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U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

OFFICE OF SOUTHERN AFRICA REGIONAL ACTIVITIES COORDINATION (OSARAC)
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66p.

PD-AAC-866-A1

March 24, 1977

Mr. Owen Cylke, Director
AFR/ESA, Room 6758 NS
Agency for International Development
Washington, D. C. 20523

Dear Owen:

Enclosed is a copy of the Lesotho Roads Assessment (project 690-0076). The original, as our cable stated, will be in the pouch tomorrow to Len Pompa.

A number of features of this proposal are unusual: but, as you have stressed so often, we face an unusual situation. OSARAC and REDSO trust that the recommendations of this paper will be seen in Washington as a serious, urgent attempt to deal with one of Lesotho's greatest problems. We urge that the full force of the Africa Bureau be mobilized to move this project away from routine handling and into a highly-accelerated approval process that will permit use of FY 1978 SSA funds starting in October of this year.

With best personal regards.

Sincerely yours,

George T. Eaton
Acting Regional Development
Officer

cc: Mr. Leonard Pompa, AFR/ESA
(with original of paper)

Mr. Sheldon Cole, AFR/DR
(with copy of paper)

Rec'd AFR/ESA
3-30-77

LESOTHO

ROADS

ASSESSMENT

PROJECT 690-0076

MARCH 24, 1977

LESOTHO ROADS ASSESSMENT

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LESOTHO ROADS ASSESSMENT
(690-0076)

I. Introduction and Summary

This paper was prepared by OSARAC and REDSO/EA staff in Maseru, Nairobi and Mbabane during March 1977. Although it has not been formally cleared by the Government of Lesotho (GOL), the recommendations were reviewed with the GOL and received its enthusiastic endorsement. The investigations that led to this assessment were conducted in close collaboration with GOL officials, especially from the Ministry of Works.

Lesotho has always lacked a basic national road network and the necessary institutional capacity to cope effectively with road construction and maintenance. These deficiencies are major impediments to implementing the country's rural development and agricultural production plans. For the last few months there has also been a political crisis occasioned by the "independence" of the Transkei which has hampered traditional transport links between remote parts of the country and surrounding South Africa. The institutional development and road construction project recommended in this assessment is an attempt to plan an effective American response to the situation consistent with AID priorities and the U.S.-supported United Nations Security Council resolution of December 22, 1976, that called upon the world to give immediate economic assistance to Lesotho.

Despite the shortage of time and difficulty of undertaking such an assessment without outside help, this paper constitutes, we believe, a good deal more than an ordinary PID. We consider that the circumstances (including the projected availability of FY 1978 SSA funds) warrant an accelerated project development schedule in this case. We strongly urge that this paper be treated as a "PID-PRP" and be reviewed and approved within 60 days by the ECPR so that final design work and preparation of the PP can commence by July 1. Following such a schedule should make project authorization possible by September 30, so that FY 1978 funds can be obligated right at the start of the new fiscal year.

GOL officials, notably the Minister of Works and the Permanent Secretary, Works, strongly and repeatedly expressed their appreciation for the rapid U.S. response to their problems represented by OSARAC and REDSO's work on this assessment. We strongly recommend that AID capitalize on this favorable environment by moving ahead rapidly and directly with final

project design so that U.S. inputs can be seen on the ground in Lesotho at the earliest possible date.

For further background, readers are referred to the following classified cables:

STATE 23100, February 2, 1977, which authorized this assessment

MASERU 137, February 4, 1977, Field's first general summary of situation

MASERU 166, February 10, 1977, Summary of additional information following further discussions with GOL

STATE 56857, March 14, 1977, Guidance from AID/Washington.

MASERU 327, March 15, 1977, on probable recommendations of the UN (Farrah) Mission including this project.

In summary, this assessment paper recommends a five-year $20,140,000 technical and capital assistance grant project to help develop within the Government of Lesotho's Ministry of Works the institutional capacity to be involved effectively in Lesotho's road construction and maintenance as a part of overall national development. The major project elements are technical assistance to construct or improve 260 kilometers of road between Mohale's Hoek and Mpiti in southern Lesotho, an A & E contract(for road design, equipment specifications and equipment procurement), road equipment for this construction task, operating costs for the construction and large overseas and local training programs to increase the number of Basotho engineers and diplomate technicians.

II. Project Facesheet

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT REVIEW PAPER FACESHEET
TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE ("X" appropriate box): [X] Original [ ] Change [ ] Add [ ] Delete

DOCUMENT CODE: PRP 2

2. COUNTRY/ENTITY: LESOTHO

3. DOCUMENT REVISION NUMBER:

4. PROJECT NUMBER: 690-0076

5. BUREAU: a. Symbol: AFR; b. Code: 06

6. PROPOSED PP SUBMISSION DATE: mo. 09 yr. 77

7. PROJECT TITLE - SHORT (stay within brackets): Lesotho Roads

8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION: a. INITIAL FY 78; b. FINAL FY 81

9. ESTIMATED TOTAL COST ($000 or equivalent, $1 =)

a. FUNDING SOURCE	FIRST YEAR FY 78 b. FX	c. L/C	d. Total	ALL YEARS e. FX	f. L/C	g. Total
AID APPROPRIATED TOTAL	8,121	475	8,596	16,256	3,884	20,140
(Grant)	(8,121)	(475)	(8,596)	(16,256)	(3,884)	20,140
(Loan)	(-)	(-)	(-)	(-)	(-)	(-
Other U.S. 1.						
Other U.S. 2.	-	-	--			
HOST GOVERNMENT	-	100	100	-	1,050	1,050
OTHER DONOR(S)						
TOTALS	8,121	575	8,696	16,256	4,934	21,190

10. ESTIMATED COSTS/AID APPROPRIATED FUNDS ($000)

a. Appropriation (Alpha Code)	b. Primary Purpose Code	c. Primary Tech. Code	FY 78 d. Grant	e. Loan	FY 79 f. Grant	g. Loan	FY 80 h. Grant	i. Loan	ALL YEARS j. Grant	k. Loan
SA	660	821	8,596		3,601		4,686		20,140	
		TOTALS	8,596		3,601		4,686		20,140	

11. PROJECT PURPOSE(S) (stay within brackets) [ ] Check if different from PID

To develop within the Government of Lesotho's Ministry of Works the institutional capacity to be involved effectively in Lesotho's road construction and maintenance as a part of overall national development.

12. WERE CHANGES MADE IN PID FACESHEET DATA, BLOCKS 12, 13, 14, or 15? IF YES, ATTACH CHANGED PID FACESHEET. [ ] Yes [ ] No

13. PLANNING RESOURCE REQUIREMENTS (staff/funds)

See ~~section~~ VI.A, p. 38

14. ORIGINATING OFFICE CLEARANCE

Signature: [signature]

Title: Acting Regional Development Officer OSARAC

Date Signed: mo. 03 day 24 yr. 77

15. Date Received in AID/W, or For AID/W Documents, Date of Distribution: mo. day yr.

AID 1330-3 (7-75)

III. Problem and Setting

In its eleventh year of political independence, Lesotho has no basic national network of all-weather roads. There are three main reasons: (1) rugged topography and variable climate make road construction difficult and expensive; (2) the fact of being surrounded by South Africa has encouraged the direct, almost casual, flow of people and goods across the border at any number of points, as long as such intercourse was politically feasible, in preference to the expense and difficulty of a trans-Lesotho flow on primitive roads and tracks; (3) the country, even with growing support from external sources, has so far lacked the capital and recurrent resources to build and maintain such a road system.

As Lesotho's efforts toward rural development and increased agricultural production spread to include more parts of the nation, it is becoming clear that the absence of all-weather roads linking all of the main towns and districts is a significant impediment to the broad goals of national development. Little can be expected, for instance, from the government's twin agricultural policies of growing high-value cash crops and attaining self-sufficiency in food production if serviceable roads along which farm inputs can be delivered and harvested crops moved to market are not within reasonable striking distance of large numbers of farmers. Upgraded tracks, feeder or farm-to-market roads, and national roads connecting major centers all have key parts to play in this process (see sections on proposed response and beneficiaries).

Obvious as the preceding argument may appear to those familiar with rural development, its application in practice to Lesotho is only now commencing under the general impetus of political turmoil in Southern Africa and the specific influence of South Africa's grant of "independence" on October 26, 1976, to the African tribal homeland known as the Transkei, which adjoins most of Lesotho's southern and eastern border and lies between it and the Indian Ocean. To date the "independence" of the Transkei has not been recognized by any country other than the one that granted it.

South Africa, of course, would relish the legitimacy that even a single act of recognition of the Transkei would confer upon its policy of apartheid or "separate development"; all the more so if it should come from a black African country. Lesotho, with its difficult terrain and location within South Africa, is exceptionally vulnerable to pressure. It appears to be the target of actions that may once have been intended to force recognition but now evidently constitute punishment for its defiant stand against any dealings with what it views

as a product pure and simple of apartheid.

Some of these actions conducted by the authorities in the Transkei, e.g. the enforcement of border regulations to the letter, have disrupted traditional easy access. Previously, Basotho in areas isolated from the rest of Lesotho could cross the eastern border without formalities to sell a couple of bags of mohair (a leading product from highland Lesotho), mail a letter, or obtain a permit to work in the South African mines and then board a train to the mines. People and livestock drifted rather freely back and forth across the border. Now, passports must be presented, "visa fees" are demanded for each crossing and small scale mohair and livestock imports have been stopped. Other actions were taken by the South Africans themselves. For example, South African officials are no longer posted in the Transkei to issue mine labor permits; a would-be Mosotho mine worker cannot travel legally in S.A. without such a permit. And starting in December 1976, South Africa required that exporters shipping South African maize to Lesotho repay the South African government maize subsidy, an act that effectively raises the price of Lesotho's staple food.

Although the Government of Lesotho (GOL) had earlier made plain its contempt for apartheid while quietly accepting the economic necessity for economic cooperation with South Africa, the events of the last five months have galvanized it to undertake every possible measure to strengthen Lesotho's economy and reduce its dependence on its giant, domineering neighbor, especially insofar as that dependence is expressed through dealings with the Transkei. Late last year the GOL complained to the United Nations about South Africa's actions; the Security Council in a unanimous resolution of December 22, 1976, supported by the United States, called upon the international community to provide immediate economic assistance to Lesotho.

One obvious step that the GOL could take, and has in fact taken, is to accelerate greatly its national road construction plans. The basic all-weather network, in the original long range thinking, would not have been completed for at least another decade or sometime in the fourth national development plan period. Now the GOL wishes to finish it in the next three to four years, for several reasons:

1. To promote rural development and agricultural production in remote areas that previously had been too far from any passable road to permit effective development activities;

2. To knit together the Basotho nation within its boundaries so that transportation back and forth across

the country and up and down it can become normal rather than exceptional and can stand alongside, if not replace, the movement of people and goods between the edges of Lesotho and South Africa that had become habitual; and

3. To end the dependence of communities in eastern and southern Lesotho on direct contacts with the Transkei and if possible on goods brought in from or through the Transkei.

At the moment virtually all of the paved and improved roads in Lesotho, some 2,736 kilometers, make up an arc starting at Butha Buthe in the north and running inside the western border down through Leribe to Maseru and thence south to Mafeteng and Mohale's Hoek. There is no all-weather road from Mohale's Hoek across the south to the eastern border town of Qacha's Nek, nor is there such a road across the center of the country through Thaba Tseka or around the northern edge via Oxbow and Mokhotlong. A bad track leads southeast from Roma, a little east of Maseru, to Semonkong but there is nothing — not even a track — from there across the mountains to Sekake's on the Senqu (Orange) River. No all-weather roads of any description exist in the eastern part of Lesotho. The above summary of current road conditions may be viewed on the map at Annex A.

The GOL has now decided to construct or reconstruct within the next three to four years seven basic segments of the national network totaling 936 kilometers to varying standards, but none less than all-weather. Relevant information about these portions of road is shown in the table below:

Name	Length (Kms.)	GOL Estimate of Construction Cost	Old Standard	New Standard	Prospective Donor
Roma-Semonkong-Sekake's	154	R12.7	Unengineered track + non-existent	One-lane gravel	Germany
Thaba Tseka to Qacha's Nek via Taung	171	15.7	Food-aid track + one-lane gravel (last 33 km.)	One-lane gravel	Canada
Leribe-Oxbow	95	12.5	Rough, narrow gravel	Bitumen	
Mafeteng-Mohale's Hoek	49	4.0	Two-lane gravel	Bitumen	EEC
Mohale's Hoek-Quthing-Mpiti	260	11.8	Two-lane gravel, track, one-lane gravel	Two-lane gravel, one-lane gravel	U.S.A.
Taung-Mokhotlong	89	8.2	Food-aid track	One-lane gravel	
Mokhotlong-Oxbow	118	5.0	Single-lane track	One-lane gravel	
	936	R69.9			

R 1 = $1.15

(See also the summary of the proposed road network on the map at Annex B.)

The GOL's Roads Department, Ministry of Works, has the estimated capacity today to maintain and construct roads at the expenditure rate of approximately R2.5 million per year. The projected construction cost alone for the national network over the next three to four years (leaving aside construction equipment, added headquarters staff, and maintenance buildings, equipment and operations) is nearly R70 million. Clearly the Ministry is in no position now to implement all of this work by force account, though it would much prefer doing that to relying on outside, probably South African, contractors. Its original intention to undertake all of the implementation itself has been modified in the face of the urgent need for rapid construction progress. Some of the construction segments may well be contracted out *in toto*, or some donors may find it feasible to provide ancillary technical assistance and training support to the Ministry while contracting for a good deal of the actual construction of the projects they agree to finance. It is believed that the GOL would reluctantly accept such an arrangement in the interest of achieving rapid progress on the roads, provided a maximum effort were made in each case to use local resources to the greatest extent possible and to build the Ministry's own capability for more sustained, effective involvement over the long haul in road construction and maintenance.

IV. Proposed Response

IV. A. General

The proposed AID response, developed jointly by OSARAC and REDSO in close collaboration with the Government of Lesotho (GOL), is a combined capital and technical assistance grant project (1) to help strengthen the capacity of the Ministry of Works' Roads Department for effective involvement over the long run in Lesotho's road construction and maintenance and (2) to upgrade to all-weather, gravel standard some 260 kilometers of road linking Mohale's Hoek on the western edge of the country with Mpiti, near Qacha's Nek on the southern border.

A project incorporating these elements was chosen for the high impact it will have upon a number of pressing problems facing Lesotho today. Chief among these are the acute shortage of trained manpower in technical fields, lack of access to rural areas with potential for economic and especially agricultural development, and lack of an all-weather transport route between the more developed western fringe of the country and the southern districts bordering the Transkei.

By financing training in the U.S. and possibly third countries for Basotho engineering candidates, the project will help meet the country's acute needs for skilled engineering personnel (there is only one graduate Mosotho engineer in the Ministry of Works today). The eternal shortage of intermediate or "technician level" personnel will be eased by the project's proposed technical assistance and construction inputs to the Leritholi Polytechnic which will allow a substantial increase in the numbers of Basotho receiving diploma training in engineering subjects.

The construction of an all-weather road from Mohale's Hoek to Mpiti will open up a well-populated part of Lesotho to increased agricultural production and other rural development activities for which considerable promise exists once a reliable transportation link is assured. Activities of the existing United Nations Senqu area development project are seriously hampered by lack of an all-weather road, especially between Quthing and Sekake's. Wheat, maize, barley and some peas and beans badly needed for Lesotho's food self-sufficiency are already grown in the Senqu River valley as well as numerous smaller upland valleys, but today these crops are confined mainly to subsistence production. An all-weather road would remove a major impediment to additional production that might be sold, not to mention the introduction of new cash crops such as seed potatoes. Sale of livestock products, especially wool and mohair, could be stepped up using such a road (the European

Economic Community (EEC) is now planning a rural development project that would concentrate on livestock in the general area of Ongeluk's Nek, Lethena and Mphaki to be served by the road).

The construction itself, at least a part of which is expected to be implemented by the Roads Department, will offer opportunities for on-the-job training and supervision of inexperienced Basotho technical personnel by American engineers, thus also contributing to the creation of a pool of skilled, experienced manpower for future construction and maintenance.

In addition, the road is a key link uniting the western, more developed parts of the Basotho nation with the eastern and southern border area which for so long has depended on its relationship with the outside rather than the rest of Lesotho. It should also be recognized that this road will provide the most feasible geographic connection to the Transkei when normalization comes, as it eventually will, and that such a normalization will offer Lesotho its first direct access to the outside world without going through South Africa, including the tie-in to a nearby railroad and the use of an ocean port (Port St. Johns) once it is developed.

Not the least of the considerations that went into selection of this particular road segment is the fact — stressed repeatedly by the Minister of Works, the Permanent Secretary for Works, and the Permanent Secretary for Planning and Statistics — that the GOL places top priority within its roads program on the Mohale's Hoek-Mpiti road and considers the entire accelerated road construction plan of the greatest urgency for immediate implementation. Construction of the proposed road, along with planned heavy inputs of technical assistance and training, constitutes therefore a major opportunity for the United States to demonstrate its intention to implement the United Nations Security Council resolution of December 22, 1976, which the Council adopted by consensus with U.S. support. That resolution "appeal(ed) to all states to provide immediate financial, technical and material assistance to Lesotho so that it can carry out its economic development programs . . ."

The proposed project is generally related to the past, existing and already planned AID program which has always stressed the training of Basotho in technical fields so as to help meet the critical shortage of skilled manpower. Previous efforts have concentrated on agricultural subjects such

as soil conservation and agronomy and a range of health activities, particularly nursing, maternal-child health and family planning. The technical training and supervision to be financed under this project will complement AID training already provided by helping to develop the transport means for Lesotho to extend agricultural and health services to parts of the country that are now too remote to participate effectively in national development. The road to be constructed is obviously a major physical structure with immense economic development significance for southern Lesotho, but in addition the project as a whole, through its training and institutional development aspects, should offer strong, long range benefits for the entire country.

IV. B. Current Road Standards and Status

Classification of GOL Roads

The road network is divided into the following classifications:

Primary	Roads linking major towns, district capitals and border posts
Secondary	Roads which are within the district and connect with other districts
Tertiary	Sub-district roads - these roads branch off the district or track roads and serve as feeder roads.

Note: These roads may be gravelled as well as bituminized; the surfacing criteria and geometric standard will depend upon traffic requirements.

Roads Standards in Lesotho

Prior to 1960, road systems in Lesotho were poor with many roads having developed from bridle paths and wagon tracks of the early pioneering days. Since 1960, the road systems have been improved so that in 1973 Lesotho had a 2,736-kilometer road network although the standards were still poor.

In March 1974, a Lesotho Transportation Study prepared by Roughton and Partners (R&P) of UK, developed a set of road standards which was accepted by GOL and reviewed by REDSO Engineering and found to be acceptable with one exception. The standard road width under Gravel 1 appears to be wider than necessary (11.3 meters formation width and 7.6 meters carriage width). Discussions will be held with the GOL during the next documentation stage to determine if the road width shown in the following table for Gravel 1 is acceptable to GOL. Given the shortage of funds, the possibility of staged construction etc, AID feels the GOL will be receptive to this proposal.

Type of Road	Terrain	Formation Width Meters	Carriage Way Meters	Maximum Gradient	Design Speed Kms / Hrs
	Rolling	9.7	6.7	6 %	100
Gravel 1	Hilly	9.7	6.7	8 %	80
	Mountainous	8.0	6.0	10 %	50
	Rolling	8.0	5.5	8 %	80
Gravel 2	Hilly	8.0	5.5	11 %	60
	Mountainous	6.0	3.5	12 %	30
	Rolling	6.0	3.5	8 %	60
Gravel 3	Hilly	6.0	3.5	12 %	50
	Mountainous	5.0	3.5	14 %	30

Notes:

i) cross slope to be 3 percent on all gravel roads

ii) these standards generally are to be used to upgrade the proposed roads

iii) the precise geometric standards are expected to be developed by a consulting firm to be engaged by USAID to design the alignment and criteria

iv) Sections of the road with gradients in excess of 10 percen (totalling approximately 25-km) will be bituminized

v) Since there are no standard GOL plans for bridges, culverts, etc., a consulting engineer will have to provide these details.

Present Conditions

The total length of the road under consideration is approximately 260-km and is classified by GOL as a primary road. To describe this project in more detail, the overall length is divided into four

segments, each with differing conditions and expected to have different implementation criteria.

a. Segment One

This segment begins at Mohale's Hoek and ends at Quthing, a distance of about 58-km. The road is a two-lane gravel type and is categorized by GOL as "gravel 2 standard". At present the condition of the road, after recent maintenance operations, is fair except at four sections where the gradient ranges from 12 to 18 percent and where the drainage facilities are inadequate. This alignment crosses over the "Orange River" via a single lane truss bridge which is in good condition. The formation width of this road is generally 8-meters wide (5.5 meters travel way and 1.25 meters of shoulders) all of which is gravel surfaced.

A 1973 traffic count for this segment of road revealed 75 vehicles per 24 hours of which 67 percent were light vehicles. Based on the projected annual increase of 7 percent 1/ the 1977 average daily traffic (ADT) is expected to be about 100 vehicles.

b. Segment Two

This segment commences at Quthing district headquarters and ends near Mount Moorosi, a distance of about 40-km easterly from Quthing. It is a one-lane gravel road and is classified as "gravel 3 standard" by the GOL. At present the condition of this segment is being improved by maintenance operations and the travel way is now in fair condition. However, the alignment in general requires improvement both vertically and horizontally.

The overall drainage requires substantial improvements; additionally there are about 9 ford-type drain crossings with imbedded culverts which are inadequate. One existing 20-meter steel beam reinforced concrete deck bridge near Quthing is in good condition but requires improvement or widening with foot paths.

1/ Source: R & P Report of March 1974

c. Segment Three

Segment three covers a distance of about 118-km from Mount Moorosi to Sekake. This segment was constructed under Food-Aid Programs and may be categorized as an access track or a "gravel 3 road". It has a dry-weather single lane with no specific geometric standards.

About 50-km of this road from Mount Moorosi, north easterly has been improved under a maintenance program and upgraded to single lane gravel surface status. Some drainage facilities, 13 locations within the limits of this section, have been improved also. These crossings consist mainly of stone or concrete fords with or without culverts. The general condition of the drainage and the road alignment are still poor. The remaining 68-km of this segment consist of unsurfaced earth track totally impassable after light rain showers. Emergency improvements to this section are underway, financed by EEC. The objective of the emergency improvement is to make the track passable throughout the year with no specific geometric/structural standards. An attempt by AID/GOL staff to travel into this remaining 68-km area was made on March 9, 1977. However, the attempt was abandoned since the surface of the track was very slippery and dangerous and about 50 minutes were required to travel only 15-km. Traffic observed in 10 hours of travel time within this segment in both directions was about 30 vehicles excluding construction traffic, of which 20 were buses and trucks with the remainder being pickups and light vehicles. This traffic was located only in the improved first 50-km.

d. Segment Four

A distance of about 40-km from Sekake to Mpiti consists of segment four. It is a single lane improved access track categorized as improved access track by GOL or "gravel 3 road". The road follows closely along the Orange River Valley and gorge for the greater part of its length. Culverts have not been used for the

entire length, some culverts are used near Mpiti. There are a number of large streams and two small rivers which are crossed at river bed level via fords of concrete or masonary.

There are some sharp corners which make the road difficult for large vehiclesto negotiate. The gradient is up to 18 percent. A 24-hour traffic count in 1973 showed 13 vehicles made up of 6 light vehicles and 7 buses and trucks (source: Transportation Study by R & P, February 1974).

IV.C. Proposed Improvements

a. Segment One

This segment will require to be upgraded to "gravel 2 standards" 1/. The gradient of the four poor sections will need redesigning in some places, the horizontal alignments may require modifications, side drains need to be constructed in several places, culvert type cross drains need to be installed and seven minor bridge crossings with spans of up to 12-meters improved (adding concrete decks, replacing the ford-type crossings with bridges, repairing of the abuttments, etc). In addition one ford type crossing of 45-meters span will require replacement by a bridge. It is assumed that the existing bridges of one-lane widths (4 to 4.5 meters) will be adequate at this stage of improvements.

b. Segment Two

This segment will require upgrading to "gravel 2 standards" The horizontal alignment and the gradient require improvements. The overall drainage conditions require close study. Nine ford type drain crossings and one 20-meter span concrete bridge will also need substantial improvements. These improvements will require the study of the waterflow, quantity of boulders travelling down the river and the traffic volume. The existing ford type low level crossings seem to be appropriate for use in many of these locations where inexpensive cross drains are needed. However, it was observed that a number of culverts, imbedded in concrete under these crossings, were blocked by boulders travelling in the streams.

c. Segment Three

The first 50-km of this segment will require fewer improvements as some upgrading is being carried out under the emergency maintenance program. This segment will require upgrading to "gravel 3

1/ The determination of the appropriate road standard was made by the R & P Study and accepted by GOL. Anticipated traffic volume was an important criterion in determining the identified standards.

standards" with substantial improvements to drainage facilities, horizontal alignments and gradients.

The second section (68-km) of this road will require heavy cut and fill operations, improved drainage facilities, bridges, etc. This section is virtually unimproved and will be the most costly section to construct requiring heavy rock excavation as well as blasting operations.

At present none of the above two sections have been studied; justifiably so - as efforts are concentrated in making the road passable.

d) Segment Four

This segment will require upgrading to "gravel 3 standards". Horizontal alignment, gradient and drainage structures must be designed. A number of stream crossings will require some kind of drainage structures and the two known small rivers may require bridges. The alignment to be designed for this segment will provide access to Qacha's Nek.

Terrain and Soil Conditions

The terrain of Lesotho consists of mostly rough mountains. The geology consists of a sequence of lava flows overlying sedimentary sand stones and snale. Sandy stone is found mainly on the plateau at a height of 5,000-feet. Sand stones are fine-grained and may be crushed if necessary as blending material to reduce the plasticity index. Volcanic lava of basalt covers about 60 percent of the country. Additionally, large numbers of dolerite intrusions can be seen throughout the country which can also be used for road bed material. Dolerite can easily be ripped and stock piled; the resulting material has sufficient amount of fines and plasticity that it can be used as road beds and surfacing material. In cases where bituminization becomes necessary, control of gradation and fines will be required. It is concluded, therefore, that the necessary material to construct this road is available in abundancy - hauls will be no more than 6 to 8-km and crushing operations will not be required except in some special cases and where aggregate is needed for concrete work.

Construction Strategies

To devise a method for construction of roads, the following alternatives were discussed with GOL:

1. Contracting

   Preparation of plans, specifications and contract documents by an engineering consultant, solicitation of bids from the US and local contractors and award of construction contract for the total length of 260-km of road.

2. Force Account

   Preparation of plans and construction details by the engineering consultants; procurement of all necessary equipment, provision of technical assistance and construction by "force account" methods by the Roads Department of the MOW.

3. Combination of Force Account and Contract

A combination of alternatives one and two above to be taken as one package, probably segments one and two of the road to be constructed by MOW with segments three and four by a contractor.

Unfortunately, Lesotho does not have any local contractors with the required capabilities to build roads of these lengths. Available contractors in Lesotho are either European or South African based. It is felt that the approach of contracting the total project will not provide the much needed training and experience for GOL personnel for future road construction.

The second option (force account) would appear to provide the best solution. MOW will gain the additional and much needed experience in road building and the road can be completed within the 3-year construction time projected by GOL.

Under this option, technical assistance of this program will provide nine engineers (eight in the field and one project manager located in Maseru). Thus it is felt that GOL will have the adequate construction supervision capability. Additionally, it is anticipated that AID would finance services of mid-level technicians. These capabilities can be imported from a third country where mid-range technicians are in abundance (e.g. India). This approach will only be necessary if the polytechnic college at Maseru is unable to train sufficient numbers of technicians (see the appropriate section of this paper discussing Manpower and Training).

The above options are open to further investigation and research. GOL is cognizant of the problems and is prepared to accept any of the three. However, expanding MOW capabilities and reaching a level of self-sufficiency are clearly what GOL hopes to achieve. For the purpose of developing cost estimates for the construction project, the approach in the second option was used.

IV. D. Proposed Inputs

IV.D.1 Equipment and Facilities

a) Proposed List

The MOW has developed a report on "Road Development Project in the Mountain Areas of Lesotho". This report projects the construction over 3 years of 936-km of road with a total of 10 construction units by means of force account 1/. Additionally, this report contains personnel needs, cost estimates and equipment lists. The basic equipment list attached herewith was extracted from this report. However, numerous alternations were made by REDSO Engineering to develop a more effective and self sufficient construction spread (unit). 2/

b) Utilization

The MOW presently has sufficient equipment and capability to continue a maintenance/construction type of operation equivalent to US$ 2 to 3 million each year. Equipment assigned to the Mechanical Branch is referred to as "plant pool" (plant meaning equipment). Any government department may lease equipment from the pool whenever needed on payment of a set daily rate for each unit. These rates include POL, maintenance, repairs, operators and the amortization cost of the equipment. The MOW is suggesting that this practice be continued with AID-provided equipment. However, AID does not favour this approach and is proposing to assign this equipment directly to the AID-financed road project for the total construction period. Upon completion of the road project the equipment could then be reassigned to the MOW plant pool to be used for maintaining roads. Further discussion will be required before any final decision is made. However, AID is confident that GOL will accept a constructive solution.

1/ The MOW has had a close look at the magnitude of the 10-unit force account construction approach and is now planning to contract several segments of these roads financed by other donors.

2/ It is assumed that all equipment and spare parts in this project will be procured from South Africa.

c) Support

Spare parts support for equipment normally in use in Lesotho is considered adequate. Repair shop support requires considerable amount of improvement efforts. At present the MOW has nine vehicle repair shops scattered throughout the country. However, these shops do not have the capability of supporting heavy construction equipment. All construction equipment is maintained by one MOW workshop and private suppliers' representatives travelling in mobile shops directly from Maseru. The MOW main workshop in Maseru is inadequate; however, a new and up to date shop is presently under construction (50 percent complete) and should be finished in the near future. EEC, at the request of the MOW, is expected to finance two decentralized workshops, one each at Makoae's and Qacha's Nek to be located on the alignment of the proposed road. The MOW has also requested AID assistance to construct and equip a third workshop[1/] at Mohale's Hoek, the beginning point of the project road. With provisions of these workshops it is believed that the AID-financed road section will be adequately covered.

Construction Material

All the necessary materials for construction of the roads are readily available in Lesotho. An abundance of rock throughout the country encourages the utilization of rock for several purposes. Bridge abuttments, box culverts and even some culverts are built with rock (sand stone or dolerite). Drainage culverts, from corrugated metal sheet, are fabricated on site as labor supplied by women is available (men laborers are generally employed in the surrounding mines).

Present Organization and Capacity

The Roads Branch, headed by a Chief Roads Engineer and assisted by a Senior Roads Engineer will be responsible for construction of the proposed roads. The Roads Branch is directly under the Minister for Works through his Permanent Secretary (PSW) and the Controller for Works Services (CWS). The main function of this branch is to plan,

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1/ Estimated cost: $500,000

design, construct and maintain the roads and communications system throughout Lesotho. The branch also undertakes additional civil engineering duties such as the construction and maintenance of airfields and storm drains. The Roads Branch has six divisions with responsibility for different areas of functions: i) Engineering for North and Central, ii) Engineering for South, iii) Engineering for Township, iv) Engineering for Design, v) Engineering for Material Testing, and vi) the Crown Agents' Team providing supervisory staff for construction works on projects financed by U.K.

Of the present 58 sanctioned positions, 46 are filled - an organization and manpower analysis will be prepared during the next stage of documentation and will address the adequacy of the structure and need for increased personnel. The Project Manager (an engineer), proposed to head the two AID-financed construction units, will be stationed in Maseru and will report directly to the Senior Roads Engineer.

The Mechanical Branch, also directly under the MOW and parallel with the Roads Branch, is responsible for repairs and maintenance of all MOW equipment. This branch is also entrusted with responsibility of maintaining a "plant pool" (equipment pool). Any GOL ministry requiring equipment for construction work (including the Roads Branch) rents whatever they need from this section.

Road Maintenance Capability

The MOW has a small amount of equipment, adequate personnel and a budget of $ 2 to 3 million a year to maintain roads. It appears that GOL is able to do a fair job of maintaining the major roads. Obviously, however, a major road construction program would make additional large demands on the road maintenance capability. While it is proposed that some or all of the equipment provided under this project be turned over to the MOW plant pool to be utilized in road maintenance, this may well prove to be inadequate to meet the greater requirements. Other problems may also exist. To assure that road maintenance does not become a future problem the next stage of project documentation will examine road maintenance in detail and develop a course of action which addresses any identified problems.

Consulting Services for Construction Requirements

It is proposed to secure the services of an engineering consulting firm to provide the following (estimated cost - $800,000):

i) Design plans for construction of 260 km. of road including bridges and drainage facilities.

ii) Design plans, specifications and contract documents for construction of one workshop at Mohale's Hoek along with necessary standard housing plans to provide shelter for the personnel assigned to the workshops.

iii) Necessary specifications for procurement of equipment.

iv) Procurement services to purchase the construction equipment.

Requirements for AID Support Staff

Due to the complex nature of this project, the fact that it has both large technical and capital assistance components and given the low level of GOL capacility in engineering/construction areas, it is anticipated that a full time AID direct hire engineer will be required to serve as project officer and monitor implementation during the life of the project.

Shop Equipment and Construction

The workshop proposed to be constructed at Mohale's Hoek is planned to support (repair and maintain) equipment operating on the segment of the road from Mohale's Hoek to Quthing area. This workshop will eventually support road maintenance operations for the general area. Therefore, AID proposes to provide a sum of $260,000 to finance the necessary shop equipment for this workshop and $300,000 to construct the workshop itself.

IV. D.2 Technical Assistance

To help the Ministry of Works carry out the construction of the 260 km. Mohale's Hoek-Mpiti road and to supervise and give on-the-job training to inexperienced Basotho technical staff, OSARAC and REDSO propose an OPEX staff of nine technicians, eight of them divided between the two field construction units that will work on the road and the ninth a headquarters project coordinator located in the Ministry of Works in Maseru, who will be responsible for assuring support to the field units as well as providing overall direction to the AID project. In addition, two OPEX instructors are requested for the Leritholi Polytechnic in Maseru to permit enlargement of the existing technical training courses for the MOW (more about these courses is found in the section on training inputs).

In summary, the proposed T.A. inputs are as follows:

MOW Headquarters

1 project coordinator (civil engineer)

Field Units (2)

* 2 project engineers
* 2 assistant project engineers
* 2 engineer mechanics
* 2 engineer operators

(* one assigned to each unit)

Leritholi Polytechnic

1 mechanical engineering instructor
1 electrical engineering instructor

It is estimated that the services of the first nine Americans listed will be required for 3½ years each and the last two for four years each. The resulting 39½ man-years of fully-funded OPEX services are costed at an average of $60,000 per man-year. Another $330,000 has been added for short-term consultancies as required and for contingencies, yielding a contract staff cost of $2,700,000.

Lesotho suffers acutely from the common problem of a vast gap between top-flight technical personnel and laborers. There are simply not enough skilled or semi-skilled personnel available to fill this intermediate "technician level", though efforts are being made to train such people and this project proposes to support and enlarge those efforts (see Inputs - Training). It may be, however, that to assure the timeous

success of the proposed road construction a certain number of AID-provided intermediate technical people will have to be included in the project. Depending on the detailed analysis by the final design team, it is estimated that approximately ten such officers might be provided to the two construction units, perhaps divided unequally between them given differences in terrain and construction difficulties. Third Country Nationals (TCNs) or Peace Corps Volunteers could possibly be found for such assignments or some combination of these with volunteers from other sources might be feasible. It is recommended that this matter be examined in depth by the final design team. In the meantime, as a form of contingency, we are including $1,000,000 more in the contract staff category (10 officers x 3.5 years x $25,000 plus contingency) in the event that such middle-level support is deemed essential to project success.

The proposed contract staff total therefore is $3,700,000

We also recommend that the final design team consider whether additional technical assistance and equipment should be added to the project to improve the MOW's maintenance capabilities. If so, more funding would be required.

Because of the size and complexity of the construction element of this project, it is clear that an AID direct-hire engineer should be assigned to Lesotho as full-time project officer. The project officer should remain for four years, and the estimated cost to the project for his services is $350,000.

IV. D.3 Training

The greatest and most important long range effect of this project will come from the trained Basotho it finances and guides with on-the-job training and supervision. It is exceptionally important that this part of the project be designed carefully and realistically so as to produce the most effective possible results for the government of people of Lesotho.

Aside from the less formal training aspects of the project (on-the-job training and supervision) which will have to be planned in detail between the Ministry of Works and the U.S. project staff, this assessment paper proposes support for two types of formal training: overseas (probably in the U.S. though possibly in third countries) for engineers and locally for diploma-holding technicians.

The Ministry of Works has requested U.S. training (B.Sc. degrees) for 22 Basotho, starting with the academic year 1978-79, as follows:

civil engineering	10
electrical engineering	5
mechanical engineering	2
architecture	4
hydrology	1
	22

At the moment the Ministry is selecting candidates from the latest "O" level examinations to be sent to a similar program in India starting in mid-1977. They are confident that a qualified group of 22 candidates can be chosen after the 1977 "O" level examination results are released and in time to start U.S. training in mid-1978; but they need reasonable assurance by October 1977 that such a program can be arranged and financed so that the process of advertisement and selection can begin then. The GOL believes and OSARAC and REDSO concur that few if any of the candidates, though qualified by local standards, would be acceptable for direct admission to an American engineering course. It is proposed, therefore, that an arrangement be made with a U.S. university or universities (preferably more than one to avoid having too many future MOW engineers all from the same school) to place the students in a preliminary preparatory year stressing mathematics, sciences, English, draftsmanship and U.S. academic methods before they enter the highly competitive world of a four-year engineering course.

Allowing for inflation and the high costs of U.S. engineering

schools by using a per student-year cost of $15,000, the estimated cost of such a program (22 x 5 x $15,000) is $1,650,000.

For several years the Ministry of Works has operated a technical training school for civil engineering technicians (three-year diploma course) on the campus of the Leritholi Polytechnic (L.P.) at Maseru. Admission requirements are clear passes at the "O" level in English, physics, chemistry and mathematics. The first class of 15 graduated in 1975 and another 14 were successful in 1976. As of this month a third group of 15 prospective graduates is taking the final examination. While this input of diploma-holders to the MOW has been useful, it is far short of the personnel required for implementing the accelerated roads program. The MOW wishes urgently to build up the course to an annual output of 15-20 civil engineering and 10 electrical and mechanical engineering graduates but lacks the facilities and staff to do so. The U.K. has supported the existing program with staff, buildings and equipment but is unable to consider increasing its financing at this time. OSARAC and REDSO propose to include in this project two engineering instructors (see the section on technical assistance inputs) as well as the estimated $300,000 needed for additional construction and equipment that will make possible this expansion of the technical courses. It is also recommended that a few of the engineering candidates sent to the U.S. be trained with a view toward assigning them as instructors at the Leritholi Polytechnic technical courses to replace the expatriate instructors. These recommendations by no means exhaust the training needs of the Ministry of Works or possible useful activities that might be undertaken under this project. For example, another intermediate requirement might best be described as the "supervisory craft-level", above artisans or craftsmen but below the "technician level". With an extra classroom and a teacher, the L.P. could mount a one-year certificate course to prepare such personnel. In addition, there may well be a need to train bulldozer operators, truck drivers, grader operators, etc. for the construction units of this and other projects. These possibilities and others of their type, if they emerge, should be studied by the final design team, but no cost allowance has been made for them in this paper.

IV.E. Labor Intensive and FAR Approach

1. This program, by the nature of its mountainous and rocky terrain, the urgency of the roads needed and the shortage of labor, is designed to utilize equipment intensive construction methods. Allowance is made to maximize the use of labor where 't is feasible, e.g. all culvert fabrication and installation, bridge construction, etc. will utilize labor intensive methods.

The rational for this method is as follows:

a) The alignment of this road goes through rough, mountainous and rocky terrain where heavy dozers for ripping and blasting will be required

b) For political reasons, GOL proposes to construct these roads within a 3-year construction period

c) Large numbers of laborers in Lesotho travel to the Republic of South Africa to work in the mines. To counter this problem, GOL recently increased salaries and intends to increase them further in the near future. This action is expected to encourage the Basotho to return to their home land. However, the return is expected to be gradual and will not result in fulfilling the number of laborers required to make this a labor intensive project.

2. The FAR approach was considered for this project. However, due to the nature of this construction method (force account), the FAR method is not favoured.

Lesotho is one of the least developed countries in the world and is not in a position to assume the initial financial burden that use of the FAR method would impose. Consideration has been given to using a substantially modified version of FAR with provision of large advance, but in view of the government's extremely limited financial and technical resources, application of the FAR concept, whereby a government is expected to perform work for subsequent reimbursement by AID, would not appear to be valid in this project.

IV. F. Beneficiaries

The three districts (Mohale's Hoek, Quthing and Qacha's Nek) through which the proposed route lies comprise about 34% of the land area of Lesotho and have a population of 300,000, or about one-quarter of the country's total, according to the 1976 census. At least 90% of these people are engaged in small scale farming and grazing. The immediate beneficiaries of the upgraded all-weather road from Mohale's Hoek to Mpiti will be the rural poor (almost everyone) of that area, many of whom are now isolated by rugged terrain and impassable tracks from reasonable contact with the rest of Lesotho and even with the towns of the immediate area. This means that access to markets, consumer products, agricultural development inputs, education and health services is severely limited. No significant improvement in the lives of most of these people can be expected without a reliable transport link to the rest of the country.

The first segment of the road, starting from the Mohale's Hoek end, is for the most part already up to two-lane gravel standard, despite certain deficiencies of alignment and drainage, and therefore generally meets the needs of the population between Mohale's Hoek and Quthing for an all-weather connection to the national roads network. Though many development problems remain (especially soil erosion and low fertility, insufficient agricultural inputs to raise productivity, shortage of male farm labor and lack of motivation on the part of farmers), the fundamental access link through the area is already in place. Moving east from Quthing, more or less following the Senqu (Orange) River valley, one remains at first on what is technically a two-lane gravel surface but one which repeatedly narrows, especially around sharp curves and on steep slopes, and possesses utterly inadequate bridges and culverts at many points. These deficiencies frequently render this part of the road impassable during the six-month rainy season; nonetheless, farmers do have some access to inputs, markets and transport during large portions of the year. In this area maize and wheat are grown in the river valley; wool and mohair are important livestock products. Productivity again is low; the opportunities for entry of new agricultural inputs and technical advice from extension workers as well as access to potential markets will be improved by a reliable, all-weather road. East of Mt. Moorosi one plunges into the highlands where most of the road is little more than an unengineered track, cannot be relied upon at all and is often made impassable by melting snow in the winter and rain in the summer. In this region, of which Mphaki is the center, the open treeless slopes are overgrazed, "roads" consist mainly of bridle paths and horses are the most reliable form of transport, there are no postal or telephone services, and the police radio is the only means of communication. Such gentle slopes as there are get used chiefly for wheat, maize and barley, with some peas and beans (an esti-

mated 85% of cropland is sown to wheat and maize in the summer). Farmers plow, plant, harvest, thresh and store; crop husbandry is at the very minimum and so is output. This is largely because the soil has lost much of its natural fertility, the climate is unreliable leading to high risk for crops, male farm labor is in short supply, farm machinery is neither available nor easy to operate on the terrain, and the necessary input and marketing infrastructure is absent. Farmers have learned to accept low yields as inevitable and consequently tend to apply minimum inputs. Lacking an all-weather road, it will not be possible to mount a serious effort at agricultural development or even to introduce the fundamental agricultural inputs planned by the IBRD's Basic Agricultural Services Project (BASP), an agriculture extension program planned for widespread application throughout Lesotho.

Livestock holding is widespread in the highlands. About four-fifths of the households are believed to have some form of livestock, whether oxen, donkeys, goats, sheep, horses or fowl; the mean household is estimated to own 25 animals, of which 15 are sheep. Cattle and equines are kept mainly for power, milk and transport, while sheep and goats produce wool, mohair and meat for domestic use as well as sale.

Between Sekake's and Mpiti, or more generally on to Qacha's Nek, the road broadly speaking returns to a rough one-lane gravel standard, but this apparently more favored area is still cut off from the rest of Lesotho by the impassable track through Mphaki.

The planned road should have a particular impact on the daily lives of rural women, for two reasons: (1) as is true all over Lesotho, large numbers of men are absent most of the time for employment in South Africa, leaving the women to run households and scratch out a subsistence living from agriculture. In the general area to be served by the road, each household as a statistical mean is estimated to have .8 of a male away from home. Benefits from the road, therefore, should be felt especially by the women, who constitute a disproportionate share of the economically active population; (2) a considerable number of the road laborers and certain of the construction workers performing semi-skilled functions are women, so construction of this road may be expected to increase paid employment available to women.

Similar benefits will be provided indirectly elsewhere in Lesotho by this project through the strengthening of the capacity of the Road Department to construct and maintain roads all over the country.

V. ESTIMATED FINANCIAL REQUIREMENTS AND PLANS

V.A. SUMMARY COST ESTIMATE AND FINANCIAL PLAN (ALL GRANT)

(U. S. $000)

	AID		Host Country		Total
	FX	LC	FX	LC	Total
Technical Assistance (39.5 man-years plus consultancies and contingencies)	2,700	-	-	300	3,000
Middle-level technicians (TCNs, volunteers, etc).	1,000	-	-	100	1,100
Direct-hire AID project officer	350	-	-	-	350
MOW Headquarters local staff support	-	-	-	350	350
Training Overseas (110 student-years)	1,650	-	-	300	1,950
Commodities	4,966	-	-	-	4,966
Other Costs					
A & E contract	800		-	-	800
Construction (road, workshop) and operating Costs	4,715	3,809	-	-	8,524
Construction (Polytechnic)	75	75	-	-	150
Totals	16,256	3,884	-	1,050	21,190

Note: Host Country contributions are shown in notional form only at this stage and will be subject to thorough review and negotiation during final project design.

V. B. INCREMENTALLY - FUNDED PROJECTS

PROJECT SUMMARY -- AID APPROPRIATED FUNDS (U.S. $000)

Country: LESOTHO Project Number: 690-0076 Project Title: Lesotho Roads

	BUDGET YEAR (FY 1978)		
	Direct AID	Contract/Other Agency	Total
Cost Components			
U.S. Technicians	80	1,320	1,400
TCNs and/or Volunteers	-	500	500
Participants	330	-	330
Commodities	4,616	-	4,616
Other Costs	1,750	-	1,750
Total	6,776	1,820	8,596

V. C. EQUIPMENT LIST AND COST ESTIMATE

Unit 1 - Mohale's Hoek to Mount Moorosi

	Description	Qty	Unit Cost US $	Total US $
1.	Dozer, D-7	2	115,000	230,000
2.	Grader, 130-HP	3	75,000	225,000
3.	FEL, 2 cubic yard	1	55,000	55,000
4.	Dump Trucks, 5-7 yard	5	28,000	140,000
5.	Water Trucks, 1500-2000-gallon	1	35,000	35,000
6.	Roller, 10-12-ton	2	35,000	70,000
7.	Compressor, 150-cfm with drilling tool	1	10,000	10,000
8.	Concrete Mixer, 5-7 yard	2	5,000	10,000
9.	Flat Bed Trucks	2	22,000	44,000
10.	Mobile Workshop including welding	1	100,000	100,000
11.	Water Pump, 4-inch	2	2,000	4,000
12.	Fuel Storage Tank, 1500-2000gallon	2	5,000	10,000
13.	Water Storage Tank 1500-2000-gallon	1	5,000	5,000
14.	Water Storage Tank on wheels, 500-gall	2	2,000	4,000
15.	Water Tankers, 1500-2000-gallon	1	35,000	35,000
16.	Fuel Tankers, 1500-2000-gallon	2	35.000	70,000
17.	House Trailer (caravan)	2	20,000	40,000
18.	Pickup Truck, 3/4-ton	2	8,000	16,000
19.	Service Lubrication Truck	1	30,000	30,000
20.	Lowboy Truck Trailer, 50-ton	1	100,000	100,000
21.	Miscellaneous Tools	lot	50,000	50,000
22.	Radio, mobile units	5	2,000	10,000
23.	Office Equipment	lot	5,000	5,000
24.	Electric Generator, 15-kw	1	5,000	5,000
25.	Vibrator Roller, small	2	2,500	5,000
26.	4-wheel drive vehicle	4	12,000	48,000
				1,356,000

V.C. EQUIPMENT LIST AND COST ESTIMATE

Unit 2 - Mount Moorosi to Mpiti

	Decription	Qty	Unit Cost US $	Total US $
1.	Dozer, D-7	4	115,000	460,000
2.	Grader. 130-HP	3	75.000	225,000
3.	FEL, 2 cubic feet	3	55,000	165,000
4.	Dump Trucks, 5-7 yards	15	28,000	420,000
5.	Water Trucks, 1500-2000-gallon	2	35,000	70.00
6.	Roller, steel drum/10-20-ton	3	35,000	105,000
7.	Compressor, 150-cfm with drilling tool	2	10,000	20,000
8.	Concrete Mixer. 5-7 yard	2	5,000	10,000
9.	Rock Crusher, 40-ton/hr	1	100,000	100,000
10.	Flat Bed Trucks, 7-ton	2	22,000	44,000
11.	Mobile Workshop, including welder	1	100,000	100 000
12.	Water Pump, 4-inch	2	2.000	4,000
13.	Fuel Storage Tank, 1500-2000-gallon	2	5,000	10,000
14.	Water Storage Tank, 1500-2000-gallon	1	5,000	5,000
15.	Water Storage Tank, towed/500-gallon	2	2,000	4,000
16.	Water Tankers, 1500-2000-gallon	1	35.000	35 000
17.	Fuel Tankers, 1500-2000-gallon	2	35,000	70,000
18.	House Trailer (caravan)	2	20,000	40,000
19.	Pickup Truck, 3-4-ton	2	8,000	16,000
20.	Service Lubrication Truck	1	30,000	30,000
21.	Lowboy Truck Trailer, 50-ton	1	100,000	100,000
22.	Miscellaneous Tools	lot	50,000	50,000
23.	Radio, mobile units	5	2.000	10,000
24.	Office Equipment	lot	5,000	5,000
25.	Electric Generator, 15-kw	1	5,000	5 000
26.	Vibrator Roller. small	2	2,500	5,000
27.	4-wheel drive vehicle	4	12,000	48,000
				2,156,000

V.C. Cost Estimate: Units 1 and 2

	US $
Sub-Total: Equipment for Units 1 and 2 (CIF Maseru)	3,512,000
- Price escalation on equipment at 1.2 percent per month from March 1977 to July 1978 (19.5 percent initial equipment cost - anticipated time for ordering equipment)	684,840
Sub-Total: Equipment and Price Escalation (CIF Maseru)	(4,196,840)
- Spares, 40 percent manufacturer FOB (75 percent CIF), price for new equipment for 3-year period	1,053,600
- Transportation of Spares at 15 percent (from RSA)	158,040
Sub-Total: Spares and Transportation	1,211,640
- Price escalation on spares at 15 percent, total CIF value over 3-year period (1979-1982)	181,746
Sub-Total: Spares and Escalation over 3-year period	(1,393,386)
Sub-Total: Equipment, Spares and Escalation	5,590,226
- POL, 3-year operation including 30 percent escalation (see Annex C)	2,145,000
- Salary for GOL Personnel (80 persons for 2 units - see Annex D for details)	1,521,300
- Labor Force of 200 for 2 units, locally hired at $2 per day at 312 work days per year or $124,800 per year for 3-year period	374,400
- Bridge Construction (5-meter widths, one 45-meter span, about 10 averaging 10-meter spans) at $1000 per square meter	725,000

	US $
- Construction Materials for about 30 fords at $10,000 each (including culverts)	300,000
- Bituminization of about 10 percent of roads (steep grades)	200,000
- Culverts at the rate of 4 per kilometer x total of 260-km = 1040 culverts, at average of 8 meters each in length = total length 8,320 meters at $50 per meter	416,000
- Hand Tools for 3 years	100,000
- Mobilization and Camp Construction (2 x $100,000 per camp)	200,000
- Rock Blasting	100,000
	11,671,926
- 10 Percent Contingency	1,168,074
TOTAL COST : US $	12,840,000

Total Capital and Recurrent Costs	12,840,000
Less Capital Investment Residual Value (50% of Total Estimated Equipment Costs) 50% X 4.616 =	2,308,200
Less Residual Value of Spares (20% of Total Cost of Spares) 20% X 1.393 =	278,600
Balance	$10,253,200

Construction Cost per Km:

$$\frac{10,253,200}{260} = 39,400 \text{ per Km.}$$

Current construction cost, contracted to an Italian subsidary firm, in Lesotho is about $50,000 per Km. This is for construction of the "Mountain Road" from near Roma to Thaba Tseka.

VI. Project Development

VI.A. Design Requirements and Schedule

As stated in the Introduction and Summary, OSARAC and REDSO strongly recommend that this Lesotho roads assessment paper be considered as a good deal more than a normal PID and that, in view of the economic and political urgency of starting the project, a final design team be mounted at the earliest possible date so that the Project Paper can be approved by the start of FY 1978, when Security Supporting Assistance funds are expected to be available.

It is our current estimate that the PP team will require the following personnel:

Title	Source
Project designer/writer/ editor/team leader	AID/Washington or REDSO
Engineer	REDSO
Engineer	AID/Washington or outside consultant
Economist	REDSO or OSARAC
Sociologist	REDSO

Availability of the above as shown from REDSO will depend on scheduling of the PP and the other demands on REDSO staff at that time. REDSO has indicated interest in providing as much help as possible but is not able to make commitments until a firm schedule is established. It is anticipated that a representative from OSARAC headquarters would work with the team at least part time. Certain team members (e.g., sociologist, economist) probably would not be needed for the full period.

The suggested schedule is as follows:

April 1 - May 31	AID/W reviews assessment and gives green light for final design
June	Final selection of team, mobilization and briefing
July 1 - August 15	Field work
August 15-31	Project Paper put in final

September 1	PP handcarried to AID/Washington by OSARAC and REDSO reps for presentation to ECPR
September 15	ECPR meeting
September 30	Project authorized
October 1	FY 1978 funds available.

VI. B. Implementation Schedule

For purpose of providing a preliminary time horizon for this project, the following schedule shows the estimated dates for major units of implementation:

1.	Authorization	September 30, 1977.
2.	Agreement Signed	November 1, 1977
3.	CPs Satisfied	January 1, 1978
4.	Issue PIO/T for Technical Assistance Recruitment	January 1978
5.	Execution of A & E Contract	March 1978
6.	Completion of Road Design	July 1978
7.	Equipment Award	July 1978
8.	TA arrival	July 1978
9.	Equipment Delivery	September 1978 *
10.	Commencement of Construction	November 1978
11.	Completion of construction	November 1981
12.	Termination of TA	January 1982

* Much later if procured from U.S.

VII. Issues

In the course of preparing this assessment, several issues have arisen that should be examined in depth at the time of final project design. A brief summary follows:

1. The extent to which the Ministry of Works will be able, even with the technical assistance proposed in this paper, to implement the planned upgrading of the Mohale's Hoek-Mpiti road by force account rather than turning to a contractor. The GOL fully recognizes that it is unrealistic to expect the Ministry to construct the entire accelerated roads network and is consequently planning to contract for certain portions of it. But it strongly wishes to implement some of the work through the Ministry — partly as a means of further developing the Roads Department's capability — and has selected the Mohale's Hoek-Mpiti segment as a prime candidate for the force account method. This issue, of course, goes to the heart of the Ministry's organizational capacity, its ability to recruit, train and retain suitable staff, and whether it can establish the necessary structure to maintain roads effectively once they have been completed. OSARAC and REDSO have the utmost sympathy for the GOL's desire to implement this proposed AID project entirely by force account and would like if at all possible to do the project that way. It is recommended that the feasibility of this prospect be studied with great care at project design time.

2. The extent to which South African facilities, equipment and materials should be used in the project. Most ordinary construction materials in Lesotho (cement, gravel, household fixtures, windows, etc.) are imported from South Africa, and it will not be feasible in the short run to alter that practice. Therefore, a source and origin waiver should be expected for those materials to be financed by AID in this project. A large quantity of heavy construction equipment will also be required which will become a part of the GOL's construction "plant". In order to assure compatibility with existing equipment, easy access to spare parts and service, and speed of delivery, it may be necessary to request a waiver here as well so that South African equipment manufactured by subsidiaries of U.S. companies can be purchased under the project. Furthermore, depending upon resolution of the first issue sketched out above, it might even be necessary to turn to a South African contractor for at least part of the construction work, which would also require a waiver (it is believed that use of a U.S. firm for construction would drive costs substantially higher than they are already estimated to be). The whole matter of necessary source/origin waivers should be examined in careful detail by the project design team.

3. The amount of host country contribution that can be expected under the circumstances. Lesotho's straitened economic condition and RLDC status, along with the large amount of money that 25% of project costs would constitute, appear to argue strongly for a waiver of the 25% rule. The GOL would like if at all possible for AID to cover all foreign exchange and local costs of the project; in fact, it would like to go even further by obtaining AID financing to cover amortization of project equipment so that there still exists a full pool of useable equipment for future activities following completion of the Mohale's Hoek-Mpiti road. Such a plan, in the view of the Ministry of Works, would be of the greatest assistance in helping build local capability for future road construction and maintenance as opposed to leaving behind only a physical product and is consistent with the GOL's standard practice of "renting" out equipment from a central pool to operating Ministries for a charge that includes capitalization of that equipment. While expressing a strong desire to strengthen the Ministry's institutional capacity through technical assistance and training, OSARAC and REDSO representatives have firmly discouraged the thought that AID could provide any such "double financing" for project equipment. We believe that the entire matter of GOL financial capacity and the proportion of project costs it should be requested to bear is an issue requiring full analysis at final design stage.

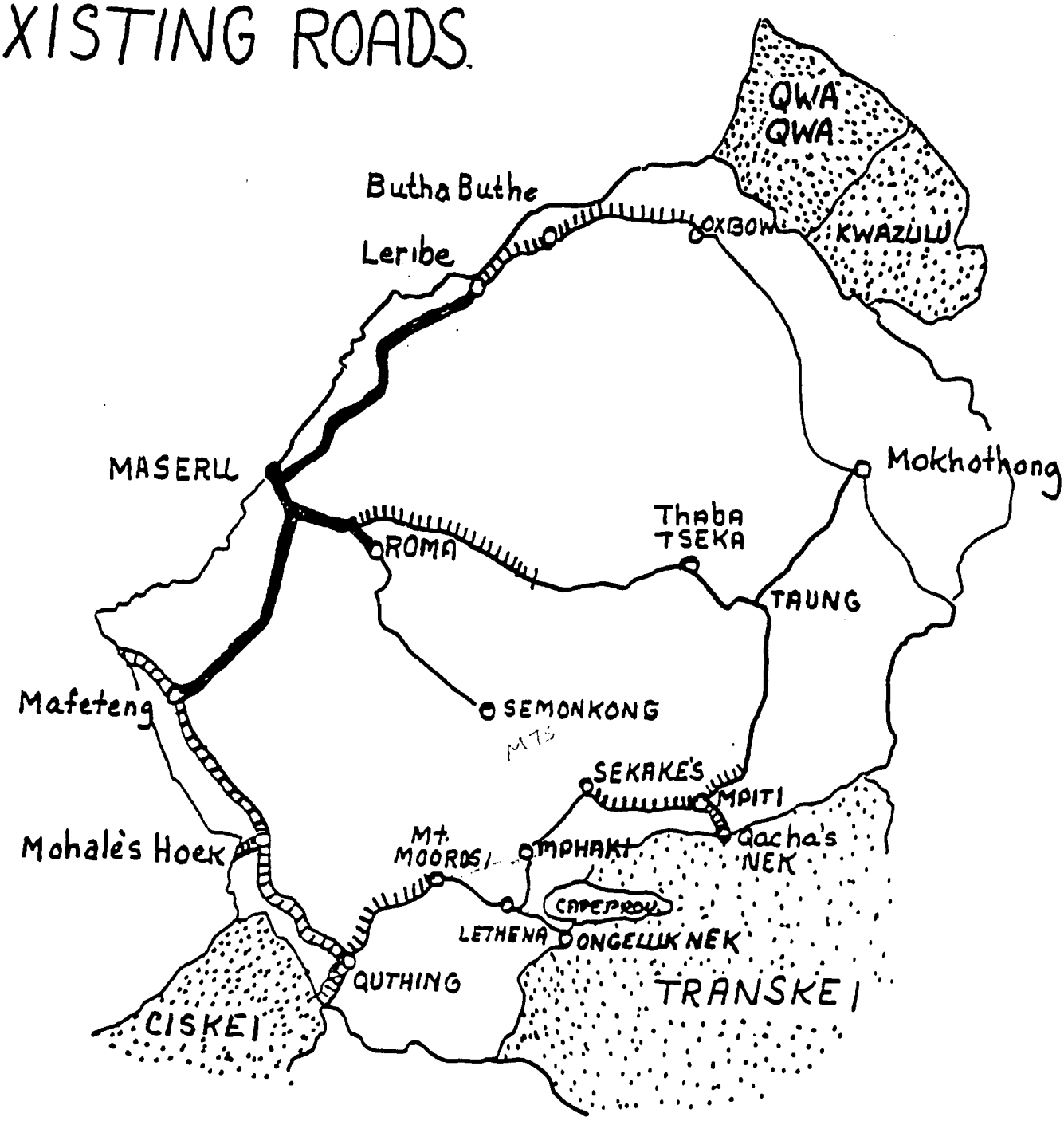
4. How this project can cope with the three-year limit on capital grant disbursements. On account of the extremely difficult terrain and the length of the road project under consideration, it is REDSO's preliminary estimate that a three-year disbursement period would be barely adequate only if everything went unusually well throughout the construction period. Given normal delays and problems, three to four years seems like a more realistic time. The final design team should examine ways and means of overcoming the discrepancy between the estimated needs of the project and the three-year disbursement rule. If none can be found, a waiver may be necessary.

5. Whether GOL salary scales and working conditions are likely to make it possible for the government to retain the services of those engineers and technicians trained by the project. The Ministry of Works takes the position that the 1976 pay raise and another one due in April 1977, added to better non-salary conditions in government (e.g., prospects for scholarships for future training) and a growing disinclination among Basotho with some education to be willing to tolerate life in South Africa, will keep loss of personnel to a minimum. It believes that some of these same factors will restrict departure of personnel to private employment in Lesotho. As evidence the Ministry reports that of 29 diploma holders

from its technician training school since the first class graduated in 1975, two dozen are still with the Ministry and none have gone to work in South Africa. Nonetheless, it is well known that retaining personnel in government is a general problem both in developing countries generally and in Southern Africa in particular. OSARAC and REDSO therefore recommend that the project design team consider this question carefully.

We request AID/Washington's guidance in the resolution of these issues.

LESOTHO: EXISTING ROADS



BITUMEN

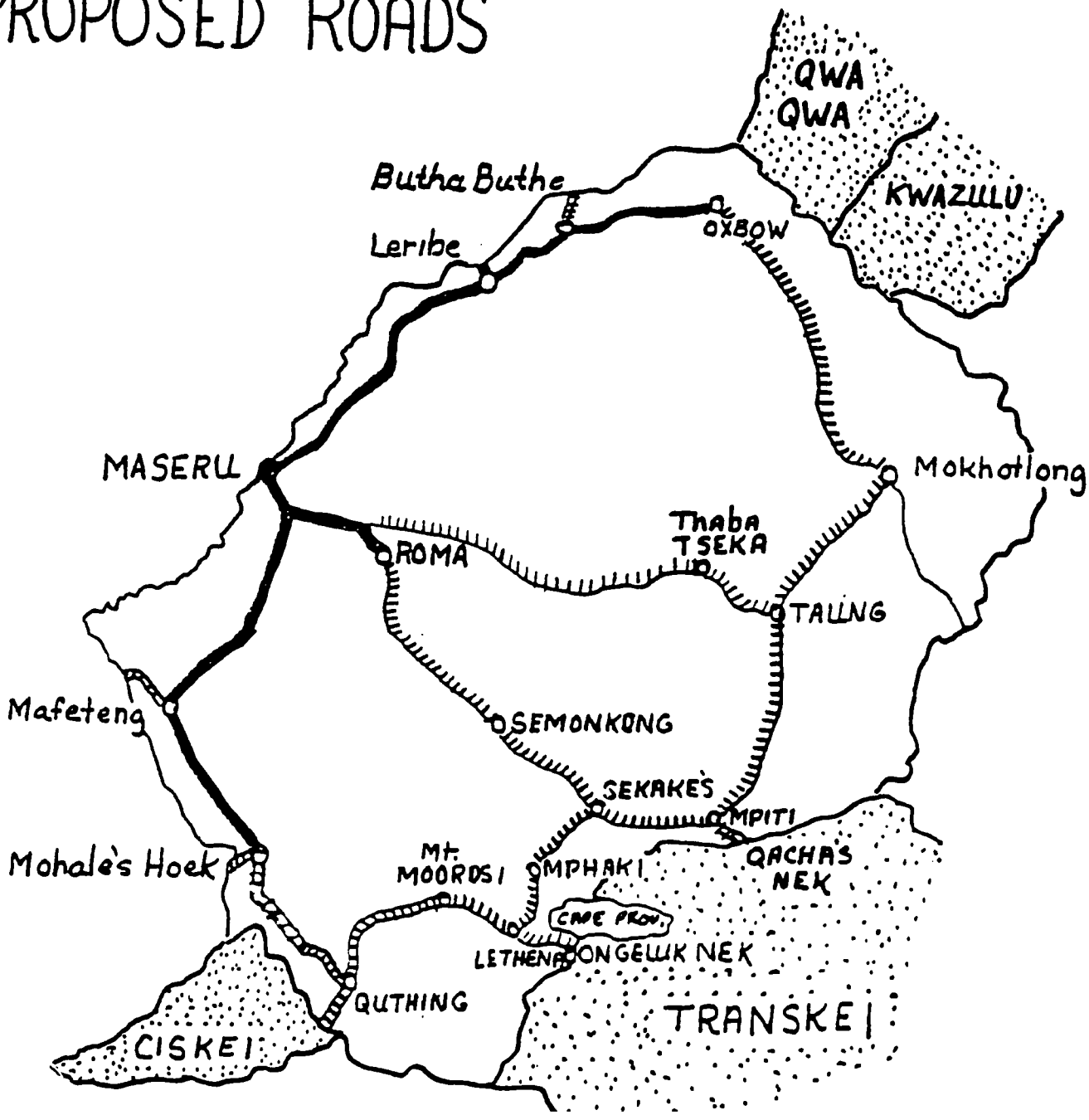
TWO LANE GRAVEL

ONE LANE GRAVEL

TRACK

HOMELANDS

LESOTHO: PROPOSED ROADS



BITUMEN

TWO LANE GRAVEL

ONE LANE GRAVEL

TRACK

HOMELANDS

		US $
1.	Crawler Tractors/Graders/FEL $8 per hour/40 hours per week/42 weeks per year or $13,440 per tractor year - 16 tractors at 3 years each or total of 48 tractor years	645,120
2.	7-ton Trucks $3 per hour/40 hours per week/ 45 weeks per year or $5,400 per truck year x 37 trucks at 3 years each or total of 111 truck years	599,400
3.	Land Rovers/Pickups $3 per hour/50 hours per week/48 weeks per year or $7,200 per vehicle per year x 12 vehicles at 3 years each or total of 36 vehicle years	259,200
4.	POL and Upkeep of Generator, Compressor, Concrete Mixer, Vibrators, Water Pumps etc, for 3 years	146,280
	Sub-Total	1,650,000
	Escalation on POL = 30 percent x 3 years..	495,000
	TOTAL: POL & Escalation	2,145,000

Local - Staff Salaries
including all allowances

Annex D

		Number of Persons	Cost Per Person	Total
			US $	US$
1.	Secretary	2	7,000	14,000
2.	Clerk/Typist	2	5,000	10,000
3.	Accountant	2	6,000	12,000
4.	Surveyors	4	10,000	40,000
5.	Tractor/Heavy Machinery Operators	20	3,500	70,000
6.	Vehicle Drivers	30	3,500	105,000
7.	Artisans (masons/carpenters)	10	3,000	30,000
8.	Mechanics & Assistants	20	3,000	60,000
9.	Watchmen	4	3,000	12,000
	Total:	80		461,000
	Salaries x 3 years (461,000 x 3)			1,383,000
	10 percent salary increase for 3 years			138,300
	Total Salaries and Increases		US$	1,521,300

Annex E

INITIAL ENVIRONMENTAL EXAMINATION

Project Location	:	Lesotho
Project Title	:	Lesotho Roads (690-0076)
Funding	:	$20,140,000
Life of the Project	:	Five Years
IEE Prepared By	:	Lucian A. Bonkowski REDSO/EA Pushkar A. Brahmbhatt REDSO/EA
Date	:	March 24, 1977

Environmental Action Recommendation: Negative Determinatio

Concurrence : Date:

Assistant Administrator's

Decision : Date:

I. Description of Project

The objective of the Government of Lesotho (GOL) Ministry of Works Road Division is to build new access routes and upgrade the existing roads to provide farm areas with access to markets, agricultural program inputs, health, education, extension facilities and services. Lesotho has 2,736 km. road network of which 201 km. are bituminized and the remaining are roads of varying standards and tracks.

AID financing for this project includes provision of earth-moving and related road building equipment, workshop and equipment, spares, POL, training and personnel to be used in improving, realigning and constructing some 260 km. of roads classified by GOL as primary roads. The total length of the project is divided into four segments, each with diverse existing conditions and expected to have different implementation criteria.

A description of each segment in existing condition and proposed improvement is briefly outlined below:

a) Mohale's Hoek to Quthing: 58 km.

Presently the road is a two-lane gravel route, with steep gradient in four sections ranging from 12 to 18 percent and needing adequate drainage. Improvements will consist of upgrading and redesigning the gradient, modification of the horizontal alignment in some parts with adequate drainage and proper bridge crossings.

b) Quthing to Mount Moorosi: 40 km.

The existing road can be classified as a one-lane gravel road and improvements will elevate it to a two-lane gravel standard consisting of vertical and horizontal realignment with improved ford and drainage structures.

c) Mount Moorosi to Sekake: 118 km.

A one-lane gravel track without specific geometric standards is in existence. The first 50 km. of this segment has been improved by the MOW maintenance crew and upgraded to one-lane gravel road standard. The remaining 68 km. is an impassable track during the wet season. Temporary emergency repairs to make this section passable during the rainy season are underway under EEC financing.

The first 50 km. will require lesser improvements mainly to the present drainage facilities, modification of the existing gradients and horizontal alignments.

d) Sekake to Mpiti: 40 km.

The existing one-lane gravel track follows alongside the Orange River Valley and gorge with a number of river and ford crossings. The gradient, up to 18 per cent, has several sharp curves making it difficult for large vehicles to maneuver. Proposed improvements will consist of redesigning the horizontal alignment, gradient and drainage structures, including some relocation of the alignment to provide access to Qacha's Nek.

The improved access will induce agricultural program inputs such as seeds, fertilizer, credit, marketing facilities, extension services, applied crop research and storage services, thereby promoting a shift from subsistence farming to successful cash cropping, resulting in better standards of living for farm families.

II. Discussion of Impacts

A. Land Use

1. Changing the character of the land through:

a) Increasing Population

Improvement to the existing roads will facilitate movement of crops and related commodities from farm to market. This may cause movement of people from urban centers to rural farming areas. However, this movement will be limited and will not cause noticeable population influx.

b) Extracting Natural Resources

The proposed improvement to these roads will provide easy access to farming areas and to forested or mineral areas but will not have appreciable affect as there are very few forested or mineral areas.

c) Land Clearing

Road improvements will not involve land clearing; however, in selected cases existing alignments may require some modifications necessitating land clearing. It is anticipated that the course will follow existing rights-of-way. Land clearing will not be significant as the main purpose of this project is to improve the present roadways and tracks.

d) Changing the Soil Character

The proposed project does not have direct impact on the existing soil characteristics; however, indirectly, with improved access facilities, a shift from subsistence farming to cash cropping is expected to follow. This change could result in depletion of certain minerals from the soil but presently no changes in the existing farming methods are anticipated which could increase soil erosion. However, improved access to better farm technology can offset soil depletion.

2. Altering Natural Defenses

Additional improvements to the existing drainage structures will be designed so as to cause minimal interference with natural erosion defenses of the land. Areas disturbed during the construction (borrow pits, removal of top soils, diversions, etc) will be re-established, but there may be some erosion in the construction process.

3. Foreclosing Important Uses

It is possible that a road with inadequate drainage or overflow capabilities could cause a dam to be breached or damage property. However, the improvement of the existing drainage and provision of additional structures will reduce this possibility. Proper drainage with side ditches and culverts is planned; however, a culvert especially in the hilly areas can plug up and be breached during heavy rainfall. MOW plans to carry out regular maintenance, which, in part, will address this problem.

4. Jeopardizing Man or his work.

None anticipated.

5. Strip or Squatter Development

Some areas along the right-of-way of the project have been settled. Squatter or strip development could expand along the rights-of-ways in the future.

6. Borrow Pits

The proposed design will address this issue in detail so that the borrow pits will not encroach upon productive agricultural land. Pits will ultimately be graded and drained and restored to natural condition. There will be little opportunity for mosquitoes or other water borne disease vectors to be sheltered in the pits.

B. Water Quality

1. Physical State of Water

Due to the rugged and rocky terrain, there will be no significant cummulative effect on the physical state of the water. Sediment and other water borne matter could affect the area in the immediate surrounding of the road, however. The area will be graded in order to dispose of the water and guard against this danger.

2. Chemical and Biological States

Anticipated shift to cash cropping from subsistence farming will increase use of pesticides and fertilizer. Construction will provide adequate drainage and avoid concentration of these fertilizers and pesticides in the water that may be used for human or animal consumption. The adequate drainage will also avoid mosquito and other vector breeding.

3. Ecological Balance

There are no standing bodies of water in the vicinity of the proposed construction; however, part of the road follows the course of the Orange River. Effects of the road on runoffs into the river are insignificant.

C. Atmospheric Changes

1. Air Additives

Nil.

2. Air Pollution

Construction and road improvement procedure with regard to use of machinery will cause short term dust and exhaust pollution. The increase in traffic flow will not be significant to cause any long term pollution.

3. Noise Pollution

Noise created by earthmoving equipment during the construction period will be temporary.

D. Natural Resources

1. Diversion and Altered Use of Water

Road drainage structures will cause runoff diversions for short distances; alteration of the flow of major water channels is not anticipated. More intensive farming may result in the use of more water.

2. Irreversible, Inefficient Commitments

The project does not irreversibly commit the use of any natural resources.

3. Wildlife

The farming areas surrounding the project do not support significant numbers of game animals. There is no wildlife migration being interferred with and there are no bird or lake sanctuaries in the project area.

E. Cultural Changes

1. Altering Physical Symbols

It is anticipated that the alignment of some of the sections may require alterations; however, adequate precaution will be taken during the design phase so that the new alignment may not affect historic sites, natural land marks or archeological sites.

2. Dilution of Cultural Traditions

Improved road facilities will enhance movement of people to markets, educational and health facilities and will in some way affect the cultures of the people involved. However, these effects are not likely to prove detrimental to the cultural traditions.

3. Damage to Primitive Cultures

There are no primitive cultures in the area that will be affected by this project.

F. Socio-Economic Effects

1. Changes in Economic/Employment Patterns

More intensive farming and cash cropping will mean increased incomes for the farming families. This may encourage some portion of the male population to stay on their farm to work. Increased production and deman for farm implements, fertilizer, pesticides and such could give rise to small agricultural business enterprises creating more employment opportunities.

2. Changes in Population

A slight increase in the number of males staying on the farm to work is the only change in population that is expected as a result of the project (men frequently seek wage employment in South Africa).

3. Changes in Cultural Patterns

No significant changes in the existing cultural patterns of the people are expected which can be attributed to this project.

4. Dislocation of Population by New or Widened Rights-of-Way.

Rights-of-Way for the improvement of these roads will occasionally be altered or widened to facilitate safer road alignments. There may be some effect on the population by these changes; however, maximum efforts will be taken to minimize these effects. Right-of-Ways will be selected with the approval of the local population so that the relocation of families will be minimal.

G. Health

1. Changes in the Natural Environment

No natural environment will be changed by the proposed program.

2. Eliminating the Ecosystem Elements

No element of the ecosystem will be eliminated or altered significantly by the road program.

3. New Pathways for Disease Vectors

The proposed program will allow access to sections/areas previously inaccessible during the rainy season. Improved access will allow increased traffic in people and products which may enhance the chances of plant animal and human disease vectors moving from one area to another. But there will also be improved access to health and agricultural services.

H. General

1. International Impacts

Nil.

2. Controversial Impacts

A selection of new alignments of roads in some sections will be made on the basis of sound design and the safe movement of traffic. Changes of existing alignment as far as permanent inhabited areas are concerned

will be minimal. This criterion of selection of new alignment will minimize any controversial impact.

3. Large Program Impacts

The goal of the GOL road program is to increase farm incomes by improving the existing roads from farm areas to marketing outlets. Some shift from subsistence farming to cash cropping may occur and have an impact on the environment. However, considering the magnitude and extent of the program, the impact should be quite low.

III. Recommendation for Environmental Action

The impacts on enviroment that will stem from the project range in intensity from "none" to "little". Potentially adverse impacts on land use, water and air quality and natural resources will be minimized or eliminated by the purposeful design of the project. Other cultural, socio-economic and educational program impacts are the intent of the GOL and are, in the case of access to health and education facilities and to extension services, beneficial

It is concluded that this project will not have any significant effects on the environment, and it is recommended that a negative determination be made.

IV. Impact Identification and Evaluation Form

Impact Areas and Sub-Areas	Impact Identification and Evaluation 1/
A. Land Use	
1. Changing the character of the land thru:	
a. Increasing the population	L
b. Extracting natural resources	N
c. Land Clearing	L
d. Changing soil character	L

2. Altering natural defenses _____ L
3. Foreclosing important uses _____ L
4. Jeopardizing man or his work _____ N
5. Strip or Squatter development along R/W _____ L
6. Borrow Pit Siting _____ L

B. WATER QUALITY

1. Physical state of water _____ L
2. Chemical and biological state _____ L
3. Ecological balances _____ N

1/ Use the following symbols: N - No environmental impact.
L - Little enviromental impact.
M - Moderate environmental impac
H - High environmental impact.
U - Unknown environmental impact

C. ATMOSPHERIC

1. Air additives _____ N
2. Air Pollution _____ L
3. Noise Pollution _____ L

D. NATURAL RESOURCES

1. Diversion, altered use of water _____ L
2. Irreversible, Inefficient comitments _____ N
3. Wildlife _____ N

E. CULTURAL

1. Altering physical symbols _____ N
2. Dilution of cultural traditions _____ L
3. Damage to primitive cultures _____ N

F. SOCIOECONOMIC

1. Changes in economic/employment patterns _____ L

2. Changes in population _____ L
3. Changes in cultural patterns _____ N
4. Dislocation of population by new or widened R/W _____ L

G. HEALTH

1. Changing a natural environment _____ N
2. Eliminating an ecosystem element _____ N
3. New pathways for disease vectors _____ L

H. GENERAL

1. International impacts _____ N
2. Controversial impacts _____ L
3. Larger program impacts _____ L

G O A L

PRELIMINARY LOGICAL FRAMEWORK LESOTHO ROADS (Project 690-0076)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
To contribute to Lesotho's long-run rural development plans (see Second Five Year Plan) and more specifically to development of a basic national transport infrastructure.	Progress toward achieving Second Five-Year Plan targets. Progress on constructing national roads network according to accelerated schedule.	Central Planning Office records. MOW records.	The GOL will maintain the top priority it attaches to implementation of the Second Five-Year Plan and rapid construction of a national road network. Large inputs from donors will be provided rapidly. Conditions in Southern Africa will remain sufficiently stable for Lesotho to pursue its national development plans.

Annex F

PURPOSE

PRELIMINARY LOGICAL FRAMEWORK LESOTHO ROADS (Project 690-0076)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS (EOPS)	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
To develop within the GOL's Ministry of Works the institutional capacity to be involved effectively in Lesotho's road construction and maintenance as part of overall national development.	MOW handling growing share of construction work by force account (measured by kilometers constructed and costs incurred).	MOW records	MOW can use U.S. technical assistance effectively. GOL will maintain policy of doing maximum amount of construction by force account.
	Effectiveness of MOW's equipment and road repair and maintenance activities.	AID evaluation. Professional judgments of AID and other donor engineers as expressed in official reports.	MOW can gear up to handle much greater maintenance burden (as result of new construction) than in past.
	Increasing MOW staff with upgraded professional qualifications.	MOW records.	

Annex F

OUTPUTS

PRELIMINARY LOGICAL FRAMEWORK LESOTHO ROADS (Project 690-0076)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS (Magnitude of Outputs).	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
1. Basotho in training overseas with established MOW positions awaiting them.	22 students	MOW and AID records	MOW can select, recuit and retain Basotho trained under project.
2. Expanded Lerotholi Polytechnic (L.P) capacity to produce engineering diplomates.	L.P. graduates increase from 15 in 1977 to 30 in 1980.	MOW and AID records	Other donor support to L.P. will continue.
3. Appropriate MOW units functioning more effectively to perform road maintenance.	Increase of road maintenance capacity from R2.5 million in 1977 to R5.0 million in 1981.	MOW records and AID evaluation	MOW continues to appreciate need for good maintenance.
4. Two-lane and one-lane gravel road between Mohale's Hoek and Mpiti.	260 kilometers.	MOW and AID records	Inputs will be adequate and timely to produce this output. Weather will cooperate.

Annex F

INPUTS

PRELIMINARY LOGICAL FRAMEWORK LESOTHO ROADS (Project 690-0076)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS (Implementation target - type & quantity)	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
1. U.S. technical assistance.	39.5 man-years of OPEX services $2,700,000.	AID records	Inputs will be provided timeously and prove to be effective.
2. Direct-hire AID project officer.	4 man-years=$350,000		
3. TCN and/or volunteer technical assistance	35 man-years =$1,000,000.		
4. Training in U.S./ third countries.	110 student-years = $1,650,000.		
5. Commodities.	Road equipment, vehicles, miscellaneous worth $4,616,000.	On-site inspection.	
	Workshop equipment $200,000, L.P. equipment $150,000.		
6. Other costs			
A & E Contract	$800,000		
road construction & operating costs	$8,224,000		
workshop construction	300,000		
L.P. construction	150,000		

Annex F