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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

APPRAISAL OF
A FIFTH HIGHWAY PROJECT
ETHIOPIA

June 14, 1972

Transportation Projects Department
Currency Equivalents:

Currency Unit - Ethiopian dollar (Eth$)

US$ .43 = Eth$1.00
US$1.00 = Eth$2.30
US$1,285,434 = Eth$1 million

Fiscal Year: July 8 - July 7

System of Weights and Measures: Metric

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<th>Metric</th>
<th>British/US</th>
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<tr>
<td>1 meter (m)</td>
<td>3.28 feet (ft)</td>
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<tr>
<td>1 kilometer (km)</td>
<td>0.62 miles (mi)</td>
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<tr>
<td>1 metric ton (m ton)</td>
<td>2,204.60 pounds (lb)</td>
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Abbreviations and Acronyms:

FER - Franco-Ethiopian Railway
GRS - General Roads Study
IHA - Imperial Highway Authority
MPP - Minimum Package Program
NER - Massawa-Asmera-Agordat Railway
PAS - Public Administration Service
PCO - Planning Commission Office
UNDP - United Nations Development Programme
US A.I.D. - United States Agency for International Development
ER - Economic Return
ADT - Average Daily Traffic
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This report was prepared by Messrs. F.D.T. Reid and B.P. Kennedy (Engineers), A.J. Stone (Engineer/Economist) and M.H.F. Cooper (Agricultural Consultant).
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SUMMARY

i. For a country of its size and population, Ethiopia's transport facilities are poorly developed with most of the country still remote from modern means of communications and still relying predominantly on animal transport. The transport system focuses primarily on Addis Ababa, and secondarily on Asmera in the north, Jima in the southwest, and Aseb on the Red Sea. Highways are the dominant mode. The main trunk road system is fairly well developed with about 8,000 km of all-weather roads serving about 42,000 registered vehicles. The Imperial Highway Authority (IHA), created and developed with Bank Group assistance, administers highway operations. An extensive internal air system unifies the country and links the administrative districts, and an international airline links Ethiopia with Europe and Asia. The ports of Aseb and Mitsiwa on its own territorial coast and Djibouti in the French Territory of the Afars and the Issas serve Ethiopia. The Franco-Ethiopian Railway joins Addis Ababa and Djibouti and the Mitsiwa-Asmera-Akordat Railway operates in northern Eritrea. Future development planning in transportation will be aided by the recently completed General Roads Study and an ongoing study of domestic aviation, both UNDP-financed with the Bank as executing agency.

ii. The Bank Group lending strategy for Ethiopia assigns highest priority to agricultural development. The emphasis on Bank Group lending in the transport sector will be on roads and, in particular, those roads which complement and promote expansion and improvement in the agricultural sector. In line with this strategy, the proposed highway project assists in the construction and improvement of lower class roads oriented principally towards area development and represents a marked change from the past highway projects which emphasized the extension and improvement of the primary road system.

iii. The proposed project includes construction of six gravel surfaced roads to IHA feeder road standards (about 430 km) and supervision of their construction. Most feasibility studies and all detailed engineering of the roads to be constructed were completed by IHA staff, assisted by Bank Group preappraisal missions. The feasibility study of one road was completed by consultants under the Fourth Highway Project financed by the Bank Group. Technical assistance by consultants will be provided to the Planning Commission Office (PCO) for a study of rural roads (farm-to-highway) and to the IHA for management, road maintenance, design, planning, and research. The local road contracting industry will be assisted through training and loans for equipment purchases. Funds will be provided for purchases of equipment for training and materials research.
iv. The project will be implemented over a period of about four years, with the IHA, assisted by consultants under the project, responsible for executing all items but the rural roads study, for which the PCO will be responsible, and the loans to Ethiopian contractors, which will be handled by the Agricultural and Industrial Development Bank (AIDB). The civil works contracts will be awarded after international competitive bidding. Several of the contracts are of a size suited to the participation of Ethiopian contractors.

v. The six gravel road construction projects have a combined Economic Return (ER) on investment of 23%, with individual ER’s from 16% to 43%. They will provide reductions in transport costs and permit access for extension services to guide intensification of agriculture and to open up new land for cultivation.

vi. The total project cost is estimated at US$22.0 million, with a foreign exchange component of US$14.0 million. Costs of the civil works are based on detailed engineering estimates by the IHA, revised by the appraisal mission to include additional drainage and protection works and reflect the estimated cost at the time of bidding. For construction supervision and technical assistance, costs are based on current figures available in the Bank for comparable services. The cost provisions for equipment purchases are estimated on the basis of discussions with IHA.

vii. The project will be financed by an IDA credit of US$17.0 million, which will cover the foreign exchange expenditure of US$14.0 million and US$3.0 million of local expenditures. The Government has indicated that it will finance the remaining US$5.0 million of local costs.

viii. A condition of credit effectiveness is the execution and delivery of a Subsidiary Loan Agreement between the Government and the AIDB for the purposes of onward lending to Ethiopian contractors.

ix. The project as originally envisaged and appraised included the bituminous surfacing of about 430 kms of primary roads and procurement of emergency road maintenance equipment. These elements of the project are now proposed for parallel financing by the United States Agency for International Development (US A.I.D.) under a separate project. Details of US A.I.D. financed project are given in Annex B.
APPRAISAL OF

A FIFTH HIGHWAY PROJECT

ETHIOPIA

I. INTRODUCTION

1.01 The Imperial Government of Ethiopia (Ethiopia) has asked the Association to help finance a highway project consisting of: (i) construction of six gravel feeder roads (about 430 km); (ii) supervision of (i); (iii) technical assistance to the Planning Commission Office (PCO) to study rural roads (farm-to-highway) and to carry out the recommendations; (iv) technical assistance to the Imperial Highway Authority (IHA) for management, road maintenance, design, planning, and materials research; (v) aid to the local road contracting industry through training and equipment loans; and (vi) purchases of equipment for training and research.

1.02 The proposed project emphasizes roads principally oriented toward agricultural development, a marked change from the past emphasis on extending and improving the primary road system. Lower class roads are necessary for development of areas adjacent to the present primary network and it is essential for the country's economic growth, particularly in agriculture, that full support be given to this shift toward a better balanced road system.

1.03 The project cost is estimated at US$22.0 million. An IDA credit of US$17.0 million will finance 75% of construction and supervision costs and the actual foreign exchange costs of all other project elements. This would be the fifth Bank Group operation in Ethiopia's transport sector. The first four loans and credits for highways totalled US$54.7 million, financing the foreign exchange costs of: (a) construction of about 1,480 km of primary roads and paving of about 970 km of roads; (b) equipment purchases for road reconstruction and maintenance; and (c) consulting services for feasibility studies and detailed engineering, an institutional review of IHA management, technical assistance, and training. The first three projects have been completed. After some initial delays in finalizing plans and bidding documents, the construction works under the fourth project are now more than half completed and the rate of progress is satisfactory. Details of all 4 projects are given in Annex A.

1.04 The roads to be constructed and improved under the proposed project agree largely with the priorities allocated in the General Road Study (GRS) of 1969, financed by the United Nations Development Programme (UNDP) with the Bank as Executing Agency.

1.05 The project was appraised in November, 1971 by Messrs. F.D.T. Reid (Engineer), A.J. Stone (Engineer/Economist) and M.H.P. Cooper (Agricultural Consultant), who, with Mr. B. P. Kennedy (Engineer), prepared this report.
II. THE TRANSPORT SECTOR

A. General

2.01 Ethiopia is one of the largest countries in Africa, about twice the size of France. The topography is dominated by a vast plateau rising from torrid plains in the east and cut diagonally northeast to southwest by the Rift Valley. Two distinct rainy seasons occur and the country is generally well-watered, with rivers originating in the highlands and flowing mainly through deep gorges. The topographical and climatic conditions have made provision of communications and transport networks very difficult and expensive, consequently many parts of the country remain isolated with only minimum development of agriculture and other potentials.

2.02 In addition to topography and climate, the transport system in Ethiopia is greatly influenced by an administrative and economic focus on the centrally-located capital, Addis Abeba where just under one million of Ethiopia's estimated 25 million people live. Economic activity is further concentrated at Asmara, in the north; Jima, in the southwest coffee area (seasonal); and Aseb, the major Red Sea port. Commodity flows between Addis Abeba and other centers create the main demand for goods transport which is satisfied mainly by road transport. An extensive internal air system unifies the country and links the administrative districts. The import-export flow between Addis Abeba and the port of Djibouti in the French Territory of the Afars and the Issas is served by the Franco-Ethiopian Railway (FER). Except for a fairly well developed trunk road network and domestic aviation system, the country's transport facilities are inadequate in size and capacity. Most of the country is still remote from modern means of communication and still relies heavily on animal transport.

B. The Modes

(a) Highways

2.03 Details of the highway sector are given in Chapter III.

(b) Civil Aviation

2.04 Ethiopia has an extensive domestic aviation system plus an international airline linking it with Europe and Asia. Forty-three airfields operate for domestic service and airports at Addis Abeba, Asmara, and Dire Dawa operate for international service. Except for the civil airfield at Jima and the international airports, the runways are unpaved. Presently only daylight operations are possible at any of the airports; however, lighting is

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1/ Additional information on the country and its economy may be found in IBRD/IDA Report AE-9, Economic Growth and Prospects in Ethiopia, September 22, 1970.
being installed at Addis Abeba and Asmera. The fleet serving scheduled flights consists of four Boeing aircraft, two 707's and two 720's, two Douglas DC6B's, and ten Douglas DC3's. A major decision on replacement of the DC3 fleet is pending. Although daily flights are scheduled to most airports, climate, altitude and poor runways disrupt service in the rainy season. The domestic air system is an important means of unifying remote regions, the capital, and other main centers. A UNDP-financed study on aviation and tourism in Ethiopia has recently been carried out with the Bank as executing agent and the final report of the study is expected to be available soon.

(c) Ports

2.05 Ethiopia is served by Aseb and Mitsiwa on its own territorial coast and by Djibouti in the French Territory of the Afars and the Issas. The Ethiopian ports are operated by the Marine Department of the Ministry of Communications. Traffic at all three ports has been affected by the Suez Canal closure and the number of ships calling has been substantially reduced. Djibouti, in particular, has lost the substantial servicing of vessels previously using the Canal and, in addition a part of its previous traffic has been diverted to the nearby port Aseb. Traffic statistics are unreliable, but Aseb and Mitsiwa handle about 70% of all cargo.

2.06 The GRS, financed by the UNDP, recommended studies to develop master plans for future improvement and expansion of Aseb and Mitsiwa and suggested that any study of Aseb should examine the comparative advantage to Ethiopia from using Aseb and its road route or Djibouti and its rail route. As international commitments are involved, however, it is expected that such a decision will take some time. Recently, the Japanese Government has agreed to finance the preparation of a ports master plan for Ethiopia, which should be based on comparative analysis of the Aseb and Djibouti alternatives.

(d) Railways

2.07 Two railways operate in Ethiopia: the 781 km FER linking Addis Abeba with the port of Djibouti and the 306 km Mitsiwa-Asmera-Akordat Railway (NER) in northern Eritrea. The FER is the more important and is owned by the Ethiopian Government (50%) and by the French Government and private French shareholders (50%). Its source of revenue is Ethiopian traffic passing through the French port of Djibouti. Both tonnage and revenues have been increasing recently and the FER is now in a stronger financial position than previously. Competition from road transport between the port of Aseb and Addis Abeba may develop when a Bank/IDA-financed road between Awash and Tendaho, scheduled to be completed late 1973, provides a much better route than at present.

2.08 The NER's principal revenues come from freight transported between Asmera and the port of Mitsiwa with a sizable portion coming from licenses issued to road haulers. The railway alignment is tortuous with very steep grades and a limited load carrying ability. Freight and passenger traffic on the railway has been declining since 1966 due to continuing deterioration
of equipment and a necessary heavier reliance on road transport. The fi-
nancial position of NER has deteriorated sharply, with increasingly serious
annual deficits since 1967. The Planning Commission is currently carrying
out a study of the possibilities of closing this railway.

C. Planning and Coordination

2.09 The Planning Commission Office (PCO) of the Prime Minister's De-
partment is responsible for coordinating budget expenditures proposed by
the various ministries for development. Within the transport sector, co-
ordination of planning for all modes except roads, but including trucking,
is to be carried out in the recently established Research and Planning Unit
of the Ministry of Communications. The PCO is responsible for coordinating
road planning with planning of other modes.

2.10 The basic structure for coordination of planning in the Ethiopian
Government is sound. However, available manpower is limited in the planning
units of the various ministries and the PCO. This has resulted in problems
in project planning where the services are required of more than one minis-
try, such as in agricultural development regarding road projects. Coordina-
tion between road planning and domestic aviation planning is now being inves-
tigated in a UNDP study of internal aviation for which the Bank is Executing
Agency. Formal planning concerning coordination between road and rail ser-
dvice to the competing ports of Aseb and Djibouti is lacking, but it is expect-
ed that the Japanese financed study (para. 2.06) will examine this matter.

2.11 Road planning originates in the Planning and Programming Division
of the IHA. This Division is staffed by young, inexperienced economists who
nonetheless are developing considerable ability in applying economic criteria
to highway projects. However, the present administrative arrangement whereby
the Executive Assistant to the General Manager also is the head of this Di-
vision does not provide the concentrated direction that this important Divi-
sion deserves. During negotiations the Government agreed to separate the re-
sponsibilities of the Executive Assistant to the General Manager and of the
head of the Planning and Programming Division and to appoint suitable quali-
fied individuals to work full-time in these posts. In addition, the Govern-
ment requested, and the Association agreed to, the provision of an expert
under the project, to assist the Planning and Programming Division in its
work.

2.12 A more organized approach is needed to planning, constructing, and
maintaining rural roads (farm-to-highway) as this deficiency now inhibits
agricultural development. The IHA does not consider these roads to be their
responsibility. Some provincial governors have accepted the responsibility
without financial support from the Central Government, but their efforts are
necessarily limited. The Central Government has been considering establish-
ing a suitable organization to carry out this function, but has not reached
a decision. A study of the organizational and operational requirements for
construction of rural roads has been initiated by the Planning Commission
working through a Ministerial Steering Committee and the Government has re-
quested that two foreign experts, one engineer and one administrator, be 
provided to the PCO under the project to assist the Committee in final-
izing the study and in the implementation of the findings and recommenda-
tions of such study. The scope and timing of this study was discussed and 
agreed during negotiations, and the Government gave an assurance that the 
findings and recommendations of the study would be reviewed with the Asso-
ciation and that the recommendations would be implemented in accordance 
with a timetable to be agreed with the Association.

III. THE HIGHWAY SECTOR

A. The Network

3.01 The existing highway network totals about 23,000 km, of which 
about 8,000 km are all-weather roads and the balance dry-weather trails. 
Details are shown in Table 1. About 6,900 km of all-weather roads are now 
being maintained by the IHA and about 800 km will be taken over from con-
tractors for maintenance between 1972 and 1974. The main road network is 
fairly adequate at present but there is almost a complete lack of rural 
roads.

B. Characteristics and Growth of Traffic

3.02 The marked growth in the vehicle fleet between 1960 and 1965 has 
been followed by a period of stagnation, principally due to the impact of 
depressed earnings on the coffee crop (the major contributor to the economy). 
Accurate vehicle statistics are difficult to obtain. The vehicle fleet in 
1970 was estimated at 42,300 units, composed of cars (72%), trucks, pickups, 
and trailers (21%), and buses (7%). Details are shown in Table 2. Military 
and police vehicles have been estimated at 5,000 units.

3.03 Vehicle fuel consumption between 1965 and 1969 increased at an 
average annual rate of 12.5%, with gasoline increasing 8.5% and diesel 15.6%. 
Details are shown in Table 3. In 1969, 66.4 million tons of gasoline and 
147.2 million tons of diesel were consumed. Statistics on vehicle registra-
tions and fuel sales show that the vehicle fleet is generally adequate but 
continues to be disproportionately concentrated in the capital, Addis Abeba.

3.04 The trucking industry continues to operate under relatively free 
competition, except on the Aseb-Addis Abeba route where fixed tariffs are 
in force and between Mitsiwa and Asmera where the railway controls freight 
movements. Freight charges are relatively low due to considerable competi-
tion on most main routes. During negotiations, an assurance was obtained 
from the Government that it will continue to enforce vehicle weight and 
dimension regulations.
3.05 Rural traffic movement is recorded by the IHA at 48 counting stations, each surveyed manually twice in the dry season and once in the wet season. These surveys continue to be carried out only in daylight, with no mechanical checking. No origin and destination studies are regularly carried out by IHA, although some statistical data were prepared in the GRS. With increasing sophistication in planning roads, the present system of data collection needs further improvement and the Government has agreed to improve methods of traffic data collection.

C. Administration (see Chart)

3.06 The IHA, created in 1951, to develop and maintain the highway network, is divided into nine districts and two sub-districts, each with its own workshops and administrative offices under a district engineer. The governing body is a Board of Commissioners comprising the Minister of Public Works as chairman, the Vice Minister of Finance, the Vice Minister of Commerce and Industry, and two other members appointed by the Emperor. One of these members is the IHA General Manager, a qualified engineer.

3.07 From the IHA's inception until mid-1963, staff of the United States Bureau of Public Roads assisted in management. In May 1963 Ethiopians assumed the management, supported by foreign managerial and technical advisers from consulting firms employed under individual contracts which ended in 1967. The tendency of IHA to depend on foreigners is being overcome and during the past 2-3 years Ethiopian staff has been replacing foreigners. Ethiopianization will continue to be encouraged by the Bank as formal and on-the-job training produces improved local staff.

3.08 In 1966 the Bank Group arranged for a United States firm of management consultants, Public Administration Service (PAS), to investigate thoroughly the organization and administration of IHA. The IHA asked the PAS to assist in carrying out the recommendations of the investigations, and funds were provided for this purpose under the Fourth Highway Project. The recommendations have generally been carried out satisfactorily but difficulties have arisen in implementing certain improvements, particularly in the Equipment and Supplies Division, mainly because failure to implement some management directives has led to lack of coordination in interdivisional activities. The proposed project contains funds for two experts; one to assist IHA further in the implementation of PAS's general organizational recommendations (including technical auditing and costing) and the other to assist in the implementation of procedural recommendations for the IHA's Equipment and Supplies Division. During negotiations the Government gave assurances that it would take the necessary action to improve the implementation of IHA management directives and the supervision of IHA divisional and district operations.

D. Planning and Financing

3.09 In the past, only limited road planning to prepare Five-Year Development Plans has been carried out by the IHA Planning and Programming
Division. The third Plan is now in its fourth year. The Division is now using more sophisticated economic methods to plan road construction projects and needs to be strengthened (para. 2.11). The PCO is becoming increasingly active in coordinating road planning with planning in other economic sectors.

3.10 The IHA Planning and Programming Division prepares the highway budget. After approval by the IHA Board of Commissioners, capital expenditures for particular projects are reviewed by the PCO and ordinary expenditures (administrative, engineering and technical services, and maintenance), by the Ministry of Finance. Highway construction and maintenance expenditures have increased from approximately US$21.2 million equivalent for FY1967/68 to an allocation of US$38 million equivalent for FY1971/72. Details of budgets and expenditures are shown in Table 4. Expenditures are financed by domestic general revenue funds and foreign loans and credits.

3.11 After Parliament approves or modifies the budget, the Ministry of Finance disburses funds. Once the IHA receives the funds, they are solely within the control of the General Manager. The Ministry of Finance audits IHA financial accounts, but no technical auditing takes place. Partly in consequence, costing in IHA is virtually meaningless as no inspection of the technical works costed is done. During negotiations, the Government gave an assurance that effective technical auditing and costing of IHA operations, along the lines of the PAS recommendations, would be implemented. The expert to be provided under the project to assist in the implementation of PAS organizational recommendations will assist IHA in this regard (para. 3.08).

E. Engineering

3.12 The IHA Design Division is carrying out an increasing amount of road design, but consultants still carry out some designs and supervise new major road works. The quality of work produced by the Design Division is generally reasonable, but a tendency exists to apply design standards too rigidly. Therefore, continued technical assistance is needed to advise the Design Division on proper design techniques and to review their work; funds for this purpose are included in the proposed project (para. 4.05).

3.13 Design standards, shown in Table 5, are generally satisfactory for the classes of road for which they are intended although, certain aspects of the general standards, related mainly to geometrics, need to be amended; this matter was discussed and agreed during negotiations for the roads included in the project.

3.14 More use of local materials and adjustments in design and construction practices to take advantage of subsurface conditions could lead to improved road structure and, in some cases, to substantial cost savings in construction and maintenance. Therefore, the proposed project includes funds for an expert and equipment to undertake research and develop recommendations for design and construction practices related to local materials and sub-surface conditions (paras. 4.05 and 4.07).
F. Construction

3.15 Past major road construction has been carried out by foreign contractors supervised by consultants. However, under the Fourth Highway Project, local IHA staff supervised the bituminous surfacing of two roads; the result was generally satisfactory. Two other large construction contracts, awarded to foreign contractors under that project and supervised by foreign consultants with a number of IHA staff attached for training, are progressing well. For the purpose of further training the Government has requested, and the Association has agreed, that IHA staff participate more fully in the supervision of the construction of the project roads under the supervision of experts financed under the project.

3.16 Some road construction could be carried out by competent local civil works contractors who appear to be interested in expanding into roadworks. However, they generally lack experience in pricing, administering, and executing roadworks and, therefore, funds have been included in the proposed project for training of local contractors (para. 4.06). Local contractors also generally lack the funds to purchase needed basic equipment and have considerable difficulties borrowing privately. The project, therefore, includes funds with which to purchase needed equipment to be loaned to local contractors who are successful in bidding for roadworks. The loan funds will be administered by the Agricultural and Industrial Development Bank (AIDB) through which Bank Group funds are being channeled in other projects and which the Bank Group considers to be a suitable and dependable organization. Confirmation of the AIDB's interest in administering these loan funds has been obtained and detailed procedures to be followed regarding contractor qualification, loan guarantees, etc. were discussed and agreed during negotiations. Continuity of work is essential to encourage contractor development, and an assurance that the IHA will plan their future construction programs accordingly was obtained during negotiations.

G. Maintenance

3.17 The IHA Operation Division, under the overall supervision of the Chief Engineer, performs road maintenance. In the last fiscal year, an average of about US$600 equivalent per km was allocated for road maintenance, excluding equipment depreciation and salaries of IHA permanent staff employed on maintenance work. If salaries were included in the total sum, the amount probably would exceed US$635 per km, which is considered more than ample if all were used for maintenance. However, some funds have been used to produce materials to upgrade existing roads to higher standards and other funds have been used to supplement road construction works lacking adequate capital funds. The quality of maintenance depends partly on the individual field engineer in charge. In most cases, headquarters staff do not provide proper direction and control. During negotiations, an assurance was obtained from the Government that it will spend funds allocated to the IHA for maintenance for that purpose, establish proper costing and technical auditing procedures, and improve headquarters supervision and coordination of district operations. IHA gave a further assurance that it would submit to the Association a detailed quarterly report on road maintenance expenditures and work output.
3.18 A condition inventory of the road network to be maintained by IHA is under preparation. However maintenance standards need to be established and maintenance operations and techniques require improvement. The US A.I.D. has provided finance for an ongoing study of the problems of providing better road maintenance. The first phase of the study has been completed and has identified emergency road maintenance equipment which US A.I.D. are to finance under their project (see Annex B). The second and final phase of the study is expected to be available at the end of 1972 and will provide a realistic routine and periodic road maintenance program between 1973 and 1977 and related budget allocation needs. During negotiations, an assurance was obtained from the Government that it will implement the study recommendations as agreed between the Government and the Association and in accordance with a time schedule acceptable to the Association. The Government has requested, and the Association has agreed, that two foreign experts be provided under the project to assist IHA in the improvement of road maintenance organization, operations and techniques, and in the implementation of the recommendations of the road maintenance study.

3.19 Recognizing that operations for the maintenance of road equipment need improvement, US A.I.D. has provided the IHA with a US$3.5 million loan for technical assistance, tools, and spare parts to reorganize and improve equipment maintenance and to train local personnel in planning and organizing their work. Progress under this loan is satisfactory. All 12 of the technical assistance personnel have started work and have compiled a list of required workshop tools and spare parts. Tools and spare parts have been ordered and are expected about mid-1972; the percentage of deadlined equipment has already decreased by about 10%. Training of local personnel will not be completed by mid-1973 when this aspect of the present US A.I.D. scheme ends, and US A.I.D. has agreed to extend its technical assistance in this field.

H. Training

3.20 Recognizing that the local labor market could not meet the skilled manpower needs of the IHA, a training center was established in 1956 to provide the necessary skills for road construction and maintenance and today nearly 3,900 have been trained there. In addition, some 400 senior employees have received advanced training in schools and universities in Ethiopia and abroad.

3.21 The training center is located in Alemgana, near Addis Ababa, and comprises classrooms, library, dormitories and mess facilities equipped to handle 70 trainees at a time. The facilities include training aids and equipment demonstration models, some of which are out of date and need modernizing. Additional aids and books are also needed. While some of the courses are well organized, others need to be revised to meet modern conditions. Courses are planned for local contractors in subjects such as costing, organization, and bidding procedures. The proposed project includes funds for these purposes. The provision of an expert to further plan and reorganize training programs is being planned under the extended US A.I.D. Technical Assistance Program (para. 3.19).
IV. THE PROJECT

A. Description

4.01 The proposed project consists of:

(i) construction and supervision of six gravel feeder roads (about 430 km);

(ii) technical assistance by consultants to the PCO to study rural roads (farm-to-highway) and recommend the organization necessary for planning, financing, constructing, and maintaining these roads and to help carry out the recommendations;

(iii) technical assistance by consultants to the IHA for management, road maintenance, design, planning, and research;

(iv) aid to the local road contracting industry; training in costing, organization, and bidding procedures, and loan funds for equipment purchases by successful local bidders for road works; and

(v) purchases of equipment for training, and for materials research.

Consultants and technical experts for items (i) - (iv) are expected to be provided from outside Ethiopia. During negotiations, the terms of reference for these services were generally discussed and agreed by the Association and the Government. An assurance was obtained from the Government that it will retain consulting firms and individual experts for these services under terms and conditions satisfactory to the Association.

4.02 Details are given in Annex B of those project elements appraised by the Bank Group mission and subsequently proposed for financing by US A.I.D. under a separate project. These elements comprise: (i) upgrading and bituminous surfacing to IHA primary road standards of three roads including supervision; and (ii) procurement of emergency road maintenance equipment.

(a) Gravel Roads to be Constructed to IHA Feeder Road Standards

4.03 The following roads will be constructed:

(i) Asela-Dodola (120 km);
(ii) Bonga-Mizan Teferi (80 km);
(iii) Agaro-Ghera-Chira (48 km);
(iv) Dejen-Mota (96 km);
(v) Gelemso-Mechara (42 km); and
(vi) Butajira Ziway (48 km).
The roads are described in detail in Annex C and the design standards in Table 5; the standards are satisfactory. Most feasibility studies and all detailed engineering of these roads were completed by IHA staff, assisted by Bank Group pre-appraisal missions. The feasibility study of the Bonga-Mizan Teferi Road was completed by consultants (Sauti, Italy), under the Fourth Highway Project.

(b) Technical Assistance to the PCO

4.04 To assist the Government in completing a study to identify the structure, staffing and policies of an organization capable of administering, planning, constructing, and maintaining farm-to-highway roads and to assist in implementing the findings (para. 2.12), two foreign experts (an administrator and an engineer) will provide assistance for two years. They will be attached to the PCO.

(c) Technical Assistance to the IHA

4.05 An estimated 12 man-years of technical assistance for management, training, design, planning, and research will be provided as follows:

(i) an expert to continue advise and assistance on reorganization procedures and help implement improved technical auditing and costing (paras. 3.08 and 3.11);

(ii) two experts to advise and assist in the improvement of road maintenance organization, operations and techniques (para. 3.18);

(iii) a design expert to assist in improving the quality of design work (para. 3.12);

(iv) a planning expert to advise the Planning and Programming Division on improved planning procedures (para. 2.11);

(v) an expert on road construction materials to undertake research to develop pavement design and construction practices related to local materials and sub-surface conditions (para. 3.14); and

(vi) an expert to assist on coordinating the procurement, storage and workshop procedures of IHA's Equipment and Supplies Division (para. 3.08).

(d) Aid to the Local Contracting Industry

4.06 To train local contractors in subjects such as costing, organization, and bidding procedures for road construction contracts (para. 3.16),
a construction expert will be available for two years. The training will be carried out at the IHA Training Center at Alemgana. Funds will also be provided under the project from which successful domestic bidders on roadworks may borrow to purchase essential construction equipment. These loans will be subject to commercial interest rates and will be administered by the AIDB (para. 3.16). The execution and delivery of a Subsidiary Loan Agreement between the Government and the AIDB in conformity with provisions agreed with the Association during negotiations, is a condition of Credit effectiveness.

(e) **Purchases of Equipment**

4.07 Equipment to be purchased under the project includes:

(i) additional training equipment and materials to bring up-to-date several courses at Alemgana Training Centre, near Addis Abeba (para. 3.21); and

(ii) research equipment to develop pavement design and construction practices related to local materials and sub-surface conditions (para. 3.14).

**B. Cost Estimates and Financing**

4.08 The total project cost, including contingencies, is estimated at US$22.0 million, with a foreign exchange component of US$14.0 million. A summary of the project costs is given on page 13.

4.09 Costs of road construction are based on detailed engineering estimates prepared by the IHA and revised by the appraisal mission to include necessary additional drainage and protection works (see Table 6). The estimates are based on unit prices obtained recently in bidding for similar works in Ethiopia adjusted to reflect costs expected at time of bidding. For technical assistance, including aid to local contractors, cost estimates are based on current cost figures available in the Bank for comparable services. The cost provision for loans for contractor equipment purchases is notional. Contingency allowances totaling about 24% are included for the construction and equipment purchase elements of the project; 10% for possible quantity increase and about 14% for price escalation. The 14% allowance for price increases is based on a 10% p.a. increase in local and foreign costs over the implementation periods for the various project elements with the rates for local and foreign costs assumed to be the same. For construction supervision and technical assistance a physical contingency allowance of 10% is considered adequate. During negotiations, the Association and the Government discussed and agreed on the cost estimates.

4.10 The foreign exchange component for gravel road construction is estimated at 60% with foreign contractors and at 50% with Ethiopian contractors. The foreign exchange cost of supervision of construction is estimated at 55%. This is based on the Government's request that consultants provide
<table>
<thead>
<tr>
<th>Component</th>
<th>Eth. $ thousand</th>
<th>US$ thousand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local</td>
<td>Foreign</td>
</tr>
<tr>
<td>I. Gravel Road Construction</td>
<td>13,290</td>
<td>19,935</td>
</tr>
<tr>
<td>II. Supervision of I</td>
<td>1,495</td>
<td>1,826</td>
</tr>
<tr>
<td>III. Technical Assistance to the:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) PCO; and</td>
<td>57</td>
<td>329</td>
</tr>
<tr>
<td>b) IHA, Including Local Contractor Training</td>
<td>193</td>
<td>1,104</td>
</tr>
<tr>
<td>Sub-total III</td>
<td>250</td>
<td>1,433</td>
</tr>
<tr>
<td>IV. Equipment Purchases</td>
<td>9</td>
<td>451</td>
</tr>
<tr>
<td>V. Loan Funds for Equipment Purchases</td>
<td>-</td>
<td>3,450</td>
</tr>
<tr>
<td>VI. Contingency Allowances:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) On items I-IV - 10% Physical</td>
<td>1,503</td>
<td>2,363</td>
</tr>
<tr>
<td>b) On items I and IV about 14% Price</td>
<td>1,853</td>
<td>2,742</td>
</tr>
<tr>
<td>Sub-total VI</td>
<td>3,356</td>
<td>5,105</td>
</tr>
<tr>
<td>Total Project Cost</td>
<td>18,400</td>
<td>32,200</td>
</tr>
</tbody>
</table>

1/ Construction cost estimates for individual roads are shown in Table 6.
the responsible resident engineering personnel on the contract sites, and
that the remaining supervisory personnel be provided by IHA, according to a
staffing plan to be agreed between the IHA and the Association (para. 3.15).
The foreign exchange component for technical assistance to the PCO and IHA,
including training of local contractors, is 85%. For equipment purchases
the foreign exchange component is 98% and for loans to domestic contractors
100%.

4.11 The proposed credit will finance US$14.0 million of foreign cost
and US$3.0 million of the local costs of the project. During negotiations
an assurance was obtained that the Government will provide the remaining lo-
cal costs of US$5.0 million.

C. Execution

4.12 The IHA, assisted by consultants under the project, will be re-
sponsible for executing all project items except the rural roads study, for
which the PCO will be responsible, and the equipment loans to Ethiopian con-
tractors which will be handled by the AIDB.

4.13 The contracts for the civil works will be let on the basis of unit
prices after international competitive bidding in accordance with the Bank
Group’s Guidelines on Procurement. To attract foreign bidders, as well as
to permit local contractors to tender for works of a size within their ca-
pabilities, contracts will be combined into bidding groups whose totals
would range between about US$900,000 and US$5.8 million. A contracting
proposal, shown in Annex D, was reviewed and agreed with Government during
negotiations.

4.14 It is expected that all road construction will be underway by mid-
1973 and completed by mid-1976; all right-of-way for road construction has
been acquired. Technical assistance, including aid to local contractors,
should begin by early 1973 and be completed in about two years. Equipment
should be purchased by mid-1973. During negotiations, the Bank Group and
the Government discussed and agreed the timing of project execution.

4.15 Some unemployment exists in Ethiopia principally in the major urban
areas of Asmera and Addis Abeba but reliable statistics on the magnitude are
not available. In general, the IHA prefers that major road construction be
carried out by mainly equipment intensive methods. Their standard specifi-
cation, however, permit contractors to use alternative methods of construction
whereby more labor can be utilized provided quality standards are met. More
labor intensive construction methods could be applied on low-class rural
(farm-to-highway) roads and the study of such roads to be carried out under
this project (para. 2.12) will make recommendations on this aspect.

D. Disbursements

4.16 Disbursements from the Credit Account will be on the basis of
75% of the cost of road construction and supervision, the actual foreign ex-
change costs of technical assistance and consulting services and the CIF
costs of equipment for training, and materials research, and for the equip-
ment loans to Ethiopian contractors either 100% of the CIF costs of equip-
ment financed under the loans or 100% of such loans net of any payments to
finance import duties, transaction taxes or any other taxes. Based on the
foregoing and on the schedule of project execution in para. 4.14, an Esti-
mated Schedule of Disbursements has been prepared. The Schedule, shown in
Annex E, was reviewed and agreed in conjunction with the timing of project
execution (para. 4.14) during negotiations. Any surplus funds remaining in
the Credit Account after the project has been completed will be cancelled.

V. ECONOMIC EVALUATION

5.01 Economic analysis showed the project to be well justified. The six
project roads to be constructed have a combined Economic Return (ER) on in-
vestment of 23%, with individual ER's from 16% to 43%. Details are given in
Table 7.

5.02 Five of the six roads to be constructed are the initial planned
development for their respective areas. The sixth road (Asela-Dodola) com-
pletes an existing agricultural extension project financed by the Swedish
International Development Agency (SIDA). For the first five roads, agricul-
tural extension services to improve crop yields and guide development are
considered to be a mandatory part of the project. During negotiations an
assurance was obtained that the Government would establish Minimum Package
Programs (MPP's) on these roads on completion of their construction.

5.03 For these five roads, it is impossible to differentiate between
the benefits of the road and those of the MPP. The analysis, therefore, com-
pared the net benefits of the road and MPP with the costs of the road and
the cost of the MPP, including inputs such as fertilizer. As no reliable
traffic flow data are available for these developmental roads, the basic
tool of the analysis was an equilibrium agricultural model which estimated
production surpluses. Briefly, the model related: population, area cul-
tivated (and maximum area of road influence), yields, losses, and consumption;
the result was a marketable surplus. Existing and future traffic was esti-
mated on the basis of the surplus and IHA and GRS statistics on truck load
factors and the relation between trucks and other vehicles. Benefits to
existing traffic and generated non-agricultural traffic were estimated by
comparing estimates of existing transport cost by four-wheel-drive vehicles
or pack animals with cost on the proposed road. The value-added of the net
increase in marketable surplus was calculated using estimated import parity
prices at the farm gate with the new roads. Adding the agricultural value
added to the benefits to existing and generated traffic gives the total bene-
fits which are expressed on Table 7 as an ER on the investment in roads and
MPP's.

5.04 For analysis of the Asela-Dodola Road, agricultural production was
used only to forecast local traffic. The benefits of agricultural develop-
ment in the area are not attributable to road investment but to the existing
investment in extension services. Hence, this road is economically justified on savings in vehicle operating costs for local and through traffic. Through traffic was estimated from GRS origin and destination information.

5.05 Estimated costs of construction, maintenance, and vehicle operation were calculated at economic cost using factors developed in the GRS relating financial and economic costs. Construction costs used in the analysis included quantity contingencies and supervision.

5.06 Sensitivity analyses were carried out to determine the effect on the ER of changes in values of parameters affecting agricultural production, consumption, prices, and costs of construction. A 10% change in agricultural production, consumption, and surplus resulted in an average change on the ER of about 5%. A 10% change in construction costs changed the ER about 7%. A 25% change in the upgrading and surfacing costs change the ER about 20%. None of the effects produced by these analyses are critical for the investment decision.

5.07 Benefits were not quantified for the proposed investments in: technical assistance to the PCO and IRA; aid to the local road contracting industry; and equipment purchases for training and materials research. As discussed in Chapter III, these elements are essential for efficient operations and further improvements in the highway sector and, therefore, are considered fully justified.

VI. RECOMMENDATIONS

6.01 During negotiations, the Government gave assurances that it will:

(i) enter into a Subsidiary Loan Agreement with AIDB for the purpose of onward lending to Ethiopian contractors, in conformity with provisions agreed with the Association (paras. 4.06 and 6.02);

(ii) spend funds allocated to the IHA for maintenance for that purpose, establish proper costing and technical auditing methods, and improve headquarters supervision and coordination of district operations (para. 3.17);

(iii) implement the US A.I.D. maintenance study recommendations as agreed with the Association and in accordance with a time schedule acceptable to the Association (para. 3.18);

(iv) implement the recommendations of the rural road study in accordance with a time schedule acceptable to the Association (para. 2.12); and

(v) establish MPP's on the project roads following completion of their construction (para. 5.02).
6.02 A condition of credit effectiveness is the execution and delivery of the Subsidiary Loan Agreement between the Government and AIDB.

6.03 The project constitutes a suitable basis for an IDA credit of US$17.0 million on the usual terms to Ethiopia.
## Table 1

**APPRAISAL OF A FIFTH HIGHWAY PROJECT ETHIOPIA**

### Road Inventory, 1961/62-1970/71 (km)

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Asphalt</th>
<th>Gravel</th>
<th>Earth</th>
<th>Total</th>
<th>Dry-Weather Trails</th>
<th>Total All-Weather Roads and Dry-Weather Trails</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961/62</td>
<td>1,065</td>
<td>3,250</td>
<td>0</td>
<td>4,315</td>
<td>18,685</td>
<td>23,000</td>
</tr>
<tr>
<td>1962/63</td>
<td>1,244</td>
<td>3,578</td>
<td>0</td>
<td>4,822</td>
<td>18,178</td>
<td>23,000</td>
</tr>
<tr>
<td>1963/64</td>
<td>1,244</td>
<td>3,702</td>
<td>0</td>
<td>4,946</td>
<td>18,054</td>
<td>23,000</td>
</tr>
<tr>
<td>1964/65</td>
<td>1,455</td>
<td>3,869</td>
<td>137</td>
<td>5,661</td>
<td>17,539</td>
<td>23,000</td>
</tr>
<tr>
<td>1965/66</td>
<td>1,526</td>
<td>3,778</td>
<td>451</td>
<td>5,755</td>
<td>17,245</td>
<td>23,000</td>
</tr>
<tr>
<td>1966/67</td>
<td>1,868</td>
<td>4,257</td>
<td>657</td>
<td>6,782</td>
<td>16,218</td>
<td>23,000</td>
</tr>
<tr>
<td>1967/68</td>
<td>1,875</td>
<td>4,666</td>
<td>626</td>
<td>7,167</td>
<td>15,833</td>
<td>23,000</td>
</tr>
<tr>
<td>1968/69</td>
<td>1,942</td>
<td>4,805</td>
<td>626</td>
<td>7,373</td>
<td>15,627</td>
<td>23,000</td>
</tr>
<tr>
<td>1969/70</td>
<td>2,009</td>
<td>4,943</td>
<td>626</td>
<td>7,578</td>
<td>15,422</td>
<td>23,000</td>
</tr>
<tr>
<td>1970/71</td>
<td>2,078</td>
<td>5,341</td>
<td>626</td>
<td>8,045</td>
<td>14,955</td>
<td>23,000</td>
</tr>
</tbody>
</table>

1/ Surfaced with crushed stone.

2/ Service roads, surfaced with selected material.

Source: Imperial Highway Authority, November 1971

June 14, 1972
## APPRAISAL OF
### A FIFTH HIGHWAY PROJECT
#### ETHIOPIA

**Vehicle Fleet, 1965/66 - 1969/70**

(Units)

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Cars</th>
<th>Buses</th>
<th>Trucks</th>
<th>Pick-ups</th>
<th>Trailers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965/66</td>
<td>27,644</td>
<td>2,291</td>
<td>2,071</td>
<td>2,171</td>
<td>1,705</td>
<td>35,882</td>
</tr>
<tr>
<td>1966/67</td>
<td>30,767</td>
<td>2,611</td>
<td>2,740</td>
<td>2,428</td>
<td>1,946</td>
<td>40,492</td>
</tr>
<tr>
<td>1967/68</td>
<td>31,718</td>
<td>2,726</td>
<td>2,766</td>
<td>2,141</td>
<td>2,050</td>
<td>41,709</td>
</tr>
<tr>
<td>1968/69</td>
<td>31,700</td>
<td>2,958</td>
<td>3,001</td>
<td>2,690</td>
<td>2,051</td>
<td>42,103</td>
</tr>
<tr>
<td>1969/70</td>
<td>31,162</td>
<td>3,099</td>
<td>2,857</td>
<td>3,041</td>
<td>2,068</td>
<td>42,227</td>
</tr>
</tbody>
</table>

Average Annual Growth Rate (%)

<table>
<thead>
<tr>
<th></th>
<th>Cars</th>
<th>Buses</th>
<th>Trucks</th>
<th>Pick-ups</th>
<th>Trailers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965/66-69/70</td>
<td>3.1</td>
<td>7.9</td>
<td>8.4</td>
<td>8.8</td>
<td>4.9</td>
<td>4.2</td>
</tr>
<tr>
<td>1966/67-69/70</td>
<td>0.4</td>
<td>5.9</td>
<td>1.4</td>
<td>7.8</td>
<td>2.1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Source: General Road Study and Planning Commission, November 1971

June 14, 1972
### APPRAISAL OF
### A FIFTH HIGHWAY PROJECT
### ETHIOPIA

Vehicle Fuel Consumption, 1965-70 (thousand m tons)

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>Gasoline</th>
<th>Diesel</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>49,560</td>
<td>83,830</td>
<td>133,390</td>
</tr>
<tr>
<td>1966</td>
<td>55,901</td>
<td>101,204</td>
<td>157,105</td>
</tr>
<tr>
<td>1967</td>
<td>59,450</td>
<td>110,360</td>
<td>169,810</td>
</tr>
<tr>
<td>1968</td>
<td>61,764</td>
<td>137,147</td>
<td>198,911</td>
</tr>
<tr>
<td>1969</td>
<td>66,394</td>
<td>147,242</td>
<td>213,636</td>
</tr>
<tr>
<td>1970(^1)</td>
<td>76,000</td>
<td>174,000</td>
<td>250,000</td>
</tr>
</tbody>
</table>

Average Annual Growth Rate

<table>
<thead>
<tr>
<th></th>
<th>Gasoline</th>
<th>Diesel</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965-69</td>
<td>8.5</td>
<td>15.6</td>
<td>12.5</td>
</tr>
</tbody>
</table>

\(^1\) Estimated

Source: BEICIP Study of Refinery Development in Ethiopia, November 1971

June 14, 1972
APPRAISAL OF
A FIFTH HIGHWAY PROJECT
ETHIOPIA

IHA Highway Budgets and Expenditures
(Eth. $ thousand)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I. A. SUBMITTED BUDGET</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEG Fund</td>
<td>51,489</td>
<td>55,128</td>
<td>51,145</td>
<td>69,608</td>
<td>84,874</td>
</tr>
<tr>
<td>Loan Fund</td>
<td>24,676</td>
<td>27,673</td>
<td>30,563</td>
<td>51,502</td>
<td>78,145</td>
</tr>
<tr>
<td>B. APPROVED BUDGET</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEG Fund</td>
<td>37,056</td>
<td>36,463</td>
<td>34,682</td>
<td>43,738</td>
<td>n.a.</td>
</tr>
<tr>
<td>Loan Fund</td>
<td>14,873</td>
<td>27,673</td>
<td>21,791</td>
<td>51,306</td>
<td>n.a.</td>
</tr>
<tr>
<td>II. A. RECEIPTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEG Fund</td>
<td>27,266</td>
<td>28,818</td>
<td>35,296</td>
<td>26,871</td>
<td>n.a.</td>
</tr>
<tr>
<td>Loan Fund</td>
<td>6,518</td>
<td>22,060</td>
<td>21,752</td>
<td>14,341</td>
<td>n.a.</td>
</tr>
<tr>
<td>Others</td>
<td>799</td>
<td>791</td>
<td>756</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Credit Granted</td>
<td>-</td>
<td>4,292</td>
<td>-</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Cash Balance (Opening)</td>
<td>1,916</td>
<td>2,043</td>
<td>4,546</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Total Cash Available</td>
<td>36,199</td>
<td>58,004</td>
<td>65,350</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Less: Cash Balance (End)</td>
<td>2,043</td>
<td>4,545</td>
<td>1,614</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Total Cash Applied</td>
<td>34,156</td>
<td>53,459</td>
<td>63,736</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

1/ Audit not complete for fiscal year 1971-72 and figure shows only receipts up to February 1972.

n.a. means not available
APPRAISAL OF
A FIFTH HIGHWAY PROJECT
ETHIOPIA

THA Highway Budgets and Expenditures
(Eth. $ thousand)

Fiscal Years

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Administration</strong></td>
<td>6,218</td>
<td>6,653</td>
<td>8,106</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td>1,674</td>
<td>1,855</td>
<td>2,874</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Construction: Force Account</strong></td>
<td>7,031</td>
<td>5,994</td>
<td>2,853</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Contract Work</strong></td>
<td>639</td>
<td>11,105</td>
<td>32,677</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>10,348</td>
<td>11,591</td>
<td>10,574</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Work in Progress</strong></td>
<td>147</td>
<td>482</td>
<td>401</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Fixed Assets</strong></td>
<td>3,696</td>
<td>1,821</td>
<td>2,525</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Clearance of Liability</strong></td>
<td>5,529</td>
<td>-</td>
<td>2,113</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Receivables</strong></td>
<td>578</td>
<td>18,246</td>
<td>3,195</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Total Expenditures</strong></td>
<td>35,860</td>
<td>57,747</td>
<td>65,318</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Excess of Expenditures Over Receipts**

|         | 1,404 | 4,288 | 1,582 |

---

1/ Receivables include 20% advances given from Loan Fund to Contractors on Fourth Highway Project.

2/ Excess of expenditures over receipts due to (i) use of cash balance from previous year to meet obligations incurred in that year during the first seven days of each fiscal year and (ii) fact that materials and supplies purchased in one year are not fully consumed in same year with difference held as warehouse inventory.

n.a. means not available.

June 14, 1972
### Table 5

**APPRAISAL OF**

**A FIFTH HIGHWAY PROJECT**

**ETHIOPIA**

**Design Standards**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Unit</th>
<th>Primary Flat</th>
<th>Primary Rolling</th>
<th>Secondary Flat</th>
<th>Secondary Rolling</th>
<th>Feeder Flat</th>
<th>Feeder Rolling</th>
<th>Feeder Mountainous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometric Design Standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td>km/h</td>
<td>100</td>
<td>80</td>
<td>60</td>
<td>90</td>
<td>70</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Minimum Horizontal Radius</td>
<td>m</td>
<td>327</td>
<td>229</td>
<td>127</td>
<td>287</td>
<td>164</td>
<td>57</td>
<td>229</td>
</tr>
<tr>
<td>Maximum Gradient</td>
<td>%</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Minimum Gradient</td>
<td>%</td>
<td>0.5</td>
<td>-</td>
<td>0.4</td>
<td>-</td>
<td>0.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pavement Camber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bituminous Surface</td>
<td>%</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Gravel Surface</td>
<td>%</td>
<td>-</td>
<td>n.a. 1/</td>
<td>-</td>
<td>n.a. 1/</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Roadway Features</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>m</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Pavement Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bituminous</td>
<td>m</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Gravel</td>
<td>m</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
<td>5</td>
</tr>
<tr>
<td>Structural Design Features</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Axle Loading</td>
<td>lbs</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>18,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bridges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loading</td>
<td>m.a.</td>
<td>-</td>
<td>-</td>
<td>AASHO</td>
<td>H.20-3.16</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>width, curb to curb</td>
<td>m</td>
<td>-</td>
<td>-</td>
<td>7.32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

1/ where primary and secondary roads are constructed with gravel surfaced pavement as initial stage construction, the pavement camber will be 4%.

n.a. means not applicable.

Source: Imperial Highway Authority, November 1971.

June 14, 1972
## APPRAISAL OF

A FIFTH HIGHWAY PROJECT

ETHIOPIA

Feeder Road Construction Cost Estimates

<table>
<thead>
<tr>
<th>Road Construction by Contract</th>
<th>Length (km)</th>
<th>Eth.$ thousand</th>
<th>US$ thousand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local</td>
<td>Foreign</td>
<td>Total</td>
</tr>
<tr>
<td>(i) Asela-Dodola</td>
<td>120</td>
<td>2,570</td>
<td>3,853</td>
</tr>
<tr>
<td>(ii) Bonga-Mizan Teferi</td>
<td>80</td>
<td>3,807</td>
<td>5,710</td>
</tr>
<tr>
<td>(iii) Agaro-Gera-Chira</td>
<td>48</td>
<td>1,996</td>
<td>2,996</td>
</tr>
<tr>
<td>(iv) Dejen-Mota</td>
<td>96</td>
<td>2,148</td>
<td>3,222</td>
</tr>
<tr>
<td>(v) Gelemso-Mechara</td>
<td>42</td>
<td>1,877</td>
<td>2,815</td>
</tr>
<tr>
<td>(vi) Butajira-Ziway</td>
<td>48</td>
<td>892</td>
<td>1,339</td>
</tr>
<tr>
<td>Total</td>
<td>434</td>
<td>13,290</td>
<td>19,935</td>
</tr>
</tbody>
</table>

Source: Imperial Highway Authority and Appraisal Mission, June 1972
### APPRAISAL OF
### A FIFTH HIGHWAY PROJECT
### ETHIOPIA

**Economic Analysis**

<table>
<thead>
<tr>
<th>Road</th>
<th>Length (km)</th>
<th>Construction Cost (1972 Prices) (US$ thousand)</th>
<th>Average Annual Agricultural Cost (US$ thousand)</th>
<th>ADT</th>
<th>ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel Roads to be Constructed to IHa Feeder Road Standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asela-Dodola</td>
<td>120</td>
<td>27.8</td>
<td>3,350</td>
<td>401</td>
<td>16</td>
</tr>
<tr>
<td>Bonga-Mizan Teferi</td>
<td>80</td>
<td>62.1</td>
<td>4,965</td>
<td>547</td>
<td>122</td>
</tr>
<tr>
<td>Agaro-Gera-Chira</td>
<td>48</td>
<td>53.2</td>
<td>2,604</td>
<td>557</td>
<td>108</td>
</tr>
<tr>
<td>Dejen-Mota</td>
<td>96</td>
<td>29.2</td>
<td>2,802</td>
<td>487</td>
<td>94</td>
</tr>
<tr>
<td>Gelemso-Mecchara</td>
<td>42</td>
<td>58.4</td>
<td>2,148</td>
<td>610</td>
<td>146</td>
</tr>
<tr>
<td>Butajira-Ziway</td>
<td>48</td>
<td>24.2</td>
<td>1,164</td>
<td>440</td>
<td>146</td>
</tr>
</tbody>
</table>

Note: n.a. means not applicable

Source: Appraisal Mission, June 1972

June 14, 1972
APPRAISAL OF
A FIFTH HIGHWAY PROJECT
ETHIOPIA

Highway Projects Financed by the Bank Group

A. First Highway Project, Loan 31-ET, September 1950 (US$5 million)

1. Purchases of urgently needed equipment for reconstruction and maintenance of the road network were financed. This project was completed satisfactorily, and the loan fully disbursed.

B. Second Highway Project, Loan 166-ET, June 1957 (US$15 million)

2. Foreign exchange costs were financed for:
   (a) constructing of main roads (about 850 km); and
   (b) engineering by consultants of roads for future construction (about 1,000 km).

Execution of this project was delayed mainly due to disagreement between the Imperial Highway Authority (IHA) and the Ministry of Finance over the funds needed to complete it. Road construction was satisfactorily completed in 1968.

C. Third Highway Project, Credit 35-ET, February 1963 (US$13.5 million)

3. Foreign costs were financed for:
   (a) completing road construction started under the Second Highway Project;
   (b) constructing new roads (about 210 km) and several bridges;
   (c) bituminous surfacing of roads (about 800 km); and
   (d) consulting services to:
      (i) replace staff of the United States Bureau of Public Roads in IHA management; and
      (ii) carry out economic and engineering studies of a road through the Awash Valley.
This project was completed, but substantial claims by contractors are currently under arbitration.

D. **Fourth Highway Project, Loan 523-ET (US$13.5 million) and Credit 111-ET (US$7.7 million), January 1968**

4. Foreign costs were financed for:
   
   (a) constructing main roads (about 420 km);
   
   (b) asphaltic paving of existing main roads (about 170 km); and
   
   (c) consulting services for feasibility studies of further roads, advice to the IHA, technical assistance, and training.

The Swedish Government also provided a US$5.8 million credit for this project, bringing the total foreign participation to US$27 million. Some delays in the commencement of the project resulted from slow progress in the preparation of acceptable tender documents and contractors prequalification and the small number of responses to the first tender necessitated a second tender with some changed conditions. Road contracts were finally signed in July and August 1969 and work is now progressing satisfactorily. The two road paving contracts were recently completed ahead of schedule, one road construction contract is well ahead of schedule and the other is on schedule.
APPRAISAL OF
A FIFTH HIGHWAY PROJECT
ETHIOPIA

US A.I.D. Financed Project
(Originally Appraised by Bank Group Mission)

1. The Project

The project comprises:

(A) Upgrading and bituminous surfacing of the following roads; feasibility studies and plans were prepared by IHA:

(i) Weliso-Jima (223 km)

(ii) Agaro-Bedele (95 km)

(iii) Nekemte-Gimbi (111 km).

(B) Supervision of Construction.

(C) Emergency road maintenance equipment.

2. Description

The Weliso-Jima road is the unsurfaced part of the Addis Abeba-Jima road, constructed with Bank Group assistance to primary road standards under the First Highway Project. This improvement will provide a bituminous surfaced road between Addis Abeba to Jima and thence to Agaro (the Jima-Agaro road was bituminous surfaced with Bank Group assistance under the Fourth Highway Project). The Nekemte-Gimbi and Agaro-Bedele roads were constructed to gravel surfaced standards with Bank Group assistance under the Third Highway Project. The emergency road maintenance equipment was identified in the first phase of an ongoing US A.I.D. financed Road Maintenance Study (para. 3.18).
3. **Cost Estimates**

<table>
<thead>
<tr>
<th>Component</th>
<th>Local</th>
<th>Foreign</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Road Surfacing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) Weliso-Jima</td>
<td>1,613</td>
<td>3,202</td>
<td>4,815</td>
</tr>
<tr>
<td>(ii) Agaro-Bedele</td>
<td>490</td>
<td>973</td>
<td>1,463</td>
</tr>
<tr>
<td>(iii) Nekemte-Gimbi</td>
<td>425</td>
<td>845</td>
<td>1,270</td>
</tr>
<tr>
<td></td>
<td>2,528</td>
<td>5,020</td>
<td>7,548</td>
</tr>
<tr>
<td>Contingencies - 25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10% Physical and 15% Price escalation)</td>
<td>670</td>
<td>1,331</td>
<td>2,001</td>
</tr>
<tr>
<td>Sub-total (A)</td>
<td>3,198</td>
<td>6,351</td>
<td>9,549</td>
</tr>
<tr>
<td>(B) Supervision of Construction</td>
<td>430</td>
<td>405</td>
<td>835</td>
</tr>
<tr>
<td>Contingency - 5%</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Sub-total (B)</td>
<td>450</td>
<td>425</td>
<td>875</td>
</tr>
<tr>
<td>(C) Emergency Road Maintenance Equipment (including 10% for spare parts)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Procurement</td>
<td>-</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>2,275</td>
<td>2,275</td>
</tr>
<tr>
<td>Contingency</td>
<td>-</td>
<td>225</td>
<td>225</td>
</tr>
<tr>
<td>Sub-total (C)</td>
<td>-</td>
<td>2,500</td>
<td>2,500</td>
</tr>
<tr>
<td>Total (A), (B), and (C)</td>
<td>3,648</td>
<td>9,275</td>
<td>12,924</td>
</tr>
</tbody>
</table>

4. **Financing**

US A.I.D. financing of an amount of US$9.3 million will cover the foreign exchange costs of the project.
5. Economic Evaluation

Existing ADT is 111 vehicles on Nekemte-Gimbi road, 185 vehicles on Agaro-Bedele road and 224 vehicles on Weliso-Jima road. Growth rates forecast in the CRS are about 10%, 7% and 6% respectively. Investments in upgrading and bituminous surfacing are well justified on benefits from savings in vehicle operating costs and maintenance costs.
APPRAISAL OF
A FIFTH HIGHWAY PROJECT
ETHIOPIA

Description of the Project Roads

A. Gravel Roads to be Constructed to Feeder Road Standards of the Imperial Highway Authority (IHA):

1. Asela-Dodola (120 km): The road will replace a dry weather track in a rich agricultural area now being developed with aid from the Swedish Government. It is economically justified on savings in transport costs for local and through traffic.

2. Bonga-Mizan Teferi (80 km): This road, passing through partly forested hilly terrain, will link the coffee-rich Mizan Teferi area with the all-weather road system. It will replace a pack-animal track and meet the Bonga-Jima Road, built under the Second Highway Project. The influence area is fertile, well-watered, and potentially rich in tea, coffee, and grain. The local agricultural system, together with extension services provided in a Minimum Package Program (MPP), will result in considerable benefits from agricultural development (excluding tea). Investments in the road and MPP are economically justified on these benefits as well as on savings in transport costs.

3. Agaro-Chera-Chira (48 km): The road will link Ghera and Chira to the all-weather road system at Agaro. The influence area is hilly and well-watered. Agriculture is partly developed between Agaro and Ghera and expanding between Ghera and Chira. A MPP will permit intensification and guide development, mainly of grain and coffee. Investments in the road and MPP are economically justified on benefits from increased agricultural production and savings in transport costs for existing and generated non-agricultural traffic.

4. Dejen-Mota (96 km): Construction of about 35 km of the road will complete previous construction to formation level. It will join Mota to the all-weather road system at Dejen on the Addis Abeba-Gonder Road. This completely developed area will require a MPP with the road to increase exports of agricultural surpluses. Investments in the road and MPP are well justified on benefits from increased agricultural production and savings in transport costs for existing and generated non-agricultural traffic.
5. **Gelemso-Mechara (42 km):** This road will replace a pack-animal track traversing hilly terrain and extend the existing Dire Dawa-Gelemso Road. A MPP is required to intensify grain and coffee production in a fertile, well-watered, developed area. Investments in the road and MPP are economically justified on benefits from increased agricultural production and savings in transport costs to existing and generated non-agricultural traffic.

6. **Butajira-Ziway (48 km):** This road replaces a dry weather track and will provide a cross link between two roads radiating from Addis Ababa. About half the road length next to Butajira is an area of rich developed agriculture, expanding towards Ziway into poorer land with a high erosion risk. A MPP is required to control expansion of agriculture and intensify production of grain, pulses and chillies in the rich area. Investments in the road and MPP are economically justified on benefits from increased agricultural production and savings in transport costs to existing and generated non-agricultural traffic.
## APPRAISAL OF

A FIFTH HIGHWAY PROJECT

ETHIOPIA

Schedule of Individual and Combined Road Contracts

<table>
<thead>
<tr>
<th>Roads</th>
<th>Individual (US$ million)</th>
<th>Combined (US$ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gelemso-Mechara</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>Dejen-Mota</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Asela-Dodola and Butajira-Ziway</td>
<td>3.2, 0.9</td>
<td>4.1</td>
</tr>
<tr>
<td>Bonga-Misan Teferi and Agaro-Gera-Chira</td>
<td>3.8, 2.0</td>
<td>5.8</td>
</tr>
</tbody>
</table>

June 14, 1972
APPRAISAL OF
A FIFTH HIGHWAY PROJECT
ETHIOPIA

Estimated Schedule of Disbursements

<table>
<thead>
<tr>
<th>IBRD/IDA Fiscal Year and Quarter</th>
<th>Cumulative Disbursement at end of Quarter (US$ thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972/73</td>
<td></td>
</tr>
<tr>
<td>March 31, 1973</td>
<td>2,015</td>
</tr>
<tr>
<td>June 30, 1973</td>
<td>4,200</td>
</tr>
<tr>
<td>1973/74</td>
<td></td>
</tr>
<tr>
<td>September 30, 1973</td>
<td>5,885</td>
</tr>
<tr>
<td>December 31, 1973</td>
<td>7,125</td>
</tr>
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<td>March 31, 1974</td>
<td>8,705</td>
</tr>
<tr>
<td>June 30, 1974</td>
<td>10,450</td>
</tr>
<tr>
<td>1974/75</td>
<td></td>
</tr>
<tr>
<td>September 30, 1974</td>
<td>12,300</td>
</tr>
<tr>
<td>December 31, 1974</td>
<td>13,760</td>
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<tr>
<td>March 31, 1975</td>
<td>15,000</td>
</tr>
<tr>
<td>June 30, 1975</td>
<td>15,730</td>
</tr>
<tr>
<td>1975/76</td>
<td></td>
</tr>
<tr>
<td>September 30, 1975</td>
<td>16,370</td>
</tr>
<tr>
<td>December 31, 1975</td>
<td>16,740</td>
</tr>
<tr>
<td>March 31, 1976</td>
<td>17,000</td>
</tr>
</tbody>
</table>

1/ Includes advances to contractors and loans to Ethiopian contractors

Source: Mission Estimates, June 1972

June 14, 1972