general overhaul	Lome
60	" " "	10T	10-263	1948		Immobilized	To be repaired	Sokode
61	Roller, compactor, Galion	TC8	10D-38760	1963	1180	Immobilized	Broken front cylinder - worn out drive wheel pinion	Lome
62	Roller, rubber-tired, Richier	RTP25		1958		Immobilized		Sokode
63	" " " "	RTP25	652	1965		New		Lome
64	" " " "	RTP25	653	1965		New		Atakpame
65	" " " "	RTP25	655	1965		New		Atakpame
66	" " " "	RTP25	654	1965		New		Mango
67	Roller, self-propelled, Galion	UD226		1961		New		Lome
68	Roller, rubber-tired, Bros	67W	3326A-48	1948		Immobilized		Sokode
69	" " " "	67W	1326A-48	1948		Immobilized		Mango
70	Roller, rubber-tired, Richier	RTP25		1965		Immobilized		Sokode

MINISTRY OF PUBLIC WORKS

INVENTORY OF HIGHWAY MAINTENANCE EQUIPMENT

REPUBLIC OF TOGO
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TRUCKS

Item No.	Description	Model	Kilometrage	Year Purchased	Condition	Observations	Location
1	Cabin truck, 4^{m3} Citroen	T45	---	5-12-52	Bad	To be scrapped	Atakpame
2	" " " "	T46	---	22-11-59	Bad	To be scrapped	Lome
3	" " " "	T46	200,000	15- 7-59	Bad	To be scrapped	Atakpame
4	" " " "	T46D	250,000	20-12-57	Bad	To be scrapped	Atakpame
5	" " " "	T46	---	29- 2-56	Bad	To be scrapped	Sokode
6	" " " "	T46	---	6-11-57	Very bad	To be scrapped	Sokode
7	" " " "	T46	---	6- 6-58	Very bad	To be scrapped	Sokode
8	" " " "	T46	---	14- 7-57	Immobilized	To be scrapped	Mango
9	" " " "	T47	90,000	30- 4-63	Good		Lome
10	" " " "	T47	60,000	23-12-64	Good		Lome
11	" " " "	T47D	190,000	1- 4-60	Immobilized	To be scrapped	Atakpame
12	" " " "	T47D	190,000	1- 4-60	Immobilized	Damaged gear-box	Atakpame
13	" " " "	T47D	90,000	30- 4-63	Good		Atakpame
14	" " " "	T55	---	31- 3-55	Immobilized	To be scrapped	Lome
15	" " " "	T55	---	21- 5-57	Bad	To be scrapped	Lome
16	" " " "	T55	---	31-12-54	Immobilized	To be scrapped	Sokode
17	" " " "	T55	---	18-11-55	Bad	To be scrapped	Sokode
18	" " " "	T55	---	23- 5-57	Bad	To be scrapped	Mango
19	" " " "	T55	---	23- 5-57	Bad	To be scrapped	Mango
20	" " " "	T55	---	31- 3-55	Immobilized	To be scrapped	Mango
21	" " " "	T60	60,000	24-12-64	Good		Sokode
22	" " " "	T60	60,000	24-12-64	Good		Atakpame
23	" " " "	T60	60,000	24-12-64	Good		Mango
24	Cabin truck, 5^{m3} International	IH220	150,000	13- 7-61	Fair		Lome
25	" " " "	IH220	150,000	13- 7-61	Fair		Lome
26	" " " "	IH220	150,000	13- 7-61	Fair		Lome

Item No.	Description	Model	Kilometrage	Year Purchased	Condition	Observations	Location
27	Cabin truck, 5^{m3} International	IH220	150,000	13- 7-61	Fair		Atakpame
28	" " " "	IH220	150,000	13- 7-61	Fair		Atakpame
29	" " " "	IH220	150,000	13- 7-61	Passable	Overhaul completely	Sokode
30	" " " "	IH220	150,000	13- 7-61	Passable	Overhaul completely	Sokode
31	" " " "	IH220	150,000	1- 8-61	Fair		Sokode
32	" " " "	IH220	---	1- 8-61	Immobilized	In pieces, Cannibalized	Mango
33	Cabin truck, 2.5^{m3}, International	IH1600	---	20- 9-63	Immobilized	Damaged engine, under repair	Lome
34	" " " "	IH1600	---	20- 9-63	Immobilized	Under repair	Sokode
35	" " " "	IH1600	75,000	20- 9-63	Good		Sokode
36	Tanker, 5000l, Citroen	T45		30- 4-53	Fair	To be scrapped	Lome
37	" " "	T45		30- 5-56	Fair	To be scrapped	Lome
38	" " "	T45		12-11-52	Fair	To be scrapped	Mango
39	" " "	T45		12-11-52	Bad	To be scrapped	Sokode
40	" " "	T60	15,000	24-12-64	Immobilized	Damaged motor	Atakpame
41	" " "	T60	60,000	23- 3-65	Good		Mango
42	Tanker, 5000l, International	IH220	90,000	20- 9-63	Good		Mango
43	" " "	IH220	150,000	13- 7-61	Fair		Lome
44	Tanker, 5000l, GMC	GMC	---	6-12-49	Bad	To be scrapped	Atakpame
45	Tanker, 5000l, International	IH220	150,000	13- 7-61	Passable		Mango

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