

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
REHABILITATION OF TANZAM HIGHWAY
(KITONGA GORGE SECTION)
IN
THE UNITED REPUBLIC OF TANZANIA**

DECEMBER 2001

JAPAN INTERNATIONAL COOPERATION AGENCY

NIPPON KOEI CO., LTD.

IN ASSOCIATION WITH

JAPAN ENGINEERING CONSULTANTS CO., LTD.

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PREFACE

In response to a request from the Government of the United Republic of Tanzania, the Government of Japan decided to conduct a basic design study on the Project for Rehabilitation of TANZAM Highway (Kitonga Gorge Section) and entrusted the study to the Japan International Cooperation Agency (JICA).

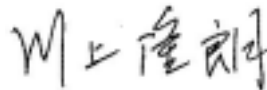
JICA sent to Tanzania a study team from June 11 to July 17, 2001.

The team held discussions with the officials concerned of the Government of Tanzania, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Tanzania from September 24 to October 1, 2001 in order to discuss a draft basic design and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned to the Government of the United Republic of Tanzania for their close cooperation extended to the teams.

December, 2001



Takao Kawakami

President

Japan International Cooperation Agency

December, 2001

LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Rehabilitation of TANZAM Highway (Kitonga Gorge Section) in the United Republic of Tanzania.

This study was conducted by the joint venture between Nippon Koei Co., Ltd. and Japan Engineering Consultants Co., Ltd., under a contract to JICA, during the period from June, 2001 to December, 2001. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Tanzania and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

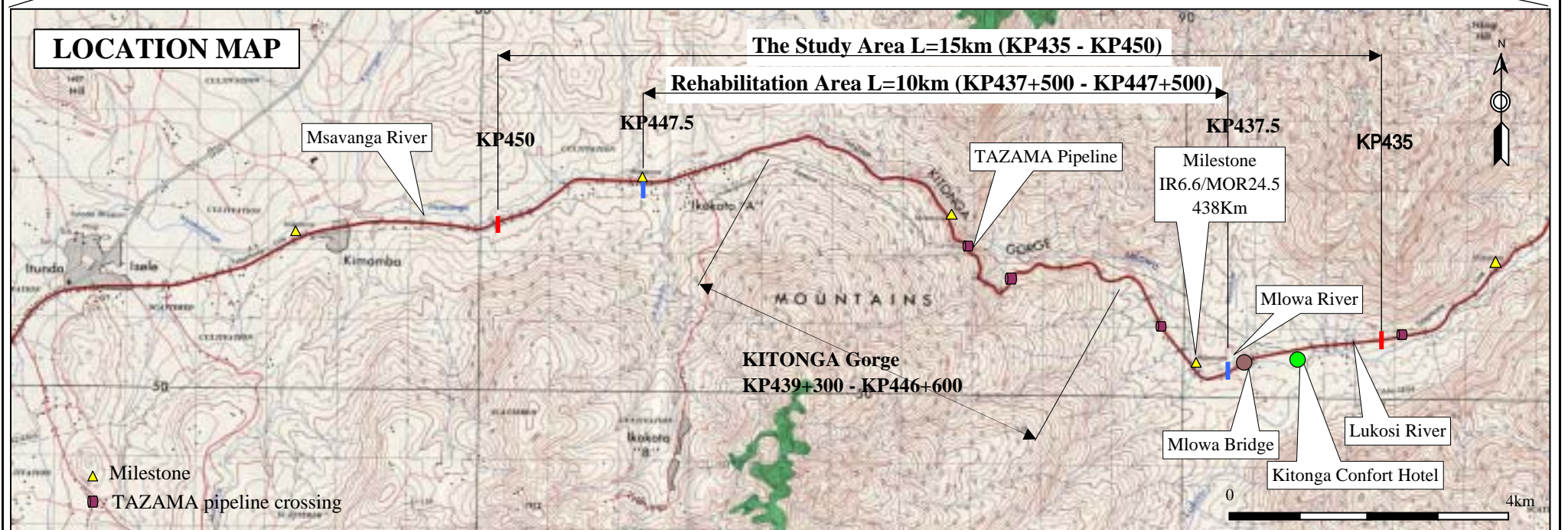
Very truly yours,

Hiroshi Fujisawa

Project Manager

The Basic Design Study Team on
the Project for Rehabilitation of TANZAM
Highway (Kitonga Gorge Section)
in the United Republic of Tanzania

The joint venture between
Nippon Koei Co., Ltd.
and Japan Engineering Consultants Co., Ltd.



The Basic Design Study on The Project for Rehabilitation of TANZAM Highway (Kitonga Gorge Section)

LOCATION MAP



PERSPECTIVE

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ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
AfDB	African Development Bank
AC	Asphalt Concrete
ADT	Average Daily Traffic
A/P	Authorization to Pay
B/A	Banking Arrangement
BHN	Basic Human Needs
CBR	California Bearing Ratio
DCP	Dynamic Cone Penetrometer
E/N	Exchange of Note
ERRP	Emergency Roads Rehabilitation Programme
GDP	Gross Domestic Product
GNP	Gross National Product
GOT	Government of Tanzania
IDA	International Development Association
IRP-I	Integrated Roads Project
IRP-II	Second Integrated Roads Project
JICA	Japan International Cooperation Agency
MOW	Ministry of Works
MTEF	the Medium Term Expenditure Framework
NEMC	National Environmental Management Council (Ministry of Natural Resource)
ODA	Official Development Assistance
p.c.u	Passenger Car Unit
PER	Annual Public Expenditure Review
PRSP	Poverty Reduction Strategy Paper
PSI	Present Serviceability Index
RCCP	Rolled Compacted Concrete Pavement
RPF	The Rolling Plan and Forward Budget for TANZANIA
TANROADS	Tanzania National Roads Agency
TAS	Tanzania Assistance Strategy
TRRL	Transport and Road Research Laboratory
Tsh	Tanzania shilling
VAT	Value Added Tax
WB	World Bank

Summary

The United Republic of Tanzania is located in eastern Africa and consists of continental Tanganyika and the islands of Zanzibar, Pemba and others. It is bordered by the Indian Ocean to the east and eight other countries, such as Kenya in the north, Malawi and Mozambique to the south, Zambia to the west and several others. The overall area of land is 945,000 square kilometers (about 2.5 times of Japan), its population is deemed to be 32,130,000 (1998, World Bank statistics), and an estimated 2,500,000 people live in Dar es Salaam, the capital city. Most of the terrain of the continent consists of plateaus with an average altitude of 1,200 m except for the plain along the coast facing the Indian Ocean. The northeast and southwest parts are dotted with high mountains. The annual precipitation on the coastal plain is 750-1,400 mm and although the climate varies regionally, the average annual temperature of 27 degrees is influenced by the wet tropical weather. The climate of the inland plateaus is tropical savanna in general and the annual precipitation is 500 mm or less and is generally hot and dry. On the other hand, the highlands in the southwest are warm and receive moderate rainfall.

The economy of Tanzania is dependent on primary products, so the agricultural sector contributes approximately half of the GDP, employs 90% of the working population and has an export value of over 70% of total exports. After Tanzania abandoned a socialist economic policy in 1986 and converted to a market oriented economic model, it now seems to be making the required structural adjustments with the support of the World Bank and the IMF. From 1993, the Development Plan for the macro economic sector has been based on the new plan and budget allocation method, which is revised every 3 years. The RPFB (The Rolling Plan and Forward Budget for Tanzania) provides both the outline of a development strategy and a medium term financial plan, presenting a synopsis of the national development plan. This has introduced consistent management of financial and administrative procedures. This approach is beginning to show definite results, although GNP per person in 1999 was still as low as US\$ 240 dollars and there is still a serious situation of a US\$ 7.2 billion foreign debt (1997).

Large demands on the budget for maintenance and management in the first half of the 1980s resulted in a shortage of funds due to stagnation of the economy. This led to serious deterioration of road infrastructure, which in turn caused further stagnation of economic activity. Hence, the Government of Tanzania has identified the priority for maintenance of roads in the RPFB as follows.

- rehabilitation of prioritized trunk and agricultural roads
- improvement of urban and regional traffic
- maintenance of rehabilitated trunk and regional roads

The Ministry of Works (MOW), which is responsible for the subjects with overriding priority described above, has established the IRP-I and IRP-II (Integrated Roads Project) fund for a 10-year road development plan from 1991 supported by various international agencies such as the World

Bank and ODA of individual countries.

In the IRP-I planned for 1990-1995, “rehabilitation the trunk road upgrade to a level of 80%” aimed at functional recovery of the road network. In the IRP-II planned for 1996-2000, “repair of the 25 sections in 8 trunk roads all over the country” and “improvement of transportation roads between agricultural production area and consumer area”, etc. were identified as the maintenance targets.

The TANZAM Highway is an international trunk road and starts from Dar es Salaam and runs through the western part of Tanzania terminating at Lusaka city in Zambia, a total length of 1,400 km (the Tanzania portion is about 920 km). It is the primary transport route for agricultural products from the major cultivation areas of Iringa and Mbeya in the west of Tanzania. The TANZAM Highway is regarded as the most important road route in Tanzania from the viewpoint of benefits to residents along the route, distribution of grain and cash crops, and as an international route for passengers and cargo. Maintenance of the road infrastructure is not only a stimulus to economic growth, but is also essential for improvement of the standard of living of farmers, who are generally in poverty. So the maintenance of the road is an extremely vital matter.

"Kitonga Gorge" is a section of the road 450 km west of Dar es Salaam. It is located in mountainous terrain with steep longitudinal grades and continuous small curves over a length of 10 km. Although this road section was paved as 2 lanes with asphalt concrete in 1973, increases in heavy freight vehicles running at low-speed has caused serious rutting to a maximum depth of 15 cm on the pavement surface. Although deformation of the pavement surface is increasing, appropriate rehabilitation of the pavement has not been done leading to more erosion of the shoulder and insufficient traffic safety facilities such as delineator. The section is well known as an accident black spot with complicated traffic.

Improvement of the TANZAM Highway by ODA has been carried out by various international agencies and countries. In addition, this Project site had been targeted for improvement in 1991. However the plan was abandoned in response to increased construction expenses in another contracted road section that was contracted at the same time. After that, a feasibility study for IRP-II by the British ODA fund was executed in 1993. It was pointed out that the road deterioration of the Kitonga Gorge section was excessive and was given a high priority for rehabilitation.

Against this background, the Government of Tanzania requested the Japanese Grant Aid to the Government of Japan in October, 1997 to fund the rehabilitation of the road section at Kitonga Gorge. While the preliminary field survey by the Japan International Cooperation Agency (JICA) was carried out in January, 2000 and the validity of the request plan was confirmed, it was pointed out that proper ascertaining of an institution scale is important.

With this result, the Government of Japan determined to conduct a basic design study, and JICA dispatched a study team for field survey to Tanzania from June 10, 2001 to July 19, 2001 and

prepared a domestic analysis. The study team was again dispatched to the Tanzania from September 23, 2001 to November 3, 2001 for discussion of the draft report of the basic design study.

The requested components of the Government of Tanzania are the road rehabilitation by widening of the mountain side with an additional climbing lane by concrete pavement and installation of traffic safety facilities, etc. However, the cost of large rock excavation for widening the road is not effective when taking the present ADT of 500 vehicles into account at the Kitonga Gorge. So, widening of the road and addition of a climbing lane are not adopted. In the meantime, it is expected that rutting of the pavement will re-appear if asphalt pavement is adopted. Hence, rigid concrete pavement is adopted.

From these examinations and the institutional scale, the plan was determined as follows.

- Length of Rehabilitation: 10 km
- Width of the road: 6.3 - 7.5m (existing-road width)
- Pavement: Concrete pavement at the Kitonga Gorge section
Asphalt concrete overlay at flat section
- Road structure: Inverted T type retaining wall
- Road safety facilities: Emergency parking bays (9 portions), roadside barrier to prevent vehicles falling, delineator post, road traffic sign and center line

The project will require 4 months for the detailed design, 4 months for tendering and 13 months for construction.

By execution of the Project, the benefit population is regarded as:

- Direct effect: 4,863 thousand in 3 regions (Iringa, Mbeya, Ruvuma regions)
- Land locked countries: 68,416,000 people in 3 countries (Zambia, Malawi, Congo democratic republic)

The direct effects of execution of the Project are as follows.

- Recovery of safe and smooth traffic of the road

Difficulties for vehicles travelling over the Kitonga Gorge section will be relieved by the rehabilitation of the deformed pavement, greatly reducing the risk of accidents (including vehicles leaving the road) and the rate of injuries to pedestrians by vehicles.

- Improvement of traffic safety of the road

The improvement of traffic safety is expected with installation of the following facilities:

- Emergency parking bays for safe escape of troubled and broken-down vehicles

- Delineator facilities such as posts and center lines that can be seen at night to enable safe running of vehicles
- Rehabilitation of side ditches and deformed pavement to reduce accidents involving pedestrians
- Precautionary road traffic signs to promote appropriate driving for the conditions to reduce accidents
- Limitation of maximum speed and prevention of overtaking to reduce vehicle operating complexity and lower operating speeds.
- The improvement in pavement durability and reduction of maintenance expenditure

Use of rigid concrete pavement instead of asphalt will avoid the problems of rutting of the new pavement and will maintain the road surface in good condition for the long term. It is forecast that deformation of an asphalt pavement would appear in 1 or 2 years. Adoption of concrete pavement will also reduce the cost of maintenance of the road.

The indirect effects of implementation of the Project are as follows.

- Economic activities

Rehabilitation of the road will promote agricultural development and cash crop production along the road and enhance agricultural production logistics. It will also secure reliable access to Dar es Salaam, the largest consumer market and export port, for Iringa, Mbeya and Ruvuma regions in the west of Tanzania, which are highly dependent on agriculture. Moreover, these improvements will achieve price support for agricultural products through the enhanced reliability of supply.

- Preservation of a safe transportation road

The TANZAM Highway is regarded as the most important trunk road in Tanzania, and it is also an important international road for the landlocked countries as a life-line to reach the Dar es Salaam harbor. With economic and social conditions in these surrounding countries deteriorating through civil war or economic morbidity, the road is a vital need because Tanzania is a stable country. If the road were blocked at Kitonga Gorge due to serious pavement defect or collapse of the shoulder, the effect on the national economy of Tanzania and neighboring countries would be serious. However, this can be averted and safe transportation secured by realization of the Project.

- Reduced operating cost of vehicles

It is possible to reduce the operating costs by providing smooth vehicle running at Kitonga Gorge.

The obligation of the Government of Tanzania is to provide temporary yards and sites for disposal of road waste material. There is no problem expected in meeting these obligations in

light of past performance of the Government of Tanzania in Japanese Grant Aid projects of this budgetary scale. The cost of maintenance and repair after construction will be less than under the present conditions and should satisfactorily be met judging from the current level of organization for maintenance management in Tanzania.

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