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

PROJECT PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

KENYA - ROADS GRAVELLING

615-170

AID-DIG/P-2212

UNCLASSIFIED

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

UNCLASSIFIED

AID-DLC/P-2212

December 15, 1976

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Kenya - Roads Graveling

Attached for your review are recommendations for authorization of a loan to the Government of Kenya ("Borrower") of not to exceed Seven Million Seven Hundred Thousand United States Dollars (\$7,700,000) to assist in financing the United States dollar and local currency costs of the procurement of construction equipment, spare parts, supplies, and materials to be used by the Borrower for the upgrading, improvement, and graveling of approximately 800 miles of secondary and minor roads in agricultural areas of Kenya.

This loan proposal is scheduled for consideration by the Development Loan Staff Committee on *Wednesday, January 12, 1977, at 2:30 p.m.*, in Room *3886* New State. Also, please note your concurrence or objection is due by close of business *Monday, Jan 17, 1977*. If you are a voting member, a poll sheet has been enclosed for your response.

Development Loan Committee
Office of Development Program
Review

Attachments:

Summary and Recommendations
Project Analysis
Annexes I - XV

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NOTE

The following sections of the Kenya Roads Graveling Project Paper are available in AFR/DR/CSAP:

- Sec. I.B.5., Relationship to Other AID Activities, pp.20-26
- Sec. I.C.1., Project Area, pp. 27-40
- Sec. III.D., Social Soundness Analysis, pp. 98-123
- Annexes: I-V, VII-VIII, and XII
- Figures: 1-3

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Abbreviations Used

| | | |
|----------------------|---|--|
| AAPC | - | African-American Purchasing Center |
| ADT | - | Average Daily Traffic |
| AID | - | Agency for International Development |
| CBD | - | Commerce Business Daily |
| CBS | - | Central Bureau of Statistics |
| CIDA | - | Canadian International Development Agency |
| CPI | - | Critical Performance Indicator |
| DAP | - | Development Assistance Plan |
| FAA | - | Foreign Assistance Act of 1961, as amended |
| FAR | - | Fixed Amount Reimbursement |
| FRG | - | Federal Republic of Germany |
| FTC | - | Farmer Training Center |
| GBC | - | Gravelling, Bridging, and Culverting Program |
| GDP | - | Gross Domestic Product |
| GOK | - | Government of Kenya |
| IADP | - | Integrated Agriculture Development Program |
| IBRD | - | International Bank for Reconstruction and Development |
| IFB | - | Invitation for Bid |
| ILO/ UNDP | - | International Labor Office/United Nations Development Program |
| IRR | - | Internal Rate of Return |
| IRS | - | Integrated Rural Survey |
| MOA | - | Ministry of Agriculture |
| MOW | - | Ministry of Works |
| MSA | - | Most Seriously Affected (by increased costs of energy) |

NISSP - National Integrated Sample Survey Program

ORT - Organization for Rehabilitation through Training (Geneva)

POL - Petroleum, Oil, and Lubricants

PP - Project Paper

RAR - Rural Access Roads Program

REDSO - Regional Economic Development Services Office

SIDA - Swedish International Development Authority

SPB - Special Projects Branch, Ministry of Works

STD - Staff Training Department, Ministry of Works

UK - United Kingdom

USAID/K - United States AID Mission to Kenya

VOC - Vehicle Operating Costs

I. Summary and Recommendations

A. Face Sheet Data - See Above

B. Recommendations

| | |
|----------|--------------------|
| 1. Grant | 1.4 million |
| 2. Loan | <u>7.7 million</u> |

(Terms: 40 years; 10-year grace;
2% during grace, and 3% thereafter)

TOTAL 9.1 million

3. Approval to increase the transaction limitation on shelf items of Code 935 origin to \$5,000.

C. Description of the Project

The Kenya Roads Graveling Project will finance with loan funds imports of U.S. capital equipment, construction materials and spare parts, as well as local currency costs of POL and spare parts to equip and operate one graveling unit for the Ministry of Works Graveling, Bridging and Culverting Program (GBC). Grant financing will provide 13 worker-years of services of a Project Engineer to work at the Ministry of Works, and a Construction Superintendent and a Maintenance Mechanic to work with the AID-provided graveling unit. This unit will be used to gravel about 800 miles of secondary and minor roads in Western and Nyanza Provinces, thus improving the roads to an all-weather standard, during a proposed loan implementation period of about six years, i.e., FY 1977, FY 1982. 1/

This unit along with possibly one other proposed for AID financing and three provided by Canada (CIDA) will implement the national roads graveling program of the Ministry of Works. The MOW Special Projects Branch (SPB) has implementation responsibility for this activity and the GOK's proposed Rural Access Roads (RAR) program to which various donors, including AID, are expected to contribute. The AID Project Engineer along with a similar CIDA expert will be assigned to the SPB, and each will be responsible for organization, administrative arrangements, roads selection, and so on, for their respective graveling units. Field-level supervision of the unit's work and required equipment maintenance will be the responsibility of the other two technical assistance experts.

1/ Secondary and minor roads (rural roads) constitute Class "D" and "E" roads in Ministry of Works roads classification system.

Three types of road improvements are proposed. The first corresponds to construction to MOW standards for D roads (5.5 m. surface with 1.2 m. shoulders). The second is to provide only spot improvements to those sections of the road which are impassable at certain times of the year, where these sections constitute 25% of the road length or less where this procedure is technically feasible. The third is to build to MOW standard with a bituminous seal on very steep grades (over 8%) on sections with intense rainfall. The objective of the second improvement type is to allow an economically feasible improvement on roads with lower traffic volumes. The aim of the third type is to protect the gravel surface in those areas where it is known to wash away within a short period.

Provision of the proposed inputs and achievement of the output of 800 miles (1,300 km.) of roads improved to an all-weather status will result in a significant increase in access for approximately 400,000 persons, the great majority of whom (99%) are making a living from small holdings. This represents the most isolated 12% of the total population of the two provinces involved. This increase in farmer access to markets and service centers will also provide a needed all-weather link between proposed rural access roads and the primary road system. At the same time it will support the Ministry of Agriculture's Integrated Agriculture Development Program (IADP), and ASL 1 Part C, which are directed specifically at small holders.

The MOW's Rural Access Road Program (RARP) is presently being organized (under joint USAID-IBRD financing) to provide farm-to market access roads in the same project area. An estimated 40% of these access roads will connect to the D and E roads to be improved by the present project. The IADP is a program aimed specifically at increasing the production and incomes of small holders in parts of 14 districts. Seven of these districts comprise the GBC project area. This program will provide an integrated package of inputs (seeds, fertilizer, pesticides and credit), expanded extension services, applied crop research, storage facilities and marketing services. The IBRD loan to finance the IADP selection of specific program areas will be conditioned on prior assurances of "adequate infrastructure," including 30% of the D and E network in the project area. This program is to be financed by the IBRD and the BADEA in the 1976/77 fiscal year.

D. Summary Findings

The technical analysis finds that the engineering analysis of the GBC program is consistent with sound engineering principles and that the MOW has the capability to gravel the roads in accordance with the proposed program. A review of the proposed MOW training program for personnel required by GBC, RAR and ongoing MOW efforts concluded that if the donor financing is obtained as expected and the program expanded as now proposed, the MOW should have sufficient manpower available to implement all new and existing roads programs. While the expectation is that sufficient GOK funding should be available for maintenance of the GBC roads, this cannot be guaranteed at this time, due to the fact that funds for road maintenance are allocated on an annual basis. Financing of maintenance is to be a subject for discussion during loan negotiation per section IV.D. below.

The economic analysis concludes that the "working poor" of Western and Nyanza Provinces would be the principal beneficiaries from the GBC program, due to a relative reduction in travel and transport costs and to further benefits resulting from induced agriculture development. However, initially the more progressive smallholders are expected to benefit the most. A breakeven analysis at 10% IRR is used to determine the extent of the D and E network for which the GBC program is economically feasible.

Financial and implementation plans are such that the project is judged ready for implementation. Contract services of a procurement agent such as the African-American Purchasing Center (AAPC) and an engineering consultant firm are considered necessary for commodity procurement and recruitment of experts, respectively.

The project meets all applicable statutory criteria (see the "Checklist of Statutory Criteria", Annex XII, and the Mission Director's 611(e) certification that Kenya has the capability to maintain and use the project effectively, Annex XIII).

E. Project Issues

Seven major issues have been raised in connection with the gravelling program. These issues have been satisfactorily addressed during the design and review of the project.

The first is the technical capability of the MOW to carry out this activity while also implementing the RAR program and continuing existing roads construction and maintenance programs. The technical analysis in Section III. A. concludes that the MOW has this capability.

The second issue which has been raised is that of the GOK's financial capability. As discussed in Section II.B.2. below and in Annex II, the GOK is so far complying with planned increases in funding for secondary, minor and unclassified roads and tracks, and there are good reasons to believe the maintenance budget will be similarly increased. Donor financing for a reduced GBC program (cut back from the originally proposed ten gravelling units to only six) is also expected to be forth-coming, assuming the approval of the Kenya Roads Gravelling project and of a proposed future AID funded gravelling unit. Financing from the IBRD, SIDA, UK and the FRG for RAR construction and from the IBRD and SIDA for manpower training of both GBC and RAR similarly seems firm. The IBRD also expects to finance a portion of equipment and local costs of maintenance for RAR program roads during the first three years of that program.

The financial burden on the GOK for road maintenance in the project area must increase by 15% over the life-of-project if the proposed D and E roads are to be kept in good condition after they are improved. 1/ This represents a significant commitment by the GOK through the Ministry of Finance and Planning (MOFP) which should be explicitly recognized in the loan agreement. During the development of the project, problems associated with road maintenance

1/ 15% over present road maintenance allocations for D and E roads in the Western and Nyanza provinces; 9.1% over all present road maintenance allocations for these provinces.

nance were fully discussed with the GOK. These included (a) the appropriate level of maintenance that should be applied to D, E, and rural access roads; (b) procedures for implementing the maintenance programs for these roads; and (c) the overall magnitude of maintenance allocations required to maintain roads improved and constructed under the GBC and RAR programs, respectively,

as well as on-going maintenance activities, and (d) budgeting procedures which would allow for increasing roads maintenance allocations. Detailed discussion of these points are presented in Section III.A. below. The loan agreement will include a covenant wherein the GOK will supply funding adequate for the continued support of construction and maintenance work on the AID project, in addition to other present and projected road construction and maintenance requirements.

Third is the question of benefit incidence. This question is discussed in some detail in Section II.B.2., III.B, and III.D.3.

Three additional project issues include: selection of road links for improvements, technical characteristics of improvements, labor-intensive vs. capital-intensive methods, and program evaluation.

Selection of Road Links for Improvement

In order to realize the anticipated benefits of the proposed GBC program, careful attention must be given to the link selection process and criteria. The selection must cope with the trade-off between serving present traffic flows and providing increased access to relatively isolated rural areas. The present orientation of AID policy suggests that the second objective should be given the greatest weight in link selection.

This can be accomplished by giving first priority to those links which are presently cut during some part of the year. Knowledge of the location of these links is very limited, although some estimates are available as discussed later. This requirement points to the need for a complete inventory of D and E roads that might be considered in the program. (This will be gathered by the MOW Roads Inspectorate and its verification and review will be one of the first tasks of the project engineer).

Within this set of non-all-weather links, priority will be given to those areas where the greatest response in terms of rural development can be anticipated. This response is expected to occur in areas where 1) local inhabitants give a high priority to road improvement, 2) planned rural access roads will connect directly to the road link in question, and 3) other agricultural inputs and services will be provided. A selection process which ensures that these criteria are met has been discussed with and agreed upon by the GOK during the development of the project. (See III.A. below)

The selection criteria is directly linked to the cost-benefit analysis described in Section III-B., and the most economically and socially beneficial links will be selected first. Given the scarcity of existing information on present link condition, use and potential use, it is clear that some additional information must be obtained prior to link selection. In addition to the road inventory mentioned above, a traffic survey will be carried out on each road link identified as a potential program link prior to improvement. Evaluation of this data and data gathered by the IRS in the project areas ^{1/} will provide a means of updating and improving the preliminary selection criteria proposed here, early in the life of the program. (A similar evaluation of the CIDA GBC links will also provide valuable information although from a different project area).

^{1/} Integrated Rural Survey, designed to collect data required for development planning. (see p. 132 below)

Technical Characteristics of Improvements

The great variety of soils, rainfall and road condition on D and E roads links within the project area demands a relatively high degree of flexibility in the characteristics of improvements that will be carried out by the proposed GBC unit. In addition the nature and extent of these improvements should correspond to the present and potential use. Therefore four alternative types of improvements are identified as potentially applicable to the GBC project. These are (1) improvement of the entire link to MOW standards (7.9 m. width including shoulders and a 5.5 m. surface), (2) improvement of the entire link with one lane (3.5 m.) gravelled (this is slightly less than the present average width of gravelled roads in the two provinces according to the MOW inventory), (3) spot improvement for non-all-weather sections on a link, and (4) improvement of an entire link with a bituminous seal on those sections with a high grade (over 8%) and intense rainfall.

Each of these alternatives can apply to different conditions and traffic levels in the project area. In the case of links with higher volumes of traffic (over 70 ADT), the first alternative is economically feasible. However in the case of lower traffic volumes (20-70 ADT), only a spot improvement level can be justified on the basis of a cost-benefit analysis. Below 20 ADT a road must have additional justification to be feasible, such as direct connection to a development project or a new rural access road.

On the basis of an estimated cost per km for alternative 2 (see section III-B) it was determined that only a 10% cost savings would be realized over the first alternative. Because maintenance is made more difficult for MOW equipment and the road is more prone to accidents, this alternative was ruled out as less cost effective than the first alternative.

The fourth alternative is more expensive, but necessary to hold the gravel in place on steep slopes in areas such as the foothills of Mt. Elgon. An unsealed surface in this area allows the gravel to be washed away within 2 years rather than the expected 5 year period, resulting in a very low benefit-cost ratio for unsealed surfaces.

One of the final three alternative improvement levels will be programmed for each eligible link by the project engineer on the basis of present and future traffic levels, road condition and priorities as assigned by District Development Committees, as described in section IV-B below.

Labor-Intensive vs. Capital-Intensive Construction

The possibility of using labor-intensive methods of road construction in the GBC program has been examined. The GBC program has been reoriented from upgrading whole road links to emphasizing spot improvements (75% of the works). The GBC unit will thereby cover a large number of roads and have to be highly mobile. It would be inefficient to hire and train staff in each locality where the unit would temporarily be deployed. It would also increase the cost of those construction operation (shaping, digging gravel, loading, transport, and spreading of gravel) where machines can more effectively be used. The use of capital-intensive methods of road construction appears also to be justified in view of the large quantity of work required and the benefit impact of accelerated work completion.

The GBC program currently plans to make use of hand labor wherever possible. Local laborers will be hired as needed by the MOW at a daily wage to complement MOW crews. This will be cost effective, because training required is minimal and the laborers would not be transported, housed, and fed by MOW. This will enhance the social benefits of the program and the "spread effect" of the economic expenditures envisaged, by generating temporary jobs in the project area and contributing to the cash incomes of unskilled workers.

Culvert placement and bridge construction can be relatively labor-intensive operations and there will be a local income and job-generating effect attributable to the GBC program. Local contracting of bridge construction will contribute to development through the transfer of construction skills to previously unskilled and underemployed rural laborers. Specific decisions as to when this will be appropriate should, however, remain the responsibility of the MOW.

Program Evaluation

Due to the insufficient amount of data available on key criteria for project selection (road condition, traffic levels, potential benefits) the realization of projected benefits and costs is not ensured. Consequently a yearly evaluation of the program is proposed for at least the first three years of the project to determine whether the initial estimate of costs and benefits are being achieved and to identify potential methods of improving construction or maintenance effectiveness and realizing greater benefits as program results become available.

The evaluation can be divided into two parts: the engineering evaluation, which will be carried out by the project engineers, and the economic and social evaluation, which will require consultant expertise. The engineering evaluation will determine whether equipment utilization, output per day and overall cost projections are being followed and where they could be improved, and whether the planned road condition and all-weather passage is being achieved as forecast. The economic and social evaluation will determine if the forecast benefits are being achieved, the distribution of these benefits between farmers, traders, and consumers, and how this distribution might be improved, the level of local participation in the project and the degree of coordination of this project with RARP and other rural development programs.

This information will be fed back into a process of revision of the selection criteria and construction or maintenance methods as early as possible in the program. This evaluation program should also be closely coordinated with the evaluation of the R A R program, the IADP, and ASL 1 Part C.

An issue which has not previously been discussed is that of the implementation period, slightly over six years dating from anticipated authorization through gravelling by this GBC unit of the 800 miles of roads. While it is estimated that 80% of loan funds will be disbursed within three years of satisfaction of conditions precedent, the remainder (for POL and spare parts) is expected to be expended during the balance of the project. Given the time

required for equipment procurement and shipment, financing for POL and additional spares would only be available for about 25 per cent of actual operations of the unit if the PD 57 three-year disbursement period is adhered to. It is recommended that the disbursement period cover the entire proposed life of project activities.

II. Background and Detailed Description

A. Macro-Economic Overview

During the first decade of independence (1964-74) Kenya enjoyed a comparatively remarkable level of overall economic growth - 7 percent average rate of growth in real terms. However Kenya's performance at attaining a relatively equitable distribution of these benefits of development was less satisfactory due to the dualistic nature of the economy. In reviewing the past performance of the economy, the IBRD, in its publication "The Second Decade: Basic Economic Report on Kenya", January, 1974, made several recommendations to effect a more efficient utilization of domestic resources and a more equitable distribution of wealth. These broad basic recommendations were incorporated into the GOK's Third Development Plan, 1974-78, published in early 1974. The Plan projects an overall economic rate of growth of 7.4 percent (real terms); slightly higher than the average real reate of growth achieved during 1964-74. Accordingly, the rate of growth is to be achieved by a major restructuring of the growth strategy. This strategy had previously concentrated on high and growing investment rates in public and private sectors (with fixed capital formation equalling about 25 percent of GDP in early 1970s). These high rates of investment were primarily supportive of programs that were heavily dependent upon imported capital goods and raw materials (particularly petroleum). Thus it was obvious that the growth process would have to be restructured to focus on greater more effective use of domestic factors of production (particularly labor) and in the most directly productive sectors (e.g. agriculture).

During 1974, the initial year of the Plan, the economy was hit by accelerated world-wide inflation, including the full impact of the oil crisis, resulting in a sharp deterioration in the terms of trade and a balance of payments crisis. The terms of trade declined by about 9 percent during 1974. As a result of increases in world wide inflation, the domestic level of inflation rose sharply from an average of 2 percent per annum during the first decade of independence to about 13 percent in 1974. The level of domestic inflation was further aggravated (15 percent in 1975) by drought in 1973/74 which significantly reduced crop and livestock production for domestic consumption and for export. In 1974 the current account deficit amounted to approximately \$280 million. The real rate of growth dropped to 5 percent per annum.

Kenya's balance of payments are detailed below with IMF projections for 1976-77. In 1974/75 the foreign exchange constraints were met by a combination of extensive draw-downs on foreign exchange reserves, borrowings from the IMF oil facility, accelerated disbursements under existing donor foreign exchange

commitments and increased borrowing from donor agencies. Official reserves declined from an equivalent of six months of imports at the end of 1970 to only an equivalent of two months imports by the end of 1974. The level of reserves continued to fall until only the equivalent of 5 weeks of imports were available by the end of 1975.

Kenya: Balance of Payments
(K Shillings million)

| Item | <u>1974</u> | <u>1975</u> | <u>1976</u> | <u>1977</u> |
|-------------------------|-------------|-------------|---------------|---------------|
| | | | (IMF Project) | (IMF Project) |
| Imports, cif | -7,370 | -6,936 | -9,100 | -9,800 |
| Exports, fob | 4,150 | 4,242 | 5,620 | 5,830 |
| Trade Balance | -3,220 | -2,684 | -4,380 | -3,970 |
| <u>Total Invisibles</u> | <u>796</u> | <u>998</u> | <u>1,360</u> | <u>1,510</u> |
| Goods & Services | | | | |
| Balances | -2,424 | -1,686 | -2,120 | -2,460 |
| Capital Movements | 1,720 | 1,224 | 1,510 | 1,730 |
| Central Monetary Auth. | 460 | 217 | 290 | 330 |
| Errors & Omissions | 20 | -31 | N/A | N/A |

Sources: Central Bureau of Statistics and IMF.

Comparison of Balance of Payments
(K Shillings million)

| | <u>1970</u> | <u>1972</u> | <u>1975</u> | <u>1977 (est)</u> |
|--------------------------------|-------------|-------------|-------------|-------------------|
| Exports | 2,040 | 2,410 | 4,242 | 5,830 |
| Current Account | | | | |
| Deficit | -350 | -486 | -1,410 | -2,060 |
| Capital Movements: | | | | |
| Private (long & short term) | 298 | 350 | 406 | 700 |
| Government (long & short term) | 322 | 306 | 806 | 1,030 |
| Terms of Trade (1971=100) | 109 | 101 | 86 | N/A |

Sources: Central Bureau of Statistics and IMF.

In 1975 the GOK entered into a three year program with the IMF, under an extended fund facility (EFF), allowing Kenya to purchase up to SDR 67.2 million (\$77.6 million) from the IMF provided that the GOK agreed to follow a mutually agreed upon strategy for reducing the foreign exchange constraint. The GOK's austerity program initiated in 1975 consists of the following objectives:

- (a) containing the effective demand for imports in the short-run and reducing the propensity to consume in the long-run;
- (b) compressing levels of public and private consumption; and
- (c) restricting the expansion of credit in the short run and channelling more credit investment resources into the most directly productive sectors which have greatest potential for reducing unemployment and increasing import-substitution and export promotion programs.

In early 1976 the GOK prepared a revised development budget reflecting its austerity program to restructure the growth process and address its domestic inflation and external resource constraint. The GOK is taking a number of steps to implement the above objectives, including: increasing producer prices to stimulate agricultural production, increasing the prime lending rate to restrict credit expansion, increasing interest rates on savings deposits to encourage higher levels of savings, increasing taxes on some non-essential import and domestic items, increasing capital gains, urban property and inheritance taxes, and instituting measures to increase the efficiency of tax administration and collection. Measures which make income tax policies more progressive were introduced in 1973/74, so no significant increases in income tax revenue is expected.^{1/}

GOK Financial Position

The GOK's budget deficit increased dramatically from K.Shs.442 million in FY 1970 to over K.Shs.1,820 million (312%) by FY 1976 with an increase in GOK assets held by the Central Bank from K.Shs.171 million in FY 1970 to K.Shs.907 million by FY 1976 (430%). During the same time period money supply rose from K.Shs:2,759 million to K.Shs. 6,597 million (139%). ^{2/}

^{1/} IBRD, Third Education Project, Dec. 1975.

^{2/} GOK's fiscal year ends June 30.

The following summarizes the GOK's financial position for FY 1975, FY 1976, and estimates for FY 1977. and compares certain budgetary items from FY 1970 up to FY 1977:

Central Government Financing Summary
(K.Shs. millions)

| <u>Item</u> | <u>FY '75</u> (actual) | <u>FY '76</u> (Revised Est) | <u>FY '77</u> (Budget Est.) |
|--|---------------------------|--------------------------------|--------------------------------|
| Recurrent Revenue | 5,432 | 5,320 | 6,160 |
| <u>Recurrent Expenditure</u> | <u>3,853</u> | <u>4,800</u> | <u>5,160</u> |
| Recurrent Surplus | 679 | 520 | 1,000 |
| <u>Foreign Grants</u> | <u>144</u> | <u>280</u> | <u>400</u> |
| Surplus Available for Financing Development Expenditures | 823 | 800 | 1,400 |

Central Government Financing Summary
(K.Shs. millions)

| <u>Item</u> | <u>FY '75</u> (actual) | <u>FY '76</u> (Revised Est) | <u>FY '77</u> (Budget Est.) |
|-------------------------|---------------------------|--------------------------------|--------------------------------|
| Development Expenditure | 1,990 | 2,620 | 2,560 |
| Overall Deficit | 1,167 | 1,820 | 1,160 |

Deficit Financing:

| | | | |
|--------------------------|-----|-----|-----|
| External Borrowing (net) | 367 | 680 | 540 |
| Domestic NonBank (net) | 199 | 270 | 380 |
| Banking System (net) | 601 | 870 | 240 |

Comparison of GOK Financing

| | <u>FY 1970</u> | <u>FY 1972</u> | <u>FY 1975</u> | <u>FY 1976</u> | <u>FY 1977</u> |
|------------------------|----------------|----------------|----------------|-----------------|----------------|
| Central Govt. Deficit | 442 | 733 | 1,167 | 1,820 | 1,160 |
| Deficit as % Devel. | | | | | |
| Expenditure | 73% | 71% | 58% | 69% | 45% |
| GOK Assets Held by | | | | | |
| Central Bank <u>1/</u> | 171 | 273 | 575 | 907 | N/A |
| Money Supply <u>2/</u> | 2,759 | 3,558 | 5,408 | 6,597 <u>3/</u> | N/A |
| Consumer Price | | | | | |
| Index <u>4/</u> | 95 | 103 | 149 | 166 <u>3/</u> | N/A |

The overall budget deficit for FY 1976 is 30% above the original estimate and the GOK's recourse to the banking system has been approximately twice what was planned. Fortunately domestic credit demand during FY 1976 was such that sufficient liquidity existed to fund the budget deficit without straining the market or putting an excessive demands on total domestic resources. Recurrent expenditures increased well above budget levels and revenues fell below projections, forcing increased government borrowing with the result that domestic credit rose 24% rather than the EFF targeted increase of 19%.

During FY 1977 the GOK is focusing on the following budgetary target:

(1) limiting bank borrowing by the GOK to K.Shs.500 million; (2) achieving a current account surplus of approximately K.Shs.800 million; and (3) maintaining the real level of development expenditures, with a parallel significant reduction in the rate of increase in real recurrent expenditures. These minimum target levels are well within the budget estimates for FY 1977 presented above. To avoid unplanned expenditure increases recruitment for most civil service vacancies has been suspended, the purchase of new vehicles has been deferred, the power to enter new contracts has been centralized in the Ministry of Finance and a system of monthly cash limits on departmental outlays is being introduced.

Careful attention to recurrent budget expenditures combined with conservative monetary policies pursued by the Central Bank should keep the GOK's budget deficit in check and allow for a system of deficit financing which does not place an undue strain on Kenya's financial markets or the monetary system as a whole.

Sources: Central Bureau of Statistics, Central Bank of Kenya, GOK Budget Estimates.

- 1/ G O K assets held by central bank include Kenya treasury bills, direct advances to central government, other Kenya Government securities, and securities guaranteed by Kenya Government.
- 2/ Includes K.Shs.334 million of IBRD and USAID loans to Cereals and Sugar Finance Corporation.
- 3/ March 1976 (latest data available)
- 4/ Nairobi Price Index, Middle Income, August 1971=100

Debt Service

GOK borrowing is required to meet both the internal budget deficit as well as the foreign exchange deficit. In addition to borrowing to bridge these gaps, the GOK assumes debt obligations through its participation in the East African Community^{1/}. Since independence, the GOK has increased its rate of borrowing (current prices) by about 8.5 percent per annum - less than the growth of the economy in current prices. The debt servicing as reported by the Central Bureau of Statistics only represents the GOK's official obligations and does not include all public debt although servicing such debt requires an allocation of foreign exchange. Private external debt is not estimated by the GOK. The following presents different levels of debt service and attempts to integrate various reporting and accounting procedures:

Kenya Debt Service (as of June 30, 1976)
(K. Shillings million)

| | <u>1970</u> | <u>1972</u> | <u>1974</u> | <u>1975</u> | <u>1980</u> | <u>1985</u> ^{2/} |
|--|-------------|-------------|-------------|-------------|-------------|---------------------------|
| A. <u>GOK Official Debt</u> | | | | | | |
| 1. Total Debt ^{3/} | 1,555 | 1,691 | 2,302 | 2,926 | N/A | N/A |
| a. Lending Governments(%) | 84% | 76% | 70% | 68% | N/A | N/A |
| b. International Org.(%) | 16% | 24% | 30% | 32% | N/A | N/A |
| 2. Debt Service | 100 | 144 | 173 | 202 | N/A | N/A |
| 3. Debt Service/Exports | 2.9% | 3.6% | 2.6% | 2.8% | N/A | N/A |
| 4. Debt Service/Outstanding | 6.6% | 7.3% | 6.8% | 6.4% | N/A | N/A |
| B. <u>Kenya - Public Debt</u>^{4/} | | | | | | |
| 1. Total Debt | 2,284 | 2,797 | 3,669 | N/A | N/A | N/A |
| 2. Debt Service | 151 | 200 | 227 | N/A | N/A | N/A |
| 3. Debt Service/Exports | 4.0% | 4.6% | 3.0% | N/A | N/A | N/A |
| 4. Debt Service/Outstanding | 6.6% | 7.2% | 6.2% | N/A | N/A | N/A |
| C. <u>Kenya - External Debt</u>^{5/} | | | | | | |
| 1. Debt Service/Exports | N/A | 6.3% | 6.0% | 6.6% | 7.0% | 6.7% |
| 2. Revised Estimates: ^{6/} Debt Service/Exports- | N/A | N/A | N/A | N/A | 16.0% | N/A |

^{1/} Kenya's liability for community debts is calculated to be one-third of the total community's liability.

^{2/} IBRD projections from "The Macro-Economic Model and Projections", A Basic Economic Report on Kenya - January 1974.

^{3/} Official debt includes unfunded debt to lending governments and international organizations. Note that the U.S. share of lending government debt rose from 8% in 1970 to 16% by 1975. Source: Central Bureau of Statistics.

^{4/} Public external debt includes obligations to IBRD, IDA, other multilateral organizations, lending governments, suppliers, financial institutions, bonds and public loans. Source: IBRD, development data, June 1976.

In 1974 the average public debt service/exports ratio for thirty-four African nations was 4.5 percent, with Tanzania's ratio being 6.1 percent, Uganda's 4.9 percent while Kenya's was 3.0 percent. Zaire, which had recently encountered difficulties meeting its debt repayment schedule, had a debt servicing/export ratio of 11.7 percent in 1974.

While it can be argued that Kenya's past economic performance, the present and projected foreign exchange and internal budget deficits, and the austerity measures taken by the GOK justify substantial amounts of concessionary financing, it must be recognized that such resources are limited. Therefore, the future terms of borrowing will be considerably less favorable than in the past. The extent by which the debt service/exports ratio must increase, of course, depends on how successful the GOK is in implementing its austerity program. If results are favorable and barring further major deteriorations in the terms of trade (particularly further increases in POL costs), IBRD projects that Kenya's debt-service ratio may approximate 16 percent by 1980. Beyond 1980 GOK's creditworthiness will depend on its ability to significantly reduce the propensity to import, increase non-traditional as well as traditional exports, and significantly reduce its level of budget deficit financing.

Since June 1976 Kenya's foreign exchange reserves have risen dramatically due to abnormally high export earnings from coffee. These earnings have not yet been incorporated into projections of external borrowing and the debt-service ratio, however it is clear that the coffee "bonanza" will reduce Kenya's requirements for massive external financing. Evidence of the increase in foreign exchange reserves is Kenya's disinterest in making an anticipated second EFF drawdown of SDR 20.7 million (US \$23.8 million).

Based on the foregoing, it is reasonable to conclude that the GOK will be able to service its debts, including the debt incurred under this project.

⁵/ Includes Kenya's liability on East African Community obligations. Source: IBRD, "The Macro-Model and Projections", A Basic Economic Report on Kenya. Basic Economic Scenario. Note that these projections preceded the 1973/74 increase in oil prices and therefore understate borrowing requirements.

⁶/ IBRD, June 1976.

B. Project Background and Justification

1. GOK Policy

The 1974-78 Development Plan is regarded by the GOK as a comprehensive strategy for developing the rural areas so as to achieve the fundamental goal of a more equitable distribution of national income and faster growth of employment opportunities. To the GOK the Plan contains proposals for interlocking and mutually reinforcing activities in agriculture, roads, health, public works, education and water. Achieving the fundamental goal, however, is viewed by the GOK as being primarily dependent on development of the agriculture sector so as to achieve a 6.7 percent growth rate for marketed production, a significant increase in the proportion of farmers obtaining cash incomes from their land, increased opportunities for employment in the sector, development of less-favored areas, and doubling agriculture development expenditures over the levels of the 1970-74 plan period. The strategy for achieving these targets was stated to be increasing the rate of public expenditure on integrated programs aimed at helping large numbers of farmers to intensify production. According to the Plan (page 197), "This implies giving highest priority to programs aimed at developing the small-holder farming areas."

Infrastructure development to support projected growth in this and other economic sectors was to be the primary responsibility of Government with the thrust of such efforts to be on providing efficient connections to smaller centers. Special attention was to be directed to providing all-weather access between farming and marketing centers, thus enabling the rural populace to travel more easily and to market their produce more cheaply. Accordingly, major emphasis was to shift to improvement and maintenance of the secondary and minor roads networks and high priority given to constructing new access roads in agricultural areas where communication is not possible in the rainy season or the cost of road transport is excessively high. The two separate but related activities cited by the Plan to address these objectives are the Graveling, Bridging and Culverting (GBC) and Rural Access Roads (RAR) programs.

Two subsequent policy statements have reaffirmed the Plan goals and strategy. In responding to a drastically changed balance of payments situation due to world-wide inflation and the rising costs of energy (Kenya is an MSA), Sessional Paper No. 1 of 1974 indicated the GOK would place more stress on increasing production by all classes of farmers

1/ For a fuller treatment of the material in this section see Annex II.

in order to meet domestic food needs, to reduce imports, and, hopefully, increase exportable surpluses. Sessional Paper No. 4 of 1975 reaffirmed this strategy while cutting back significantly Plan targets for growth of GDP, of real per capita income, and of GOK development and recurrent expenditures. However, despite the decrease in total development spending the pattern of expenditure was to be shifted so that expenditures on agriculture, water, and rural development would grow even faster than proposed in the Plan (up 66.8 percent from K£59.0 to K£98.4 million, or 21.6 percent of the development budget). Spending on rural roads was to continue the shift toward access and feeder roads in a Ministry of Works budget that was to be held to its present level. Between 1975-78 K£22.4 million, or 44.3 percent of the roads budget and over twice the 21.6 percent attributed to these roads in 1973-74, is to be devoted to secondary and minor roads.

2. Relationship of GOK Policy to IBRD and ILO/UNDP Recommendations

During 1971-73 Kenya was the subject of three intensive surveys carried out by the ILO/UNDP and the International Bank for Reconstruction and Development (IBRD). All have served as the basis for the GOK policies described above and one - the Bank's Agriculture Sector Survey-Kenya (Report No. 254a-KE of 1973) - has served as a starting point for project design by the GOK and donors.

The 1972 ILO/UNDP report, Employment, Incomes and Equality and the 1974 IBRD document, The Second Decade: A Basic Economic Report on Kenya reached similar conclusions though having some slight differences in emphases. Both, for example, concluded that a redirection of GOK development policy so as to focus on income and equity was urgent. Both also recommended that redistribution of income could only occur in association with increased production and growth although the Bank refined this somewhat to growth in "productive" sectors. The IBRD further emphasized the need for more efficient use of (increased) resources and restructuring the pattern of growth. Development of agriculture was seen by both agencies as key to achieving all of these objectives.

Recommended policies and programs for the agriculture sector from all these reports were also strikingly similar although the Sector Survey was much wider in its scope and more specific in its proposals. Vastly increased spending, particularly on integrated, area-based programs, including credit, farm inputs, extension services, marketing and storage, aimed at intensifying land use and raising production and incomes of smallholders was particularly stressed. The Sector Survey concluded that if the GOK's concern was with income distribution, it should center these programs in predominantly smallholder areas located in two geographic blocks - all of Western and Nyanza

Provinces and much of Eastern and Central Provinces. These areas, which fit into the IBRD's "Category B" (see Annex II), were characterized as having dense populations at unsatisfactory income levels, often base subsistence, and considerable unexploited potential.

The two agencies recommended that rural roads be closely coordinated and integrated with agriculture development projects. The ILO/UNDP report, for example, preferred emphasis on improved marketing and reduced transport costs through construction of feeder roads and linking remote areas to main marketing centers to raising producer prices, although price increases were also felt important. Within the broader context of constructing rural works, however, rural roads development was additionally stressed as one means of extending social and public services to rural areas in order to facilitate development in the various sectors, i.e. health, education, agriculture.

3. Relationship to DAP and DAP Supplement

The Kenya DAP, issued in October 1974, and the DAP Supplement of June 1975 set forth the basic strategy and rationale for an expanded program of U.S. assistance to Kenya. Agriculture is designated as the principal sector of concentration with the focus of that involvement being increasing smallholder incomes. The DAP recognizes that achieving this goal will necessitate broadening AID's activities in the sector to include efforts in food production, specifically through smallholder integrated crop production programs based in high potential areas and directed toward improving input delivery systems, necessary infrastructure (such as farm-to-market roads), and marketing. The Kenya Roads Graveling project is considered to be one means of implementing this approach.

The DAP Supplement identifies the following sector constraints, listed in order of priority, which are most critical for achieving the GOK's agriculture goals, particularly with regard to employment and equity:

- a) Trained manpower, including organization for implementing sector development activities, agriculture planning, regional planning, and training and retraining of new and existing staff cadres;
- b) Macro-economic policies;
- c) Small producer access to agriculture institutions, services and infrastructure, including inputs, credit, knowledge/extension to apply inputs, markets, and/or storage facilities, roads, and water ; and
- d) Research

4. Progress in Implementing Development Plan

Programs

To date the GOK has been very successful in promulgating and implementing a series of measures on taxation, interest rates, currency devaluation, and increased producer prices for agriculture products, all of which accord with Plan policies and seem to have been effective so far.

The most striking achievement, however, has been in increasing investment in the agriculture sector, although performance here has not been fully in accord with policy proposals. The development budget estimates for the Ministry of Agriculture (actual expenditure data is not yet available) in 1974/75 (Kf15.8 million) exceeded by about Kf 1 million the amounts set by the original Plan and the Sessional Paper No. 4 revision and were significantly above the Kf8.0 million of 1973/74. While the 1975/76 estimate fell substantially short of the targets set by these two policy statements, they still exceeded by about Kf5.6 million the 1974/75 budget level and represented about 16.5 percent of the total development budget. The Ministry of Works budget estimates have increased slightly over 1973/74 figures, but are still less than Sessional Paper No. 4 projections. Roads spending has begun to shift as proposed, with budget estimates for rural roads exceeding planned targets. There was, however, a decrease in the budgets for secondary and minor roads between 1974/75 and 1975/76 and an increase in the budget for primary and secondary roads, reflecting anticipation of an earlier start-up on the donor-supported RAR and GBC programs as well as the impact of inflation on primary and trunk roads work already in progress.

Because of the planning constraint, progress toward designing and implementing a smallholder-oriented sector strategy has been piecemeal. In late FY 1975, with assistance from AID, the first-ever program aimed at "non-progressive" smallholders was approved as Part C of ASL I. The MOA's own proposal for smallholder development, the IADP, was finally presented to the IBRD last May. Negotiations on that program have been concluded and the program should begin in time for the next long rains. Similarly, a revised proposal for the RAR effort was presented to the IBRD and other donors in July 1975, while the GBC program received a temporary set-back with the withdrawal of SIDA in September 1975. Proposed AID assistance for GEC beyond this loan is still being formulated. The first CIDA-provided technical expert for GBC has only recently arrived in Kenya, and the Canadian-financed equipment procurement and delivery is still in process. In effect, many of the new activities needed to implement Plan policies are just now approaching their start-up point.

For further information see Annex II.

2. The Project

As indicated previously the GOK has decided to concentrate its roads construction activities during 1974-78 on improving the feeder, secondary and minor roads network. This effort is part of the overall rural development thrust of the Development Plan and has the principal objective of providing more efficient connections to smaller centers, particularly joining villages and farms to marketing and service centers. The two specific programs which are to implement this strategy are the Graveling, Bridging and Culverting (GBC) effort and the Rural Access Roads (RAR) activity which are together to form the all-weather connections between farms and the primary and trunk road network. The GBC program will upgrade existing secondary and minor, or class D and E, roads to all-weather standard basically through realignment and regrading, installation of culverts and bridges where necessary, and graveling of the roads' surface. The RAR activity will build all-weather minor and unclassified roads from villages to small market centers and/or their juncture with secondary and minor roads, including those covered by the GBC program. Thus, the two efforts are inseparable parts of a basic rural roads construction and improvement program.

As originally proposed in 1972 by the Government the GBC program was to encompass over a six-year period the graveling of 19,355 km (about 12,000 miles) of roads, construction of 70 bridges, and installation of minor drainage culverts. Ten graveling units were to implement the program in seven provinces, each producing about 325 km. (200 mi.) of gravelled roads per year and using capital-intensive construction methods.

After review of the proposal and the carrying out of various economic, financial and technical studies two donors - SIDA and CIDA - agreed in 1974 to participate in the program, each to provide three graveling units and related technical assistance personnel. The total CIDA contribution was to be \$13.5 million, of which \$11.4 million was to be loan financed and \$2.1 million, grant, while SIDA agreed to grant \$14.7 million for the program. SIDA also was to provide financing for in-country training of MOW personnel needed for both the GBC and RAR programs. SIDA was originally to be responsible for GBC activities in the Western and Nyanza Provinces and five adjacent districts in the Rift Valley Province while CIDA-financed graveling units were to be assigned to provinces east of the Rift Valley, i.e. Central, Eastern and Coast. AID was subsequently approached in mid-1975 to provide up to two more units for assignment to the Rift Valley Province.

At that time the Ministry of Works (MOW) expected that the GBC program would involve only eight units. Subsequently, the program was again cut back to the current total of six with the GOK decision to apply the SIDA funds for gravelling to cost overruns on other assistance activities already being implemented (SIDA will still contribute about \$1.2 million for training), and with the later proposal to AID to increase its contribution to cover a total of three units while shifting their area of operation to Western and Nyanza Provinces alone. The first of these units, including related technical assistance engineering and maintenance

personnel, would be financed under the present project. AID is presently considering providing an additional unit subject to the availability of funds and to a review of the present project performance.

The MOW currently hopes to have available six gravelling units, which over six years will gravel about 7,000 mi. of secondary and minor roads in Western, Nyanza, Central, Eastern and Coast Provinces. Unless SIDA at some future point has funds to consider again participating in the GBC effort, Rift Valley and North Eastern Provinces will be omitted from the program until after completing work in the other areas.

Originally the GBC Program for Kenya envisaged the complete gravelling of all secondary and minor roads within a period of six years. AID found this objective to be uneconomic (See Section III-B below) and an alternative program is proposed for the AID component of GBC, which introduces extensive spot improvements rather than link improvements where technically feasible. In addition, the sealing of certain high grades in areas of intense rainfall has been added to the original program to preserve the investment in gravelling. The primary objective of the GBC is still to upgrade D and E roads to (1) all-weather accessibility and (2) a condition where maintenance is practical.

The GBC force will consist of 3 units provided by Canada (C.I.D.A.) which now have most of their equipment delivered in Kenya and expect to begin in a few months, one unit under this Loan (U.S.A.I.D.) and possibly one other unit proposed for AID financing. (This is a reduction of one unit from the MOW proposal based on the analysis of total kilometers to be improved as shown in section II-B below). Each unit is expected to produce approximately 250 km. per year of MOW standard or 500 km. per year of spot improvements, improving access over an average of 400 km. per year.

The selection and programming of links to be improved will be carried out according to the process described in Section III-A below. The number of kilometers which would be eligible for each type of improvement can be estimated from the percentage of non-all-weather roads and the distribution of roads by traffic volume as shown in Tables 8, 9, and 10 below.

Of these non-all-weather roads, approximately one half of those in Kisumu, Siaya and So. Nyanza are located on structurally very poor but productive black cotton soils. This amounts to approximately 600 km.

Of project roads, 42% of the D roads (800 km.) and 10% of the E roads (400 km.) are already gravelled and are, therefore, excluded from the GBC program. ^{1/} These correspond essentially to roads in the higher traffic ranges. This leaves 4951 km. of D and E roads with an earth surface (see Table 10).

Table 10 also provides an estimate of the total kilometerage of road in each of the three GBC selection categories described in section III-A. These totals are based on estimated of the distribution of road types by traffic levels derived from limited periods of field observation. However, a variation of 20 to 25% between categories, would only change the total 4000 eligible kilometers by 10% and the allocation within GBC categories by approximately 400 km.

^{1/} If some of these roads are non-all-weather certain sections could be included on a spot basis.

On the basis of these figures it appears that only 313 km. or 8% of the eligible roads would qualify for the MOW standard, (75 ADT as calculated in Annex IV) unless there is a dramatic increase in traffic levels over the next 5 years. 1/ This means that one GBC unit (which would complete 250 km. per year at MOW standard or 500 km. per year of spot improvements) can handle approximately 2000 km. during the 5-year project period, and that a total of two units would be required to accomplish the 4000 km. program within the period. Only one of these units is proposed in the present project paper and a second is proposed for future AID financing.

In the interim, MOW has agreed to inventory the road network and review the traffic count data in order to verify or revise the figures in Table 10 as necessary.

1/ In fact, more roads will qualify for MOW standard due to future projects or for technical reasons, and 500 kilometers of MOW standard (or 20% of the total) are allocated to the proposed program. Existing traffic levels on some roads may be considerably low if roads are in need of major repairs (e.g. requiring a bridge). Therefore, in addition to counting present traffic and estimating average growth in traffic levels, selection of roads will allow for immediate increases in traffic levels resulting from the improvements.

TABLE 8
Length of Non-All weather Roads

| <u>District</u> | <u>Kilometers D & E Roads <u>1/</u></u> | <u>Estimated percentage all- weather D & E roads <u>2/</u></u> | <u>Estimated Kilometers non all-wea- ther D & E rds.</u> |
|-----------------|---|--|--|
| Bungoma | 730.9 | 65 | 475 |
| Busia | 326.8 | 20 | 65 |
| Kakamega | 959.5 | 35 | 335 |
| Kisii | 861.7 | 35 | 300 |
| Kisumu | 1042.7 | 20 | 210 |
| Siaya | 815.3 | 25 | 205 |
| So. Nyanza | 1414.6 | 45 | 635 |
| Total | 6151.5 | 36 | 2225 |

1/ MOW (see Table 1)

2/ estimate of the Provincial Engineer for the project area

TABLE 9
Length of Roads by Traffic Range

| <u>Province</u> | <u>Road type</u> | <u>kilometers^{1/}</u> | <u>Traffic Range</u> <u>(AADT)</u> | <u>Percent links in range^{2/}</u> | <u>Kilometers of roads in Range^{3/}</u> |
|-----------------|------------------|--------------------------------|---------------------------------------|--|--|
| Nyanza | D | 1,126 | over 125 | 8 | 90 |
| | | | 50-125 | 27 | 304 |
| | | | 10-50 | 51 | 574 |
| | | | 0-10 | 14 | 158 |
| | E | 3,008 | over 125 | 0 | 0 |
| | | | 50-125 | 8 | 241 |
| | | | 10-50 | 50 | 1504 |
| | | | 0-10 | 42 | 1263 |
| Western | D | 776 | over 125 | 10 | 78 |
| | | | 50-125 | 31 | 241 |
| | | | 10-50 | 53 | 411 |
| | | | 0-10 | 6 | 46 |
| | E | 1,241 | over 125 | 12 | 149 |
| | | | 50-125 | 25 | 310 |
| | | | 10-50 | 38 | 472 |
| | | | 0-10 | 25 | 310 |

^{1/} from Table 1

^{2/} from analysis of sample traffic counts in Appendix 1 of the Scandia consult report (50% of D roads, 25% of E roads)

^{3/} Percent links in range times kms

TABLE 10
Road Length Eligible for GBC Program

| <u>1978-79</u> <u>Traffic</u> <u>Range</u> | <u>1973/1974</u> <u>Traffic</u> <u>Range</u> | <u>Total</u> <u>D & E</u> <u>Kms.</u> | <u>Kilometers</u> <u>already</u> <u>gravelled</u> | <u>Earth</u> <u>D & E</u> <u>Roads</u> | <u>Non</u> <u>All-wea-</u> <u>ther rds.</u> | <u>GBC</u> <u>Category</u> | | | <u>Total Km</u> <u>Eligible</u> <u>for GBC</u> |
|--|--|---|---|--|---|-------------------------------|--------------------|--------------------|--|
| | | | | | | <u>A</u> <u>1/</u> | <u>B</u> <u>2/</u> | <u>C</u> <u>3/</u> | |
| Over 180 | Over 125 | 317 | 317 | 0 | 0 | 0 | 0 | 0 | 0 |
| 75-180 | 50-125 | 1096 | 783 | 313 | 125 | 125 | 188 | 0 | 313 |
| 20-75 | 10-50 | 2961 | 100 | 2861 | 600 | 600 | 1211 | 150 | 2861 |
| 0 -20 | 0-10 | 1777 | - | 1777 | 1500 | 0 | 750 | <u>4/0</u> | 750* |
| | <u>Total</u> | <u>6151</u> | <u>1200</u> | <u>4951</u> | <u>2225</u> | <u>725</u> | <u>2149</u> | <u>150</u> | <u>3924</u> |

- 1/ Non all weather roads with a traffic level greater than 20 ADT in 1978 (assumed to be the same as greater than 10 ADT in 1973/74) on good soils.
- 2/ Non all weather roads with traffic less than 20 ADT in 1978 but associated with a development project such as a rural access road, or all weather roads in bad condition with traffic greater than 20 ADT in 1978.
- 3/ Roads on black cotton soils with a traffic level greater than 20 ADT in 1978 and associated with a development project such as a rural access road.
- 4/ Assuming half the lowest traffic, non all-weather links will be associated with a development project or will generate 20 ADT for other reasons within the 5 year project period.

The technical analysis discusses several significant issues regarding the MOW's capability to maintain the roads once constructed and, more crucial in the short run, to locate suitable, trained manpower to implement simultaneously two programs of the magnitude of RAR and GBC while also meeting a resulting, much-expanded maintenance requirement. The analysis concludes that these capabilities do exist; however, it does recommend that during loan negotiations the GOK covenant that sufficient provision will be made in the annual budgets for maintenance of secondary and minor roads. AID will additionally provide for each of its gravelling units the services of a construction superintendent and senior maintenance mechanic to head up the unit's operations. Under the present project, AID will also finance a Project Engineer who will be assigned to the MOW Special Projects Branch which has overall administrative responsibility for both RAR and GBC. This Engineer will handle administrative and logistics support arrangements for the proposed AID gravelling unit(s) as well as roads selection and other related duties. CIDA has similarly supplied a Project Engineer to work with its units, and both of these donor-financed engineers will work under the direction of the SPB's Chief Executive Engineer (Special Projects).

The Mission has determined that technical assistance personnel included as part of loan programs should in future be grant rather than loan-financed. (As AID/W is aware TA personnel provided under the FY 1974 Livestock Loan and the FY 1975 ASL I are loan-financed.) However, the high cost of such staff, particularly in relation to that of inputs provided by other donors, and Kenya's current economic problems justify provision of loan-related TA, both personnel and training, on a grant basis. Such a move would also be in accord with decisions by several other donors, notably SIDA and the UK, to provide all their assistance on a grant basis (SIDA) or to increase the grant component of their aid programs (UK).

It has been suggested that the GBC be made more labor-intensive. While the MOW has agreed to review the possibility of making some operations under the gravelling program more labor-intensive than originally proposed, it does not agree, and the Mission concurs with the Ministry, that this is practical or warranted. Such a change would not only increase GBC costs dramatically, but would also increase the requirement for lower-level supervisory manpower beyond the capability of the MOW's present and planned training program to supply. As agreement on the capital-intensive nature of the GBC activity has already been reached with CIDA and since agreement on proposed increases in training programs is far advanced among the MOW,

IBRD and SIDA, it would be inappropriate for AID to insist at this point on such a major change in the program's approach and components. Since the national RAR effort will be labor-intensive, it also seems reasonable that the MOW should gain experience with labor-intensive techniques before resorting to another national effort of a similar magnitude.

Finally, provision of the one gravelling unit under the project will enable phased delivery of U.S. equipment, and, thus, a reduction in the possible strain which might be placed upon GOK human and financial resources by simultaneous delivery of two units. It will also make available GBC equipment needed to follow up on rural access roads already being constructed in the Western Province under the AID-supported Rural Development Project-Vihiga and in South Nyanza District. It will, lastly, through provision of the Project Engineer, provide a mechanism for carrying out detailed implementation planning for the U.S. assistance components, including selection of roads to be gravelled, prior to arrival of U.S.-financed equipment.

3. AID Inputs

AID financing for one gravelling unit and three technical assistance personnel will total \$9.1 million in grant and loan funds.^{1/} Of this amount about \$1.4 million will be grant financing for a total of 13 years of services, including a Project Engineer (five years), a construction superintendent (four years), and a master mechanic (four years), and for a special evaluation program. Loan funds now estimated at \$7.7 million will provide imports of U.S. equipment for one gravelling unit, construction materials, and certain recurrent costs, including spare parts, a percentage of POL costs, inflation and contingencies. The GOK contribution is estimated at \$3.2 mil. For more detail see the technical and financial analyses.

As indicated later in the financial analysis section, grant disbursements are estimated to occur over a five-year period, FY 1977-FY 1981. Loan disbursements on all major equipment items should be completed at the end of the first quarter of FY 1979 or about two years after authorization. However, disbursements on POL and spare parts shall be distributed throughout the implementation period of the program, or until April 1982. This gravelling unit should become fully operational NLT mid-1978, which would mean that POL financing would be assured only for the first 17 months of the total six-years of operations if the PD 57 disbursement limitation is adhered to, i.e. three years from satisfaction of CP's or to about July, 1980. The Mission believes this would not be appropriate and requests that the disbursement period be extended to ensure that adequate quantities of spare parts and POL will be available for the AID unit throughout the duration of the program, i.e. through April 1983. (These dates can only be illustrative since they are subject to modification in light of actual recruitment time and operations).

^{1/} All grant funds to be obligated in FY 1977.

III. Project Analyses

A. Technical Analysis

1. Engineering Requirements

a. Introduction

The program proposed for AID loan financing includes the purchase of equipment and spares for one construction unit to be used in the gravelling of 800 miles of existing secondary and minor roads in two provinces of Kenya - Western and Nyanza. Also to be loan-financed by AID are materials for construction of approximately 20 bridges and 2,600 cross drainages, and a portion of the POL required for operation of the construction unit. In addition, the AID program will include funding of contracts for (a) 13 worker-years of technical assistance (to be grant-financed) and (b) equipment procurement services (to be loan-financed). The technical assistance will include a project engineer, an engineer/construction superintendent, and a master mechanic.

The AID program is part of a larger undertaking in road gravelling for which CIDA will be providing three construction units and the IBRD and SIDA will be financing training facilities and staff. Basic data for this technical analysis was developed in connection with the planned CIDA/IBRD/SIDA inputs.

b. Road and Bridge Standards

The road improvement program basically consists of constructing:

- 1) Surfacing - Consists of 5.5 meters wide (18 feet), the thickness will be 15 cm. granular material (6 inches).
- 2) Shoulders - Consists of 1.2 meters wide (4 feet), constructed of drainable material.
- 3) Ditches - Shaped at a minimum depth of .5 meters (20 inches) paralleling the road.
- 4) Drainage - Cross drainage in the form of corrugated metal culverts.
- 5) Bridges - Steel girders and/or reinforced concrete box culvert placements where perennial stream conditions prevail.
- 6) Alignment - Both vertical and horizontal alignment may require minor readjustments to provide minimum vehicle stopping sight distance.

These are Ministry of Works Road Department standards for secondary (Class D) and minor (Class E) roads which have been applied throughout Kenya. (See ANNEX III for a typical cross-section.)

Bridge standards for the project have been developed by the Roads Department of the Ministry of Works. These standards represent a low-cost type of steel girder or reinforced box culvert construction. Bridging requirements and priorities will be determined, phased and costed on the basis of annual construction plans for gravelling.

Standards for roads and bridges have been reviewed by AID and are considered appropriate and acceptable for the proposed program.

c. Construction Methods

The AID-financed self-contained gravelling unit will perform the following construction work:

- 1) Right of way clearance (where required)
- 2) Shaping of road surface and parallel ditch sections
- 3) Curvature correction of roadway, both vertical and horizontal
- 4) Placement of cross drainage culverts (ahead of the main operations)
- 5) Selection of gravel pits and pioneering of access roads to gravel pits
- 6) Pit excavation and stockpiling of surfacing material
- 7) Loading and hauling of surfacing material
- 8) Placing and spreading of surfacing material
- 9) Compaction of the surfacing material.

There is a great variation from road to road in the amount of these works required for a viable all-weather road. The needed amounts will vary with the topography, rainfall pattern, angle of the axis to contours (practically no realignment is planned) and soil conditions. The blend of equipment proposed conforms well to the average for Western and Nyanza Provinces developed by the MOW pragmatically over these last 5 years of limited GBC, and is sufficiently flexible to allow shifting of dozers, trucks and loaders to keep two crews efficiently employed.

In general, shaping, ditching and surfacing will be equipment-intensive operations, culverting and bridging will be labor-intensive.

i) Surfacing Materials

The MOW has completed preliminary investigations for pit sources of select surfacing materials for the gravelling operation in the areas where the AID unit will be working. Identification of specific locations for surfacing materials will be carried out following the arrival of the project engineer. Preliminary investigations by MOW indicate sufficient sources of surfacing material are available adjacent to the roads. Therefore, material source and quantities are not expected to present a problem in the implementation of the program and no crushing equipment will be required.

The quality of material selected for surfacing will be based on MOW standard specifications for gravel wearing course. The "gravelling" is the application of "murrum" as surfacing on a subgrade of existing material. Murrum is a term applied to select material containing particles from larger than gravel size, gravel sand, silt and/or clay in varying proportions. The gradation curve can be improved by "scalping" to eliminate over 8 cm. sizes, by selecting the thickness of the layer to be exploited and by dozer blending before loading. At times suitable murrum may be found along the road to be surfaced, at other times it must be hauled some distance. Generally it provides a good and durable surface for the traffic volume anticipated on these roads.

In areas of high rainfall and steep grades (e.g. Mt. Elgon region in Western Province) murrum surfacing will not be sufficient and some areas will have to be bituminized for resisting the torrential runoffs, especially in sag of profile.

There are many areas where the subgrade of existing material is quite hard (small boulders and outcroppings in more or less sandy clays) but of rugged riding quality. In some of these areas, only 3 to 4 inches of murrum will suffice to produce an adequate surface. In other areas, where traffic is light, existing width less than the MOW specified 5.5 meter width of surfacing will suffice. Contract "regravelling" costs more than MOW's and is of poorer quality, judging from field observations.

ii) Culvert Placement

Cross drainage installation will be carried out by hand labor and equipment contained within the gravelling unit. Most culverts should be of plain concrete pipe of local manufacture. For diameters up to 90 cm. (36") the only machine work necessary is trucking to the job site. Unloading, grading, placing of pipe and rough stone headwalls can all be done efficiently and well by labor only. Small box culverts of short span can also be hand-built with masonry walls and headwalls, concrete or masonry inverts and lightly reinforced concrete decks.

This work will be done in advance of the reshaping, and some local casual labor could be employed.

iii) Bridge Construction

Bridge design plans, as well as engineering supervision and inspection, will be the responsibility of the MOW; however, if considered necessary by the project engineer, inspection control may be supplemented by employing a local consultant firm.

Bridge construction will be undertaken using local contractors selected through competitive bidding procedures. The MOW will finance all design and construction costs using GOK local cost contributions to the project. Bridging materials, i.e., steel girders and reinforcing steel, will be purchased with AID financing and made available to the contractor(s).

The project engineer/MOW will assure coordination between the bridge and road construction programs. Bridge work is to be started well in advance of earthwork and regravelling because of (1) the slower pace of such work, (2) the advantage of a completed bridge in reducing the cost of gravelling (fewer trucks will be needed to keep the grader and roller on a high daily output), and (3) bridge (and culvert) work can be pursued during the initial period between agreement and delivery of the road-building machinery.

Bridges of masonry substructure, reinforced concrete deck and masonry parapets are adequate, labor-intensive, and already widely used in Kenya. This is the expected "standard" type to be used in the GBC program. Local contractors should be encouraged to bid on this work.

Where Bailey bridges or other truss structures are necessary, for example where flood conditions, riverbed configuration, temporary need because of planned stage construction for future programs, et al, some are available in Kenya and could probably be used economically, perhaps more than once. Because of highcost, long delivery time, and the need for cranes which are not part of the GBC unit, long span steel beam bridges should be used only where no other solution is practicable.

d. Link and Improvement Selection

A system of link selection is required to identify and assign priorities among the road links to be improved under the GBC program. Such a system should limit these links to those parts of the total D and E roads network which require improvements and which are economically feasible and/or associated with local development projects. This selection process must involve the MOW's evaluation according to technical criteria but should allow also for formal consultation between the MOW and the District Development Committees, which are the lowest level planning bodies in the project area.

The decision on which links to improve should be separated from the choice of a level of improvement. The latter should be decided strictly on the basis of forecast traffic. ^{1/} The structure of the link selection process, in contrast, should be designed to maximize small holder access.

(1) Link Selection Criteria and Procedures

The link selection criteria proposed below would group the candidate links into three categories corresponding approximately to benefit cost analysis elements described in subsequent sections. These categories are as follows:

category A: Presently non-all-weather road with traffic levels greater than 20 ADT on good or fair soils.

category B: Presently non-all-weather roads with traffic levels under 20 ADT but connected with specific development projects such as rural access roads, and on good or fair soils.

or
presently all-weather roads in poor condition with traffic levels greater than 20 ADT on good or fair soils.

category C: Roads on black cotton soils or other poor soils, with traffic greater than 20 ADT and associated with a specific development project.

The object of using a minimum traffic threshold is to ensure that only roads with some economic value are improved.

The traffic levels used for this selection should be future traffic in the opening year. This traffic should include an allowance of 8% per year for growth from the last traffic count, and 10 ADT for each significant development project to which the road is directly linked ^{2/} (This would include a rural access road project, or a health center or an agricultural training center or any other project that can be expected to generate some traffic).

^{1/} This is in accord with the conclusions of the 1975 evaluation of SRDP road programs by the Institute for Development Studies of the University of Nairobi (Chapter 12).

^{2/} Both the 8% growth rate and the 10 ADT figure are to be verified in the evaluation program described in section IV-C. These initial assumptions are based on preliminary road impact evaluation data for rural roads constructed under the Vihiga SRDP.

The selection procedure would take place in three steps. First the MOW will provide a list of the roads in each category within each district to the District Development Committee. Second, the DDC will then decide on link priorities within each category. Third, the MOW would program the GBC unit to improve the highest-priority links first in each district.

Given the necessity of keeping transportation costs and unit downtime to a minimum, it is not desirable to move the unit from its base location until all the eligible GBC roads are improved in the service area of that base. In order to improve the maximum number of category A links early in the program, however, the base locations should be selected first in those areas with the highest percentage of category A roads.

This selection procedure focuses the MOW evaluation process on the technical criteria where the MOW staff is most informed, while allowing the DDC's to fulfill their role by determining local priorities and bringing to bear their knowledge of local conditions and potential response. The DDC's could also recommend that additional roads be added to the list if such roads can be shown to qualify on the basis of future development.

(2) Link Improvement Selection

The type of link improvement to be carried out on a given link is to be determined primarily on the basis of future traffic as defined above, in comparison with a traffic threshold (see Annex B.IV.).

The following thresholds should be used:

- 75 ADT for MOW standard in flat or hilly terrain
- 60 ADT for MOW's standard with sealed grades, in mountainous terrain with intensive rainfall
- 20 ADT for spot improvements. ^{1/}

This procedure is aimed at getting as many links improved to an all-weather standard as possible by the first GBC unit, while assuring that the standard of the road is suitable to the traffic level (and therefore economic benefits are high enough to cover costs) and that the improved road will be maintainable with adequate maintenance support from the MOW. Those links which meet spot improvement thresholds but have more than 40% bad sections could be improved to MOW standard in exceptional cases. ^{2/}

(3) Data required from the GOK

In order to implement the above selection system, three types of data are required from the GOK, two types to be provided by the MOW and one type by the DDC's.

From the MOW, data is required on road condition and on traffic levels. The present road inventory maintained by the inspectorate does not contain information on whether or not a link is an all-weather link or on the average surface condition of each link. As the first step, the MOW will inventory this data for those links which could be candidate links for the GBC program. The AID project engineer can work with the MOW on this inventory but the MOW should have primary responsibility for it.

^{1/} The average for spot improvements is expected to be 40 ADT.

^{2/} Allowance has been made for an additional 12% MOW standard in the economic and technical evaluation for this circumstance.

The present traffic counts taken in the project area are not comprehensive. However, a complete traffic survey of all roads in the two provinces is judged to be unnecessary. As the second step the MOW will estimate current traffic levels on candidate links relative to the 20 ADT threshold, and carry out a traffic count or survey on each link selected for improvement prior to improvement to verify the traffic level. (Data obtained through this count or survey would also be used for program evaluation as described below).

The DDC's can play a role in estimating local road needs where traffic counts are not available or of limited use. However the primary data required from DDCs would be the specific development project locations associated with each link. This data should be available as a normal part of DDC planning activities. The method of transmission of this data from the DDC's to the project engineer prior to the development of the MOW's proposed program of improvement in each district remains to be determined. (The MOW representative on the DDC could serve this function; however, some relationship between the DDC and the project engineer should be encouraged). A summary of these selection procedures and criteria is presented below. They have been fully discussed with and agreed upon by the GOK. The loan agreement will include a covenant wherein the roads to be improved will be selected in accordance with the procedure and criteria described hereunder and that, upon joint agreement by AID and the GOK, these criteria will be amended as necessary in accordance with the results of periodic evaluations of the project.

SUMMARY SELECTION PROCEDURES AND CRITERIA

| | <u>Time</u> |
|---|-------------|
| 1. MOW Roads Inspectorate and SPB Screen Project Area Roads based on existing data for: Road Condition Soil Condition/Type Traffic level (AID-funded Project Engineer verify the above). | 3 months |

Criteria: a) Non-all-weather links that are impassable during year, which provide increased access to relatively isolated rural areas, which are in areas where local inhabitants give high priority to road improvements, and which

- (1) have average traffic levels greater than or equal to 20 ADT on good or fair soils;

Time

- (2) have average traffic levels less than 20ADT on good or fair soils and which connect to rural development project areas;* or all-weather roads on good or fair soils;
 - (3) have traffic levels greater than 20ADT on poor soils which connect to rural development project areas;^{1/} and
 - (4) all of above roads with gradients of 8% or more.
2. SPB carry out traffic counts on candidate road links and determine type of improvement for candidate road links based on estimated traffic level. 4 months
- Criteria: a) Spot improvement when 25% or less of road link is impassable, when this procedure is technically feasible, and when average ADT is 45 (i.e. $20 < ADT < 70$);
- b) Construction to MOW standard for Class D roads (5.5 m. surface with 1.2 m. shoulders) where ADT is greater than or equal to 70;
 - c) Build to MOW standard with bituminous seal on steep grades of 8% or more on sections with intense rainfall and where ADT is greater than or equal to 60.
3. DDC verify condition of roads on SPB candidate list; include other or/and alternate road links; prioritize final list of road links. 2 mo. concurrent with No. 2 above
- Criteria: a) Local knowledge of roads' condition.
- b) Local knowledge of present and planned rural development activities*
 - c) Local knowledge of present and future traffic levels.
4. SPB revise as necessary type of improvement for selected road links based on traffic count survey. 2 months

^{1/}
For example IADP, RARP and ASL I - part C .
One criteria for RAR will be that roads selected for construction will connect to classified roads which either are presently passable or which will be made passable by GBC within 12 months of construction.

Time

Criteria: a) Same as No.2 a-c above

5. SPB develop annual program of work for gravelling unit. 1 month

Criteria: a) Select base area and subsequent work areas as those which have largest percentage of highest priority roads (see 1.a. above) and which minimize necessary movement of unit.

6. Joint GOK-AID review of workplan. 2 months

Criteria: a) All above criteria

7. Construction Begins (based on first workplan)

Criteria: Per No.2 and No.5 above.

Work Plans and Reports

Annual programs of work will be developed to identify the specific roads to be improved, the proposed type and sequence of the improvement and the proposed plan of evaluation. All work plans will be jointly reviewed by USAID/Kenya and the SPB about 60 days prior to the start of operations for the relevant period. The first work plan will be prepared and reviewed prior to the arrival of the first shipment of equipment.

During implementation of the work plan SPB will submit to AID quarterly progress reports specifying, inter alia, the extent to which the program of work has progressed (Km. gravelled, whole link vs. spot improvements, bridges constructed/repared, etc.), progress/problems associated with the technical services provided and with procurement, storage and transport of spare parts and equipment, percent of capacity utilization, rate of progress (Km. gravelled per day), and other information as may be jointly agreed upon by AID and SPB. A format for these reports will be jointly developed by the AID-financed Project Engineer and USAID.

The purpose of the annual programs of work and quarterly progress reports is to ensure that the project will be successfully implemented without serious delays, particularly on the planning side. It should be noted that, although specific roads to be improved are not identified prior to loan/grant signing, there are numerous roads in the project area that will meet the above established and agreed upon criteria. Thus the possibilities of delays on the planning side are minimized.

2. Technical Feasibility

a. Appropriateness of Technology

The gravelling program was deliberately designed by the MOW as a capital intensive operation. Canadian support (three units) is being provided on this basis and SIDA, had its support not been withdrawn by the GOK in order to cover inflationary cost increase on projects already being implemented, would also have supported this approach. Target construction is for each gravelling unit to complete 1.6 km of road per day (one mile) at a sustained rate of 325 km (200 miles) per year. This rate of construction can only be completed by an equipment intensive operation with a minimum, although highly skilled, labor component. AID supports this basic premise. (See also the Economic Analysis section on "Labor vs. Capital - Intensive Methods.") Nevertheless, certain labor-intensive operations are applicable to this project. These include clearing and minor grubbing of the right-of-way and installation of CMPC-cross-drainage.

If AID is to assist in financing the gravelling program with the construction targets already established, it is not proposed that AID attempt to change the basic orientation of the program from capital to labor-intensive. However, it is planned that additional labor operations will be introduced as the construction gets underway and as project engineers evaluate the project to determine what labor substitutions are feasible vis-a-vis the high rate of construction which must be maintained on a daily basis.

The equipment list proposed for AID financing is presented in ANNEX VI. The basic equipment spread (about 95%) is the same as that recommended in the CIDA feasibility report; however, additional items have been included for mobility and effectiveness of the unit, for maintenance of the construction equipment, and to allow for greater use of labor intensive methods wherever possible.

Major modifications for increasing the mobility and effectiveness of the unit are increases in the number of fuel tankers, service trucks and parts vans, and the addition of project manager's vehicles, a mobile workshop, fuel storage tanks, tools, radios and a low boy tractor-trailer. Major modifications to allow for a more labor intensive unit are the deletion of one front end loader (loading some dump trucks by labor) and the addition of water storage tanks for labor camp and flat bed trucks for transport of workers.

The equipment type and quantity selected for one gravelling unit provides enough capacity to maintain the rate of one mile of gravelling of road per 8-hour working day. Based on net available working time per unit per year, an estimated 280 miles of road gravelling can be completed each year.

While the CIDA funded gravelling unit will be operating in other provinces and will be emphasizing improvement of whole road links, REDSO/EA engineering staff have determined that the equipment proposed for this project is

1/ Corrugated metal pipe culvert

appropriate for the topography of Western and Nyanza provinces and for the three types of road improvements described above. It should be noted that certain adjustments in the AID list may be made if considered warranted by the experience gained in initial operation of the CIDA units which are scheduled to commence work prior to final ordering of the AID-financed equipment.

b. Equipment Maintenance and Spare Parts Support

The AID-financed gravelling unit will have sufficient maintenance support equipment on-site to enable repairs to be carried out on all equipment and vehicles up to the third echelon level of maintenance. Major overhauls and rebuilds (4th and 5th echelon) will be undertaken at dealer service points or the central workshop at MOW in Nairobi. In addition, MOW has 256 permanent maintenance camps established throughout Kenya, 61 of which are in the project area and also available for equipment repair.

Because of the equipment and intensive nature of the work, availability of and timely access to spare parts are major factors for successful operation of the field gravelling unit. Orders, in-country deliveries/transportation, storage and installation of the spares have in the past represented major constraints for the efficient functioning of an equipment fleet in Kenya.

There are generally excessive delays in ordering spare parts under the existing procurement system simply because of the amount of bureaucratic "red tape" involved. The most critical element in the procurement system is a requirement that parts costing over \$ 2,500.00 must be purchased via a lengthy competitive process involving in-country and, frequently, international bidding. To address this constraint it is proposed that AID fund spare parts equivalent to 60 percent of the FOB value of the total equipment purchased. This level of funding is intended to ensure sufficient supply of spare parts during the four-year life of the construction phase of the project. To avoid problems in procuring this volume of spare parts, procurement under this project will be undertaken by an independent overseas procurement agency (e.g. AAPC) under a contract with the GOK. For timely ordering and delivery of spare parts for this project the following system will be followed:

- (a) fast moving spares will be ordered and received in conjunction with the initial consignment of equipment and vehicles;
- (b) phased procurement from the U.S. combined to the extent available with off-shelf procurement through authorized dealers in Kenya; and
- (c) certain hard-to-obtain spares will be airfreighted from the U.S. or bonded warehouses.

The system described above is intended to avoid the high degree of non-use normally experienced when all spares are ordered as stock items with equipment.

Problems encountered with in-country delivery/transportation under existing MOW arrangements result from the unavailability of adequate transportation fleet for transporting spares from port-of-arrival to storage warehouses and from warehouses to specific worksites. To address this constraint the present project will be self-sufficient in transportation fleet for spare parts.

Problems encountered with parts installation result from lack of sufficient numbers of adequately trained mechanics at the provincial level workshops and at worksites. This problem will be addressed by providing a mechanical engineer with the AID gravelling unit where it is expected that 80 percent of repairs can be made. As stated above, major overhauling and rebuilding will be undertaken either at provincial work camps or at the central workshop in Nairobi. Performance in repairs at these levels should improve with the expanded and improved staff training program implemented by STD which will produce increasing numbers of trained mechanics.

To avoid problems of not having adequate storage space for the volume of spares to be ordered (60% FOB value) and of storing parts for US gravelling equipment with other makes of miscellaneous equipment, the loan agreement will include a covenant wherein the GOK will provide a separate storage warehouse/store for spare parts provided under the loan.

The MOW's existing maintenance capability supplemented by the spare parts support program outlined above and the availability of U.S. technical assistance for maintenance supervision (see section d.3 below) will keep the AID-financed equipment operating at the level needed to meet construction targets.

c. Road Maintenance

1) Requirements

Both the design standards and construction methodology of the roads being built under the gravelling program will require the MOW to provide a closely controlled and adequately financed follow-on program of road maintenance. This is necessary both to protect the initial investment and maintain the "as built" character of roads developed under this program. The proposed design of the road surface is such that with each passing vehicle there is a proportionate loss of surfacing material. Although dependent on traffic volume, the extent of loss of surfacing material will be such that at the end of year three

four, or five, from 50 to 75 percent of the surfacing material may have disappeared.

The SIDA report states that the MOW has established an as yet-to-be-tested maintenance program, whereby roads gravelled under this program will be regravelled under a maximum five-year program cycle. The cycle would be shortened by one to three years dependent upon wear conditions from daily traffic volume. This means that regravelling will be effected on every kilometer of road built/upgraded on a schedule of every three to five years. In addition, routine annual maintenance of the roadway would include planned dragging of the roadway 12 times a year, blading by grader and gravel patching four times a year, cleaning of ditches and culverts, all to be accomplished by the MOW.

However, an AID analysis of projected traffic levels and of the proposed maintenance program revealed that regravelling operations will be required on every kilometer of road built on a schedule of every six to ten years and that regular maintenance operations should be made more labor intensive. At projected traffic levels, the roadways should be patched by hand 12 times a year and bladed by a grader only once or twice a year. A more detailed system of regular maintenance and rebuilding operations is discussed below.

2) Performance

The MOW's capability to adequately maintain the roads proposed for gravelling under this program is by and large dependent on:

- (a) adequate budget allocations from Treasury to perform routine maintenance and the required regravelling cycles, as well as funding from Treasury for (i) replacement of road maintenance equipment, (ii) procurement of additional units of equipment to meet expanding needs, and (iii) the POL and spare parts necessary to keep the existing and expanded fleet of equipment operational;
- (b) adequate numbers of trained personnel to operate an expanded road maintenance program.

With respect to annual GOK budget allocations for road maintenance, available data indicate a relatively high request/approved ratio, i.e., historically the MOW has received on an annual average basis more than 80 percent of funds requested for maintenance of all roads in Kenya. According to the CIDA report, however, the budget experience for regravelling programs has been less satisfactory and in fact is described as more of a constraint than actual capacity to do maintenance work. In part in the last two to three years this is a reflection of an anticipated earlier start up of the GBC program and consequent deletion by the Ministry of Finance and Planning of funds for regravelling and maintaining GBC program roads.

The MOW forces and budget have so far been inadequate to the task of maintaining the D and E roads which were generally of poor quality when added to the national system in 1971. In the present condition of some of these roads (unculverted, undrained, unsurfaced) maintenance really means rebuilding; the annual cost of maintaining an undrained earth track can approach its construction cost and it would still be impassable after the rain. The GBC program will reduce the cost of maintenance on a road of this type to achieve an all-weather standard, although more MOW effort than is presently being expended is required to keep them in good condition.

The roads upgraded by the GBC unit would be maintained by an expanded M.O.W. work force in the project area. A training school in Nairobi is now functioning and is currently undergoing expansion of plant, facilities and faculty so as to produce the increased number of operators, mechanics and artisans necessary to the success of these interrelated programs. Financing and implementation of the school is assured by S.I.D.A. and others (see Section III.A.2.d. below).

The present maintenance allocation for D and E roads in the project area is £804,000 or £130 (\$310) per km. This money is not presently spent on maintaining the D and E roads, as part of it is spent on higher-priority road maintenance and part on the road "regravelling" program which the GBC is supposed to supplement. Therefore the actual amount spent on D and E road maintenance is closer to £100 per km., and the lower-traffic roads receive hardly any maintenance.

The inadequacy of maintenance funds is witnessed by the condition of the less-travelled D and E roads and by the present necessity of the provincial MOW to forsake the use of its available machines for 6 months of the year due to lack of funds. There is a clear capacity to do more maintenance with additional operating funds using the same personnel and equipment. This problem has been exacerbated recently with the allocation of 54% of requested funds in 1975/76 as compared with 80% in previous years.

The allocation procedure for budgeting used at present is based on road traffic levels and starts from £100/km/yr in the lowest category and rises to £160 and £210 for the next two higher categories. The present D roads are found mostly in the lower category but some roads appear in the two higher categories. Almost all E roads are relegated to the lower budget level.

It is estimated that an additional \$210 (£90) is required per km in order to keep the project roads in good condition. This implies an increase of $90 \times 1300 = £117,000$ per year to maintain the roads to be improved by this one GBC unit over present budget conditions. At project completion this represents an increase of 15% in the budget for D and E roads. This amount would increase proportionately with additional GBC roads if they are properly maintained and it will increase with price inflation. The whole impact of course will not be felt until the end of the 5 year project period.

This represents an increase of 3% per year (or 6% per year for 2 units) which may be possible with an adequate effort by the Ministry of Finance and Planning and the MOW. Within the present budgeting structure, this increase can be accomplished by upgrading the project roads two categories. This increase may in fact be partly justified by a traffic increase which would upgrade the budget category in any case.

However, the projected increase in required maintenance allocations is clearly more significant for more than one gravelling unit working on other (non-project) D and E roads. Also, the additional maintenance requirements for RARP roads and the ongoing maintenance requirements for RARP roads and the ongoing maintenance requirements for other (class A, B, and C) roads are important factors in determining the amount of effort which the GOK can make for road maintenance.

The following attempts to estimate the impact of the GBC and RAR program on the country-wide road maintenance allocations. The figures below do not include allowances for inflation.

AID-Funded GBC Unit

| <u>Year</u> | <u>Incremental Km.</u> | <u>Incremental Maint-^{1/}</u> | <u>Cumulative</u> | <u>% Increase^{2/}</u> |
|-------------|------------------------|--|-------------------|--------------------------------|
| 1978 | 325 | £ 29,250 | £ 29,250 | 2.3 |
| 1979 | 325 | 29,250 | 58,500 | 4.6 |
| 1980 | 325 | 29,250 | 87,750 | 6.9 |
| 1981 | 325 | 29,250 | 117,000 | 9.1 |
| | <u>1,300</u> | | | |

^{1/} Average incremental maintenance requirements estimated at £90/km.

^{2/} Base year (1975/76) routine road maintenance allocations for roads in the Western and Nyanza Provinces is about £1,279,728 of which £804,000 or 62% is for D and E roads. Percentage increase is over total provincial road maintenance allocations.

| <u>Year</u> | <u>Incremental Km.</u> | <u>Overall RARP^{1/}</u> | | <u>% Increase^{3/}</u> |
|-------------|------------------------|--|-------------------|--------------------------------|
| | | <u>Incremental^{2/}</u> <u>Maint.</u> | <u>Cumulative</u> | |
| 1978 | 1,206 | £ 60,300 | £ 60,300 | .9% |
| 1979 | 2,150 | 107,500 | 167,800 | 2.6 |
| 1980 | 3,014 | 150,700 | 318,500 | 4.9 |
| 1981 | 3,330 | 166,500 | 485,000 | 7.5 |
| 1982 | <u>3,330</u> | 166,500 | 651,500 | 10.0 |
| | 13,030 | | | |

Assuming that the revised GBC program will consist of five units operating at a capacity of one mile per day for 325 days per year, this would give a total incremental allocation for routine road maintenance resulting from the total GBC program of about £585,000 over a 4-5 year period. Adding this increment to the incremental requirement resulting from the RAR program (£651,500 over a five-year program) results in a total estimated incremental allocation for routine maintenance of about £1,236,500 or about a 19% percent increase in base year routine maintenance allocations, without inflation.

The above figures assumes that MOW will perform maintenance tasks for the GBC project roads following existing maintenance procedures. In preliminary analysis for the AID component of the RARP, the maintenance procedures for all secondary and minor roads were studied. The analysis shows that MOW organization for maintenance on these roads is essentially identical to its organization for maintenance on higher priority (higher ADT levels) roads. This procedure depends on use of permanent employees in work camp situations in which housing is provided and relatively heavy use of motorized vehicles for transport of unskilled labor for relatively short distances. While this type of procedure is applicable for major trunk road maintenance in which work crews will travel longer distances and will maintain roads with significantly higher ADT levels, a different maintenance procedure would be more effective and economic for secondary and minor road maintenance. AID has proposed the basic elements of such a maintenance system to the MOW, which agrees that its present maintenance procedures for lower classed roads should be reorganized. Preliminary projections show that with some restructuring of the maintenance procedures, adequate maintenance for all existing classified roads in the project area could be assumed within present levels of maintenance allocations.

1/ The AID Rural Roads Systems project will construct approximately 800 km or 6% of RARP roads

2/ Incremental maintenance requirements are estimated at £50/km.

3/ Base year country-wide (1975/76) routine maintenance allocations for all roads is £6,513,366.

AID is proposing a system (or some variation thereof) involving considerably less use of motorized vehicles for transportation (replacing them with bicycles) greater use of casual/day labor rather than permanent labor (reducing amount of funds spent on under or un-utilized labor and housing), greater use of maintenance engineers and inspectors to ensure quality control and more use of hand maintenance.

The above proposed system would significantly reduce and, depending on the extent to which it is implemented in the various provinces, possibly eliminate the projected increases in the maintenance allocations for Class D and E roads. Presently there are no road maintenance allocations for unclassified (RARP) roads. ^{1/} Therefore construction of additional kilometrage of unclassified roads and stipulation that they be adequately maintained will require that incremental maintenance funds be requested by MOW and allocated by MOFP.

To assist the MOW in restructuring its maintenance procedures for low Class D and E roads and in developing an appropriate system for maintaining RARP roads, AID is proposing to incorporate a very small technical assistance component for rural road maintenance in the AID-funded RARP. This component of the AID project would establish and test a pilot rural roads maintenance system which, if successful, would be phased-in over the total project area over the life-of-project which possibly could be replicated in other provinces. Replication of such a maintenance strategy could have significant impact in enabling the GOK to meet incremental maintenance requirements resulting from its expanded roads initiatives.

1/ This is because the maintenance requirements for these feeder roads are so small relative to overall maintenance requirements as to not require separate allocations. Some maintenance for feeder roads is being funded under feeder roads construction budgets.

Examination of the operations of the MOW Road Department, Road Maintenance Branch, indicates it to be a well organized unit of the Road Department with a high degree of planning and implementation capability. The Road Maintenance Branch, as is the case with the total MOW operation, has a high proportion of expatriate engineers, planners and administrators which is reflected in its reputation for high quality performance. Expansion of the Road Maintenance Branch to meet the requirements of the GBC program is now in the planning stage. In fact, the GOK/MOW is fully cognizant of the need to provide additional trained staff not only for construction but for maintenance as well, and has taken the necessary steps, including securing appropriate donor financing, to significantly increase the availability of skilled supervision, plant operations and mechanics over the next five years. These plans are discussed in the next section.

In conclusion, it would seem reasonable to make the following judgements with respect to road maintenance: First, while the MOW's proposed regravelling plans outlined above are probably set at unrealistically high levels, it must be noted that as a developing country, Kenya's reputation for overall road maintenance is among the best in Africa. Further, with its present high caliber Road Maintenance Branch as well as programs for increasing trained manpower availability, there is no reason to expect any diminution in the MOW's capacity to do maintenance work. Second, while there is no way to guarantee in this paper that adequate maintenance funding will be available, the GOK, by seeking assistance from CIDA and AID and by committing its own resources, has indicated a relatively high development priority for the gravelling program. Also, the fact that the GOK is devoting appropriate attention to assuring the availability of trained staff is another factor which leads one to believe that the prospects for adequate and timely budgeting for road maintenance are good.

d. Manpower Analysis

1) Training Facilities:

Studies and investigations have shown that the MOW, although well organized on managerial terms, both vertically and horizontally, presently lacks sufficient qualified personnel, especially at field supervisory grades, to satisfactorily implement the gravelling program. The following paragraphs describe MOW plans for expanding its capacity to train skilled manpower.

Within the MOW organization is a Staff Training Department (STD) which has been conducting training operations for a number of years for MOW personnel in the skills necessary to implement MOW programs. The STD is considered to be a well organized and managed department, with a more than adequate planning implementation capability to recruit and train the necessary personnel to fill MOW program requirements. The STD is headed by an expatriate and contains a high level of expatriate instructors. The capability of the MOW to adequately fund recurrent training costs is not considered a constraint as the GOK places considerable emphasis on training activities in its overall development program.

Starting with the initial planning of the Graveling and Rural Access Roads Programs, in 1974 the MOW recognized that an expanded training program would have to be initiated by the STD in order to provide the necessary training of existing and newly-hired personnel required to staff these programs. In consideration of training requirements and subsequent donor financing of these programs, an evaluation of the MOW Staff Training Department was funded by the IBRD and SIDA. This evaluation conducted in January and February 1975 by ORT resulted in a series of recommendations for training expansion and improved operations as contained in its Report "Study of Training Need, Road Maintenance, Road Graveling and Rural Road Program, Kenya," dated October 1975. Concurrent with the publication of this report was a second report prepared by the Department Head of the STD, titled "Staff Training Department, Review of Current Activities and Proposed Expansion," dated September 1975.

These two reports concluded that (i) additional training facilities needed to be constructed; (ii) additional training equipment needed to be procured, and (iii) expansion of the training staff was required.

Estimated total cost of the five-year training expansion program is \$4.6 million, of which \$2.2 will be financed by the IBRD, \$1.2 by SIDA and the balance by the UK and GOK. The expansion program will consist of the following components:

- (a) An increase in the current number of instructors/administrators from 44 to 72.
- (b) Expansion of STD facilities (additional dormitories, classrooms/workshops, laboratories, stores, etc.)
- (c) Acquisition of training equipment (heavy road maintenance equipment, audio-visual and teaching aids, etc.).

2) MOW Staffing Needs and Availabilities

By 1980, total trained manpower requirements of the graveling program, the rural access roads program and road maintenance will reach an estimated 5,000 employees. This demand is expected to be filled by the combination of trained MOW staff existing at the end of 1975 which totalled 2,162 and increased output from the expanded STD facilities which, as shown in the following table, will add an additional 3,744 trained employees to the MOW staff.

TABLE 11
Annual Output of STD by Major Category, 1976-1980,
and Existing Trained Staff as of 12/31/75

| | <u>Road Supervisors</u> | <u>Equipment Operators</u> | <u>Mechanics</u> | <u>Other</u> ^{1/} | <u>Total</u> |
|-------------------------|-------------------------|----------------------------|------------------|----------------------------|--------------|
| 1976 | 75 | 250 | 193 | 236 | 754 |
| 1977 | 184 | 250 | 193 | 300 | 927 |
| 1978 | 184 | 250 | 193 | 289 | 916 |
| 1979 | 92 | 244 | 193 | 233 | 762 |
| 1980 | - | - | 197 | 188 | 385 |
| Total 1976-1980 | 535 | 944 | 969 | 1,246 | 3,744 |
| Total as of 12/31/75 | 535 | 270 | 350 | 1,007 | 2,162 |
| | 1,070 | 1,264 | 1,319 | 2,253 | 5,906 |

^{1/} Drivers, surveyors, storekeepers, welders, auto-electricians, etc.
 Source: IBRD

With its increased capacity, the STD should be fully capable of not only meeting total skilled manpower requirements but also of allowing an orderly phasing of trained personnel into the CIDA and AID gravelling units which are expected to be fully mobilized by mid-1977 and mid-1978, respectively.

3) Technical Assistance

It is proposed that AID grant finance expatriate personnel at supervisory and operational levels in the MOW to administer and implement the AID project. The technical assistance component will, therefore, provide the following:

- (a) One project engineer at MOW headquarters level, working within the Special Projects Branch on the gravelling program for five years. The project engineer will assist in selection of final equipment list, preparation of specifications for equipment procurement, establishment of road gravelling priorities and coordination between field activities and MOW headquarter operations.

- (b) one engineer/construction superintendent at field level and in overall charge of the gravelling unit operation for four years.
- (c) one master mechanic in charge of overall maintenance, on-the-job operator training and performance of the equipment located within the gravelling unit for four years.

e. Reasonableness of Cost Estimates

Cost estimates used for equipment and technical assistance are based on prices of equipment and consultants for recent (mid-1975) AID-financed projects for Kenya and adjacent countries in the Eastern Africa area.

Cost estimates for GOK/MOW inputs for labor, POL and related items are based on 1974 prices also contained in the CIDA report and updated to reflect increases in POL, materials and labor, through January 1976.

A price escalation factor of 1.5 percent per month and a contingency factor of 10 percent have been added to basic cost estimates for equipment.

f. Environmental Impact

An assessment of the potential environmental impact of this program indicates that no significant problem areas exist or are likely to develop. See the Environmental Annex for details.

g. Summary Conclusion

1) Summary Conclusion

The engineering analysis prepared by CIDA and SIDA, along with MOW, has been reviewed in detail by REDSO engineering and determined to be consistent with sound road engineering principles applicable to facilities desired by GOK for the gravelling program.

2) Section 611(a)(i) of the FAA related to firm cost estimates is considered to have been satisfied. Engineering plans, due to the nature of the construction, will be developed by the project engineer during the first year mobilization stage of the project. Typical cross-sections for the road improvements have been established by the MOW along with standard drainage designs. Section 611(e) related to the effective maintenance of the improved road facility is determined to be satisfied with regard to the capability of the Roads Maintenance Branch of the Roads Department, MOW, to perform the required follow-on maintenance. Assurances regarding the availability of adequate maintenance funds for the AID financed gravelled roads will be provided as a covenant in the Loan Agreement.

B. Economic Analysis

This section is organized into a discussion of economic benefits, traffic threshold analysis, cost-benefit analysis, incidence of benefits, and labor vs. capital-intensive methods.

1. Benefits to be Derived from the GBC Program

Both economic and social benefits are derived from the GBC program. Only the economic benefits are discussed here. (See section III.D. for social benefits). The economic benefits can be classified as direct and indirect, and they apply to road users and non-road users.

a. Direct Road User Benefits

These benefits are the user cost savings which accrue to the vehicle operators or owners whose vehicles use the road. These benefits have been estimated by the MOW in terms of standard road types based on an updating of a table in the Scandia-consult report. ^{1/} This updating was done by simply multiplying all the figures in the table by 1.49 to take into account price changes since the original figures were calculated. ^{2/}

The estimated average savings per vehicle are shown in table 12 below for each improvement type. Supporting computations are presented in Annex IV.

Present road surfaces range from very poor to good on D and E roads in the project area. For the purpose of this analysis an average intermediate state of G1 was chosen as the base condition on good soils and G0 for poor soils. Future surface condition is assumed to be maintained at a G3 level (good) for gravelled roads and at G2 for those earth sections of a well-maintained link with spot improvements. Sealed portions of a gravel road are calculated at bitumen standard (although higher costs due to mountainous terrain are accounted for).

b. Direct Benefits to Non-Road Users

This category includes maintenance cost savings due to the lower effort needed to keep the improved road in good condition. Since there are not enough maintenance funds allocated to keep the present D and E roads in good condition, these savings are somewhat academic, although additional maintenance funds would have a high economic return (much higher than the present project). Therefore these benefits will not be realized (except through better-maintained project road links and lower user costs) and a higher maintenance expenditure is included as a project cost below.

^{1/} SIDA, Improvement of Roads in Kenya-Technical Economic and Financial Evaluation (April 1974).

^{2/} This procedure is not accurate for different vehicles but is adequate for the overall average used in this P.P.

TABLE 12

Weighted Average User Cost Savings Per Vehicle 1/

| <u>Improvement</u> | <u>Savings per vehicle 2/</u> | |
|---|-------------------------------|---------------|
| | <u>K. shs.</u> | <u>\$U.S.</u> |
| a) MOW standard (G1 to G3) | .250 | .0298 |
| b) Spot Improvement (G1 to G2-G3) | .189 | .0225 |
| c) Sealed Grades (G1 to G3 in mountainous terrain + 20% bituminized) | .405 | .0482 |
| d) MOW standard on poor soils (G0 to G3) | .354 | .0421 |

1/ This procedure is not accurate for different vehicles but is adequate for the overall average used in this P.P.

2/ See details in Annex IV. \$1 = 8.4 shs.

c. Indirect Benefits to Road Users.

Indirect benefits to road users will come about through greater use of the access gained by road improvement. More trips will be made at a lower cost per trip by the inhabitants of the project area, if user cost savings are passed on to passengers and farmers who ship produce (see discussion under motivation in section III-D).

There is only very indirect evidence that these savings will be passed on by the transporters (based on an assessment of the competitiveness of the transport industry in the Scandia-consult report). This evidence indicates that some part of the user cost savings will be passed on and that a higher frequency of "matatu" service on these roads will develop (a higher frequency of service on SRDP roads was noted in the field).

The origin-destination surveys proposed in the evaluation section below and related data collection on transport price changes are the only way to obtain an estimate of these benefits. For the purpose of this PP, these have been lumped with the estimate of benefits to non-road users described below. (see incidence of benefits for more discussion of this point).

d. Indirect Benefits to Non-Road Users

There are many benefits in this category that are not quantifiable in the present state of the economic art. These include social impacts described in section IIID below and political and administration benefits to the project area residents and their government. There are also benefits to the USAID credit program under ASL 1 part C.

For the purpose of this analysis it was possible to estimate the additional agricultural benefit to the project area on an area-wide basis, in relation to the GOK Rural Access Road Program and the Integrated Agricultural Development Program. The logic of this analysis is as follows:

1. For the RARP

- a certain proportion of RAR will connect with D and E roads (estimated as 32% on the basis of population served only by D and E roads).
- The GBC will provide the necessary all-weather connection to RAR on the 36% D and E roads to be improved which are non-all-weather.
- those benefits to the RAR which are dependent on GBC improvement of non-all-weather D and E roads should be allocated between the two programs. (a 50-50 split is used based on the ratio of costs for a spot improvement).
- Therefore 5.8% of the RARP benefits in the project area are attributable to the GBC program ($.32 \times .36 \times .5 = .058$)

2.. For the IADP

- The IADP will not reach a proportion of farmers in the project area which are presently isolated due to non-all-weather D and E roads. (estimated at 36% of D and E roads serving 30.4% of the farmers in IADP locations, or $0.36 \times .304 = 9.9\%$ of IADP served farmers).
- The proportion of gross benefits from IADP attributable to GBC program is the ratio of GBC costs in the IADP area as to other IADP costs (2.0%)
- Therefore 0.198 % of the gross IADP benefits in the project area are attributable to the GBC program ($.02 \times .099 = .00198$)

The application of the results of this logic to the benefit estimates computed by the IBRD in appraisal of these two projects is shown in Table 13

The total estimated indirect benefits of \$ 7 million shown in this table amounts to 11% of the total project benefits shown in Table 14, which is within the range of 1-17% found for other road projects in Kenya in the IBRD Appraisal of the Fifth Highway Project.

Since this calculation is based only on improvement of non-all-weather roads, it may understate the total indirect benefits. It should also be noted that these indirect benefits arise later in the project period due to the time required for indirect linkages between access and agriculture to take place.

2. Traffic Threshold Analysis

In order to estimate the traffic ranges where each alternative improvement would be economically feasible, a traffic threshold analysis was carried out as documented in Annex IV. This calculation determined the traffic level in the opening year which would provide exactly enough user cost savings to equal construction maintenance and regravelling costs when discounted at a rate of 10%. The results are shown below:

- a) MOW standard on good soils - 76 ADT
- b) Spot improvements on good soils - 43 ADT
- c) MOW standard with sealed grades - 61 ADT
- d) MOW standard on poor soils - 97 ADT

From these thresholds it can be seen that spot improvements can be justified with traffic levels near 40 ADT but that MOW standard requires around 70 ADT on good soils and 100 ADT on poor soils.

The implication of this analysis is that the GBC program should have stage construction by spot improvements on roads averaging 40-ADT, and that MOW standard can be applied to roads with 70 ADT or more. Roads with spot improvements can then be upgraded to MOW standard as a second stage when traffic levels warrant it. Also MOW standard improvements in poor soils (such as black cotton soils) areas require much more justification in terms of economic benefits than those in good soils.

These results are used to estimate the total kilometrage of each improvement level and the number of GBC units required, in the following section.

TABLE 13

Additional Benefits Induced by the GBC Unit

(000's of US dollars)

| Year | Benefits of RAR Program <u>1/</u> | RAR Benefits <u>2/</u> Attributable to GBC | Benefits of <u>3/</u> IAD Program | IADP Benefits <u>4/</u> Attributable to GBC |
|-------|-----------------------------------|--|-----------------------------------|---|
| 1978 | - | - | - | - |
| 1979 | - | - | - | - |
| 1980 | 15.9 | 0.3 | 182.2 | 8.1 |
| 1981 | 50.0 | 1.0 | 1068.2 | 19.6 |
| 1982 | 175.4 | 3.3 | 3138.7 | 33.6 |
| 1983 | 457.7 | 8.7 | 7438.1 | 51.7 |
| 1984 | 976.8 | 18.6 | 10281.2 | 60.8 |
| 1985 | 1791.7 | 34.1 | 12435.2 | 66.9 |
| 1986 | 2945.7 | 56.0 | 13664.0 | 70.1 |
| 1987 | 4211.4 | 80.1 | 13664.0 | 70.1 |
| 1988 | 5604.4 | 106.4 | 14773.7 | 72.9 |
| 1989 | 7131.9 | 135.4 | 14773.7 | 72.9 |
| 1990 | 8805.3 | 167.2 | 14773.7 | 72.9 |
| 1991 | 10635.5 | 202.0 | 14773.7 | 72.9 |
| 1992 | 12631.6 | 239.8 | 14773.7 | 72.9 |
| 1993 | 14354.5 | 272.6 | 14773.7 | 72.9 |
| 1994 | 17187.9 | 326.4 | 14773.7 | 72.9 |
| 1995 | 19761.6 | 375.3 | 14773.7 | 72.9 |
| 1996 | 22566.2 | 428.6 | 14773.7 | 72.9 |
| 1997 | 25609.8 | 486.4 | 14773.7 | 72.9 |
| 1998 | 28912.7 | 549.1 | 14773.7 | 72.9 |
| 1999 | 32641.6 | 619.9 | 14773.7 | 72.9 |
| 2000 | 36851.4 | 699.9 | 14773.7 | 72.9 |
| 2001 | 41604.1 | 790.2 | 14773.7 | 72.9 |
| Total | 294,923.1 | 5,601.2 | 268,703.4 | 1,401.5 |

1/ From Table 3 Annex 7 of the IBRD project appraisal report for the RARP of Feb. 1976. Kenyan pounds were converted to shillings (\$ 2.38 = 1 K£.)

Continuation Table 14 - Footnotes

- 2/ Assuming that 33% of the RARP is in the project area (0.33 RARP benefits in area x 0.58 benefits attributable to GBC program = 0.019 times total RARP benefits shown in column 1).
- 3/ From table 1 annex 16 of the IBRD project appraisal report for the IADP of January 6th, 1976. Kenyan shillings were converted to dollars at the ratio of 8.4 shs = \$1.
- 4/ Assuming that half the IADP is to take place in the project area (0.5 benefits in project area x benefits attributable to the GBC program). Earlier benefits are attributable in higher proportions to the GBC improvement due to the GBC investment concentrated in the earlier years. GBC represents 4.4% of project area IADP costs in 1980, declining to 0.5% in later years.

TABLE 14

Benefits for the Project

(COO's of dollars)

| Year | User Cost Savings ^{1/} | | | | Total Savings | RARR ^{4/} related Benefits | IADP ^{4/} related Benefits | Total Benefits |
|-------|---------------------------------|--------------------------------|-----------------------------|---------------------------|---------------|-------------------------------------|-------------------------------------|----------------|
| | MCW ^{2/} Standard | Spot ^{3/} Improvement | Sealed ^{2/} Grades | Scour ^{2/} Soils | | | | |
| 1978 | - | - | - | - | - | - | - | - |
| 1979 | 97.9 | 82.1 | 66.5 | 0 | 246.5 | - | - | 246.5 |
| 1980 | 125.4 | 225.0 | 119.4 | 0 | 469.8 | 0.3 | 0.1 | 479.2 |
| 1981 | 292.3 | 355.4 | 128.9 | 0 | 766.6 | 1.0 | 19.6 | 797.2 |
| 1982 | 353.9 | 548.0 | 139.3 | 0 | 1041.1 | 3.3 | 33.6 | 1078.0 |
| 1983 | 431.1 | 715.5 | 150.4 | 48.9 | 1345.9 | 8.7 | 51.7 | 1406.3 |
| 1984 | * | * | * | * | 1453.6 | 19.6 | 50.8 | 1533.0 |
| 1985 | | | | | 1569.9 | 34.1 | 66.9 | 1670.9 |
| 1986 | | | | | 1695.4 | 56.0 | 70.1 | 1821.5 |
| 1987 | | | | | 1831.1 | 80.1 | 70.1 | 1981.3 |
| 1988 | | | | | 1977.6 | 106.4 | 72.9 | 2156.9 |
| 1989 | | | | | 2135.8 | 135.4 | 72.9 | 2344.1 |
| 1990 | | | | | 2306.6 | 167.2 | 72.9 | 2546.7 |
| 1991 | | | | | 2491.2 | 202.0 | 72.9 | 2766.1 |
| 1992 | | | | | 2690.5 | 239.9 | 72.9 | 3003.3 |
| 1993 | | | | | 2905.7 | 272.6 | 72.9 | 3251.2 |
| 1994 | | | | | 3138.2 | 325.4 | 72.9 | 3537.5 |
| 1995 | | | | | 3389.2 | 375.3 | 72.9 | 3837.4 |
| 1996 | | | | | 3660.3 | 423.6 | 72.9 | 4151.8 |
| 1997 | | | | | 3953.2 | 486.4 | 72.9 | 4512.5 |
| 1998 | | | | | 4269.4 | 549.1 | 72.9 | 4891.4 |
| 1999 | | | | | 4611.0 | 619.9 | 72.9 | 5303.3 |
| 2000 | | | | | 4979.9 | 699.9 | 72.9 | 5752.7 |
| 2001 | | | | | 5378.2 | 790.2 | 72.9 | 6241.3 |
| Total | | | | | 58306.7 | 5601.4 | 1401.5 | 65309.6 |

^{1/} based on calculations shown in Annex IV and table 1 Initial conditions will vary from G0 to G2 depending on weather and maintenance.

^{2/} assuming an average traffic of 90 ADT in the opening year and 8% annual growth

^{3/} assuming an average traffic of 50 ADT is achieved in the opening year and 8% annual growth.

^{4/} see table 2

^{5/} assuming an average traffic of 60 ADT is achieved in opening year and 3% annual growth.

* all user cost savings are assumed to grow at 3% after 1983, but only the total is shown.

3. Cost of Alternative Improvements.

The cost of four alternative improvements are estimated in relation to the cost of the MOW standard improvement. The four alternatives are:

- a. MOW Standard (5.5 m. gravel surface with 1.2 m. shoulders and good drainage)
- b. A 3.5 m. gravelled surface with the same drainage as above.
- c. Spot improvements averaging 20% of the length, based on two low sections with culverts per km. and 100 m. of earth work and gravel on each.
- d. MOW standard with a bituminous seal on high grades (8% or more) in intensive rainfall areas.

The costs for each are shown in Table 15 below along with the key assumptions.

TABLE 15

| <u>ESTIMATED CONSTRUCTION COSTS BY ALTERNATIVE IMPROVEMENT TYPE</u> | | | | MOW standard with sealed grades |
|---|--|--|---|---|
| | <u>MOW Standard</u> | <u>3.5 m. Gravel</u> | <u>Spot Improvement</u> | |
| <u>derivation</u> | 1. MOW estimates of GBC program costs. | 1. 30% of gravel haul cost is saved or 12.5% of total costs. | 1. 20% of length improved 2. unit costs 150% higher. | 1. 20% of length sealed 2. 10% higher unit costs due to terrain 3. 100% additional costs on sealed areas. |
| <u>cost/km.</u> | \$ 7,700/Km* | \$ 7,100/km | \$ 3,900/Km | \$ 10,200/Km |

In poor soils such as black cotton soils this cost may be doubled due to addition of costs of excavation of the existing soil.

These costs are used in the following economic analysis except for the 3.5m gravel alternative. This alternative is only 8% cheaper than MOW standard and incurs other costs due to higher maintenance and accidents which offset this savings. Therefore this alternative is eliminated on cost-effectiveness grounds.

4. Cost-Benefit Analysis

Based on the number of kilometers identified in section II.B.2. that are eligible for the GBC improvement, a set of 2000 km. of the highest priorities were selected, and allocated to each year of the program in Table 16. This allocation takes into account the programming constraints which favour improving lower-priority links located near certain high-priority links in order to minimize the transportation and related downtime of GBC equipment.

The total benefits to road users are shown in Table 14. These were obtained by multiplying the kilometers in each category by the unit benefits per vehicle in Table 12 and by 365 times the traffic level on the link. The opening year traffic is assumed to be an average of 50 ADT on spot improved links, 90 ADT on MOW standard links and 60 ADT on poor soils links. This traffic is assumed to increase at a rate of 8% per year during the period after improvement.

The total costs associated with the improvement schedule in Table 16, are shown in Table 17. An additional regravelling cost of 45% of the initial construction cost is added in three 5-year cycles after construction. Annual maintenance costs are assumed to increase by \$210 per kilometer as shown in table 18. ^{1/}

The total cost including regravelling and annual maintenance costs are shown in Table 18. The resulting total costs and benefits and the stream of net benefits are summarized in Table 19. The evaluation period shown in this Table averages 23 years in order to take into account the staging of construction over a five-year period. The net value of the proposed project when discounted at 10% is \$210,000 and the economic rate of return is 10.2%.

This relatively low rate of return is the result of the orientation of the project toward providing access to isolated small holders along presently non-all-weather roads. It is possible that the response of these small holders, particularly in the areas where IADP inputs and the credit provided by ASL I Part C is available, will be sooner and more wide-spread than the relatively conservative assumptions used above. This can only be determined by means of the evaluation program described in Section IV-C.

^{1/} The maintenance of the improved roads should be sufficient to keep the road surface in good condition. As traffic increases this cost increases. However the costs of maintaining the present earth roads even in a poor but passable state is assumed to increase at a slightly higher rate than maintenance costs on the improved road, so that the differential maintenance cost remains constant.

This simplifying assumption undoubtedly under-estimates the benefits of the improvement, as much higher maintenance cost would be required to keep the earth road in its present condition at higher traffic levels. Under the assumed costs the actual condition of the earth road would decline, leading to significantly higher base user costs and, therefore, much higher user cost savings than those shown in Table 14.

TABLE 16

Kilometers Improved by Type of Improvement

| Year | MOW : Standard | Spot Im- provements | MOW standard with sealed grades | MOW standard on poor soils | Total kilometers |
|-------|-------------------|------------------------|---------------------------------------|-------------------------------|------------------|
| 1978 | 100 | 200 | 50 | 0 | 350 |
| 1979 | 20 | 400 | 30 | 0 | 450 |
| 1980 | 150 | 200 | 0 | 0 | 350 |
| 1981 | 50 | 400 | 0 | 0 | 450 |
| 1982 | 50 | 300 | 0 | 50 | 400 |
| Total | 370 | 1500 | 80 | 50 | 2000 |

1/ Assuming so that all of category A is accomplished in the first two years. Total for one GBC unit only.

TABLE 17
Costs of the Project
(000's of dollars)

| | Construction and Regravelling Costs ^{1/} | | | | Main- tenance | Total Costs |
|--------------|---|-------------------------------------|-----------------------------------|--------------------------------|------------------|----------------|
| | MOW Standard (\$7,700/km) | Spot Improvement (\$3,900/km) | Sealed Grades (\$10,200/km) | Pcor Soils (\$15,400/km) | | |
| 1978 | 770.0 | 780.0 | 510.0 | 0 | 73.5 | 2133.5 |
| 1979 | 154.0 | 1550.0 | 306.0 | 0 | 168.0 | 2188.0 |
| 1980 | 1155.0 | 780.0 | 0 | 0 | 241.5 | 2176.5 |
| 1981 | 385.0 | 1550.0 | 0 | 0 | 336.0 | 2281.0 |
| 1982 | 385.0 | 1170.0 | 0 | 770.0 | 420.0 | 2745.0 |
| 1983 | 346.5 | 351.0 | 229.5 | 0 | 420.0 | 1347.0 |
| 1984 | 69.3 | 702.0 | 137.7 | 0 | 420.0 | 1329.0 |
| 1985 | 519.8 | 351.0 | 0 | 0 | 420.0 | 1290.8 |
| 1986 | 173.3 | 702.0 | 0 | 0 | 420.0 | 1295.3 |
| 1987 | 173.3 | 526.5 | 0 | 346.5 | 420.0 | 1466.3 |
| 1988 | 346.5 | 351.0 | 229.5 | 0 | 420.0 | 1347.0 |
| 1989 | 69.3 | 702.0 | 137.7 | 0 | 420.0 | 1329.0 |
| 1990 | 519.8 | 351.0 | 0 | 0 | 420.0 | 1290.8 |
| 1991 | 173.3 | 702.0 | 0 | 0 | 420.0 | 1295.3 |
| 1992 | 173.3 | 526.5 | 0 | 346.5 | 420.0 | 1466.3 |
| 1993 | 346.5 | 351.0 | 229.5 | 0 | 420.0 | 1347.0 |
| 1994 | 69.3 | 702.0 | 137.7 | 0 | 420.0 | 1329.0 |
| 1995 | 519.8 | 351.0 | 0 | 0 | 420.0 | 1290.8 |
| 1996 | 173.3 | 702.0 | 0 | 0 | 420.0 | 1295.3 |
| 1997 | 173.3 | 526.5 | 0 | 346.5 | 420.0 | 1466.3 |
| 1998 | - | - | - | - | 420.0 | 420.0 |
| 1999 | - | - | - | - | 420.0 | 420.0 |
| 2000 | - | - | - | - | 420.0 | 420.0 |
| 2001 | - | - | - | - | 420.0 | 420.0 |
| Total | 6695.6 | 13747.5 | 1917.6 | 1809.5 | 9219.0 | 33389.2 |

^{1/} Based on the number of kilometers shown in the Table 4. Regravelling costs are 45% construction in years 6,11,16.

^{2/} From table 5. The additional maintenance cost differential is assumed constant although the total will increase with traffic

TABLE 18

Additional Maintenance Costs per Year

| Year | Cumulative kilometers | ^{1/} added cost' per Km. | Total added cost per year |
|------|--------------------------|--------------------------------------|---------------------------|
| 1978 | 350 | \$ 210 | 73,500 |
| 1979 | 800 | 210 | 168,000 |
| 1980 | 1150 | 210 | 241,500 |
| 1981 | 1600 | 210 | 336,000 |
| 1982 | 2000 | 210 | 420,000 |

^{1/} Based on MOW estimates less estimated actual maintenance.
 This is 240-30= \$ 210/Km. for low traffic (less the 100 ADT)
 At higher traffic levels at (100-200 ADT) there is additional
 maintenance presently carried out so that the differential
 of \$ 210 remains essentially the same even for higher traffic
 volumes.

TABLE 19

Costs and Benefits of the GBC Program

(000's of dollars)

1 9 7 5

| <u>Year</u> | <u>Total Costs</u> ^{1/} | <u>Total Benefits</u> ^{2/} | <u>Net Benefits</u> |
|-------------|----------------------------------|-------------------------------------|---------------------|
| 1978 | 2,133.5 | - | (2,133.5) |
| 1979 | 2,188.0 | 246.5 | (1,941.5) |
| 1980 | 2,176.5 | 478.2 | (1,698.3) |
| 1981 | 2,281.0 | 787.2 | (1,493.8) |
| 1982 | 2,745.0 | 1078.0 | (1,667.0) |
| 1983 | 1,347.0 | 1406.3 | 59.3 |
| 1984 | 1,329.0 | 1533.0 | 204.0 |
| 1985 | 1,290.8 | 1670.9 | 380.1 |
| 1986 | 1,295.3 | 1821.5 | 526.2 |
| 1987 | 1,466.3 | 1981.3 | 515.0 |
| 1988 | 1,347.0 | 2156.9 | 809.9 |
| 1989 | 1,329.0 | 2344.1 | 1,015.1 |
| 1990 | 1,290.8 | 2546.7 | 1,255.9 |
| 1991 | 1,295.3 | 2766.1 | 1,470.8 |
| 1992 | 1,466.3 | 3003.3 | 1,537.0 |
| 1993 | 1,347.0 | 3251.2 | 1,904.2 |
| 1994 | 1,329.0 | 3537.5 | 2,208.5 |
| 1995 | 1,290.8 | 3837.4 | 2,546.6 |
| 1996 | 1,295.3 | 4161.8 | 2,866.5 |
| 1997 | 1,466.3 | 4512.5 | 3,046.2 |
| 1998 | 420.0 | 4891.4 | 4,471.4 |
| 1999 | 420.0 | 5303.8 | 4,883.8 |
| 2000 | 420.0 | 5752.7 | 5,332.7 |
| 2001 | 420.0 | 6241.3 | 5,821.3 |
| Total | 33,389.2 | 65309.6 | 31,920.4 |

Net Present value at 10% = \$ 210,000; Economic Rate of Return = 10.2%

^{1/} From Table 17

^{2/} From Table 14

5. Incidence of Economic Benefits

The direct economic benefits of the GBC program will be first received by vehicle owners in the form of lower operating costs for trips that would be made whether or not there is an improvement. The vehicles using the road are primarily (49%) matatus, pick ups or buses; a significant number of cars or jeeps (31%) and some trucks (20%).

The cars or jeeps are owned mostly by relatively wealthy farmers or persons with high off-farm incomes, some traders and a number of government agents working in rural areas. Cars or jeeps will receive approximately 25% of the total savings.

The matatus, buses and pickups are mostly owned by transporters and are primarily used for public transport, by low and middle income farmers, lower income traders, and some representatives of cooperatives. To the extent that vehicles owned by cooperatives or traders make up this traffic, all the benefits go to the coop farmers or traders. (This is a very low proportion of vehicles, however). The matatus owners are transporters, usually driver-owners who participate in a very competitive industry (as mentioned in the Scandia-Consult report and the PP). Therefore, some of the cost savings are likely to be passed on to the passengers. These vehicles will receive 40% of the savings.

The trucks on project roads are owned by transporters and traders, and are used primarily to transport agricultural produce and consumer goods for stores, some trucks are rented by traders, cooperatives and more progressive small-holders. To the extent that these rental rates are competitive some of the savings will be passed on. Trucks will receive 35% of the savings.

The exact proportions of vehicle ownership is not known but it is possible to estimate roughly the proportions as indicated above for the purposes of this project paper. The part of benefits passed on is assumed to be 60% in this relatively competitive industry. 1/

The indirect benefits in terms of increased agricultural output will accrue principally to the farmer. Since there are only 1% large farmers in the area, they are estimated to receive only 5% of these indirect benefits. Another estimated 10% will go to traders and transporters, and 20% to cooperatives in the project area.

Table 20 contains a summary of the estimates described above. These preliminary estimates should be further verified and refined as part of the evaluation program described in Section IV-C.

1/ The speed of this passing on of savings is a pertinent concern. These mechanism is usually a slower rise of transport prices, rather than an outright reduction. Therefore, the rate of passing on depends on the inflation rate. The probable period in this case is 2-3 years.

TABLE 20

Estimated Distribution of Benefits from the GBC

| | Recipient Group | | | | | |
|----------------------------------|---------------------|----------------|-------------------|---------------------|---------------------|--------------------|
| | <u>Transporters</u> | <u>Traders</u> | <u>Government</u> | <u>Cooperatives</u> | <u>Large Farmer</u> | <u>Smallholder</u> |
| 1. Direct Benefits | | | | | | |
| a) initial savings | | | | | | |
| cars %group | - | 30% | 50% | 15% | 5% | - |
| (25%):%total | - | 7.5% | 12.5% | 3.8% | 1.2% | - |
| Pickups %group | 75% | 10% | - | 10% | 5% | - |
| on matatus | | | | | | |
| (40%) %total | 30% | 4% | - | 4% | 2% | - |
| Trucks %group | 85% | 15% | - | - | - | - |
| (35%) %total | 30% | 5% | - | - | - | - |
| Total initial % | 60% | 16.5% | 12.5% | 7.8% | 3.2% | - |
| Ratio passed on | .6 | .6 | 0 | 0 | 0 | - |
| Total passed on | 36% | 9.9% | - | - | - | - |
| Total received from traders | - | - | - | - | + 3.3% | +6.6% |
| Total received from transporters | - | + 10.8% | - | + 5.4% | + 1.8% | + 18.0 |
| Net % received | 24% | 17.4% | 12.5% | 13.2% | 8.3% | 24.6% |
| 2. Indirect Benefits | | | | | | |
| Net % received | 5% | 5% | - | 20% | 5% | 65% |
| 3. Total Benefits ^{1/} | | | | | | |
| initial % received | 55% | 15% | 11% | 9% | 3% | 7% |
| net % received | 22% | 16% | 11% | 14% | 8% | 29% |

^{1/} 89% of Direct Benefits% plus 11% of indirect benefits, rounded to nearest %.

From Table 20 it can be seen that if smallholders and coop farmers are grouped together, that group will receive almost half (43%) of the benefits. The remainder of the benefits are divided between transporters (22%), traders (16%), government (11%) and large farmers (8%). These figures are very imprecise but the order of magnitude of this distribution is indicative of the distribution of benefits to be expected. This distribution will be checked during the evaluation program described in Section IV-C.

The small holders favoured by this program are off the main roads and have had less access in the past to inputs and services, than farmers located on the A, B and C roads. Consequently data from surveys such as that shown in Annex IV indicate a lower-than-average percent of crops marketed and a lower-than-average income level for these farmers, compared to the project area as a whole (which has \$94 - 150 average annual income per capita).

The additional emphasis on improving non-all-weather roads put forth in this addendum will shift the benefits even more in favor of the isolated small holder. This emphasis will also favor those districts with lower per-capita income: South Nyanza, Bungoma, Busia and Siaya. Therefore, more than 80% of the small holders favored by this project are expected to have income below the \$122 per capita poverty level determined by the IBRD, and more than 95% of this group are expected to be below the IBRD-calculated minimum acceptable income level of \$196 per capita.

6. Labor vs. Capital-Intensive Methods

It has been proposed that the GBC program be altered in such a way as to replace presently capital-intensive (machine) methods of road construction with labor-intensive methods. This alternative now appears to be economically unfeasible due to higher costs and longer time periods needed to complete construction postponing the stream of benefits to a time when their discounted value would not cover the increased costs. Hence, using the break-even criterion of the previous analysis, substantially fewer road links would be eligible for improvement using a labor-intensive approach to construction.

Certain operations (e.g., brush clearing, ditching, gravel sorting and spreading can be done by hand labor as well as by machines. The GBC program will employ labor-intensive methods wherever feasible for such tasks, since the MOW is abundantly supplied with labor in comparison to its equipment constraints. However, the MOW has also demonstrated a willingness to hire local day laborers when this decision is justified on a cost basis (i.e., the cost of local labor is less than the cost of transporting permanent employees from a base camp to the construction site). The MOW has shown considerable sophistication in evaluating such situations on the ground, and the responsibility for day-to-day decision making concerning the use of local labor and labor-intensive methods should remain with them.

Little is presently known about the unit costs of labor intensive methods and the variety of techniques which may be employed. The cost of labor-intensive operations has been the subject of a controlled experiment in the project area under AID financing as part of the SRDP. However, results of this study were not available for use in the present analysis.

The Scandiaconsult report analyzes the operations in the road graveling program additional labor might be employed (a number of operations such as bush clearing for roads and quarries, tree, stump and boulder removal, culverts and drainage construction, and bridge construction are to be done by labor intensive methods, while other tasks such as compaction of roadbeds and gravel can only be effectively done by machine). The report concludes that at a labor price of Shs. 5/day, the operations will cost more if done by hand (see p. 79).

However, the report also notes that shadow pricing might make some of the operations economically feasible. But because "there is no agreement with the Ministry of Finance and Planning on how to deal with shadow pricing," because it is highly probable that labor will not be available at less than Shs. 5/day and because there is a lack of foremen to handle additional laborers, it was concluded that additional labor-intensive operations are not feasible. The report also recognizes that time pressure (to finish the program in less than 15 years) favors capital intensive methods.

Increase in total cost when using labor intensive methods

| | <u>Operation</u> | <u>Increase in Total Cost</u> |
|----|-------------------------------|-------------------------------|
| 1. | Preliminary shaping | 10-20% |
| 2. | Removal of top soil on quarry | 1-2% |
| 3. | Digging out gravel | 10% |
| 4. | Loading gravel | 30-40% |
| 5. | Spreading of gravel | 10% |

We would note that the higher current cost of capital intensive methods may have altered the situation. However, because labor costs have also risen and because the factors mentioned in the previous paragraph remain in effect, it is probably still not feasible to employ labor intensive methods on tasks which can be more efficiently carried out by machine.

6. Conclusion

The economic analysis, based on user cost savings and induced agricultural benefits but not including social service access benefits, shows that the project is economically feasible for a major part of the secondary and minor road network in the project area. However, perhaps of more concern than economic viability based on VOC savings, given the Congressional Mandate and the AID emphasis on the rural poor, is the distribution of benefits. The Scandiaconsult report concluded that in Western and

Nyanza Provinces most of the savings in vehicle operating costs would be passed on to passengers and producers in the rural areas. Because of the land holding and population characteristics of these provinces the passengers and producers have a very high probability of being smallholders with the majority falling into the category of the working poor. The tentative AID analysis of the magnitude of annual monetary benefits from farming accruing to these poor smallholders, if all VOC savings were passed on, indicates a likely range of Shs. 48 to 60 per family. It is also evident that a high percentage of any induced agricultural benefits would accrue to smallholders while for other developmental benefits smallholders would probably benefit relative to their numbers and percentage in the total population. For all benefits, the major beneficiaries, at least initially, will be the more progressive smallholders.

A final point is that the gravelling program is of varying criticality to the effect of the rural access roads program which will be undertaken in Western and Nyanza Provinces and which will impact on smallholders. In some areas the secondary roads are adequate to allow the rural access.

C. Financial Analysis and Plan

1. Introduction

The Kenya Roads Gravelling Project will result in approximately 800 miles of secondary and minor roads being gravelled and construction of accompanying bridges and culverts at a total cost of US \$12,262 million. A summary of the funding is presented below:

| | <u>FUNDING SUMMARY</u> (000 US \$) | | | |
|-----------------|---------------------------------------|---------------------------------|-----------------|----------------|
| | <u>FOREIGN</u> <u>EXCHANGE</u> | <u>LOCAL</u> <u>CURRENCY</u> | <u>TOTAL</u> | <u>PERCENT</u> |
| USAID | \$ 8,100 | \$1,000 | \$9,100 | 75% |
| GOK | - | \$3,200 | \$3,200 | 25% |
| TOTAL (rounded) | <u>\$ 8,100</u> | <u>\$4,200</u> | <u>\$12,300</u> | <u>100%</u> |

The "Summary Cost Estimate and Financial Plan," Table 21, shows the details of source and use of total financing. AID will provide loan financing for equipment, spare parts, construction materials and 40% of the total requirement of POL in the amount of US \$7.7 mil. AID will also provide grant financing for 13 worker-years of technical assistance in the amount of US \$1.2 mil. and for a special evaluation program in the amount of US \$200,000. The GOK will provide US \$3.2 mil. equivalent for financing local support costs. Inasmuch as the GOK's inputs are 26% of total inputs, the minimum Host Government contribution required by FAA Section 110 (A) is satisfied.

TABLE 21

SUMMARY COST ESTIMATE AND
FINANCIAL PLAN
(OOO US \$)

| SOURCE | AID | | | | | | GOK | | | TOTAL | | |
|----------------------------|-------|-----|-------|-------|----|-------|-----|-----|-------|-------|-----|-------|
| | LCAN | | | GRANT | | | FX | LC | TOTAL | FX | LC | TOTAL |
| | FX | LC | TOTAL | FX | LC | TOTAL | | | | | | |
| USE:* | | | | | | | | | | | | |
| 1. Equipment/ Delivery | 2,348 | | 2,348 | | | | | 200 | 200 | 2,348 | 200 | 2,548 |
| 2. Spare Parts | 1,057 | 352 | 1,409 | | | | | 200 | 200 | 1,057 | 552 | 1,609 |
| 3. Const. Mater- ials. | 1,663 | | 1,663 | | | | | 75 | 75 | 1,663 | 75 | 1,738 |
| 4. Technical Assistance | | | | 753 | | 753 | | | | 753 | | 753 |
| 5. Procurement | 364 | | 364 | 400 | | 400 | | | | 764 | | 764 |
| 6. POL | | 352 | 352 | | | | | 528 | 528 | | 880 | 880 |
| 7. Camp Support | | | | | | | | 240 | 240 | | 240 | 240 |
| | | | | | | | | | | | | |

* Exclusive of inflation. Allowances for inflation included in continuation table.

TABLE 21 (contd.)

**SUMMARY COST ESTIMATE AND
FINANCIAL PLAN
(000 US \$)**

| SOURCE | AID | | | | | | GOK | | | | | |
|-----------------|-------|-------|-------|-------|----|-------|-----|-------|-------|-------|-------|--------|
| | LOAN | | | GRANT | | | FX | LC | TOTAL | FX | LC | TOTAL |
| | FX | LC | TOTAL | FX | LC | TOTAL | | | | | | |
| USE: (Cont'd) | | | | | | | | | | | | |
| 8. H.Q. Support | | | | | | | | 120. | 120 | | 120 | 120 |
| 9. Local Labour | | | | | | | | 832 | 832 | | 832 | 832 |
| 10. Training | | | | | | | | 300 | 300 | | 300 | 300 |
| 11. Inflation | 855 | 239 | 1,094 | | | | | 264 | 264 | 855 | 503 | 1,358 |
| 12. Contingency | 387 | 38 | 425 | .47 | | 47 | | 403 | 403 | 434 | 441 | 875 |
| 13. Evaluation | | | | 210 | | 210 | | | | 210 | | 210 |
| TOTAL (rounded) | 6,700 | 1,000 | 7,700 | 1,400 | | 1,400 | | 3,200 | 3,200 | 8,100 | 4,200 | 12,300 |
| PERCENT: | | | 64% | | | 11% | | | 25% | | | 100% |

2. The AID Project Contribution

a. Loan Funds

Details of the AID contribution are shown in Annex VI. Of total loan financing, US \$6.7 mil, or 87 percent, will be utilized to provide foreign exchange for the procurement of equipment, spare parts, construction materials and to meet the cost of related procurement service fees. In estimating the cost of this portion of inputs, REDSO engineering staff utilized the latest available data on actual costs of bid proposals for similar activities in East Africa. Escalation and contingency factors were then applied to arrive at a realistic estimate for that point in time when firm orders are expected to be placed. This technique for estimating the cost of project inputs is sound and provides for adequate funding levels, assuming no change in inflation rates, unforeseen contingencies, or changes in composition of the actual equipment and materials requirements. (See also III.A.2.a.)

The local currency costs of AID's contribution will also be loan funded at an estimated cost of US \$1.0 million. This sum represents 11 percent of AID's total project financing and 13 percent of AID's loan financing. The local currency element will be used to fund 40% of the POL requirements of the Gravelling Unit and 25% of the total spare parts requirement, thus providing for immediate purchase of spare parts as circumstances dictate and a sharing the burden of recurrent POL costs.

Although expenditure of loan funds will occur throughout the life-of-the-project (see Table 22), it is estimated that slightly over 80 percent or US \$6.1 mil. will be expended by the end of FY 1979 as the equipment, initial spare parts and construction materials are scheduled to be shipped by January 1978. Expenditures for spare parts and POL will occur until the completion of construction, approximately June 1982.

The total estimated cost requirement for POL over the planned four-year operation is \$1,320,000. This estimate consisted of cost of \$880,000 and inflation of \$440,000 over the life-of-project. Of this total amount AID will assume responsibility for financing 40% or \$528,000, which includes \$176,000 for inflation. The question is the basis to be used for reimbursement to the GOK for costs incurred for POL. It was felt that the most appropriate basis would be reimbursement of a flat 40% of each years' cost incurred. This basis would be administratively simple and, in the event that construction was below planned levels early in the life-of-the-project but higher or equal to planned levels later in the life-of-the-project, it would still allow full disbursement and complete loan draw-down for this project element. However, the weakness of this basis for reimbursement is that there is no phasing of increased funding responsibility of the GOK and at project completion they would be faced with assuming a large element of cost in lump sum. To address the issue of phasing increased GOK financial responsibility for this project element, reimbursement could, of course, be done on a declining percentage basis, i.e. 100% year one, 70% year two, 40% year three and 10% year four or any other declining percentage that would yield a total reimbursement to the

GOK of \$528,000 based on estimates of the quantity and cost of each years' construction. However, if POL costs start low and escalate over budget late in the project's life, this basis would provide a greater probability that the GOK would be unable to completely draw down this element of the loan.

The schedule of POL financing included in Table 22 provides a basis for reimbursement that phases in increased GOK financial responsibility and insures full loan draw-down. This basis would follow the following cost projections:

| <u>(\$000)</u> | <u>TOTAL</u> | <u>FY 78</u> | <u>FY 79</u> | <u>FY 80</u> | <u>FY 81</u> | <u>FY 82</u> |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|
| POL Costs | 880 | 55 | 220 | 220 | 220 | 165 |
| Inflation | 440 | 11 | 66 | 99 | 132 | 132 |
| Sub-Total | 1,320 | 66 | 286 | 319 | 352 | 297 |
| AID % | 40% | 100% | 70% | 40% | 30% | 10% |
| AID \$ | 528 | 66 | 200 | 127 | 105 | 30 |

To insure complete loan draw-down in the event that the above projections are not realized, a financial review will be held during the third quarter of FY 1980 by USAID/Kenya and the GOK to reassess the appropriateness of the reimbursable percentages to be applied in FY 1980 and the remaining life-of-the-project. The review will establish such revised reimbursable percentages that will allow full disbursement of \$528,000 for POL, although the revised percentages will continue to be on a declining basis. This reassessment once initially approved in this document will require no subsequent approvals or programming documentation other than the issuance of an Implementation Letter at the conclusion of the review.

Grant funds are also included for the implementation of a special evaluation program designed to improve MOW data collection and program evaluation design capabilities as well as to provide new information concerning the economic and social impact of rural road construction (improvement to an all-weather standard). This program will be closely coordinated with and may even become fully integrated into the evaluation programs for the RARP and other infrastructure development projects under the IADP, if such evaluation programs become operative during the GBC project period. A detailed breakdown of costs for this special evaluation effort is given in Section IV-C.

TABLE 22
SUMMARY
PROJECTED ACCRUED EXPENDITURES
(000 US \$)

| | <u>FY. 77</u> | <u>FY. 78</u> | <u>FY. 79</u> | <u>FY. 80</u> | <u>FY. 81</u> | <u>FY. 82</u> | <u>TOTAL</u> |
|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|
| <u>TECHNICAL ASSISTANCE</u> | | | | | | | |
| 1. Enginer-In-Charge | 67.5 | 90.0 | 90.0 | 90.0 | 90.0 | 22.5 | 450.0 |
| 2. Engineering Superintendent | - | 70.2 | 93.6 | 93.7 | 94.0 | 23.5 | 375.0 |
| 3. Master Mechanic | - | 70.2 | 93.6 | 93.7 | 94.0 | 23.5 | 375.0 |
| SUB-TOTAL: | 67.5 | 230.4 | 277.2 | 277.4 | 278.0 | 69.5 | 1,200.0 |
| <u>COMMODITIES</u> | | | | | | | |
| 1. Heavy Equipment | 1,672.0 | 1,672.0 | - | - | - | - | 3,344.0 |
| 2. Spare Parts | 125.0 | 293.5 | 357.0 | 419.5 | 524.0 | 213.0 | 1,932.0 |
| 3. Construction Materials | 925.5 | 925.5 | - | - | - | - | 1,851.0 |
| SUB-TOTAL: | 2,722.5 | 2,891.0 | 357.0 | 419.5 | 524.0 | 213.0 | 7,127.0 |
| <u>OTHER COSTS</u> | | | | | | | |
| 1. P.O.L. | | 66.0 | 200.0 | 127.0 | 105.0 | 30.0 | 528.0 |
| 2. Evaluation Programs | 90.8 | 57.1 | 62.1 | | | | 210.0 |
| TOTAL: | 2,880.8 | 3,244.5 | 896.3 | 823.9 | 907.0 | 312.5 | 9,100.0 |
| | (Rounded) | | | | | | |

1/ Line items include Procurement Service Fees, Inflation and Contingency factors.

TABLE 23

KENYA ROADS GRAVELLING PROJECT

OBLIGATION SCHEDULE

(\$000)

| <u>I. GRANT FUNDS</u> | FY <u>1/</u> <u>1977</u> |
|-------------------------------|-----------------------------|
| 1. Engineer in Charge | 450 |
| 2. Engineering Superintendent | 375 |
| 3. Master Mechanic | 375 |
| 4. Evaluation | <u>200</u> |
| TOTAL | 1,400 |
| <u>II. LOAN FUNDS</u> | |
| 1. Heavy Equipment | 3,344 |
| 2. Spare Parts | 1,932 |
| 3. Construction Materials | 1,851 |
| 4. Local Costs (POL) | <u>528</u> |
| TOTAL | 7,655 |
| Total all funds: (Rounded) | 9.1 |

1/ Line items include procurement service fees, inflation and contingency factors.

c. Fixed Amount Reimbursement

The Fixed Amount Reimbursement procedure has been considered for use however, several aspects of the gravelling activity do not lend themselves to this technique. Given the total estimated cost and the proportion of the foreign exchange element (66 percent), the use of this procedure would represent a considerable hardship in the short-term for the GOK. Also, the foreign exchange would be required at a time when the GOK has limited availabilities of foreign exchange.

Another requirement for utilization of the FAR procedure is that the cooperating government's implementing agency possess all the required skills for independent implementation. Our project analyses have identified the three specific manpower needs of MOW for successful implementation set forth in Section III.C.2.b. above.

Based on these constraints it has been concluded that the utilization of FAR procedures would not be appropriate.

d. Costing of Outputs

Table 24 illustrates the relationship, in financial terms, between project inputs and outputs.

3. The GOK Project Contribution

The GOK contribution will be US \$3.2 million equivalent (26 percent of total inputs) for local support costs (see Annex VI). This "local support" will be the financing of 60% of the total cost of POL for the Gravelling Unit, local purchase of concrete beams for bridge construction, camp support, H.Q. support, transportation of equipment from the port to the construction site, spare parts and local labor - skilled and unskilled. Cost estimates for the above elements were extracted from a CIDA feasibility study by Blackman and McGinns, "Kenya Road Gravelling Project Reconnaissance Mission" dated February 1974. The estimates were then updated to reflect implementation during 1978 - 1982. Cost estimates are considered reasonable and adequate for each element of local support.

4. Other Donor Participation

As indicated previously, SIDA and the IBRD are contributing funds for MOW training programs as part of their contributions to the Rural Access Roads program. CIDA has financed equipment and related technical assistance for gravelling operations in a geographically separate and distinct area -- Central, Eastern and Coast Provinces.

Table 24

COSTING OF PROJECT OUTPUTS/INPUTS

(000 US\$)

| PROJECT INPUTS | PROJECT OUTPUTS ^{1/} | TOTAL |
|--------------------------------|-------------------------------|---------------|
| | No. 1 | |
| <u>AID APPROPRIATED</u> | | |
| 1. Equipment | 3,344 | 3,344 |
| 2. Spare Parts | 1,932 | 1,932 |
| 3. Construction Materials | 1,851 | 1,851 |
| 4. Technical Assistance | 1,200 | 1,200 |
| 5. Recurrant Local Costs (POL) | 528 | 528 |
| 6. Evaluation Program | 200 | 200 |
| <u>GOVERNMENT OF KENYA</u> | | |
| 1. Labour Costs | 957 | 957 |
| 2. POL | 911 | 911 |
| 3. Training | 345 | 345 |
| 4. Camp Operations | 276 | 276 |
| 5. Spare Parts | 230 | 230 |
| 6. Trans-portion | 230 | 230 |
| 7. H.Q. Support | 138 | 138 |
| 8. Construction Materials | 75 | 75 |
| TOTAL (Rounded) | 12,300 | 12,300 |

1/ P CT OUTPUTS

No. 1 800 miles of gravelled secondary and minor roads.

IV. Implementation Arrangements

A. Borrower and AID Administrative Arrangements

1. Borrower

a. Implementation Responsibility

Responsibility for implementation of the GBC program will rest with the Special Projects Branch (SPB) of the Road Department, Ministry of Works. This Branch also is responsible for the planned Rural Access Roads Program.

b. Management Capability

The Special Projects Branch is headed by a Chief Superintending Engineer (Special Projects) who reports directly to the MOW Chief Roads Engineer. Below the Chief Superintending Engineer are the gravelling unit organizations of CIDA and AID, each headed by a Project Engineer. All three of these positions - the Chief Superintending Engineer and the two Project Engineers - are to be filled by expatriates (the Chief Superintending Engineer and CIDA Project Engineer are now on board). The Chief Executive Engineer also has direct access to the Superintending Engineer Direct Labor and the MOW Training School.

The field organization will consist of a construction superintendent and master mechanic for each of the CIDA and AID gravelling units (these positions will be filled by Canadian and U.S. expatriates) plus appropriate local support staff, including supervisory foremen who will be provided either from the MOW's existing staff of skilled personnel or from "graduates" of the Training School.

The design and tendering for all bridges will be managed by the MOW's Bridge and Contracts Division; however, at the request of MOW, a CIDA engineering consultant will be in charge of overall supervision of the bridge construction program. Culverting is an integral part of the gravelling program and will, therefore, be managed by on-site personnel of the gravelling units.

Although the MOW has already had considerable experience with gravelling roads in Kenya, it was concluded during the course of CIDA's 1974 assessment of the proposed expansion in gravelling that establishment of a separate section in the Ministry was necessary for proper management. The Special Project Branch with its key expatriate personnel and access to existing and newly trained local staff is expected to provide the program with the level of managerial capacity required for successful implementation.

2. A.I.D.

While the USAID Mission will designate a project officer for monitoring of AID's involvement in the gravelling program it is planned to rely heavily on the AID-financed Project Engineer assigned to the Special Projects Branch of MOW for day-to-day detailed planning and implementation of work required for establishment and operation of the AID-financed gravelling unit. The roles of the USAID project officer, REDSO and the Project Engineer are indicated in more detail in the implementation schedule in Section B.2. below.

B. Implementation Plan

1. Procurement Procedures

a. Commodities

Since virtually all overseas procurement for the Government of Kenya is performed by the Crown Agents of London, the GOK lacks experience in overseas buying. For this reason, it is intended that a host country contract for offshore procurement services with a firm such as AAPC will be financed under the loan. The services provided under the contract will be performed in accordance with Handbook 15 - Country Contracting, together with relevant GOK procurement requirements. The authorized source for procurement will be Geographic Code 941 and Kenya. Details of the procurement of the various commodities required for the project are as follows:

- 1) Equipment - All equipment will be procured from Geographic Code 941 sources, with the requirements that all motor vehicles be of U.S. (Code 000) manufacture. It is anticipated that in limited instances it will be necessary to procure some small value items off-shelf in Kenya. Such off-shelf procurement will be done by the MOW and will be in accordance with Attachment 3H of Handbook 11.
- 2) Spare Parts - Spare parts will be procured as follows:
 - a) Fast moving spare parts will be ordered with the initial procurement of equipment.
 - b) While the bulk of spares will be purchased from the U.S. during the construction period of the project, a sizeable portion of spares will also be procured off-shelf in Kenya from the authorized representatives of the manufacturers of the equipment. It is anticipated that most spare parts procured off-shelf in Kenya will be of Code 941 origin, but it is possible that a limited amount of spares will

have been imported from Code 935 sources, but will be from countries other than those listed as authorized sources under the loan. It is anticipated that some individual transactions for particular off-shelf items of Code 935 origin will exceed the \$2,500 limitation specified in Handbook 15. Such items may include, for example, engine and transmission components, tools, etc. Therefore, it is requested that the per transaction limitation for the latter items be raised from \$2,500 to \$5,000.

- c) A certain limited amount of hard-to-obtain spares will be air-freighted from the U.S. or bonded warehouses.
- 3) Construction Materials - All procurement of corrugated metal culverts, steel girders and reinforcing steel bars, will be of Code 941 source, with the possible exception that minimal amounts of reinforcing bars may be purchased in Kenya.
- 4) Petroleum, Oils and Lubricants - The MOW will procure all POL in Kenya and will be reimbursed for the agreed upon proportionate share, from the loan funds.
- 5) Utilization of Excess Property - The Excess Property Division of AID will be approached concerning the availability of suitable equipment for the project.

b. Technical Assistance

It is contemplated that the three technicians (Project Engineer, Construction Superintendent and Master Mechanic) will be provided under a grant-financed host country contract with an engineering consultant firm.

2. Implementation Schedule

Implementation of the AID gravelling project is separated into three distinct phases of work.

Phase I - Phase I of project implementation is estimated to require approximately 10 months. This Phase includes:

- 1. Submission of the PP to AID/W for review and loan authorization 1 month

- | | |
|--|-----------|
| 2. Review of loan agreement between USAID/GOK and signing of the loan agreement by the GOK. | 3 months |
| 3. Fulfillment of the C.P.s by GOK for initial disbursement of loan funds, including advertisement for, selection of, and signed contract for technical assistance and negotiation and signing of contract for procurement services. | 4 months |
| 4. Arrival of Project Engineer on site (following execution of TA contract) | 2 months |
| | <hr/> |
| | 10 months |

During Phase I of implementation, it is planned that not later than month 4 after submission of the PP to AID/W, USAID/K will designate a full-time project manager. In the interim, a temporary project officer will be assigned from the USAID/K Program Office staff.

During the period from month 1 to month 10 the USAID Project Officer, working with the MOW (Special Projects Branch) and REDSO, will accomplish the following:

1. Preparation of basic equipment specifications.
2. Preparation of CBD notice for consultant services for technical assistance (subsequent to loan authorization), monitor selection of short listed consultant firms by GOK.
3. Preparation of final terms of reference for consultant services and notice to short listed firms for RFPs (subsequent to loan signature by the GOK).
4. Preparation and approval (GOK/AID) of draft contract for consultant services and IFB for equipment procurement.
5. Review of CIDA field operations jointly with MOW and CIDA personnel for evaluation feed-back into the AID project design.

The Phase I operation will be implemented between USAID and the MOW and completed with the execution of the contracts for the TA and procurement services and the arrival of the Project Engineer on site.

Phase II - Phase II is estimated to require approximately 16 months to accomplish beginning in month 11 and ending in month 26. This phase includes:

1. Preparation and approval of the IFB package for equipment procurement by MOW/USAID. 2 months
2. Advertisement for procurement and awards for equipment orders. 3 months
3. Shipment and arrival of the first tranche of equipment. 11 months
4. Arrival of the remaining two technicians on site (construction superintendent and master mechanic).

16 months

The Phase II implementation will be the responsibility of the Project Engineer at site functioning in his operational role within the MOW Special Projects Branch. Monitoring and AID-related requirements will be provided by assistance from the USAID Project Officer and REDSO working with the Project Engineer. The latter will be considered a direct representative of the GOK for project implementation purposes. The Project Engineer during this 16 month period will:

1. Review and finalize spare parts specifications.
2. Prepare work plan for construction activities.
3. Assist in the priority selection and scheduling of roads to be gravelled.
4. Establish the logistical support plan for gravelling operations.
5. Review, with USAID and CIDA, the CIDA gravelling operations for the purpose of improvement in implementation of the AID-financed portion of the program.

Phase II, as implemented by the Project Engineer within the MOW, will be completed with the mobilization of the gravelling unit and arrival of the remaining two technicians on site.

Phase III - Phase III is estimated to require approximately 48 months from month 27 to month 74 and includes:

1. Completion of the 800 miles of road gravelling.
2. Annual and special project evaluations.
3. Kenyanization of the TA positions during months 68 to 74.
4. Continual planning and logistical implementation by the Project Engineer and two project technicians.

Phase III is implemented by the Project Engineer and two project technicians who will complete the target objectives of the project and provide a six month, phased turnover of the gravelling operation to the MOW.

A CPI network has been developed and is included as Annex XI.

C. Evaluation Plan

In accordance with AID requirements and the related Mission Order AID assistance to the gravelling program will be evaluated annually, beginning approximately 10 months after the date of authorization (in order to facilitate the review of CIDA experience mentioned above in Section B.2.) and at about 12-month intervals thereafter. GOK participation (from the MOW) will be invited and encouraged as is the case with all Mission evaluation activities. These evaluations will be initiated by the responsible USAID Project Officer with the guidance and the assistance of the Mission Evaluation Officer. Others participating will include the Mission's Senior Evaluation Committee, including the Director, Assistant Director, Program Officer, General Development Officer, and Controller, and representatives of REDSO/EA.

The focus of such evaluations may be on (as appropriate) continued relevance of the gravelling program to Kenya's development and the AID agriculture sector program, implementation status and problems, roads maintenance, progress of the MOW training program, operations of the SPB and the units themselves,

related other donor activities, and relationship to other GOK development efforts, such as IADP and RAR. Of special concern, particularly in relationship to the latter efforts, will be "benefit incidence". Other issues for attention at regular evaluations will be added to the agenda as these arise.

In addition, because of the lack of solid data concerning the economic and social consequences of the proposed GBC program, a special evaluation program is proposed to be carried out by the MOW planning staff in cooperation with short-term consultants. This program will be grant financed by AID. Baseline data collection will be carried out on selected links during the first year of project implementation, i.e. before any regravelling is actually accomplished by the AID-financed unit. Annual replication of this study during the next two years will provide change data reflecting economic and social impact of rural road improvements in short term. Such data might also form a baseline for the assessment of long term impacts if replicated in the future over longer intervals of time.

There are three different elements to the evaluation of the GBC program.

First, within the engineering element it must be ascertained if the unit is achieving its forecast output and cost per kilometer, and whether the resulting road condition is kept at the forecast level. The AID project engineer is expected to perform this part of the evaluation. Feedback from the project engineer concerning improvements in construction techniques and maintenance practices should be formally communicated on an annual basis to supplement regular informal communications within the MOW. This evaluation is of definite interest to the MOW for its own purposes, in addition to USAID.

Second, the program must be evaluated to determine if the forecast benefits are being achieved with the actual links selected for improvement. Review of the initial results should be used as a means of improving the link selection criteria as early in the program as possible. This evaluation is of some interest to the MOW for planning purposes, but USAID is more directly concerned.

Third, the program must be evaluated to determine if the benefits actually reach the smallholder or the low-income agricultural producer. This evaluation will require more detailed information than may be available through a regular MOW sources.

An initial evaluation could be carried out with the CIDA GBC unit which would yield information of use particularly in the engineering evaluation. Some indications of benefits may also be obtained, although they have limited application to the project area.

There are three alternative structures for carrying out the second and third evaluation elements. In the first alternative these elements could be carried out entirely within the MOW planning unit by MOW personnel with some assistance from USAID in formulation of the evaluation procedures and to provide logistical support. The second alternative is to have the MOW gather only that part of the information which is of interest to the Ministry, with some logistical assistance from USAID. Then there would be a separate evaluation of these and other data to be gathered by USAID in an external evaluation to the MOW. The third alternative is for USAID to carry out a completely separate evaluation for its own purposes and to communicate the pertinent results to the MOW.

These three alternatives represent a spectrum of possible MOW participation. This participation should be encouraged to the extent that it strengthens the MOW planning system. However, it should be noted that the cost and effort to the MOW of the evaluation effort also increases with the level of MOW participation and that this burden should be kept to a minimum.

Given the desirability of strengthening the MOW without passing on to it an undue proportion of the evaluation costs, it appears appropriate to select the second alternative. The training aspect of this alternative could be enhanced by having the personnel responsible for the evaluation work within the planning unit of the MOW. This would also facilitate coordination with the RARP evaluation process.

The evaluation design for the second and third elements will focus on an analysis of origin-destination surveys and traffic counts conducted by the MOW and information on operating experience with the GBC units. Collection of traffic count data could begin with the CIDA unit in 1976/77. This would help in preparation of the base year data collection for the USAID project area.

The above data will be supplemented by information provided by the DDC's, associated ministries, and the IRS. As background to the above the 1974-79 National Integrated Sample Survey Program is the responsibility of the Central Bureau of Statistics. Within the framework of a national sample, currently being identified, the CBS intends to collect data needed for development planning and evaluation on demographic, social and economic trends. The IRS will be one of a series of surveys included within the integrated approach adopted for the NISSP so as to generate statistical data on the "non-formal" sector of the economy.

The IRS will be conducted annually using the household, or holding, as its basic unit of enumeration. It will integrate three previously existing surveys: The Small Farms Census Survey; the Farm Management Survey, and the Rural Household Budget Survey. Fixed core questionnaires will be used in each survey round supplemented by a series of special studies of different subjects. The first round, which has been completed, gathered data on four broad subjects - demographic characteristics of the household; physical description and valuation of assets; household expenditure, consumption and income, and farm production. Special studies may include such topics as labor inputs, off-farm income, household health and nutrition, marketed farm production, and household consumption.

The special evaluation program will require approximately 3 person-months per year of consultant technical assistance for the initial evaluation period (3 years). MOW support will consist of provision of survey, traffic count and data processing teams and office space, and a counterpart, if available. USAID will provide for logistic support for the survey teams and transport and secretarial support for the short-team consultants.

The first year tasks will include design of the detailed data collection forms and procedures. In addition, traffic counts on CIDA GBC-improved links will be made and origin-destination surveys will be carried out to provide baseline data on 16 links selected to be improved in the first year of the proposed USAID GBC unit program. The O and D survey can then be replicated in two succeeding years to obtain data on the type of responses that the improvements are generating and their associated benefits.

Two O and D teams would be required for eight weeks to carry out the survey and eight more weeks to process the resulting data. Logistic costs for these surveys as estimated by the MOW are shown in Table 29. The additional costs for the short term consultant who would prepare the survey forms, analyze the data and carry out the evaluation are

SUMMARY
Evaluation Program Cost

TABLE 29

A. Local Cost

(Origin Destination Survey, Road Inspection & Traffic Counts)

| | <u>Year 1</u> | <u>Year 2</u> | <u>Year 3</u> | <u>Total</u> |
|---|---------------|---------------|---------------|---------------|
| 1. Vehicle purchase | \$36,000 | \$ - | \$ - | \$36,000 |
| 2. POL a) O & D survey | 2,600 | 2,800 | 3,000 | 8,400 |
| b) Inspection | 1,950 | 2,200 | 2,400 | 6,550 |
| c) Traffic counts | 1,950 | 2,200 | 2,400 | 6,550 |
| 3. Equipment a) O & D survey & supply | 3,000 | 1,000 | 1,000 | 5,000 |
| b) Inspection | - | - | - | - |
| c) Traffic counts | 1,000 | 200 | 200 | 1,400 |
| 4. Travel expenses a) O&D survey per diem | 700 | 800 | 900 | 2,400 |
| b) Inspection | 300 | 400 | 500 | 1,200 |
| c) Traffic counts | 400 | 500 | 600 | 1,500 |
| Total | 47,900 | 10,100 | 11,000 | 69,000 |

B. Technical Assistance

1. Fixed Daily Rates

| | | | | |
|---------------------------------|---------------|---------------|---------------|---------------|
| a) social anthropologist(lm/yr) | 10,000 | 11,000 | 12,000 | 33,000 |
| b) senior economist (2 mo/yr) | 20,000 | 22,000 | 24,000 | 66,000 |
| | <u>30,000</u> | <u>33,000</u> | <u>36,000</u> | <u>99,000</u> |

2. Other direct costs

| | | | | |
|----------------------|---------------|---------------|---------------|---------------|
| a) airfare @ | 3,800 | 4,000 | 4,200 | 12,000 |
| b) excess baggage | 400 | 450 | 500 | 1,350 |
| c) per diem | 3,650 | 3,800 | 4,000 | 11,450 |
| d) vehicle rental | 3,000 | 3,500 | 4,000 | 10,500 |
| e) secretarial costs | 2,000 | 2,200 | 2,400 | 6,600 |
| | <u>12,850</u> | <u>13,950</u> | <u>15,100</u> | <u>41,900</u> |

Total Technical Assistance

140,900

Total Evaluation Program Costs (rounded)

200,000

also shown. Maximum provision will be made for working closely with the MOW planning unit and also for providing feedback to the DDC's through the Rural Planning Unit currently being set up in the Ministry of Finance and Planning.

It is proposed to purchase three vehicles for MOW use in conducting traffic counts and surveys. Table 30 compares the cost of vehicle purchase with that of vehicle rental demonstrating the cost advantage of vehicle purchase. Inasmuch as these vehicles will be needed very shortly after Loan signing and CP satisfaction for the first series of surveys, it is proposed that USAID/Kenya act as the GOK agent and procure these vehicles through the PIO/C procedure. If it is necessary to rent vehicles in Year I the total evaluation costs would increase by 16% from \$209,900 to \$246,100.

The evaluation contractor will also be required to pay all local costs of the evaluation POL, per diem, equipment and supplies and claim reimbursement from AID under the contract. This procedure will streamline administrative logistic support arrangements.

TABLE 30
Cost Estimate
Vehicle Rental
(K.Shs.)

1. Daily Fee:

4 x 4 vehicle 140.00 per day for
90 days or 11,250.00 each vehicle. Three
Vehicles:

K.Shs. 33,750.00

2. Mileage Costs

Average of 300 KM per day for 90 days or
27,000 KM by 3.00 per KM or 81,000.00 per
vehicle. Three vehicles:

K.Shs.243,000.00

Vehicle Rental Costs, Year I
(\$1.00 = K.Shs. 8.40)

K.Shs.276,750.00
\$ 32,946.00

Projected Rental costs, Year II

36,200.00

Projected Rental costs, Year III

39,800.00

Total Estimated Vehicle Rental Costs

\$108,946.00

Vehicle Purchase
(U.S. \$)

3 Vehicles @ \$12,000

\$36,000

(Price CIF Mombasa from U.S. supplier for
4 x 4 vehicle)

D. Conditions, Covenants and Negotiating Status

1. Conditions

The project^{1/} agreement will contain the standard conditions, including legal opinion and specimen signatures as well as the requirement for an approved contract for procurement services prior to any disbursements. The project agreement will also provide that an approved contract be executed for technical services prior to any disbursements.

2. Covenants

During negotiations for the project agreement, efforts will be made to strengthen and make more specific standard covenants with respect to the Borrower's funding, execution and maintenance of the project. In this regard, it is proposed to include covenants to the following effect:

a) The Borrower will covenant that it will provide the necessary trained construction and maintenance personnel required for the AID-financed gravelling project. To this end, the Borrower will also covenant that its existing training program for skilled construction and maintenance personnel will be expanded to meet the requirement of this project without detracting from the support of other, present or projected, road construction and maintenance efforts.

b) The Borrower will covenant that it will supply funding adequate for the continued support of roads construction and maintenance work in the AID project area, in addition to other present and projected construction and maintenance requirements.

c) The Borrower will covenant that roads to be improved under the AID project will be selected and evaluated in accordance with the procedures and criteria set forth in Annex 1 of this Loan Agreement. Generally, such criteria and procedures will take into consideration, inter alia, the following elements: (a) the degree of local level participation in roads selection and construction, (b) the extent of social and economic benefits based upon average daily traffic levels and coordination with other rural development programs including but not limited to, the proposed Rural Access Road project, and (c) the degree of access the improved roads will provide to relatively isolated rural areas. The criteria and procedures contained in Annex 1 may be modified by mutual written agreement of the Parties to reflect the results of periodic evaluations of the progress of the project. Within sixty (60) days of loan signing the Borrower will submit to AID a detailed plan of action for implementing the agreed upon roads selection criteria and procedures.

d) Borrower will develop for joint AID-GOK review annual programs of work for the AID project gravelling unit. Such programs of work will be submitted for joint AID-GOK review at mutually agreed upon dates specified in Project Implementation Letters and will identify:

- (1) planned roads for improvement;

1/ Combined loan and grant agreement.

- (2) types of planned improvements;
- (3) sequence of the improvements; and
- (4) plan(s) for evaluation.

The initial program of work will be developed and reviewed prior to the arrival in Kenya of the first shipment of AID project equipment.

e) Borrower will covenant that it will establish an appropriate, timely and effective system for procuring and transporting spare parts provided in the AID project and that it will establish a separate warehouse/store for storage of spare parts provided in the AID project. To this end, the Borrower will submit, prior to the arrival in Kenya of the first shipment of AID project equipment, a plan satisfactory to AID which describes in detail the proposed procurement, transportation and storage system.

3. Negotiating Status

The components of the proposed AID loan and grant have been developed in parallel to the CIDA assistance for which agreement has already been reached with the GOK. The GOK, including the Special Projects Branch of the MOW which will have implementation responsibility for the GBC program, is thoroughly familiar with the substance and scope of the AID proposal and has been provided relevant portions of the draft PP. Therefore, no special difficulties are expected to develop during the course of final negotiation of the AID project agreement.

A N N E X E S

Cost Estimates
Kenya Roads Graveling Project
FY 1976 - FY 1980

ANNEX VI
Page 1

I. AID CONTRIBUTION TO PROJECT COSTS

A. EQUIPMENT AND EQUIPMENT COST FOR ONE GRAVELLING UNIT

| <u>ITEM</u> | <u>QTY</u> | <u>US \$ EACH</u> | <u>TOTAL US \$ (CIF MOMBASA)</u> |
|---|------------|-------------------|--------------------------------------|
| 1. Motor Graders (CAT-130) | 2 | 70,000 | 140,000 |
| 2. Dozers with Rippers (D-7) | 2 | 110,000 | 220,000 |
| 3. Front End Loaders (2-cubic yard) | 3 | 60,000 | 180,000 |
| 4. Vibrator Rollers (2 towed and 1 self-propelled) | 3 | 50,000 | 150,000 |
| 5. Dump Trucks (5-7 cubic yards) | 30 | 25,000 | 750,000 |
| 6. Water Tankers (1500/2000 gallons) | 3 | 35,000 | 105,000 |
| 7. Fuel Tankers (2000 gallons) | 2 | 40,000 | 80,000 |
| 8. Service Trucks (lubrication, etc.) | 2 | 15,000 | 30,000 |
| 9. Pick-Up Trucks - 3/4 tons (4x2) | 2 | 12,000 | 24,000 |
| 10. Headquarters Project Manager's Vehicle (4x4) | 2 | 12,000 | 24,000 |
| 11. Flat Bed Trucks (7 tons) | 3 | 20,000 | 60,000 |
| 12. Office Van (towed) | 1 | 15,000 | 15,000 |
| 13. House Trailer | 2 | 20,000 | 40,000 |
| 14. Parts Van | 2 | 15,000 | 30,000 |
| 15. Mobile Workshop (towed) | 1 | 85,000 | 85,000 |
| 16. Air Compressor (150 cfm) | 1 | 15,000 | 15,000 |
| 17. 300 Amp. Welder (towed) | 1 | 8,000 | 8,000 |
| 18. Water Pumps (4 inch) | 4 | 1,500 | 6,000 |
| 19. Fuel Storage Tanks - towed chassis (2000 gallons) | 2 | 15,000 | 30,000 |
| 20. Fuel Storage Tanks - towed chassis (500 gallons) | 2 | 4,500 | 9,000 |
| Sub-Total US\$ | | | 2,001,000 |

| Sub-Total: | | | (2,001,000) |
|-----------------|--|-----|--------------------|
| 21. | Water Storage Tanks - towed chassis | 3 | 5,000 15,000 |
| 22. | 50 Ton Low Boy/Tractor | 1 | 100,000 100,000 |
| 23. | Miscellaneous Tools | lot | 95,000 95,000 |
| 24. | Radios - one base unit and 9 sets | 10 | 2,200 22,000 |
| 25. | Rubber-Tired Tractors (80 HP) | 4 | 25,000 100,000 |
| 26. | Electric Generators - 15 KW | 2 | 5,000 10,000 |
| 27. | Office Equipment | lot | 5,000 |
| 28. | Sub-Total, Equipment: | | (2,348,000) |
| 29. | Price escalation on equipment at 1.5 percent per month from January 1976 to April, 1977 - 24 percent initial equipment costs | | 564,000 |
| 30. | Sub-Total, Equipment and Escalation: | | (2,912,000) |
| 31. | Spares, 60 percent manufacturer FOB price for new equipment (4 year supply) | | 1,057,000 |
| 32. | Spares, Transportation Costs | | 352,000 |
| 33. | Sub-Total, Spares: <u>1/</u> | | (1,409,000) |
| 34. | Price escalation on spares at 18 percent total CIF value over 5 years (1977-1981) | | 254,000 |
| 35. | Sub-Total Spares and Escalation | | (1,663,000) |
| 36. | Sub-Total Equipment, Spares and Escalation | | (4,575,000) |
| 37. | Plus 10% contingency | | 458,000 |
| 38. | Total Estimated Cost: Equipment and Spares CIF Mombasa, Inflation and Contingency | | US\$ 5,033,000 |
| ESTIMATED TOTAL | | | 5,000,000 |

B. CONSTRUCTION MATERIALS COSTS**TOTAL US \$
(CIF MOMBASA)**

| | | |
|---|------|-------------------------|
| 1. Culvert Piping, 2 cross drainage per 1 km for 60 cm (24 inch) CMPC x 8.5 m (28 foot) length 1,300 km (800 miles) x \$30.00 linear meter. | | 663,000 |
| 2. Bituminous Material | | 400,000 |
| 3. Reinforced steel, \$500.00 per ton x 1200 tons | | 600,000 |
| 4. Total Cost for Materials: | US\$ | <u>1,663,000</u> |
| 5. Escalation Prices at 6 percent, per year, January 1976/March 1977 | | 100,000 |
| 6. Total Estimated Cost: Materials, including escalation | US\$ | <u><u>1,763,000</u></u> |
| C. <u>PROCUREMENT SERVICE FEES, EX-FACTORY PRICES</u> | | |
| 1. Equipment at 5.5 percent | | 160,000 |
| 2. Spares at 7.0 percent (US \$1,663,000) | | 116,000 |
| 3. Construction material at 5 percent | | 88,000 |
| 4. Total Procurement Fees | US\$ | <u><u>364,000</u></u> |
| D. <u>TECHNICAL ASSISTANCE</u> | | |
| <u>ENGINEER-IN-CHARGE - 5 WORKER YEARS</u> | | |
| <u>DUTY STATION - NAIROBI, FAMILY OF 4</u> | | |
| 1. Salary | | 150,000 |
| 2. Benefits | | 15,000 |
| 3. Travel to Post/Return | | 8,000 |
| 4. Air Freight/HHE - POV Shipment | | 16,000 |
| 5. Storage | | 7,500 |
| 6. Medical/Disability Insurance | | 3,000 |
| 7. Temporary Lodging | | 3,000 |
| 8. Quarters Allowance | | 35,000 |
| 9. Education Allowance | | 20,000 |
| 10. Home Leave/Return | | 12,000 |

D. TECHNICAL ASSISTANCE(contd)

| | |
|-------------------------------|---------|
| 11. Guard Services | 7,500 |
| 12. In-Country Travel | 6,000 |
| 13. Miscellaneous/Contingency | 17,000 |
| | <hr/> |
| TOTAL US\$ | 300,000 |

CONSTRUCTION ENGINEERING SUPERINTENDENT - 4 WORKER YEARS
DUTY STATION - KISUMU, FAMILY OF 4

| | |
|----------------------------------|---------|
| 1. Salary | 100,000 |
| 2. Post Differential | 10,000 |
| 3. Benefits | 10,000 |
| 4. Travel to Post/Return | 8,000 |
| 5. Air Freight/HHE- POV Shipment | 16,000 |
| 6. Storage | 6,000 |
| 7. Medical/Disability Insurance | 2,000 |
| 8. Temporary Lodging | 3,000 |
| 9. Quarters Allowance | 16,000 |
| 10. Education Allowance | 33,000 |
| 11. R&R (Athens) | 8,000 |
| 12. Home Leave/Return | 12,000 |
| 13. Guard Services | 6,000 |
| 14. In-Country Travel | 5,000 |
| 15. Miscellaneous/Contingency | 15,000 |
| | <hr/> |
| TOTAL US\$ | 250,000 |

MASTER MECHANIC - 4 WORKER YEARS
DUTY STATION - KISUMU, FAMILY OF 4

| | |
|-----------------------------------|---------|
| 1. Salary | 100,000 |
| 2. Post Differential | 10,000 |
| 3. Benefits | 10,000 |
| 4. Travel to Post/Return | 8,000 |
| 5. Air Freight/HHE - POV Shipment | 16,000 |
| 6. Storage | 6,000 |
| 7. Medical/Disability Insurance | 2,000 |
| 8. Temporary Lodging | 3,000 |
| 9. Quarters Allowance | 16,000 |

MASTER MECHANIC- Contd)

| | |
|-------------------------------|--------|
| 10. Education Allowance | 33,000 |
| 11. R&R (Athens) | 8,000 |
| 12. Home Leave/Return | 12,000 |
| 13. Guard Services | 6,000 |
| 14. In-Country Travel | 5,000 |
| 15. Miscellaneous/Contingency | 15,000 |

TOTAL US\$

250,000

E. CONSULTANT SERVICE COSTS, TECHNICAL ASSISTANCE

| | |
|--|--------|
| 1. <u>ENGINEER-IN-CHARGE</u> - \$300,000 | |
| Home Office/Overhead @ 20% | 60,000 |
| General Administration @ 20% | 60,000 |
| Fixed Fee @ 10% | 30,000 |

US\$

150,000

| | |
|---|--------|
| 2. <u>CONSTRUCTION ENGINEER</u> - \$250,000 | |
| Home Office/Overhead @ 20% | 50,000 |
| General Administration @ 20% | 50,000 |
| Fixed Fee @ 10% | 25,000 |

US\$

125,000

| | |
|---------------------------------------|--------|
| 3. <u>MASTER MECHANIC</u> - \$250,000 | |
| Home Office/Overhead @ 20% | 50,000 |
| General Administration @ 20% | 50,000 |
| Fixed Fee @ 10% | 25,000 |

US\$

125,000

TOTAL CONSULTANT SERVICE COSTS, TECHNICAL ASSISTANCE \$

400,000

F. SUMMARY OF TECHNICAL ASSISTANCE COSTS

1. TOTAL TECHNICAL ASSISTANCE:

| | |
|---|---------|
| a. Salary, Post Differential and Benefits | 405,000 |
| b. Total consultant service costs | 400,000 |
| c. Personnel support costs | 395,000 |

TOTAL ESTIMATED COST \$1,200,000

2. ESTIMATED COST PER MAN YEAR:

12 man years $\frac{\$1,200,000}{13}$

= 92,300/man y

3. ESTIMATED COST PER MAN MONTH:

$\frac{\$ 92,300}{12}$

= 7,700/man mo

G. RECURRENT PROJECT COSTS:

| | |
|---|---------|
| 1. POL Costs, 4 year operation | 880,000 |
| 2. 50% escalation POL costs over 4 year period | 440,000 |

3. AID funded 40% POL Costs TOTAL US\$ 1,320,000
528,000

H. TOTAL AID FUNDED PROJECT COSTS:

| | |
|--|--------------------|
| 1. Equipment, CIF Mombasa | 5,000,000 |
| 2. Construction Materials, CIF Mombasa | 1,763,000 |
| 3. Procurement fees, equipment and construction materials | 364,000 |
| 4. Technical Assistance | 800,000 |
| 5. Procurement fees, Technical Assistance | 400,000 |
| 6. Recurrent project costs | 528,000 |
| 7. Evaluation Program (see detailed budget in Section IV.C) | 200,000 |
| Total (rounded) | <u>\$9,100,000</u> |

I. GOK CONTRIBUTION TO PROJECT COST

| | <u>US\$ - One Year</u> 220,000 | <u>Total US \$</u> <u>4 - years</u> 880,000 |
|--|-----------------------------------|---|
| 1. a. POL - one year operation | | |
| b. Plus 50 percent escalation over 4 year period | | 440,000 |
| | | <hr/> 1,320,000 |
| c. GOK Contributions (60 percent) | Sub-Total: US\$ | 792,000 |
| 2. Labor Expenses | | |
| a. 200 personnel per gravelling unit Cost 160,000 per year x 4 years | 160,000 | 640,000 |
| b. 3-year labor rate increase at 10% = 30% | | 192,000 |
| | Sub-Total: US\$ | <hr/> 832,000 |
| 3. Equipment Maintenance, additional to AID funded spare parts (4 year period) | 50,000 | 200,000 |
| 4. Camp operations (4 year period) | 60,000 | 240,000 |
| 5. Headquarters Overhead (4 year period) | 30,000 | 120,000 |
| 6. Equipment Transportation, CIF Mombasa to site | | 200,000 |
| | Sub-total: US\$ | <hr/> 760,000 |
| 7. GOK Contributions to GBC Training Operation (5 year period) from MOW estimates | | 300,000 |
| | | <hr/> 2,684,000 |
| 8. Contingency of 15 percent (Items 1 to 7) | | 403,000 |
| 9. Construction Materials (concrete bridge beams and culverts) | | 75,000 |
| | | <hr/> <hr/> 2,759,000 |
| TOTAL GOK FUNDED PROJECT COSTS (rounded) | US\$ | <hr/> <hr/> \$3,200,000 |

J. PROJECT COST SUMMARY
 One Graveling unit per 4-year operation

ANNEX VI
 Page 8

US \$
 (Millions)

| | | |
|--|----------------------------|----------|
| 1. <u>Capital Cost AID Project Funded 1976-1981 Period</u> | | |
| a. Equipment | | 2.348 |
| b. Spare Parts | | 1.057 |
| c. Construction Materials | | 1.663 |
| d. Technical Assistance of 13 man years | | .753 |
| e. Procurement Costs | | .764 |
| f. Escalation + contingency | | 1.289 |
| g. Evaluation Program | | .200 |
| | Total : AID FX Costs US | \$8.100 |
| | (rounded) | |
| 2. <u>Local Cost Support by AID (Recurrent)</u> | | |
| a. Spare Parts and misc. tools | | .352 |
| b. Petroleum, Oils and Lubricants | | .352 |
| c. Inflation + contingency | | .277 |
| d. Evaluation Program | | |
| | Total : AID Local Costs | \$1.000 |
| | (rounded) | |
| 3. <u>AID Project Support Costs</u> | TOTAL : AID LOCAL COSTS US | \$9.100 |
| | (rounded) | |
| 4. <u>Recurrent Costs by GOK - Kenya Shilling Funded</u> | | |
| a. Petroleum, Oils and Lubricants | | 0.792 |
| b. MOW Labor Expenses | | .832 |
| c. Shop Support Expenses | | .200 |
| d. Camp Operation Expenses | | .240 |
| e. Headquarters Support Expenses | | .120 |
| f. Transportation of Equipment | | .200 |
| g. Training Costs | | .300 |
| h. 15 percent contingency | | .403 |
| i. Construction materials (includes contingency) | | .075 |
| Total : GOK - Local Currency Project Support Cost | US | \$3.200 |
| | (rounded) | |
| Total Project Costs (AID and GOK) | US | \$12.300 |
| | (rounded) | |

K. ESTIMATED COST PER ROAD MILE CONSTRUCTION

ANNEX VI
Page 9

| | <u>Total US \$</u> |
|---|---------------------|
| Total Construction estimated to be completed in 4-year Period = 1300 kilometers (800 miles) | |
| a. Total Capital and Recurrent Costs | \$12,227,000 |
| b. Less Capital Investment residual value (50% of Total estimated equipment costs) = 50% x 3.344 Million: | 1,672,000. |
| c. Less residual value on spares (20% Total Estimated Cost of Spares) 20% x 2,162 | <u>432,000</u> |
| | TOTAL: \$10,123,000 |
| d. <u>TOTAL COST</u> (10,123) = US \$7,787 per kilometer 1300 km | |
| e. <u>TOTAL COST</u> (10,123) = US \$12,654 per mile 800 miles | |

Note: CIDA cost estimates - 1973 figures = US \$5,457.00 per mile

1/

SPARE PARTS ACQUISITION

AID intends to support the spare parts requirements of this project during the four year life of the construction program. The project is designed on the assumption that it will be required to purchase approximately 76% (\$1.479 million) of total spare parts requirement from 941 source as FX component. The 24% balance (0.453 million) is estimated to be purchased in country off-shelf as a local cost.

It is further estimated that 60% of the acquisition cost of the equipment, based on CIF Mombasa prices, will provide sufficient funds for procurement and shipping of the necessary spares to cover requirements during the project life. The 60% requirement is based on the following criteria:

| | <u>Percent</u> |
|--|----------------|
| 1. Initial acquisition of fast moving spares purchased with equipment, (filters, belts, etc) | 10 |
| 2. First year operation (normal new equipment spare requirement) | 7 |
| 3. Second year operation (normal requirement) | 10 |
| 4. Third year operation (possible rebuilds) | 15 |
| 5. Fourth year operation (possible rebuilds) | 18 |
| Estimated requirement | <u>60%</u> |

The cost breakdown for acquisition and shipping of spare parts for the project is estimated as follows:

| | <u>(\$ million)</u> |
|--|---------------------------------------|
| 1. Acquisition Cost 60% of F.O.B. value of equip- ment (.60 x \$1.761 M) | = 1.057 |
| 2. Estimated Shipping Costs (CIF Kenya, surface and air) | = 0.352 <u>0.352</u> \$1.409 M. |
| 3. Escalation, (18% over four year period) | = 0.254 |
| 4. Contingency, (9%) | = 0.153 |
| 5. Procurement fees (7% x 1.663) | = 0.116 <u>0.116</u> |
| Estimated Total Cost <u>\$1.932 M.</u> | |

The estimated cost breakdown of spares for the life of the project is further divided into Foreign Exchange and local cost as follows:

| | U.S.\$ (Million) | | |
|---------------------|------------------|----------------|----------------|
| <u>Project Time</u> | <u>FX</u> | <u>LC.</u> | <u>Total</u> |
| 1. Initial Purchase | 0.251 | 0 | 0.251 |
| 2. First year | 0.177 | .136 | 0.313 |
| 3. Second year | 0.251 | .091 | 0.342 |
| 4. Third year | 0.356 | .090 | 0.446 |
| 5. Fourth year | 0.444 | .136 | 0.580 |
| | <u>\$1.479</u> | <u>\$0.453</u> | <u>\$1.932</u> |

ENVIRONMENTAL ANALYSIS OF KENYA GRAVELLING PROGRAM

Summary:

The principal objective of the Government of Kenya is to improve the surfacing and drainage condition of some 800 miles of existing secondary and minor roads in two provinces of Kenya - Western and Nyanza. The objective of the AID project is to support this program by means of financing construction equipment, spare parts and material for construction of approximately twenty bridges and culverts for cross drainage for some 2,600 locations. Additional financing will be provided to finance a portion of POL required for operation of construction equipment; the construction duration is anticipated to be about four years.

The AID program is part of a large GOK undertaking in road graveling for which AID will be providing one construction unit, CIDA will provide three construction units. This project was initiated by the Kenya Government's 1972 request - CIDA/SIDA/IBRD as well as AID, will be supporting this program. The analysis contained here is derived from reports prepared by these organizations, completed by USAID/GOK/REDSO reviews.

Summary of Environmental Assessment:

There are six major categories of environmental impact areas to be considered within this project. The areas are:

1. Effects of improved access routes into previously less accessible areas and resulting increased level of noise.
2. Protection of wildlife, rangelands, migration routes, etc.
3. Effects of improved road on industrial, commercial or other urban land use patterns.
4. Effects of minor changes in the existing alignment concerning land use, land marks, archaeological sites, etc.
5. Effects of improved drainage patterns.
6. Effects of air pollution from dust.
7. Effects of borrow pits used for surface material.

Environmental Impact Areas:

- 1) The road networks selected for improvement in the two provinces are not associated with areas designated for wildlife protection, such as rangelands or migration routes. In fact, because of the population densities involved, these areas are devoid of the wildlife which is characteristic of other parts of Kenya. The areas for road improvement are also devoid of bird sanctuaries or lake sanctuaries as found in other parts of Kenya.
- 2) The proposed two provinces are located in the western part of Kenya containing productive agricultural land. These provinces are densely populated by small farmers primarily involved in subsistence type agricultural operations. Therefore, it is not envisioned that the gravelling of these roads will have a large impact on industrial and commercial development in the area. The only effect expected is that the improved surfacing of roads will facilitate movement of agricultural products to markets which in turn may encourage more intensive cultivation in the area.
- 3) The roads designated for improvement already exist as a network secondary and minor roads. These roads presently are surfaced with earth, with a limited amount of gravel or laterite. The intention of this program is to upgrade these roads by adding select surfacing material. The minor proposed changes in the vertical and horizontal alignment does not infringe upon or involve historic sites, natural landmarks, archaeological sites, etc., nor does the project destroy timberland, cropland or other resources.
- 4) It is expected that the regraveling program, which includes shaping parallel ditches and stream crossings, will change the drainage patterns now existing on the unimproved road network. The change is anticipated to result in an improvement of water run-off control by channeling and controlling water into designated ditches and thus minimizing erosion effects. Due to erosion, the improved drainage areas will have some minor environmental impact until the disturbed areas are re-established with vegetation.
- 5) There will be a certain amount of dust problem during the construction period. This temporary environmental impact is unavoidable. The anticipated increase in the traffic volumes will also contribute to increased dust in the areas. However, the roads are proposed to be improved by surfacing with select gravel material, thus an overall reduction of dust in the areas is anticipated.

6) The gravelling program will be implemented by use of suitable gravelling material from borrow pits. The pits will be selected in areas where it is not densely populated. Borrow pits will ultimately be graded to drain and the natural condition will be restored. These pits are not expected to shelter malaria mosquitos or other water borne insect disease vectors. Therefore, it is expected that this phase of the operation will have very little effect on the environment.

Other possible environmental impact categories suggested in AID's Environmental Assessment/Guidelines Manual were carefully reviewed and found not to be effected by this project. Hence, it is assessed that the overall environmental impact caused by this project is insignificant.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

AID 1070-20 (11-78)
SUPPLEMENT 1

Project Title & Number: Kenya Roads Graveling

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project: 1977 to 1982
From FY 1977 to FY 1982
Total U.S. Funding: \$9,605,000
Date Prepared: MARCH 3, 1979

| NARRATIVE SUMMARY | OBJECTIVELY VERIFIABLE INDICATORS | MEANS OF VERIFICATION | IMPORTANT ASSUMPTIONS |
|--|---|---|--|
| <p>Program or Sector Goal: The broader objective to which this project contributes: (A-1)</p> <p>To improve the welfare of smallholders.</p> | <p>Measures of Goal Achievement: (A-2)</p> <ol style="list-style-type: none"> 1. Net real incomes of smallholders will increase. 2. Food and cash crop production will increase. 3. Availability of social services (health, family planning, education) will improve and utilization will increase. | <p>(A-3)</p> <ol style="list-style-type: none"> 1. Central Bureau of Statistics Rural Integrated Survey. 2. Study of "Impact of Roads on Rural Development." 3. Evaluation data. 4. MOA statistics on production, gross farm revenue, farm management data. | <p>Assumptions for achieving goal objectives: (A-4)</p> <ol style="list-style-type: none"> 1. Increased production results in increased real incomes. 2. Distribution and use of social services will be facilitated and will follow roads |

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORKLife of Project
From FY 1977 to FY 1982
Total U.S. Funding \$9,065,000
Date Prepared March 3, 1976APP-1025-20 (1-75)
SUPPLEMENT 1Project Title & Number: Kenya Roads Graveling

PAGE 2

| NARRATIVE SUMMARY | OBJECTIVELY VERIFIABLE INDICATORS | MEANS OF VERIFICATION | IMPORTANT ASSUMPTIONS |
|---|--|---|---|
| <p>Project Purpose: (B-1)</p> <p>To improve smallholder access to agriculture institutions, services and infrastructure, including inputs, credit, knowledge/extension to apply inputs, markets and/or storage facilities, roads and water.</p> | <p>Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)</p> <p>1. Existence and use of improved and increased all-weather road links between markets and farms in Western and Nyanza Provinces.</p> | <p>(B-3)</p> <p>1. Average daily traffic counts, MOW reports and visual observation.</p> <p>2. AID evaluation of GBC.</p> | <p>Assumptions for achieving purpose: (B-4)</p> <p>1. Maintenance of gravelled roads will be funded adequately and carried out on a regular basis.</p> <p>2. Criteria used for selection of roads for GBC are appropriate and utilized.</p> <p>3. IADP is successfully implemented and on schedule.</p> |

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: 1977 to FY 1982
From FY 1977 to FY 1982
Total U.S. Funds: \$9,065,000
Date Prepared: March 1, 1976

AID 1020-20 (11-75)
SUPPLEMENT 1

Project Title & Number: Kenya Roads-Gravelling

PAGE 3

| NARRATIVE SUMMARY | OBJECTIVELY VERIFIABLE INDICATORS | MEANS OF VERIFICATION | IMPORTANT ASSUMPTIONS |
|--|--|--|--|
| <p>Project Outputs: (C-1)</p> <p>1. Gravelled secondary and minor roads in Western and Nyanza Provinces.</p> | <p>Magnitude of Outputs: (C-2)</p> <p>1. 800 mi. over a five-year period - 1978 - 82</p> | <p>C-3;</p> <p>1. Project and MOW reports and statistics.</p> <p>2. USAID evaluations.</p> | <p>Assumptions for each output: (C-4)</p> <p>1. MOW training produces needed personnel at time required.</p> <p>2. Special Projects Division, MOW, and TA personnel provide appropriate and timely administration and management of program.</p> <p>3. Timely arrival equipment and TA experts.</p> <p>4. MOW hires qualified staff to replace project engineer at end of his/her tour and complete CES program.</p> |

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Annex X
Page 4

Life of Project From FY 1977 to FY 1982
Total U.S. Funding \$9,065,000
Date Prepared March 1, 1976

AID INSURANCE
SUPPLEMENT 1

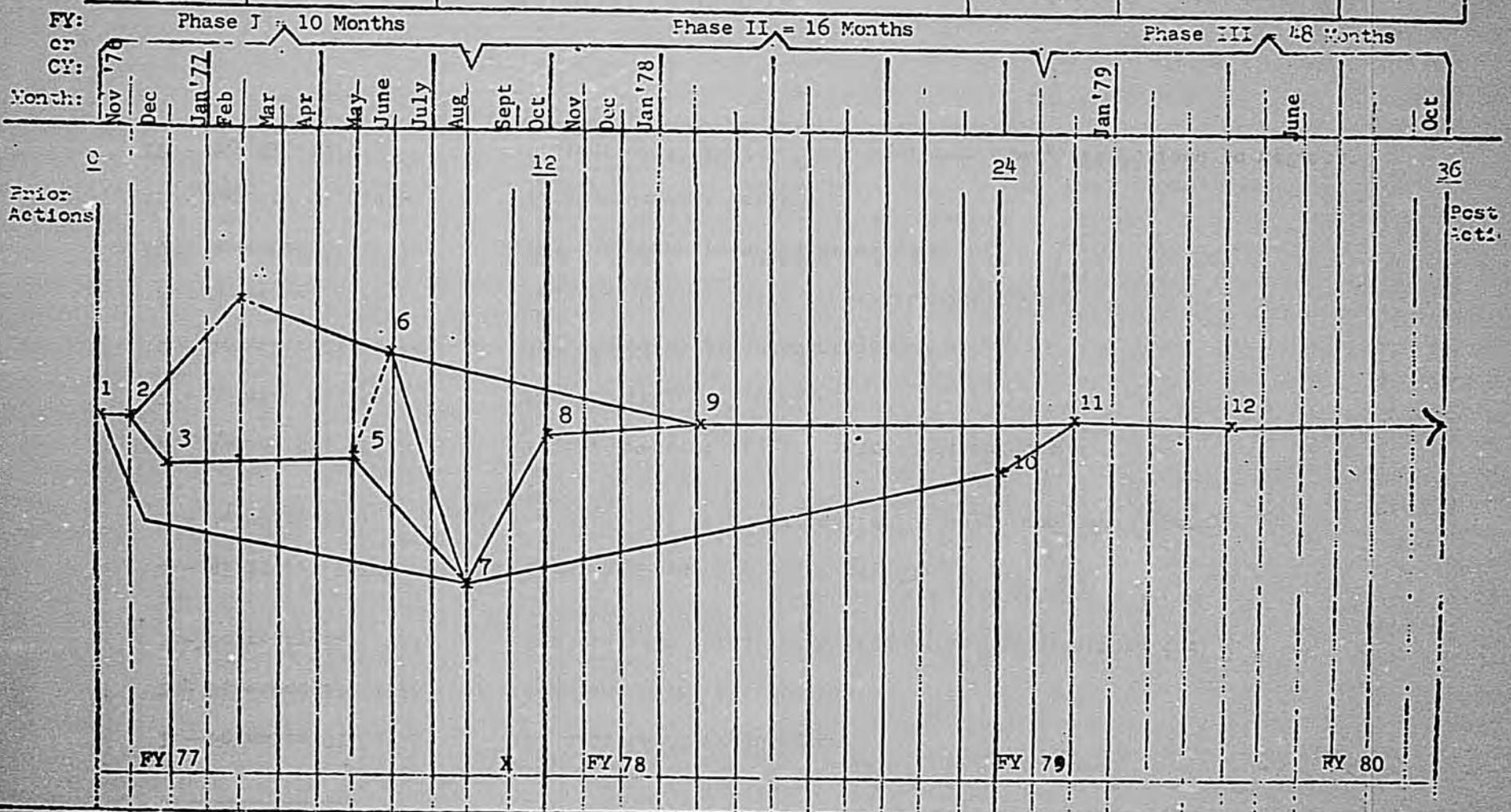
Project Title & Number: Kenya Roads Graveling

PAGE 4

| NARRATIVE SUMMARY | OBJECTIVELY VERIFIABLE INDICATORS | MEANS OF VERIFICATION | IMPORTANT ASSUMPTIONS |
|--|--|---|---|
| <p>Project Inputs: (D-1)</p> <p><u>AID</u></p> <ol style="list-style-type: none"> 1. Loan financing for capital equipment, and procurement. 2. Loan financing for recurrent costs. 3. Grant financing for technical assistance. <p><u>GOK</u></p> <p>Local cost support</p> | <p>Implementation Target (Type and Quantity): (D-2) AID:</p> <ol style="list-style-type: none"> 1. Heavy equipment, construction materials, procurement service fees - \$6,674,000. 2. Spare parts and POL - \$981,000. 3. a. Engineer-in-Charge 5 worker-years - b. Construction Superintendent - 4 worker-years. c. Master Mechanic - 4 worker-years. d. Evaluation Total \$1,410,000 obligated FY 1977 | <p>(D-3)</p> <ol style="list-style-type: none"> 1. AID financial records. 2. GOK and donor-financial records and reports. | <p>Assumptions for providing inputs: (D-4)</p> <ol style="list-style-type: none"> 1. Funds will be provided in time for effective utilization. 2. AID loan signed by April 1, 1977, and all disbursements (grant and loan) completed by end FY 1982. 3. GOK financing available in amounts (total \$3.2 million and at times required). 4. SIDA and IBRD financing for MOW training program available. 5. CIDA grant and loan financing adequate to cover costs of GBC program in Central and Coast Provinces. |

PROJECT PERFORMANCE NETWORK

| | | | | | |
|-------------------|-------------------------|---|-----------------------|------------------------|-----------|
| Country: KENYA | Project No: 615-0170 | Project Title: Kenya Roads Graveling | Date: Oct 25, 1975 | ✓ Original Revision | PPT appr. |
|-------------------|-------------------------|---|-----------------------|------------------------|-----------|



Mineral Plan:
Evaluation Plan:

CPI DESCRIPTION:

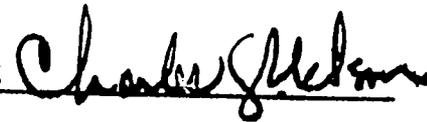
- 1 - November 01, 1976 PP sent to AID/Washington
- 2 - December 31, 1976 Loan and Grant Authorized
- 3 - February 01, 1977 Construction services advertised and negotiations for procurement started
- 4 - April 01, 1977 Loan Agreement and ProAg signed
- 5 - July 15, 1977 Construction services contracted and procurement agency selected
- 6 - August 01, 1977 Fullfillment of CPs for initial disbursement
- 7 - October 01, 1978 Project engineer on site
- 8 - December 01, 1978 IFB issued by procurement agency
- 9 - April 01, 1978 Purchase order issued by procurement agency
- 10 - November 01, 1979 Two follow-on technicians on site
- 11 - January 01, 1979 First equipment arrival
- 12 - May 01, 1979 Project mobilization (work plan completed, PPT revised to reflect schedule for completion of construction)

Kenya Roads Graveling Program

Certification Pursuant to FAA Section 611(e)

I, Charles J. Nelson, the principal officer of the Agency for International Development in Kenya, having taken into account, among other things, the maintenance and utilization of projects in Kenya previously financed or assisted by the United States, the demonstrated capacity and willingness of the Government of Kenya to maintain its road network at a level above that of most developing countries, and the assistance provided by other donors specifically directed to the expansion of Kenya's construction and maintenance staff training department, do hereby certify that in my judgment the Government of Kenya has shown both the financial and human resources capability to effectively maintain and utilize the assistance provided under the Roads Graveling Loan.

Signed



Charles J. Nelson
Director

Date

5 March 1976

REPUBLIC OF KENYA
MINISTRY OF FINANCE AND PLANNING

ANNEX XIV.

Telegraphic Address:
FINANCE-NAIROBI
Telephone: 24261-72
When replying please quote
Ref. No.DV. 9/03...
and date



THE TREASURY
P.O. Box 50007
NAIROBI
KENYA

4th March, 1975

USAID DISTR. (3/5)

ACTION: PROG

(Due: 3/11)

INFO: DIR

A/DIR

REDSO

CHRON

RF

Mr. C.J. Nelson,
Director,
United States of America
Agency for International Development,
P.O. Box 30261,
NAIROBI.

Dear Mr. Nelson,

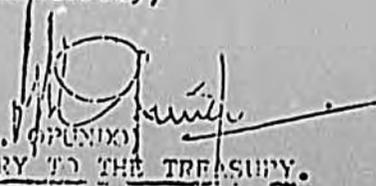
U.S.A.I.D. ASSISTANCE

GRAVELLING SECONDARY AND MINOR ROADS.

I refer to previous discussions regarding U.S.A.I.D. Assistance towards Road Graveling Programme. It is our understanding that the finances involved will cover costs of purchasing various equipment as well as running costs necessary for the implementation of the programme.

The purpose of this letter is to formally request U.S.A.I.D. to provide the essential technical assistance. Ideally we expect to receive from you qualified and experienced men who will work with Kenyan counterparts during the project period. The details of the Technical Assistance required have already been discussed between Kenya Government and USAID. It would be greatly appreciated if the USAID could be good enough to provide the required personell as soon as possible.

Yours sincerely,


(G.C.O. OPUNIKI)

C.C. Fox: PERMANENT SECRETARY TO THE TREASURY.

The Permanent Secretary/
Engineer-in-Chief,
Ministry of Works,
P.O. Box 30260,
NAIROBI.

(Att: Chief Engineer Road - Mr. Radics)

Draft Loan Authorization

AID Loan No. : 615-T-010
Provided under: FAA Section 103, Food and Nutrition
For : Kenya - Roads Graveling

Pursuant to the authority vested in the Administrator, Agency for International Development ("A.I.D."), by the Foreign Assistance Act of 1961, as amended, and the delegations of authority issued thereunder, I hereby authorize the establishment of a loan pursuant to Section 103 of said Act to the Government of Kenya ("Borrower") of not to exceed seven million seven hundred thousand United States dollars (\$7,700,000) to assist in financing the United States dollar and local currency costs of the procurement of construction equipment, spare parts, supplies, and materials to be used by the Borrower for the upgrading, improvement, and graveling of approximately 800 miles of secondary and minor roads in agricultural areas of Kenya. The Loan shall be subject to the following terms and conditions:

1. Interest Rate and Terms of Repayment - The Borrower shall, in United States dollars:
 - (a) Repay the Loan to A.I.D. within forty (40) years from the date of the first disbursement under the Loan, including a grace period of not to exceed ten (10) years.
 - (b) Pay to A.I.D. interest on the unrepaid principal and on any interest accrued thereon, at the rate of two percent (2%) per annum during the grace period and three percent (3%) per annum thereafter.
2. Other Terms and Conditions
 - (a) Equipment, materials and services financed by the Loan shall be procured from Kenya and from countries included in Code 941 of the A.I.D. Geographic Code Book as in effect at the time orders are placed for such equipment, materials and services.

- (b) Based upon the justification set forth in the Project Paper, the invoice value limitation on single transactions involving shelf items imported from Code 935 countries, as prescribed by Chapter 11, paragraph 11B.3 of AID Handbook 15, is modified to raise the invoice value limitation to \$5,000 on single transactions.
- (c) The Loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

Deputy Administrator

Date: _____