

APPENDIX I

Field Survey

I: COAST PROVINCE

I.1 GENERAL

Danida signed an agreement to support the Roads 2000 project in Coast Province from 1999/2000 financial year and they have set aside 81.6 million Danish Kroner. The GoK will provide counterpart funding from the Road fund of about Kshs. 530 Million. The GoK contribution will be provided on an increasing scale starting from 20% of the cost of works and training in the first year to 60% in fifth year, increasing in 10% steps each year.

The Project Co-ordinator has been recruited for the job. Danida has recruited a Mechanical Advisor. The field activities commenced in October 1999.

A two-phase approach has been adopted. Phase I of the agreement is for 2 years and will cover the existing MRP Transition Project Districts in Coast Province (Kilifi, Kwale, Taita Taveta and Malindi). Phase II will cover all districts in Coast Province and will take three years.

The Danida calendar of activities spans a period of five (5) years.

I.2 DANIDA VIS-À-VIS ROADS 2000 PROGRAMME

So far only four out of the six Districts in the Province enjoy the Danida grants. These Districts are Lamu, Malindi, Kilifi and Taita Taveta.

Malindi and Kilifi Districts were visited. It was established that activities in these Districts are a reflection of what is taking place elsewhere in the Coast Province. The following can be said about the Danida activities in the Province.

- ◆ **During the field survey it was established that the spot improvement and spot repair of roads is receiving high priority in the Danida funded roads. Maintenance approach is labor intensive with small component of light machinery. Petty contractors are executing renovation works.**
- ◆ **Labor-based contractors are being developed to undertake subsequent regravelling and rehabilitation works. Trained contractors are given preference in contracts. At the on-going projects, small contractors undertake 95% of all periodic maintenance on the road network.**

- ◆ It was found that there were no established guidelines and procedures for environmental and soil impact assessment in the Danida interventions.

In brief, the activities under the Danida calendar include the following: -

- (i.) road condition surveys and preparation of bills of quantities for spot improvement and maintenance works
- (ii.) conduct trial surveys with the District Roads Engineers (DREs) using the proposed methods with emphasis on testing and practical training
- (iii.) they have trained District road personnel (DRE and Inspectors) on how to undertaking road surveys
- (iv.) labor-based lengthmen contract approaches is in place on most of the unpaved road network where traffic density is sparse
- (v.) some sections of minor roads with higher vehicular traffic were also being renovated by these length but supported by light equipment

I.3 DATA CAPTURED DURING THE TOUR TO THE PROJECT SITES

A distance of 520 Km of minor classified roads was traversed. Classified road types C, D, and E were visited. The program of the field survey exploration had the following subroutines: -

- (i.) Traversing through the classifies road under construction and taking photographs of salient engineering features
- (ii.) Interviewing the private contractors on site (petty contractors)
- (iii.) Holding lengthy discussions with the DRE and the District Works officers (DWO) in regard to the work under implementation

The following section discusses events encountered during the field survey mission with the aid of illustrations.

I.4 PICTORIAL ACCOUNT OF DANIDA ENGINEERING ACTIVITIES

Consider a damaged part of Road type E shown in figure 1 below. The spot improvement here required raising the ground using importing suitable material brought from selected quarry within the proximity. To improve the drainage situation at the same spot will require the use of culvert.



Figure I-1. Damaged part of class D road requiring spot improvement.

A typical solution of such a defect is shown here in figure I-2. Note that the culverts are locally made at the District Resident Engineer's yard as exemplified in figures I-3 and I-4 overleaf.



Figure I-2. Typical solution to the defect (in Figure I-1).

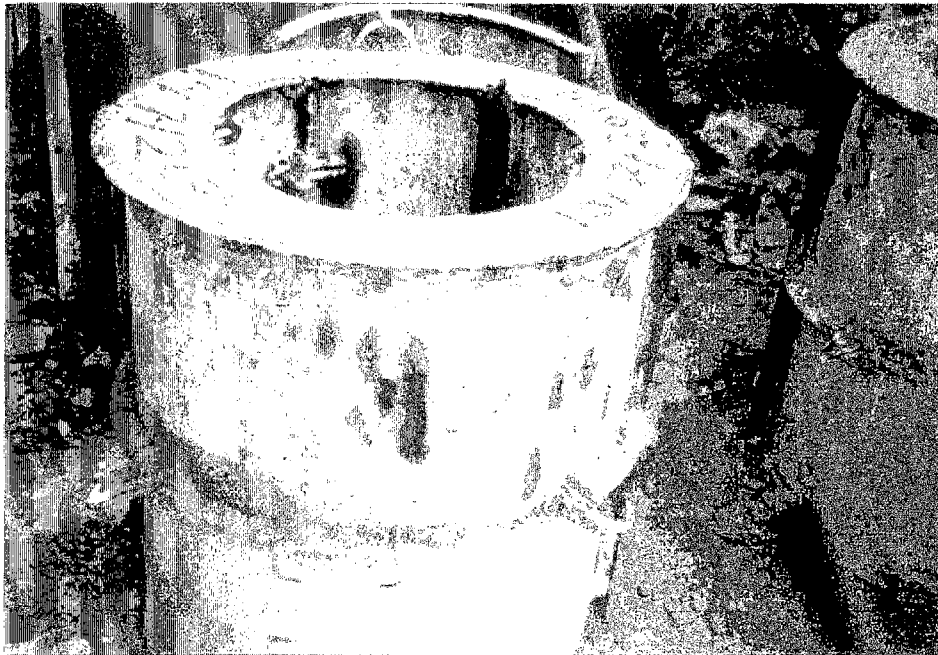


Figure I-3. Making of Culverts at the District Roads Engineer's yard.

The making of culverts requires very simple molds and aggregates and cement. This methodology (which is both appropriate and cost effective) of making culverts in the Danish project is shown in figure I-3 above. Each culvert made is calibrated with the date of manufacture for purposes of curing.



Figure I-4. Fully cured Culverts read for use at the District Roads Engineer's yard.



Figure I-5: Properly Maintained class D road in Malindi District.

Routinely maintained earth road is possible. For instance, if the drainage system and potholes are addressed, we obtain very pleasant trafficable roads as shown in figure I-5 (above) and figure I-6 (below) respectively.

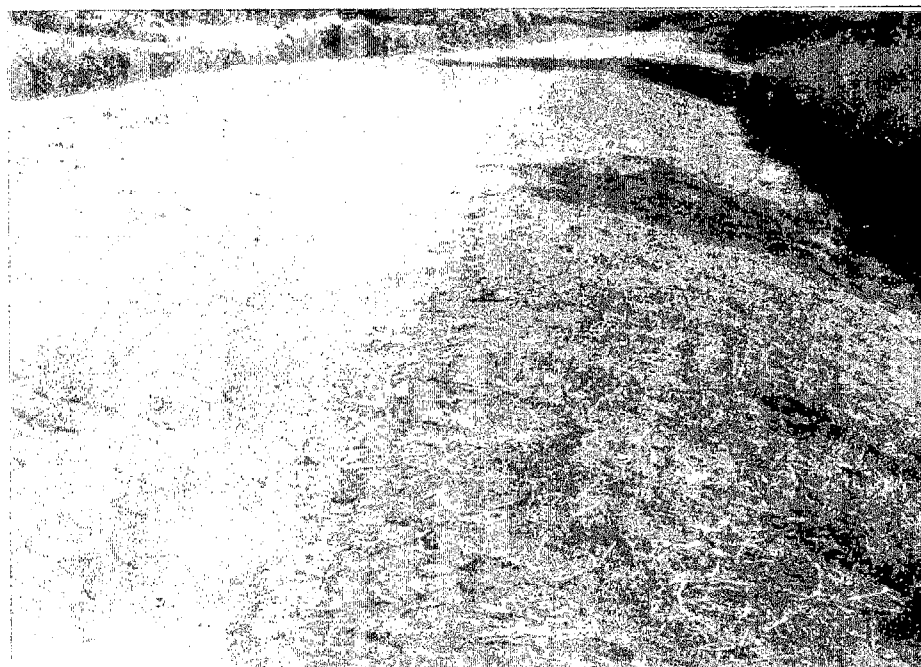


Figure I-6. Properly Maintained class E road in Malindi District.



Figure I-7. Routine Maintenance of a classified road using lengthman.

Routine maintenance requires use of very simple tools such as slasher and jembe for cleaning weed (see figure I-7 above). The DRE has a four-wheel drive Japanese car for routine inspection of maintenance works (see figure I-8 below).



Figure I-8. The DRE's Four Wheel Drive Car for Supervisory tasks.

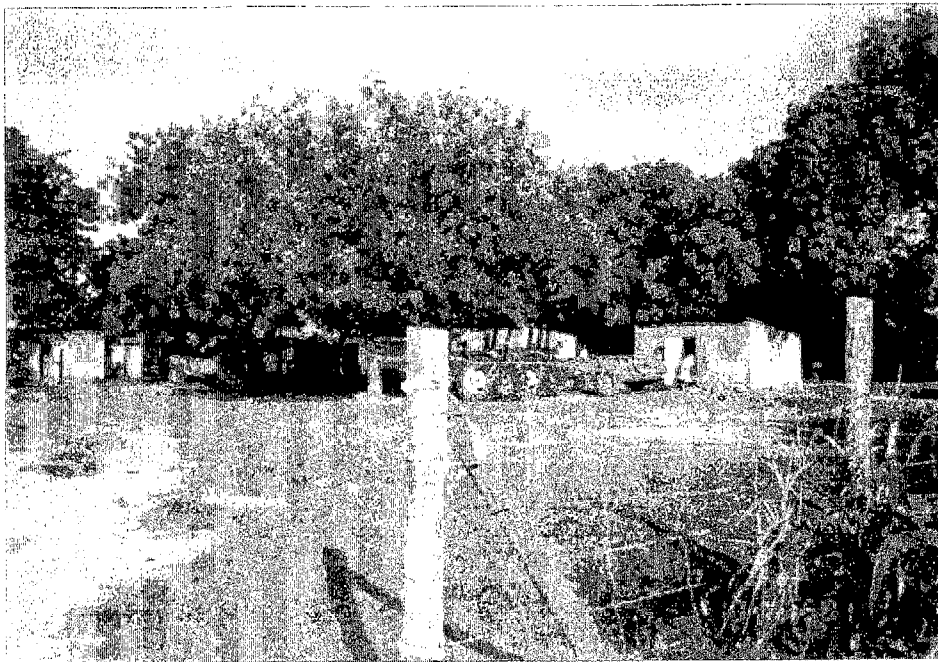


Figure I-9: Light Machinery for Transportation needs at Fundisa.

Off site quarry material transportation done by trailer-tractors centrally located in a maintenance camp established by MORPW (see figure I-9 above). Equipment maintenance is done at the camps. The trailers are simplistic as depicted in figure I-10 and spare parts are available locally at reasonable prices.



Figure I-10: Simple Trailer (locally assembled).

A minor road serving a rural urban center in the Province is shown in figure I-11.



Figure I-11: Properly Maintained class C road serving a rural-urban center in the Province.

Finally, lack of vision and inappropriate road maintenance practices led to failure of RARP and MRP programs as illustrated in figure I-12 below. Similar scenario can be seen all over the Republic of Kenya, heralding the fact that equipment based methods are none sustainable in Kenya.

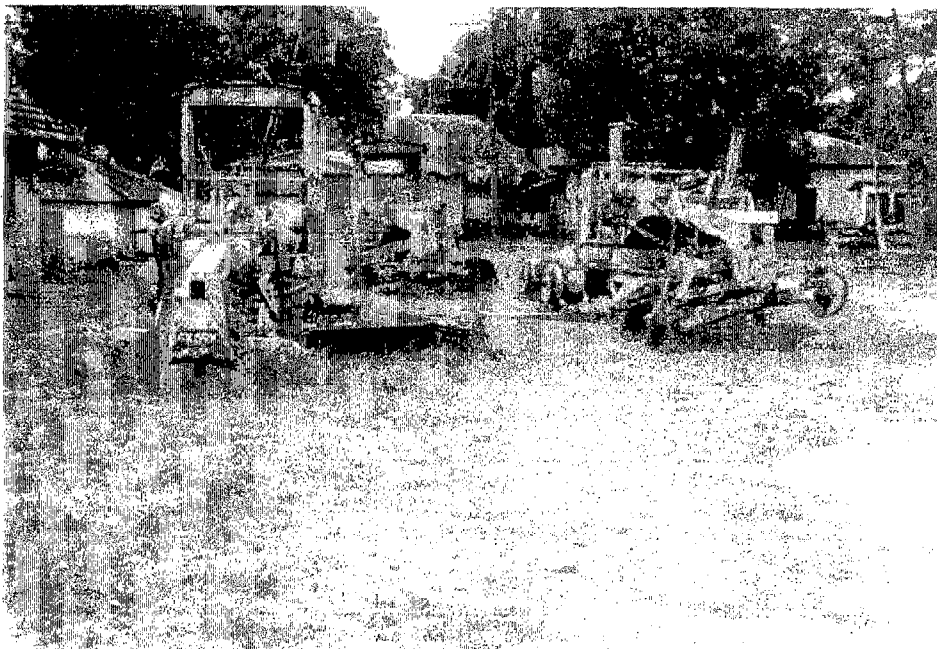


Figure I-12: Fruits of Unsustainable Maintenance Programs.

L5 OTHER INFORMATION ON DANIDA ACTIVITIES

(i.) It was established that overseers use bicycles for traversing the road sections under their portfolio to inspect works and give advice to lengthmen. The DRE drives through the entire road network in his district to ascertain that works are properly executed.

(ii.) Small-scale contractors (petty contractors) are invited to attend training that will make them suitable to undertake the labor-based maintenance works now and in the future. Here is an excerpt of an invitation from the MORPW/Danida to private sector:

"Ministry of Roads and Public Works in collaboration with Danida Coast would like to invite interested persons or groups who are eligible as listed below to be trained as labor-based routine maintenance (small scale contractors) for future road maintenance contracts in Malindi District".

(iii.) Payments are made to contractors soon after the DRE has prepared the claim and the Consultant has approve it. So far there has been no major hitch on payments processes for certified contractors certificates.

(iv.) However, it was noted that there is discontinuity in works just before the end of the financial year. Certificate payments resume two months after the Budget is read. This was observed as a hindrance to the timely execution of calendar activities since contractors either go slow or stop works during this stalemate period.

(v.) From the interview conducted, we noted (with satisfaction) that there is ample room for creating job-specific contractors.

(vi.) Elsewhere, it was established that we have a pool of very experienced contractors with sophisticated machinery. But these Contractors are not indigenous people. They are based either in Mombasa or Nairobi.

(vii.) Contractors are receiving training on a regular basis both at the DRE headquarters and Kisii Training School. At Kisii Training the curriculum is subdivided into three phases: -

- new courses in managing contractors for the ministry staff
- site orientation courses for lengthmen contractors involved in road maintenance
- more substantial re-orientation courses for existing contractors in labor based construction techniques

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II: CENTRAL PROVINCE

II.1 GENERAL

Sida is already actively supporting Roads 2000 in some Districts of Central Province, namely Nyeri and Kirinyaga. This is a continuation of their support for Minor Roads Programme (MRP) since July 1997. Sida is providing 35 million Swedish Kroner (about Kshs. 270 million) for 3 years while GoK is expected to provide Kshs. 263 Million in the same period. The progress in the last 2 years has been very slow due to problems of disbursement of funds from the GoK (Treasury) to the District.

Roads 2000 program is a government and Sida initiative geared towards the rehabilitation and maintenance of all roads in a given district to a sustainable and trafficable condition in all weathers. This involves grading of earth roads followed by gravelling and spot improvements of deteriorated sections. Road shoulders, road furniture, culverts (cross and access) and drainage is also included in this improvement. This leads to an increased economic, social and health of the public in general.

The GoK counterpart funding to the Roads 2000 effort is obtained from the Fuel Levy fund. The Ministry of Roads and Public Works (MORPW) is responsible for the planning, construction and maintenance of the classified road network in Kenya. MORPW provides the work plan for determining the amount of funding required in various areas and prioritization of the roads to maintained (priority aspect is formulated in conjunction the District Development Committee - DDC). Full details on the structure of the MORPW had been explained elsewhere in the main text. In the next sections an attempt is made to discuss the events, results and shortfall of the GoK-Sida venture on Roads 2000.

II.1 ROADS 2000 PROGRAM IN NYERI

The Roads 2000 Programme in Nyeri is being implemented in stages since 1998. It is on going in two of the four constituencies of Nyeri (Mathira and Tetu) having been completed in the others (Othaya, Mukurweini respectively).

Roads 2000 Programme implementation in this District is labor-based as much as is practicable and economical, although in some cases minimal machinery is employed on difficult terrain. Local contractors are awarded tender to either supply required materials (gravel, concrete culverts, etc.) or to perform renovation

works. Such tenders are advertisement in the local dailies and awarding is based on competitive bidding.

The first step in the maintenance procedure is grading of the roads, mostly with the use of GoK Grader machines to achieve the required road longitudinal and lateral profiles. The road profiles are made such that they follow the natural terrain as nearly as possible (see figure II-1). In a few instances labor-based methods are substitute by Grader equipment.



Figure II-1. MORPW Grader spreading quarry waste.

Due to lack of adequate machinery, the MORPW is compelled to hire plants from the private sector to expedite the construction activities. At the moment the government has only four graders and several rollers in good working condition. This machinery at the MORPW District camp yard is shown in figure II-2.

The local contractors supply the gravel and tip it at intervals adequate to form a 150 mm thick wearing course under the supervision of the District Roads Engineer's (DRE's). This is shown in figure II-3. The amount of gravel per unit length of the road under maintenance depends on a number of variables including the carriageway width. The source of gravel is from selected quarries which are readily available and in cross proximity to the works.

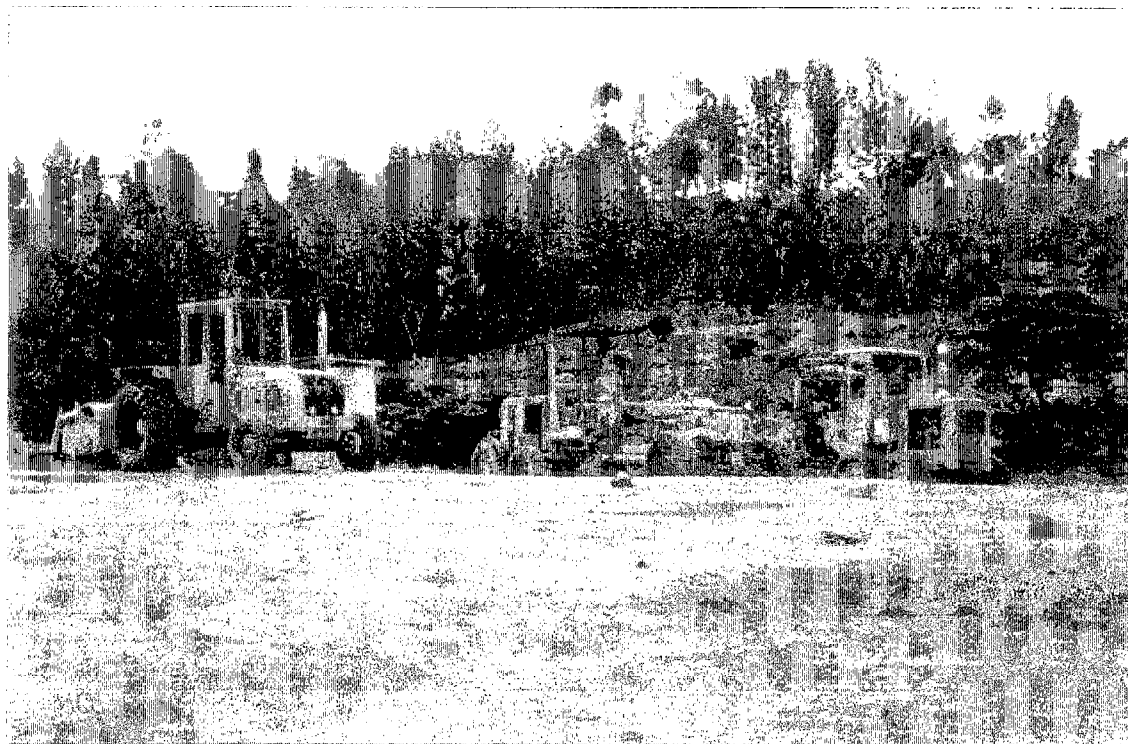


Figure II-2. MORPW Machinery on Roads 2000 Programme.



Figure II-3. Heaping of murrum/quarry waste prior to spreading

The MORPW Materials Department technical personnel identifies the quarries with good and adequate supply through field and laboratory tests and they continuously monitor the quarried material to note any changes in quality (refer to figure II-4).



Figure II-4. Identification and inspection of quarry/murram source.

Either labor-based methods or machinery is employed to spread and level the gravel (or quarry waste) to the required grade and falls. These methods are well illustrated in figure II-5 and figure II-6. Reference can also be made to figure II-1 above.

The labor based method lays emphasis on gender equity so as to have a greater impact on the social-economic status of the entire community. Rollers are employed for gravel compaction to the required standards.

In cases where the terrain is difficult or rollers are not in serviceable condition, then some degree of compaction is achieved naturally when vehicles pass on it. Natural compaction is not usually recommended because the degree and quality of material compaction is poor thereby leading to the uneven compaction and waste in gravel. Mechanical compaction is usually adequate, faster and more economical, but also can sometimes lead to the pulverization of gravel and the roads can be dusty.

A road overseer carries out the supervision of sections of construction works on a day-to-day basis. The road inspector supervises several roads and sections with the overseer. The overall coordinator of road maintenance works in the District is undertaken by the DRE. The District structure has been discussed in the main text.



Figure II-5. Spreading murram/quarry waste using labor based methods.

The road works are audited both for the technical and financial aspects. The District treasurer carries out the financial appraisal on behalf of the Ministry of Finance and Planning. Figure II-8, which was taken during the survey, shows the District Treasury team on one of the maintenance sites auditing financial entities. The Donor Agency (SIDA) has engaged consultants to carry out various auditing - Ms Gibb East Africa Consulting engineers for the technical audit and Ms. Price-Water House accounting firm for the financial audit. The audit is usually carried out quarterly and before any further donor assistance is provided. The District Works Officer (DWO) has the powers to stop any payment to the contractor if he detects flaws in the contractual works. It was established that some unscrupulous contractors have either supplied substandard materials or reduced material quantities below the engineering specifications. The level of supervision on the ground was found to be adequate to detect this kind of malpractice. However, the probability of site supervisors being compromised cannot be over-emphasised since their monthly remuneration from the Government are lower than the cost of living *per se*.



Figure II-6. Labor methods on Roads 2000 showing simple equipment.



Figure II-7. Damage to the environment as a result of quarry mining.

Local contractors have the necessary equipment for mining the gravel and adequate labor force for excavating murram. Unfortunately the open mine methods of extraction have adverse effect on the environment since the depressions and pits created are not backfilled. This leads to soil erosion, degradation of natural vegetation, stagnation of rainwater leading to proliferation of water-borne diseases. A typical quarry left behind after material excavation is shown in figure II-7. From this picture it can be appreciated that the status of this zone is in great contrast with the other greener areas in the neighborhood. So far the GoK-Sida counterpart efforts have not properly addressed the aftermath of exploiting the environment.

The major complaint from the contractors is the delays in payment for work done due to bureaucratic GoK procedure. This is dangerous to the survival of private sector petty contractors who do not have firm finances.

Contractors were found in several areas supplying murram in the right quantity and quality implying that funding situation is good. Long haulage distance, delays in loading time because of long queues (due to scarcity of quarry site), difficult terrain and high purchasing costs of murram were the main concern of the contractors. The cost of 4 m³ of murram costs Kshs. 10,000.

The Donor agency main concern is the delay in completion of the earmarked road works given that funding is readily available. The fact that the government has first to spend its own funds and then be reimbursed by the donor is the major handicap.

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Figure II-8. Financial and technical auditing by GoK officials.

Last year the Roads 2000 Programme in Nyeri District received funds at the District level only one month to the close of the Government financial year. The implication of such a delay has far reaching effects. There was scarcely any time left for project implementation. Within one month the remaining funds were recalled back to the Treasury. Such unwarranted delays have resulted into the Sida-GoK counterpart cooperation to extend beyond the three years that it had been planned. In April 2000, the GoK had to plead for cooperation time extension which was granted by Sida.

The donor agency (SIDA) is also heavily involved in training personnel for road works inspection by supporting the Kenya Institute of Highways and Building

Technology (KIHABT) which trains Road inspectors. During our engineering expedition in the Central and Eastern Provinces, students from the Kisii Training School were met touring the Roads 2000 projects in those Provinces. They were on special courses and study tours managed KIHABT under the training provision (see figure II-9).



Figure II-9. KIHABT students on study tour of Roads 2000 Programme.

The local inhabitants of the area where the program is on going are overjoyed by the rehabilitation of their road network. This is a highly productive agricultural region where cash crops like tea and coffee, dairy industry and generally agricultural activity is carried out as depicted in figure II-10. The population density is also high and several schools and colleges are located in the area. With improved road network, agricultural produce can easily get to the market centres. The emphasis of using petty contractors and labor improves the socioeconomic status of the rural people. And, as mentioned earlier, gender equity is observed in allotment of jobs, hence, promoting even distribution of resources in the area across the board.

An interview with the residents revealed that they had suffered a lot of setback because of poorly maintained infrastructure in the past. They also expressed delight at job availability right at their rural homes. Now they can afford a few

cash-requiring commodities. Idle youth are also busy on the roads. Petty crime rate has gone down tremendously over the last two years.



Figure II-10. Agricultural activities in Nyeri District (cash crop).

The Roads 2000 program does not involve re-alignment of roads to an extent of encroach in neighbouring farms. Usually the road reserve is sufficiently wide to accommodate any minor re-alignment. Therefore the people in the neighborhood of the road reserve are friendly to the program as it provides them with employment. Sida conducted an impact assessment study has been carried to determine the effect of the program and it was found to be a positive and viable project. In cases where the road system is not badly deteriorated the roads are analysed to identify the trouble spots to be improved and work is carried only in these areas to make it sustainable and trafficable.

Tenders are initially analysed at the DWO and forwarded to the District Development Committee (DDC) for award. Usually this is a problem as the committee is headed by a Senior Civil Servant (District Commissioner) who has a lot of influence since he also controls any monetary payments for works exceeding Kshs. 100,000.

The newly enacted Kenya Roads Board has not held its first sitting. This board will comprise of and be represented by officials from local government, Office of the President (D.C.), and one person chosen from the Private Sector. The District

Roads Engineer is the secretary to the board. This board is expected to be more efficient in coordinating the road management system in a given District (will especially boost the success of Roads 2000 activities).

The major trunk and classified roads (class A, B, and C) in the district are not covered by this Programme. These are funded from different kitty. Some of these roads are heavily in need of rebuilding as they serve a lot of traffic and are fed by the roads covered by the Programme (see figure II-11). In one instance, a firm contracted by the government to rehabilitate a class "B" road abandoned works after stripping the pavement and getting paid full contract amounts for works not carried out.



Figure II-11. Damage part of class B road requiring spot improvement.

III: EASTERN PROVINCE

The Donor is providing Kshs. 700 million for a period of 3 years from 1998 up to 2001. The Districts being funded are Meru North, Meru Central, Meru South, Tharaka, Embu, Mbeere, Machakos and Makueni.

Embu and Mbeere Districts were visited during the fact finding engineering exploration. The program is on going in two pilot projects Embu and Mbeere Districts. The Donor agency is the European Union. Works in this Province could form a case study since one of the projects is wholly undertaken by the MORPW (through the DWO), using labor-based methods and the other by a contractor using machinery (and little human labor force). In both projects, a local consultant (Plateau Consulting Engineers) has been appointed by the donor agency to oversee the projects on their behalf.

III.1 PRIVATE CONTRACTED ROADS

The actual road under study is Road D467 connecting Siakago town Ugweri market-Ena road in Mbeere district (see figure III-1). This has been contracted to a private contractor under the supervision of the MORPW but the resident engineer has been appointed by the supervisor. Works in some areas require total rehabilitation and realignment to gravel road standard and spot improvement in other sections. The works have been done to the gravel surface compaction level and some of the ditches have been done, and the bush clearance in some areas is complete. Unfortunately, the contractor pulled out of site together with the machinery. The "Resident" Engineer did not have knowledge that the contractor deserted the site, implying that supervision was indeed very poor.

The reason behind this project stalling is a dispute on the contractor certificate of payment which had been prepared with a lot of flaws. He was asking money for works either not done or down below the expected standards. The Donor's appointed consultant refused to approve this claim. Therefore, the contractor abandoned the site claiming that the consultant had no mandate to object to a certificate prepared by a compromised resident engineer. Initial Survey Works on the project are available but the consequent measurements to determine the amount of works already done by the contractor were not available. This is due to the laxity on the part of the resident engineer to take measurements. The resident engineer has signed the payment certificate for payment albeit having no build up computations (back up) to authenticate the certificate. While the contractor insists

that he had completed the works and was due for payments, figure III-2 conveys a different message.

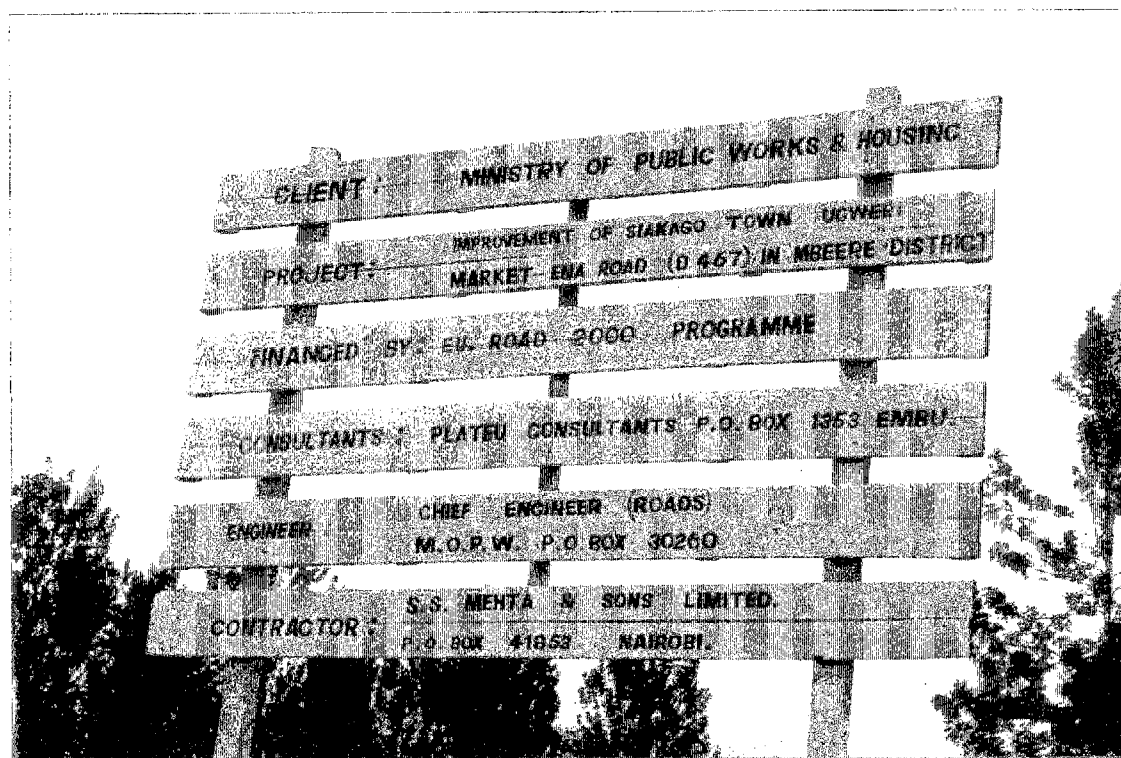


Figure III-1. A typical Roads 2000 Programme team.

Bottlenecks

Profit motivation is the major cause of incomplete and substandard work and also the laxity in the supervising officer appointed by the government. The presence of the private consultant whose loyalty is to the donor agency helps keep the project in check at critical stages, thus, ensuring Donor funds are put to correct use (and timely).

III.2 DIRECT LABOR ROAD

This class D road is located in the same neighbourhood as the privately contracted road. This is a direct labor project and the supervising authority is public works through the DRE. The reshaping of the longitudinal and cross files to formation level is all done by human labor as illustrated in figure III-3.

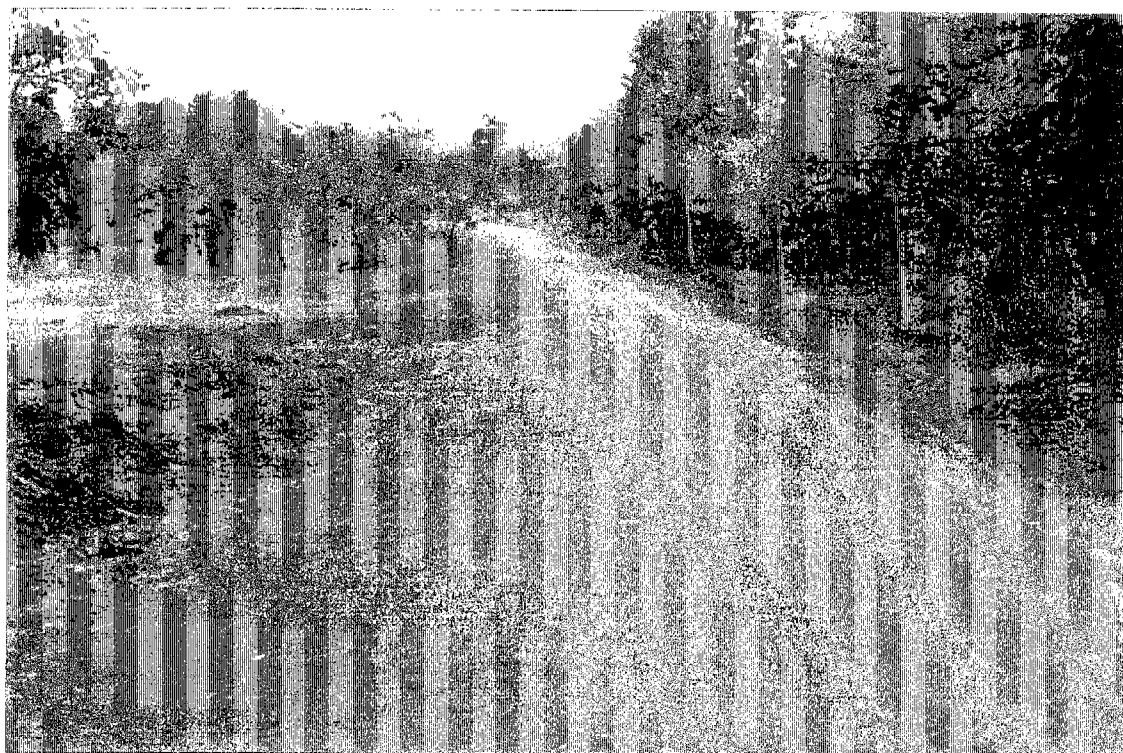


Figure III-2. Bush clearing and drainage structures incomplete in a class D road.



Figure III-3. A class D road at formation level using labor intensive methods.

Bottlenecks

The major complaint in this project is lack of the simple hand equipment - hand tools like such as jembes, hoes and wheelbarrows which are usually provided for in the casual laborer contracts. Due to poor fund flow, the wages to the casual gangs is often delayed for up to six months making them hostile and demotivated to carry on with the road works. There is also lack of materials like culverts because of cash flow problems to the District coffers. Vested interests could be one of the reasons for the centralization of the supply system. This uncertainty in funding creates a problem in planning of work. The rate of work is fairly good at about 2 Km per month with a gang of 120 manual laborers whose work starts from the road formation level. Graveling of the final 150mm layer is done mechanical means.

III.3 CONCLUSIONS

- ◆ From the foregoing, it is noted that both the direct labor and contracted projects have their peculiar problems that need to be ironed out if success is to come.
- ◆ The direct labor method has a greater positive socioeconomic effect on the people since it provides employment to the rural populace and is cost-effective in most cases. However, labor based methods are slower than the contracted ones in implementation. It is possible to achieve acceptable standards with labor based methods.
- ◆ For either implementation method, lack of coordination and goodwill from the Government is the main stumbling block to success of Donor funded activities. If bureaucratic malpractice and lack of accountability are eliminated then there is great hope that Road 2000 Programme will succeed (and remain sustainable).