

CLASSIFICATION
PROJECT EVALUATION SUMMARY (PES) – PART I

Report Control
 Symbol U-447

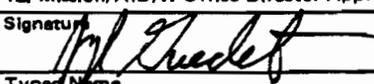
1. PROJECT TITLE Transport Sector I (Road Maintenance)	2. PROJECT NUMBER 633-0073	3. MISSION/AID/W OFFICE USAID/Botswana
4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) <u>83-3</u>		
<input checked="" type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION		

5. KEY PROJECT IMPLEMENTATION DATES A. First PRO-AG or Equivalent FY <u>79</u> B. Final Obligation Expected FY <u>79</u> C. Final Input Delivery FY <u>83</u>	6. ESTIMATED PROJECT (\$000) FUNDING A. Total \$ <u>12,458</u> B. U.S. \$ <u>6,000</u>	7. PERIOD COVERED BY EVALUATION From (month/yr.) <u>9/81</u> To (month/yr.) <u>1/83</u> Date of Evaluation Review _____
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8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Extend the contract of the Cost Accounting TA by one year.	Stafford Baker	7/83
2. Extend the contract of one Mechanic Trainer by six months.	Collin Hawes Stafford Baker	9/83
3. Purchase U.S. source spare parts for equipment with remaining AID project spare parts funds.	A.H. Rosenkhan Stafford Baker	3/83
4. Establish a spare parts procurement and/or stocking system that will adequately support the AID equipment.	Spare Parts Coordinator	3/83
5. Formalize field input and monthly or quarterly output reporting for the Cost Accounting system.	B. Struksnes	3/83
6. Report on mechanic support in the Southern Division.	B. Struksnes	3/83

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS <input type="checkbox"/> Project Paper <input type="checkbox"/> Implementation Plan e.g., CPI Network <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> Financial Plan <input type="checkbox"/> PIO/T <input type="checkbox"/> Logical Framework <input type="checkbox"/> PIO/C <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> Project Agreement <input type="checkbox"/> PIO/P	10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT A. <input checked="" type="checkbox"/> Continue Project Without Change B. <input type="checkbox"/> Change Project Design and/or <input type="checkbox"/> Change Implementation Plan C. <input type="checkbox"/> Discontinue Project
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11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles) Stafford Baker, Project Officer (GEO) F. A. Zobrist, USAID/Lesotho, Regional Engineer Paul Tuebner, PDO B. Struksnes, Acting Principal Roads Engineer (Maint.)	12. Mission/AID/W Office Director Approval Signature:  Typed Name: Paul Guedet Date: 3/10/83
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13. Summary

The project has been underway now for over three years. Much of the first two years was devoted to equipment procurement actions and a reorganization of the Road Department Maintenance Branch (RDMB). The RDMB has had about a year and a half of experience with utilization of project-inputs for road maintenance uses. The experience has been very positive and the Project purpose has been achieved. Further improvements are expected over the remaining nine months of the project. While affected by a number of factors outside of the project, there are indications (such as increased traffic counts and reduced public criticism of the road system condition) that improved road maintenance is also contributing to goal achievement. This evaluation has focused on identifying areas where improvements can be made in project implementation. Recommendations are made to improve spare parts support for the road maintenance equipment and utilization of the Cost Accounting System.

14. Evaluation Methodology

This evaluation constitutes the second Project Evaluation Summary (PES), specified in the Project Paper. The first PES, combined with a special mid-Project Evaluation, was performed in September 1981. The purpose of this evaluation is to review the design of the project, to measure progress against the log frame, to verify project hypotheses and to recommend measures to improve the implementation of the project. Findings are based on a review of project files, discussions with AID staff, interviews with selected senior government officials and site visits. An evaluation team composed of Stafford Baker (USAID/Botswana General Engineering Officer and Project Manager), Paul Tuebner (USAID/Botswana Project Development Officer) and Fred Zobrist (USAID/Lesotho Regional Engineer) inspected equipment and RDMB and CTO facilities and discussed the project with RDMB and CTO officials from Maun, Francistown and Gaborone. Individuals providing major contributions to the evaluation were:

RDMB

B. Struksnes - Acting Principal Roads Engineer (Maintenance)
Peter Argo - Senior Roads Engineer - Maun (Project TA)
Friederich Sander - Senior Roads Engineer - Francistown
Frank German - Senior Technical Officer - Francistown
Helge Simenstad - Senior Roads Engineer
Warren Niles - Cost Accounting Specialist (Project TA)

CTO

Leonard Mukokomani - General Manager
A. H. Rossenkhan - Supplies Office
Collin Hawes - Chief Technical Officer (Training)
Bob Rokos - Mechanic Trainer (Project TA)
Ron Cox - Mechanic Trainer (Project TA)
Johannes Mpetsane - Supplies Officer

15. External Factors

One project purpose assumption was that GOB recurrent budget levels would expand as planned. With the downturn in diamond sales during 1982 the expansion has been deferred. The only immediate effect has been to delay new GOB procurement to replace a few light duty vehicles in the RDMB fleet. This has not had a serious effect on the project, but could have in the longer term if the replacement of a substantial amount of equipment scheduled for 1985 is also delayed.

16. Inputs

Some adjustments to the AID inputs planned in the PP have become necessary as the project has been implemented. For example, Technical Assistance and Participant Training requirements and opportunities were underestimated. Budgetary flexibility has allowed extensions to TA contracts and Participant Training programs. American made pick-up trucks appear to be unsuited to the rough off-road conditions and to be incompatible with locally available spare parts. Plans to purchase additional trucks in the 2nd tranche of procurement were dropped, the U.S. manufacturer's technical representative inspected the trucks and recommended extraordinary maintenance procedures for CTO to follow and this evaluation recommends that more spare parts be purchased for the trucks on hand. As of January 1983, most AID financed inputs have been provided or are in place, and approximately \$5,931,000 of the \$6,000,000 available in the project has been committed.

Adjustments have also been necessary to accommodate delays with GOB contributions to the project. CTO was to second nine mechanics to the RDMB (one for each District) by mid-1980, to carry out most routine maintenance and repair on the equipment. Throughout 1982, only seven had been provided, requiring some mechanics to cover extra territory and numbers of equipment. Two additional mechanics are scheduled to be seconded in January 1983. The GOB was also to provide nine new depots for the RDMB districts. Workshops and storerooms were finished in 1981, but construction of office blocks and provision of water and electrical services are not scheduled for completion until later in 1983. The workshops and stores are being used, with portable generators providing electricity when needed. Finally, the adequacy of standard GOB procedures for providing spare parts to maintain the USAID equipment is the subject of a separate analysis (attached). The analysis recommends that suppliers bear the responsibility for stocking most parts and that RDMB implement a Spare Parts Coordinator staff position to coordinate parts procurement with CTO.

17. Outputs

a. Equipment

	Targets	Status		
		(9/78)	(9/81)	(9/82)
Fleet obsolescence	0%	75%	33%	10% ⁽¹⁾
Fleet Size	247	249	271	288 ⁽²⁾
Availability:		(July-Dec. 78)	(1980)	(Jan.-Sept. 82)
Graders	78%	69%	69%	78%
Dozers	80%	70%	76%	77%
F.E. Loaders	80%	69%	85%	93%
Rollers	70%	60%	88%	80%
Tipppers ⁽³⁾	70%	36%	27%	68%
Flat-beds	80%	82%	78%	77%
Pick-up Trucks	80%	70%	66%	83% ⁽⁴⁾
Tractors ⁽⁵⁾	85%	75%	86%	71%

Notes:

- (1) 23 of the 29 officially obsolete items in the fleet are trailers which are still serviceable and performing well.
- (2) The fleet has grown as new equipment has been added and replacement schedules for older equipment have been lengthened. RDMB believes even more equipment will be required to adequately maintain the growing road network.
- (3) AID financed IH tipper trucks, as a sub-group, have an availability of only 59%.
- (4) The period when Ford 4x4's were grounded pending an investigation of possible tie-rod faults has not been considered in this calculation.
- (5) Age and manufacture seem to be important factors here. If the notoriously troublesome SAME tractors and all others manufactured before 1980 are not considered, availability improves to 81%.

Another target in the PP was to standardize on no more than 2 to 3 makes of each type of equipment. This target had been met by the time of the first evaluation and has since been improved upon.

b. Administration/Management

Planned project outputs were an operational Cost Accounting System by June 1981, annual maintenance program based on the improved accounting system, improved road maintenance productivity and localization of the accounting system. A separate report (attached) examines the Cost Accounting System in considerable detail. It recommends an additional one year's extension to the Cost Accounting Technical Assistant's contract and steps to institutionalize input and output reporting procedures in order to ensure successful use and localization of the system. Other planned outputs are being met.

c. RDMB and CTO Personnel

The project has as a planned output the promotion of trained MB (7) and CTO (6) personnel to more responsible positions. As of January 1983, four MB Technical Officer and four CTO Mechanics have returned from training in the U.S. and are serving in or slotted for top technical positions. The PP also planned that the seconded mechanics would be having an impact on improved equipment availability. RDMB personnel agree that they have had that effect, but the new equipment and provision of spare parts have also been important factors. However, an attached chart of availability for Galion graders (items that have not been replaced and have not benefited from special spare parts procurement) supports their opinion by showing a dramatic improvement in availability which begins when the number of seconded mechanics was more than doubled.

18. Purpose

The project purpose is "to improve the capacity of the Ministry of Works to adequately maintain its large and expanding road network..." End-of-Project Status (EOPS) conditions are: (a) A modernized and appropriate road maintenance fleet; (b) RDMB efficiently carrying out a planned nationwide maintenance program; and (c) Increased numbers of trained local personnel in key MB and CTO positions. The project purpose and EOPS conditions have been achieved and improvements are expected during the last nine months of the project. Over a longer term, maintaining the improvements resulting from the project will be affected by the GOB's economic position and ability to replace equipment as it completes its useful life. The economic downturn in the past year has forced the GOB to delay replacement of a few light duty vehicles in the fleet. Major replacements do not come due until 1985.

19. Goal

The approved sector goal for this project is to upgrade the transport sector in Botswana to: (a) promote development and the provision of basic social and economic services in rural areas; (b) encourage exploitation of the development potential of isolated regions of Botswana; and (c) decrease Botswana's dependency on existing transport networks through South Africa.

The majority of road maintenance work that has resulted under this project has taken place in rural areas of Botswana primarily in the undeveloped central interior and western regions. However, most economic development in Botswana has occurred in the eastern portion of the country. Through this project, significant regraveling and periodic maintenance of some of the

worst roads in the western region have linked this area with the more developed eastern region. With the completion of these major road improvements, the provision of basic social services and economic opportunities of Botswana citizens living in rural areas has been greatly enhanced. It has been noted during the evaluation, for example, that road traffic between the major village of Maun in the west, and Francistown in the east has increased considerably. With the improved road system, the GOB is now increasingly focusing on the development of secondary and tertiary-level villages surrounding Maun which have major agricultural potential. Similar results have occurred in the southern region of the country. In addition, before the initiation of this project, travel from Kanye to Tsabong in the southern region was mainly undertaken through South Africa. With the improved road system linking these two important villages, travel can now be undertaken entirely within Botswana thereby reducing Botswana's dependency on the transport networks through South Africa.

20. Beneficiaries

In theory, the beneficiaries of the project are the vast majority of Botswana's population who live in rural areas where road maintenance is crucial for the provision of improved economic opportunities and social services. In reality, however, defining the project's beneficiaries is more complex.

Principal benefits are lower vehicle operating costs or lower transport costs for people who use the road system or consume and use goods and services transported over the road network. Since most of the maintenance operations are taking place on the worst roads in the country, improved communication links are directly benefiting rural people.

The people who utilize the improved roads are those with personal vehicles or bicycles, those with access to Government vehicles and bus passengers. However, the project is also significantly benefiting a much larger group of people, albeit indirectly. These are people who benefit from improved Government services, increased availability of consumer goods and private services and improved marketing channels for their produce.

21. Unplanned Effects

Not pertinent at this time.

22. Lessons Learned

This evaluation has closely examined the utilization of project resources and has noted a number of areas where utilization can be improved. Specifically, this evaluation recommends that:

- a. The contract of the Cost Accounting technical assistant be extended by one year.
- b. The contract of one Mechanic trainer be extended by six months.
- c. Remaining AID project spare parts funds be used to purchase U.S. source parts for Ford and possibly Caterpillar equipment.

- d. The RDMB Spare Parts Coordinator work with CTO to establish a spare parts procurement and/or stocking system that will ensure satisfactory availability of the road maintenance equipment.
- e. RDMB formalize field input and monthly or quarterly output reporting for the Cost Accounting System.
- f. RDMB report to USAID/B on seconded mechanic support situation in the Southern District.

23. Special Comments or Remarks

Attachments:

- a. Memo on Provision of Spare Parts
- b. Job Description for Spare Parts Coordinator
- c. Memo on Mechanic Support
- d. Memo on Cost Accounting System
- e. Budget Review

memorandum

DATE: December 20, 1982
REPLY TO: F. A. Zobrist, Regional Engineer
ATTN OF: *Sticker for*

SUBJECT: Botswana Transport Sector I Project (633-0073); Provision of Spare Parts Evaluation

TO: Stafford Baker, Project Manager, Transport Sector I

1. Background

The project provided for the provision of approximately \$4.6 million worth of Road Maintenance Equipment with U.S. source and origin. All equipment has been received and arrived with about 8% of fast moving spare parts to facilitate minor repairs. The GOB agreed to finance any spares in addition to those financed under the USAID grant.

In this regard, a special covenant was included in the Grant Agreement stating "The cooperating country hereby agrees to provide the funds necessary to purchase spare parts to insure the proper upkeep of AID financed equipment for its normal life". The recent management audit had concluded that "The GOB had not lived up to its commitment to supply repair parts for AID provided equipment", and had recommended that "USAID/Botswana work with the GOB to develop a listing of spare parts needed and to get GOB to order spare parts as rapidly as possible". In turn the Mission's evaluation TOR has raised the following questions to be answered regarding spare parts:

- a. What is the appropriate re-stocking system?
- b. What is the appropriate distribution of spares on hand?
- c. How can procurement of parts from the U.S. best be handled in the long term?
- d. What has been the effect of AID financed spares?

2. Project Paper

Other than the covenant mentioned above, the project paper provided no specific guidance in regard to procurement of spares. The paper did note, however, that the CTO will be responsible for the management of fast-moving spare parts financed by the project and for subsequent procurement, through the GOB Tender Board of spares for AID financed equipment. The project paper pointed out that procedures for procurement of spare parts are well defined within CTO and are carried out adequately on a routine basis by CTO and the Tender Board.

The PP also points out that the CTO does not have the capability to handle large quantities of spares although assistance from CIDA and KFW should improve the situation. At this time, CTO still does not have the capability to handle large inventories of spare parts.

3. CTO Procurement and Stores Process

The evaluation team reviewed the procurement process with Mr. Mpetsane, CTO's supply manager, and his key staff. The basic process is as follows:

- a. Operators/Mechanics identify problems.
- b. Mechanic checks and identifies parts needed.
- c. Check of local depot as to part availability.
- d. If not available locally, part is ordered from central depot. Orders are made by radio for emergency needs. Part is put on stores delivery truck which calls on all delivery centers once each week. Maximum waiting time is one week for delivery of part after order.
- e. If part not available at central depot, order is placed with local dealer, generally through open authority provided by Tender Board. In most cases one week maximum delivery is still met.
- f. If local dealer cannot provide, RSA sources are used. A CTO collection from the RSA is made on the average of about once every three weeks. Such purchases can take up to 4-5 weeks assuming the normal channels are followed.
- g. For parts that are not available in the region, the CTO has generally relied on local or RSA suppliers to fill these needs. Obviously such delivery can take several months.

The CTO staff noted that any item exceeding P3,000 must receive Tender Board approval. However, they also note that in emergency situations they work closely with the Tender Board to avoid delays. Further, they have approved open end procurement contracts in some cases as well as service contracts outside the CTO capabilities.

All parts accounting by CTO is manual and thus time consuming. The system appears to be very detailed and therefore maintaining adequate inventory control of parts. The staff noted that they did desire a computer in order to improve efficiency. They were aware of the WANG being used by the RDMB and hoped to get funding for a similar system. They noted that plans were in effect to increase the central warehouse capacity and in turn they could increase their inventory by a factor of three. This would decrease turn around time as well as provide savings through an improved buying approach. A computer would be a requirement with such an expansion.

Mr. Mpetsane pointed out that funds have always been available to meet spare parts procurement and thus delays have not been because of the lack of funds. The CTO staff noted that, for USAID equipment, parts are procured the same as for all other CTO equipment. Further, they noted that any overseas (U.S.) procurement would obviously take some time. In this regard they plan to draft a list of parts needed about next March or April during their annual review. Mr. Mpetsane volunteered that maintaining large inventories of spare parts was unwise, with the result being a warehouse full of unused parts when the equipment is retired. Further, he pointed out that the CTO is not in position to fund extensive regional parts depots to meet the need of Roads Division. Roads would have to seek such funding if this were to be a requirement.

Mr. Mpetsane voiced some concern over the USAID parts currently in hand. He noted that they had been turned over to the Roads Division who did not maintain the extensive inventory and accountability system maintained by CTO. He implied that he could not be accountable for non-available parts.

4. Roads Division Parts Management

The RDMB Senior Staff and Division Engineers expressed some concern over the procurement process. They noted that AID furnished spare parts were never intended to be stored and monitored by them but received them only because of a lack of space at the CTO facilities. This was noted to be temporary and that when stocks are depleted, CTO will again retain custody of all parts.

All expressed concern over delays in the parts procurement process and noted that 6 months is often required to obtain some parts. The group was unclear on the exact method for obtaining parts and described differing approaches for different districts. In one case the local CTO district staff was not involved while in others they performed very well. For the Maun District, a vehicle was being sent to Gaborone, about 1,000 km one way, to pick up parts, while the CTO parts delivery truck is reported to make weekly trips to the same area. Maun officials say this does not happen.

Lack of follow-up appears to be one reason for the long delays. Once orders are placed, the system does not apparently have an adequate follow-up approach to assure that orders are being processed. As a result the Maintenance Branch has proposed the establishment of a post for Spare Parts Coordinator. Duties they have proposed are as follows:

1. Do the initial establishing of a spare part stock and spare part register for USAID equipment.
2. Maintain the stock by coordinating the ordering of spare parts between the Divisional Senior Roads Engineers, Roads Training Center and CTO.
3. Be available at the store telephone at any time during normal working hours. Spare parts orders shall have the highest priority and must be executed without delay.
4. In case the telephone service is not working, communication shall be maintained by radio, operated by an officer in the yard between 0800-0900 and 1530-1630 hrs.
5. Supply all the SRE (HQ, RTC and Divisions) with updated registers of spare parts whenever necessary.
6. Maintain a regular and good communication with the SREs, including visits to the various local road camps. In case of absence, replacement must be arranged with SRE(s).

An inspection of South and North Division's Spare Parts Stores revealed that all items were well monitored. A cardex system was used to record in and out dates for each part. Out information showed where the part was assigned by use of the license (BX) number. These particular stores' facilities contained many of the Ford, International and some Caterpillar parts. No other parts monitoring is apparently being done other than the in-out cardex system. For example, such things as depletion rates or long lead items (U.S. order) are not being identified or tracked. Under the current system such problems would not be noted until a mechanic had identified a part and it has been determined that such part was not in the RDMB inventory. CTO would then attempt to order only to find out that the sources would be the U.S. This is another reason why some parts take 6 months to arrive.

5. Equipment Procurement

The equipment was procured in two tranches. An IFB was originally issued in October 1979 for all heavy equipment. The Ford truck purchase was separate but used the same IFB conditions. The second tranche was procured from the same suppliers using a proprietary procurement waiver. The IFB was not reissued for the second tranche. In this regard, the IFB, which became a part of the supply contract, had two important clauses regarding spare parts:

Clause 20 titled Spare Parts requires the supplier to submit a list of recommended spare parts within 30 days after receipt of award. The Clause provides that "The ordering of the spare parts will be at the option of the Purchaser."

Clause 21 titled Service Facilities for Overhaul and Repair of Equipment requires that the supplier has existing service shops for repair of equipment, equipped with special tools, instruments, gauges, test equipment, necessary spare parts and trained personnel to facilitate expeditious and proper repair of equipment. Depending on the type of equipment, such shops are to be in Gaborone or within a 350 mile radius of Gaborone. The conclusion is that the manufacturer of each item of equipment must be able to repair as well as stock all parts for equipment provided. The IFB further stipulates this in Clause 21 c quoted as follows: "The agent must be financially and otherwise capable to stock the manufacturer's recommended spare parts for operating the items quoted by the bidder for a minimum of 5 years. The agent must employ adequate technical personnel and must have a proven capability to repair fully and properly maintain any equipment supplied under the terms of this IFB to the satisfaction of the Government."

6. Discussion

The foregoing background information can be summarized as follows:

The project paper and subsequent grant agreements made no special requirements on the GOB regarding the equipment other than to provide funds to purchase spare parts. The GOB's Central Transport Organization is fully capable of providing funds as well as purchasing parts as needed. Parts for all USAID purchased equipment are to be stocked by dealers either in Gaborone or within 350 miles. This is not being done. In addition, the current procurement process appears to lack adequate coordination and follow-up between RDMB and CTO.

The philosophy of stocking spare parts at district work centers for the sake of having spare parts immediately available is not recommended, or as it appears, never intended. It is not the standard GOB spares approach nor the approach used by most heavy equipment operators, whether private or government. Unfortunately, heavy stocking of spares results in major waste and often does not reduce down time. A variation of Murphy's Law prevails whereby the part that is always needed is never available, while those that are available are rarely needed. AID experience in spare part stocking over the years has shown that much waste results for the dumping of spare parts at the end of a project. On the other hand, the procurement for this project was adequately designed to assure that parts would be available locally. Using the standard GOB procurement and distribution approach would mean the part being delivered immediately to upwards of 5 weeks, unless emergency expediting steps were taken. The project paper accepted the GOB procurement and spare parts control as being adequate and made no attempt to improve it in the Project Design. By some

standards the GOB system is very adequate. However, weaknesses still exist and require improvement if project objectives are to be fully and timely met.

First, most suppliers of the USAID equipment will be able to easily meet the local spare parts requirements if such equipment is fully compatible with South African stocked equipment. However, U.S. supplied equipment generally has variations from RSA assembled equipment by U.S. manufacturers. In these cases, suppliers will be reluctant to stock spare parts and will ignore the conditions of the IFB until pressed. All suppliers under the conditions of the contract should have supplied suggested spare parts lists; thereby the GOB will have a basis to insist that such parts be kept available in the region as provided for in the supply contracts.

Secondly, laxity now occurs in the monitoring of USAID supplied U.S. source spare parts. Once these are depleted, the GOB must depend on local suppliers, who to date have not responded adequately. Adequate lead time for reorders must be considered. These particular parts are now under the management of RDMB and therefore their monitoring will be the responsibility of the MB. The parts inventory was originally entered into the computer system; however, updating based on depletions is not taking place. The RDMB may want to consider the use of the computer as an aid to assuring parts are timely procured. The proposed spare parts coordinator is required immediately to assist in resolving this problem.

Thirdly, the overall parts management of the CTO appears very good with strong accountability. Efficiency, including delivery time, could be greatly increased with an inexpensive computer system. Such a system would probably cost much less than anticipated parts wastage from an extensive stocking program.

The primary impact of major delays on parts procurement for USAID supplies equipment will be a decrease in the availability rate. Obviously this will decrease the amount of road maintenance work that could be completed in a year. However, this should have no detrimental impact on the equipment. Assuming that routine maintenance is being performed, extended down time will, on the other hand, extend the plant life.

Specific questions addressed in the TOR for this evaluation are discussed as follows:

A. The appropriate restocking system is to work within the GOB standard system of obtaining parts through local procurement sources. Fast moving parts are stocked in CTO centers with others procured as needed. Special procurement procedures are available for emergency procurement.

B. USAID supplied spares on hand should properly be placed under the management of the CTO. However, this does not appear to be immediately possible. The RDMB has what appears to be an adequate inventory control system, plus the storage space and clerical personnel to manage in-out records. However, parts are somewhat unevenly stored in relation to equipment location. Redistribution should be considered as well as use of the CTO distribution service to make more efficient deliveries.

C. In regard to best handling parts from the U.S., the following should be done. Suppliers must be asked to meet their contractual agreements with the GOB of maintaining required parts in the region. USAID should participate in calling suppliers to task on this issue.* Obviously, on U.S. supplied equipment it will be impossible to stock each and every part, especially those expected to last the life of the equipment. For these cases CTO should arrange procedures for emergency procurement with each supplier, including use of airfreight.

The Ford trucks appear to be the worst case, and probably a mistake instigated by USAID. Use of remaining funds to procure a tranche of Ford parts should be considered as these units appear to be completely incompatible with local supplies. Several physical problems related to their adaptability to Botswana also require stocking of items not normally considered to be fast moving.

D. The effect of AID financed spares may have resulted in some complacency in the GOB in formalizing procurement sources and needs. Also storage was a problem and accountability was transferred to RDMB rather than CTO, which may have only confused procurement of replacement procedures.

On the other hand, having spares available in a GOB warehouse should, in most cases, have minimized equipment down time and assured timely maintenance. The CTO notes, however, that this would have automatically been done through their processes and the USAID procurement had no impact on improving parts availability. Of course, they are assuming that parts are available locally and that the system is working as planned when making this statement.

Conclusions

The GOB is meeting the conditions and intentions of the project paper regarding provision of spare parts for USAID equipment. However, considerable margin for improvement of the timing and processing of the parts delivery can be made. Much of this can be done by improvement of coordination between CTO and RDMB. The proposed Spare Parts Coordinator will be a help. Computerizing CTO inventories will be a help. Enforcing contract terms with suppliers will also be a help. At this time, USAID supplied parts levels

* With the goal of developing a minimum list of parts to be stocked locally by suppliers, plus a methodology to obtain others as rapidly as possible when needed.

and equipment wear are such that availability rates will rapidly fall off if parts are not rapidly forthcoming.

Recommendations

1. The GOB with USAID assistance should develop a required parts stocking plan with all suppliers in accordance with their contract terms.
2. The RDMB should immediately implement the proposed plan for a Spare Parts Coordinator to include the following:
 - a. Develop a liaison with CTO.
 - b. Assist with Item 1 above.
 - c. Determine which parts are now in critical need considering lead times for ordering from the U.S. using GOB procurement procedures.
 - d. Develop a system to improve deliveries to the division office in conjunction with the CTO delivery system.
 - e. Review advisability of using the WANG computer to assist in tracking long lead time parts.
3. Encourage CTO to establish a computer based inventory system with the intent of reducing down time and providing a follow up tool. Warren Niles should be able to play a key advisory/consultant role in guiding the CTO in developing such a system.
4. Consider using remaining USAID funds for procurement of US source Ford parts. This should not be done with the intent of letting the Ford supplier out of his obligations, but more with a sense of urgency to assure these vehicles stay in an available status.

UNITED STATES GOVERNMENT

Memorandum

TO : Transport Sector I (633-0073) Evaluation
Files

DATE: January 24, 1983

FROM : *SBaker*
Stafford Baker, GEO

SUBJECT: Provision of Spare Parts

REFERENCE: Fred Zobrist Memo on same subject dated December 20, 1982

The following comments and points of clarification, keyed to sections of the referenced memo, are offered on the subject.

4. Roads Division Parts Management

The head of the Maintenance Branch during the PP development and the first few years of Project Implementation states that it was always the intent for Roads Department to store the AID furnished spare parts and furthermore, the former Manager of CTO had agreed to maintain those separate stocks at some acceptable level.

The Spare Parts Coordinator position has been established with a NORAD furnished advisor filling the post.

6. Discussion

CTO and RDMB are not enthusiastic about the prospects of enforcing the spare parts stocking requirements of the IFB. Technically, only FORD is known to have failed in this requirement and their local agent has been against the U.S. procurement and uncooperative from the very beginning. CTO would see enforcement as another unwelcome burden on their already overtaxed administration. RDMB anticipates no satisfactory resolution in time to be of any help to them.

RDMB has proposed a compromise alternative. Recognizing the wastage resulting from heavy stocking of spare parts, they are developing a plan to maintain minimum levels of those AID furnished parts that experience has shown will be utilized. The plan will be discussed with CTO in the near future.



5010-108

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

JOB DESCRIPTION

For Spare Parts Coordinator

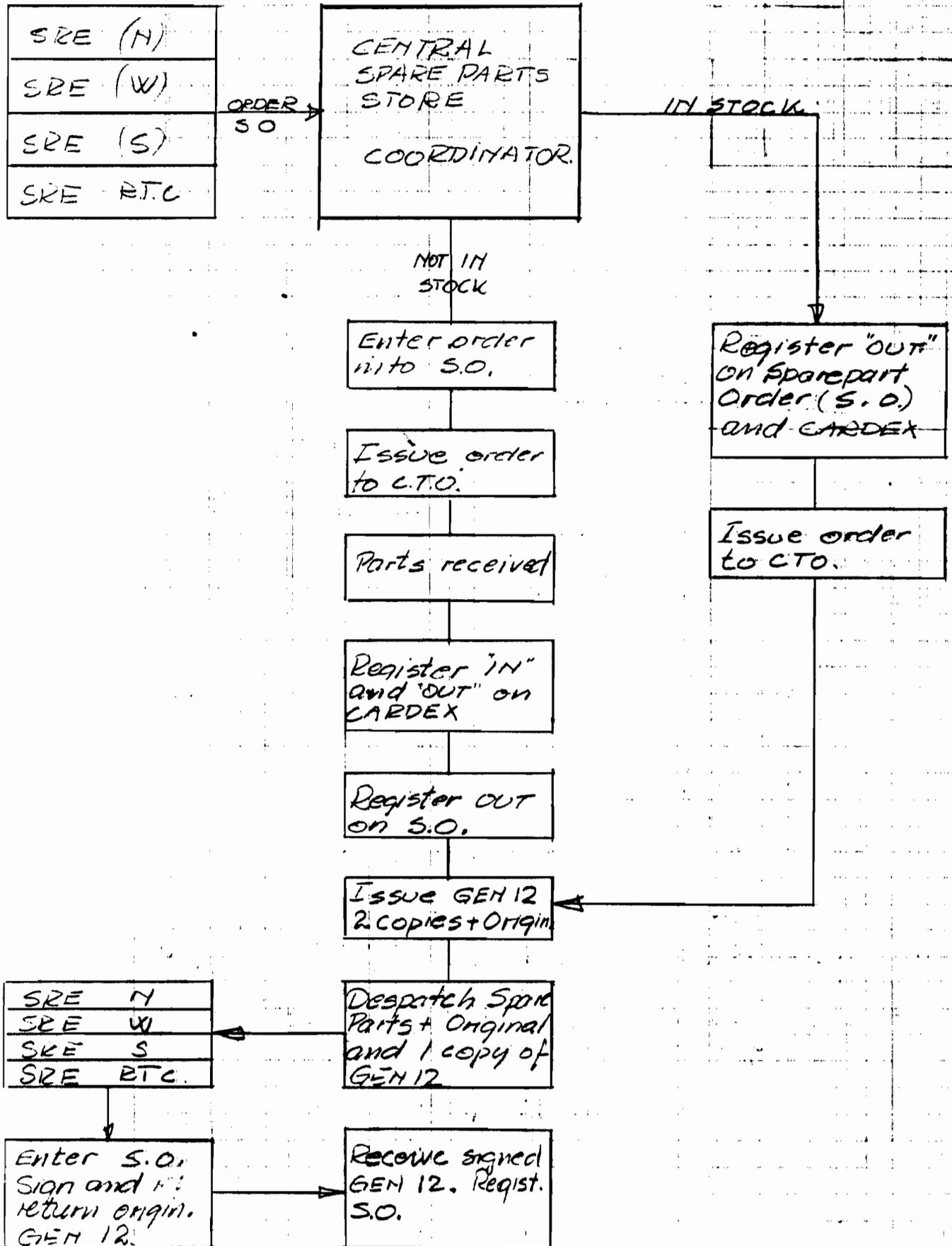
The central store coordinator is directly subordinated the Senior Roads Engineer South and shall:

1. Do the initial establishing of a spare part stock and spare part register for USAID equipment.
2. Maintain the stock by coordinating the ordering of spare parts between the Divisional Senior Roads Engineers, Roads Training Centre and C.T.O. (See flowchart).
3. Be available at the store telephone at any time during normal working hours. Spare parts orders shall have the highest priority and must be executed without delay.
4. In case the telephone service is not working, communication shall be maintained by radio, operated by an officer in the yard between 0800 - 0900 and 1530 - 1630hr.
5. Supply all the SRE (HQ, RTC and Divisions) with updated registers of spare parts whenever necessary.
6. Maintain a regular and good communication with the SREs including visits to the various local road camps. In case of absence replacement must be arranged with SRE(S)

Handwritten signature
Roads Department
2/11/82 B.S.

ORDERING PROCEDURE

SRE - COORDINATOR - C.T.O.



memorandum

DATE: January 25, 1983
REPLY TO: *Baker*
ATTN OF: Stafford Baker, GEO

SUBJECT: Mechanic Support for Roads Department Maintenance Branch

TO: Transport Sector I (633-0073) Evaluation Files

One of the outputs planned in the Project Paper was "Improved CTO capacity to maintain MB fleet and availability rates increased." To this end, CTO was to second mechanics to each of the nine district RDMB depots. It was planned that with these mechanics taking care of routine maintenance and minor repairs on RDMB equipment, pressures on CTO facilities would be reduced, MB efficiency would increase and time lost by moving equipment to and from CTO facilities would be eliminated. At the time of the PP design, three mechanics had already been seconded and six more were expected prior to June 1980.

The one seconded mechanic remaining from the original three was assigned in January 1979. Four more mechanics were assigned in March 1981. In July 1981 these four were about to be seconded, bringing the total of seconded mechanics up to seven. Two of the original mechanics were replaced, in May and August of 1982, maintaining the total number at seven. The final two mechanics were assigned in January 1983 and should be seconded to the districts by the end of the month.

The effectiveness of the seconded mechanics was discussed with the three Senior Roads Engineers (in charge of the three Divisions) and the Acting Principal Roads Engineer (in overall charge of the Maintenance Branch) at their monthly meeting in December 1982. They expressed near unanimous satisfaction with the improvements to equipment availability attributable to the performance of the mechanics. The West and North Divisions were having the best results. The Northern Division had one vacancy, but its three seconded mechanics were able to share the work load in the one district without a mechanic. The Western District had no vacancies and had developed a closely monitored system to schedule routine maintenance of equipment. The Southern Division did not have the resources to establish a similar system. One of the two mechanics for the three Districts in the Southern Division (a Motswana) was not as skilled as the Mauritian mechanic. The Mauritian mechanic had his hands full with two large districts to cover and many of the oldest and most trouble prone equipment items in the fleet. The Senior Roads Engineer (South) expected this situation to be greatly alleviated in January 1983 when a third mechanic would be seconded. The engineers also reported that CTO cooperation was very good. Mechanics were made available for short-term assistance when special problems arose. Furthermore, Roads Department had two assistant mechanics on its payroll in each of the districts with a seconded CTO mechanic.

CTO's delay in providing all nine seconded mechanics is due largely to its own numerous mechanic vacancies. A separate component of the project has been training newly hired and lower technical grade in-service mechanics for CTO. Eight new hires have received classroom and on-the-job training from the two mechanic trainer TA's provided under the project. After basic training in Botswana, the trainees have been sent to the United States for advanced courses in fields requiring facilities unavailable in Botswana. Four trainees returned from the U.S. in December 1982. They will receive further instruction from the TA in preparation for their next trade tests. When the trade tests are passed they become available to CTO for regular job assignments. The last group of four trainees are not scheduled to return from their U.S. courses until after the two TA's contracts expire. The chief of the CTO Training Division believes this lack of an overlap with the mechanic trainers will adversely effect the trainees' performance on their next trade tests.

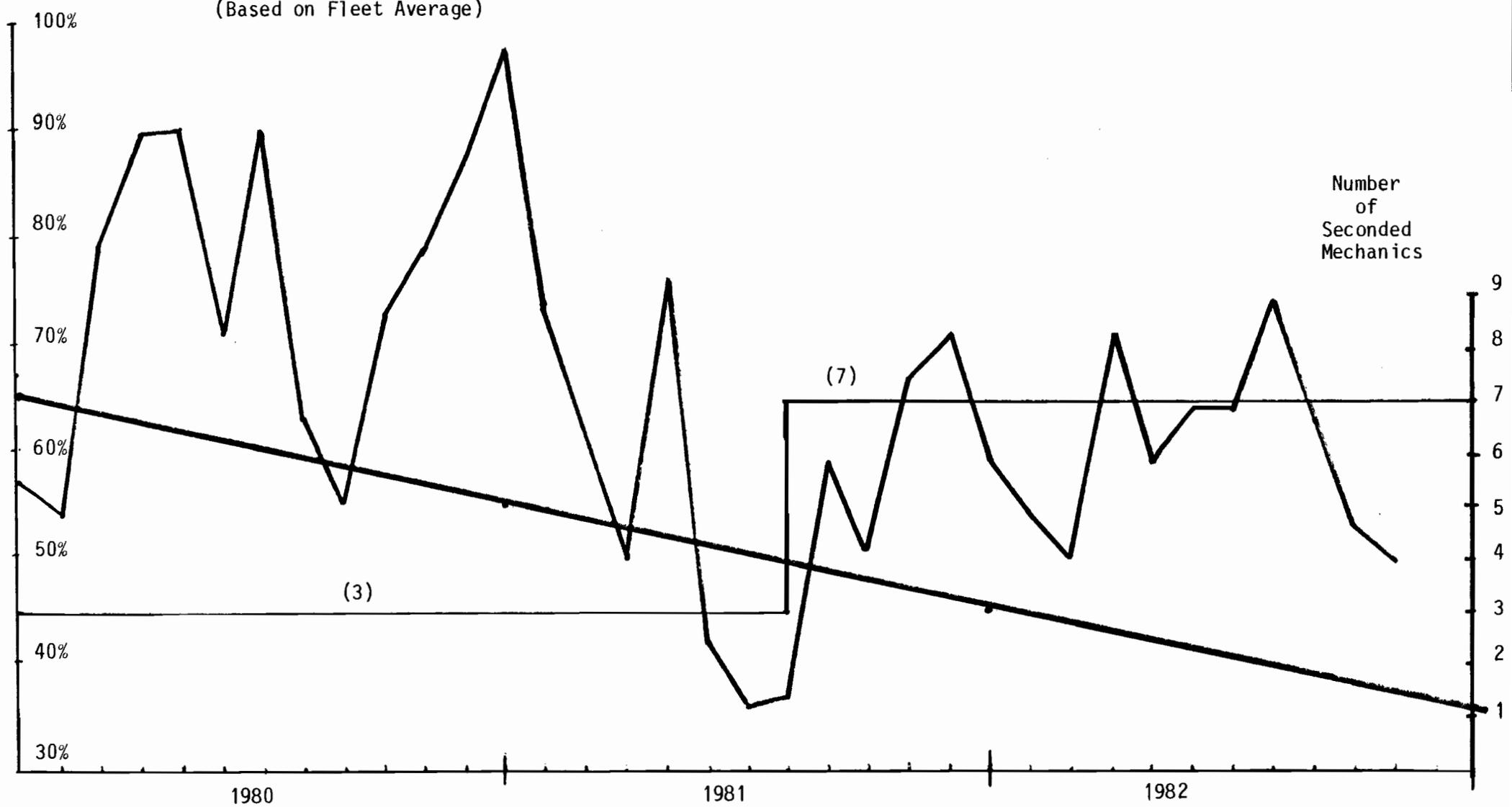
RECOMMENDATIONS:

1. The SRE (South) report at the end of March 1983 on the mechanic support situation in Southern District.
2. The contract of at least one of the mechanic trainers be extended for six months to allow an overlap with the last group of mechanic trainees.

Impact of Seconded Mechanics
on Equipment availability

Galion Graders
Availability

Actual ———
Predicted ———
(Based on Fleet Average)



NOTE: Predicted availability declines with age of equipment

UNITED STATES GOVERNMENT
memorandum

DATE: December 20, 1982
S. Behar for
REPLY TO
ATTN OF: F.A. Zobrist, Regional Engineer
SUBJECT: Botswana Transport Sector I Project (633-0073);
Evaluation of Cost Accounting System
TO: Stafford Baker, Project Manager Transport Sector I Project

1. Background

This memorandum report summarizes the review of the Cost Accounting System for the subject project and is based on a detailed review of the system, meetings with the TA, Warren Niles, and meeting with several Senior Roads Division Management Officials including the Chief Roads Engineer, the acting Director of the Maintenance Branch and the Division Engineers.

The recent management audit of this project raised several questions regarding the Cost Accounting System. As a result, the following audit recommendation was made with the suggestion that it be resolved during this evaluation.

"USAID/Botswana in conjunction with the GOB's Roads Department Management, (A) Determine exactly what information Roads Department Management needs to better manage their operations (B) Determine how much of the information can realistically be obtained considering field reporting limitations, capacity of present hardware, and the extent that programs would have to be rewritten to obtain information (C) Determine if productivity measurements aspects of the system should be abandoned and (D) Develop an action plan for localizing the Cost Accounting positions."

2. 1981 Evaluation

The 1981 evaluation made one recommendation concerning the Cost Accounting system, which was "Plan for localizing for Cost Accounting system in RDMB should be prepared." Subsequently the GOB and USAID had accepted that such a plan was being implemented. The evaluation report at that time noted that the RDMB believed that a one-year extension of the Cost Accounting TA contract would be necessary to completely localize the position. This was subsequently done. Further the evaluation pointed out that RDMB and AID agreed that formal training for the Motswana Cost Accounting System counterpart would be more appropriate after on-the-job training. The counterpart departed for training in the US in August 81, about a year and a half later than planned in the P.P. He is expected to return in December 83. The TA contract currently expires in July 83. A second Motswana is currently assisting the TA contractor on a counterpart basis. He has completed 6 months of training in the US, however, is reported to not have the qualifications to manage the Cost Accounting System. Obviously a gap exists between the current TA contract and the return of the trained Motswana. An overlap period is required for project success. The RDMB has recognized this problem and has asked AID to continue the TA contract for another year.

OPTIONAL FORM NO. 10
(REV. 1-80)
GSA FPMR (41 CFR) 101-11.6
5010-114

3. Project Paper

The project paper proposed a relatively inexpensive yet sophisticated approach to a Cost Accounting System based on use of a mini-computer. The project paper noted that when implemented, the system will provide:

- Improved budgeting procedures without the need for more accountants which are in extremely short supply in Botswana.
- A sound basis for evaluating the efficiency of work accomplished by developing cost standards for the various types of roads comprising the network.
- Sound basis for evaluating performance of personnel as measured against standards and peers.
- Cost and reliability standard of vehicles providing the basis for determining economic life and the scheduling of periodic maintenance, over hauls and rebuilds (if warranted as compared with new purchase opportunities).
- Basis for evaluating overall project and departmental performance and a mechanism for tracking during the period ("Bench Marks on milestones performance against time schedules and budgets)."

The project paper provided that a Wang computer be purchased from a full service Gaborone firm. The project paper planned for a TA contractor with Cost Accounting experience on roads projects and a counterpart with mathematical aptitude and management experience. It was suggested that the system should be operational in 9 months.

4. Implementation

Implementation of the Cost Accounting components of the project has suffered the usual problems and set backs of sophisticated technology transfer. First the Wang supplier suffered from financial difficulties and was unable to provide adequate support. The anticipated software was not available to meet the RDMB needs and all programs had to be completely developed by the TA contractor. Further the TA contractor lacked roads experience and had to suffer through the learning curve of understanding Cost Accounting methods related to a government labor force who worked without standards and on a program funding base. The Motswana selected for the 6 months training obtained very little skill from his US training and has only continued to develop under the guidance of the TA contractor. After 2 1/2 years on the job the TA contractor has developed, on his own initiative, an extensive job cost system, including a Material Consumption Module, Equipment Charges Module, Labor Cost Module and Job Cost Module. These are supported by a Fleet Register (Vehicle inventory) Payroll Register, and Equipment Availability Reports. The RDMB annual payroll budget for the past two years has been completed with the assistance of the computer system at several manweeks of savings. Many other problems have been encountered and resolved which include increasing the computer user storage, a second access terminal, decreasing turn around time,

improving accuracy and refining feed back approaches.

The latter three items remain projects for further refinement and will be addressed further in the discussion.

Discussion

The plan envisaged by the project paper was extremely optimistic and lacked adequate implementation considerations. Computer Aided Management approaches were never thought through and even today are still evolving for this project. The technical capability of the staff to accept and adapt to the computer as a management tool was never considered. In hindsight the project paper plan was overly optimistic and premature for the GOB Rural Maintenance program. However at this time much effort and cost has been put into the plan with the result being the development of a valuable management tool still in its final stages of debugging while still seeking its proper niche as a management tool of the Roads Department.

The broad based objectives noted in the project paper for the system are generally being met. Budgeting procedures have been improved with plans to expand this service even more. In regard to cost standards several years of observations of data will be required before such a system can be considered sound. Base level standards have been developed for costs and personnel performance. However because of the nature of road maintenance work in Botswana these are only general indicators and at best can only serve as a measure from year to year for the same units. Comparative use between division or developed world standards can only be made with qualification and full understanding of material and design differences. Reliability standards for all plant and vehicles have been established and are being tracked.

Overall project and departmental performance can be interpreted from data output by senior management. Personnel and equipment inventories are also being maintained.

A major obstacle in developing the system was in the collection of accurate data in order to develop a base and subsequently the data necessary to indicate progress. At the start of the project much roads maintenance work was done without regard to records, standards or measurement. Fuel and maintenance are supplied through CTO as needed as is much of the equipment. MB expenses were funded from an annual budget and were expended without detailed records. The idea of measurement and reporting, therefore, evolved slowly but is now to a level where accuracy is considered good for a management tool. Questions raised by the management audit are addressed as follows:

A. In regard to determining exactly what information Roads Department requires, it first must be noted that management is not an exact science. However in general terms Roads is pleased with computer based systems developed to date. The inventory records have proved to be most valuable and participation in two annual budget presentations is noteworthy. They note that the standards development will continue for another year or two even though a base has now been established. Proposals currently being considered for inclusion into the system are; undertaking total Roads Department Accounting, an inventory of all boreholes used for MB water supply

(road construction purpose), Gravel Quarry Inventory, and traffic Census Data. District engineers report that data is adequate to give them general performance indicators and that they foresee a system that will continue to grow and develop as their own levels of needs change. In conclusion the general objectives outlined in the project paper have been completed, however the system can only be considered to be in a continual state of development with new management aids to be added as needed.

B. This question concerns accuracy of field data, the capacity of the present hardware and the extent that programs have to be rewritten to obtain information.

Information collection standards and accuracy have evolved slowly over the past 2 1/2 years. At the beginning, report requirements were taken lightly and often made up or ignored. As the system evolved reporting procedures improved. A follow up system was initiated. Accuracy still may be questioned as may be measurement techniques and standards. For a management tool, accuracy standards do not need to be precise. The TA for the computer system estimates accuracies currently vary between 90 to 100%, well within desirably limits for management data inputs. The machine capacity is adequate and user storage was recently expanded. Current programs are adequate and do not require any rewriting. Modification will, however, be made from time to time, to meet new management requirements or to accept new data sources. These of course will build on existing work. It is also noted that the cost accounting unit lacks any formality within the GOB and therefore their required reports have not always been given priority. This has added to the data gathering problems, especially during early development and start up periods.

C. The question was raised regarding the abandonment of the productivity measurement aspects of the system. These aspects are the heart of the management system and cannot be abandoned unless the concept of computer Aided Management is abandoned by the Roads Division. Roads Division management staff feel that these aspects must be continued and that they provide valuable data. As noted earlier, at this time productivity measurement aspects are only general indicators and more years of data collection will be required to develop detailed and accurate standards. However, at this time the system can provide enough comparative data to enable experienced managers to spot problem areas and seek answers.

D. The recommendation asked that an action plan be developed for localizing the cost accounting positions.

In this regard the GOB and USAID noted that they have an action plan which at best may need updating. The current plan calls for the return of the counterpart in December 1983 after two years of training in the U.S. A technician has been trained to assist with the system and provide coordination within the Roads Department. He is currently on the job. The expatriate TA has a contract through May of 1983. The GOB, USAID and

the TA all agree that an overlap of the TA and the returning trainee counterpart will be mandatory in order to maximize the success of the system. The GOB has initiated steps to have the TA contractor extended, hopefully at USAID expense. Further the TA has been working closely with the local WANG representative. It will be most important for the returning counterpart to continue this relationship. The TA also suggests that a one year service contract with the WANG representative should be implemented to assist the new counterpart after the TA's departure. Also suggested was assignment of an engineer to the Cost Accounting office to assist with liaison and interpretation of data.

Conclusions

The evaluation team devoted much of its efforts to the Cost Accounting System and did not reach the same level of concern as expressed by the auditor. However as is the case with many LDC implementation initiatives sponsored by AID, continued careful monitoring of the Cost Accounting System by both USAID and senior GOB personnel will be required to achieve the desired success.

The Project Paper proposed computer based management tool may have been over-optimistic and premature. However, at this time the results are valuable and should be continued.

The current USAID sponsored TA should be extended for one more year to assure adequate overlap with his counterpart now in training in the U.S. If this is impossible a replacement must be found in order to continue the system. Localization will not be possible until sometime after the return of the counterpart who is currently in training. Further, formal status or gazetting of the Cost Accounting System input reports should be done in order to assure that these are given the proper attention at all levels.

Recommendations

1. That USAID assist the GOB in extending the TA contract for a period of about 1 year.
2. That USAID closely monitor the Cost Accounting system to assure that localization remains on schedule, Roads Department Coordination and communications remain open and positive and that the system continue to evolve as planned. This may in part be accomplished through the TA's quarterly reports to USAID which should be expanded to include summary data as appropriate from each system. Savings and special management accomplishments should be particularly noted as these would be useful for AID's technology transfer records.

3. Encourage the Roads Department to take the following actions regarding the Cost Accounting unit.
 - (a) Formalize reporting requirements through gazetting or directives.
 - (b) Assign an Engineering Officer to the unit either on a part time or full time basis.
 - (c) Develop a summary report format to be completed monthly or quarterly by the Cost Accounting unit providing key management data required by the Chief Roads Engineer, Principle Engineers and Senior Engineers, and others deemed necessary.

TRANSPORT SECTOR I (633-0073) BUDGET REVIEW

\$ (000)

INPUT	PP Budget Estimate	Actual Commitment to Date	Required to End of Project	Amount over (+) or Under (-) Budget
<u>TA</u>				
Roads Engineer (Argo)	118	165	165	+ 47
Cost Accounting (Niles)	85	133	133	+ 48
Mechanic Trainer (Rokos)	84	113	113	+ 29
Mechanic Trainer (Cox)	84	118	118	+ 34
<u>Training</u>				
MWC	(4) 102	(9) 194	(9) 194	+ 92
CTO	(6) 154	(8) 130	(8) 130	- 24
Cost Accounting	(1) 18	(2) 12	(2) 12	- 5
<u>Commodities</u>				
Mini-Computer	60	54	60	- 0
Training Materials	10	7	4	- 6
<u>Other Costs</u>				
TA House	35	25	25	- 10
Local Support	120	7	7	-113
Inflation and Contingency	115	0	0	-115
LDV Refitting	0	4	4	+ 4
Radio Aerials/Battery	0	4	4	+ 4
<u>Equipment</u>				
1st Tranche	3446.1	3492	3492	+ 46
2nd Tranche	1553.9	1454	1375	-179
SUBTOTAL	5985	5912	5836	- 149
ROUNDING OFF	15	0	0	- 15
TOTAL	6000	5912	5836	-164

EQUIPMENT PROCUREMENT REVIEW

L/COMM	RECIPIENT	EARMARKING	ITEM	ORDERS GPO NO.	AMOUNT	RECEIVED	CHARGES EXPECTED	TOTAL
(1st Tranche)								
633-007301	Chase	1,026,785.71			1,090,112.26	1,026,785.71		1,026,785.71
633-007302	Caterpillar	1,660,283.39	Equipment Spares	54484	1,603,148.00 121,243.81	1,545,629.00 114,654.39		1,545,629.00 114,654.39
*633-007303	IH/RSA	687,834.40	Trucks Spares	105008	650,303.76 44,185.70	650,303.76 37,530.64		650,303.76 37,530.64
N/A	INTRACO	38,098.53	Ford Spares		38,098.53	38,098.53		38,098.53
633-007304	Dynapac	3,460.27	Spares	78095	3,631.20	3,460.27		3,460.27
N/A	Rassow	880.66	Spares	78090		880.66		880.66
N/A	Rennies	74,997.96	Shipping			74,997.96		74,997.96
(TOTALS)		3,492,340.92			3,512,624.73	3,492,340.92		3,492,340.92
(2nd Tranche)								
*633-007303	INTRACO	1,060,000.00	Equipment	3944	1,060,000.00	982,158.91		982,158.91
N/A	IH/RSA	226,270.80	Trucks	3921	226,270.80	226,270.80		226,270.80
633-007305	INTRACO	30,344.15	Roller	36089	29,921.00	30,344.15		30,344.15
633-007306	INTRACO	70,868.27	Cat Spares		70,868.27		69,265.43	69,265.43
633-007307	INTRACO	66,713.04	Compactors	38092	68,030.00	66,713.04		66,713.04
(TOTALS)		1,454,196.26			1,455,090.07	1,305,486.90	69,265.43	1,374,752.33

* IH/RSA L/Comm was issued by USAID/B, Intraco L/Comm was issued by AID/W

PARTICIPANTS TRAINING REVIEW

NAME	073 FUNDS EARMARKED	069 FUNDS EARMARKED	FUNDED TRAINING DURATION (MONTHS)	RETURN DATE
(Roads Department)				
Dingalo	18,873	36,229	12/24	
Kenokgatla	26,217	26,834	12/24	
Kgotlaetsile	22,567		15	8/83
Legwaila	20,000		12	8/81
Mangadi	29,000		20	5/82
Mangwegape	22,567		15	8/83
Modipane	12,000		6	
Pelopedi	20,000		12	8/81
Sechele	22,567		15	8/83
(Totals)	(193,791)	(63,063)	(286/48)	
(CTO)				
Goyamang	17,848		9	12/82
Lebona	17,848		9	12/82
Malemane	14,654	28,837	12/12	8/83
Molathwa	17,848		9	12/82
Mosweunyane	14,654	29,982	12/12	8/83
Mpuchane	14,654	23,928	12/12	8/83
Thembe	17,848		9	12/82
Tlhorro	14,654	23,982	12/12	12/82
(Totals)	(130,008)	(106,730)	(84/48)	
(Cost Accounting)				
Makgowa		18,000	/24	12/83
Molefi	12,039		6/	2/82
(Totals)	335,838	187,793	376/120	

EXECUTIVE SUMMARY

PREPARED BY: F.A. Zobrist, USAID/Lesotho

DATE: December 20, 1982

PROJECT: Transport Sector I (633-0073)

COUNTRY: Botswana

COST : \$6,000,000

1. What constraints did this project attempt to relieve?

This project was designed to attack the poor efficiencies of the Road Maintenance Division. These were caused by poor skill levels, poor equipment and the lack of standards by which to evaluate performance.

2. What technology did the project promote to relieve this constraint?

The project promoted three levels of improvement which were:

- (a) new equipment
- (b) improved mechanical skills
- (c) and a computer based management system

3. What technology did the project attempt to replace?

This project did not attempt to replace a technology but was designed to improve the levels of sophistication and efficiency of the technology in place.

4. Why did project planners believe that intended beneficiaries would adopt the proposed technology?

With the exception of the computer based management system the proposed technology is an expansion or improvement of existing technology. In the case of the computer, project planners believe that the output data would be so enlightening that beneficiaries would rapidly accept it as a labor saving as well as a reliable management tool.

5. What characteristics did the intended beneficiaries exhibit that had relevance to adopting the proposed technology?

For the most part intended beneficiaries are skilled engineers, and they by nature have experience and training to easily accept computer technology, as well as to fully understand the value of new equipment and its need for proper care and maintenance.

6. What adoption rate has this project achieved in transferring the proposed technology?

Upgrading components of course have been fully adopted. In the use of the computer, this technology is still evolving and its final niche as a management tool has not yet been determined. For example, many systems have been developed of which several are critical to the effective management of the maintenance branch. Others will be developed

as new ideas and needs occur. Localization had not yet occurred because of the extreme sophistication of this system, a parameter project planners failed to fully appreciate. However, localization is being accomplished and includes the return of a trainee at the end of 1983.

7. Has the project set forces into motion that will induce further exploration of the constraint and improvements of the technical package proposed to overcome it?

This at the time is happening subtly but is happening and will continue to accelerate as systems and data develop. Data output is now to the level where many interesting questions are being raised. Once the questions have been raised answers must be sought. The old system did not raise questions thus no answers were required regarding inefficient or unnecessary operations. This is the most exciting aspect of this technology transfer component which is just now starting to evolve.

8. Do private input suppliers have an incentive to examine the constraint addressed by the project and come up with solutions?

Yes, in the future the system will identify difficulties caused by private suppliers as opposed to government forces (i.e. obtaining spare parts and the repair of equipment) and on the other hand will be able to clearly identify which operations can be done more efficiently by private enterprise as opposed to government.

9. What delivery system did the project employ to transfer technology to intended beneficiaries?

The project employed US based computer technology, TA and training system to transfer the computer system management component.

10. What training techniques did the project use to develop the delivery system?

The project used TA trainers, local suppliers reps and US based training facilities to transfer all components of this project.

11. What effect did the transferred technology have upon those impacted by it?

The full story is not in at this time but all impacted will be able to accomplish their responsibilities with much greater efficiency. The end result will be a much better managed and maintained roads system in Botswana which in turn will improve conditions for almost every resident in the country.