

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET	1. TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete <input checked="" type="checkbox"/> A	Amendment Number _____	DOCUMENT CODE 3
2. COUNTRY/ENTITY ZAIRE	3. PROJECT NUMBER <input type="text" value="660-0028"/>		
4. BUREAU/OFFICE AFR	5. PROJECT TITLE (maximum 40 characters) <input type="text" value="AGRICULTURAL MARKETING DEVELOPMENT"/>		

6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY <input type="text" value="09"/> <input type="text" value="30"/> <input type="text" value="85"/>	7. ESTIMATED DATE OF OBLIGATION (Under 'B' below, enter 1, 2, 3, or 4) A. Initial FY <input type="text" value="81"/> B. Quarter <input type="text" value="4"/> C. Final FY <input type="text" value="82"/>
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8. COSTS (\$000 OR EQUIVALENT \$1 =)						
A. FUNDING SOURCE	FIRST FY <input type="text" value="81"/>			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	2000		2000	4000		4000
(Grant)	()	()	()	()	()	()
(Loan)	(2000)	()	(2000)	(4000)	()	(4000)
Other U.S.						
1.						
2.						
Host Country				4109		
Other Donor(s)						
TOTALS	2000		2000	4000	4109	8109

9. SCHEDULE OF AID FUNDING (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) FN	130		061	-	-	-	2000		4000
(2)									
(3)									
(4)									
TOTALS				-	-	-	2000		4000

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each) <input type="text" value="635"/>	11. SECONDARY PURPOSE CODE <input type="text" value="614"/>
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12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)									
A. Code	TNG	BS							
B. Amount									

13. PROJECT PURPOSE (maximum 480 characters)

TO FACILITATE THE ACCESS OF SMALL CULTIVATORS TO AGRICULTURAL MARKETING SYSTEMS.

14. SCHEDULED EVALUATIONS Interim MM YY MM YY Final MM YY <input type="text" value="06"/> <input type="text" value="83"/> <input type="text" value="06"/> <input type="text" value="85"/>	15. SOURCE/ORIGIN OF GOODS AND SERVICES <input checked="" type="checkbox"/> 000 <input type="checkbox"/> 941 <input type="checkbox"/> Local <input type="checkbox"/> Other (Specify) _____
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16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

17. APPROVED BY	Signature: <i>Norman L. Sweet</i> Title: Mission Director, USAID/Zaire	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION Date Signed MM DD YY <input type="text" value="09"/> <input type="text" value="24"/> <input type="text" value="81"/>
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INSTRUCTIONS

The approved Project Data Sheet summarizes basic data on the project and must provide reliable data for entry into the Country Program Data Bank (CPDB). As a general rule blocks 1 thru 16 are to be completed by the originating office or bureau. It is the responsibility of the reviewing bureau to assume that whenever the original Project Data Sheet is revised, the Project Data Sheet conforms to the revision.

Block 1 - Enter the appropriate letter code in the box, if a change, indicate the Amendment Number.

Block 2 - Enter the name of the Country, Regional or other Entity.

Block 3 - Enter the Project Number assigned by the field mission or an AID/W bureau.

Block 4 - Enter the sponsoring Bureau/Office Symbol and Code. (See Handbook 3, Appendix 5A, Table 1, Page 1 for guidance.)

Block 5 - Enter the Project Title (stay within brackets; limit to 40 characters).

Block 6 - Enter the Estimated Project Assistance Completion Date. (See AIDTO Circular A-24 dated 1/26/78, paragraph C, Page 2.)

Block 7A. - Enter the FY for the first obligation of AID funds for the project.

Block 7B. - Enter the quarter of FY for the first AID funds obligation.

Block 7C. - Enter the FY for the last AID funds obligations.

Block 8 - Enter the amounts from the 'Summary Cost Estimates' and 'Financial Table' of the Project Data Sheet.

NOTE: The L/C column must show the estimated U.S. dollars to be used for the financing of local costs by AID on the lines corresponding to AID.

Block 9 - Enter the amounts and details from the Project Data Sheet section reflecting the estimated rate of use of AID funds.

Block 9A. - Use the Alpha Code. (See Handbook 3, Appendix 5A, Table 2, Page 2 for guidance.)

Blocks 9B., C1. & C2. - See Handbook 3, Appendix 5B for guidance. The total of columns 1 and 2 of F must equal the AID appropriated funds total of 8G.

Blocks 10 and 11 - See Handbook 3, Appendix 5B for guidance.

Block 12 - Enter the codes and amounts attributable to each concern for Life of Project. (See Handbook 3, Appendix 5B, Attachment C for coding.)

Block 13 - Enter the Project Purpose as it appears in the approved PID Facesheet, or as modified during the project development and reflected in the Project Data Sheet.

Block 14 - Enter the evaluation(s) scheduled in this section.

Block 15 - Enter the information related to the procurement taken from the appropriate section of the Project Data Sheet.

Block 16 - This block is to be used with requests for the amendment of a project.

Block 17 - This block is to be signed and dated by the Authorizing Official of the originating office. The Project Data Sheet will not be reviewed if this Data Sheet is not signed and dated. Do not initial.

Block 18 - This date is to be provided by the office or bureau responsible for the processing of the document covered by this Data Sheet.

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S U M M A R Y

The purpose of this project is to facilitate the access of small cultivators to agricultural marketing systems. The target area is the Kwilu subregion of Bandundu Region. The principal means to the end will be the upgrading of the arterial national route between the key towns of Kikwit and Idiofa, a length of some 150 kilometers. Additionally, approximately 50 kilometers of feeder road will be constructed and/or improved.

Food crops are produced largely by small cultivators in Zaire. The project area is among the most densely populated rural areas of the country. Although a number of factors constrain the small cultivator from increasing production and income, various studies have demonstrated that limited (or no) access to markets is the principal constraint. The main constituent element of this constraint is the absence of, or deteriorated state of, rural roads to permit the timely extraction of crops from productive (or potentially productive) areas. It has been shown also that relief of this constraint alone will create sufficient opportunities and incentives to allow production increases, whether other constraints can be relieved simultaneously or not.

The project also will support the initiation of training at the new Lubumbashi Training Center, one of three centers forming the Bureau of Roads' national basic training system for road equipment operators, mechanics, and other technicians. The project, with a planned life of four years, is budgeted at \$8,109,000, of which AID will finance \$4,000,000 of foreign exchange costs and the GOZ the remainder in local currency for local costs.

I. BACKGROUND

A. Economic Overview

The primary development objective in Zaire at the present time is the stabilization and recovery of the economy. This is important in view of Zaire's strategic location, land area, and human and natural resources. The period 1967-74 was one of comparative stability and economic growth fueled by relatively high mineral prices. However, the mining sector was overemphasized, the agricultural sector neglected, and economic infrastructure, including the crucial transport sector, allowed to deteriorate. The causes of the economic crisis that began in late 1974 include principally the relative neglect of agriculture since the late 1960's, the economy's dependence on mining for export, an abrupt deterioration in the terms of trade (copper and zinc prices fell as petroleum prices increased) followed by an acute balance of payments crisis, the dependence of the manufacturing sector on imported inputs, and poor economic management. In 1977-78 a drought struck Bas-Zaire and part of Bandundu Region, reducing food supplies in the capital. In addition, the invasions of the mineral-rich Shaba Region in 1977 and 1978 created political and economic disruptions.

Consequent to these crises, there has been an acceleration in the deterioration of the country's agricultural productive capacity, and the associated transport and marketing infrastructure has been progressively decapitalized. The prolonged crisis has coincided with a very large increase in Zaire's debt servicing requirements. (The country borrowed some \$1.7 billion in 1973-75 alone.) In spite of debt reschedulings and IMF assistance, Zaire has been forced to run a trade surplus in order to service external debts. Real imports averaged about 60 percent of their 1972-74 level during 1978-80 (IBRD estimate).

In the six years since 1974, Zaire's GNP in real terms has declined by about 16 percent. Nearly all of this decline occurred in 1975, 1976, and 1978. Industrial production fell to 25-30 percent of capacity. Inflation exceeded 100 percent annually. In 1979 and 1980 the economy stagnated. This comparative improvement has been achieved at the expense of both investment and consumption, in particular of commercialized consumption. Price inflation has become an acute problem. During 1981, for example, consumer prices in the city of Kinshasa have increased at an annual rate of about 70 percent over end-1980. In June, 1981, Zaire officially devalued its currency by 40 percent. Since then, prices have increased dramatically, abetted by a 15 percent pay raise granted to Government employees, and by a flour shortage caused by an electrical power breakdown in Matadi where the large national flour mill is located. Average price increases for the months of July and August were about 14 percent per month for the lowest income groups in Kinshasa. This compares with a monthly average of 2.9 percent for the first six months of 1981. Food prices increased substantially, especially for cereals, meat, and fish. Price surveys at the end of August showed a post-devaluation increase of 113 percent for bread, 20 percent for manioc paste, and 29 percent for manioc flour. Increases in

Salaries and wages have not kept up. It is estimated that the median salary of an unskilled private sector worker in Kinshasa is less than half the monthly cost of feeding an average family of six people. Reportedly, there is widespread malnutrition, particularly among low-income groups in urban areas.

Within the agriculture and rural development sector, USAID is addressing its efforts toward the alleviation of hunger and the achievement of food self-sufficiency in basic food crops. The AID agricultural strategy includes efforts to stimulate production of food crops by facilitating the access of small cultivators to agricultural marketing systems. This means new and improved roads so that harvested crops can be sold and gotten to market. Of all the constraints to increased agricultural production, marketing deficiencies (or simply no markets at all for isolated cultivators) have the most constraining effects, depriving the small cultivator of any incentive to produce surpluses. Various studies have shown that, given the very unfavorable conditions facing Zaire's farmers, improved marketing opportunities, through an improved transport infrastructure, will do more than any other single developmental action to stimulate agricultural production.

B. Background on Agriculture

The performance of the agricultural sector in Zaire over the last two decades has fallen far short of national policy objectives. It has been characterized by a declining or stagnating output per farm unit, dramatic rural-urban migration, declining real income for farmers, increased food imports, continued environmental deterioration, and a decline in health and nutrition for the rural population. Factors adversely affecting Zaire's agricultural development include: underdeveloped physical and institutional infrastructure; lack of skilled manpower; breakdown of the existing transport system; disincentives inherent in the agricultural pricing system; malnutrition and endemic, debilitating diseases; high population growth rates; and lack of national cohesiveness, as a result, in part, of the presence of some 250 different ethnic groups within Zaire's borders.

The Government's role in promoting and regulating agricultural development has been relatively restricted. The private sector has been the principal promoter of the development of modern agricultural activities.

The Department of Agriculture and Rural Development, which consists of two secretariats--Rural Development and Agriculture--has broad responsibilities for the formulation, execution and coordination of policies and programs that affect the rural agricultural sector.

The Department has either partial or total responsibility for agricultural research, statistics, extension (particularly in livestock and food crop activities), seed reproduction, rural technology, the supervision of agricultural and

rural development projects, and the formulation of agricultural policies. It has on its official payroll an estimated 28,000 personnel; however, a high proportion of these lack the necessary qualifications. In addition, salaries are low and extension workers have little or no access to agricultural inputs or means of transport.

Lack of finance has been a serious constraint on agricultural development. With continuing heavy debt service requirements, Zaire will be unable significantly to increase production-oriented imports for the agriculture and related transport sector without additional foreign donor assistance. Although the agricultural sector was declared the "priority of priorities" in the Mobutu Plan for 1979-81, and as revised (1981-83), its share of government budgetary resources has been low. The weakness of financial management and of procedures for financial control also has been a problem, in agriculture and other sectors.

Agricultural credit is not well developed in Zaire and the lack of credit available for productive enterprises is an obstacle to the development of that sector. Most agricultural credit is used for the speculative holding of stocks of export crops (geared to the unrealistic official exchange rate) and of food crops (because of domestic price inflation). Several institutions provide production loans to medium- and large-scale enterprises but organized credit for smallholder agriculture is virtually non-existent. Similarly there need to be more effective mechanisms to provide incentives for private traders in food crops, notably the provision of credit and particularly foreign exchange resources for trucks and fuel.

Most food crop production comes from relatively small farms: 70 percent of the total population is engaged in agriculture, the majority in traditional agriculture, although this accounted for only about 12 percent of monetized Gross Domestic Product in 1979. In order to guarantee an adequate return to small farmers, the Government sets minimum farm gate prices; however, the Government has been unable to guarantee that crops will be purchased. Moreover, minimum prices sometimes have been declared to be maximum prices by local authorities, a practice which obviously constitutes a substantial disincentive to official marketing and, if repetitious or announced before planting, to production itself.

A further disincentive has been the decline of all services in the rural sector, including road, rail, and river transport, and extension services. The deterioration of the transport network and a shortage of transport equipment, in particular trucks, has rendered difficult or impossible the marketing of food crop surpluses in large areas of the country.

As a result of these factors (transport, institutional, credit, pricing), marketing arrangements often are unreliable and costly, resulting in low prices for producers, irregular supplies of food crops to population centers, and reduced incentives to farmers to produce for the market. Government interventions aimed at ensuring an adequate supply of food crops to the cities at reasonable cost while guaranteeing a fair return to farmers have proved ineffectual.

C. Background to Road Transport in Zaire

Zaire's road network presently comprises about 145,000 km, of which approximately 20,000 km are national roads carrying almost 90 percent of the total traffic, approximately 40,000 km are regional roads carrying about 8 percent of the total traffic, and 85,000 km are local interest roads. Only some 2,300 km of the national roads are paved.

Road maintenance declined after the country's independence in 1960. Vehicles often were not available because of military action; spare parts, tools, and skilled personnel were scarce. This decline has had a direct and deleterious effect on agricultural production and marketing.

Investments in the transportation sector during the coming years will give priority to the rehabilitation and maintenance of the existing infrastructure since these are expected to yield the earliest returns to the economy at the lowest cost. The Government's development policy aims at furthering the diversification of the economy to make it less dependent on the mining sector. Within this strategy, particular emphasis is placed on the expansion of agricultural production throughout the country. This in turn implies an increasing need for and dependence on road transport.

In 1981 Zaire's vehicle fleet was estimated at 200,000 units of which about 80,000 were trucks. Unlike large elements of the air and water transport sectors, the road transport industry is predominantly privately owned. In 1978 the road transport industry consisted of one large haulage firm which operated a fleet of more than 100 vehicles and a large number of small operators, many of them owner-drivers of a single vehicle. Most transport within rural areas is undertaken at present by individual carriers. Only the large company and vehicle fleets operated by government agencies comply with vehicle axle-load limit regulations. From 1969 to 1973 the average annual rate of growth in the trucking industry was 11.9 percent; from 1973 to 1975 the average annual rate of growth dropped sharply to 1.4 percent. Overall since 1974 the truck fleet growth has declined by an estimated 70 percent, with local vehicle assembly plants currently producing about 10 percent of the new trucks. This decline in the rate of growth was due to the country's lack of foreign exchange, which continues to reduce vehicle imports.

The Office des Routes (OR) was created in 1971 as the agency responsible for improving and constructing, maintaining and rehabilitating roads, bridges and ferries. The Bureau of Roads (OR) has primary responsibility for 60,000 km of the national and regional road networks. However, recurrent and capital funds actually made available to the Bureau of Roads have not matched total allocations in recent years. In the 1980 budget, the Bureau of Roads was funded at a level of 230 million; however, it received only its 1977 level of allocation at 218 million.

The Bureau of Roads employs some 11,000 staff of whom 3,600 are permanent local employees and 7,100 are paid on a daily basis. About 5 percent of the staff works at headquarters in Kinshasa and 95 percent works in the regions. Each region operates as a small Office des Routes headed by a Zairian regional director assisted by an expatriate technical director. Each region has a certain number of autonomous brigades and mechanized units (Unités d'Intervention); each brigade is made up of several working crews that vary in number and skills according to the requirements of the area where they are assigned. The brigade is the basic operational unit of the Office. Each brigade has a small workshop; normally rents the equipment it requires from the department that manages the Bureau of Roads equipment, the Service de Gestion du Material des Travaux Publics (SGMTP); and hires the personnel it requires. Fifty-one brigades are presently operational, with another 22 planned to be created in the period 1981-83.

D. Training Department, Offices des Routes

One of the Plan Mobutu objectives for the period 1980-85 is the creation of a Training Department in the Ministry of Public Works' Office des Routes. The purpose of the Training Department is to assist the Bureau of Roads in accomplishing its goals by ensuring that the necessary human resources are available, and that Bureau personnel have opportunities for professional improvement through programs of training and career development.

The Office des Routes memorandum of 15 May 1980 formally established the Training Department within the Bureau with the following objectives:

- (a) assume all training responsibilities for the Bureau of Roads, including the preparation of training materials and the conduct of training activities;
- (b) determine the training needs, both qualitative and quantitative, and take steps to meet those needs;
- (c) adapt the training to meet the needs of the trainees' job responsibilities;
- (d) improve the selection, orientation and evaluation of personnel within the Bureau;
- (e) develop job descriptions, establish a hierarchy of job functions and set up organizational charts; and
- (f) prepare a training plan as well as a career ladder for Bureau personnel.

The previous training efforts of the Bureau of Roads consisted of on-the-job training by expatriate personnel. In 1972/74 the Bureau contracted with the Organization for Rehabilitation through Training (ORT) an international technical assistance organization with wide experience in vocational training, for 34 expatriate technicians to provide brigade training at actual work sites. Some 1,100 personnel received instruction in the maintenance and repair of motors and heavy equipment engines, civil engineering and the operation of vehicles and heavy road-building equipment. Following the three-year project,

two School Brigades were created to train Bureau personnel on site. Although this system appeared to operate satisfactorily when first in operation, within six months the brigades were no longer functioning effectively, and road construction equipment was beginning to break down. After that time, no training was carried out for the Bureau's personnel until the creation of the Department of Training.

The Plan Mobutu details the following personnel training needs for Zaire for the period 1981-84:

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>TOTAL</u>
CIVIL ENGINEER					
Yard Chief	6	36	36	25	103
Team Chief	16	54	55	54	179
Supply Management	8	48	16	1	73
GENERAL MECHANIC					
Engine Maintenance	36	95	95	95	321
Engine Repair	24	28	28	28	108
Chief Mech. Brigade	9	22	22	22	75
Electricians	6	18	18	6	48
Mechanics	15	15	--	--	30
Mechanics of SGMTP	18	59	59	59	195
EQUIPMENT OPERATOR					
Driver, various equipment	5	28	28	28	89
Driver, basic equipment	50	150	150	125	475
Chauffeurs	<u>160</u>	<u>284</u>	<u>284</u>	<u>284</u>	<u>1012</u>
TOTAL	353	837	791	727	2708

Between 1981 and 1984, the Training Department plans to train some 3,000 employees of the Bureau of Roads in both technical and managerial skills. To this end it is planned to establish a grid of three regional training centers under the direction of the Bureau's Department of Training. These centers will provide training for the Bureau of Roads Brigade personnel. The center at Kasangulu near Kinshasa will train personnel from the Bas-Zaire, Bandundu, and Equateur regions; the one at Bukavu for the regions of Kivu and Haut-Zaire and the one at Lubumbashi for the Shaba, Kasai Oriental, and Kasai Occidental regions.

E. Project Rationale

The Kwilu subregion of Bandundu is one of the most densely populated and agriculturally productive areas in Zaire. Most of its inhabitants are small cultivators engaged in the production of food crops. Developmental assistance to this area affects a large beneficiary group; increased marketing of food crops also benefits the inhabitants of Kinshasa and other urban centers that draw on Kwilu's food production. For developmental projects, the area also

affords the advantage of being accessible from Kinshasa and more readily supportable than distant regions reliant upon problematical transportation for support.

Achievement of Kwilu's potential agricultural productivity is impeded by a number of factors, principal among which is the absence or deteriorated state of roads. The paved road from the nation's capital to the interior terminates at Kikwit, the subregional urban center. Beyond that point, the poor condition of national, regional, and local (feeder) roads precludes easy movement of produce. The project will upgrade the extension of the main national road from Kikwit to Idiofa, thus extending the good surface communications line some 150 km through the heart of this productive belt. The project will complement AID Project 660-0026, which will upgrade connecting regional roads. The linkages will establish a basic network for improved evacuation of food crops from the area. Other donors (including IDA, FAO, and several PVOs) are undertaking activities in this area; all will contribute to the accelerated development of the area's potential.

The best source of current agricultural sector information for Kwilu is the survey carried out by the FAO in 1980. The FAO selected one community in each of Kwilu's five zones for an in-depth socio-economic analysis. The principal purpose of the survey was to identify agricultural priorities for developmental project attention. The survey's managers concluded that foremost among these priorities is the road and transport system. Survey findings suggested that improved roads would do more to increase agricultural production in the area than any other single activity. These include village feeder roads as well as arterial routes, although the latter take first priority because of their extremely deteriorated state. Data available to FAO indicate that over 200 vehicles (mainly trucks) daily traverse the paved road between Kinshasa and Kikwit. The continuation of that road to Idiofa, a dirt road in a very poor state of maintenance, carries a daily average of about 40 vehicles, mostly produce-laden trucks. An improved road from Kikwit to Idiofa is expected to increase significantly the amount of traffic servicing this almost entirely agricultural area. The Department of Agriculture estimates that the project area (Bulungu and Idiofa zones) produces about 400,000 tons of food crops annually, almost half of which is accounted for by cassava, a principal export to urban areas as well as a staple food. The FAO survey findings demonstrate persuasively that improved market accessibility through improved roads can induce substantially increased production, and concomitant small cultivator income, with no other changes in the economic environment.

Other studies also have suggested the critical importance of improved marketing opportunities as the most remunerative investment among developmental alternatives at this stage in the country's development. The rationale for this project is based on targeting a key marketing communications link in a vital area of food crop production with significant potential for expanded production and increased income for small cultivators.

II. Detailed Description of the Project

Goal

The goal of this Project is to stimulate agricultural production of food crops by small cultivators. Of Zaire's total land area, between 30 and 40 percent is estimated to have good potential for agriculture. At present, however, only a small part of this potential is productively exploited, perhaps 3 percent of total land area, while the importing of substantial amounts of agricultural products continues.

The major constraint to increasing food crop supplies is the difficulty and at times impossibility of collecting and transporting food crop surpluses because of the seriously deteriorated condition of the transport network, particularly the road system.

Other constraints on the production of food crops include Government pricing policies where preference in practice is given to the provision of food crops to large population centers at the lowest cost possible rather than to ensuring incentives in the form of a profit margin for the small cultivator. The present official exchange rates encourage the importation of food stuffs which undersell and thus discourage domestic food production. For example, Zaire once was a maize exporter; by 1970 maize imports were estimated at 64,000 tons, increasing to 100,000 tons in 1975 and about 175,000 tons in 1978. Production credit also is a constraint. Access to such credit might allow the small cultivator to purchase agricultural inputs, in particular tools and improved varieties, and to overcome cash flow difficulties which are encountered during the growing season. Agricultural labor supply is not a serious constraint at the present time but may become so in the longer term.

The availability of food crops to the population in general but particularly to urban centers also could be increased through a reduction in the post-harvest losses of existing production. Although no comprehensive quantitative data exists on actual post-harvest losses there is a clear discrepancy between the amount of food crop production used for domestic consumption and the amount that is commercially available. Improving the speed and frequency of access of the small cultivator by improving the road system will reduce their post-harvest storage losses.

An improved road transportation system is thus a necessary condition for the stimulation of agricultural production by small cultivators and the transportation of marketable surpluses of food crops to large population centers.

Purpose

The purpose of the Project is to facilitate the access of small cultivators to agricultural marketing systems.

The transportation of marketable surpluses in the Kwilu is dependent upon the existence of an agricultural marketing system including the merchants (commerçants) who form an essential link in the food chain from the producers to the consumers in urban areas. An increase in producer-merchant contact would require that the present marketing system operate more efficiently and/or that it be expanded. The improvement and extension of the road system, and the upgrading of the maintenance capability of the Bureau of Roads, will lower merchant vehicle operation and maintenance costs and allow the existing commercants to increase their area of operation. An increase in merchant profit margins could lead to an expansion of the commercant vehicle fleet and attract more individuals and firms to the sector. Such an expansion of the agricultural marketing system remains dependent on the availability of marketing credit, foreign exchange and fuel, but it would support an increase in food crops available in larger population centers and would stimulate further agricultural production, thus increasing the small cultivators' incomes. It is estimated that if only five percent of the present crops lost through inadequate storage and transportation were marketed, the gross income of small cultivators in the Kwilu subregion would be increased at least \$18 million, at 1981 market prices.

The purpose of the Project will be achieved by improving parts of the road system in Kwilu, and by improving the ability of the Bureau of Roads to maintain and improve the existing road network through the development of the expertise and experience of its personnel, the strengthening of the administrative capacities of its field units and the provision of increased opportunities for career development and job satisfaction.

The direct beneficiaries of the project will include the commercants of Kwilu, the small cultivators serviced by those commercants, those who will benefit from the wage employment to be generated by the project, and the employees of the Bureau of Roads whose skills will be upgraded by the Project.

Project Components

The Project has two major components: (1) The establishment and operation of a Bureau of Roads regional training center in Lubumbashi for the training of personnel in the regions of Shaba, Kasai Occidental, and Kasai Oriental in techniques of road maintenance and rehabilitation and equipment maintenance and repair. This is to be achieved through the provision of tools and equipment for the machine shop, motor maintenance shop, spare parts warehouse, and engine repair shop to provide training opportunities for practical experience in a full range of road maintenance skills; the provision of equipment by the Bureau of Roads to provide training opportunities with equipment available in the regions; the provision of technical assistance to the Bureau of Roads in the accomplishment of the foregoing; the provision of training to counterpart staff to ensure that the direction and operation of the Center will be assumed by personnel of the Bureau of Roads; and (2) improvement of approximately 150 kms of main arterial roads from Kikwit to Idiofa in order to provide improved access to the markets of Kikwit and Kinshasa. This is to be achieved through

the provision of road construction and maintenance equipment to the heavy road brigade to be established by the Bureau of Roads for the maintenance, improvement and construction of the roads under the Project; the provision of spare parts essential for the preventative maintenance of the Project equipment; the improvement or construction of approximately 50 kms of feeder roads to provide access to the main arterial roads for small cultivators and commercants and thereby to allow an expansion of the transport system servicing this predominantly agricultural area; and technical assistance to the Bureau of Roads in the accomplishment of the foregoing.

(1) Regional Training Center, Lubumbashi

The Center will offer skills training in road and equipment maintenance and repair to personnel of the Bureau of Roads, predominantly from the Shaba, Kasai Oriental and Kasai Occidental regions. It is the final center of a grid of three regional centers, to be established by the Training Department of the Bureau of Roads, which together will provide the required training in road maintenance and repair and associated skills for its permanent staff.

Under the overall supervision of the Bureau of Roads, an existing facility in Lubumbashi will be renovated for workshops and dormitories for 60 trainees, and classrooms will be constructed. The workshops and equipment will provide ample training, demonstration and operating opportunities for practical experience in a full range of road maintenance skills. An equipment fleet containing a cross section of road maintenance and construction vehicles will provide training on equipment available to road brigades in the regions. Training aids and equipment, together with appropriate pedagogical materials already under preparation by the Training Department for the three regional centers, will be available for classroom instruction, demonstrations and independent study. A training brigade will be formed in Lubumbashi to provide two months on-the-job training for trainees after completion of formal training. The Zairian faculty will be supplemented by the services of a master mechanic and an equipment operator for the life of this component of the Project (24 months). A Chief Technical Advisor/Engineer will function as the Center's Director for the length of the Project. He will be directly responsible to the head of the Bureau of Roads' Department of Training in Kinshasa, and through him will coordinate his work with that of the other two regional centers. The Director will ensure the planning, scheduling, support and supervision to carry Project activities to the timely achievement of objectives.

When the Center is fully operational, with all staff and equipment on site, it will have the capacity to train at least 250 trainees per year. The Center will provide training in the following specialities: civil engineering, mechanics (including soldering and electricity), and equipment operation. The Civil Engineering course will include both theory and practical work in the construction and maintenance of paved and dirt roads and bridges. Control of stock and inventory also will be covered. The Mechanics Course will provide training in a variety of motors and

heavy equipment engines, their maintenance and repair. The Vehicle and Heavy Equipment Operation Course will cover the operation of small vehicles, seven and twelve-ton trucks, and heavy road building and maintenance equipment, including bulldozers, front end loaders, back hoes and graders. The courses will vary in length from two months to six months depending on subject requirements.

Institutionalization of the Project

From the beginning of the project, emphasis will be placed on the process of institution building through the training of counterparts, who eventually will assume responsibility for the direction and operation of the Center. The Director of the Center will have one counterpart and the two instructors will each have two or three counterparts. The counterparts will be recruited by the Bureau of Roads' Training Department in Kinshasa and will work with the team for an initial 12 month period. Following that, counterparts will be selected for short-term training abroad. Upon their return the counterparts again will work with the technical assistance team, utilizing the knowledge and skills acquired during their training abroad. The counterparts gradually will assume responsibility for the direction of the Center and for the planning and implementation of the curriculum and practical work. The technical assistance team will hand over responsibility to their counterparts at the end of the Project.

Inputs

AID financed inputs for this component will include:

1. Provision of tools and equipment for stocking the workshops and tool warehouse of the Center;
2. Provision of training aids and equipment for classroom instruction and demonstration;
3. Provision of three technical personnel for the life of this component of the Project (24 months); a Director responsible for the management of the Center and for the development, modification and evaluation of its program of work; a master mechanic and a master equipment operator as advisor-trainers responsible, under the overall supervision of the Director, for the development and implementation of training courses in areas of expertise appropriate to the requirements of the Bureau of Roads.

13
TRAINING COMPONENT BUDGET
(FX COSTS, AID-FINANCED)

A. Personnel

Positions	Director (24 PM)		Instructors (48 PM)		Total (72 PM)
Period	1982	1983	1982	1983	1982-83
Annual base salary	50,400	55,440	86,400	95,040	287,280
Allowances	18,620	20,132	32,920	35,512	107,184
Other costs	29,336	32,167	49,586	54,447	165,536
Total	98,356	107,739	168,906	184,999	560,000

B. Commodities

1. Training materials

Unit	Number	Unit Cost	Total
Projection Equipment	2	250	500
Projection Equipment	2	300	600
Projection Equipment	2	150	300
Video Tape Recorder	2	2,000	4,000
Color monitor	2	100	200
Sound projector (16 mm)	2	150	300
Typewriter (French keyboard)	2	500	1,000
Photocopier	2	1,000	2,000
Electronic stencil	2	1,500	3,000
Duplicating machine	2	1,000	2,000
Calculator	2	200	400
Drawing board	2	100	200
Technical slides	L.S.		6,000
Reproduction materials	L.S.		6,000
Reference Material	L.S.		5,500
Sub-Total			32,000
Transport and Insurance			<u>5,000</u>
Component Sub-total			37,000
2. Workshop Tools and Equipment			<u>100,000</u>

The Government of Zaire financed inputs for this component will include:

1. The renovation, construction and furnishing of the facilities in Lubumbashi.
2. Salaries and costs of 22 local staff in 1982 and 39 in 1983.
3. Travel of staff and trainees within the country.
4. Local currency costs of technical assistance personnel.
5. Provision of heavy equipment, workshop equipment and spare parts for the training courses.
6. Provision of office supplies and utilities.

The summary cost estimate for the life of this component is set out in Table 6.

Outputs

The principal output for this component of the Project will be an estimated 500 Bureau of Roads personnel trained over a two-year period in road maintenance and equipment repair.

Conditions Precedent

Prior to the disbursement of funds under this component of the Project, the Government of Zaire will furnish to AID:

(a) A comprehensive schedule of work for the preparation of physical facilities, training materials, and curriculum of the training center, and the selection of staff and trainees, over 24 calendar months; this schedule of work shall contain at a minimum:

1. A schedule of work for the preparation of facilities at Lubumbashi, including construction of classrooms, workshop, lodging and maintenance facilities.
2. A schedule for the preparation of training materials and course curricula for the training center.
3. A schedule for the recruitment of staff.
4. A procedure for the selection of trainees and the projected number of trainees over a 24-month period.

(b) A list acceptable to AID of training materials, equipment and spare parts to be procured with Loan funds for the training center at Lubumbashi, including proposed source and origin and estimated cost, and plans acceptable to AID for proposed utilization, protection and maintenance of such training materials, equipment and tools during the life of the project.

Special Covenants

The Government of Zaire will agree:

1. To ensure that all equipment, tools, and training materials financed under the Loan for the Lubumbashi training center shall be utilized exclusively by the center during the life of the Project, and thereafter to further the objectives of the Project.
2. To provide a sufficient and timely supply and delivery of diesel fuel and lubricants to the training center at Lubumbashi during the life of the Project to meet the requirements of the Project.
3. To provide adequate facilities in Lubumbashi to be used for training under the project, including as necessary classrooms, workshop, lodging and maintenance facilities, and to make necessary renovations and alterations thereto.
4. That Bureau of Roads personnel assigned to training under the Project will be relieved of all other duties during the period of such training, and that the scheduling of such training shall be taken into consideration in setting up work schedules for road construction or reconstruction.

Responsibilities

The Bureau of Roads' Department of Training will appoint a person who will have responsibility for liaison between the Director/Project Manager and the Department of Training. The Bureau of Roads will ensure that this liaison officer has sufficient budget support so that he may make quarterly field trips to the project area. For the purpose of these field trips, the project area is defined to include the regions of Shaba and the Kasais Occidental and Oriental, in particular the training facilities in Lubumbashi.

The Bureau of Roads also will assign qualified Zairian employees full-time to serve as homologues to the AID-financed technical advisors.

Road Improvement or Construction; Kwilu Subregion

Road improvement or construction under this component of the Project will be carried out under the direction and supervision of the Bureau of Roads. Approximately 150 kms of the main arterial road from Kikwit to Idiofa will be upgraded to provide improved access to the markets of Kikwit and Kinshasa. This will require improvement by grading, widening, filling, shaping, watering and compacting to the required grade and cross-section, providing adequate drainage, and protecting the embankments and slopes. To this end a road brigade will be established and operated out of the Bureau's regional maintenance and support center at Kikwit to accomplish the work.

To enable the Kikwit-based brigade to undertake these road improvements and to properly maintain roads in the Project area during and beyond the life of the Project, the equipment, repair and technical capabilities of the brigade will be augmented and improved.

A technical assistance team of two technicians is envisaged: a road engineer (team leader/senior technical advisor) and a master mechanic. These personnel will live in Kikwit in quarters to be provided and furnished by the Bureau of Roads, but will spend the majority of their time in the field with the brigade, working on the roads and training the brigade personnel at the job site.

The team leader will be directly responsible to the head of the Bureau of Roads (Président Délégué-Général) in Kinshasa. He will coordinate the work with the Bureau's Regional Office in Bandundu. The Bureau's sub-regional facility in Kikwit will provide warehousing for equipment and spare parts as well as a maintenance facility for major repair work.

The engineer/team leader, in association with the Brigade Chief, will ensure the planning, scheduling, support, and supervision necessary to successfully complete the project on time. The team leader will be responsible for the coordination and support needed to keep the project on schedule.

The team leader and the mechanic will have project vehicles and radios at their disposal for transportation and communications. The identification of needs for spare parts and other direct support of the brigade, as well as the timely response to those needs, will be ensured by the team leader.

The mechanic will provide advice and assistance to operate and maintain the brigade equipment including bulldozers, graders, loaders, compactors, dump trucks, and other mechanized equipment. The mechanic will work closely with the Brigade Chief and will be responsible to the engineer/team leader.

The Project will incorporate structured training sessions with on-the-job demonstrations for the personnel assigned to the road brigade. The senior technical advisor's responsibilities will include the specification of training objectives and needs. See Annex J for a detailed discussion of on-the-job training and instruction.

In addition to the upgrading of the main arterial road in the Project area, some 50 kms of feeder road will be improved or constructed in areas where potentially productive land can be made accessible to enable the produce of small farms to be transported to market areas. The feeder road improvement or construction will be carried out by the Kikwit-based road brigade.

The determination of the location of the feeder roads will be the responsibility of the Bureau of Roads, in consultation with the Bureau d'Etudes of the Department of Agriculture, and with the approval of AID. The criteria to be used will include the location of population centers, existing patterns of land use, the potential for intensive or extensive land cultivation, the location of other development projects, and the placement of markets and existing marketing routes.

Design Criteria

Although the Office des Routes adopted geometric standards in 1974, only about six percent of the existing primary road net meets those standards. Roads to be constructed under contract (new roads) will comply with these minimum standards. This project, concerned basically with the improvement of an existing arterial road, will undertake a level of improvement based on considerations of existing and expected traffic volumes, topography, terrain characteristics and prevailing drainage conditions. The objective will be to improve earth roads in poor condition to earth roads in good condition.

The Project road will be surfaced with selected granular material. Clearing width will be 15 meters minimum on existing alignments and 30 meters on relocated alignments in flat areas. The maximum grade normally will be no more than 15 percent. The road profile shall be at least 0.3 meters above natural ground, except on hillside areas where the alignment makes this impossible. The roadway shall have ditches on each side where necessary and culverts shall be installed for cross drainage.

The design criteria selected are based on the following standards:¹

ADT (Average daily traffic)	50-250 vehicles
Design Speed (KPH)	30-80
Maximum Gradient (%)	6-12
Width of Carriageway (M)	5.0-6.0*
Width of one shoulder (M)	1.0
Formation Width (M)	7.0-8.0*
Minimum Radius (M)	30-150
Width of Bridges (M)	3.5-4.0
Vertical Clearances (M)	5.0
Design Live Loading - bridges (AASHO or Equiv.)	H15-44
Surface Type	Granular
Design life (Years)	5-10

* Values selected for this project

For the 150 kms of arterial road it is estimated that 500 work days will be required to improve to the planned level. As there will be considerable earthwork involved in widening existing deteriorated roadway and in installation of numerous drainage structures, an estimated improvement rate of 300 meters per work day has been used. As the 50 kms of feeder road will involve only minimal clearing and construction, it is estimated that one km of road per work day can be completed with minimum usage of brigade equipment. Assuming the brigade averages 16 workdays per month, about three years will be required to complete the Project.

¹ The above table is based on recommendation for low volume road construction in a study by the Transportation Research Board, National Academy of Sciences, prepared under the Transportation Technology Support for Developing Countries Project, Contract AID/OTR-C-1591, Project 931-1116, Washington, D. C., 1979.

Inputs

The AID financed inputs for this component include:

1. Provision of road construction and maintenance equipment required for the improvement and construction of the roads under the Project;
2. Provision of a shelf inventory of spare parts essential for the preventive maintenance of the Project equipment during the life of the Project;
3. Provision of two technical personnel: an engineer senior technical advisor and a master mechanic as advisor-trainer for 36 months each to provide technical assistance to the Kikwit brigade in the operation, repair, maintenance and control of brigade equipment and in the improvement and construction of roads under the Project.

Details of the AID-financed inputs are as follows:

<u>A. Personnel</u>	<u>Dollars</u>		
Engineer (36 PM)	375,000		
Mechanic (36 PM)	300,000		
	<hr/>		
Subtotal A	675,000		
<u>B. Commodities</u>			
<u>Heavy Equipment</u>			
<u>Unit</u>	<u>No.</u>	<u>Unit Cost</u>	<u>Total Dollars</u>
		(FOB USA)	
Bulldozer (D6D)	1	133,000	133,000
Grader (12G)	1	159,500	159,500
Grader (120G)	1	93,000	93,000
Front End Loader (75B)	2	92,500	185,000
Back Hoe Attachment (450G)	1	15,000	15,000
Vibratory Compactor (SP-56)	1	49,500	49,500
Dump Trucks (F700/4M ³)	12	35,000	420,000
Lubrication Truck	1	60,000	60,000
Fuel Truck (2,000 gal.)	1	45,000	45,000
Water Truck (1,500 gal.)	2	45,000	90,000
Pickup (F150 4x4 diesel)	3	9,500	28,500
Water Pumps	4	3,000	12,000
House Trailer w/generator	1	30,000	30,000
Radio	3	4,500	13,500
Tools	L.S.	6,000	6,000
			<hr/>
			1,340,000
Spare parts 40%			536,000
			<hr/>
			1,876,000
Freight/Insurance Costs 30%			563,000
Procurement 7%			131,000
			<hr/>
Subtotal B			2,570,000
Total			3,245,000

The Government of Zaire financed inputs for this component include:

1. The provision of an adequate and regular supply of fuel and lubricants for the project vehicles and equipment.
2. Arrangements for quartering brigade personnel and equipment at job sites along the project roads.
3. The provision of adequate accommodation in Kikwit, and in-country travel and allowances for the technical assistance team.
4. The provision of the personnel for the Project Brigade and of sufficient casual laborers for the needs of the Project.
5. The provision of all materials required for drainage of the Project roads.
6. The provision of a storage facility in Kikwit for housing and repairing the Project brigade equipment and for storing spare parts.

The summary cost estimates for this component of the Project is in Table 3.

Outputs

The outputs of this component of the Project include:

1. Road grading, widening, filling, shaping, watering and compacting to the required grade and cross-section, including adequate drainage, and the protection of embankments and slopes necessary to improve or construct the following roads in the Project area:
 - a. approximately 150 kms of the main arterial road from Kikwit to Idiofa; and
 - b. approximately 50 kms of feeder roads to the main arterial road.
2. On-the-job training of brigade personnel to produce competent heavy equipment operators, truck drivers, mechanics for engine maintenance and repairs, other maintenance and repair personnel, supplies and spare parts managers, and crew chiefs.

Conditions Precedent to Disbursement

Prior to disbursements under the Loan, the Government of Zaire will furnish to AID:

- a. A comprehensive schedule of work to be performed under the project on all roads to be reconstructed or constructed over the life of the project, and a schedule for the identification of locations acceptable to AID of all feeder roads to be constructed or reconstructed.

b. A list acceptable to AID of equipment and spare parts to be procured with Loan funds for the Project brigade based in Kikwit, including proposed source and origin and estimated cost, and plans acceptable to AID for proposed utilization, protection and maintenance of such equipment and spare parts during the life of the Project.

c. Evidence of actions or plans made by the Borrower for the determination and promulgation of vehicle axle-load limits along the arterial road of the Project.

Special Covenants

The Government of Zaire will agree:

1. To ensure that all new road equipment and spare parts financed under the Loan shall be utilized exclusively for purposes of carrying out the Project and thereafter to further the objectives of the Project in the Project area.
2. To provide a sufficient and timely supply and delivery of diesel fuel and lubricants to the Project brigade at Kikwit during the life of the Project to meet the requirements of the Project.
3. To provide adequate facilities in Kikwit to be used as the main base for equipment and spare parts required by the Project Brigade.
4. To make arrangements satisfactory to AID for the long-term maintenance of roads constructed or reconstructed with Loan funds.
5. That the scheduling of training under this component of the project shall be taken into consideration in setting up work schedules for road construction or reconstruction.

Responsibilities

The Bureau of Roads will appoint a project manager who will have responsibility for liaison between AID and the Bureau of Roads and for supervision of all matters relating to day-to-day project implementation. The Bureau will ensure that the project manager has sufficient budget support so that he may make quarterly field trips to the project area. For the purposes of these field trips the project area is defined to include Kikwit and Bulungu and Idiofa zones.

The Bureau of Roads also will assign qualified Zairian employees full-time to serve as homologues to the AID-financed technical advisors.

III. PROJECT ANALYSES

A. Technical Analysis

1. Road upgrading to the level of service of a good, unpaved, all-weather road will be the objective. This will include construction of a compacted-earth travel surface, to the proper cross-section, and provision of adequate drainage facilities. A new construction brigade will be fully equipped and an adequate stock of spare parts provided. This equipment fleet will be sufficient to accomplish the work.

2. Two experienced specialists will be contracted to support the new brigade based at Kikwit. They will assist in the supervision, operation and maintenance of the brigade's facilities and equipment to help insure successful execution of the work.

3. The soils in the project area are predominantly sandy soils which, when compacted with moisture and provided with adequate drainage, can be improved to the desired classification.

4. The completion time for the project is based on the Bureau of Roads records of the average working rates and days per year. The yearly production rates have been modified to include the additional requirement of installing adequate drainage. The estimated 300 meters of improvement work per day by one brigade is considered reasonable.

5. The equipment cost estimates have been prepared using current US equipment prices plus 37% for procurement, handling, and shipping (based on recent experience in Zaire). Spare parts costs are estimated based on a percentage of new equipment costs (40% to ensure upkeep during the life of the project). Local cost estimates are based on information from Bureau of Roads' records as adapted to expected project conditions and requirements.

6. As ascertained by project design team consulting engineers, the technical design for the proposed work is appropriate for the objectives to be accomplished, and the estimate of costs is reasonable.

7. Appropriate training materials for the courses to be offered at the Lubumbashi training center are being prepared by the Training Department.

8. The provision of experienced specialists to the Lubumbashi center will assist it in its establishment and, through the training of counterparts, insure that the management and operation of the Center can be assumed by national employees of the Bureau of Roads within the scheduled 24 months.

9. The training, training materials, and tools to be provided are suitable to the Center's requirements as determined by on-site review by the design team's training consultant.

The project's road design standards and equipment requirements are practical and in accord with sound engineering practice. The cost estimates are realistic and the inputs appropriately reflect the needs of the project. The technical assistance personnel will complement the skills already available in the Bureau

of Roads and will be valuable in upgrading brigade capacities. The project's planned means are appropriate to the ends and the estimate of project costs is reasonably firm. The requirements of Section 611 (A) of the Foreign Assistance Act have been met. Assuming prompt project implementation, no technical constraints on the satisfactory completion of the project on schedule are foreseen.

B. Financial Analysis

The total cost of the four-year project is estimated at \$ 8,109,000 of which \$ 4,000,000 will be financed by AID loan funds and the equivalent of \$ 4,109,000 by the Government of Zaire. All local costs will be financed by the Government of Zaire and will be met from the Bureau of Roads' current budget, over which it has direct control for expenditures of funds allocated. The cost of its inputs to the project is within the Bureau of Roads budgetary capability, based on current experience, although the bureau has suffered, as have other government agencies, from periodic delays in release of budgeted funds. Should a similar situation obtain during the project, it might pose obstacles to timely project completion despite the adequacy of financial planning. In that event, USAID and the Bureau of Roads will consult to determine actions appropriate to promote project objectives.

The continuation of training activities after the life of the project will place no foreign exchange requirements on the Government of Zaire. Local operating costs will be included in the Bureau's annual budget. Long-term maintenance of the roads to be improved and/or constructed is more problematic at this stage. The government's record of road maintenance since independence has not been good, and it needs to strive for improvement in this critical function. The Bureau of Roads has found that one reliable method of rural road maintenance is contracting maintenance services from local merchants who use the roads. Given the presence of merchants capable and willing to assume such responsibilities, the only potential deterrent to successful maintenance operations is the availability of funding for the contract services. The Bureau is exploring ways and means to satisfy these funding requirements as is USAID (specifically in Project North Shaba, 660-0059). Possible means of revenue generation have been proposed and will be tested. The results of those efforts may suggest ways of ensuring adequate long-term maintenance. In the project agreement, the government will covenant to make suitable arrangements for road maintenance in order to protect the investment made through the project. Upgraded brigade capacities, including equipment and personnel, will be conducive to improved maintenance of the arterial roads. The creation of a new brigade through the project will itself contribute to higher possible standards of maintenance along the main road to be upgraded.

Table 2 presents a summary of estimated costs, by expenditure categories and by year of disbursement. Unit costs from road improvements are discussed below.

UNIT COSTS FOR ROAD IMPROVEMENTS

The average unit cost of the road improvement is calculated below. The total brigade size is calculated at 78 local employees and two expatriate personnel. The brigade includes 40 laborers. Yearly salary totals for the brigade's local employees are projected at 2394,200. Fuel consumption for all brigade equipment is estimated at 200 liters per hour. Local prices indicate that 15 percent must be added to the 22.8 cost of a liter of diesel fuel to account for oil and lubrication. The efficiency of the equipment is assumed to be 80 percent and the yearly usage is assumed to be 200 days. Equipment depreciation is assumed to be 10,000 hours for heavy equipment and five years for trucks and other equipment.

Drainage costs are for materials and transportation only; installation costs are included in the brigade's operating expenses. The estimated corrugated metal culverts number 150 evenly divided between 0.8 and 1.0 meter diameters. Cement costs cover the cost of concrete headwalls and the construction of 18 km of concrete ditch to be used in side hill areas where the road cannot be raised above the existing ground. All cost estimates are based on the Bureau of Roads' current operating experience.

Average Unit Cost of Road Improvement for upgrading 150 km of existing national road and constructing 50 km of feeder roads is as follows (dollar costs and local currency costs are distinguished in Table 4):

Depreciation of Equipment	906,000
Spare Parts	734,000
Equipment Transport	244,000
POL	631,000
Labor	
local	366,000
U.S. T/A	840,000
Drainage	
corrugated metal pipe	290,000
concrete	482,000
reinforcing steel	95,000
camp facilities	<u>218,000</u>
TOTAL	4,806,000

Length of road to be upgraded: 200 km
 Cost per km: \$24,030

C. Economic Analysis:

1. Background

The general economy of the Kwilu subregion is dominated by agriculture and the supporting role of small commerce. The 1970 census indicated that the agricultural population of Kwilu accounts for 57 percent of the total agricultural population of Bandundu region and represents 7.7 percent of the total agricultural population of Zaire. The three predominant agricultural zones of Kwilu - Idiofa, Gungu and Bulungu - produced 1,682,800 metric tons of food crops in 1980.¹ The agricultural production in 1980 of the twelve main food crops of the Bulungu Idiofa and Gungu Zones is set out in Table 2². It is estimated that 20 percent of all domestically grown food marketed in Kinshasa comes from Kwilu.

At 1981 farm gate prices, the theoretical value of this production is \$ 361,617,000 (Z 1,988,893,500)³. However, it is estimated that only 40 percent of this production reaches the secondary commercial market place. As only about 13 percent of total production is estimated to be consumed by the producers and their immediate families, 47 percent of the total production is not included in these figures. Some is used as gifts and payment for services, and some is lost through handling, spoilage and theft. Moreover, in all likelihood, a substantial error in the existing data base (which tends to inflate basic statistics) accounts for some of the discrepancy. Nevertheless, there is ample evidence that a significant amount of the actual harvest does not attain its commercial potential.

Another factor contributing to crop losses arises from the Government policy of requiring farmers to grow certain crops, which once harvested, cannot at times be marketed. Other policies contribute to the non-marketability of the crops. For example, exporters are allowed to retain hard currency, which has encouraged merchants to favor trading in coffee at the expense of food crops. Also, large merchants are granted import licenses for foodstuffs at official (artificial) exchange rates and a considerable portion of available foreign exchange is allocated to food.

1. All data are composite data from : 1) FAO Report - Le Milieu Rural Et Son Développement Au Kwilu, Juin 1981; 2) "Achat Des Produits Agricoles, 1979 et 1980", Développement Progrès Populaire, Idiofa; 3) "Mission de Consultation sur la Commercialisation dans le Kwilu", Jan. 1981, UNDP; 4) "L'Agriculture Zairoise - situation courante et contraintes: July 1980, Département de l'Agriculture et du Développement Rural; 5) Annual reports of the Service de la Production Agricole, 1970-1980, zone of Idiofa. Other sources include field notes, interviews with farmers, merchants and officials, and other published data.

2. The twelve food crops are as follows: corn, paddy rice, millet, manioc cassetts, sweet potatoes, plantains, bananas, peanuts, whole squash, beans, voandzou and yams. Palm oil and coffee were not included.

3. Based on price data given by merchants, D.P.P., farmers and government officials in Kwilu, August 1981.

However, the major contributing factor to these losses is the inadequate marketing infrastructure. Although hindered by several constraints, such as poor storage facilities and unstructured credit systems, the market suffers most from the lack of a good transportation system, primarily roads. The Kwilu sub-region accounts for only a little over 2,000 km (1,250 miles) of the total 15,366 km (9,600 miles) of roads in the Bandundu region. None of the unpaved roads in Kwilu have a gravel surface at the present time. The major arterial route, National Route No.1, which is the major road link between Kinshasa and Lubumbashi extending some 150 km from Kikwit to Idiofa, requires seven non-stop driving hours by four-wheel drive vehicles in the dry season. Unloaded medium and large trucks are unable to navigate many portions of this route without external assistance such as hand-pushing. On many ridges and plateaus the road is non-existent, long since abandoned for random tracks. In places, these tracks and deep ruts run in parallel rows, reaching 100 meters or more in width, taking a large toll on men and equipment, and blemishing the environment. During the rainy season this major route often is impassable for days at a time. Capital and operating costs incurred by commercial transporters and/or merchants are enormous because of the road conditions.

2. Economic Feasibility

On the basis of a composite of the best data currently available, it would seem reasonable to assume that, if the road system in the agriculturally highly productive areas of Bulungu and Idiofa zones were improved to the design standards set out in this paper, this would allow the extraction of at least 5 percent of the present post-harvest crop loss. If marketed at 1981 farm-gate prices, this would represent an increased income for the small cultivators of this area of an estimated \$ 18 million on an annual basis.

The total non-urban population of Kwilu is calculated at 1,854,000, of whom an estimated 1,190,000 are small cultivators. An increase in their gross income of \$ 18 million thus would represent an average increase of \$ 15 in their per capita annual income.

Additional benefits would accrue in the form of reduced user costs on the improved roadway. These may be calculated with reasonable accuracy by comparing current operating costs per kilometer on existing road conditions between Kikwit and Idiofa with the estimated operating costs per kilometer that would prevail on upgraded road conditions. For these calculations the following assumptions are made:

- a. Type of trucks: Most of the estimated 200 - 300 trucks now using the Kikwit-Idiofa route are of the military surplus variety (Mercedes, Men, etc.) generally in the seven- to ten-ton category. The trucks, early to mid-1960's vintage, are delivered to Zaire in like-new condition, with an average of 20,000 km.
- b. Average Purchase Price: \$ 8,900 (including tires).

- c. Life of Trucks: Merchants currently operating trucks along this route report that the existing poor road conditions cause the vehicles to lose 1/2 of their normal economic life; i.e. they are completely worn out after 3 1/2 years. Bureau of Roads personnel in the area confirm this estimate. Assuming that these trucks are able to undertake 50 round trips of 300 km between Kikwit and Idiofa per year, (i.e. 15,000 km/year, a reasonable estimate given that reported turn around time for such a voyage is seven days), this yields an average life-expectancy of 52,500 km over 3 1/2 years. Similar trucks now operating on existing improved roads in Zaire, by comparison, have an estimated lifespan of seven years and more than 200,000 km.
- d. Fuel Price and Consumption. Diesel fuel now costs Z 2.80 (\$ 0.51) per liter in the project area. The Bureau of Roads estimates that seven-ton trucks currently working on the Kikwit-Idiofa route consume one liter of diesel fuel per 3.3 kilometers travelled. These trucks are comparable to the majority of trucks that comprise the commercial fleet now operating on this road. Inasmuch as commercial trucks often are poorly maintained and usually are fully loaded, this analysis estimates that one liter of fuel is consumed per every three kilometers travelled by commercial trucks under current road conditions. If the Kikwit-Idiofa route is upgraded to the design specifications called for in this paper a conservative estimate is that one liter of fuel will be consumed per six kilometers travelled.
- e. Oil and Lubricants: Calculated at 1/4 of total fuel cost (standard Bureau of Roads estimate).
- f. Maintenance: Calculated at 1/3 of total truck purchase price (not including cost of tires) over the life of the truck.
- g. Overhaul: Calculated at 1/3 of total truck purchase price (not including cost of tires) over the life of the truck.
- h. Tires: One set of tires for 7 to 10-ton trucks costs approximately \$ 3,000. Trucks wear out one set of tires per approximately 26,000 km travelled.
- i. Drivers: Truck drivers in the Kwilu area earn an average of Z 500 (\$ 90.90) per month.
- j. Depreciation: Calculated at 2/3 of purchase price of truck (not including tires) amortized over the life of the truck.
- k. Insurance, Taxes and Storage: Local costs (annual) for items are approximately as follows:
- | | |
|------------|--------|
| Insurance: | \$ 400 |
| Taxes: | \$ 500 |
| Storage: | \$ 800 |

Based on these assumptions, the per-kilometer cost of current operations on unimproved roads can be calculated. That calculation is set forth in Table 5A, which indicates that one round-trip between Kikwit and Idiofa now costs approximately \$ 0.659/km or \$ 197.70 for the entire trip. Table 5B shows that the same journey on an improved road would cost approximately \$ 0.348/km, or \$ 104.40 for the entire trip.

The implications of this difference in costs are illustrated in Table 5C. Upgrading the existing route would result in a savings of \$ 0.311 in user cost per kilometer travelled. At the current annual rate of usage (15,000 km/truck), this equals a savings of \$ 4,665 per truck per year.

While precise figures on the number of trucks currently operating on the Kikwit-Idiofa route are difficult to obtain, informed estimates range from a low of 200 to a high of 300. Thus, using the lower figure, an annual savings of \$ 4,665 per truck would yield an annual savings of \$ 399,000 for the entire fleet. Using the higher figure, annual savings for the entire fleet could equal \$ 1,399,500. In other words, the existing truck fleet could accomplish the same amount of work at an annual savings of between \$ 900,000 and \$ 1.4 million. The only variable changed to achieve these savings is the condition of the road. These calculations do not take into account the increased traffic predicted on an improved road, the additional savings represented by the lower hauling costs of the extra traffic, nor the incremental added value of produce/merchandise hauled by the increased traffic.

The average cost of training Bureau of Roads Staff at the Lubumbashi regional training center also can be calculated. Assuming that within the life of this component of the project at least 500 staff are trained at a cost of \$ 700,000 (FX) and with a Bureau of Roads commitment of 8,900,000 zaires (equivalent to about \$ 1,600,000 at the current official exchange rate) costs per trainee can be estimated at \$ 4,600. However, a substantial portion of the initial start-up costs will provide returns over a longer period. A reasonable estimate would be ten years and 2500 trainees. This would yield an average cost per trainee of less than a thousand dollars.

The benefits that will accrue when these trained personnel go to work with their brigades in terms of decreased operating time and increased quality of maintenance cannot be quantified. One can, however, compare the overall cost of the project to the benefits that will accrue from three quantifiable outputs from the project: a decrease in the amount of food crops lost in storage or transportation with a concomitant increase in the amount of food crops being marketed, decreased truck operating expenses, and increased ton miles.

Operating on the Idiofa-Kikwit road are between 200 and 300 trucks. A road in good condition between these two points represents a potential annual operating savings for the entire fleet of between \$ 0.9 and \$ 1.4 million. This does not address the increased revenues that could be expected from the additional tonnage hauled. The theoretical increase in loaded ton miles for the entire fleet on good roads over the same fleet on unimproved roads would generate up to three times the present gross revenues.

The prevention of harvest losses, lowering of truck operating expenses, and increasing ton miles are but three factors among a range of benefits that could result from improved roads in the Kwilu subregion. In the absence of sophisticated econometric models, these three areas alone demonstrate the levels to which good roads stimulate the economy.

From a cost-effectiveness point of view, a five million dollar cost to improve some 200 kilometers of arterial and feeder roads in Kwilu could be recovered in one year through the more efficient marketing of harvests at existing levels (saving an estimated 5% of present losses) and the lower truck operating costs. The latter savings will cover the total project costs in four to six years' time.

D. SOCIAL ANALYSIS

The regional training center in Lubumbashi will be instrumental in increasing the skill level of Bureau of Roads staff. The structured on-the-job training of the Kikwit brigade personnel will perform a similar function. Such training not only will lead to significantly greater employee job satisfaction but also will allow these employees an opportunity for career development. This should help lower the Bureau's attrition rate, and also might help decrease the rural exodus. The brigade in Kikwit and the Bureau of Roads' continuing maintenance activities will create some employment opportunities in a region of high population density and an already high rate of male rural/urban migration.

A significant cause of this male rural exodus appears to be strictly observed traditional division of labor by gender. Traditional agriculture is an almost all-female occupation. Some fields are cleared by men but even there they often are assisted by women. All other traditional agricultural tasks are performed by women, at times assisted by children. This is indicated in the data by the finding that 93 percent of all agriculturalists in the region are women. Marketing of household surpluses also is an exclusively female task. The marketing of certain manufactured goods in the rural areas, such as combs, buttons, thread, soap, razors, mirrors, medicines and other secondary goods is a male occupation, and provides one of the few rural non-farm occupations currently open to men. All agricultural merchants in the area are men. Weaving, carving and blacksmithing provide other but limited opportunities. In the project area few men are occupied in fishing, or hunting. By creating opportunities for employment, the project will expand opportunities in occupations which are open to men.

The female smallholder cultivators clearly will benefit. Expanded marketing facilities will allow an increase in production of food crops in an area where already more than half the household income derives from agricultural production. The time and energy women spend on these tasks could be lessened by easing women's marketing responsibilities and by allowing the possibilities of a proportion of the increase in income being spent on new or improved agricultural tools and inputs. Decreasing women's time and energy spent on routine, repetitive tasks is particularly valuable in cultures such as these where there is no tradition of women's mutual support in their villages.

The increased access to information that an improved road system would allow also could lead to greater access to agricultural extension services or information. The improved road system would allow an increase in the mobilities of the rural population and an increased possibility of short-term or circular migration, rather than larger and longer separations or desertion. In this, it may lessen the incidence of a new form of polygamy that is emerging

in this region: the town wife and the village wife. Access to education and health services, to marketing opportunities and to information of all kinds will be increased.

The project area is one of high average population density: 23 inhabitants per km² as compared with an average of only 10 per km² for the country as a whole. In parts of the area the density is estimated to be as high as 39 per km². Thus the project has a high potential impact. Furthermore the greatest beneficiaries will be the smallholder cultivators of the region through a greater redistribution of wealth from the urban to the rural areas. This new wealth will be distributed equitably among smallholder cultivators as a return on labor.

The present marketing structure seems to be influenced by the state of the road system. Where roads are badly deteriorated, for example around Idiofa, private enterprises tend to be larger in scale and to be located exclusively in the towns. In the Bulungu zone, however, where the road system including feeder roads is in better condition and where agricultural production is high, many merchants live and operate out of their own villages. These merchants tend to be owner/drivers of a single truck, or merchants without any vehicle of their own who hire space on the trucks of other merchants, often accompanying their products as far as Kinshasa to sell. The project, with its attention to the improvement of feeder roads, thus could expand the activities of the small merchants and in this way ensure that existing inequalities in wealth and access are lessened. Clearly all merchants in the area, as all cultivators, will benefit.

It has been noted¹ that the spirit of entrepreneurship has developed more significantly here than in some other areas of Zaire. The existence of a creative entrepreneurial energy is a requirement for successful merchants and marketing systems. In recent years, a generation of young Zairian merchants emerged in the region. By improving the road system in this region, access to the merchant class will be made possible for a greater number of individuals. In an area from where, traditionally, the talented and hard-working have migrated, this could lead to the creation of further employment opportunities for men, and thus might contribute to strengthening social cohesion and stability.

E. ENVIRONMENTAL IMPACT

The environmental impact of upgrading 150 kms of arterial road is considered both with respect to the project objectives, namely to increase the food crop production of small farmers in the Kwilu subregion, and with respect to the means of achieving this goal, namely the upgrading and construction of a road system. The upgrading of the Kikwit-Idiofa road is not expected.

1. Dr. Nsaman Lutu, "Bandundu Field Trip Notes: January 16 - February 1, '79" USAID/Zaire, 1979.

ted to have any significant adverse effects on the physical or ecological environment of the project area inasmuch as this route already is established. Construction materials are locally available. Construction campsites will be monitored and controlled to keep site impact to a minimum. Some noise, exhaust, and dust pollution will occur with the road work and with the subsequently increased volume of traffic. The impact on the social environment potentially will be beneficial insofar as the availability of goods and services, the latter including development information, health and education, agricultural and other extension services, is expected to increase. Work opportunities for skilled or semiskilled laborers in road construction and repair, and in vehicle and road maintenance, will be created. This may slow migration from the project area to urban centers, which could to some extent counterbalance the destabilization of the local communities that the increased ease of egress might otherwise encourage.

The improved access to markets will facilitate the fulfillment of the project's objective of increased food crop production but at the same time may occasion the project's most significant environmental effects. Increased production not based on more intensive usage of existing cultivated lands leads to further exploitation of unused lands, often entailing the cutting and clearing of forested areas. Under the system of shifting cultivation employed in the Kwilu subregion, valuable forest land could be lost and the exposed soils leached of nutrients by sun and rain. USAID has given consideration to this problem, which is of general environmental concern throughout the populated areas of Zaire. Future USAID-assisted project attention is anticipated. The overriding needs of economic recovery in Zaire presently dictate priority attention to increasing agricultural production and marketing.

It has been found, paradoxically, that there have been instances of increased malnutrition along the upgraded roads to Kinshasa, despite an increase in food crop production as a result of improved roads. Improved marketing opportunities apparently induce cultivators to sell even some of the foods they would normally eat in order to increase their incomes. The USAID-assisted Area Nutrition Improvement Project (660-0079), targeted on the Kwilu area (Bandundu Region), has the objective, inter alia, of reducing malnutrition through various means, including improved nutrition education and interventions. That project may help alleviate any otherwise deleterious nutritional effects of improved roads and marketing opportunities in the area.

The environmental impact of upgrading 50 kms of feeder roads will differ quantitatively rather than qualitatively from the above. More land will be cleared for crop production, spoilage lessened, household incomes increased and changes in cropping patterns introduced. The ease of egress will increase the accessibility of health and educational facilities, markets, information and goods but may also lead to community destabilization through out-migration.

The training center will use existing facilities for its classrooms and workshops. Only student dormitories need to be constructed. Thus, land clearing

and construction pollution will be kept to a minimum. Maintenance workshops will repair the broken equipment of local road-building and maintenance brigades. This will mean an efficient use of resources and also will help clean up the rural environment. Training in the use of heavy earth-moving equipment will contribute some noise and air pollution. The availability of new equipment will help keep any potentially deleterious effects of this activity to a minimum. During training the employees of the roads division will be temporarily relocated but no adverse human or social effects are anticipated. The training will lead to accelerated career development as well as to increased job satisfaction and prestige in their communities for these employees.

IV. IMPLEMENTATION PLANNING

A. Administrative Arrangements

The Government of Zaire agency directly involved in the implementation of the project is the Office des Routes (Bureau of Roads) in the Department of Public Works. The Bureau of Roads has primary responsibility for improving and constructing, maintaining and rehabilitating some 60,000 km of national and regional roads throughout the country. The SGMTP is the logistical unit of the Bureau of Roads. SGMTP procures all the Bureau of Roads' equipment and is responsible for getting it to the necessary sites.

The Bureau of Roads will appoint a person responsible for liaison between the Senior Technical Assistance Advisor of each component and the Bureau.

USAID will appoint a Project Officer whose responsibilities will include:

1. Monitoring and evaluation of project activities to ensure that the management of AID resources is satisfactory;
2. Assisting in the preparation of project implementation documents, particularly those relating to procurement;
3. The maintenance of liaison with the relevant host country officials;
4. Assisting in the maintenance of project reporting and record keeping, including financial management information and project performance tracking.

The Government of Zaire will be responsible for all procurement of commodities and services financed by the project. To this end, a procurement agent acceptable to USAID may be employed.

The government will be responsible for providing adequate land and physical facilities at Lubumbashi and Kikwit to enable project activities to take place and for the timely and adequate provision of fuel and lubricants. The Department of Training of the Bureau of Roads will develop the curriculum and training materials to be used in the regional training center at Lubumbashi.

B. Implementation Schedule

The general schedule for the implementation of project activities from the date of approval until project completion is presented below. Planned Performance Tracking charts and critical performance indicators are presented in the Annexes.

Activities Schedule

Project Paper approved by AID	September 1981
Project Loan Agreement signed	September 1981
Conditions Precedent met	Oct - Dec 1981
Commodities list developed	October 1981
Technical assistance solicited	October 1981
Commodities order placed	December 1981
Technical services selected	Jan - Feb 1982
Training materials on site	April 1982
Technical advisors on site	May 1982
National counterparts on site	May 1982
Lubumbashi trainees selected	Apr - May 1982
Remaining commodities on site	June 1982
Training commences, Lubumbashi	June 1982
Road work commences, Kwilu	July 1982
Technical services completed	June 1985
Project completion date	20 September 1985

C. Evaluation Plan

Two evaluations are slated for this project, one in mid-CY 1983 and one in mid-CY 1985. The first will be a mid-point evaluation, the second a final. Both will be joint evaluations covering both this project and companion project, Agricultural Marketing Development (660-0026). The latter project will come on stream before this project, but it will be carried out simultaneously for much of the life of the project. Project 026 will be upgrading secondary regional roads in the Kwilu area while Project 028 will address the principal national route traversing Kwilu. The joint evaluations thus will provide an opportunity for comparative assessments.

Mid-Point Evaluation. This first evaluation will have the principal purpose of reviewing project objectives vis-a-vis project purpose to determine the degree to which the project design is leading toward purpose achievement. This will entail an analysis of available data on area food crop production and marketing. The evaluation team will be led by an agricultural marketing economist and will include a road engineer and a sociologist. The road engineer will be responsible for assessing the quality of the road work in relation to projected standards. The sociologist will review the project's impact on the affected Kwilu populace vis-a-vis expectations and assumptions at the design stage.

Final Evaluation. This evaluation will be conducted following the completion of both 026 and 028 road work. The evaluation will provide a comprehensive assessment of both projects and their impact on the Kwilu subregion. A thorough-going economic analysis will determine the extent to which Kwilu small cultivators have benefited through increased market access. Increased food crop production will be estimated and related to project accomplishments. The effects of the improved roads also will be evaluated in the larger perspective of the entire subregional economy. The evaluation team for the final evaluation will be constituted similarly to that for the mid-point evaluation.

TABLE 1. PROJECT COST ESTIMATE

('000)

COMPONENT	AID	Borrower	TOTAL
	Dollar	Zaires	Dollar Equivalent*
Training Center	697	8,906	2,316
Road Improvement	3,245	13,695	5,735
Contingency and Inflation	58	-	58
TOTAL	4,000	22,601	8,109

* U.S. 1\$ = 5.5 Zaires

TABLE 2: ESTIMATED EXPENDITURE OVER THE LIFE OF THE PROJECT ('000)

INPUTS	FY 82		FY 83		FY 84		FY 85		TOTAL	
	Dollars	Zaires								
Technical Assistance	291	393	508	180	324	180	112	154	1,235	907
National Personnel	-	969	-	2,162	-	1,416	-	447	-	4,994
Construction	-	2,394	-	-	-	-	-	-	-	2,394
Training Equipment	37	-	-	-	-	-	-	-	37	-
Equipment, tools and spare parts	2,230	1,708	147	1,489	220	840	73	54	2,670	4,091
Drainage	-	1,059	-	1,588	-	1,588	-	530	-	4,765
Fuel and Lubricants	-	561	-	1,508	-	1,332	-	770	-	4,171
Supplies and Utilities	-	21	-	39	-	19	-	-	-	79
Construction Camp	-	1,067	-	50	-	50	-	33	-	1,200
Contingency and inflation	15	-	15	-	14	-	14	-	58	-
Total	2,573	8,172	670	7,016	558	5,425	199	1,988	4,000	22,601

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TABLE 3: COST ESTIMATES: ROAD IMPROVEMENTS, KWILU

('000)

INPUTS	AID	Borrower	TOTAL
	Dollars	Zaires	Dollar Equivalent ^A
A. Personnel			
a. Technical assistance	675	907	840
b. National personnel	-	2,012	366
A. Sub-Total	675	2,919	1,206
B. Commodities			
a. Heavy equipment and spare parts	2,570	1,342	2,814
b. Construction camps	-	1,200	218
c. Fuel and lubricants	-	3,469	631
d. Drainage	-	4,765	866
B. Sub - Total	2,570	10,776	4,529
COMPONENT SUB-TOTAL	3,245	13,695	5,735

^A U.S. \$ 1 = 5,5 Zaires

TABLE 4

Average Cost of Road Improvements

150 km of primary road upgraded, 50 km of feeder road built.

	(000)		
	<u>AID</u>	<u>GOZ</u>	<u>TOTAL</u>
Equipment Depreciation	906		906
Spare Parts	734		734
Handling Equipment In-Country		244	244
POL		631	631
Labor			
local		366	366
U.S. T/A	675	165	840
Drainage			
culverts		290	290
concrete		482	482
reinforcing bars		95	95
Camp Facilities		218	218
TOTALS	\$ 2,315	\$ 2,491	\$ 4,806
Cost per kilometer	\$11,575	12,455	24,030

TABLE 5A

COST FOR ONE ROUND TRIP, KIKWIT-IDIOFA

ON UNIMPROVED ROAD

<u>Direct Costs</u>		<u>Cost/km</u>
Fuel	300 kms at 3.0 km/l = 100 liters 100 liters x Z 2.80/l = Z 280 Z 2.80 + 5.5 = \$ 50.91 + 300 km	\$ 0.170/km
Oil	\$ 0.170/km, x 0.25 =	\$ 0.042/km
Maintenance:	\$ 5900 x 1/3 = \$ 1966 \$ 1,966 + 52,500 km =	\$ 0.037/km
Overhaul:	Same as maintenance =	\$ 0.037/km
Tires:	Two sets per life of vehicle \$ 6,000 + 52,500 km =	\$ 0.114/km
Total Direct Costs		\$ 0.400/km
<u>Indirect (Fixed) Costs</u>		
Driver	Z 500/month x 42 months = Z 21,000 Z 21,000 + 52,500 km = Z 0.4 + 5.5 =	\$ 0.072/km
Depreciation	\$ 5900 x 2/3 = \$ 3,933 \$ 3,933 + 52,500 km =	\$ 0.074/km
Insurance Taxes, Storage	\$ 400 / year insurance \$ 500 / year taxes \$ 800 / year storage \$ 1700 / year \$ 1700 x 3.5 yrs = \$ 5,950 + 52,500 km =	\$ 0.113/km
Total Indirect (Fixed) Costs:		\$ 0.259/km
Total Costs :		\$ 0.659/km
Cost per round trip:		\$ 197.70

TABLE 5B

COST FOR ONE ROUND TRIP, KIKWIT-IDIOFA

ON IMPROVED ROAD

		<u>Cost/km</u>
<u>Direct Costs</u>		
Fuel:	300 km at 6.0 km/l = 50 liters 50 liters x Z 2.80 = Z 140 ÷ 5.5 = 25.45 \$ 25.45 ÷ 300 km =	\$ 0.085/km
Oil:	\$ 0.085/km x 0.25 =	\$ 0.021
Maintenance:	\$ 5900 x 1/3 = \$ 1,966 \$ 1,966 ÷ 210,000 km =	\$ 0.009/km
Overhaul:	Same as maintenance	\$ 0.009/km
Tires:	Eight sets per life of vehicle \$ 24,000 ÷ 210,000 km =	\$ 0.114/km
		\$ 0.238/km
Total Direct Costs:		
<u>Indirect (Fixed) Costs</u>		
Driver	Z 500/month x 84 months = Z 42,000 Z 42,000 ÷ 210,000 km = Z 0.2/km ÷ 5.5 =	\$ 0.036/km
Depreciation	\$ 5900 x 2/3 = \$ 3,933 \$ 3,933 ÷ 210,000 km =	\$ 0.018/km
Insurance, Taxes, Storage	\$ 400 / year Insurance \$ 500 / year Taxes \$ 800 / year Storage \$ 1700 / year \$ 1700 x 7 years = \$ 11,900 ÷ 210,000 km =	\$ 0.056/km
		\$ 0.110/km
Total Indirect (Fixed) Costs		\$ 0.348/km
Total costs		\$ 104.40
COST PER ROUND TRIP		

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Life of Project

From FY 81 to FY 85

Total US Funding \$ 4,000,000

Date Prepared: 9/81

Project Title & Number: AGRICULTURAL MARKETING DEVELOPMENT

PAGE 4 (b)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs:	Implementation Target (Type & Quantity)		Assumptions for providing inputs
D. <u>Kikwit Based Road Brigade</u> Road equipment	1 bulldozer 2 graders 2 front end loaders 1 back hoe attachment 12 dump trucks 1 vibratory compactor 2 water trucks 1 fuel truck 1 house trailer 3 radios 3 pick ups spare parts 1 lubrication truck 4 water pumps tools.	Equipment and spare parts inventories. Inspection	
<u>Government of Zaire inputs</u>			
A. <u>Personnel</u> Training Center, Lubumbashi	Approximately 40 staff when fully operational	All personnel meet requisite qualifications	
Kikwit Road Brigade	Full brigade complement and manual laborers	Inspection	
B. <u>Construction</u>	Facilities at Lubumbashi	Inspection	
C. <u>Commodities</u> Training Center	Heavy equipment and spare parts Training equipment Fuel and lubricants Office supplies and utilities	Inspection	
Kikwit brigade	Drainage materials Storage facilities Fuel and lubricants Construction camps, if required.	Inspection	

TABLE 5C

POTENTIAL FLEET SAVINGS

Current Cost per kilometer	\$ 0.659 / km
Estimated Cost/km, Improved Road	- \$ 0.348 / km
	<hr/>
Potential Savings / Km	\$ 0.311 / km
Current Annual Truck Usage	x 15,000 km
	<hr/>
Potential Annual Savings per Truck at Current Usage	\$ 4,665.00
<u>Low Estimate of Trucks now in Fleet</u>	x 200
	<hr/>
<u>Low Estimate of Potential Annual Fleet Savings at Current Usage</u>	\$ 933,000
Potential Annual Savings per Truck at Current Usage	\$ 4665.00
<u>High Estimate of Trucks now in Fleet</u>	x 300
	<hr/>
<u>High Estimate of Potential Annual Fleet Savings at Current Usage</u>	\$ 1,399,500

TABLE 6 : COST ESTIMATE: REGIONAL TRAINING CENTER LUBUMBASHI

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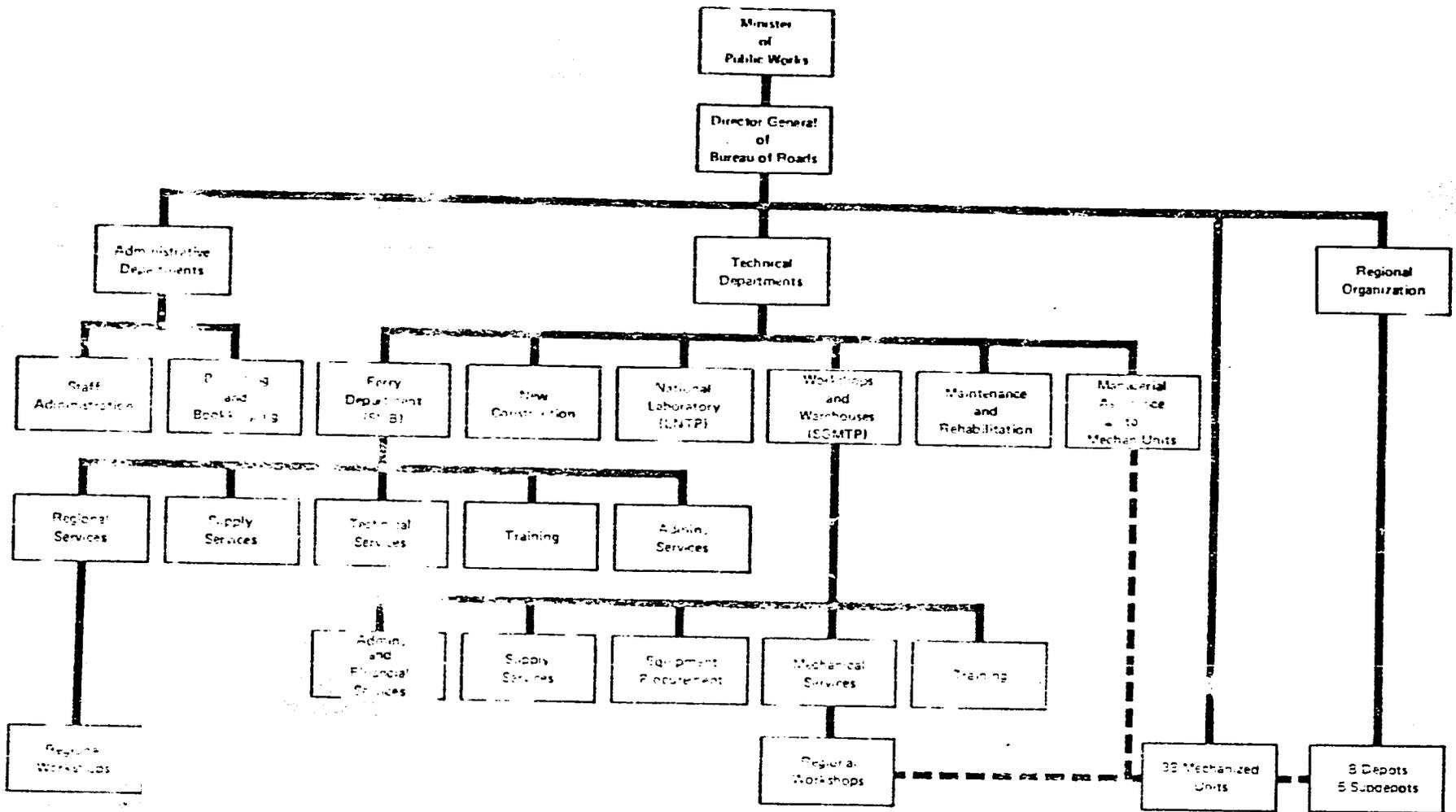
INPUTS	AID	Borrower	TOTAL
	Dollars	Zaires	Dollar Equivalent ^A
A. Personnel			
a. Technical assistance	560	-	560
b. National personnel	-	2,982	542
A. Sub-Total	560	2,982	1,102
B. Commodities			
a. Training equipment	37	-	37
b. Workshop equipment	100	699	227
c. Heavy equipment	-	2,050	373
d. Fuel and lubricant	-	702	128
e. Office supplies and utilities	-	79	14
B. Sub-Total	137	3,530	779
C. Construction			
a. Lubumbashi facilities	-	2,394	435
C. Sub-Total	-	2,394	435
COMPONENT SUB-TOTAL	697	8,906	2,316

^A U.S. \$ 1 = 5.5 Zaires

ANNEXES

- A. PID Approval Cable (State 249553)
- B. Maps and Charts
 - 1. Organization chart, Bureau of Roads
 - 2. Zaire Road Network
 - 3. Kwilu Project Area
- C. FAA 611 (A) Certification
- D. Logical Framework
- E. Project Performance Tracking Chart
- F. Road Design Cross-sections
- G. Job Descriptions (Technical Assistance)
- H. Project Data Base
- I. Project Committee and Design Team
- J. Notes on Training

**ORGANIZATION OF THE BUREAU OF ROADS
REPUBLIC OF ZAIRE**



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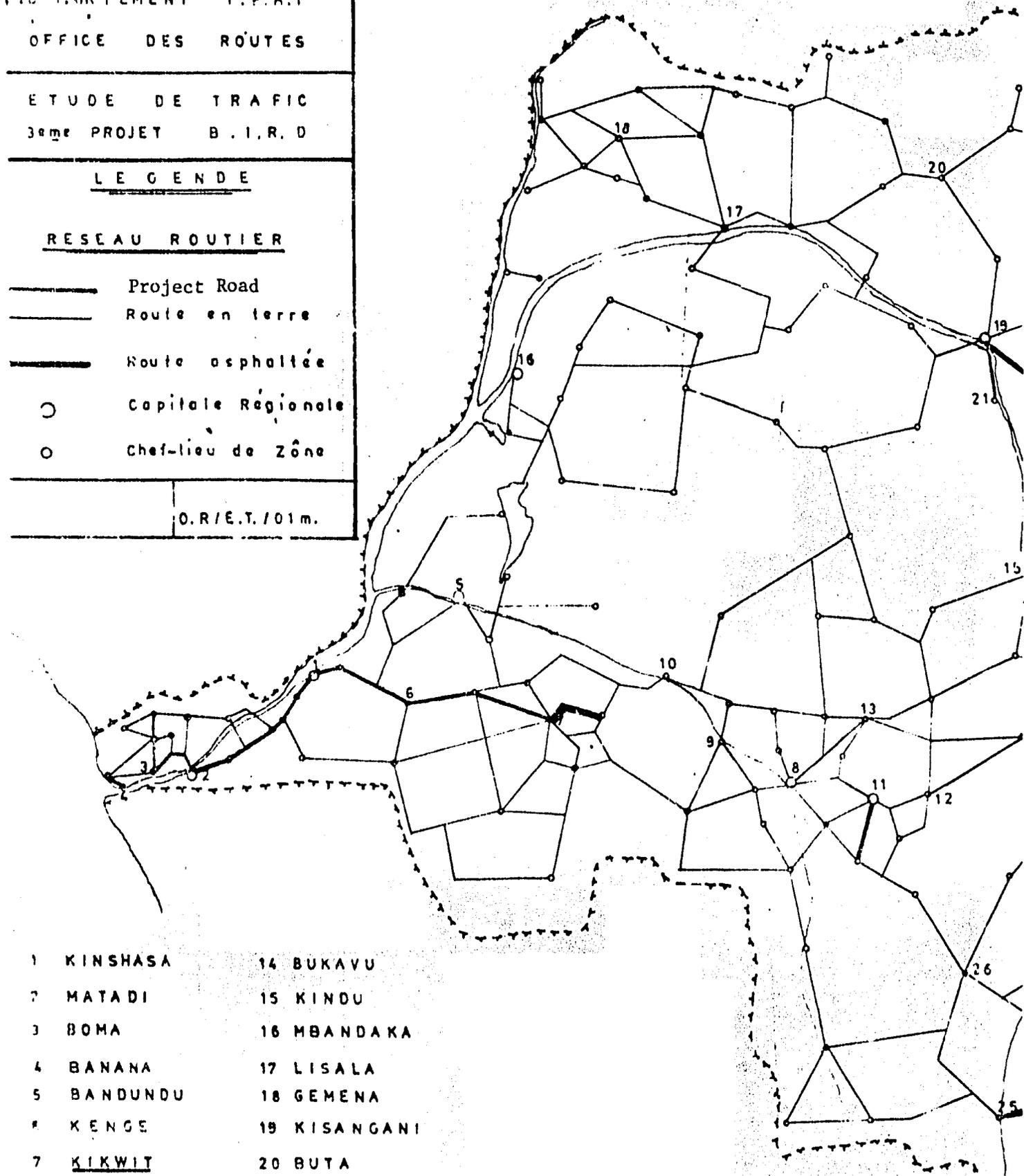
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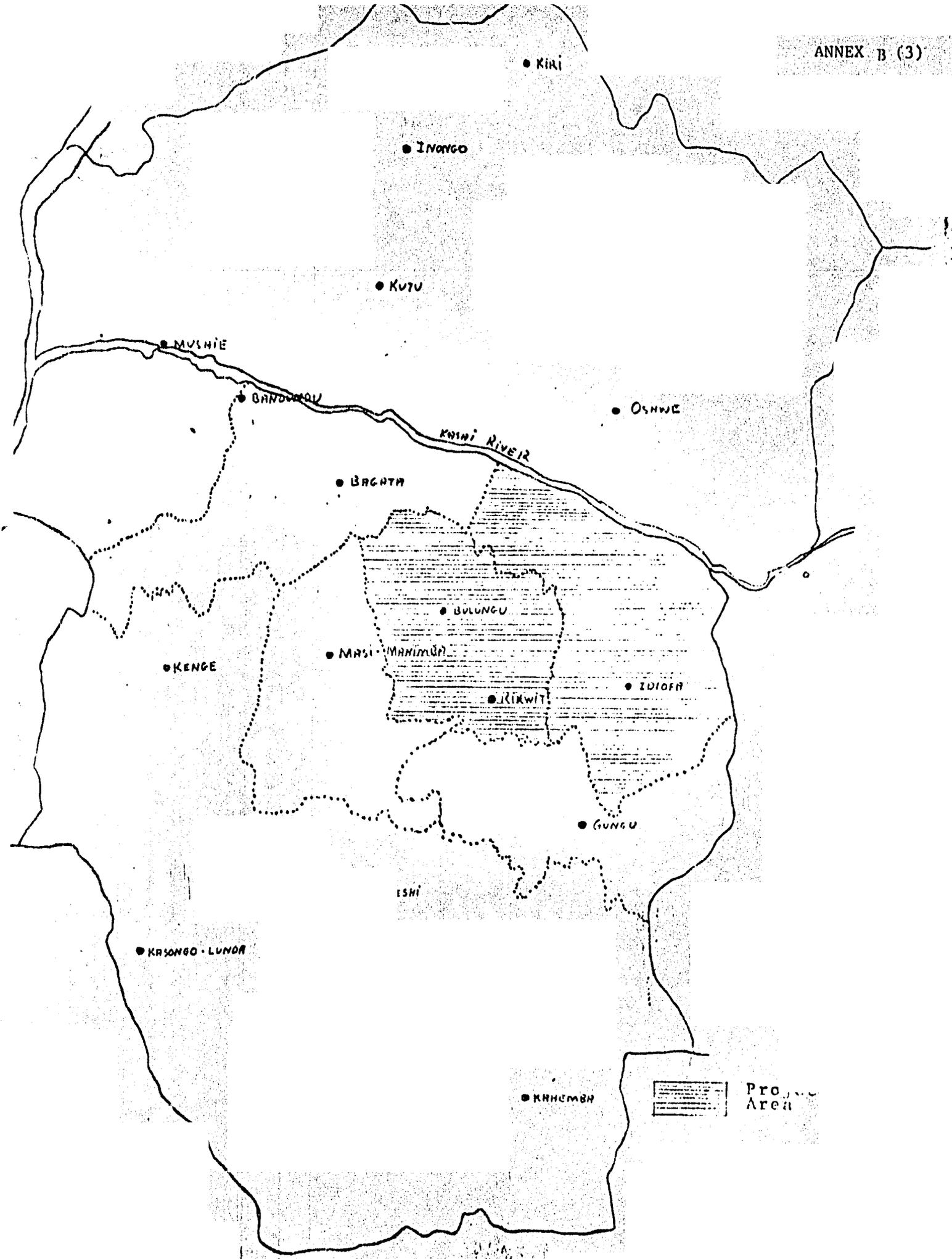
RESEAU ROUTIER

-  Project Road
-  Route en terre
-  Route asphaltée
-  Capitale Régionale
-  Chef-lieu de Zone

O.R.I.E.T./01m.



- | | |
|-----------------|----------------------|
| 1 KINSHASA | 14 BUKAVU |
| 2 MATADI | 15 KINDU |
| 3 BOMA | 16 MBANDAKA |
| 4 BANANA | 17 LISALA |
| 5 BANDUNDU | 18 GEMENA |
| 6 KENGE | 19 KISANGANI |
| 7 <u>KIKWIT</u> | 20 BUTA |
| 8 KANANGA | 21 UBUNDU |
| 9 LUERO | 22 BUNIA |
| 10 ILEBO | <u>23 LUBUMBASHI</u> |
| 11 MBUJI-MAYI | 24 LIKASI |
| 12 KABINDA | 25 KOLWEZI |
| 13 LUSAMBO | 26 KAMPONA |

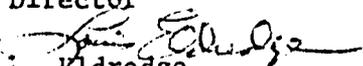


UNITED STATES GOVERNMENT

Memorandum

DATE: September 11, 1981

Mr. Norman L. Sweet
Director

FROM : 
L. Eldredge
Consulting Engineer

SUBJECT: Satisfaction of FAA Sections 611(a) Condition, Project 660-0028.

I have reviewed the technical and financial plans for the road improvement component of the subject project for compliance with the requirements of Section 611 (A) of the Foreign Assistance Act of 1961 as amended. Cost estimates and details of project design have been checked. In accordance with the plan as presented in the Project Paper, including technical assistance, I believe the physical and human resources of the Office des Routes are adequate to assure project completion. Sufficient engineering, technical, and financial planning has been carried out to provide a reasonably firm cost estimate and to satisfy the conditions of Sections 611 (A) of the FAA.



5010-110

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

LOGICAL FRAMEWORK

Project Title & Number: AGRICULTURAL MARKETING DEVELOPMENT 660-0028

From FY 81 to FY 85
 Total US Funding \$ 4,000,000
 Date Prepared: 9/81

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs:	Implementation Target (Type & Quantity)		Assumptions for providing inputs:
<u>AID INPUTS</u>			
A. Personnel			
Training Center, Lubumbashi	Director/Team Leader (24 PM) Master Mechanic/Trainer (24PM) Master Equipment Operator/Trainer (24 PM)	All personnel will meet requisite qualifications stated in list including level of education, experience and language requirements. Curriculum vitae Selection procedures On-the-job performance	Technical assistance personnel will be provided on schedule.
Kikwit-based Road Brigade	Road Engineer/Team Leader (36 PM) Master Mechanic/Trainer (36 PM)	Same as above	Training materials, workshop and road equipment will be purchased, freighted and delivered to sites, on schedule.
B. Training			GOZ will provide:
Training Center Lubumbashi	Course materials and training schedule prepared. Training conducted.	Site verification Training records.	a. adequate facilities for training in Lubumbashi.
On-site training, Kwilu sub-region			b. accomodations for the technical assistance team and a storage warehouse in Kikwit.
C. Commodities			c. camp site facilities.
Training Center Lubumbashi	As itemized in Project Paper	Equipment, etc., inventories. Inspection	d. road brigade for the Project.
Training aids and equipment			e. heavy equipment for the training center fleet,
Workshop tools, and equipment			

5

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of project:
From FY 81 to FY 85
Total US funding \$ 4,00,000
Date prepared: 9/81

Project Title & Number: AGRICULTURAL MARKETING DEVELOPMENT 660-0028

NARRATIVE SUMMARY	OBJECTIVELY VERIFYABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project outputs:	Magnitude of Outputs:		Assumptions for achieving outputs:
Rehabilitation of arterial road from Kikwit to Idiofa	150 km of main arterial road upgraded	Records of the Bureau of Roads Project records	Labor requirements for road upgrading and maintenance can be met locally; wages will be adequate.
Upgrading and construction of a feeder road system connecting to the arterial road	50 km of feeder roads to the main arteries upgraded or constructed	Records of the Bureau of Roads Project records.	The technical expertise and experience of the Bureau of Roads permanent employees, and the strengthened administrative capacities of its field units gained through the Project, will not be lost by attrition
Increased road and equipment maintenance and repair capacity of the permanent employees of the Bureau of Roads in the Shaba and Kasai Oc. and Or. Regions.	250 permanent employees of the Bureau of Roads trained per year when the Lubumbashi Center is fully operational. Approximately 500 trained during the LOP.	Lubumbashi Center records	
Road maintenance, repair and reconstruction and equipment repair and maintenance skills of the Bureau of Roads Project brigade developed through structured on-site training.	Personnel of the Project road brigade trained and using required skills	On-site verification Project records	
Project brigade equipment maintained in good condition	All equipment in acceptable condition	On-site verification Project records.	
Improved road transportation infrastructure for the removal and transportation of food crops to large population centers.	Travel time within the Project area reduced by 50% on the arterial road	Records of the Bureau of Roads; Project Baseline data	
	Increase in traffic conveying food crops along arterial roads.	Records of the Bureau of Roads; Project baseline data	
	Significant decrease in vehicle operating costs in the subregion	Merchant records; project baseline data	

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PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Life of project:

From FY 81 to FY 85

Total US funding \$ 4,000,000

Date prepared: 9/81

Project Title & Number: AGRICULTURAL MARKETING DEVELOPMENT 660-0028

PAGE 3 (b)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project outputs:	<p>Magnitude of Outputs:</p> <p>Increase in vehicle operating life span.</p> <p>Decreased rate of deterioration of arterial roads</p>	<p>Merchant records; Project baseline data</p> <p>Records of the Bureau of Roads, Project baseline data</p>	Assumptions for achieving outputs:

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LOGICAL FRAMEWORK

From FY 81 to FY 85
 Total US funding \$ 4,000,000
 Date prepared: 9/81

Project title & Number: AGRICULTURAL MARKETING DEVELOPMENT 660-0028

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE	INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project purpose:	Conditions that will indicate	End-of-Project status		Assumption for achieving purpose:
To facilitate the access of small cultivators to agricultural marketing systems.	Decrease of at least 5% in production lost through spoilage	Project Baseline /end-line data; DOA regional statistics	Project Baseline /end-line data; DOA regional statistics	The installation of functional road networks and the means of maintaining them are preconditions of sustained rural development.
	Increase in area of land under food crop cultivation in areas serviced by feeder roads	Project baseline/end-line data DOA regional statistics	Project baseline/end-line data DOA regional statistics	Rural producers have an incentive for investing in further food production given an adequate transportation network, adequate farmgate prices and access to goods and services.
	Decrease in vehicle maintenance and operating costs	Project baseline data; Merchants records.	Project baseline data; Merchants records.	The GOZ will not pursue policies that discourage domestic food production.
	Increase in the number of merchant trading in Project area (i.e. increased producer/merchants contact)	Project baseline data; OR records	Project baseline data; OR records	Marketing system able to handle an increase in production.
	Gross income of small cultivator increased by the market value of the 5% of the present spoilage	Project baseline data DOA regional statistics	Project baseline data DOA regional statistics	Resources available to merchants for purchase of production and for purchase of vehicles, spare parts and fuel.
	Decrease in the rate of deterioration of arterial road system.	Project baseline data OR records, inspection	Project baseline data OR records, inspection	Fuel and spare parts available in the region.
	Increase in quantity of food crops reaching surrounding major population centers.	Project baseline data DOA regional statistics	Project baseline data DOA regional statistics	
	Improved technical and training capacities within the Bureau of Roads	OR records Inspection	OR records Inspection	
	Increased respect for vehicle axle-load limits on arterial roads.	Baseline/endline data	Baseline/endline data	

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Date of project:
from FY 81 to FY 85
Total US funding \$4,000,000
Date prepared: 9/81

Project Title & Number: AGRICULTURAL MARKETING DEVELOPMENT 660-0028

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes:</p>	<p>Measures of Goal Achievement:</p>		<p>Assumption for achieving goal targets:</p>
<p>To stimulate agricultural production of food crops by small cultivators.</p>	<p>Small farmers' marketed surplus increased by 5% by EOP through a decrease in loss by spoilage</p> <p>Increased production of food crops</p> <p>Improved road transportation system.</p>	<p>Project Baseline data; DOA marketing studies.</p> <p>DOA records.</p> <p>OR records.</p>	<p>Improved roads will assist Zaire in bringing about an economic upswing.</p> <p>Market access is a <u>sine qua non</u> for increasing agricultural production.</p> <p>The GOZ can absorb an increased level of project assistance.</p> <p>Expansion of small farmers' production not inhibited by low returns on food crops.</p> <p>Land productivity able to be increased substantially.</p> <p>Increased labor demand with increased productivity can be met by small cultivators themselves or met locally</p> <p>Seeds, tools, bags, etc. available in the region.</p>

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CRITICAL PERFORMANCE INDICATORS

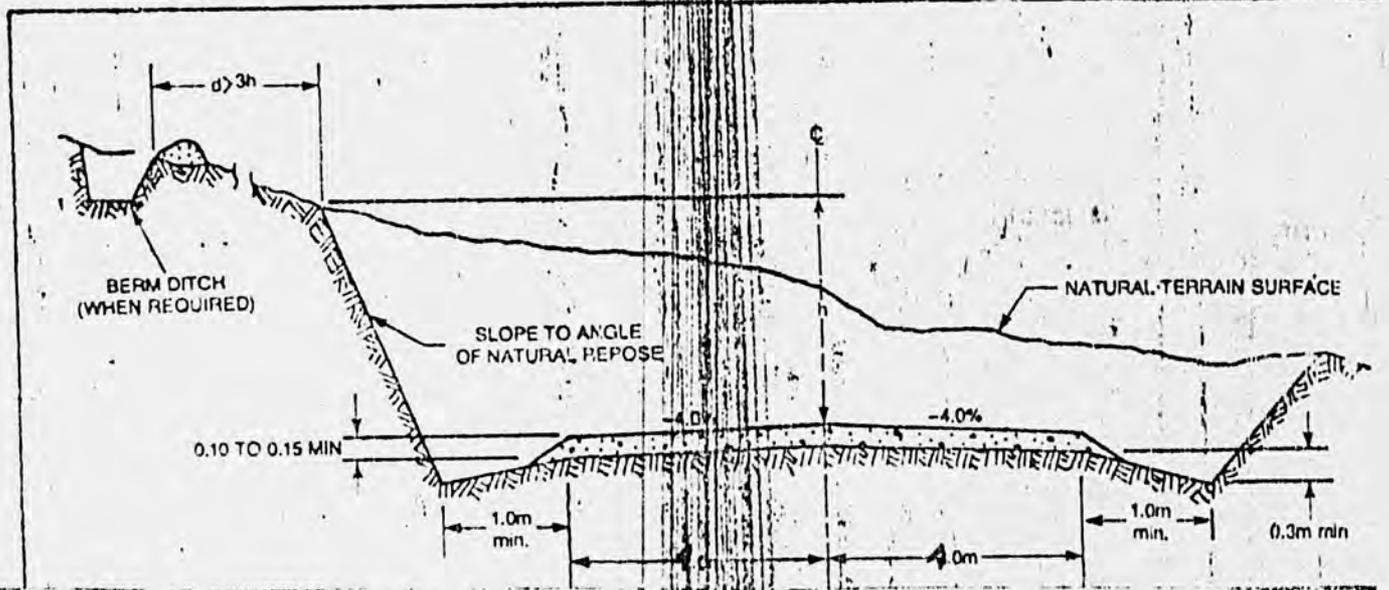
Country: ZAIRE	Project No: 660-0028	Project Title: AGRICULTURAL MARKETING DEVELOPMENT	Date:	Original	Apprvd:
<u>CPI DESCRIPTION</u>					
1.	9/81	Project Paper approved by AID			
2.	9/81	Project Loan Agreement signed			
3.	10/81	Commodities list developed			
4.	10/81	Technical Assistance Solicited			
5.	9-10/81	Conditions Precedent met			
6.	11/81	Commodities order placed			
7.	1-2/81	Technical services selected			
8.	4/82	Training materials on site			
9.	5/82	Technical advisors on site			
10.	5/82	National counterparts on site			
11.	4-5/82	Lubumbashi trainees selected			
12.	6/82	Remaining commodities on site			
13.	6/82	Training commences, Lubumbashi			
14.	7/82	Road work commences, Kwilu			
15.	6/83	Mid-term Evaluation			
16.	6/84	Lubumbashi technical services completed			
17.	6/85	Kwilu technical services completed			
18.	8/85	Final evaluation			
19.	9/85	Project assistance completed			

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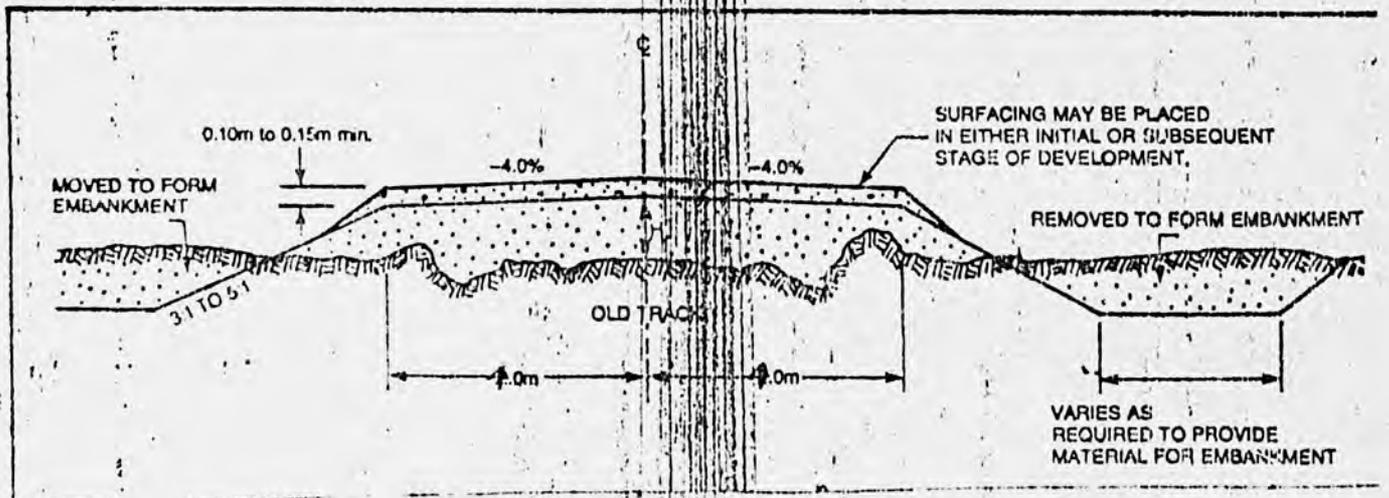
ALTERNATE CONSTRUCTION CONCEPTS

FOR PROJECT USE

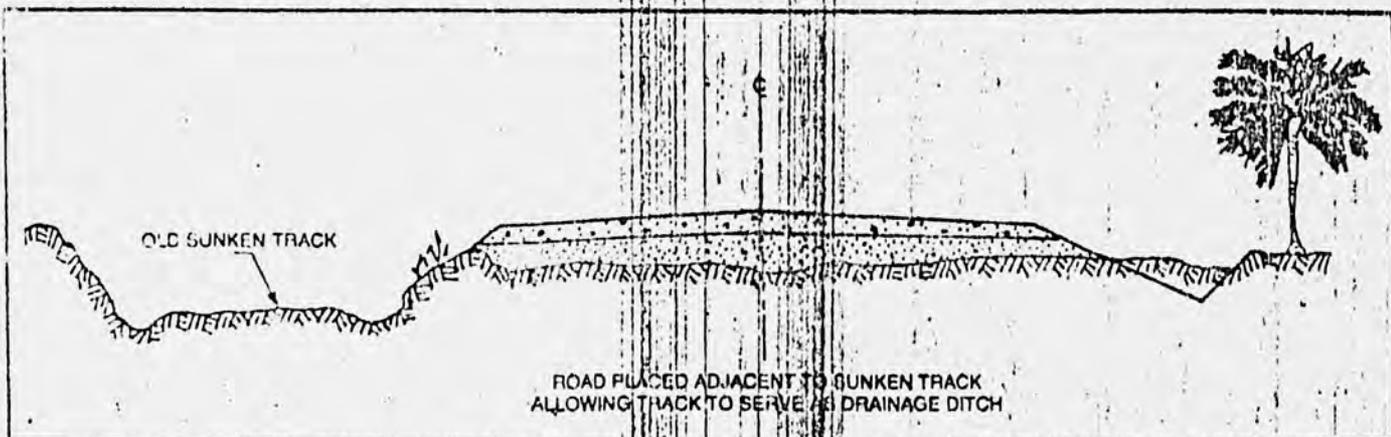
Typical section in cut,



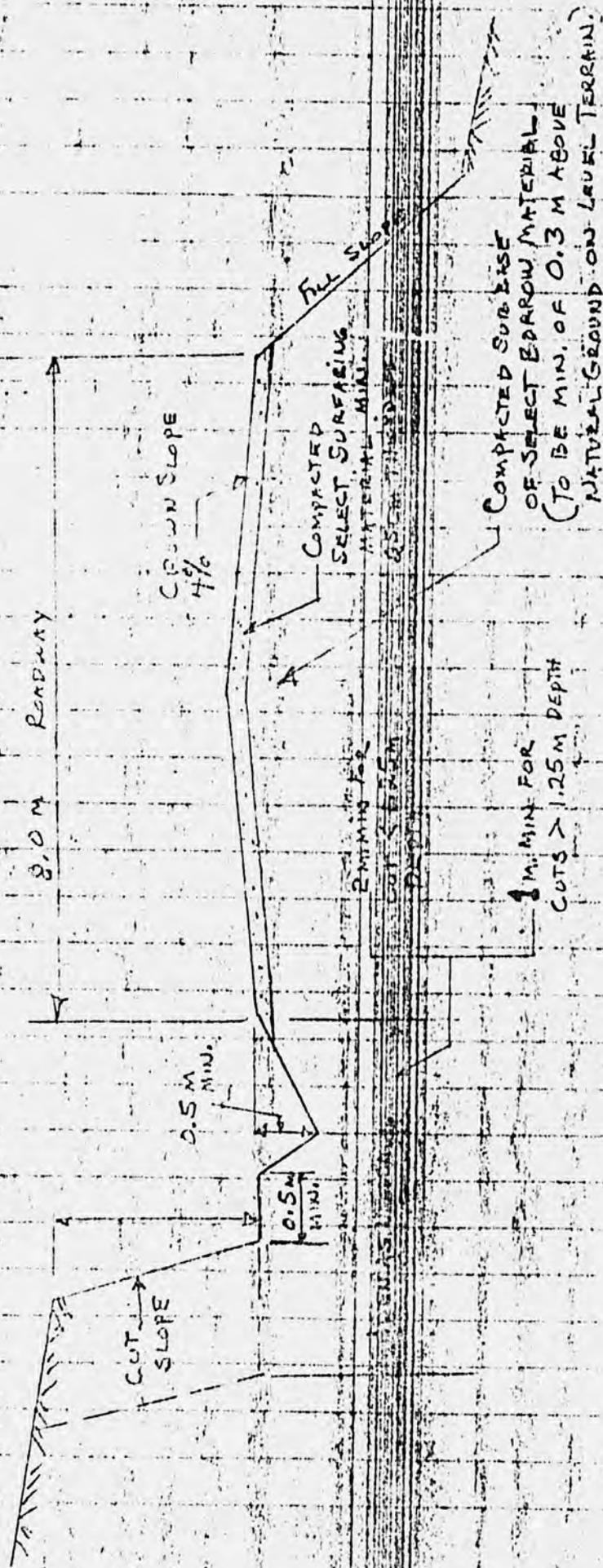
Embankment section over old track.



Sunken track drainage ditch.



DESIGN STANDARD
FOR
PROJECT ARTERIAL ROAD



Typical Road Cross Section

JOB DESCRIPTIONSTechnical Assistance Personnel - Lubumbashi Regional Training Center.I. Director

- a. Language Requirement: Thorough knowledge of French
- b. Experience: Should be a Public Works or mechanical engineer with a minimum of ten years specialized experience in road project administration, construction and maintenance, preferably with field experiences in Africa, or LDC's with similar conditions. He or she should have extensive knowledge of and experience in (a) road construction and maintenance equipment, (b) use of heavy equipment, (c) various elements of road construction, and, (d) the administration of a garage or repair shop. In particular, he or she should have had extensive training experience and a proven capacity to direct, coordinate and manage a training constitution.
- c. Duties: The Director will be directly responsible to the head of the Training Department, Office des Routes, Kinshasa. His or her duties will include (a) the management, administration and finances of the Center, (b) responsibility for the technical equipment used at the Center, (c) the planning and supervision of the Center's training activities, and (d) the supervision of the Center's staff, including the training of the counterpart staff.

2. Master Mechanic Instructor

- a. Language Requirement: thorough knowledge of French
- b. Experience: should have a Master's license or equivalent in auto mechanics and heavy equipment with extensive professional/practical experience in the repair and preventive maintenance of road construction equipment, preferably in Africa or LDC's with similar conditions. He or she should also have experience in the management of stocks, supply centers and spare parts, knowledge of the operation of heavy equipment and extensive experience in professional training.

c. Duties: The mechanic/instructor will be responsible to the director of the Regional Training Center. His or her duties will include (a) the organization, development and implementation of the practical and theoretical training courses required by the Center, (b) the selection of training materials and documents, (c) the preparation of the technical documentation to be used in the courses, (d) the preparation and review of examinations, and (e) the training of counterpart instructors.

3. Equipment Operator Instructor

a. Language Requirement: thorough knowledge of French

b. Experience: should have a Master's license or equivalent in the speciality area with extensive professional/practical experience in the operation of a relevant range of heavy equipment, preferably in Africa or in LDC's with similar conditions. He or she should also have (a) knowledge of engine mechanics for the Department of Public Works vehicles, (b) preventative maintenance of vehicles and road building equipment, and (c) extensive experience in professional training.

c. Duties: The operator instructor will be responsible to the Director of the Regional Training Center. His or her duties will include (a) the organization, development and implementation of the practical and theoretical training courses required by the Center, (b) the selection of training materials and documents, (c) the preparation of the technical documentation to be used in the courses, (d) the preparation and review of examinations, and (e) the training of counterpart instructors.

Technical Assistance Personnel - KwiluI. Construction supervisor

- a. Language requirement: fluent in French
- b. Experience: A minimum of ten years specialized experience in practical road administration, including both construction and maintenance, supervising local workers in LDC's. A civil engineering background is desirable but hands-on experience and the ability to work with local government construction employees to produce a usable road conforming to the required cross section, properly drained, is of primary importance. The construction supervisor must be able to work within the existing highway organizational structure. The candidate must be able to instruct the local officials, technicians and equipment operators employed in a new construction brigade in efficient work methods and techniques so that the project can be completed within the budget and time constraints for this project.

II. Master Mechanic

- a. Language Requirement: Fluent in French
- b. Experience: must have a minimum of ten years experience in responsible charge of road construction equipment repair and maintenance as a master mechanic or shop superintendent in a LDC. Experience should include supervision and management of personnel at the sub-journeyman experience level. Candidate is expected to supervise and instruct local government employees in the proper care and repair of equipment being purchased to form a new road upgrading brigade. Additional knowledge of the proper operating techniques of common road construction equipment would be extremely helpful since the equipment operators will have received minimal training and can be expected to abuse the equipment without further instruction. Candidate will be responsible for maintaining an adequate supply of spare parts to keep the equipment operational. He or she will be under the nominal supervision of the construction Advisor but will function in a semi-independent manner in conjunction with the Construction Advisor's overall program.

PROJECT DATA BASE1. Physical Characteristics: Kwilu

The topography of the Kwilu subregion of the Bandundu Region displays two basic characteristics: first, a high plateau, intact in the south, opening in the center and dropping in the north as it approaches the Kasai River; and second, a dense network of rivers running parallel from south to north for several hundred kilometers before converging into the Kwango and then to the Kasai River. The soils of the high plateau are sandy and generally of poor fertility. The most fertile soils are found close to streams and rivers in forested or recently deforested land and in the alluvial belt of the Kasai River. The most productive areas for food crops are the Bulungu and Idiofa Zones (see maps); the Idiofa Zone remains the most heavily forested. There are no virgin forests in Kwilu. Since it was inhabited, the forests have been continuously burnt and cleared, either for hunting or for agriculture. Although at present the savannah is fast encroaching on the remaining forest area, the climate would allow the re-growth of dense forests throughout these parts.

The climate of the Kwilu is tropical with a tendency to subequatorial. The average rainfall is about 1,600 mm with about 150 days annually of rain. There is no significant difference between the rainfall on the plateau and in the valleys. The heaviest rains fall in March-April and October-November, an average 200 mm or more per month. The dry months are June, July and August, with less than 30 mm per month, and a short dry season in February. The mean daily temperature is 25 degrees C with a variation of only 1.3 degrees throughout the year. The humidity fluctuates between 70 and 80 percent.

2. Demographic Characteristics: Kwilu¹

The rural population of Kwilu, excluding the towns of Kikwit (150,000) and Bandundu (99,000), was estimated in 1979 as 1,854,000 inhabitants, of which about 80 percent are engaged in agriculture. The average population density in the Kwilu is 23 inhabitants per square kilometer, which increases to 25 inhabitants/km² if the two principal towns are included. The average population density for the whole of Zaire is 10 inhabitants/km². There are significant differences between the five zones of Kwilu that range from 39 inhabitants/km² in Bulungu to 10 inhabitants/km² in Bagata. The zone of Idiofa averages 25 inhabitants/km². The distribution of the population between the plateau and the valleys is in the order of 1:10. Sixteen percent of the population is under 5 years and 43% under 15 years.

1. Official demographic and economic data for the Kwilu are often inaccurate or inconsistent. The following sections are based on a summary report, prepared by Ms. Louise Fresco, of an FAO study: Développement Rural Intégré du Kwilu (PNUD/FAO ZAI/78/001): Le Milieu Rural et son Développement au Zaire, June 1981.

The division of the population by sex is relatively constant throughout the subregion with 86 males for every 100 females. This low ratio is a direct consequence of rural-urban migration as can be seen from the following table where the adult men to adult women differs significantly from the ratio of that of under 18 males to under 18 females:

Table 1: Population of Kwilu by Zone^A, sex and age

Zone	Adult Males	Adult Females	Under-18 Males	Under-18 Females	Total
Bagata (1978)	26,663	39,248	45,563	46,340	157,814
Bujungu (1979)	77,332	112,547	149,850	141,984	481,713
Gungu (1977)	52,055	73,004	79,006	73,546	277,611
Idlofa (1979)	95,581	122,463	154,629	153,056	525,729
Total	251,631	347,262	429,048	414,926	1,442,867
Ratio	72	: 100	103	: 100	-

A This data is not available for the zone of Masi-Manimba

With the shrinking of the rural agricultural economy to a subsistence economy where the maximum land surface cultivated tends to be the minimum imposed by the government, fewer children are needed for manual labor. As real incomes shrink, it is becoming more difficult to support the education, clothing and feeding of a large family.

The pattern of migration from the Kwilu region tends to be short-term and circular, flowing between the rural areas, Kinshasa and Kikwit. Bandundu Region as a whole has the highest number of people migrating elsewhere in all of Zaire, some 22,000 annually, according to FAO's research, of whom 56% are men. There are indications that out-migration is beginning to occur from Kinshasa, thus slowing down its estimated 11 percent per annum rate of growth. However, this may be helping to increase the rate of growth of Kikwit, already estimated at 18 percent per annum. Migration to these secondary cities allow the possibility of increased urban/rural contacts.

Kikwit thus functions in the Kwilu subregion as a center of migration, of commerce and of education, whose inhabitants maintain a variety of links to the rural areas. In particular, and similar to Kinshasa, it receives food from the rural areas in exchange for the provision of accommodation and often education to the rural youth, a form of exchange outside of the cash economy. The population of Kikwit was estimated in 1976 to be 150,000 with a ratio of 106 males to 100 females. Almost 50 percent of the population

is under 15 and almost 60 percent under 20 years. The annual birth rate is estimated to be around 55 per thousand. It is estimated that 80 percent of the population of Kikwit have no economic activities. Of those economically active, 9 percent of the men and 25 percent of the women work in the agricultural sector and 23 percent of men and 55 percent of women are engaged in commerce, often on a part-time basis.

The average rural household in Kwilu comprises 5 to 6 persons. In about 65 percent of the cases the household consists only of the non-extended family: the husband, his wife (or wives) and their children with occasionally another member of the family. Without exception, all households retain their matrilineal affiliations but, in general, a new household is virilocal, located in the husband's village. This tends to minimize cooperation among the women. Almost 70 percent of all marriages are monogamous.

The incidence of polygamy in rural households is highest in Idiofa, 19 percent, and lowest in Bagata, 2.5 percent. Almost 20 percent of all rural households are headed by women alone, which number increases to 29 percent in Bagata. The average number of children per household is low, 3.5, due in part to the practice of sending children to the towns to be educated. Life expectancy is 45 years for men and 36 years for women. Of those actively engaged in agriculture in Kwilu, 93 percent are women.

There are at least twelve different ethnic groups in Kwilu, most of which share Kikongo as their lingua franca. Each ethnic group is composed of several clans, the members of a clan recognizing a common matrilineal descent. In general, villages are not unified by clan and may contain several ethnic groups. Furthermore between 1920 and 1930, traditional villages were regrouped for health and administrative reasons by the colonial authorities. Traditional clan rights to land often continue to exist alongside the colonially imposed patterns of land use, which leads to irregular and often isolated plots under cultivation or lying fallow. It is estimated that only 5 percent of the total surface area of Kwilu is cultivated although most of the land is arable.

3. Basic Needs: Health, Education and Information

The majority of all illnesses in the Kwilu area can be attributed to a small number of causes directly or indirectly linked to the social and sanitary environment of the village: inadequate clean water, hygiene and nutrition. There are few protected water sources; latrines often are absent; medicines are almost prohibitively expensive; and medical services, particularly preventative medical services are frequently unavailable for these areas. More than a quarter of all deaths and 50 percent of childhood deaths are attributed to malaria. Next in order of severity are measles, diarrhea, and worms.

Protein calorie malnutrition exists in the region. In Bulungu and Bagata zones, 56 percent of all children under 5 years of age suffer from chronic malnutrition. In Kikwit, the hospital outreach program estimated that 33 percent of children in the city suffer from chronic malnutrition. It is estimated that acute malnutrition, the indicator of most value in identifying children at risk, affects 10 percent or more of the children under 5 years of age in many parts of the Bandundu region, possibly 30,000 children in the Kwilu area alone.

Ninety-seven percent of families produce all the manioc they consume. The staple daily diet of manioc and a sauce provides 1,700 calories per day and 7 grams of protein, respectively 73 percent and 10 percent of the FAO recommended daily intake. However, there is a tendency on the part of rural families to sell an increasing percent of their production to defray expenses, in particular taxes, education, medical expenses and foodstuffs. The proportion has increased because of a general decrease in production of food crops and an increase in the cost of living while agricultural prices have remained low. Apart from manioc, the other crops sold for cash are those rich in protein, due to the high price they demand in the urban markets.

In the urban areas, manioc is being replaced more and more by rice or bread as the staple foodstuff. But the nutritional status of the town dwellers poses serious problems. Few families have access to fields and those that do receive low yields since the land is rarely fertile, often quite a distance away and insufficient to allow adequate rotation. The majority of households thus depend on purchased foodstuffs or gifts. Household purchasing power in Kikwit was only one quarter in 1980 of what it was in 1970.

With the exception of the Bulungu zone, which has an extensive educational system, illiteracy is high in Kwilu, between 50 and 60%, as compared with 36 percent in Bulungu. On the average, 68 percent of adults have attended at least three years of primary school, and 56 percent of men and 37 percent of women have completed primary school. Only 8 percent of adults in the rural areas have attended secondary school. About 43 percent of adults can read and write Kikongo and about 11 percent know French.

The majority of children between the ages of 8 and 14 years attend school. The dropout rate is estimated at 60 percent during primary school, significantly higher for girls than boys. This is partly because the costs of education are so high and parents still tend to prefer to educate boys rather than girls, and partly because girls often must absent themselves because of domestic or agricultural responsibilities.

Access to information is perhaps the greatest need in the region. Most access to information is by word of mouth from passers-by. Only 18 percent of households have access to a radio in working condition. The only regional newspaper is sold exclusively in Kikwit. Sources of information regarding new agricultural or household techniques are non-existent outside of agricultural extension workers and mission and other similar personnel. Thus the majority of small cultivators are denied easy access to such technical services, training or information. Most rural households (86%) have no means of transport. The transportation of food crops, as also of wood and water, to the home, and of food crops to market, is done by the women on foot. Only 8 percent of households have bicycles. However in 16 percent of the households, one member (the man in 86 percent of the cases), has visited Kinshasa, mainly for family reasons.

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4. Household Economy

The main sources of revenue for rural families differ from zone to zone. In Bulungu, Idiofa and Bagata, more than half of the household income comes from the sale of food crops.

The sale of manioc, exclusively cultivated by women, brings in between 81 and 89 percent of all returns from food crops and between 30 and 55 percent of total household revenues. Peanuts are relatively important in Bulungu and Idiofa. Income from cash crops such as coffee is insignificant; income from livestock and fish culture, predominantly male occupations, varies from 1 percent of household income to 7 percent in Bulungu. The contribution of wage earners varies from 6 percent for families in the predominantly agricultural zones, Bulungu and Idiofa, to between 15 and 32 percent in the other zones. Income accruing from handicrafts varies between the zones, with the highest being Bagata where the artisan contributes up to 18 percent of the total family income. Traditionally the potters are women, while the blacksmiths, wood carvers, and weavers of Kwilu are men.

The economic base of each zone therefore is reflected in the composition of the household income. In the zones of Bulungu and Idiofa, household income is predominantly from agricultural and livestock production, whereas in the other zones rural non-farm production, from hunting, fishing, and handicrafts, are of relatively more importance. The average annual per capita income varies from 95 Zaires in Bagata to 200 Zaires in Idiofa.

Although it is impossible to quantify the respective contributions of men and women to the household revenues, a conservative estimate is that on the average over half is generated by women, for the areas of male prerogative are of less importance economically.

Nevertheless, budgetary decisions principally are taken by men. In 93 percent of households, the woman is obligated to hand over her income from the sale of her food crops to her husband from whom she receives a certain sum in return. In general, the man is responsible for clothing for the family and for education while the woman is responsible for medical expenses and food. Savings is a joint decision in most households. Decisions relating to the sale of products are made jointly in 65 percent of the cases. In nearly 65 percent of all households, the women are responsible for the transportation to and sale of the food crops at the local market.

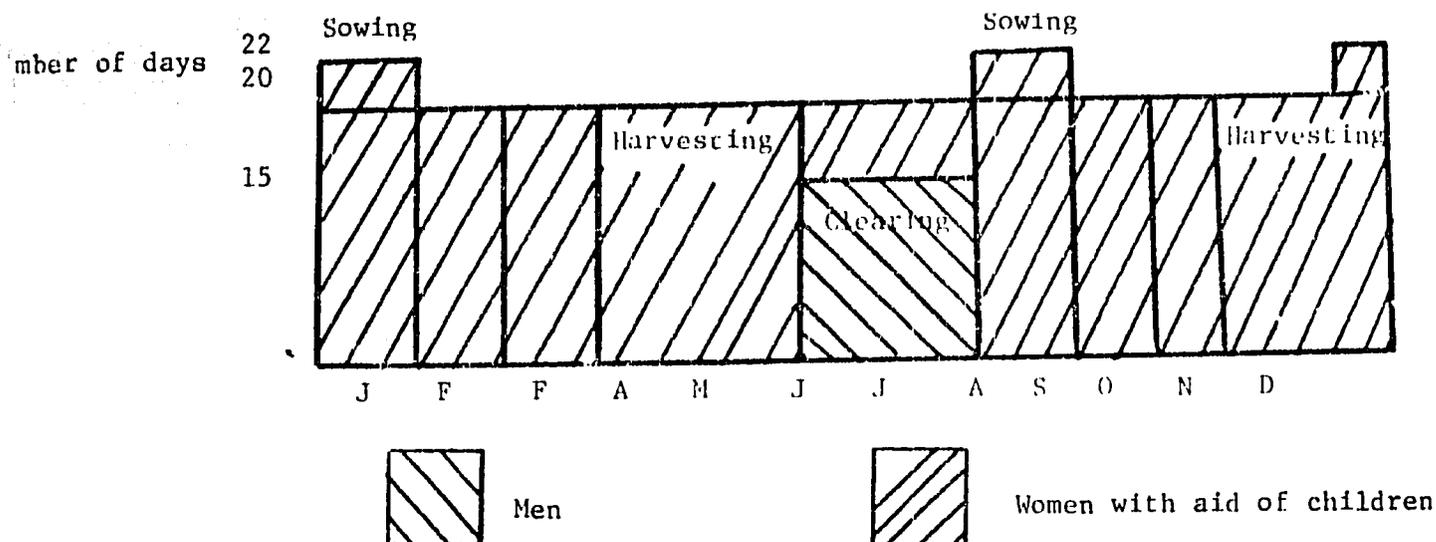
About 35 percent of the household expenditures go for foodstuffs. Given that most rural families produce primarily for home consumption, and the access to markets is very limited, this figure reflects the low average income per household. Most purchases are of local products (bread, fresh fish, caterpillars, oil, pepper, meat or vegetables) or other products of Zaïre (rice, cigarettes, alcohol, salted fish). A considerable portion of the budget is spent on salt (18%), soap (10%), and clothes (26%). Medical expenses vary between 3.5 and 9.4 percent of the total budget and education expenses between 3 and 11 percent. The latter would be higher if one took into account the contributions of other members of the extended family, particularly in the urban areas,

towards the cost of both accommodation and fees. Hardly any expenditure is made on agricultural inputs (tools, seeds, etc.).

The low per capita income is linked to several factors. The possibilities of rural non-farm employment are extremely low. The agricultural revenue is reduced because of low soil fertility, traditional cultivation techniques, lack of improved seed, and insufficient organization. The absence of a reliable marketing system, low agricultural prices, and the shortage of manufactured goods discourage small cultivators from increasing agricultural production above the minimum required to satisfy their cash and household needs.

Household labor is strictly and traditionally divided by sex and age. The women are responsible for the provision of water and firewood, cleaning and maintenance of the house, processing and preparation of food, the household garden, gathering of caterpillars, termites, wild berries, medicinal herbs and leaves, preparation of the ground, planting, weeding, harvesting of food crops, transporting the crops between field, house and market, sale of the surplus, and certain handicrafts, predominantly pottery. Men are responsible for clearing the land, in many cases assisted by the women, hunting, fishing, livestock production, the production of palm wine, house construction and roof rethatching, weaving, and blacksmithing. Men make decisions on agricultural innovations. This is not a traditional task but arises because modern agricultural services generally are directed toward men. Children assist the women in their agricultural tasks and with child minding and rearing and assist the men in the herding and tending of livestock.

There remain certain social constraints on the labor available for agricultural production. Firstly, only five days each week (or less) are available for agricultural labor. Traditionally in Kiwlu a week was three or four days long with at least one day each week being a day of rest. With the imposition of the seven-day week, no field work was performed on Sunday nor on at least one other day, depending on the ethnic group. Further various pre- and post-partum and menstrual taboos, holidays, marriages and funerals, decrease the number of field work days. On the average women work in their fields 22 days per month during the rainy season and 15 days during other months. Secondly, the time a woman has available for working in the fields is limited by her domestic responsibilities. Her agricultural working day is rarely longer than five hours. Along with her agricultural labor she also fulfills various other tasks: child minding and feeding, gathering of food and herbs and the collection of water and firewood. Thirdly, the strict traditional division of labor for food crops means that the male contribution is linked to the clearing of the land, usually from June to August.



Decisions as to how many fields and which fields should be placed under traditional cultivation are taken by the village chef, in consultation with the government moniteur agricole and the cultivators. The cultivator, herself, decides on crops, mix and density. Decisions as to when to plant are taken by the traditional women's agricultural leader, by the first wife of the chief or another important woman. The chef de collectivité decides on the placement, frequency, seasonality and hours of the local markets, the amount of land each taxable adult must cultivate under the culture imposé and often the maximum farmgate price for food crops. The Government decides on the official minimum prices and minimum yields per region.

Rural farm households often are ignorant of decisions taken outside of their own village. For example, the official minimal prices are not widely known, nor are the official marketing seasons. They are ignorant of their commercial marketing rights and, for example, rarely own scales for cross-checking merchants' weight claims.

5. The Agricultural Economy: Kwilu

The most recent official statistics, those of the 1970 census, distinguish two types of farming in Kwilu, as in Zaire itself: modern farmers, and traditional farmers and small cultivators:

Table 2 : Types of Cultivation in the Kwilu, 1970

Type of cultivation	Number of Units	Agricultural population	Land under cultivation (ha)	Livestock (in thousands)		
				Cattle	Small Animals	Poultry
Modern	36	38,000	19,500	13	1	2
Traditional	190,000	1,190,000 ¹	316,000	66	314	1,111
Total	190,036	1,228,000	335,500	79	315	1,113

A little less than half of the modern commercial farms are farmed by individuals; the remainder of these agri-businesses are run mostly by a few large firms. The land generally is conferred by concession. This commercial sector in Kwilu composes less than 0.02 percent of the farming units and 3.1 percent of the agricultural population.

The traditional sector comprises 190,000 farming units occupying 94 percent of the total land under cultivation. On average each unit comprises 5.5 individuals and cultivates 1.66 hectares. Traditional slash and burn techniques, employed by 98% of these cultivators, rely almost exclusively on hand labor of the family and on simple tools. Land tenure follows traditional, customary practices with land normally allocated for cropping by customary leaders. Land remains communally owned; crops are individually owned. Farmers, the remaining 2 percent of the traditional agricultural population, are distinguished from the small cultivators by the mode of attribution of the land, which is held in concession. Further, usually cash crops rather than food crops are cultivated and wage labor employed, usually male.

Table 3 shows agricultural production for the Kwilu for 1978².

Manioc is the predominant crop of the region. Most fields of manioc are affected by pests, bacteria, fungi and/or viruses. One of the latter, Mosaic, is considered to heighten the flavor of the manioc leaves, the vegetable most consumed locally and also exported in large quantities to the urban areas.

The agricultural cycle for a field under traditional cultivation generally lasts 18 months. Manioc is planted as soon as the field is cleared. Other crops, maize, peanuts and millet, varying in importance by ecological zone and by tradition, are intercropped with the manioc either at the beginning of the cycle (September) or during the second season (February to May). After the

1. Of which 575,000 are male and 615,000 female; 630,000 are in the 15 to 65 age group (300,000 men and 330,000 women) and 560,00 in the 0 to 14 age group.
2. There is no consistency between these figures and the FAO estimates that follow.

Table 3 : Agricultural Production in 1978 for the Subregion of Kwilu

Products	Number of Cultivators	Area under Cultivation (ha)	Total Production (tons)	Average Yield (kg/ha)	Average Production per Cultivator (kg)	Production Sold (tons)	% Sold of Total Production
Maize	295,364	178,279	156,938	880	531	110,087	70
Potatoes	1,908	59	258	4,372	135	200	78
Paddy Rice	105,299	31,878	26,159	320	248	23,087	88
Sweet Potatoes	65,899	9,108	47,403	5,204	719	7,188	15
Millet	76,597	54,333	33,927	624	442	7,506	22
Manioc	407,811	302,137	1.642,473	5,436	-	673,414	41
Plantains	61,765	5,498	32,269	5,869	522	2,783	9
Bananas	76,640	5,660	27,013	4,772	352	6,500	24
Shelled Peanuts	371,997	137,631	109,298	794	293	777,954	71
Squash	265,711	143,295	69,190	482	260	24,650	36
Dried Beans	9,000	844	723	856	80	329	46
Coffee	8,728	8,712	8,313	954	952	1,881	23
Shallots	5,473	198	633	3,196	115	468	74
Urena	-	-	3,160	-	-	3,160	100
Voandzou	68,989	12,709	8,700	684	126	2,247	26
Sesame	11,139	3,670	2,983	812	267	2,516	84
Tobacco	68,895	6,040	2,901	480	42	997	34
Yams	62,526	7,406	34,285	4,629	548	1,116	3
Other Tubers	4,754	695	3,996	5,449	840	2,407	60
Soya	5,785	253	173	683	30	4	2
Punga	-	-	232	-	-	232	100

Source: Institut National de la Statistique, Direction Régional de Bandundu, Kikwit.

second harvest, only the manioc remains to be harvested, as required, up to 18 or even 24 months after planting. Other crops are planted as borders. The length of the fallow period varies from 5 to 8 years in the forest and 3 to 5 years for savannah.

The yield varies significantly between forest fields (F) and savannah (S) as can be seen in the following table:

Table 4: Principal Crops, Savannah and Forest Production (FAO estimates)

Crops	Surface cultivated per cultivator (ha)		Yield (Tons/ha)		Annual Production per cultivator (Tons)	Average Product per household (Tons)
	F	S	F	S		
Manioc (cossettes)	0.4	0.6	12	5	7.8	8.6
Maize (grains)	0.4	-	0.7	0.3	0.28	0.31
Peanuts	-	0.6	0.6	0.5	0.30	0.33
Millet	-	0.6	0.6	0.4	0.24	0.27

Once harvested the manioc tuber is peeled, then soaked in running water for 2 to 3 days. It is then dried to produce the manioc cossettes in which form it is normally stored, transported and marketed. The cossette can be ground or pounded into flour. The transformation is as follows: 100 kg fresh roots → 80 kgs peeled roots → 35 kgs of cossettes → 30 kgs of flour. Maize is stored either as dried cobs or as grain. Little or no technology is available for processing or for storing crops.

The FAO study estimates that the annual consumption per household of its production is: manioc 35 percent, maize 22 percent and peanuts 30 percent. Losses in food production occur before harvesting due to insects, birds, weeds, and disease; during harvesting due to inadequate techniques; and, after the harvest during processing, storage and transportation. The FAO study provides some estimates on the causes of post harvest losses:

Table 5: Total Agricultural Production Losses During Storage by Region

Causes	Bagata %	Bulungu %	Gungu %	Idiofa %	Masi-M %	Kwilu %
Rats	45	14	20	15	44	27
Insects	7	22	16	-	-	12
Both	48	60	64	85	37	58
Both and humidity	-	4	-	-	-	1
Other	-	-	-	-	19	2

An indication of the extent of the losses may be gained from a comparison of Table 3 and the above FAO data on consumption of the principal food crop. Only 2.5% of households surveyed stated that they had no problems with post harvest losses. Although the magnitude may not be strictly determinable, it is clear that a not insignificant part of the food crops produced are lost during processing, storage and transportation.

6. Institutional Resources: Kwilu

The road network in Kwilu comprises 1,231 km of national roads, of which 193 km are asphalted (the Kikwit-Kinshasa road); 1,179 km of regional dirt roads; and numerous local roads. The network density is low at 3 km per 100 km², and it is estimated that it would take 25,000 km of road, and 30 ferries, to link all the villages of the sub-region.

Private enterprises manually maintain 1,546 km. The regional bureau of the Office des Routes maintains 6 autonomous road maintenance brigades at Bandundu, Idiofa, Kenge, Bulungu, Semendwa and Mushie and 8 intervention units at Kikwit, Inongo, Masi-Manimba, Popokabaka, Gungu, Oshwe, Mungata and Kasongo-Lunda. At Kikwit, there is also a regional bureau of the Service de Gestion du Materiel des Travaux Publics (SGMTP) which provides the heavy road maintenance and construction equipment to the Office des Routes. However, these resources are insufficient to maintain even urgent repairs.

Work has commenced on a European Community (EEC/FED) project to upgrade and seal the road from Kikwit to Mbuji-Mayi via Tshikapa, with side roads connecting from Idiofa and Gungu, and to construct three bridges to replace existing ferries on the route. USAID is funding the upgrading of the roads Kikwit-Bulungu-Panu and Idiofa-Dibaya-Lubwe and the upgrading of the river ports of Bulungu, Dibaya-Lubwe, and Panu (660-0026).

Agricultural produce is transported privately by large merchants located in the major towns - Kikwit, Idiofa, Tshikapa - or in certain areas by small merchants located in villages. It is thought that the number of active merchants is not as high as figures suggest. It is estimated that there is at present only the capacity to transport by truck 500,000 tons of agricultural produce per year, predominately manioc. The transport system is limited by the availability of foreign exchange for the purchase of vehicles and spare parts, by the lack of maintenance garages, and by the chronic shortage of fuel. There is no regular passenger transport service in the subregion; there is a daily bus service between Kikwit and Kinshasa.

The Department of Agriculture and Rural Development is represented in the subregion by the Subregional Agronome who is assisted by the subregional coordinator for Rural Development. At the zone level there is a Zone Agronome,

although only in the zones of Bulungu and Bagata is the Zone Agronome assisted by a similar post for Rural Development. In the collectivities, the agronome de la collectivité directs the moniteurs agricoles working in the localités. The Department is responsible for veterinary services, statistics, extension work, agronomy and rural economics. The actual number of employees of the Department in Kwilu was 869 in 1979, of whom 715 were field workers. Given an agricultural population of approximately 1,228,000 and an average of 5.5 people per household, each field worker is responsible for about 300 rural households.

The para-statal organs associated with the Department (DOA/RD) in the subregion include a research station of the Institut National des Etudes et Recherches Agronomiques (INERA) at Kiaka, where multiplication of improved varieties of manioc is scheduled to begin in 1981.

Mention should be made also of a number of non-governmental institutional resources in the region. There is a large missionary presence in the Bandundu region. Catholic mission groups engaged in development work include the Développement Progrés Populaire of the Diocese of Idiofa which concentrates on cattle raising extension, upland rice extension and farmer training; a small-scale marketing cooperative at the Koshimbanda mission; the Bureau de Développement Diocésain of the Kikwit Catholic diocese which works in cattle raising, credit-in-kind schemes, and preventative medicine, and has a small food-crop processing unit; and the Djuma Mission Marketing Program at Bulungu, a marketing scheme designated to lower the price to villages of manufactured goods. Protestant missionary activities are organized under the Eglise du Christ au Zaïre. The Community of Mennonite Brothers (CFMZ) created the Programme Agricole Protestant in 1966 for cooperative animal husbandry. It now has a feed mill, poultry hatchery, a cattle farm which includes four fish ponds and a multi-purpose extension service. The CFMZ also has created the Mennonite Economic Development Associates (MEDA) to promote the production, transportation and marketing of food crops. The Baptist community (CBZO) has started an extension training and farmer demonstration center at Lusekele.

Two other agencies working in the Kwilu are Peace Corps and OXFAM. Peace Corps provides volunteers to a large fish culture program which is USAID-assisted, as well as agriculture, health and education volunteers. OXFAM provides assistance in the form of monetary, material and technical assistance to small development activities. They have developed village-level model farms under the management of a local development committee and directed by a technical advisor. The goal is to improve local cultivation practices.

The FAO research project Développement Rural Intégré du Kwilu (PNUD/FAO ZAI/78/001) has designed a number of extension programs to identify local disease-resistant and high-yield varieties of food crops, particularly manioc, and to compare their suitability with INERA-identified (PRONAM) strains, to assist the cultivators to determine optimal planting and sowing seasons, and to test the acceptability of more intensive agricultural techniques. The project also will establish plant nurseries and test reforestation techniques.

PROJECT COMMITTEE AND DESIGN TEAM

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NOTES ON TRAINING

Training is the teaching of work methods, techniques and skills necessary for the satisfactory performance of specific work assignments. Training should be limited to the subject matter needed to perform particular jobs. It should take place immediately before the trainee is to do that specific task. Unnecessary material will impair the effectiveness of a training program. Education, on the other hand, is the process of developing the general knowledge, mind and character of a person through the study of histories, theories, and principles. Training, for example, is aimed at teaching the mechanic the proper direction in which to mount a grader tire rather than at explaining why the tire is more effective when correctly mounted.

The three most common approaches to structured training are (1) training centers, (2) training production units, and (3) decentralized training.

Training centers are fixed facilities that have classrooms, offices, shops, garages, sleeping quarters, and dining facilities. The staff is comprised of professional trainers. The trainees are transported to the training center where they participate in classroom discussion and in operational exercises and where they perform simulated work. Training centers usually offer the most intensive programs which, in turn, reduce training time. The project-assisted training at Lubumbashi falls into this category of training.

Training production units (TPU) are located in an area where work is required. They are temporary or permanent camps that have additional classroom facilities. The staff is a cadre of professional trainers. The trainees are responsible for the construction or maintenance of a portion of an actual road network reserved for exclusive use by the TPU. The trainees are shipped to the camp where they undergo classroom discussions and do actual work on the road system assigned to the TPU. The training period may be longer at a TPU than at a training center, and the number of trainees and types of training are less flexible. However, trainees must face actual work problems and their work output offsets some of the training costs. The graduates from the Lubumbashi Training Center will be assigned to a TPU upon completion of their formal training at the center.

The brigade created to do the upgrading work for this project will not be a training production unit. The foreign advisors will not be qualified professional trainers nor will the brigade staffing include a sufficient number of local qualified trainers to cover the many different activities the brigade will be undertaking. The work scheduled to be completed in the three-year active construction period precludes the use of a training production unit.

Decentralized training takes place at the trainee's regular work location; therefore, separate training facilities are not required. The training material is prepared by training specialists, but the actual training is done by the trainee's supervisor. This places the control, timing, and amount of the training in the hands of the person who is responsible for the trainee's work. Decentralized training requires intensive preparation of complete and self-contained training programs by professional trainers, and additional training for the supervisor-instructors. However, (a) the number of trainees is unlimited, (b) the training activity is completely flexible (allowing for minimal interruption to the trainee's work schedule), (c) the cost per trainee is nominal, and (d) trainees tend to pay strict attention to the training given by their supervisors.

This type of training can be carried out in the project brigade if OR can develop the necessary training materials and can properly prepare the supervisor-instructors for the brigade before actual construction activities are scheduled to begin.

Such training's major objective is to teach each employee to do each work activity in the same, accepted way. Usually, such a training program is targeted at regular highway employees in order to standardize ongoing work methods. Once this immediate objective is attained and the training methods have been perfected, the training program may be expanded to provide basic training for new employees and to prepare regular employees for advancement.

The technical advisors will be required to implement any training activities that have been properly developed by the OR training program. However, they will not be expected independently to develop and execute a training program at the same time they are trying to maintain a demanding production schedule. Nevertheless, the advisors will be expected to give ad hoc individual instruction to improve proper work performance. The OR Training Department will be encouraged to develop appropriate decentralized training materials and programs for use in working brigades. The project brigade may serve as a model for such programs.