UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
TANZANIA

ECONOMIC EVALUATION AND SOCIAL IMPACT ASSESSMENT OF THE KANAWA-KALITU ROAD

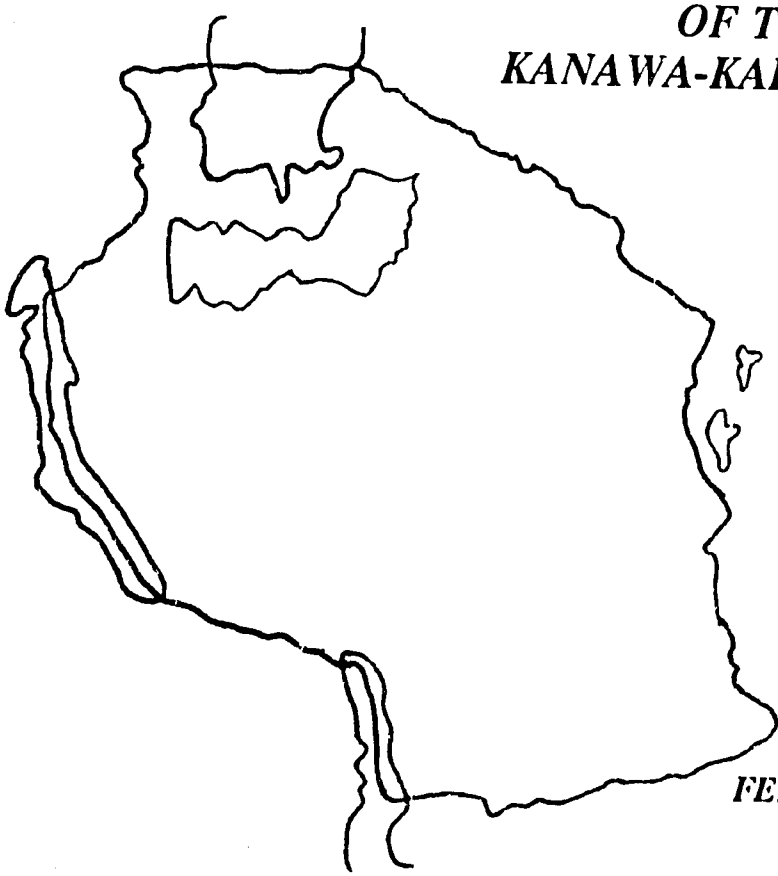

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TABLE OF CONTENTS

PART I

PREFACE

The Economic Evaluation and Impact Assessment of the Kanawa-Kalitu Road was carried out in November-December 1991. Joel Strauss, USAID/Tanzania Rural Economy Advisor, collected initial data in Dar-es-Salaam and Shinyanga. In December, he was joined by Servacius Likwelile, Transport Economist at the University of Dar-es-Salaam; Rabahi Chamani from the Ministry of Works Planning Division; Antujaelly Kiondo and Abel Salula of USAID/Tanzania. Likwelile with assistance from Chamani worked on the economic evaluation while Strauss, Kiondo and Salula conducted surveys for the impact assessment. The report was prepared by Likwelile and Strauss assisted by USAID Program Economist, Dr. Daniel Ngowi. The views expressed are those of the authors.

EXECUTIVE SUMMARY

The Government of Tanzania and the donor community have long noted the poor condition of the country's road network and lack of all-weather roads in rural areas. To begin to address this problem an Integrated Roads Project (IRP) has been initiated to rehabilitate trunk and rural roads while putting in place policies that would facilitate regular maintenance. To date 16 donors have become involved in the IRP with commitments of $900 million.

USAID assistance has been the backbone of the rural roads component of the IRP. Currently there are five contractors, of which four are local private firms, rehabilitating 650 km. in Shinyanga, Mwanza and Kilimanjaro regions for an estimated total value of TShs. 3.7 billion ($16.2 million) of local currency funds. The purpose of this study is to examine the USAID Agricultural Transport Assistance Program (ATAP) by analyzing the cost, benefits and social impact of the Kanawa-Kalitu road in Shinyanga region. Benefits were calculated both as improved balance of payments through increased foreign exchange earnings and as increased income to villagers within the road's area of influence. Four surveys were carried out to indicate the road's impact on transport and travel, agriculture, commerce and social services.

Results of the economic analysis indicate that the Kanawa-Kalitu road rehabilitation is economically viable. Using a real economic rate of return of 12% p.a. without and with diverted traffic over a 15-year planning horizon, the net present values (NPVs) were Tshs. 255.09 million and Tshs. 305.97 million, respectively, at domestic prices. The internal rates of return (IRR) were 25 and 27%. Using world market prices the NPVs jumped to TShs. 546.73 and TShs. 591.31 without and with diverted traffic, producing IRRs of 33 and 35%. The results indicate that the rehabilitation of the Kanawa-Kalitu road made economic sense. Sensitivity analysis conducted by reducing the benefit flow by 20% or increasing cost by 20% still provided positive NPVs at a 12% p.a. rate of discount indicating strong viability of the project.

Impact surveys were conducted at schools, health centers, shops and in village households along the road. Almost half the villagers and over three-quarters of the shopkeepers interviewed stated the road has had some impact, even at this early stage. The greatest impact thus far has been on evacuation of crops (particularly cotton), transport and travel, and commerce. Some impact was noted on supply of inputs, farmgate prices and access to health services and hospital care. Relatively little impact has been felt in education, livestock marketing and access to water and firewood. The road has initially benefitted men and those financially better off rather than women and those with below average income. In order to measure full impact of the roads, a similar assessment should be carried out in late 1994.

Note: Rate of exchange used : US$1.00 = TShs. 230

INTRODUCTION

Tanzania has an area of 945,000 sq.kms with a widely dispersed, low density population of 25.2 million (26 persons per sq.km). Population growth is estimated at 2.8% per annum with both fertility and mortality at relatively high levels. About 42% of the total land area is devoted to agriculture. More than 80% of the population live in rural areas and are dependent directly or indirectly on agriculture. The agricultural sector accounts for 60% of the GDP, 90% of employment, and roughly 85% of the total foreign exchange earnings.

Within this essentially agricultural economy, the rural transport network plays an important role in the internal distribution and marketing of goods and services, particularly food and export crops. It is also essential to increase personal mobility of rural households. Further, rural transport is key to attracting investments to rural areas (for agricultural and non-agricultural activities). All these activities increase their demands for transport as economic development takes place.

The government's structural adjustment program which began in 1986 correctly identified the removal of the transport bottleneck as an important component of economic recovery. Tanzania's transport system which is comprised of over 82,000 km. of road network and two railway systems operating about 3,610 km. of track had seriously deteriorated because of lack of maintenance. This poor state of roads in particular constrained the efficient movement of goods and services in the economy.

In response, USAID initiated the African Economic Policy Reform Program (AEPRP) with a funding level of $12 million in FY 1987. The AEPRP was designed to assist the GOT in implementing the Economic Recovery Program (ERP) by supporting policy changes in the transport sector to eliminate constraints to increased agricultural production and marketing, particularly of export crops. This in turn was expected to increase Tanzania's foreign exchange earnings. In 1987 a Danish firm, Cowiconsult, carried out an Agricultural Feeder Roads Study which identified high priority rural roads for rehabilitation in seven regions. Cowiconsult's criteria for road selection were slanted toward increased production of export crops, the principal benefit being increased foreign exchange. USAID followed on to AEPRP with the Agricultural Transport Assistance Program (ATAP) in 1988 with an additional $ 7.2 million. In most respects AEPRP and ATAP were similar in that both supported ERP policy reforms to remove constraints to increased export crop production and marketing. However, as ATAP money was provided under the Development Fund for Africa with its emphasis on "people-level impact," the goal was expanded to include increased incomes and social welfare for the rural population. Additional amendments to ATAP have raised total commitments to $43.8 million through FY 1992.

AEPRP/ATAP cannot be viewed as simply a traditional roads project, except at its most elementary level. USAID provides dollar credit to the Bank of Tanzania which can be drawn upon by Tanzanians with shilling cash cover to import road construction equipment, vehicles and spare parts. The shillings generated are used by the GOT to award road rehabilitation and maintenance contracts. Even at this level, AEPRP/ATAP diverges from tradition in that rehabilitation and maintenance contracts are paid out in shillings, principally to local private firms. Success is measured by the number of kilometers rehabilitated and maintained.

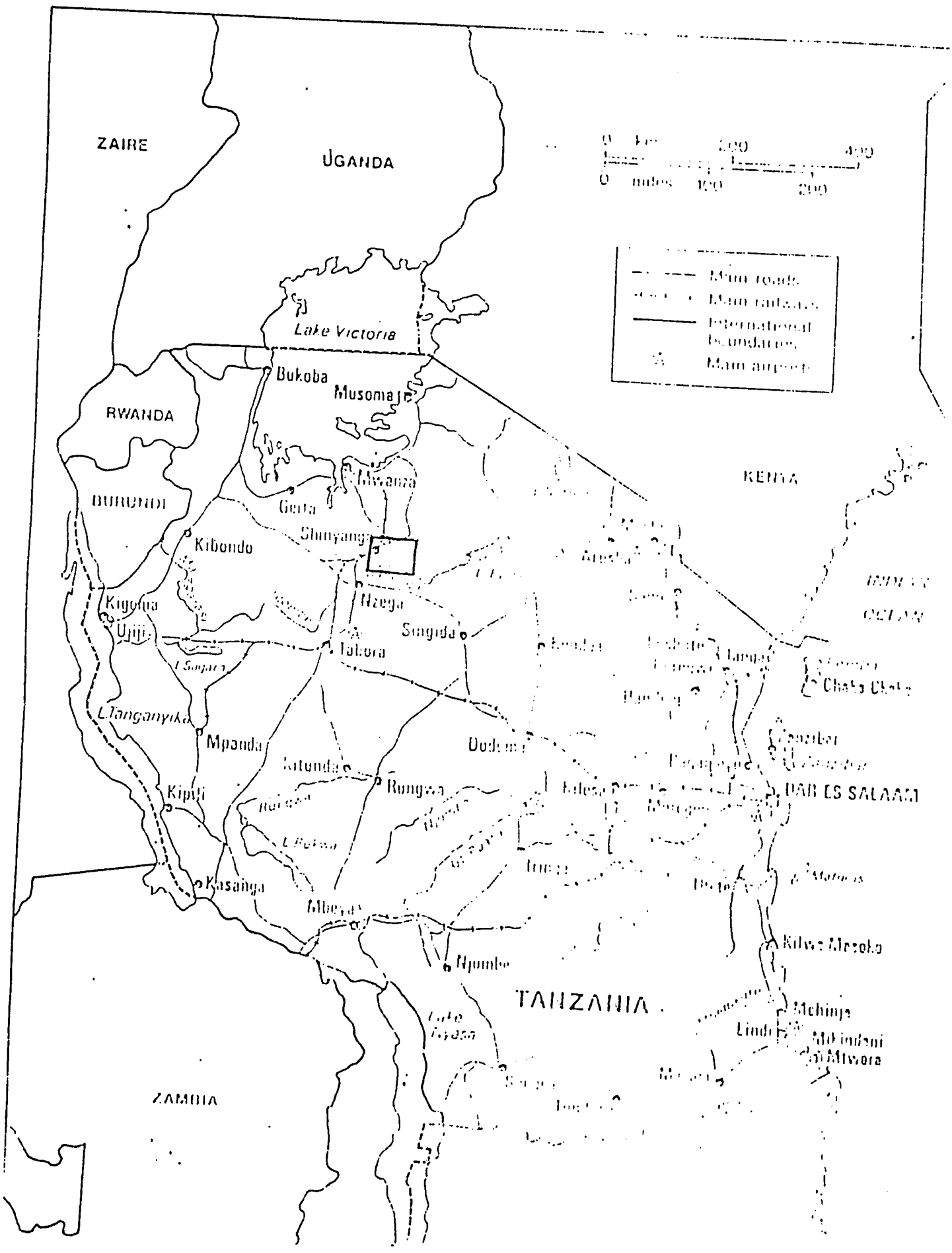
At the intermediate level, the purpose of AEPRP/ATAP is to establish a sustainable system for rehabilitating and maintaining roads involving elements of the public and private sectors. The key phrase "sustainable system" goes well beyond kilometers of roads, but rather with the GOT's capacity to plan, contract, supervise and monitor road works and its capacity to make available funds from its own revenues <u>over time</u>. This is measured by the number and volume of contracts awarded and by GOT budget allocations.

At its highest level, the goal of AEPRP/ATAP involves rural incomes and social welfare. In theory, the nation as a whole benefits from increased foreign exchange earnings. At the "people-level," the rural population along the improved roads benefit by increased incomes and social welfare. In theory, none of these various aims are mutually exclusive. However, in reality it is possible to rehabilitate roads without establishing a sustainable system; or accomplish both without increasing foreign exchange earnings; or succeed in all three without increasing rural incomes and social welfare.

This study analyzes the costs and benefits of rural road rehabilitation and indicates the people-level impact, by examining one road in Shinyanga region. It addresses the following questions:

- Can rural road rehabilitation and maintenance be justified in terms of foreign exchange earnings?
- Should increase in rural incomes also be considered in calculating benefits?
- Is road rehabilitation economically viable in light of recent cost escalations?
- Do rural roads have any perceptible people-level impacts?

Tanzania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Kigoma
Ujiji
Nzega
Singida
Tabora
L. Tanganyika
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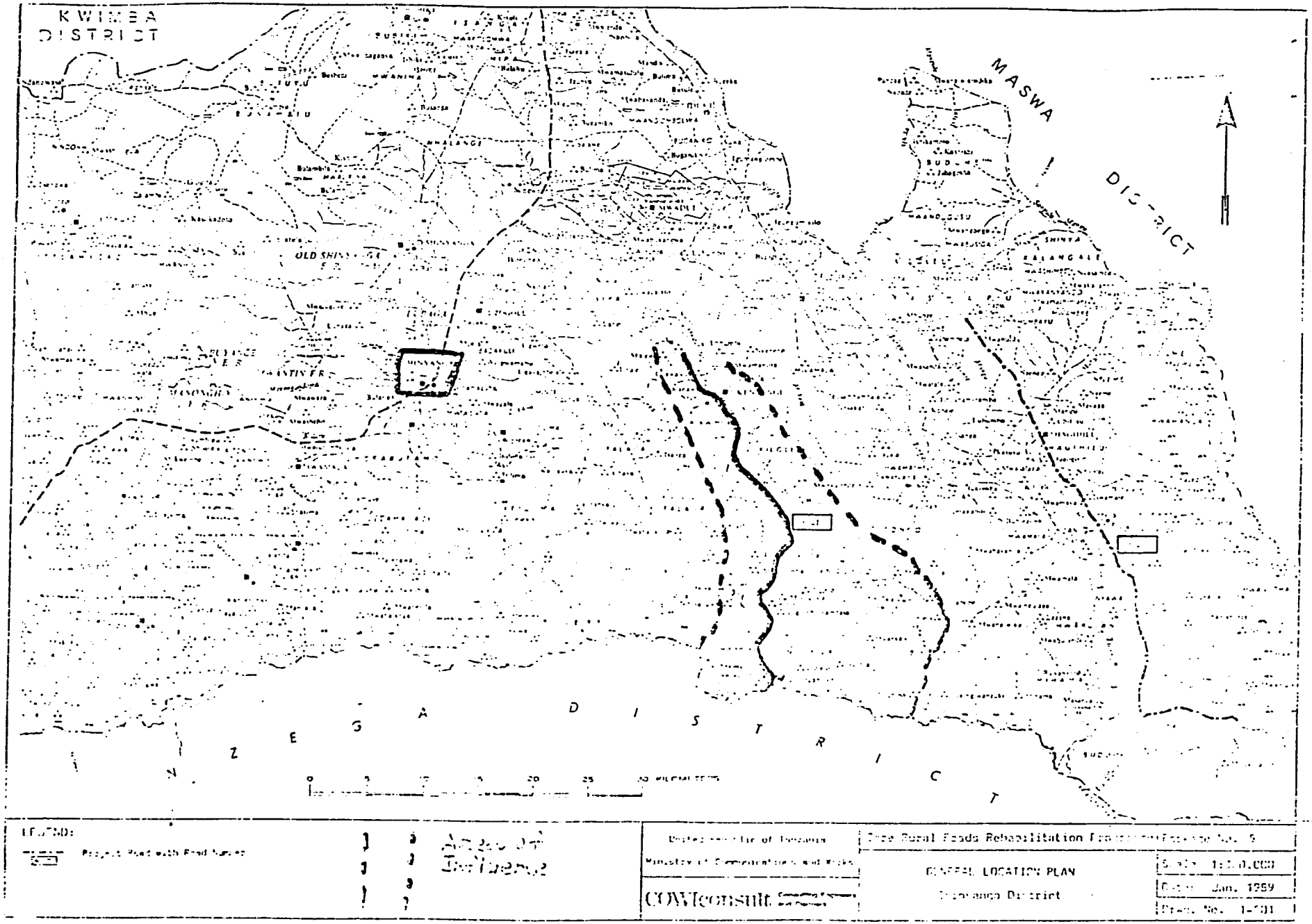
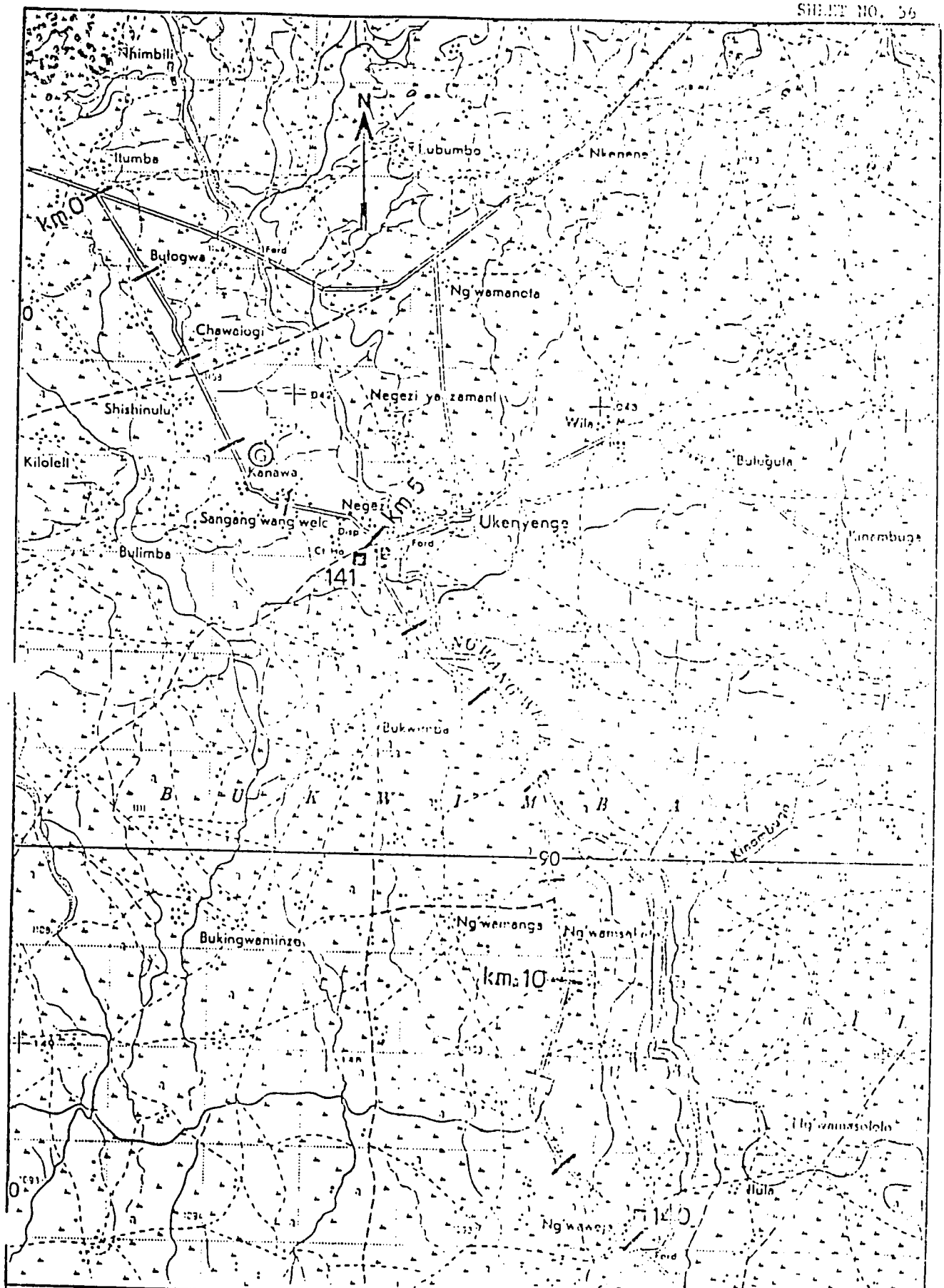


LEGEND: Project Road with Road Number	United Republic of Tanzania Ministry of Communications and Works COWIconsult	Lake Rural Feeds Rehabilitation Project Package No. 9 GENERAL LOCATION PLAN Shinyanga District
		Scale 1:1,000,000 Date Jan. 1989 Drwg. No. 1-701

4.



AGRICULTURAL FEEDER ROAD STUDY

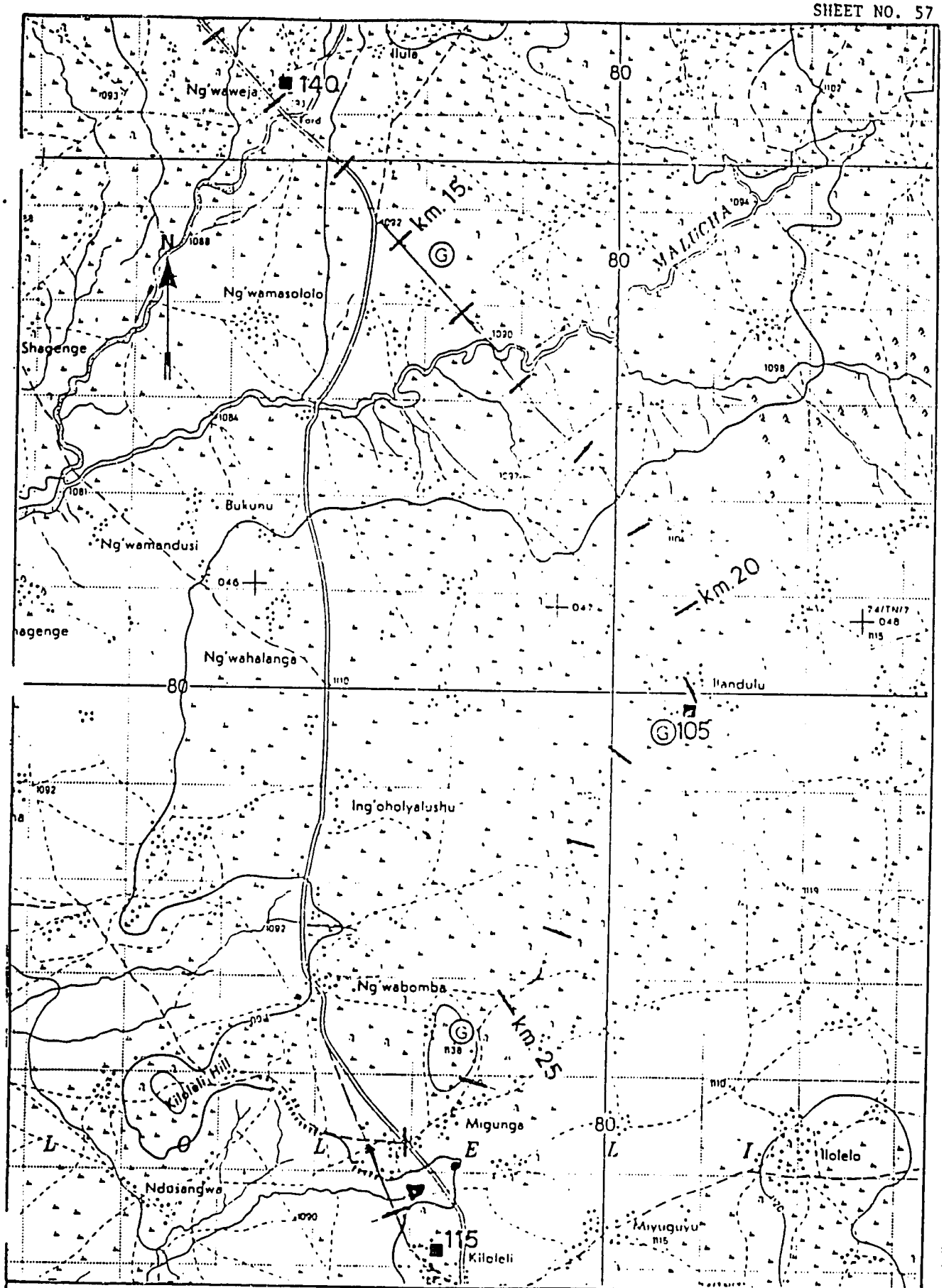
REGION : SHINYANGA

DISTRICT: SHINYANGA

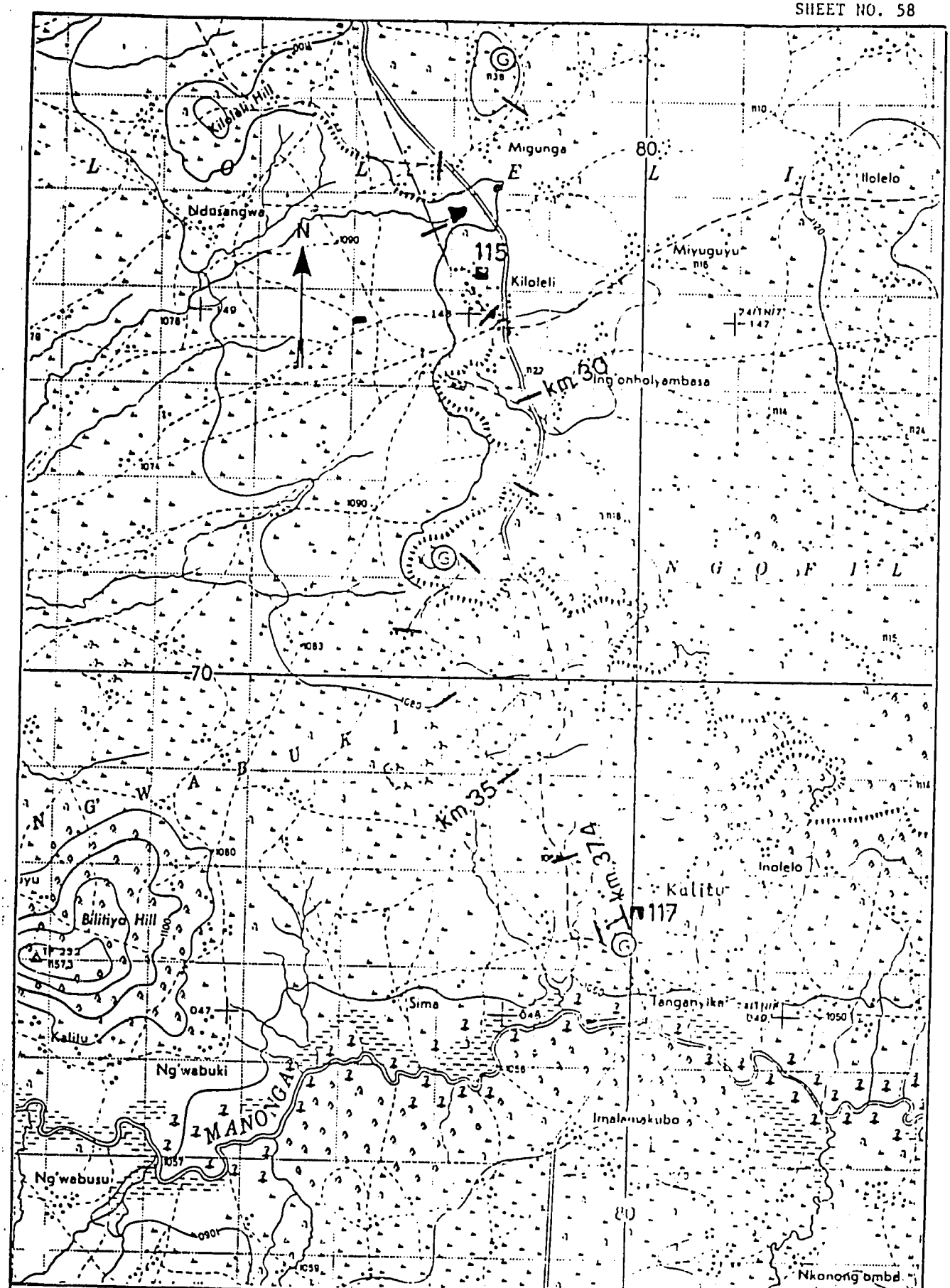
ROAD LOCATION MAP AT 1:50,000

ROAD NO : 9

FROM : km 0.0 TO : km 13.0



AGRICULTURAL FEEDER ROAD STUDY		ROAD LOCATION MAP AT 1:50,000	
REGION :	DISTRICT:	ROAD NO :	9
SHINYANGA	SHINYANGA	FROM : km 13.0	TO : km 27.0



AGRICULTURAL FEEDER ROAD STUDY

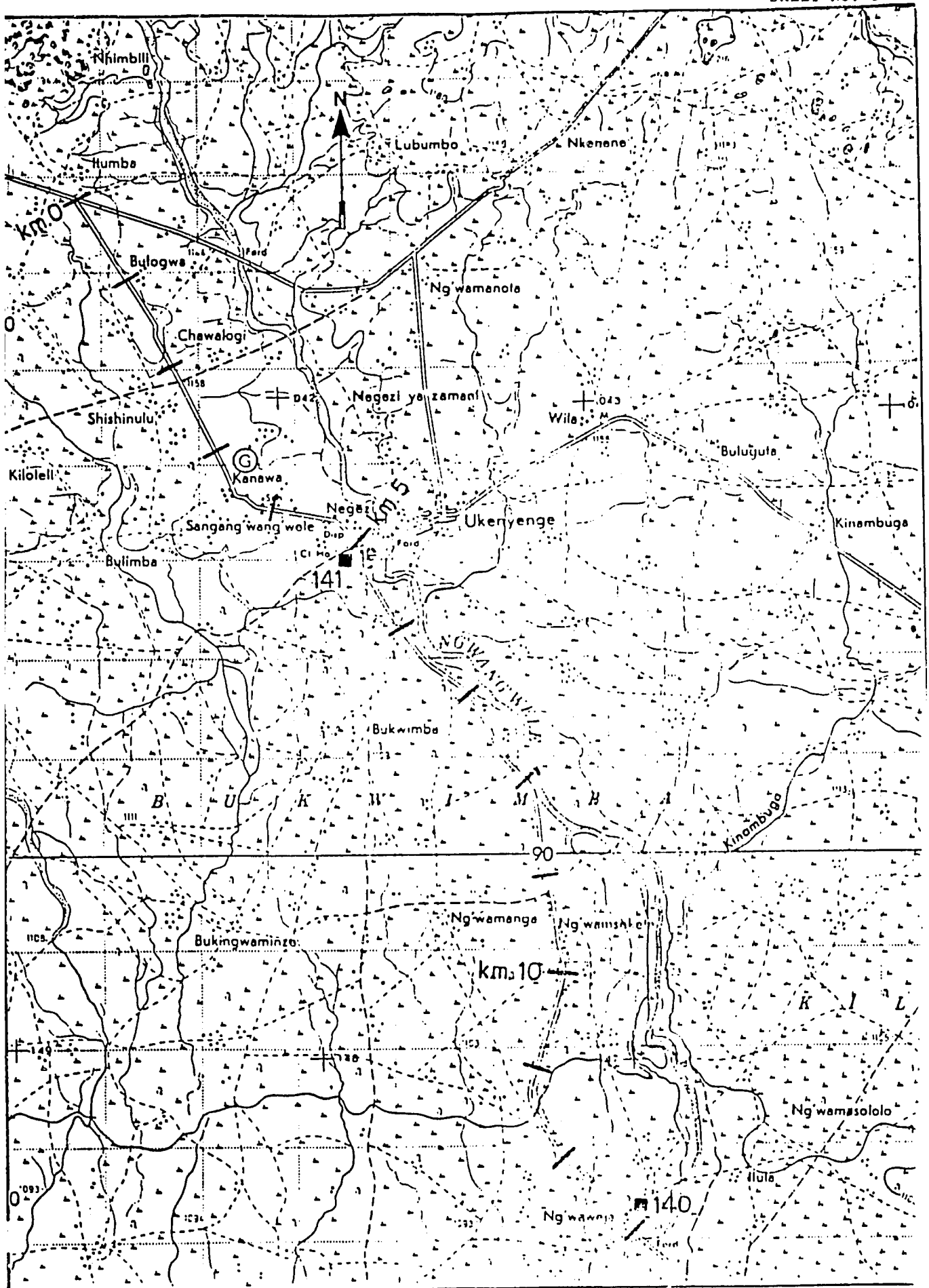
REGION : SHINYANGA

DISTRICT: SHINYANGA

ROAD LOCATION MAP AT 1:50,000

ROAD NO : 9

FROM : km 27.0 TO : km 37.4



AGRICULTURAL FEEDER ROAD STUDY		ROAD LOCATION MAP AT 1:50,000	
REGION : SHINYANGA	DISTRICT: SHINYANGA	ROAD NO :	
		FROM : km 0.0	TO : km 13.

SHINYANGA AND THE KANAWA-KALITU ROAD

Shinyanga region with a population of 1.8 million people is situated in north-central Tanzania. The total land area of the region is 50,764 square km. of which 61% is classified as suitable for agricultural production. Shinyanga is one of the five most productive regions in Tanzania. Of the 22 regions in the country, Shinyanga ranks second in export sales exceeding TShs. 1.6 billion ($6.9 million) per year. The region is the main cotton growing area in the country accounting for almost 40% of the total national production from 1987 to 1989. Other marketed production in Shinyanga includes maize, paddy, groundnuts, millet, sweet potatoes and cassava. Tne region is also a major supplier of slaughter livestock to Mwanza, Dodoma and Dar es Salaam.

As in most other regions in Tanzania, the road network in Shinyanga has deteriorated and is in need of repair and improvement. The region's road network has a total length of 3,861 km., classified as follows:

(i) national trunk roads (335 km.) which link Mwanza, Tabora and Singida towns;

(ii) regional gravel roads (570 km.) which link district centers;

(iii) district gravel roads (754 km.); and

(iv) minor access roads in largely cotton growing areas (2,202 km.).

The haulage of agricultural produce, farm inputs and consumer goods in the region is done by vehicles owned by private operators, Shinyanga Cooperative Union (SHIRECU), National Milling Corporation (NMC) and the Regional Trading Company (RTC). The vehicles owned by these operators have not met the demand for the large transport needs of the region. One sign of this inadequate supply of transport is the observed stocks of uncollected cotton and other crops from village buying posts. To take advantage of this excess demand, a parastatal by the name of Shinyanga RETCO is now in the final stages of registration and expects to start operation with 35 vehicles. The vehicle composition in Shinyanga is made up of 5-15 ton trucks, cars, pick-ups, buses, trailers and an above average number of bicycles. SHIRECU has 129 vehicles, Kagera-RETCO has 10, other parastatals own 60 and private operators own 270 vehicles.

The Kanawa-Kalitu roads runs through Negezi division of Shinyanga rural district. The road has an area of influence of approximately 400 sq. km. encompassing 14 villages with 22,709 people in 3,271 households or 6.9 persons per household. The population density of 56.7 persons per sq. km is double the national average. The area is semi-arid, receiving less than 600 mm (24 inches) of rain annually; it is badly deforested, overgrazed and not surprisingly

annually; it is badly deforested, overgrazed and not surprisingly suffers from soil erosion. On the surface, Negezi appears poor. The Baseline Survey of 1990 estimated household income in the area at Tshs. 31,000 or $22 per person which is about one-fifth of the national per capita GDP. However, appearances can be somewhat deceiving. The 14 villages within the Kanawa-Kalitu area of influence produced over 3600 tons of cotton in 1991 valued at $1.1 million. Each month at the Mhunze auction, about $100,000 worth of livestock changes hands. The area grew an estimated $1.9 million worth of food crops in 1991. (See Appendix A.)

The Kanawa-Kalitu road is located about 25 kms. east of Shinyanga town. It runs 37.4 km. north to south and terminates just short of the Manonga river which marks the boundary with Tabora region. Since rehabilitation got underway, the road is used as a short-cut to Shinyanga and Mwanza by traffic from as far away as Dar-es-Salaam. It cuts 65 km. from the journey and saves about two and a half hours of travel time. However because there is no bridge over the Manonga, the short-cut can only be used during the dry season. All inter-regional traffic must divert to the old route via Nzega between December and April.

The main center along the Kanawa-Kalitu road is 5 km. south of the junction at Negezi-Ukenyenge. It has a combined population of 4,300, is the division's administrative center, has the division's only bank, has over half of all the shops in the area, and has all of the division's motor vehicles including its one bus. The bus offers daily service to Igurubi on the Tabora side of the river, but operates only in the dry season. There is also daily bus service to Shinyanga all year round.

Donor involvement in Shinyanga includes the Dutch who have for many years assisted the cotton industry and are now rehabilitating 900 shallow wells they installed in the late 1970s and early 80s; OXFAM with activities centering on primary health care, youth groups and women; HASH (Hifadhi Ardhi Shinyanga) concentrating on soil conservation; and most particularly the UN's Join Consultative Group Program (JCGP), with a number of projects focusing specifically on Negezi and neighboring Kishapu Divisions. Activities include child survival, household food security, water and sanitation, afforestation, family planning and food-for-work. Other agencies have left development in Negezi to the UN's JCGP.

PART II

ECONOMIC EVALUATION

Introduction

This economic evaluation of rehabilitating the Kanawa-Kalitu road is a re-assessment of the pre-investment study conducted by CowiConsult. Their mandate was to provide ranking criteria based on sound economic analysis in order to prioritize rural roads to be rehabilitated. The roads selected would have to conform to the objectives of the government's Economic Recovery Program (ERP) in terms of having a positive impact on Tanzania's balance of payments whether through export earnings or through import substitution. CowiConsult therefore evaluated the benefits and costs using world market prices as an approximation to the economic value of additional produce generated from and resources used in the feeder road rehabilitation.

Using a 12% p.a. real economic rate of return over a 10-year benefit-cost analysis period, CowiConsult indicated that the Kanawa-Kalitu road was economically justified and viable. The project had an economic Internal Rate of Return (IRR) of 30.6% and an economic Net Present Value (NPV) of Tshs. 55,031,000 (US$866,900). Sensitivity analysis carried out by reducing the benefits by 20% or increasing the costs by 20% revealed that the Kanawa-Kalitu road would remain economically viable under these circumstances.

The present economic evaluation examines the benefit of rehabilitating the Kanawa-Kalitu road using two methods. In the first method, the project is evaluated taking into account Tanzania's Economic Recovery Program which emphasizes projects with a positive impact on the balance of payments. The second method emphasizes the net benefit to the beneficiaries of the project (farmers, truckers and consumers). In both cases, the road is evaluated as a self-contained project.

Estimation of Benefits Induced by Kanawa-Kalitu Road Rehabilitation

Benefits are estimated as the value of additional agricultural output and road user savings which are expected to be generated by the rehabilitation of the feeder road less the cost of this increased output. The basis for the estimates are the data for crop production from the 14 villages which comprise the Kanawa-Kalitu area of influence. This data is given in Appendix A. Forecasts were made independently for each crop taking into account likely increases in production due to expansion in land utilization and crop yield increases from improved use of chemical inputs and improved seeds.

Valuation of the estimated quantitative increase in agricultural output was done for cash crops as well as for food crops. World market prices were used to estimate the economic value of incremental agricultural production to emphasize the balance of payments effect.

The next step was to deduct the import value of major inputs needed to realize the increased production, that is, the import value of additional fertilizers, pesticides and transport.

Once this adjustment is made, the net benefits are compared against the cost of rehabilitation through means of calculating the economic Net Present Value (NPV).

A planning horizon of fifteen years was used in order to permit changes in attitudes particularly for the use of improved seeds and chemical inputs which take a long period before full adoption can take place.

Forecasting Increased Production

Forecasting the increased production induced by rehabilitation of the Kanawa-Kalitu feeder road involved the following steps:

- calculation of base year agricultural production;
- forecasting the likely increases in land utilization and crop yields in response to the road rehabilitation; and
- calculation of the forecasted increase in marketable production.

For purposes of this forecasting, it was noted that agricultural production is disposed of in three ways: subsistence for consumption by the farm household, sale for cash, and losses due to poor storage facilities, weather, etc, leading to the simple model:

Production = Subsistence + Sales + Losses.

Subsistence consumption primarily affects food crop production. Farmers normally set aside household food needs after harvest and only sell surplus food. With increased food demand in town centers, particularly from Shinyanga, Dar es Salaam and Mwanza, food crops are becoming increasingly sold for cash but this would not mitigate farmers setting aside food for subsistence.

Losses primarily affect the component of food crops farmers keep on the farm for subsistence consumption.

For purposes of measuring benefits, the FAO daily food requirement of 700 grams/person/day is increased to 800 grams/person/day, resulting in annual consumption in the area of influence of 6800 tons, leaving 3200 tons or 25% of total production marketable surplus in 1991. Subsistence consumption for cotton, which is the main cash crop is nil (farmers do not use cotton to make their own clothes or cooking oil).

The basic data for food crops were obtained from the District Agriculture Office while the data for cotton was obtained from the Shinyanga Cooperative Union (SHIRECU) which records all purchases of cotton in Shinyanga by village or primary society.

Sources of Increased Agricultural Production

This study starts with the hypothesis that the rehabilitation of the Kanawa-Kalitu road will lead to increased production of marketable agricultural produce. Two sources of this expansion are recognized:

- an increase in the farmers' willingness to expand production of crops for sale due to a more reliable evacuation system; and

- an increase in the farmers' possibility of expanding production due to more reliable supply of inputs such as fertilizers, pesticides, improved seeds and other farm inputs.

A partially off-setting effect is that subsistence consumption will expand with population growth, thus reducing part of the marketable surplus. This effect would, however, affect agricultural surplus even if the feeder road was not rehabilitated, and thus does not influence net benefits if population growth is assumed to be independent of agricultural development.

Farmers' willingness to produce more crops for sale in response to feeder road rehabilitation is based on the observation that farmers react by reducing output, eventually to subsistence level, when faced with an inadequate evacuation system which is capable of absorbing only part of the production offered for sale. It is expected that rehabilitation of the feeder road will lead to all-weather access to the areas served by the road and generally remove obstacles to transportation and increase the capacity and reliability of the evacuation system. These improvements will at the same time support the farmers by providing for a more reliable supply of farm inputs such as timely delivery of fertilizers and improved seeds, thereby further improving the prospects for increased production. The realization of these benefits rests on the assumption that bottlenecks further along the marketing chain such as ginning capacity and storage do not obstruct the expected achievements.

Calculations for the expected long-term expansion of production were prepared on the basis of the collected crop production and sales data and projections for the likely expansion rates for land utilization and yields for each crop in each village within the Kanawa-Kalitu area of influence (14 villages). The expansion rates have been calculated based on a wide variety of reports and other

material obtained from the district agriculture office, Ministry of Agriculture and Livestock Development, Marketing Development Bureau and supplemented by observations during the field study in December 1991.

Valuation of Agricultural Produce

Valuation of agricultural produce for the method which emphasizes improvement in the balance of payments was made by applying world market prices to the forecasted increase in production volume. The average world market prices used in this study were actual for 1970-90 and projections between 1991-2005 made by the World Bank in July 1991. Figure 1 shows the World market prices and projections.

For other crops such as millet, groundnuts, cassava and sweet potatoes where world market prices were not listed, the world market price was assumed to equal that of the lowest priced commodity, i.e. sorghum, with an average of 100 US dollars per ton. This minimum pricing was taken to avoid overvaluation in the study.

The world market prices, as determined at the border by the World Bank, are converted to Tanzanian shillings at the exchange rate of Tshs.230 to one U.S. dollar and then applied to the expected increase in production volume. Parallel rates (currently Tshs. 400 to US$ 1.00) would exaggerate benefits beyond what the country actually gets.

In the case of cotton and paddy, an adjustment for extraction rates is necessary. Three tons of seed cotton are needed to produce one ton of raw cotton, while 1.5 tons of paddy is needed to produce one ton of rice.

The final world market prices derived from the above-mentioned World Bank study and converted to shillings are as follows:

Commodity	World Market Price (1991 price) 1000 Tshs/ton
Cotton	406.5
Maize	26.8
Rice	70.6
Sorghum	25.4
Millet	25.4
Groundnuts	25.4
Cassava	25.4
Sweet potatoes	25.4

Estimation of Cost of Additional Inputs

In calculating the cost of additional inputs only imports were considered. As such, the cost of additional inputs was limited primarily to fertilizers, pesticides and energy consumption of tractors, mills, etc. Several sources of data were used:

- Tanzania Cotton Marketing Board
- Marketing Development Bureau
- Shinyanga Cooperative Union (SHIRECU); and
- Knud Odegaard's "Cash Crop Vs Food crop production in Tanzania," 1985.

Due to the observation that a very small amount of food crops are exported and only a negligible amount of imported inputs such as fertilizers and pesticides are used in their cultivation, it was decided to exclude food crops in the estimation of induced benefits using world market prices.

A simple causal relationship between the cost of additional inputs and world market prices was found and the following percentages were established:

Commodity	Imported Input costs as a % of World Market price
Cotton	20
Maize	10
Rice	10
Sorghum	5
Other food crops	5

For purposes of simplicity, these percentages were assumed to hold regardless of the individual level of crop productivity.

Commodity	Production (tons)	World Market price* (1000Tshs/Ton	Value (1000 Tshs.)
Cotton	3192.4	325.20	1038168.4
Maize	1369.0	24.12	33020.3
Rice	249.3	63.54	15840.5
Sorghum	2142.7	24.13	51703.4
Millet	600.3	24.13	14485.2
Groundnuts	754.1	24.13	18196.4
Cassava	179.7	24.13	89594.7
Sweet potatoes	3713.0	24.13	89594.7

*Net of imported input costs.

Estimation of Road User Savings

Road user savings were based on a detailed analysis of vehicle operating costs (VOC) of Shinyanga Cooperative Union (SHIRECU) and private vehicles conducted by J.H. Van Essen in Shinyanga for the Dutch Cotton Assistance Project in April 1991. The basic data are summarized in Appendix B.

Under the existing condition of the Kanawa-Kalitu road without any improvement, the average VOC per kilometer per day was determined by Essen to be Tshs. 375 or US$1.6 at Tshs. 230 per dollar (Table 3). With the rehabilitation of the road, the VOC would be reduced by 37.7% to Tshs. 233.6 (US$1.0) per kilometer (Table 4). These

large savings due to the lower need for spare parts for repair of vehicles, slower wear of tires, and less fuel consumption because of improved speed on the road, translate over the 15-year period to over Tshs. 600 million (US$2.6 million) in savings with diverted traffic and to Tshs. 500 million with normal traffic (Table 6). The growth model used to derive these savings is explained below. We have included diverted traffic specifically because during our December 1991 survey on the Kanawa-Kalitu road, some vehicle operators moving from Dar es Salaam to Mwanza and vice versa had begun to use this road to take advantage of both the shorter route and improved condition.

Design, Initial Rehabilitation and Supervision Cost

Actual costs obtained through competitive bidding for design, initial rehabilitation and supervision were used in the evaluation of the Kanawa-Kalitu road. The design cost for the 37.4 km road was Tshs. 1.93 million (US$8,392). Rehabilitation costs were Tshs. 237.6 million (US$1,033,140). The supervision cost was Tshs. 15.0 million (US$65,353).

Regular and Periodic Maintenance

The regular and periodic maintenance costs were derived from existing Ministry of Works (MOW) budgets. Through analysis conducted by MOW road engineers, regular maintenance would cost Tshs. 92,246 (US$400) per kilometer per year. Periodic maintenance would be done after every five years to conform to MOW program guidance at about Tshs. 2.3 million (US$10,000) per kilometer. The analysis in this study assumed these costs would hold in the first five years of the program and would increase 20% for the next five years and increase another 30% for the remainder of the analysis period using domestic prices (Table 6.) To more realistically assess costs using world market prices, maintenance costs were increased 20% over base year figures through 1996, 40% through 2001, and 50% through 2005 (Table 7).

Project Benefit Aggregation

The present value of benefits of the Kanawa-Kalitu road is the sum of the annual benefits (road user savings and induced benefits) from 1992 to 2005 (assuming that 1991 is taken by the rehabilitation and generates no benefits), discounted back to the beginning of the 15 year evaluation period. A discount rate of 12% was chosen as reflecting the opportunity cost of capital. This rate is recommended by MOW for use in road project evaluation and is the most generally used rate by the World Bank and IDA for road projects. This project was evaluated using a 12% and 20% rate of discount.

To determine the growth trend of the road user savings and the induced benefits from their base level, a "sum-of-the-years" digits model was adopted for purposes of interpolating the benefits. This is considered, in the opinion of the consultants' observations, to accord more closely than a linear, compound or other standard growth trend, to the rural road improvement situation with the investment stimulating an early and fairly high growth in induced benefits and road user savings, levelling off in the later stages of the evaluation period. The new benefits arising in successive years of a 15-year period (ignoring the first year of rehabilitation), would, expressed as fractions of the year 15 benefits, according to the formula:

Year:	1	2	3	. . .	14	15
Fraction:	15/120	14/120	13/120		2/120	1/120

where 120 is the sum of the years when numbered from 1 to 15. Thus for example, using world market prices, the induced benefits in the final year (2005) were estimated to be Tshs. 221 million, then induced benefits in the first year (1992) would be 221 million x 15/120 = 27 million, in the following year (1993), 27 + 221 million x 14/120 = 53 million, etc. This method was used for both the road-user savings and induced benefits (Table 6 and 7).

Economic Analysis

Cash flows are shown in Table 6 and 7. Economic Net Present Value (NPV) and economic Internal Rate of Return (IRR) are computed for a 12% and 20% per annum opportunity cost of capital. The results using domestic prices (Table 6) and world market prices (Table 7) indicate that the Kanawa-Kalitu road rehabilitation is justified by both methods and economic criteria. At domestic prices, the NPV at 12% without diverted traffic is Tshs. 255 million (US$1.1 million) and Tshs. 305.97 million (US$1.3 million) with diverted traffic. The IRR without diverted traffic is 25% and with diverted traffic 27%. These results clearly indicate that the benefits to the beneficiaries (farmers, truckers and consumers) justify the costs of rehabilitating and maintaining the Kanawa-Kalitu road.

Evaluation of the Kanawa-Kalitu road using world market prices to reflect the emphasis on the improvement of balance of payments revealed that the project was equally justified. The NPV at 12% without diverted traffic is Tshs. 546 million (US$2.3 million) and Tshs. 591 million (US$2.5 million) with diverted traffic. The IRR is 33% without diverted traffic and 35% with diverted traffic. These results are a considerable improvement over those obtained using domestic prices, in part reflecting the observation that the shilling is still overvalued and may have to be depreciated further to improve economy-wide resource allocation.

Evaluation of the Kanawa-kalitu road using a 20% opportunity cost

of capital revealed that the road would remain justified for rehabilitation.

Sensitivity Analysis for the Economic Evaluation

Three tests were made to find out the sensitivity of our assumptions to the results obtained and the viability of the Kanawa-Kalitu road:

(i) An increase in all costs by 20%;

(ii) A reduction of road user savings and induced benefits by 20%; and

(iii) An increase in all costs by 10% combined with a reduction of all benefits by 20%.

The results of these sensitivity analyses are presented in Tables 8A and 8B. At domestic prices (Table 8A) and using a discount rate of 12%, an increase in all costs by 20% reduces the NPV for the without diverted traffic option by 23% to Tshs. 195.9 million (US$851,739) and with diverted traffic by 21% to Tshs. 240.8 million (US$1.0 million). The IRR are 21% and 22%, respectively, for without and with diverted traffic to the Kanawa-Kalitu road. Similarly, reducing all benefits by 20% leads to a NPV of Tshs. 158.7 million (US$690,000) and Tshs. 198.8 million, respectively, for the without and with diverted traffic.

Further, reducing all benefits by 20% combined with a 10% increase in all costs results in an NPV of Tshs. 87.2 million (US$378,260) and Tshs. 123.1 million (US$534,782) for the without and with diverted traffic, respectively. These results indicate a strong viability of the project.

At World market prices (Table 8B), the results of the sensitivity analysis are even better. At 12% rate of discount, increasing all costs by 20% leads to NPVs of Tshs. 472 million (US$2.0 million) and Tshs. 518 million (US$2.2 million) for the without and with diverted traffic respectively. Reducing all benefits by 20% results in NPVs of Tshs. 397.9 million (US$ 1.7 million) and Tshs. 422.9 million (US$ 1.8 million) for the without and with diverted traffic, respectively. Similarly, raising all costs by 10% combined with a reduction of all benefits by 20% results in NPVs of Tshs. 277.6 million (US$1.2 million) and Tshs. 312.8 million (US$1.3 million), for the without and with diverted traffic, respectively. In all these options, the minimum IRR calculated is 24% for the option where all costs are increased by 10% and benefits reduced by 20%. These results, like those obtained using domestic market prices, indicate a strong viability of the Kanawa-Kalitu road.

Thus, in conclusion, there is a high degree of certainty that the

rehabilitation of the Kanawa-Kalitu road is justified on economic grounds.

TABLE 1: ESTIMATED CROP PRODUCTION AND VALUE IN KANAWA–KALITU AREA OF INFLUENCE (1989–1991)

CROPS	1989			1990			1991			AVERAGE		
	TONS	TSHS'000	US $'000	TONS	TSHS'000	US $'000	TONS	TSHS'000	US $'000	TONS	TSHS'000	US $'000
COTTON	2,036.1	57,010.8	417.8	3,908.9	160,264.9	830.5	3,632.1	254,246.0	1,111.1	3,192.4	157,173.9	786.5
MAIZE	1,561.0	17,171.0	125.8	1,153.0	14,989.0	77.7	1,393.0	41,790.0	182.6	1,369.0	24,650.0	128.7
CASSAVA	229.0	1,248.0	9.1	142.0	852.0	4.4	168.0	4,704.0	20.6	179.7	2,268.0	11.4
MILLET	769.0	5,959.7	43.7	486.0	3,888.0	20.1	546.0	21,840.0	95.4	600.3	10,562.6	53.1
SORGHUM	2,375.0	17,218.7	126.2	1,942.0	15,536.0	80.5	2,111.0	84,440.0	369.0	2,142.7	39,064.9	191.9
PADDY	393.0	7,467.0	54.7	371.0	9,646.0	50.0	358.0	11,098.0	48.5	374.0	9,403.7	51.1
GROUNDNUTS	874.0	148,580.0	1,088.7	646.0	82,042.0	425.2	744.0	118,296.0	517.0	754.7	116,306.0	677.0
SWEET–POTATOES	3,968.0	107,136.0	785.1	744.0	118,296.0	613.0	11,139.0	387,174.0	1,692.0	5,283.7	204,202.0	1,030.0
TOTAL	12,205.1	361,791.2	2,651.1	9,392.9	405,513.9	2,101.4	20,091.1	923,588.0	4,036.3	13,896.4	563,631.0	2,929.6

SOURCE: SHIRECU, MHUNZE GINNERY FOR COTTON AND SHINYANGA DISTRICT AGRICULTURE OFFICE FOR FOOD CROPS

NOTE:
1989 EXCH. RATE – $1 = TSHS 136.47 (JUNE)
1990 EXCH. RATE – $1 = TSHS 192.97 (JUNE)
1991 EXCH. RATE – $1 = TSHS 228.82 (JUNE)

TABLE 2A

INDUCED BENEFITS OF THE KANAWA–KALITU ROAD PROGRAM AT DOMESTIC PRICES

	Average yearly marketable production (base, 1989–91 average)**	Without project average yearly marketable production (normal growth)		With project average yearly marketable production		Induced benefits average per year
	(Tshs. Mn)	(Tshs. Mn)	(% Growth)	(Tshs.Mn)	(% Growth)	(Tshs. Mn)
Cotton*	157.17	162.67	3.5	196.46	25.0	33.79
Sorghum	9.77	10.13	3.7	10.70	9.5	0.57
Millet	2.64	2.71	2.7	2.83	7.4	0.12
Paddy	1.98	2.09	5.5	2.47	25.0	0.38
Groundnuts	29.08	31.37	7.9	33.15	14.0	1.78
Cassava	0.51	0.53	4.0	0.54	6.6	0.01
Sweet potatoes	32.26	32.93	2.1	37.10	15.0	4.17
Maize	6.16	6.44	4.6	6.96	13.0	0.52
TOTAL	239.57	248.87		290.21		41.34

*Marketing Development Bureau explanation for the expected high increase in cotton output is based on four observations: improvement in the transport system, improvement in ginning and trucking capacity, improvement in production techniques through extension service, and a more than 46% increase in producer prices during the 1990/91 season.

**For food crops marketable production is assumed to be one quarter of total production only (See text).

TABLE 2B: INDUCED BENEFITS OF THE KANAWA–KALITU ROAD PROGRAM AT WORLD MARKET PRICES

	Average yearly marketable production (base, 1989–91 average)*	Without project average yearly marketable production (normal growth)		With project average yearly marketable production		Induced benefits average per year
	(Tshs. Mn)	(Tshs. Mn)	(% Growth)	(Tshs. Mn)	(% Growth)	(Tshs. Mn)
Cotton	1,038.20	1,074.54	3.5	1,297.75	25.0	223.21

* For food crops, marketed production has been excluded from the induced benefit calculation at world market prices because these are not exported and their influence on the balance of payments is negligible.

TABLE 3: ECONOMIC VEHICLE OPERATING COSTS
(Costs net of taxes)
Type of Surface: EXISTING

	WITHOUT PROJECT (TShs/km)							
VEHICLE GROUP	FUEL	LUBRI-CANTS	SPARE PARTS	MAINTE-NANCE LABOUR	TYRES	DEPREC-IATION	OVERHEAD COST*	TOTAL
CAR	28.40	1.39	94.68	16.60	11.69	37.57	5.10	195.43
PICKUP	30.70	1.50	155.92	27.50	63.79	28.72	5.10	313.23
7-TON TRUCK	61.40	3.01	154.41	30.50	70.97	66.13	5.61	392.03
10-TON TRUCK	61.40	3.01	154.41	36.40	67.97	119.07	5.61	447.87
TRACTOR - TRAILER	86.30	4.26	187.11	33.00	102.04	105.21	6.12	524.04
BUS	61.40	3.01	154.41	30.50	56.61	66.13	5.61	377.67
AVERAGE ECONOMIC VEHICLE OPERATING COSTS								375.5

*Time value of year-round use and time value of cargo

TABLE 4

ECONOMIC VEHICLE OPERATING COSTS
(Costs net of taxes)
TYPE OF SURFACE: GRAVEL

WITH PROJECT (TShs/km)

VEHICLE GROUP	FUEL	LUBRI-CANTS	SPARE PARTS	MAINTE-NANCE LABOUR	TYRES	DEPREC-IATION	OVERHEAD *COST	TOTAL
CAR	26.41	1.39	35.03	8.00	5.03	30.06	3.37	109.29
PICKUP	28.24	1.50	57.69	14.57	27.43	21.16	3.98	154.57
7-TON TRUCK	58.94	3.01	58.67	16.16	52.52	54.89	4.09	248.28
10-TON TRUCK	58.94	3.01	57.13	19.29	50.30	101.21	4.09	293.97
TRACTOR - TRAILER	84.57	4.26	84.20	17.49	76.53	87.32	4.77	359.14
BUS	58.94	3.01	57.13	16.16	47.55	49.00	4.09	236.48

AVERAGE ECONOMIC VEHICLE OPERATING COSTS 233.62

* Time value of year-round use and time value of cargo

TABLE 5:

ROAD REHABILITATION USER BENEFITS, 1992 – 2005
(Savings based on vehicle operating costs net of taxes)

Road Section: KANAWA–KALITU
Road distance: 37.4 kms

	Without Project (Tshs. mn)	With Project (Tshs. mn)	Road user Savings (Tshs. mn)	Undiscounted Road User Savings per year (Tshs. mn)	Undiscounted road user savings over 15 years ** (at domestic prices)	Undiscounted road user savings over 15 years (at world Prices)
Annual VOC, Normal Traffic	5.02	3.19	1.83	18.30	511.0	563.0
Annual VOC, with Diverted Traffic*	6.02	3.67	2.35	23.50	660.0	693.0

*Assumes a 28% increase in normal traffic. During the survey, it was found out that some vehicles from villages as far off as Mamanota, and Shagihilu had began to use this road. Additional traffic came from vehicles moving from Dar to Mwanza taking advantage of both the shorter route and improved road condition.

**Assumes traffic volume would have almost doubled on the Kanawa–Kalitu road by year 15.

TABLE 6: ECONOMIC EVALUATION OF THE BENEFITS OF KANAWA–KALITU ROAD REHABILITATION

At domestic prices

All costs and benefits in Tshs. million net of taxes

	Design Cost	Initial Rehabili–tation cost	Supervi–sion cost	Regular and periodic maintenance	Road user savings (Normal traffic)	Road user savings (with diverted traffic)	Induced Benefits	Net economic benefits	
								Without diverted traffic	With diverted traffic
1991	(1.93)	(237.60)	(15.00)				–	(254.53)	(254.53)
1992	–	–	–	(3.45)	6.86	8.81	15.50	18.91	20.86
1993	–	–	–	(3.45)	13.26	17.03	29.97	39.78	43.55
1994	–	–	–	(3.45)	19.22	24.67	43.40	59.17	64.62
1995	–	–	–	(3.45)	24.71	31.72	55.60	76.86	83.87
1996	–	–	–	(85.79)	29.28	38.19	67.17	10.66	19.57
1997	–	–	–	(4.14)	34.31	44.06	77.50	107.67	117.43
1998	–	–	–	(4.14)	38.43	49.35	86.80	121.09	132.01
1999	–	–	–	(4.14)	42.09	54.04	95.07	133.02	144.97
2000	–	–	–	(4.14)	45.29	58.16	102.30	143.45	156.32
2001	–	–	–	(102.94)	48.04	61.68	108.50	53.60	67.24
2002	–	–	–	(4.55)	50.32	64.62	113.67	159.44	173.74
2003	–	–	–	(4.55)	52.16	67.56	117.80	165.41	180.81
2004	–	–	–	(4.55)	53.52	69.91	120.90	169.87	186.26
2005	–	–	–	(4.55)	54.44	70.50	122.96	172.85	188.91
TOTAL	(1.93)	(237.60)	(15.00)	(237.29)	511.93	660.30	1,157.14	1,177.25	1,325.63
NPV(12%)								255.09	305.97
NPV(20%)								59.2	88.02
IRR								0.25	0.27

TABLE 7

ECONOMIC EVALUATION OF THE BENEFITS OF KANAWA–KALITU ROAD REHABILITATION

At world market prices*

All costs and benefits in TShs. million net of taxes

	Design Cost	Initial Rehabili–tation cost	Superv–sion cost	Regular and periodic mainte–nance	Road user savings (Normal traffic)	Road user savings (with diverted traffic)	Induced Benefits	Net economic benefits	
								Without diverted traffic	With diverted traffic
1991	(2.12)	(261.36)	(16.50)			–	–	(279.98)	(279.98)
1992	–	–	–	(4.48)	7.54	9.25	27.90	30.96	32.67
1993	–	–	–	(4.48)	14.58	17.88	53.94	64.04	67.34
1994	–	–	–	(4.48)	21.14	25.90	78.12	94.78	99.54
1995	–	–	–	(4.48)	27.18	33.31	100.44	123.14	129.27
1996	–	–	–	(111.52)	32.20	40.09	120.90	41.58	49.47
1997	–	–	–	4.83	37.74	46.26	139.50	172.41	180.93
1998	–	–	–	(4.83)	42.27	51.81	156.24	193.68	203.22
1999	–	–	–	(4.83)	46.29	56.74	171.13	212.59	223.04
2000	–	–	–	(4.83)	49.82	61.06	184.14	229.13	240.37
2001	–	–	–	(120.10)	52.84	64.76	195.30	128.04	139.96
2002	–	–	–	(5.30)	55.35	67.85	204.61	254.66	267.16
2003	–	–	–	(5.30)	57.38	70.93	212.05	264.13	277.68
2004	–	–	–	(5.30)	58.98	73.40	217.62	271.30	285.72
2005	–	–	–	(5.30)	59.88	74.02	221.34	275.92	290.06
TOTAL	(2.12)	(261.36)	(16.50)	(280.40)	563.19	693.26	2,083.23	2,076.38	2,206.45
NPV(12%)								546.73	591.31
NPV(20%)								215.25	240.50
IRR								0.33	0.35

*All costs design, initial rehabilitation and supervision have been raised by 10% to reflect over–valuation of the shilling. Periodic and regular maintenance have also been raised by 30% to account for the overvaluation of the shilling in addition to those adjustments explained in the text.

TABLE 8A

Sensitivity Analysis for economic evaluation
Road Section: Kanawa – Kalitu
At domestic prices

	Without diverted traffic			With diverted traffic		
	NPV at 12% (Tshs. mn)	NPV at 20% (Tshs mn)	IRR %	NPV at 12% (Tshs mn)	NPV at 20% (Tshs mn)	IRR %
(1) Base Case	255.00	59.20	25	305.90	88.00	27
(2) All costs of Rehabilitation, design supervision and maintenance increased by 20%	195.90	9.20	21	240.80	34.00	22
(3) Both road user savings and induced benefits reduced by 20%	158.70	5.30	20	198.80	28.00	22
(4) All costs increased by 10% and all benefits reduced by 20%	87.24	(43.50)	17	123.10	(23.30)	18

TABLE 8B

Sensitivity Analysis for economic evaluation
Road Section: Kanawa – Kalitu
At World Market Prices

	Without diverted traffic			With diverted traffic		
	NPV at 12% (Tshs. mn)	NPV at 20% (Tshs mn)	IRR %	NPV at 12% (Tshs mn)	NPV at 20% (Tshs mn)	IRR %
(1) Base Case	547.70	215.20	33	591.30	240.50	35
(2) All costs of Rehabilitation, design supervision and maintenance increased by 20%	472.50	153.90	26	518.20	179.90	30
(3) Both road user savings and induced benefits reduced by 20%	397.90	129.70	28	422.90	145.70	30
(4) All costs increased by 10% and all benefits reduced by 20%	277.60	55.10	24	312.80	74.30	25

PART III
IMPACT ASSESSMENT

METHODOLOGY

Four surveys were conducted in November and December 1991 along the Kanawa-Kalitu road to assess impact on health, education, commerce, social services, transportation and agriculture. Both health clinics on the road were surveyed, four out of six schools, nine out of eighteen shops, and 34 households in three villages. Results of these surveys are summarized in tables attached to this section and will be referred to throughout the narrative. Of the 34 respondents in the village survey, 18 were male and 16 female. Ages ranged from 19 to 76. Using local parameters regarding acreage cultivated and livestock owned, some rough and ready income groups were arrived at: 7 of the respondents fit in the above average income group, 13 in the average group and 14 in the below average group.

None of those interviewed were told that the surveys concerned road impact; in fact the surveyors purposely did not mention the road unless the respondents brought up the subject, or until the very end of the interview. Rather the villagers, shopkeepers, teachers and medical aids were asked to compare conditions in 1989 (before road rehabilitation started) with current conditions. Answers were taken at face value; no attempt was made to verify the accuracy of responses given.

It should be stated that the surveys mainly indicate, rather than precisely measure, road impact. Some respondents gave contradictory answers; some quite consciously provided incorrect information. For instance, it must be assumed that shopkeepers understated their daily sales; some, if not many, herders understated their number of livestock; almost everyone understated their income. Few villagers were able to analyze why conditions had changed for the better or worse or why they had remained the same.

Nonetheless, a picture does emerge from the surveys even at this early stage in the road's existence. Just under half, 16 of 34 villagers, thought the road has had some sort of positive impact on conditions. There were more answers stating conditions had improved than conditions had worsened, which should be seen as very positive in a country which has experienced a fairly steady decline for the better part of two decades. Certainly for shopkeepers, regardless of what they say for the record, business has never been better. Shinyanga wholesalers who supply the retailers along the road claim increases in volume of goods of 50-300% in the past two years. It is difficult to isolate road impact from other factors affecting rural conditions. Cotton production in the 14 villages has risen from 2000 tons in 1989 to 3600 tons in 1991. The road has played a role in this increase but so has producer prices and the weather. Business activities are booming, partially due to the improved road and partially due to the government's liberalization policy. Nonetheless, the surveys indicate that the improved road,

coupled with other factors, has had a positive impact on development and on people's lives.

ASSESSMENT OF IMPACT

The improved Kanawa-Kalitu road is not yet finished, however many sections have been in use for about a year. Full impact of the road will not become evident for several more years. Immediate impact has been observed in the areas of transportation, crop evacuation, supply of agricultural inputs and consumer goods, and access to health care. Much less or very little impact has been made on education, access to water and fuel, and livestock marketing.

A. TRANSPORTATION

Traffic decreases dramatically along the Kanawa-Kalitu road between December and April, at which time it begins to rise with a peak between July and October when the cotton crop is hauled to Mhunze ginnery. Only 29 vehicles are registered in Negezi division, none of which are located along the Kanawa-Kalitu road south of Negezi-Ukenyenge. During a six-day period December 13-18, 1991, 39% of the vehicles counted consisted inter-regional transit traffic. During a traffic count in March 1990, there was no inter-regional traffic. Passenger traffic has greatly increased from an average of 5 per day in March 1990 to 28 per day in December 1991. Most amazing, however, is the huge amount of bicycle traffic totalling 2,141 over six days for an average of 357 per day. This indicates how important bicycles are as a means of transportation in the area. Unfortunately no bicycles were counted during the 1990 Baseline Survey, so increases can't be determined. Road impact on transportation has been considerable. Truckers claim a decrease in travel time of 50%. Fuel savings vary between 30 and 50%. A single trucker hauling cotton from villages along the Kanawa-Kalitu road would save roughly Tshs. 160,000 or more per season in fuel alone. For people along the road, increased passenger service would be a major benefit. Fully 42% of those surveyed felt the road had either some or much impact on passenger service.

B. AGRICULTURE

The road's greatest impact has been felt in evacuation of crops, especially cotton. A full 70% of those questioned stated that transportation of crops had improved in the past three years and all 70% specifically pointed to the road as the reason. Villagers' comments are borne out by data collected at Mhunze ginnery which indicate an increase in cotton purchases from 2,036 tons in 1989 to 3,632 tons in 1991. (Appendix A). Furthermore, the villages along the Kanawa-Kalitu road were the first in the district to have their 1991 cotton crop evacuated.

The road has had much less impact on food crops. In good years the area produces only a small surplus; in years of poor rainfall Negezi is a food deficit area. Most of the surplus is marketed in small quantities within the division where there would be little need for transport other than oxcart or bicycle. Most of those interviewed felt their household food supply was worse now than it was in 1989. This is verified by district estimates of food production (Appendix A).

Only 47% of those interviewed owned livestock. This corresponds to data collected in the 1990 Baseline Survey and elsewhere. While most stated that sales had improved, only 12% felt the road had any impact. In fact, few animals are transported by road; most are trekked cross-country to the Mhunze auction or to Shinyanga.

The picture changes with regard to supply of agricultural inputs, principally fertilizer and chemicals used on cotton. Thirty percent of those surveyed claimed supplies had improved over the past three years and half of those felt the road had had some impact.

C. COMMERCE

The Kanawa-Kalitu road has definitely had an impact on commercial activities in its area of influence. All shops surveyed get their stocks from wholesalers in Shinyanga. While most shopkeepers claim daily sales have not increased in the past three years, other data suggests the contrary is true. First, three of the four shopkeepers in Ukenyenge claimed daily sales had not increased; yet these same three stated that more people from villages to the south along the road were shopping in Ukenyenge. Two of the other three who claimed sales had not increased had not been in business for more than two years. Second, a full 80% of the households stated that availability of consumer goods had improved since 1989. This was verified by a survey of basic items - only 5 out of 38 were not stocked by any of the shops. It would make no sense to increase inventory if it couldn't be sold. Third, Shinyanga wholesalers claim an increase in sales to retailers in the area of between 50% and 300%. A very rough calculation places average daily sales at approximately Tshs. 10,000 rather than the Tshs. 3,450 claimed by the shopkeepers. Even if this estimate is off by as much as 50%, sales have still increased. Only two of the nine shopkeepers interviewed stated the road had no impact on their business. Furthermore, it is interesting to note that three of the five shops surveyed in Mwaweja and Kiloleli had opened for business since rehabilitation of the road began in 1990. Finally eight of the 27 villagers who stated that availability of goods had increase attributed this increase to the improved road. Road impact on commerce ranked third behind evacuation of crops and improved passenger service.

D. HEALTH

Previous evaluations of road projects in the third world have noted possible negative impacts on health. Accidents tend to increase. In the past year and a half since rehabilitation work began, only four vehicle have been damaged, none serious. There has been one fatality, a child killed by a vehicle. There is also a possibility of increases in disease, particularly those caused by water-borne insects and parasites due to poor drainage. No increase in disease was reported by the two dispensaries visited. There has, however, been no increase in supply of drugs or in daily attendance since road rehabilitation began. On the other hand, 38% of the villagers interviewed claim family health has improved since 1989, although only three out of 34 see any connection with the road. This changes somewhat when looking at access to health services and hospital care. In this case 15% saw a connection with the road. During previous discussions with villagers, access to hospital care was cited as a primary concern, particularly for women.

E. EDUCATION

The road has had little impact thus far on education. Only one of four schools surveyed reported any increase in the number of students, the number of teachers or the amount of supplies since road rehabilitation began. Teachers state travel to Shinyanga has improved somewhat. Seventy percent of villagers interviewed thought the quality of education was either the same or worse than three years ago. Only 11% felt the road had any impact on education.

F. OTHER

The village survey also included questions on access to water and firewood. Of the seven people who stated access to water had improved, six were from Mwaweja where a JCGP well had recently gone into use. Almost everyone in Kilolèli stated access to water as their number one problem. Most villagers have to go eight km. to fetch water from hand-dug pits in the Manonga riverbed. Only one person stated that the road had any impact on access to water. Firewood is also a big problem in deforested Negezi division. Only two villagers said access to firewood had improved since 1989. None noted any impact on access by the road, indicating the road is not used as a route to collect firewood.

G. HOUSEHOLD INCOME

Thirty-eight percent of the villagers surveyed claimed that their household incomes had improved in the past three years. This no doubt is related to farmgate prices, particularly cotton, and

livestock sales - the two principal sources of income for most villagers in Negezi division. However only two people saw a connection between household income and the improved road. Transport economists might think otherwise, but villagers view the road as means to evacua their cotton and they know the government does not set the national farmgate price based on their 37.4 km. of improved road. They do not use the road to market their livestock. Improved bus service and availability of consumer goods may affect household income but not in ways immediately obvious to the average villager. What may not be obvious but still the case is that as incomes improve, the road will have a greater impact on their lives.

H. GENDER

There was no significant variations in responses given by men and women with the exceptions of farmgate prices and livestock. In the survey area, men almost invariably handle financial matters. Women seldom have much idea about money earned from cotton and livestock sales and, in fact, seldom have much control of how money is spent. This may explain these variations in response. Much more significant, however, is impact of the road. Of those who claimed any impact, fully 75% were men and only 25% were women.

I. INCOME

Not surprisingly, significant variations among income groups emerged with regard to passenger service, farmgate prices, and livestock sales. The below average income group, by the definition used in this survey, own no livestock and consequently would be unaffected by livestock sales. Farmgate prices affect everyone but larger farmers benefit to a greater extent than smaller ones. Those with better incomes are more likely to travel and would note more quickly improved passenger service. When poor people travel, they usually go by foot. As with gender, there is a significant difference in road impact on income groups. Sixty-seven percent of the above average group noted some impact from the road; 69% in the average group noted impact; while only 21% of the below average group noted any impact from the road. This corresponds with other road evaluations which indicate that those with better incomes can better take advantage of improved roads.

CONCLUDING REMARKS

Full impact of the Kanawa-Kalitu road will not become evident for several years. This then has been an initial assessment of how the road has thus far affected people's lives. Not surprisingly, immediate impact has come with regard to transport/travel, agricultural marketing and commerce. Some impact has been noted in

supply of inputs, farmgate prices, and access to health/hospital care. Relatively little impact has been felt in education, livestock marketing and access to water and firewood.

The road has initially benefitted men and those financially better off, rather than women and the poor. All of these results fit the pattern of findings from other studies of road projects. What differs is that at this early stage almost half of the villagers interviewed and over three-quarters of the shopkeepers surveyed noted some sort of impact from the road.

This should not be considered the last word on road impact. It is suggested that a similar study could be carried out in late 1994 when full impact of the Kanawa-Kalitu road would manifest itself.

TABLE 1

SUMMARY SHEET
VILLAGE SURVEY
KANAWA-KALITU ROAD
DECEMBER 1991

VILLAGES SURVEYED:		NEGEZI (13), MWAWEJA (10), KILOLELI (11)
TOTAL INTERVIEWED:		34
GENDER	:	MALES-18, FEMALES-16
AGE RANGE	:	19-76
AREA CULTIVATED	:	RANGE 1-25 ACRES, AVERAGE 9 ACRES

CROPS	CULTIVATORS/34	RANGE (ACRES)	AVERAGE(ACRES)
COTTON	26	0 - 10	3.4
MAIZE	32	0 - 10	3.5
SORGHUM	26	0 - 10	2.3
RICE *	8	0 - 4	1.4
GROUNDNUTS	23	0 - 2	0.9
OTHER LEGUMES**	18	-	-
S/POTATOES***	21	-	-

* Rice grown only in one village surveyed - Mwaweja.
** Legumes - cowpeas, chicpeas, green gram - are intercropped with maize.
*** Sweet potatoes grown on generally less than one acre.

LIVESTOCK	OWNERS/34	RANGE(OWNERS ONLY)	AVERAGE(OWNERS ONLY)
CATTLE	16	5 - 300	31
GOATS	9	1 - 100	19
SHEEP	5	1 - 13	6
POULTRY	27	1 - 20	7

POSSESSIONS	OWNERS/34
IRON ROOF	6
RADIO	8
BICYCLE	9
OXCART	5
OXPLOUGH	13
OXTEAM	14
TRACTOR	0
VEHICLE	0

TABLE 2

COMPARISON OF CONDITIONS IN 1989 WITH PRESENT

ITEM	CONDITIONS TODAY			
	BETTER	SAME	WORSE	NA*
1. Access to water	7	10	16	1
2. Access to firewood	2	17	14	1
3. Quality of education	8	8	11	7
4. Bus/Passenger service	11	12	8	3
5. Supply of agricultural inputs	10	13	7	4
6. Crop Production	5	15	14	0
7. Farmgate prices	21	6	3	4
8. Livestock drugs	4	10	8	12
9. Livestock sales	16	6	1	11
10. Household Food Supply	6	8	19	1
11. Availability of goods	27	5	1	1
12. Ability to purchase	6	16	11	1
13. Access to health care	12	10	12	0
14. Family Health	13	18	3	0
15. Household Income	12	13	7	2

* NA - NO ANSWER

TABLE 3

IMPACT OF ROAD ON CONDITIONS

ITEM	ROAD IMPACT			
	MUCH	SOME	NONE	NA
1. Access to water	1	0	32	1
2. Access to firewood	0	0	33	1
3. Quality of education	0	3	24	7
4. Bus/Passenger service	8	5	18	3
5. Supply of agricultural inputs	1	4	25	4
6. Crop Production	1	2	31	0
7. Farmgate prices	0	4	26	4
8. Livestock drugs	0	2	20	12
9. Livestock sales	0	2	21	11
10. Household Food Supply	0	2	31	1
11. Availability of goods	6	2	25	1
12. Ability to purchase	0	1	32	1
13. Access to health care	5	0	29	0
14. Family Health	1	2	31	0
15. Household Income	2	0	30	2

RESPONSES DISAGGREGATED BY GENDER

ITEM	BETTER		SAME		WORSE		NA
	M	F	M	F	M	F	
1. Access to water	5	2	4	6	8	8	1
2. Access to firewood	2	0	8	9	8	6	1
3. Quality of education	4	4	4	4	7	4	7
4. Bus/Passenger service	8	3	6	6	3	5	3
5. Supply of agr. inputs	6	4	8	5	3	4	4
6. Crop Production	4	1	6	9	8	6	0
7. Farmgate prices	15	6	2	4	1	2	4
8. Livestock drug supply	2	2	6	4	7	1	12
9. Livestock sales	13	3	3	3	1	0	11
10. Household food supply	4	2	3	5	10	9	1
11. Availability of goods	15	12	2	3	1	0	1
12. Ability to purchase	3	3	7	9	8	3	1
13. Access to Health care	7	5	3	7	8	4	0
14. Family Health	7	6	9	9	2	1	0
15. Household Income	7	5	7	6	4	3	2

RESPONSES DISAGGREGATED BY INCOME

ITEM	BETTER			SAME			WORSE			NA
	A	B	C	A	B	C	A	B	C	
1. Access to water	4	2	1	1	3	6	2	8	6	1
2. Access to firewood	1	1	0	3	4	10	3	8	3	1
3. Quality of education	1	5	2	2	4	2	2	4	4	7
4. Bus/Passenger service	4	5	2	3	5	4	0	3	5	3
5. Supply of agr. inputs	3	4	3	3	4	6	1	3	3	4
6. Crop production	1	2	2	3	6	6	3	5	6	0
7. Farmgate prices	7	9	5	0	3	3	0	1	2	4
8. Livestock drugs	1	2	1	4	4	2	2	6	0	12
9. Livestock sales	6	8	2	1	4	1	0	1	0	11
10. Household food supply	3	3	0	1	2	5	3	7	9	1
11. Availability of goods	6	12	9	0	1	4	1	0	0	1
12. Ability to purchase	2	3	1	2	6	8	3	4	4	1
13. Access to health care	3	6	4	3	7	8	1	0	2	0
14. Family health	3	6	4	3	7	8	1	0	2	0
15. Household income	3	7	2	2	2	9	2	3	2	2

Group A (7) - Above average income: 15 or more head of cattle, 5 or more acres of cotton, outside income.

Group B (13) - Average income: 5-14 head of cattle, 2-4 acres of cotton, very small outside income.

Group C (14) - Below average income: Less than 5 head of cattle, Less than 2 acres of cotton No outside income other than casual labor.

TABLE 6

BUSINESS SURVEY
NINE OF EIGHTEEN SHOPS
KANAWA-KALITU ROAD
DECEMBER 1991

LOCATION: KILOLELI, MWAWEJA, UKENYENGE

Gender of Owner: M 9 F 0
Number of Employees: 1 - 3
Year business began: 1975-91
Average Daily Sales: Tshs.500 - 7000 (Three refused to answer)

Have daily sales increased since 1989?
Yes 3
* No 6

Basic Consumer Items:

ITEM	YES	NO	ITEM	YES	NO
Sugar	6	3	Sheets	1	8
Salt	7	2	Blankets	0	9
Tea	8	1	Cloth	1	8
Laundry soap	8	1	Khanga	4	5
Bath Soap	9	0	Clothes	4	5
Toothpaste	8	1	Shoes	3	6
Matches	8	1	Headache tablets	7	2
Kerosene	7	2	Malaria tablets	5	4
Batteries	8	1	Jembe	4	5
Pens	8	1	Panga	1	8
Pencils	7	2	Fertilizers	0	9
Exercise Books	7	2	Chemicals	0	9
Thread	5	4	Cooking oil/fat	8	1
Cooking Pots	1	8	Livestock medicine	0	9
Dishes	2	7	Rice	6	3
Bowls	2	7	Beans	4	5
Spoons	0	9	Bicycles/Parts	7	2
Buckets	1	8	Plough shares	2	7
Lamp	2	7	Vaseline	9	0

IMPACT: (1) All shops supplied by bus weekly - road has had impact.
(2) Increased transit traffic has improved business.
(3) Ukenyenge - more people from other villages in shops.
(4) Three of five shops in Kiloleli and Mwaweja opened in 90 or 91.

*Often contradicted by other statements.

HEALTH SURVEY
TWO OF TWO DISPENSARIES
KANAWA-KALITU ROAD
DECEMBER 1991

LOCATION: KILOLELI, NEGEZI

TYPE OF CENTER	GOT	PVT
CLINIC		
CENTER	___	___
DISPENSARY	2	___
HOSPITAL	___	___

AVERAGE DAILY ATTENDANCE: KILOLELI 50, NEGEZI 30
HAS ATTENDANCE INCREASED SINCE 1989?
YES 0
NO 2

NUMBER OF STAFF: KILOLELI 6, NEGEZI 7
HAS STAFF INCREASE SINCE 1989?
YES 0
NO 2

DRUGS AVAILABLE

CHLORIQUINE	ANTACIDS	ASPRIN
PENICILIN	ANTI-WORM	BELLADONNA
ORAL REHYDRATION	IRON TABS - ANEMIA	APHEDRINE - RESPITORY

HAS DRUG SUPPLY INCREASED SINCE 1989?
YES 0
NO 2

COMMON DISEASES

MALARIA	RESPITORY	RELAPSING FEVER
BILHARZIA	DIARRHEA	GONORRHEA
MALNUTRITION	WORMS	
EYE DISEASE	MEASLES	

HAS INCIDENCES OF DISEASE INCREASED SINCE 1989?
YES 0
NO 2 BETTER HEALTH EDUCATION

ARE FAMILY PLANNING SERVICES AVAILABLE?
YES 2
NO 0

ARE CONDOMS AVAILABLE?
YES 2
NO 0

IMPACT: ROAD HAS NOT CHANGED GENERAL HEALTH

EDUCATION SURVEY
FOUR OF SIX SCHOOLS
KANAWA-KALITU ROAD
DECEMBER 1991

LOCATION: KILOLELI, MWAWEJA, NEGEZI, KANAWA

TYPE:	GOT	PVT
DAY CARE		
PRIMARY	3	
SECONDARY		
OTHER		1

NUMBER OF STUDENTS: KILOLELI 392, MWAWEJA 193, NEGEZI 306, KANAWA 295

HAS NUMBER INCREASED SINCE 1989?

YES 1
NO 3

NUMBER OF TEACHERS: KILOLELI 5, MWAWEJA 6, NEGEZI 7 KANAWA 7

HAS NUMBER INCREASED SINCE 1989?

YES 1
NO 3

DOES SCHOOL HAVE ADEQUATE:	YES	NO
CLASSROOMS	0	4
DESKS	0	4
BLACKBOARDS	2	2
CHALK	4	0
TEXTBOOKS	0	4
EXERCISE BOOKS	2	2
PENS/PENCILS	4	0
PAPER	4	0
HOUSING FOR TEACHERS	0	4

HAS SUPPLY INCREASED SINCE 1989?

YES 1
NO 3

IMPACT: (1) Road has improved travel for teachers.
(2) Road has somewhat improved supplies.
(3) Overall impact very slight so far.

APPENDIX A

SOCIO ECONOMIC DATA

POPULATION KANAWA–KALITU AREA OF INFLUENCE

VILLAGE	# OF PEOPLE AS OF 9/91	HOUSEHOLD	AVERAGE PERSONS PER HOUSEHOLD
BULIMBA	1,527	228	6.7
NEGEZI	1,962	259	7.6
MWAWEJA	1,048	196	5.3
MWAJIGINYA	1,251	270	4.6
MIYUGUYU	1,317	173	7.6
MUGUDA	739	147	5.0
INOLELO	898	137	6.6
KILOLELI	1,965	289	6.8
KALITU	1,230	166	7.4
UKENYENGE	2,350	460	5.1
NGOFILA	3,959	310	12.8
MWAMANOTA	2,381	359	6.6
BELEDI	1,140	147	7.8
IDUSHI	936	130	7.2
TOTAL	22,709	3,271	6.9

NEGEZI DIVISION

COTTON SALES (TONS)

VILLAGE	1989 TONS	VALUE IN TSHS.	VALUE IN $	1990 TONS	VALUE IN TSHS.	VALUE IN $	1991 TONS	VALUE IN TSHS.	VALUE IN $
BULIMBA	183.2	5,129,600	37,587.75	197.4	8,093,400	41,941.23	266.3	18,641,000	81,465.78
MWAWEJA	0	0	0.00	221.9	9,097,900	47,146.71	285.7	19,999,000	87,400.58
MIYUGUYU	292.2	8,181,600	59,951.64	414.3	16,986,300	88,025.60	334.3	23,401,000	102,268.16
MUGUDA	88.4	2,475,200	18,137.32	141.8	5,813,800	30,128.00	252.3	17,661,000	77,182.94
INOLELO	0	0	0.00	318.3	13,050,300	67,628.65	384.2	26,894,000	117,533.43
KILOLELI	288.2	8,069,600	59,130.94	543	22,263,000	115,370.26	565.9	39,613,000	173,118.61
KALITU	298.6	8,360,800	61,264.75	617.5	25,317,500	131,199.15	339.5	23,765,000	103,858.93
NGOFILA	330.5	9,254,000	67,809.78	543.5	22,283,500	115,476.50	465.4	32,578,000	142,373.92
MWAMANOTA	264.5	7,406,000	54,268.34	637.6	26,141,600	135,469.76	520.1	36,407,000	159,107.60
BELEDI	290.5	8,134,000	59,602.84	273.6	11,217,600	58,131.32	218.4	15,288,000	66,812.34
TOTAL	2,036.10	57,010,800.00	417,753.35	3,908.90	160,264,900.00	830,517.18	3,632.10	254,247,000.00	1,111,122.28

*Data from Shirecu, Mhunze Ginnery

NOTE: Exch. rate for the June 1989 = 136.47
Exch. rate for the June 1990 = 192.97
Exch. rate for the June 1991 = 228.82

ESTIMATED CROP PRODUCTION IN TONS

	1988/1989								1989/1990								1990/1991								
VILLAGE	SORGH-GUM	MILLET	PADDY	GROUND NUTS	CAS-SAVA	SWEET POTATOES	MAIZE	SUB-TOTAL	SORGH-GUM	MILLET	PADDY	GROUND NUTS	CAS-SAVA	SWEET POTATOES	MAIZE	SUB-TOTAL	SORGH-GUM	MILLET	PADDY	GROUND NUTS	SWEET POTATOES	CAS-SAVA	MAIZE	SUB-TOTAL	GRAND TOTAL
BULIMBA	186	160	130	83	43	335	142	1079	148	45	150	55	35	219	125	777	150	40	122	65	300	24	150	829	2685
MEGEEI	150	83	5	250	45	420	170	1123	130	58	2	189	18	298	130	806	145	72	3	227	355	24	143	969	2898
MMANEJA	290	78	62	63	68	520	193	1261	250	40	48	52	40	380	102	912	283	65	52	55	425	60	140	1079	3251
MMAJIGINYA	320	60	18	40	53	462	183	1131	230	35	62	25	39	380	110	884	225	44	75	34	415	48	160	1001	3016
MITUGUTU	300	50	38	41	20	450	70	969	242	43	17	32	10	393	54	791	273	48	25	36	425	12	62	881	2641
MUGUDA	230	43	58	40	0	389	111	871	203	33	45	29	0	341	99	750	210	35	52	35	350	0	122	792	2413
NGOLELO	300	60	32	50	0	420	130	992	215	47	19	37	0	313	112	743	270	33	22	40	355	0	130	850	2585
PALUTU	100	42	0	43	0	250	112	547	83	32	0	27	0	229	97	468	901	36	0	33	235	0	205	509	1515
UKENYENGE	135	72	15	204	0	173	50	649	107	59	10	93	0	255	100	524	120	68	22	98	165	0	242	605	1778
NGOFILA	82	73	16	103	0	350	104	728	73	61	9	61	0	311	81	598	75	65	20	70	320	0	96	636	1962
KELEDI	252	48	19	60	0	250	190	819	261	33	9	47	0	393	145	888	270	40	22	53	425	0	250	949	2656
TOTAL	2375	769	393	874	229	3968	1561	10169	1942	486	371	646	142	3401	1153	8141	2111	546	358	744	3770	268	1393	9090	27400

DATA FROM DISTRICT AGRICULTURE OFFICER

ESTIMATED CROP PRODUCTION & VALUES FOR 1989

VILLAGE	SORGHUM TONS	SORGHUM TSHS.	SORGHUM US $	MILLET TONS	MILLET TSHS	MILLET US $	PADDY TONS	PADDY TSHS.	PADDY US $	GROUND NUTS TONS	GROUND NUTS TSHS.	GROUND NUTS US $	CASSAVA TONS	CASSAVA TSHS	CASSAVA US $	S/POTATOES TONS	S/POTATOES TSHS	S/POTATOES US $	MAIZE TONS	MAIZE TSHS	MAIZE US $	TOTAL T.SHS	TOTAL US $	TOTAL TONS
[illegible]ULIMBA	186	1348500	9881	160	1240000	9086	130	2470000	18099	13	14110000	103393	43	234350	1717	[illegible]	8505000	62321	[illegible]	1752000	13055	[illegible]	217556	1079
[illegible]EGEZI	150	1087500	7969	83	643250	4713	5	95000	696	[illegible]	42500000	311424	45	245250	1797	[illegible]	11340000	83095	170	1870000	13703	[illegible]	423397	1123
MWAWEJA	290	2102500	15406	78	604500	4430	62	1178000	8632	[illegible]	10710000	78479	68	370600	2716	[illegible]	14040000	102880	180	1980000	14509	[illegible]	227051	1261
MWA[illegible]GINYA	320	2320000	17000	60	465000	3407	18	342000	2506	[illegible]	6800000	49828	53	288850	2117	[illegible]	12420000	91009	180	1980000	14509	[illegible]	180376	1131
MY[illegible]GUYU	300	2175000	15938	50	387500	2839	38	722000	5291	[illegible]	6970000	51073	20	109000	799	[illegible]	12150000	89031	70	770000	5642	[illegible]	170613	969
MUG[illegible]UDA	230	1667500	12219	43	333250	2442	58	1102000	8075	[illegible]	6800000	49828	0	0	0	[illegible]	10260000	75181	120	1320000	9672	[illegible]	157417	871
IHOLELO	300	2175000	15938	60	465000	3407	32	608000	4455	51	8500000	62285	0	0	0	[illegible]	10500000	79135	150	1650000	12091	[illegible]	177314	992
K[illegible]	100	725000	5313	42	325500	2385	0	0	0	[illegible]	6800000	49828	0	0	0	[illegible]	6750000	49461	115	1265000	9269	[illegible]	116256	547
UKEN[illegible]	135	978750	7172	72	558000	4089	15	285000	2088	114	17650000	129552	0	0	0	[illegible]	4671000	34227	150	1650000	12091	[illegible]	159219	649
NGOF[illegible]LA	82	594500	4356	73	565750	4146	16	304000	2228	113	17510000	128307	0	0	0	[illegible]	9450000	69246	104	1144000	8383	[illegible]	216865	725
BELE DI	282	2044500	14981	48	372000	2726	19	361000	2645	[illegible]	10200000	74742	0	0	0	[illegible]	6750000	49461	160	1760000	12897	[illegible]	157452	819
TOTAL	2375	[illegible]	126172	769	5959750	43671	393	7467000	54715	[illegible]	[illegible]	[illegible]	229	[illegible]	9145	[illegible]	107136000	785052	1542	17171000	125823	[illegible]	[illegible]	10169

19[illegible] Exch. = 136.47

ESTIMATED CROP PRODUCTION & VALUES FOR 1990

	SORGIIUM			MILLET			PADDY			GROUND NUTS			CASSAVA			S/POTATOES			MAIZE			TOTAL	TOTAL	TOTAL
VILLAGE	TONS	TSHS.	US $	TONS	TSHS	US $	TONS	TSHS.	US $	TONS	TSHS.	US $	TONS	TSHS	US $	TONS	TSHS	US $	TONS	TSHS	US $	T.SHS	US $	TONS
BULIMBA	148	1184000	6136	45	360000	1866	150	3900000	20210	58	7366000	38171	35	210000	1088	215	8254000	42929	123	1599000	8286	22903000	118788	777
NEGEZI	130	1040000	5389	58	464000	2405	21	52000	269	180	22860000	118572	18	108000	560	253	10944000	56713	130	1690000	8758	37158000	192586	806
NWAWEJA	250	2000000	10364	40	320000	1658	48	1248000	6467	52	6604000	34232	40	240000	1244	350	14440000	74830	102	1326000	6872	26178000	135647	912
NWARGISYA	230	1840000	9535	35	280000	1451	62	1612000	8354	25	3556000	18428	39	234000	1213	350	14440000	74830	110	1430000	7410	23392000	121269	884
NYUGUYE	242	1936000	10033	43	344000	1783	17	442000	2291	32	4064000	21115	10	60000	311	393	14934000	77390	54	702000	3638	22482000	116560	791
MUGUDA	203	1624000	8416	33	264000	1368	45	1170000	6063	29	3683000	19135	0	0	0	341	12958000	67150	99	1287000	6669	20986000	108802	750
NDOLELO	215	1720000	8913	47	376000	1948	19	494000	2560	37	4699000	24414	0	0	0	313	11894000	61637	112	1456000	7545	20639000	107015	743
KALITU	83	664000	3441	32	256000	1327	0	0	0	27	3429000	17816	0	0	0	229	8702000	45095	97	1261000	6535	14312000	74213	465
UKENYENGE	107	856000	4436	59	472000	2446	10	260000	1347	93	11811000	61369	0	0	0	193	7334000	38023	100	1300000	6737	20599000	106854	524
NGOPILA	73	584000	3026	61	488000	2529	9	234000	1213	63	8001000	41570	0	0	0	311	11815000	61243	81	1053000	5457	22175000	115037	598
BELEDI	261	2088000	10820	33	264000	1368	9	234000	1213	47	5969000	31013	0	0	0	301	14934000	77390	145	1885000	9768	25374000	131552	893
TOTAL	1942	15534000	80510	456	3888000	20148	371	9646000	49997	666	82042000	425258	142	852000	4415	3311	129235000	669731	1151	14940000	77474	256191000	1328258	5141

1990 Exch. = 192.97

ESTIMATED CROP PRODUCTION & VALUES FOR 1991

VILLAGE	SORGHUM TONS	SORGHUM TSHS.	SORGHUM US $	MILLET TONS	MILLET TSHS	MILLET US $	PADDY TONS	PADDY TSHS.	PADDY US $	GROUND NUTS TONS	GROUND NUTS TSHS.	GROUND NUTS US $	CASSAVA TONS	CASSAVA TSHS	CASSAVA US $	S/POTATOES TONS	S/POTATOES TSHS	S/POTATOES US $	MAIZE TONS	MAIZE TSHS	MAIZE US $	TOTAL T.SHS	TOTAL US $	TOTAL TONS
BULIMBA	150	6000000	26221	40	1600000	6992	100	3100000	13548	65	10335000	45167	24	672000	2937	300	12000000	52443	150	4500000	19666	38207000	166974	829
NEGEZI	145	5500000	23347	72	2880000	12586	3	93000	406	227	36093000	157735	24	672000	2937	355	14200000	62058	143	4290000	18748	64025000	279815	969
MWAWEJA	283	11320000	49471	65	2600000	11363	50	1550000	6774	55	8745000	38218	60	1680000	7342	425	17000000	74294	140	4200000	18355	47095000	205817	1078
MWAHGINYA	225	9000000	39332	44	1760000	7692	75	2325000	10161	34	5406000	23626	48	1344000	5874	415	16600000	72546	160	4800000	20977	41235000	180207	1001
MIYUGUYU	273	10920000	47723	48	1920000	8391	25	775000	3387	36	5724000	25015	12	336000	1468	425	17000000	74294	62	1860000	8129	38535000	168407	881
MUGUDA	210	8400000	36710	35	1400000	6118	50	1550000	6774	35	5565000	24320	0	0	0	350	14000000	61183	112	3360000	14684	34275000	149790	792
INOLELO	270	10800000	47199	33	1320000	5769	22	682000	2981	40	6360000	27795	0	0	0	355	14200000	62058	130	3900000	17044	37262000	162844	850
KALITU	90	3600000	15733	36	1440000	6293	0	0	0	31	4929000	21541	0	0	0	235	9400000	41080	108	3240000	14160	22609000	98807	500
UKENYENGE	120	4800000	20977	68	2720000	11887	12	372000	1626	98	15582000	68097	0	0	0	165	6600000	28844	142	4260000	18617	34334000	150048	605
NGOFILA	75	3000000	13111	65	2600000	11363	10	310000	1355	70	11130000	48641	0	0	0	320	12800000	55939	96	2880000	12586	32720000	142994	636
BELEDI	270	10800000	47199	40	1600000	6992	11	341000	1490	53	8427000	36828	0	0	0	425	17000000	74294	150	4500000	19666	42668000	186470	949
TOTAL	2111	84440000	369024	546	21840000	95446	359	11129000	48501	744	118296000	516983	168	4704000	20558	3770	150800000	659033	1393	41790000	182633	432799000	1892177	9090

1991 Exch. = 228.82

MHUNZE LIVESTOCK AUCTION

	GOATS		SHEEP		BULLS		STEERS		COWS/HEIFERS		TOTALS	
MONTH	TOTAL	VALUE	TOTAL	VALUE	TOTAL	VALUE	TOTAL	VALUE	TOTAL	VALUE	ANIMALS	TSHS.
9/91	183	624,700	70	167,300	276	3,411,800	326	6,606,000	647	11,526,000	1,502	22,335,800
8/91	334	1,153,800	112	257,600	445	5,462,000	371	8,068,000	1309	19,472,000	2,571	34,413,400
7/91	222	769,000	89	185,600	248	2,786,000	237	4,528,000	766	11,310,000	1,562	19,578,600
6/91	346	1,015,000	119	255,100	357	4,024,000	344	6,005,000	785	9,818,000	1,951	21,117,100
5/91	262	693,800	120	189,900	487	5,930,000	426	7,513,000	1088	15,138,000	2,383	29,464,700
4/91	239	770,400	81	181,300	365	4,036,000	276	5,629,000	856	10,875,000	1,817	21,491,700
3/91	347	1,003,400	103	234,900	300	3,975,000	257	4,567,000	617	8,102,000	1,624	17,882,300
2/91	373	1,122,000	79	187,600	174	2,016,000	176	3,416,000	525	7,847,000	1,327	14,588,600
1/91	236	742,200	70	133,700	205	2,928,000	286	6,432,000	338	4,611,000	1,135	14,846,900
12/90	209	572,200	69	142,600	140	1,713,000	137	2,642,000	296	3,307,000	851	8,376,800
11/90	339	1,186,500	91	211,700	200	2,626,000	159	3,899,000	488	7,208,000	1,277	15,131,200
10/90	267	894,500	106	239,000	169	2,243,000	183	3,465,000	428	6,291,000	1,153	13,132,500
9/90	240	743,400	87	186,600	172	1,902,000	210	3,495,000	562	7,332,000	1,271	13,659,000
8/90	346	1,026,700	115	240,500	279	3,105,000	332	6,081,000	608	7,724,000	1,680	18,177,200
7/90	337	975,000	119	242,000	208	2,306,000	284	5,306,000	404	5,467,000	1,352	14,296,000
6/90	334	920,200	120	219,300	232	2,779,000	214	3,742,000	565	7,323,000	1,465	14,983,500
5/90	480	1,352,000	121	219,000	244	2,487,000	250	4,449,000	663	8,320,000	1,758	16,827,000
4/90	446	1,094,000	129	248,000	162	1,645,000	205	4,008,000	504	6,780,000	1,446	13,775,000
3/90	454	1,275,000	141	241,100	233	7,428,000	268	5,063,000	640	7,385,000	1,736	21,392,100
TOTAL	5994	17,933,800	1,941	3,982,800	4,896	62,802,800	4,941	94,914,000	12,089	165,836,000	29,861	345,469,400

Data from District Livestock Office

57

APPENDIX B

VEHICLE COSTS

VEHICLE COSTS AND TRANSPORT RATE

AVERAGE COSTS OF SHIRECU FLEET

CROP HAULING FLEET

	Annual Costs per vehicle SHS	Vehicles available	Total annual costs SHS
Daf 1600	7,296,273	36	262,665,828
Isuzu TX '86	7,517,423	6	45,104,538
AVM	7,742,598		61,940,784
Leyland Comet	8,113,848		116,019,261
Isuzu TX '88	7,822,330		70,400,970
Scania	7,683,155		38,115,775
Total			621,577,159
Average Costprice per vehicle			7,616,795
Average Costprice per km.		SHS	282

SPECIAL DUTY VEHICLES

	Annual costs per vehicle	Vehicles available	Total annual costs
Scania tank./trail.	13,420,515	1	13,120,515
Tanker DAF	6,532,476	1	6,532,176
Tanker Scania	6,681,126	1	6,681,426
Isuzu TX "88	7,822,330	1	7,822,330
Scania/Trailer BB	13,420,515	1	13,120,515
AVM Boxed Body	7,173,903	2	11,917,807
Isuzu 3 tons	2,801,597	1	2,801,597
Land Rover 110	6,135,953	10	61,359,530
Toyota L.C.	6,199,955	17	105,399,235
Suzuki old	2,039,568	6	12,237,108
Suzuki New	2,022,720	1	8,090,880
Land Rover 109	2,504,060	2	5,008,120
Total Special Duty		17	257,724,838
Total vehicles available		129	
TOTAL COSTS OF SHIRECU FLEET		SHS	882,301,997

COSTS AND RATE PER TON.KM (CROP HAULING)

Towcover per vehicle per annum	Shs	7,616,795
Average kgs per vehicle per day		7,722
Average kms per veh. per act. wo. day		137
Ton.kms per actual working day		529
To recover per day: (annual costs/ actual work. days)=	Shs	38,644
Costs per ton.km	Shs	73.06
Profit 20%		14.61
Rate per ton.km	Shs	87.67

	DAF 1600	ISUZU TX '86	DAF AVM	COMET
Purchase value	500,000	4,170,000	1,500,000	6,000,000
Replacement value	8,550,000	7,410,000	7,800,000	9,500,000
Residual value	855,000	741,000	780,000	950,000
Interest	24	24	24	24
Life time	8	8	8	8
Annual distance	27,000	27,000	27,000	27,000
Fuel cons. / km	0.32	0.32	0.32	0.32
STANDING COSTS				
Depreciation	961,875	833,625	877,500	1,068,750
Interest	60,000	500,400	540,000	720,000
Insurance	442,000	351,000	192,700	192,700
Road Tax	21,000	21,000	21,000	21,000
Salaries	191,975	191,975	191,975	191,975
TOTAL STANDING COSTS	1,676,850	1,898,000	2,123,175	2,494,425
RUNNING COSTS				
Fuel	993,600	993,600	993,600	993,600
Lub. oil/grease	49,680	49,680	49,680	49,680
Maintenance/Repairs	3,300,000	3,300,000	3,300,000	3,300,000
Tyres/Tubes	917,226	917,226	917,226	917,226
Extra Labour	88,695	88,695	88,695	88,695
Tarpaulins	180,000	180,000	180,000	180,000
TOTAL RUNNING COSTS	5,529,201	5,529,201	5,529,201	5,529,201
OVERHEAD	90,222	90,222	90,222	90,222
TOTAL ANNUAL COSTS	7,296,273	7,517,123	7,742,598	8,113,848
Boxed Body			7,173,903	

	TANKER DAF	TANK. SCAN.	TANK. SCAN. BOX B. SCAN.	TRAILER
Purchase value	500,000	500,000	6,697,100	3,280,300
Replacement value	8,600,000	9,500,000	11,000,000	7,500,000
Residual value	860,000	950,000	1,100,000	750,000
Interest	21	21	21	21
Life time	8	8	8	10
Annual distance	15,000	15,000	25,000	25,000
Fuel cons./km	0.32	0.32	0.15	
Est. fuel costs/ltr	115.00	115.00	115.00	
STANDING COSTS				
Depreciation	967,500	1,068,750	1,575,000	675,000
Interest	60,000	60,000	803,688	393,636
Insurance	412,000	192,700	192,700	23,910
Road Tax	21,000	21,000	21,000	21,000
Salaries	191,975	191,975	191,975	0
TOTAL STANDING COSTS	1,682,475	1,831,125	3,081,363	1,113,516
RUNNING COSTS				
Fuel	552,000	552,000	1,293,750	0
Lub. oil/grease	27,600	27,600	61,688	18,000
Maintenance/Repairs	3,300,000	3,300,000	3,300,000	1,704,268
Tyres/Tubes	611,484	611,481	1,528,710	1,222,968
Extra Labour	88,695	88,695	0	0
Tarpaulins	180,000	180,000	0	0
TOTAL RUNNING COSTS	4,759,779	4,759,779	6,187,118	2,945,236
OVERHEAD	90,222	90,222	90,222	0
TOTAL ANNUAL COSTS	6,532,176	6,681,126	9,361,733	4,058,782

	ISUZU TX 88	SCANIA OLD	ISUZU 3 TON	L.ROV. 109
Purchase value	4,800,000	500,000	1,305,000	100,000
Replacement value	7,410,000	9,500,000	1,600,000	1,600,000
Residual value	741,000	950,000	460,000	460,000
Interest	24	24	21	21
Life time	8	8	8	8
Annual distance	27,000	27,000	15,000	30,000
Fuel consumption/km	0.32	0.32	0.2	0.13
Est. fuel cost/ltr	115.00	115.00	115.00	212.50
STANDING COSTS				
Depreciation	833,625	1,068,750	517,500	517,500
Interest	576,000	60,000	156,6000	12,000
Insurance	351,000	492,700	91,250	236,887
Road Tax	21,000	21,000	13,800	5,800
Salaries	191,975	191,975	191,975	98,574
TOTAL STANDING COSTS	1,973,600	1,834,425	974,125	670,761
RUNNING COSTS				
Fuel	993,600	993,600	315,000	828,750
Lub. oil/grease	49,680	49,680	17,250	41,438
Maintenance/Repairs	3,300,000	3,300,000	1,000,000	750,000
Tyres/Tubes	1,146,533	1,146,533	375,000	168,000
Extra Labour	88,695	88,695	0	0
Tarpaulins	180,000	180,000	0	0
TOTAL RUNNING COSTS	5,758,508	5,758,508	1,7[illegible],250	1,788,188
OVERHEAD	90,222	90,222	90,222	45,111
TOTAL ANNUAL COSTS	7,822,330	7,683,155	2,801,597	2,504,060

	L.ROV.110	TOYOTA L.C.	SUZUKI OLD	SUZUKI NEW
Purchase value	2,800,000	4,000,000	1,400,000	3,000,000
Replacement value	4,500,000	4,500,000	3,000,000	3,000,000
Residual value	450,000	450,000	300,000	300,000
Interest	24	24	24	24
Life time	8	8	8	8
Annual distance	30,000	30,000	15,000	15,000
Fuel consumption	0.16	0.16	0.08	0.08
Est. fuel costs/ltr	115.00	115.00	212.50	212.50
STANDING COSTS				
Depreciation	506,250	506,250	337,500	337,500
Interest	336,000	480,000	168,000	360,000
Insurance	117,585	36,887	13,833	54,585
Road Tax	6,300	7,000	3,800	4,200
Salaries	98,574	98,571	98,571	98,571
TOTAL STANDING COSTS	1,064,709	1,128,711	621,707	854,859
RUNNING COSTS				
Fuel	552,000	552,000	255,000	255,000
Lub. oil/grease	27,600	27,600	12,750	12,750
Maintenance/Repairs	3,300,000	3,300,000	1,000,000	750,000
Tyres/Tubes	1,146,533	1,146,533	105,000	105,000
Extra Labour	0	0	0	0
Tarpaulins	0	0	0	0
TOTAL RUNNING COSTS	5,026,133	5,026,133	1,372,750	1,122,750
OVERHEAD	45,111	45,111	15,111	45,111
TOTAL ANNUAL COSTS	6,135,953	6,199,955	2,039,569	2,022,720

ESTIMATED TRANSPORT COSTS AND REQUIREMENTS

KANAWA-KALITU

	SHIRECU Shs	HIRED Shs	TOTAL Shs
Summary of estimated costs	29182179	85971600	115153779
Summary of estimated requirement (Diesel)	36219	94051	130270

KANAWA-KALITU	To be transported:		Seed Cotton	16307
			Lint	5673
	Shirecu	Private	Cotton Seed	0
			Dusted Seed	3852
Tonn. Ratio	25	75	Mixed Products	0
Kgs. day	7722	9598	Farm Inp.	143
Ton.kms/day	448	499	Cott. Cakes	1130
Kms./day	116	104	Opp. Serv.	100
Fuel cons.	0.35	0.42	Indstr. Serv.	300
Costs/km	282		Distr. Serv.	50
Perc. Performance	54		TOTAL	27555
Rate/ton.km				

COSTS, VEHICLE AND FUEL REQUIREMENTS

SHIRECU VEHICLES

Shirecu Tonnage	6889				
Estimated working days	892				
Estimated kms	103483				
season in month:	6	7	8	9	
in days:	181	215	243	274	
Shirecu vehicles full time	4.85	4.15	3.67	3.26	
Shirecu vehicles required	8.98	7.68	6.80	6.03	

Estimated costs Shirecu vehicles:

est. work. days * kms.day * km. costs

Shs. 29,182,179

Estimated Fuel consumption = Total kms * cons.km.

Litres 36,219

HIRED VEHICLES

Tonnage transported 20666.25
Estimated work. days 2153

Estimated costsØ tot. work. days * ton.kms.day * rate

Shs 85,971,600

Estimated Fuel consumption: kms.day * tot. work days * cons.km

Litres 94,051

ANALYSIS OF VEHICLE PERFORMANCE: KANAWA-KALITU

Period June 28, 1990 to February 1, 1991,

Buying season week 1 to 31

	SHIRECU	PRIVATE
Vehicles allocated	3	8
Possible work. days	651	1736
Actual working days	824	1,818
Total trips	926	2,376
Tonnage transported	5,824	17,449
Gas oil consumption	33,380	78,720
Kms. covered	95,750	189,177
Perc. Performance	127	
Av. distance/trip	103	80
Av. distance/day	116	104
Av. kgs./work. day	7,068	9,598
Av. kgs/trip	6,290	7,344
Av. ton.kms per day	411	499
Av. fuel cons./km	0.35	0.42
Veh. work. full time	3.80	8.38
Av. Trips per day	1.12	1.31

57

TOTAL TONNAGES TRANSPORTED: WEEK 1 TO 31

JUNE 29, 1990 ATO FEBRUARY 1, 1991

KANAWA-KALITU

	Shirecu	Private	Total	% of all Branches Total
Seed cotton	4,740	11,228	15,228	29.3
Cotton seed	142	0	142	2.3
Dusted seed	336	3,184	3,520	23.3
Lint	144	3,031	3,174	23.1
Cotton cakes	75	0	75	11.8
Mixed products	35	0	35	0.1
Farm inputs	19	0	19	1.5
Industrial service	273	0	273	2.3
Distributional services	31	6	37	3.5
Total	5,821	17,449	23,273	20.3

APPENDIX C

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