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AUDIT OF BOTSWANA FIRST HIGHWAY PROJECT

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Programming & Budgeting Department
Operations Evaluation Division

PREFACE

This study, dealing with the Botswana First Highway Project (IDA Credit 63-BEC to the former UK Protectorate of Bechuanaland), is the fourth in a series of individual project audits being carried out currently by the Operations Evaluation Division. Audits are intended to focus principally on the question: were the principal objectives of the project attained and, if not, why not? Because of the particular nature of this highway project in Botswana -- its close interrelation with the livestock industry and its importance as a major component of the country's development effort -- the scope of this audit, in terms of the subjects treated, is somewhat wider than in the previous similar studies.

Projects are chosen for audit on a random basis. The procedure followed by the Division in its current work program is to cover Bank/IDA projects for which disbursements ended in FY1968. The interim period of five years is considered adequate for the project's outcome to be fairly fully visible, although part of the benefits should still be in the future.

To prepare the audit relevant Bank files and documents were briefly reviewed and the project was discussed with staff who had been involved. A 10-day mission to Botswana was undertaken to update data and to gather impressions about the project from different sources in the country.

The valuable assistance provided by the Botswana Government is gratefully acknowledged.

Note: Currency Equivalent:

1964 - 1971:	R 1.00 = US$ 1.40
Jan.-June 1972:	R 1.00 = US$ 1.33
June-Dec. 1972:	R 1.00 = US$ 1.28

SUMMARY

In August 1964, IDA granted the UK Protectorate of Bechuanaland a US$ 3.6 million credit to help finance a US$ 4.6 million highway project comprising the construction of three roads (Francistown-Maun, Palapye-Serowe and Gaborone-border), betterments on the main North-South road and strengthening of the maintenance organization. The project took more than four years to prepare because the first proposals required considerable revision, and financing for the local component of the project was hard to raise. During project preparation the Bank made an important contribution in promoting a reduction in road standards to levels more suitable to the needs and resources of the country, and in helping to select the roads that appeared to have high priority.

The final cost of the project was only 1.3% higher than the original overall estimate, and almost all of the works originally envisaged were accomplished. Large overruns on a few roads were compensated by savings on other items and minor reductions in the maintenance and training program. Project completion was delayed about one year but most of the works were ready with only a few months delay. The reasons for delays and cost overruns were the unsatisfactory performance of one of the contractors and insufficient supervision by the Public Works Department; the latter was overburdened by the sudden increase in activity due to the project. The maintenance program was implemented on time without overruns and achieved all its major purposes.

Although traffic and economic returns on all roads have been rather lower than expected in the Bank's appraisal, improvements accounting for some 60% of total project costs seem to have yielded reasonable benefits relative to costs, and the maintenance program (15% of total project) was clearly worthwhile. Minor cost savings might usefully have been made in a few of these works by further reduction of standards. The roads from Palapye to Serowe and Gaborone to border, together accounting for 25% of total project costs, yield very low returns and should probably have been postponed a few years.

The trans-Kalahari road between Francistown and Maun is the largest single item in the project, accounting for more than two-fifths of total costs. It is included in the 60% which has yielded reasonable benefits, but results have been disappointing compared with expectations. It was successfully built at low cost; a major portion of this road is one of the cheapest, if not the cheapest, stretches of highway ever financed by the Bank (US$ 5,300 per mile). The road was supposed to have a large impact on livestock activities, by inducing trucking instead of trekking to the railhead at Francistown and by promoting modernization in production techniques. This change has not materialized and livestock is still trekked. The main reasons for the lack of impact are the existence of quarantine

camps to prevent foot and mouth disease, which makes trucking uneconomic, inadequate transport facilities and the lack of interest of small cattle owners in trucking.

Most of the roads, especially the Francistown-Maun one, had an important effect in reducing transport costs and providing all-weather connections in large sections of the country. However, most of the benefits seem to have been retained by traders and did not reach the final consumers and producers.

The new roads had a reduced development impact, because their influence on livestock, which is the main economic activity in the country, was very limited. Ngamiland, the area around Maun, which was for the first time connected to the rest of the territory with an all-weather road, has remained largely unchanged and some of the new developments in the region are not much related to improved transport. However, one effect of the project, difficult to quantify but apparently very important, was to facilitate the administrative and social integration of the country by simplifying contacts among regions and permitting a better performance of the new Government at Gaborone.

The outcome of this project reaffirms the need for a close examination of the interactions between transport and the productive sectors, in this case, livestock. The results of the study suggest that, in terms of broader regional development objectives for Ngamiland, an action program in livestock had a higher priority than investment in the Francistown-Maun road. Also, the large importance of the project in the country's development program required a more explicit consideration of fiscal considerations and of the allocation of resources among sectors. Finally, the capacity of the Public Works Department seems to have been a limiting factor; a project implemented over a longer period would have prevented sudden changes in activity and perhaps had a more significant institution-building effect.

AUDIT OF BOTSWANA FIRST HIGHWAY PROJECT

Background: History and Negotiations

On August 3, 1964 IDA granted the UK Protectorate of Bechuanaland a US$ 3.6 million credit for highway development (Credit 63-BEC). The objective of the credit was to finance the foreign exchange component of a project with a total cost of US$ 4.6 million equivalent and comprising the construction and reconstruction of three roads totalling 355 miles, the betterment of the main North-South road (418 miles), and the strengthening and expansion of the maintenance organization (see map at end of text). Neither the appraisal report nor the supporting documents mention an expected pattern of work completion or a disbursement schedule, but the project as a whole was to be completed by the middle of 1967.

The gestation of this project, from the time when the Bank[1/] was first approached until the credit was signed, took more than four years. This delay is understandable if we take an appropriate historical perspective. Bechuanaland, though a British protectorate since 1919, was intended eventually to become part of the Republic of South Africa. The decision not to proceed with this plan but to grant Bechuanaland independence was taken only in the late 1950s; the country became independent in September 1966. The consequence of political uncertainty in the interim was a relative neglect of the Protectorate by both the United Kingdom and South Africa. The territory remained largely undeveloped except for a few enclaves of European settlement. Even the capital was outside Bechuanaland, in Mafeking, South Africa.

Thus, when the Bank was first approached by the United Kingdom to assist in the development of the Protectorate it was faced with the absence of a development program from which to select projects, a skeleton civil service insufficient to prepare and implement complex investments, and great uncertainties about the possible sources of local financing and about the UK contribution to finance the local component of a project.

The Bechuanaland Government, aware of these factors, promoted a general survey mission of the country in July 1959, headed by Professor C. Morse of Cornell University.[2/] The Bank assumed no financial responsibility for

1/ "Bank" refers to World Bank Group. The Bank was first approached for a loan, but IDA finally granted the credit.

2/ Basutoland, Bechuanaland Protectorate and Swaziland. Report of an Economic Survey Mission. HMSO, London 1960.

this mission and limited its assistance to nominating Professor Morse and two other members. The mission did not propose a clear economic policy for the country, but it did point out the main action areas, which were livestock and infrastructure,[1/] and provided the basis for project selection in both sectors.

In helping define the scope of the highway project and in advising during its preparation, the Bank made probably its biggest contribution, more important perhaps than the financial resources eventually provided. The highway project proposal stemming from the Morse report was composed of a series of road stretches scattered throughout the territory. The Bank considered that not all the roads included were of high priority, that the standards were too high given the expected traffic and the resources available to the country, and that the cost estimates and technical feasibility studies were very crude. Between spring 1961, when the first appraisal mission took place and October 1963, when the project took its final shape, it was modified at least three times. In the process, several road stretches of low priority, such as a trans-Kalahari road in the southern part of the country, were eliminated. Design standards were considerably reduced and consultants were used to prepare the technical feasibility in difficult sections such as that from Maun to Nata. Finally, a provision was added to improve maintenance standards.

The long negotiations related to the UK contribution to the local cost component of the project were an important reason for delay in the gestation of the project. In the first stages of the process, the Bank wanted about 20% of the total cost of the project to be financed locally, but the Bechuanaland Government had no resources of its own to speak of and the UK wished to keep its contribution to a minimum. The situation took a dramatic turn in August 1963, when the UK decided to cut its development aid to Bechuanaland to one-third of what it had originally pledged. The project had to be modified to adapt it to the new financial constraints and it took some time before the exact amount of the UK contribution became clear.

While it is unlikely that more active participation by the Bank could have shortened these delays, it is surprising that the Bank did not fully reappraise the project again after the 1961 appraisal mission, in spite of the many changes accepted. Bank staff did visit Bechuanaland twice before the signing of the credit, but they were concerned mainly with engineering problems and the updating of some of the economic data.

1/ The mission did not emphasize education, a sector which even at that time was considered crucial by the government authorities.

The Project

The project finally agreed upon (see Table 1 at end) comprised all the investments in transport planned by Bechuanaland for the 1963-68 period, representing about 14% of the country's 1963-68 development program. The project has three main parts. The first is the investments on the North-South road and on two short roads leading to it. The North-South road (418 miles) was, and still is, the main artery of the country. It runs from the Rhodesian border to the South African border and joins the country's main population centers (Francistown, Mahalapye, Gaborone and Lobatse). The improvements included in this artery were relatively minor: the replacement of 13 small bridges, better drainage facilities, and a small amount of relocation and regravelling. Nevertheless, these betterments were designed to make the North-South artery an all-weather road. The first of the two short roads leading to it was a 33-mile link from Palapye to Serowe, considered at the time to be the largest town in Bechuanaland,[1/] which was to be constructed to all-weather gravel standards. Finally, the short Gaborone-border road (17 miles), the main connection to Johannesburg, was to be paved.

The second part of the project comprised the trans-Kalahari road from Francistown to Maun (305 miles). The works programmed were paving the first two miles from Francistown to the airport, major improvements from that point to Nata and a new all-weather gravel road from Nata to Maun. The latter was the center of the relatively important cattle-raising activities in Ngamiland and the gate to the Okavango Delta area, a region of supposedly great potential.

Finally, the third part of the project was the strengthening of the maintenance organization, which was considered too weak to undertake the operations that would be required once the project was completed. The work included the construction of road maintenance depots, purchase of equipment, drilling of boreholes for water supply, and a training program. The only special covenant contained in the loan documents expressed the Government's commitment to attain higher standards in maintenance operations.

Project Implementation

The actual total cost of the project -- US$ 4.66 million equivalent -- was only 1.3% higher than estimated. The project was completed with a delay of about a year, during the second half of 1968 (Tables 1 and 2),

1/ In the early 1960s, it was estimated that Serowe's population was about 50,000. The 1964 census showed a much lower figure, of about 15,000.

the closing date of the loan having been extended from December 31, 1967 to December 31, 1968. Disbursements were mainly concentrated in 1966 and 1967.

The aggregate figures do not reflect the differences in performance for each of the investments. The Gaborone-border road was practically completed by June 1966 with a cost overrun of 32% (23% with inclusion of proportionate share of contingencies in the base estimate). The Palapye-Serowe road was finally opened to traffic at the beginning of 1968 and it cost 34% more than estimated (25% with allowance for contingency provision). However, these two roads represented only one quarter of the total investments. Work on the Francistown-Maun road was concentrated in the 1965-67 period. New construction on the Nata-Maun section was undertaken mainly in 1966 and it was opened to traffic during the first half of 1967; the pattern was similar for the Francistown-airport section. The betterments undertaken between the Francistown airport and Nata took longer to complete and they included two rather large bridges; works were ready only at the end of 1967. The cost overrun on the Francistown-Maun road as a whole (accounting for over 40% of total project investment) was small, only 9%, but it was particularly high in the small Francistown-airport section. The series of improvements in the North-South road were completed mainly during 1968 (Table 3). The total cost of these improvements was less than what was planned (Table 1), but most of the planned physical works were successfully completed. Finally, the maintenance improvement program was kept almost exactly to the scheduled cost level, but at the expense of reducing parts of it in size.

Before examining the main reasons for these differences between estimated and actual costs and schedules, it must be noted that the performance of this project was remarkably good under the circumstances. True, we are talking about fairly easy road construction. The terrain is flat, few earthworks were necessary, no major rivers had to be crossed and building materials were readily available. Still, the results are interesting. The new 191-mile road between Maun and Nata cost about US$ 5,300 per mile (US$ 3,300 per km), making it one of the cheapest, if not the cheapest, road ever built with Bank support.

The causes of delays and cost overruns are few: (a) some changes in design; (b) difficulties with the contractor for the Palapye-Serowe and Gaborone-border roads who had serious personnel problems and mismanaged the initial stages of construction; (c) heavy rains in 1966, which slowed down all works for considerable amounts of time; (d) some price increases due to the delay in implementation. The Bechaunaland Government was particularly concerned not to exceed budgeted costs because it knew it would have to finance the overruns. This concern became so acute that one of the Bank supervision missions expressed the fear that the quality of the works was being sacrificed in order to stay within the budget; further investigations proved this fear to be unfounded.

Some of these problems were more serious than they would otherwise have been due to the limited capacity of the Public Works Department (PWD) to handle a project of the size and complexity of this one. In the early 1960s, very little highway construction was taking place; the project implied a massive jump in activity. The PWD had only a skeleton staff, most of it expatriate and subject to the vagaries of the market for engineering skills in other parts of the world, especially South Africa. The staff was also pressed by the construction of the new capital at Gaborone. Problems which would be minor for a strong public works department proved of great importance in Botswana. For example, the difficulties with the contractor working on the Gaborone-border and Palapye-Serowe roads resulted in more PWD staff than projected being assigned to supervise this work, delaying the initiation of other parts of the project. The use of consultants for supervision, as required by the Bank, may have reduced the load somewhat, but it is a question whether it was correct to bunch such a large project over a relatively short period of time in light of the institutional constraints in the PWD. The alternative -- a longer implementation period with lower annual investments -- would probably have had a more beneficial impact in terms of building the capabilities of the PWD. The only institution-building effort that the Bank attempted was directed towards maintenance, but the PWD as a whole was not considered. Most of the high positions in the PWD are still held by expatriate staff (Table 4).

The maintenance program proceeded well and budget allocations exceeded the figures planned at the time of the appraisal. However, parts of the maintenance program were reduced in size to release funds required to cover the overruns in the rest of the project: only 10 instead of 12 maintenance depots were built, and expenditure on the training program was reduced. The maintenance equipment was purchased in 1965, probably slightly ahead of what was required, since none of the roads was completed at that time. Maintenance standards have been good and in that sense the country has adhered to the main credit covenant.

Bank supervision missions were frequent -- sometimes twice a year -- and detected all problems related to project implementation. They did have some indications that benefits were not materializing as expected, but they did not raise the issue with the Government confining discussion, in accordance with normal Bank practice at the time, to matters related to project implementation.

Direct Benefits

The appraisal report provided two major justifications for the project. The first referred to its development impact: national integration and effects on the livestock sector. The second justification referred to the savings in transport costs, especially of cattle; it is discussed in this section. The development impact of the highways is analyzed in the next.

The appraisal attempted to quantify the benefits of the construction and reconstruction works and to calculate an internal rate of return. The justification of the Gaborone-border road arose from the Government's decision to move the country's capital from Mafeking to Gaborone. The rate of return was estimated at 10%.[1/] The return for the Palapye-Serowe road was 8% and for the Francistown-Maun road 20%. The latter was based on important benefits to be obtained from trucking instead of trekking cattle from the Maun region to Francistown. No return was calculated for the betterments on the North-South road.

The traffic figures available in 1972 for the 1963-72 period suggest that the base figures used in the appraisal were overestimates. As a consequence, although traffic has grown quite fast on most roads, actual levels are much lower than those projected. Thus, if we consider only the direct benefits, some of the investments have a negative or low return. The betterments on the North-South road had a return probably above 16%, even taking into account the fact that part of the improvements are already out of use because some road sections are being rebuilt following a new alignment.[2/] The reason for this high return is obvious: the betterments included minor investments designed to eliminate bottlenecks and to transform a hazardous road into an all-weather one. The Gaborone-border road has a return of only 4%, due to low traffic; only after 1972 traffic began to attain a relatively high level, about 130 vehicles per day. The Palapye-Serowe road shows a negative return, also on account of

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1/ See Table 5 for a comparison of estimated and actual traffic levels and rates of return.

2/ Our calculations of the ex-post rate of return are based on actual traffic levels and traffic composition until 1971. Traffic after that date was projected at different levels but the rates of return quoted in the text assume a 5% growth, except for the Gaborone-border road where thefigure is 10%. The economic lifetime assumed is 15 years. The vehicle operating costs used are those prepared for the Bank's second highway project, assuming that the old roads were unimproved. Time savings are not included but the benefits derived from savings in vehicle operating costs are overestimated because we have included full user-cost savings for the induced traffic. Maintenance costs were not considered because the country passed from a practically no-maintenance system to a situation in which roads are maintained; thus, no maintenance savings can be included. A recent estimate of the total annual expenditures per mile on the Nata-Maun road shows a figure of about US$ 475 , which is fairly high.

its low traffic level; the appraisal mission was apparently misled by the very high estimated population figures for Serowe and expectations of livestock development that have not fully materialized for reasons discussed later in this report.

The Francistown-Maun road requires special treatment. Traffic remains low, especially on the Nata-Maun section where it is still about 20 vehicles per day. As a consequence, the rate of return for the whole road is only about 6%. This road was justified mainly by its expected impact on the transport of cattle. Trucking instead of trekking was expected to reduce the direct cost of transport, expressed in terms of weight losses, loss of animals, lower quality and transit time. This impact on the livestock industry was expected to transform the local economy. However, cattle is not trucked but still trekked all the way to Francistown, taking several months in the process.

Our investigations unearthed three closely related explanations for this development. First, the Ngamiland region centered in Maun is subject to periodic outbreaks of foot and mouth disease because of its contact with contaminated game living in the Okavango Delta. To prevent the spread of the disease and to make the cattle acceptable on international markets, veterinary cordon fences were established on the route between Maun and Francistown. The first fences date from the early 1950s and the existing complete system, with two veterinary cordon fences and three quarantine camps, was established in 1967 after the latest outbreak. Cattle had to remain 21 days in each quarantine camp before proceeding to the next. This period has recently been reduced to 14 days. Moreover, trekking is usually done between April and July, when grazing is plentiful and net weight losses after recuperating in the quarantine camps are negligible. A special study on the subject concluded, after taking all possible factors into account, that in 1971 an average head of cattle from Maun would get a net price of 45 rands if trekked and 41 rands if trucked.[1/] Finally, time is of little value to the tribal cattle owners or those who do the trekking; on the contrary, many look forward to the trip to Francistown. Under these circumstances, it is uneconomical to truck cattle for 50 or 60 miles to a veterinary camp and load them again two weeks later for a trip to the next camp.

The second reason is the lack of adequate transport facilities. Transport of live cattle, to be truly economical, must be done in large trailer trucks carrying 25 to 30 animals, with an efficient loading and

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1/ See R. J. Hukku, "An Evaluation of the Basic Economics of Road Transportation and Trekking of Slaughter Stock along Two Important Trade Routes in Botswana," Gaborone, June 1971.

unloading system. Assuming that a minimum of 7-8 thousand head of cattle are exported yearly from the Maun area,[1/] many trucks must be readily available during the three or four months in which most of the cattle is transported to the railhead and then to the abattoir. These trucks are not available in Botswana; Rhodesian trucks transport some cattle from the last quarantine camp to Francistown, but this operation is limited and contracted only by a few big cattle owners. The reasons why this type of large truck is not available in Botswana make economic sense: the large specialized vehicles necessary for efficient transport of live cattle will be occupied only for a few months, and then without having much of a backhaul to carry. The problem will be similar even if the cattle cycle (the period in which they are sent to the abattoir) is extended. The trucks would have to remain unused the rest of the year; there just is not enough to move in the country that requires that kind of vehicle, especially since the railway carries most of the goods between Francistown and Gaborone-Lobatse at very cheap rates. The small size of the market is illustrated by the low rail freight traffic within Botswana: only 46,000 tons in 1969.

We did investigate the other obvious alternative in relation to transport services. At present, a fleet of relatively small trucks of about 10 to 12 tons serves the trade between Francistown and Maun. The trucks are small because wholesalers in Maun do not keep large stocks and frequent service is required. They carry general merchandise, especially foodstuffs, from Francistown to Maun and return practically empty, carrying only a few assorted goods and passengers. Why can they not transport the cattle, which after all moves in the direction of their backhaul, at least from the last quarantine camp? The transporters indicated that their trucks were not designed to carry cattle, and that when they tried both the vehicle and the cattle have suffered considerable damage; they also noted that the demand is small and erratic because trekking is still preferred. The transporters may be right, but one cannot avoid the impression that the opportunities of a backhaul transport are not fully utilized; to prepare a truck for cattle transport is a relatively minor investment.

The third reason why cattle are not trucked is the structure of the cattle activities themselves. In Ngamiland these activities were organized, and still are, on a tribal basis with very unclear marketing channels. There are many small owners and a few groups of cattleowners; cooperatives are just beginning. Most of these owners are illiterate, their

1/ Based on a cattle population in Ngamiland of 155,000 in 1969 and an annual off-take of 5%. The appraisal report cited figures of 10-12 thousand for annual sales from this region in the early 1960s, and projected 15-18 thousand by 1969.

production techniques are very primitive and they continue to follow traditional marketing procedures. Producers and intermediaries are usually small operators who cannot make use of the economies of scale of a large trucking operation or, more directly, cannot afford the cost of the trucking services.

The project drastically changed transport conditions in the country. In our calculations of the return of these investments we tried to take into account the very high transport costs with the previous roads, which were really sandy trails impassable in the rainy season because of flooding, and in the dry season because of the sand. A trip between Francistown and Maun at best took 12 to 14 hours of very hard travel and, at worst, was a matter of two or three days. The technical lifetime of the vehicles engaged in the trade was not more than one or two years. Transport was also made difficult because the roads would remain closed for days or weeks at a time. With the project, reliability is perhaps one of the main effects: the roads are truly all-weather and it is possible to plan on a continuous transport flow among the different towns. Travel times have been considerably reduced: the trip between Francistown and Maun can be completed comfortably in six to seven hours and between Francistown and Gaborone in about the same time, compared with 10 or 12 before the new works.

These improvements have been reflected in a drastic reduction in vehicle operating costs, especially on the new roads (Francistown-Maun and Palapye-Serowe). Before the new road, the freight rate between Francistown and Maun was 1.25 rands per 100 pounds, apparently regardless of the type of product, the volume and size of shipment or the direction of traffic. This rate went down to 0.95 rand per 100 pounds by the time the new road was completed in 1967. Now it is 0.75 rand and there are instances of tariffs of 0.40 rand on the backhaul from Maun to Francistown. Trucks have traditionally carried passengers at a rate that has remained at three rands from Francistown to Maun and two rands in the opposite direction for at least twenty years. If we take into account that there has been a moderate degree of inflation in the last ten years, the evolution of the freight and passenger tariffs implies that an important proportion of the vehicle operating cost reductions has been transferred to the transport users. Truck operating costs have decreased at least 35% since the new road was inaugurated and freight rates by 40%. The stability of passenger fares seems to reflect the higher demand derived from the better "quality" of the service due to the new road.

We have indications that rates on the other project roads have also decreased in real terms, but probably less than on the Francistown-Maun road. To understand the reasons for the different behavior we have to deal, briefly, with two other subjects; one is the structure of the road

transport industry and the other is road-rail competition in the North-South corridor.

The country's road transport industry is the result of a small economy which requires little transport, of a completely unregulated environment and of the fact that most of the transport in the North-South corridor and the foreign trade is by rail. The consequence has been that most of the really lucrative contracts, such as those related to the mining developments, are handled by foreign companies. Also, it is almost impossible for Botswana trucking firms to operate in neighboring countries. Trucking companies are mostly regional and very small, owning only a few trucks; competition is active but highly localized. For example, it is not possible even to quote a freight tariff between Francistown and Lobatse. The only long-distance road transport is that between Francistown and Maun, and even here most truckers do not go much beyond Nata. There are no bus services on that route; most buses in the country run local services in the North-South corridor. The only section where the trucking industry has developed along traditional competitive lines is between Francistown and Maun, but this is a small market which permits the operation of only a few trucks. Some time ago an attempt was made to establish a bus service between Francistown and Maun, but it suspended operations after two or three months; there is no demand for a high quality service such as that provided by a bus.

The development of the road transport industry in the North-South corridor has been largely determined by the competition from the railway. The Rhodesian Railways line that connects the Rhodesian with the South African system (the Bulawayo-Capetown line) crosses Botswana near its eastern border and connects Francistown, Gaborone and Lobatse. The railway has traditionally moved most of the passengers in the corridor, especially long distance, and most of the freight movements, aside from imports and exports, are composed of live cattle going to the Lobatse abattoir, a few agricultural products and very little else. Traffic statistics suggest that the railways have maintained their share of the transport on the North-South corridor. Passenger transport has grown from about 400,000 in 1968-69 to 650,000 in 1972. Freight with origin or destination in Botswana grew from 300,000 tons in 1966 to 500,000 tons in 1970. For traffic within Botswana, the railway follows a policy of charging rates and fares that will cover only a little more than the additional cost of moving that traffic; intra-Botswana transport is marginal to the railway. Faced with that kind of pricing policy (which, from an economic viewpoint, is beneficial for Botswana) and with a road that, in spite of the improvements made, is still a second-class gravel road, it is not surprising that few road transport services that are in direct competition with the railway have developed in the North-South

corridor. Those that have developed are mainly complementary to rail services: feeders from the surrounding areas and between nearby towns. It is the savings in vehicle operating costs on this local traffic that provide the justification for the improvements in the North-South road. However, our impression is that these developments would have taken place even without the improvements in the North-South road because they are mainly a function of the quality of the feeder roads and the production increases in the region.

Road Design Standards and Maintenance

The low return of some of the project roads, especially that from Francistown to Maun, raises two additional issues. The first refers to the roads' design standards: was it possible to attain the same objectives with roads built to lower standards? The second issue refers to the trade-off between design and maintenance standards: would lower standards have increased maintenance expenses excessively and made the total construction-maintenance cost even higher?

This audit confirmed the Bank's original position about the need to reduce standards, and the reductions incorporated in the final project implied a considerable saving for Botswana. The question is whether further reductions in standards were possible. In some cases the standards were right, as in most of the betterments on the North-South road. One of these betterments which is strangely out of line with the general frugality of the project is a railway overpass south of Gaborone. Its cost was about US$ 50,000 . In light of the traffic levels at the time -- 200 vehicles a day and 20 trains -- and the country's other requirements, the overpass was clearly superfluous. This investment was included by Bechuanaland in one of its proposals, and the Bank did not seem to have objected during the discussions that took place to define the project. In the case of the Gaborone-border road, we consider that its low return was more a problem of timing than of standards: its construction should have been postponed altogether for about four years.

From the point of view of design standards, the Francistown-Maun road must be divided in two sections: from Maun to Nata and from Nata to Francistown. The latter section, of about 120 miles, was an adequate road during the dry season although it was poorly drained and crossed several rivers. The works included in the project to improve this section included bridge construction, drainage, improved alignment and new construction limited to a few particularly difficult stretches. Since this is the section with the highest traffic, these improvements were justified.

Thus, standards are an important issue only on the two road sections that were new construction: Nata-Maun and Palapye-Serowe. The traffic evolution on both of them makes it difficult to justify even the low expenses involved in their construction. Could the standards have been

further reduced? Apparently not very much, especially on the Nata-Maun road, unless the objective of having an all-weather road is abandoned (this point is discussed in the following section). A lower quality surface would have made the roads impassable in parts of the rainy and the dry seasons, and the same applies to the bridges and drainage works; a cheaper alignment would not have saved much because both roads traverse mostly flat terrain and the amount of earthworks is low. The Palapye-Serowe road was realigned during construction to reduce earthwork even further. The main possibility was to have built narrower roads, since both are obviously too wide for the existing traffic.[1/] The problem of stage construction does not arise because a narrower road would have been sufficient for many years hence. The savings to be obtained by narrowing this type of road a few feet are not very large, certainly not more than 10 or 15%. Still, for the two roads the savings would be perhaps US$ 200,000, a sizeable amount for Botswana.

The trade-off between initial design standards and maintenance standards is not an issue in this project. It clearly did not pay to build to higher standards in order to save future maintenance costs; standards are right for most of the works and in those cases where they are high the reductions in question, such as narrowing, are not much related to maintenance standards.

The Bank's emphasis during project preparation on reducing standards as much as possible and increasing the relative importance of maintenance was correct. The impact of the maintenance component of the project has been very positive in creating an institution and a positive attitude towards maintenance problems. Roads are, by and large, well maintained, although the good condition of some of the roads is due to their low traffic. The training program was crucial in generating a considerable number of skilled workers capable of performing the tasks required. The program, as included in this project, was expected to last for three years. It was financed with local and UK funds and was completed in August 1967 after graduating a large number of maintenance workers. The Government has continued these training efforts: there is now a full-time training school attached to the Roads Division of the Ministry of Public Works and Communications graduating about 40 trainees a year. Also, the construction of road depots has become an integral part of all subsequent road work.

Development Impact of the Project

The results of the analysis of the direct impact of the project suggest that study of the transport sector alone is not enough to understand the full implications of the investment and of the Bank's participation. Some of the investments were supposed to have a crucial impact

1/ The Palapye-Serowe road has a surface width of 22 feet and the Nata-Maun road 20 feet.

on the livestock industry, but in fact they did not. This is important, because cattle raising is the main, and almost the only, economic activity in the area of influence of the project roads. Of the country's labor force, 88% work in agriculture, most of them in livestock and subsistence crops. It is necessary, then, to explore more the interaction between livestock and transport, and the possible indirect effects of the roads.

Since the early 1960s, the Government of Bechuanaland had a clear notion that what the country required was a massive action program in livestock and infrastructure (for the sake of simplicity, we are leaving aside the problem of education). It submitted a road project to the Bank because it seemed easier to define and to process in a short period. The livestock problem was more complex and the Government lacked the capacity to prepare a project acceptable to the Bank. Nevertheless, by June 1962, when it appeared that the road project would be too small to warrant the Bank's attention, the Bechuanaland authorities proposed the inclusion of a small (US$ 250,000) rural water supply scheme for livestock. The scheme entailed the creation of a National Development Bank, to grant farmers loans for borehole drilling. The Bank opposed the water development on the grounds that it was too complicated for the amount involved and suggested that the proposal should not delay progress on the road project. The Bechuanaland Government continued through 1963 to press for a credit for livestock, adding the possibility of establishing an agricultural training college. The Bank was sympathetic to the need to do something for livestock and even got to the stage of assigning a staff member to prepare a project, but insisted on keeping these efforts separate from the road project. A loan for livestock was only made in June 1972.

One unfortunate fact that seems to have delayed the Bank's interest in livestock was the report of an FAO mission which concluded in 1963 that "the development of roads is the single most important step for the further development of the livestock industry." The report reinforced the Bank's interest in going ahead with the road project as soon as possible, hoping that the inducement provided by reduced transport costs would promote the development of the rest of the economy, that is, of livestock. For example, the Bank envisaged that the new road would bring to the Maun region cheaper industrial and agricultural products, inducing the cattle owners to sell part of their stock for cash in order to buy the goods and in the process selling animals of a lower age. The livestock seasonal cycle was expected to be lengthened through trucking. Further studies and experience have demonstrated that the main obstacles to the development of the livestock industry in Botswana are, first, the land tenure pattern based on tribal customs, second, inadequate techniques,

and only last the lack of water and transport.[1/] This diagnosis was confirmed by the Bank in the appraisal of the 1972 livestock project, which included among other measures the financing of stock routes to expand the practice of trekking within the country. Thus, it is not surprising that the livestock activities made very little use of the improved roads and were hardly affected by them.

Did, then, the Bank choose the wrong sector for financing? Taking a simple view, there is a basis for saying that some of the resources invested in transport should have been directed to other sectors, possibly to livestock, at least those resources which could have been saved by reducing design standards on some of the works, such as the approximately US$ 250,000 that should have been available from making the Nata-Maun and Palapye-Serowe roads narrower, and eliminating the overpass south of Gaborone. Also, the Bank's insistence on a local component for the project which was very large for the country's finances may have diverted resources away from investments in livestock: the local component was US$ 1 million, and Bechuanaland planned at the time to invest only about US$ 2.8 million equivalent in livestock in the 1963-68 period. It is also possible that some of the other road investments could have been postponed for several years in light of the low traffic levels. However, this conclusion must be qualified in at least three important ways. The first refers to the fungibility of the resources at the time when the credit was granted. Given the constraints in the institutions dealing with the agricultural sector in the country, it was unlikely that a livestock project acceptable to the Bank could have been prepared by 1964. Thus, to a certain extent it was a matter of getting IDA funds for roads or not getting them at all. What does seem clear from our brief analysis is that the Bank and the Bechuanaland authorities should have promoted a livestock project much faster than they did, especially if one takes into account that growth in cattle population and changes in production techniques are normally slow to materialize.

A second qualification refers to the impact of the project roads on the "administrative and political integration of the country." The concept is necessarily vague, but refers to aspects such as the possibility of increasing contacts among Government officials throughout the territory; of extending Government services and programs to faraway regions, such as Ngamiland; facilities for inspection trips. Many Government officials interviewed considered this to be the most important effect

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1/ The first Bank appraisal mission in April 1961 did raise the issue of land tenure as a major problem, but the subject seems to have been dropped in the subsequent project preparation work.

of the project. Without it, the process of setting up an independent Government and promoting a national identity would have been much more difficult and costly. We have no way to quantify the importance of this factor, but tend to agree with the Government officials. A few objective measures are available. For example, some Government services could be established in Maun only because staff were willing to move there due to better accessibility. In a special nine-day traffic count done on the Francistown-Maun road in October 1972, 28% of the vehicles turned out to be Government-owned.

Finally, the last qualification derives from the fact that we based our conclusion on the ex-post return of the roads taking into account only their direct impact. In a country like Botswana, one would expect that roads would have an important indirect or "development" impact which in part should be added to the benefits computed in the original calculation. However, the development impact of the project roads has been small.

The main road with development potential, which also accounted for the largest part of the project investment, was the Francistown-Maun one. The economic and social conditions of the Maun region and of Ngamiland in general have not changed much since the opening of the road. The great majority of the population remains dedicated to livestock and subsistence agriculture and has not been much affected by the improved transport conditions, except in terms of better supply of industrial and some agricultural products originating in Francistown. The same nine-day traffic study in 1972 concluded that of 215 freight vehicles detected, 59 were moving mainly food products, 47 fuel and oil and 29 spares; according to transporters, this freight composition has not changed much in the last years. However, we have doubts that much of the benefits of reduced transport costs really got to the final consumers in any significant way; most of the benefits seem to have been retained by the intermediaries, who are the ones who ship merchandise from Francistown to Maun. The town of Maun has experienced very few changes; there are a few new traders, and the main new activity, game processing, which occupies about 100 people, was not really induced by better accessibility. The only activities related to the road are four gas stations and two repair shops. As regards the livestock industry, cattle population in Ngamiland continues to grow, although less than in the rest of the country: in 1966 it represented 11.3% (103,000 heads) of the country's total but in 1969 only 10.7% (155,000 heads). The off-take, at 5% in 1969, continued to be below the country's low average of 7.6%. Live cattle sales to Zambia and Rhodesia, to which most of the Ngamiland cattle was destined, went down from 19,600

in 1965 to 7,400 in 1967 and disappeared in 1968. This development was not influenced much by the road; it was largely determined by Government efforts to send most of the country's cattle to the abattoir and improve marketing channels and by a conscious policy of stopping this kind of sales in favor of direct exports of carcass beef. This new marketing policy was important for the region, because prices paid at the abattoir are higher than those obtained by the cattleowners in Zambia and Rhodesia. The drought conditions in 1965 and 1966 helped to accelerate this process. Thus, the development pattern envisaged at the time of the appraisal has materialized only to a small degree and has been induced largely by the changes in livestock marketing practices.

A few sources in Botswana suggested that the rapidly expanding tourism centered in the game parks of the Okavango Delta has been induced by the new road. However, a small investigation of the subject suggested that the road has been a very minor factor. No detailed studies on tourism in the country are available,[1/] but partial estimates indicate that tourism in the area has grown considerably and reached about 5,000 tourists in 1971. Of these, over half cross directly from Rhodesia by dirt roads, without using the Francistown-Maun road. Another sizeable portion of the total arrives by plane. The arrivals at Maun airport have gone up from 1,780 in 1969 to 2,880 in 1971. Thus, only a small proportion, probably 1,000 to 1,500 tourists, use the new road. Even from these we should deduct the hunters travelling in special vehicles, who would have gone anyway. This negligible impact on tourism is partly a consequence of the Government's policy of discouraging mass tourism and concentrating on a few wealthy clients.

Very little else can be said in terms of "development impact." By a fortunate coincidence, the road was completed at the same time that several thousand refugees from Angola poured into the Okavango region of Botswana. The availability of all-weather transport seems to have prevented actual starvation of many of these refugees and has permitted the maintenance of a camp in the area for several years. Also, the existence of the road has raised the possibility that a few important projects may be located in the area. One of the fattening ranches included in the Bank's livestock project is located near Maun, and one of the possible locations for a second abattoir is in the same area. Two developments may increase the importance of the Francistown-Maun section considerably: one is a new road to Zambia starting near Nata. Finally, several schemes for developing the Okavango region are under study; if they materialize soon, traffic on the road will increase considerably.

1/ See "Development of the Tourist Industry in Botswana 1970-1975" by Edward Dommen, Technical Assistance Adviser, Commonwealth Secretariat, 1969.

Conclusions

The administrative and political effects of the project and its interdependence with the complex livestock sector make a global assessment of its final impact difficult. From a strictly economic viewpoint the betterments on the North-South road and the improvements on the Nata-Francistown road, together accounting for some 35% of total project costs, appear clearly justified. The road from Nata to Maun, inexpensive per mile built but still accounting for some 25% of total project investment, carries small traffic, yields low returns in terms of road user cost savings and has to date had very limited impact on the development of the area traversed; on the other hand, creation of a reliable transport link in the area has produced benefits that seem important, even though they are very hard to quantify satisfactorily, in the form of readier Government access, stronger national integration, better administration and greater capability to cope with emergencies. Finally, the new road from Palapye to Serowe and the paving of the Gaborone-border road, together accounting for another 25% of total project costs, both yield unacceptably low returns and appear to have been undertaken somewhat earlier than would have been desirable. Aside from road construction and improvement the project contained a maintenance component, accounting for some 15% of total costs, which appears to have made a valuable contribution to the development of the Botswana highway system even though it had to be cut back slightly in physical terms to help cover cost overruns elsewhere in the overall project.

The Bank's priority ranking of the various works was approximately correct and it seems that other highways included in the original program but rejected by the Bank would have yielded lower returns than those actually undertaken. But the overestimates of base-year traffic and of traffic growth, combined with the substantial cost overruns on the two roads on which contractor performance was poor, together resulted in the levels of economic return on the roads that were financed being systematically lower than expected.

The Bank's emphasis, during project preparation, on reduction of design standards seems fully justified in retrospect. Some additional useful savings might have been made on several of the roads. More importantly, the two roads showing low returns should probably have been postponed a few years. Even the Nata-Maun link could have been briefly postponed while effort was concentrated on preparing a suitable action program in livestock. We believe that the development of the Ngamiland region required a combined effort in transport (infrastructure and services) and livestock in order to obtain a "leap forward" which would have resulted in a few years in a substantial increase in cattle exports and in trucking instead of trekking as the most economical form of transport. In this broader sense, of the regional development objectives, the project is a case of underinvestment -- in complementary transport and livestock activities -- rather than of overinvestment.

Analysis of the reasons why project objectives were not fully attained raised three main interrelated issues. The first is the interaction between transport and the livestock industry. The Bank does not appear to have analyzed in sufficient detail the mechanisms by which important improvements in transport infrastructure would induce the expected increase in livestock production. Bottlenecks that at least now seem obvious, such as marketing channels and the influence of veterinary factors, were not taken fully into account. The conventional wisdom at the time -- that transport was the key factor in the development of the livestock industry -- misled the Bank and encouraged it to push hard for the road project although Government officials were conscious that transport was not enough. Another related aspect overlooked in the appraisal was the role to be played by the trucking industry: the Bank concerned itself only with the infrastructure and did not foresee that the transport services required for the success of the scheme would be uneconomic.

The second issue concerns institution-building. The project imposed a heavy burden on the limited capacity of the Public Works Department, which resulted in supervision of works being less than fully adequate. Its completion implied a relative reduction in activity, and the level of works is only now picking up again, with several new projects. One wonders to what extent project implementation should be staged over longer periods in order to attain institution-building objectives; at least the trade-off between institutional development and direct investment benefits should be considered. In this particular case investment economics as well as institution-building would seem in retrospect to argue for a longer phased program. The Bank's highly successful efforts to help improve maintenance are an indication that similar attention directed towards the PWD as a whole would also have probably produced good results. For instance, with regard to training, it became clear in the later 1960s that efforts in this field needed to be expanded to include not only the preparation of skilled workers and low level supervisory personnel, but also the development of future management staff.

The third issue relates to the breadth of treatment given to the project in preparation and appraisal. The program financed by the Bank comprised virtually all investments in transport over five years, a fact to be expected in small countries like Botswana. It was more crucial than usual to understand the extent of the strain on the country's fiscal and human resources imposed by the project and to consider explicitly how it would fit in the intersectoral allocation of investments. The case study reaffirms the necessity for a broad sectoral approach, including intersectoral links, if optimum results are to be obtained.

Table 1

Botswana Credit 63-BEC. Estimated and Actual Total Costs and Completion Dates
(in thousand US$ equivalent)

Description of Work	Estimated Cost	Actual Cost	% Cost Overrun	Completion date 1/
A. North-South Corridor				
1. Betterments on North-South Road (bridges, drainage, minor realignments) over 418 miles	840	787	-6.3	July 1968
2. Gaborone-border road (pavement) 17 miles	330	435	+31.8	June 1966
3. Palapye-Serowe road (new gravel road) 33 miles	450	605	+34.4	February 1968
TOTAL	1620	1827	+12.8	
B. Francistown-Maun Road				
1. Francistown-airport (base and paving) 2 miles	78	106	+35.9	January 1967
2. Airport-Nata (reconstruction to gravel surface) 118 miles	622	644	+ 3.5	December 1967
3. Nata-Maun (new gravel road) 185 miles	920	1022	+11.1	September 1966
TOTAL	1620	1772	+ 9.4	
C. Engineering	340	438	+28.8	
D. Maintenance				
1. 12 buildings for depots	110	130 2/	+18.2	September 1967
2. Maintenance equipment	280	359	+28.2	1st Semester 1966
3. Training Scheme	140	97	-30.7	mid 1967
4. Bore-hole water supplies	90	37	-58.9	mid 1966
TOTAL	620	623	+ 0.5	
E. Contingencies	400			
GRAND TOTAL	4600	4660	+ 1.3	

1/ Approximate, when each road was opened to traffic, equipment bought or programs completed. Some works went on after this date.
2/ Only 10 were built

TABLE 2

BOTSWANA CREDIT 63-BEC TOTAL COSTS 1/

(in US$ equivalent)

Item	1964	1965	1966	1967	1968	Total
Gaborone-South African border road (excluding bridges)		324,760.62	82,907.43	27,440.94		435,108.98
Palapye-Serowe Road (excluding bridges)	151.92	1,681.92	328,407.76	217,175.16	574.60	547,991.36
Francistown-Maun Road (excluding bridges)						
- Francistown-airport		30,880.08	41,120.84	33,502.57		105,503.49
- airport-Nata		103,585.07	229,076.78	183,729.28	3,541.73	519,932.86
- Nata-Maun		393,900.86	547,056.23	81,127.93		1,022,085.02
Total		528,366.01	817,253.85	298,359.78	3,541.73	1,647,521.37
North-South Road		16.07	53,168.66	213,445.42	214,979.90	481,610.05
a) 10 bridges from items 1,2, 3, and 4 above		75,892.04	286,407.98			362,300.02
b) 2 bridges on Francistown-Nata road			39,073.22	85,072.32		124,145.53
Engineering	143,476.01	179,667.14	93,155.31	19,923.56	1,894.10	438,116.12
Maintenance						
a) Construction of 10 road depots		3,550.96	39,510.03	87,157.93		130,218.92
b) Maintenance equipment	32.00	150,189.20	124,871.27	84,315.91		359,408.38
c) Training scheme	73,761.07	12,716.97	10,738.97			97,217.01
d) Boreholes		11,196.33	26,188.29			37,384.62
Total	73,793.07	177,653.46	201,308.56	171,473.84		624,228.93
GRAND TOTAL	217,421.00	1,288,037.26	1,901,682.77	1,032,891.02	220,990.34	4,661,022.36

1/ As presented in the progress reports
Rate of exchange US$ 1.4 = 1 rand

Table 3

Botswana Credit 63-BEC
Betterments on the North-South Road: Completion of Works

	Work Item	1966	1967	1968	Total
1.	Relocation	1	1	1	3
2.	Improved alignment	1	2	17	20
3.	Culverts	9	5	54	68
4.	Rail crossings	-	-	3	3
5.	Bridges and approaches	1	6	7	14
6.	Others	1	-	1	2
7.	Total	13	14	83	110

TABLE 4

BOTSWANA. STAFF OF THE ROADS DIVISION OF THE MINISTRY OF WORKS AND COMMUNICATIONS, 1972-73

Job Title & Grade	Jobs	Citizens in jobs	Expatriates in jobs	Vacancies
Chief Roads Engineer	1	-	1	-
Senior Roads Engineer	1	-	-	1
Roads Engineers	4	-	3	1
Senior Eng. Asst.	3	-	3	-
Engineering Assistant	5	-	3	2
Senior Materials Off.	1	-	1	-
Inspector of Works	7	1	2	4
Engineering Draughtsman	2	-	1	1
Materials Officers	2	-	2	-
Senior Foreman	5	-	-	5
Inspector of Works (Trainee)	1	-	-	1
Junior Foreman	8	8	-	-
Senior Plant Operator	1	1	-	-
Senior Technical Asst.	7	4	-	3
Roads Section Officer	33	24	-	9
Clerical Asst/Officer	20	20	-	-
Storekeeper	3	2	-	1
Typist/Shorthand Typist	1	1	-	-
Plant Operator	4	4	-	-
Driver (C3(1.C))	1	1	-	-
Driver (C4(1.C))	11	10	-	1
	121	76	16	29

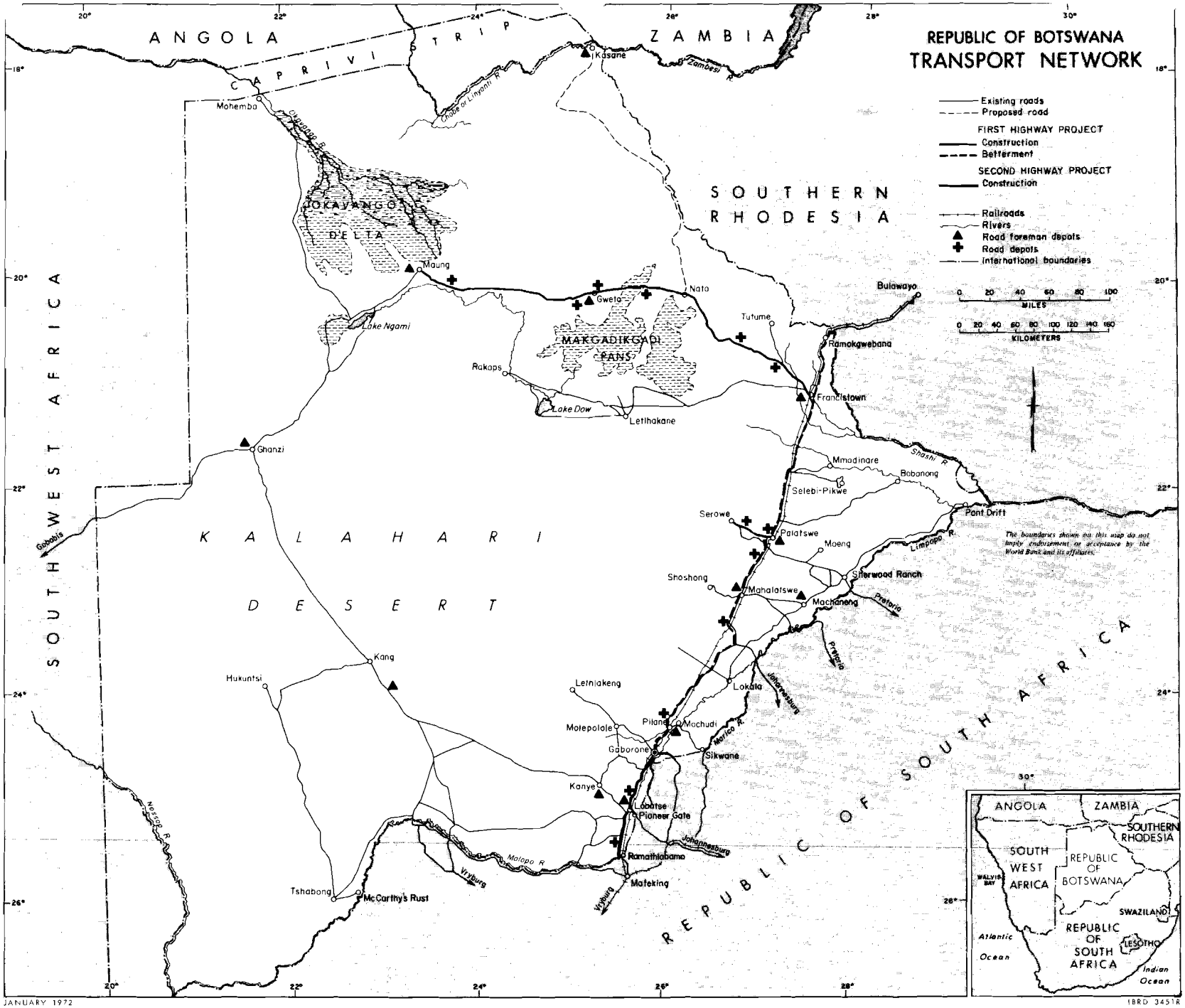
Table 5

Botswana Credit 63-BEC. Projected and Actual Return and Traffic Levels

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Annual rate of growth 1/
Traffic Levels (vehicles per day)											
1. Francistown-Nata											
Projected	50	-	-	-	-	-	100	-	-	-	12.2%
Actual (at Dukwe)		14	14	18	18	22	25	27	36	32	10.6%
Actual (at Sebina)		26	26	37	36	37	37	54	44	47	7.6%
2. Nata-Maun											
Projected	10	-	-	-	-	-	30	-	-	-	20.0%
Actual		8	9	12	12	15	17	21	22	21	12.8%
3. Gaborone-border											
Projected	25	-	-	-	-	-	150	-	-	-	35.0%
Actual		16	16	22	27	37	48	52	70	72	21.0%
4. Palapye-Serowe											
Projected	50-60	-	-	-	-	-	80	-	-	-	4.9%
Actual		27	58	47	29	34	37	37	46	44	6.2%
5. North-South Road											
Projected			not done								
Actual		61	68	80	90	105	114	115	132	147	11.6%

Internal Rate of Return	Projected	Actual
1. Francistown-Maun	20	6
2. Palapye-Serowe	8	Negative
3. Gaborone-border	10	4
4. North-South Road	not done	16

1/ 1962-1968 for projected and 1963-1971 for actual.



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